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| 0—240 " | |
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| 0—600 " | |
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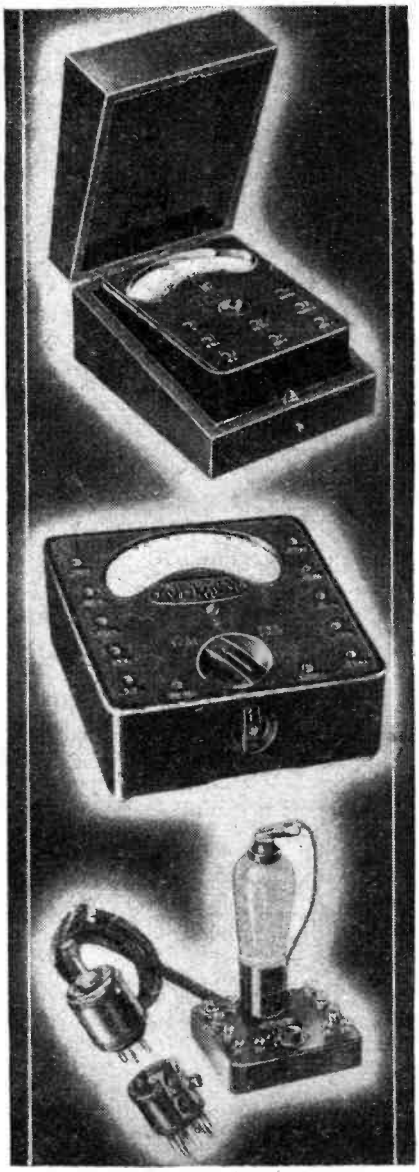
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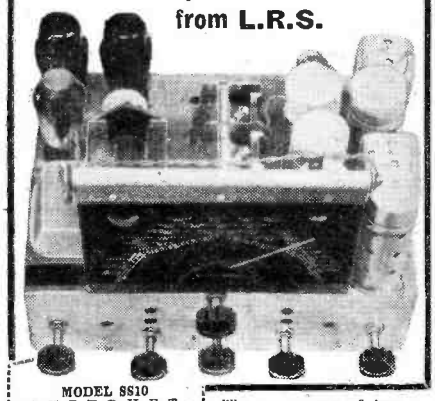
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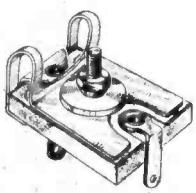
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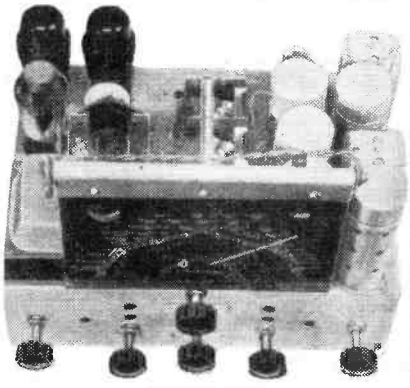
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Practical and Wireless
★ PRACTICAL TELEVISION ★
EVERY WEDNESDAY.
Vol. XIV. No. 363. Sept. 2nd, 1939.
EDITED BY F. J. CAMM
Staff: W. J. DELANEY, FRANK PRESTON, H. J. BARTON CHAPPLE, B.Sc.

# ROUND THE WORLD OF WIRELESS

## An Ambitious Programme

WE have already received congratulations on the new appearance of the paper, and many suggestions have been made as to the programme of receivers which should be described. Unfortunately, it is impossible to design a receiver which will suit everybody. In last week's issue we described three models which have a very wide appeal, and in this issue we continue the details of construction of these receivers, but there are still many readers who prefer the simple one-valver or crystal set as well as those who need a receiver which is even more comprehensive than the Air-Hawk. We shall, of course, continue to describe receivers at each end of the scale and although it is not possible to lay down any definite programme, we shall endeavour during the coming season to describe receivers of every class so that every constructor will find some models of interest in his particular case. In this issue we describe some of the more important features of the exhibits at Radiolympia for the benefit of those who are unable to visit the show, and also give illustrations of the various points of interest.

## A Licence Problem

IN a case recently brought by the authorities against a listener who was using a receiver without a licence, the defence put forward was that the receiver was only used for the reception of foreign stations. The defence was not accepted.

Editorial and Advertisement Offices:
"Practical Wireless," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.
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Telegrams: Newnes, Rand, London.
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## New Radiotelephone Service

THERE will shortly be opened between Chung-king and Hong Kong a new radio-telephone service, the distance covered being approximately 700 miles.

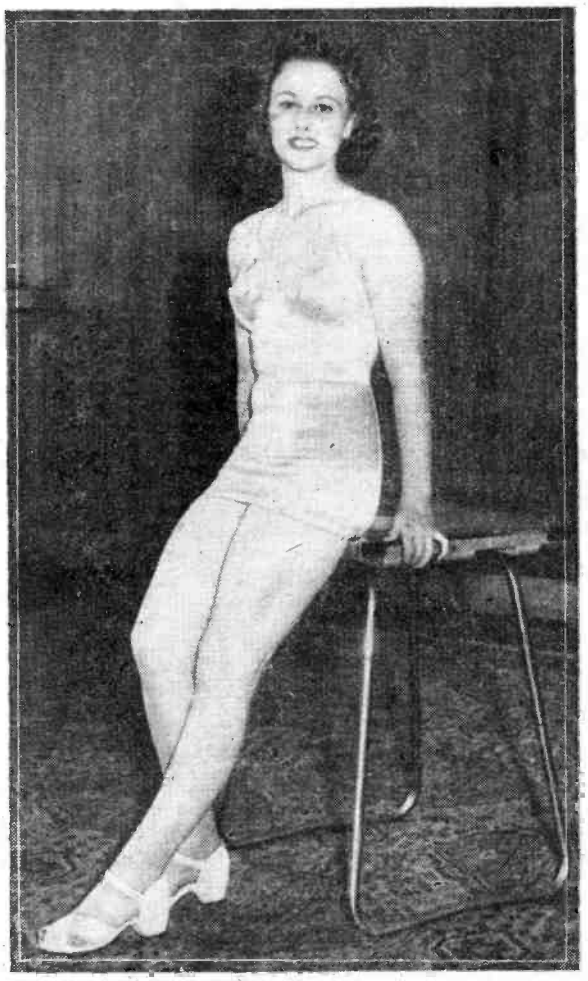
## French Licence Increase

IT is announced that next year there will be an increase in the cost of the ordinary receiver licence. The new figure is 70 francs, compared with the existing 50 francs. Television receivers are to be licensed separately, the figure being given as 16s. for private viewers and 32s. 6d. for demonstration sets.

## French Television Station

IT is announced that the Spir of Lyons, which is a local traders' and manufacturers' association, is trying out an experimental television transmitter in conjunction with the French wireless ministry. If results prove satisfactory a permanent transmitter may be installed there.

## MISS RADIOLYMPIA, 1939



*Miss Patsy Kench, who was chosen from eleven competitors to be Miss Radiolympia, 1939, in spite of the fact that she could not croon! You may see her in her "Boudoir" at Radiolympia.*

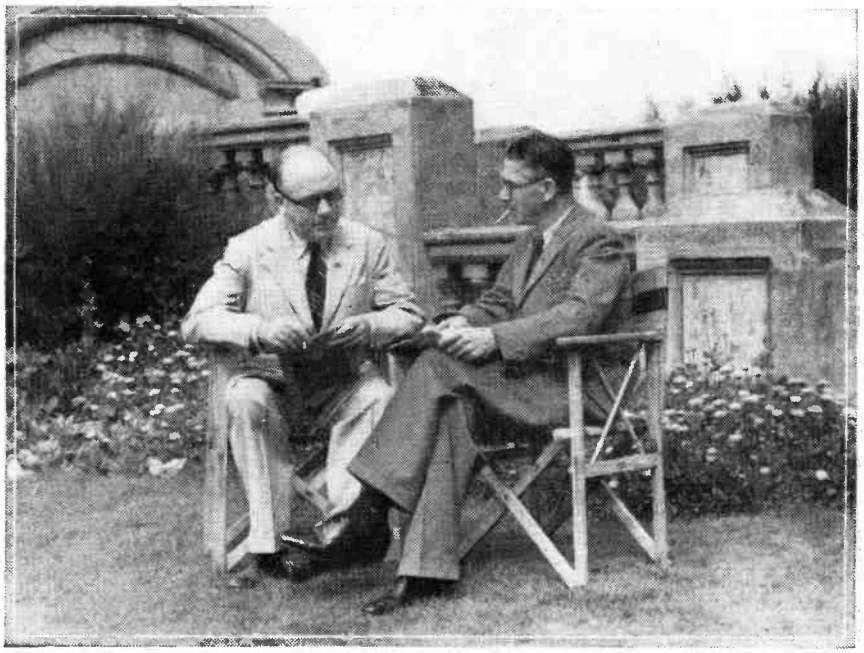
## The Next Olympic Games

THE next Olympic Games are to be held at Helsinki in Finland, and it is known that the German Government were anxious to secure the rights for televising the events. It is now learned that the Reich postal department has had its offer to carry out the work accepted, and steps are being taken to arrange for technicians to carry out the installation work. Mobile camera and transmitting units will be on duty at the various track and other events, and the radiated pictures are to be received at special public booths so that members of the public unable to be present in the Games arena can still participate in the excitement of the races. At least twenty cinemas and theatres are to be equipped with big-screen apparatus, and this will provide a picture about 8ft. by 6ft. for an average audience of 500. Bearing in mind that German television equipment is being used in the Italian service, and has been displayed successfully by a touring unit in South America, it becomes still more necessary for the British Government to take every possible step to see that its television lead is not assailed by any foreign country.

# ROUND THE WORLD OF WIRELESS—Continued

## More European High-power Stations

IT is reported that the *German Reich* intends to increase the power of its existing stations in the near future; many of them will go to 120 kilowatts. Prague and Melnik will also be overhauled and reconstructed in order to attain this power. At Hennesberget and Namsos, Norway is also erecting 100-kilowatt transmitters; with this addition the country will possess seventeen stations of a total power of some 360 kilowatts. During the coming autumn Sweden hopes to bring into operation the 100-kilowatt transmitter now under construction at Stora Tuna in Dalecarlia.



*Lawrence Wright, the composer, discusses future plans with Mr. H. Hall at Blackpool.*

## Radio Andorra

ON August 7th the small transmitter installed near Escalps (Republic of Andorra) was officially inaugurated by an eminent French official. Broadcasts will shortly be made daily in French, Spanish and Catalan on 410.4 m. (731 kc/s). (The Republic of Andorra situated on the extreme southern end of France on the Spanish border consists merely of six parishes in the Pyrénées, and is under the suzerainty of France; its total area is only 191 sq. miles.)

## Spring Cleaning?

UNTIL September 5th, Lyons P.T.T. will *not* be on the air on weekdays from B.S.T. 08.40 to noon, and again from 13.30-18.00, to permit a complete overhaul of the broadcasting plant.

## WLW Broadcast Art Series

A NEW programme launched in recognition of the rapidly growing interest in art in the United States, and devoted to newsworthy events in the art world, is now being broadcast by WLW from NBC on Wednesdays at 5 p.m., E.S.T. The series, entitled "Art in the News," is conducted by Dr. Bernard Meyers, widely-known art critic and teacher at New York University. It is presented in co-operation with the National Art Society.

## Bristol Radio Show

THE ninth Bristol Radio Exhibition will be opened at the Coliseum on Wednesday, September 6th, by Reginald Foort, the popular broadcast and stage organist.

## King's Cup Air Race

ON September 1st, the evening before the King's Cup Air Race, William Courtenay will give, for Midland listeners, a ten-minute talk about the organisation of the race and about the airport at Elmdon.

## Radio Organist's Library of Music

ARTHUR CHANDLER, Jr., popular WLW (Cincinatti) organist whose music forms an essential part of Paul Allison's poetry broadcasts, has a library of classical and popular music so large that if he presented five selections a day on the air, every day of the year, he could play for seven years without repeating a tune. Chandler recently recatalogued his library and found that he had more than 12,000 numbers on file. This makes his one of the largest private collections in America. He is heard with Allison, Monday to Friday, from WLW at 9.15 a.m., E.S.T.

## The New Aeolian Players

THIS popular quartette—Joseph Slater (flute), Samuel Kutcher (violin), Raymond Jeremy (viola) and Marie Korchinska (harp)—will be heard in an interesting programme on September 9th (National), which will include works by Scarlatti, Max Reger, Albert Roussel, and Bach.

## A Puzzling Transmission

IMMEDIATELY above P.T.T. Strasbourg, daily at B.S.T. 23.30, you may pick up a broadcast in the French language preceded by the popular melody, *Marche Lorraine*. Do not be misled in thinking that it emanates from a French station; it is from EAJ101, Radio Saragossa (Spain), on 352.9 m. (850 kc/s), and is destined to North Africa.

## Radio Bizerta

OCCASIONALLY one may hear transmissions from French Morocco on 209 m. (1,435 kc/s), in which the studio gives the above call. Although the transmitter is only rated at 100 watts, on favourable evenings the signals are well received. *Radio Bizerta* is on the ether daily at B.S.T. 12.30, 14.30 and 21.30, usually closing down with the *Marseillaise* towards B.S.T. 23.30.

## Northern Radio Show

THE sixteenth of the series of North National Radio Exhibitions, organised by the *Manchester Evening Chronicle*, will be opened on September 26th by Sir Stephen Tallents, the B.B.C. Controller of Public Relations. The Exhibition, which will remain open until October 7th, will again be held in the City Hall, Manchester.

## Televising the Zoo by Night

TELEVISION cameras are for the first time to visit the Regent's Park Zoo by night. Specially augmented lighting will be used for these two programmes, which will be radiated to home viewers as well as visitors to the Radiolympia Exhibition.

On the evening of August 30th the transmission will be from the Mappin Terraces, and polar bears have been selected by Philip Dorté as being the most photogenic artists. Their yellowish-white coats should be ideally suited to the television medium.

Penguins and flamingoes in the small pool below the Terraces will be seen on the next evening, and it is also hoped that Ming, the Giant Panda, may be persuaded to take her evening bath in front of the cameras.

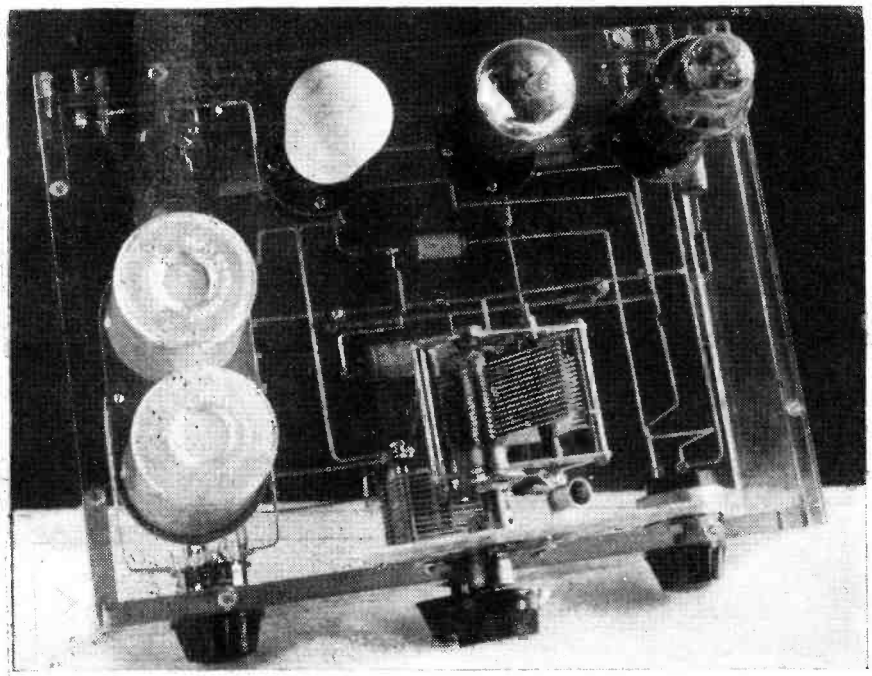


*Sylvia Rhodes, the young singer, who joined the WLW (Cincinatti) staff recently, brings a refreshing voice to the summer broadcasts. A native of Pittsburgh, where she joined Ace Brigode's orchestra for a tour of 39 states, she was widely known for her modern song interpretations before bringing them to radio. At home she practises constantly, pretending that the light switch is a microphone, announcing her songs and then singing them. She can be heard from the WLW station on the "Salute to the Cities," "String Silhouettes," and "Invitation to Listen" programmes.*

# The 1940 All-wave Three

## Constructional and Operating Details are Given of the Receiver which has Already Attracted so much Attention at Radiolympia

ALTHOUGH this receiver has many distinct features as regards price, specification and performance, there is one item in particular which has created the most keen interest from those who have been able to examine it on Stand No. 9 at Radiolympia. We refer to the very novel and attractive chassis made and supplied by Messrs. Catalin, Ltd., which, while possessing ideal qualities so far as constructional work is concerned, is perfectly transparent, and allows all wiring and components to be seen at a glance. The resultant effect is most pleasing, and if all the wiring is carried out in the manner indicated by the plan drawings, it presents a most distinctive appearance which will make the owner exceptionally proud of his work.



*This view of the receiver shows clearly the layout of components on the transparent chassis.*

### Construction

There are two components which call for particular attention as regards mounting and wiring. They are the coil unit and the special wave-change switch.

All connections to the coil unit are made to contact tags which project through the mounting base and, as these have to be brought through the chassis, it is advisable to solder suitable lengths of tinned copper wire to them before fixing it in position.

The drilling of the fixing and connecting tag holes must be carried out with due care to see that they all line up with the component. A simple template can be made to indicate tag positions by placing a thin postcard on the ends of the tags and exerting sufficient pressure to allow the tags to mark the card.

No preparatory work can be done on the switch, other than giving it a thorough examination to become familiar with its operation so that no mistakes will be made in the connecting of the various circuits. The small inset sketch of this component should make all connections quite clear.

### Drilling

We often have striking proof that too little attention is paid to the marking off and drilling of such holes as are necessary for the construction of a receiver. A little thought and care is all that is required to do this part of the work in a business-like manner and thus help to make a first-class job of the assembly.

The drilling positions of the holes for the aerial and earth and loudspeaker connecting strips should be checked against the actual parts before drilling. See that the holes allow sufficient clearance for the metal sockets.

For the valveholders, three 1in. holes are required. Before drilling these, turn one of the four-pin valveholders upside down and, with its centre hole over the marking point, mark off the positions of the four fixing holes. This makes quite sure that the sockets will come in the centre of the hole and not one-sided as so many are often mounted.

The holes for the variable condenser bracket, the slow-motion dial, the aerial series condenser, and the three components on the front runner can now be drilled and all components mounted in position.

### Wiring

It will be noted that the wiring of this receiver has been carried out in instrument wiring fashion, as this allows a much cleaner and clearer assembly to be obtained, but to obtain its full benefits it is essential to bend the wires to the correct shape before fixing them in position. A little skill with the soldering iron will make quite sure that all connections and joints are perfectly sound electrically and mechanically.

If heavier gauge tinned copper wire is used than is usual with such circuits, all wiring will be rigid and self-supporting and the danger of interaction between circuits will be reduced. On the model shown, 16 S.W.G. wire was employed; with wire of this thickness, however, it is necessary to remove all bends and kinks by stretching it well before using.

With all wire end components, such as the resistances and condensers specified, it is always advisable to clean the ends by lightly rubbing them with fine sandpaper before attempting to apply the flux and solder, otherwise a poor joint might be formed which would directly affect the efficiency of the circuit.

### Operation

Only one H.T. positive connecting lead is provided, and this should receive 120 volts. G.B. negative 1 will require 1½ volts and G.B. negative 2 4½ volts, while the L.T. supply will, of course, have to be 2 volts for the valves concerned.

With everything connected, the initial test should be made on the local station, and for this purpose the aerial can be plugged into A.2, which will give the

### LIST OF COMPONENTS FOR THE 1940 ALL-WAVE THREE

| | s. | d. |
|---|---|---|
| One variable condenser .0005 mfd. J.B. Popular Log | 5 | 6 |
| One variable condenser .0003 mfd. J.B. No. 2,048 | 4 | 9 |
| One variable condenser .0002 mfd. J.B. No. 2,095 | 2 | 6 |
| One slow-motion dial. J.B. Type No. S.L. 3 | 5 | 9 |
| Two four-pin valveholders. Clix Type No. X.111 | 0 | 10 |
| One five-pin valveholder. Clix Type No. L.111 | 0 | 6 |
| One A.1, A.2, and E socket strip. Clix No. X.382 | 0 | 6 |
| One L.S. socket strip. Clix No. X.380 | 0 | 5 |
| Fixed condensers (T.C.C.): One .0001 mfd. Type No. 300 (1s.), One .01 mfd. Type No. 300 (1s.), One .02 mfd. Type No. 300 (1s.), One .04 mfd. Type No. 300 (1s.) | 4 | 0 |
| One 2 mfd. Type No. F.T. | 2 | 3 |
| Resistances. All ½ watt type: One 20,000 ohm. (3d.), Two 50,000 ohm. (3d. each), Two 10,000 ohm. (3d. each), One 1 megohm. (3d.), One ½ megohm. (3d.), One .25 megohm. (3d.) | 2 | 0 |
| One 0.5 megohm potentiometer with switch (Erie) | 4 | 0 |
| Coil, four-range. Type No. 56 (Bulgin) | 10 | 6 |
| One wave-change switch. Type No. S.203 (Bulgin) | 2 | 9 |
| One 210 H.F., one 210 H.L., and one 220 H.P.T., valves (Cossor) | | |
| Chassis, 12 x 9 x 3 inches (Messrs. Catalin). | | |
| Batteries—one 9-volt G.B. and one 120-volt H.T. (Drydex); one 2-volt accumulator (Exide). | | |
| Speaker: P.M. moving-coil (W.B.). | | |

### THE 1940 ALL-WAVE THREE

*(Continued from previous page)*

greatest signal strength with the minimum of selectivity, that is, comparing A.2 with A.1.

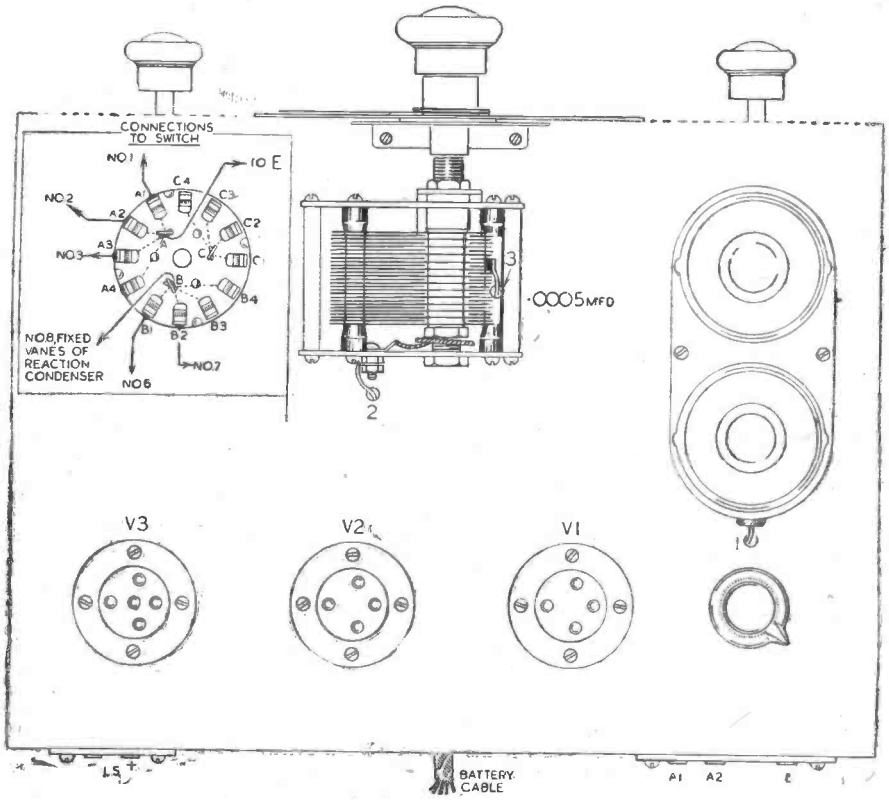
Reaction should be at minimum and the volume control at, say, halfway. These settings should give ample strength on the local station, depending, of course, on its distance from the receiving aerial, but if greater output is required, the volume control can be turned to maximum.

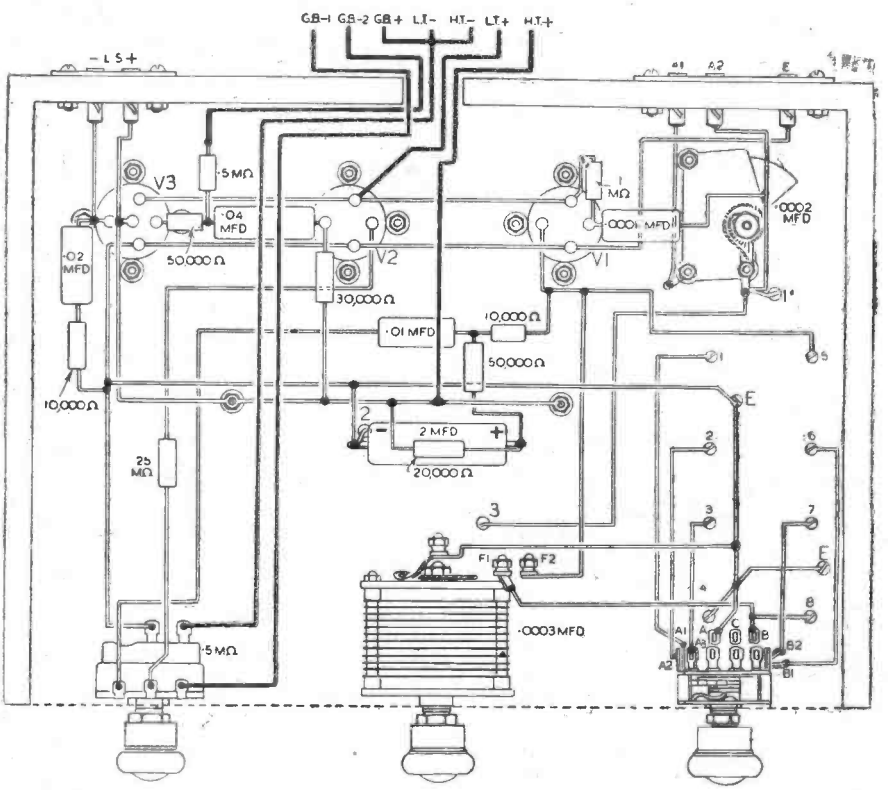
With the reaction advanced sufficiently to produce a steady rushing sound, the tuning control should be manipulated and the whole waveband explored and this procedure should bring in other transmissions. If it is found that too much interference is experienced from the local station, then the aerial should be transferred to A.1, and the aerial series condenser adjusted until the tuning is sharp enough to eliminate all trace of the unwanted signal. Careful use of this control, and the reaction condenser, will render the circuit very selective for a receiver of this type, but bearing in mind that only one tuned circuit is employed, it must not be expected to be as sharp as, say, a receiver incorporating a stage of H.F. amplification.

When the operator has become familiar with the adjustments, then the other wavebands can be explored, remembering that on the long waves the maximum signal strength will be obtained with the aerial in A.2, while on the two S.W. bands it will, no doubt, be necessary to use A.1 all the time to get smooth and even reaction over the whole dial.

If one is not familiar with S.W. operation, it should be observed that the tuning of transmissions on the short wavelengths calls for more accurate adjustments than the normal broadcasting bands, so, if no stations are logged at the first attempt, don't condemn the circuit. A little practice will soon enable one to get the hang of such tuning, and, after a whort while, it will be possible to receive many commercial stations apart from those operated by the amateur transmitters.

## WIRING DIAGRAM OF THE 1940 ALL-WAVE THREE




## HOLLYWOOD and TELEVISION

THE question of television's effect on the film industry both from the production and exhibition point of view, was dealt with quite effectively recently by one of the leading Hollywood executives. While agreeing that there had been some conjecture as to the future of films in relation to the potentialities of television, it was pointed out that this emanated largely from those who lacked full acquaintance with the long history and strong traditions of what has come to be known as the show business. While agreeing that television will eventually become a potent force in everyday life, it is known that material changes cannot take place overnight. Not many years ago there was a great hue and cry to the effect that radio would ruin all other forms of democratic entertainment, but attendance figures at cinemas in the United States showed that over 30 million more people visited cinemas in 1937 than in 1927. Furthermore, the most popular artists in the radio programmes of that country were the screen personalities, so that this was yet another case of dovetailing or co-operation between the new industry and the old. Just as many years ago there were people in the show business capable of taking over the flickering films which then existed and developing them to present-day perfection, so there will be these same progressive people who will be ready for any transition brought about by increased developments in television on the big screen, or even home reception side. As soon as television shows that it is ready to become an integral part of entertainment life, then those within that field will be ready to carry on in the new and highly intriguing field.

# Radio as a Career

## A Brief Outline of the Possibilities in Radio Engineering and of the Requirements of the Successful Professional Engineer. Scope and Limitations are Explained

By FRANK PRESTON

IT has been said by sceptics that any article on this subject should have as its sub-title "—Or the Road to the Poor House"; don't believe it.

During the past few years there have been many suggestions to the effect that radio engineering is an overcrowded profession. That is only a half-truth; overcrowding there has been, but by the wrong class of men. For the enthusiastic amateur who is prepared to work hard and study intensively there is tremendous scope in the industry and science of radio. If you are inclined to disagree, think of any of the "big names" in the business and then take the trouble to find out how they made a start in radio. In the majority of instances you will find that the present "big name" was once an amateur experimenter.

It would be difficult to provide any convincing argument that there was more scope and greater opportunity in past years than there is now, for the increased production and still-increasing number of receivers in use mean that more and more well-qualified men are required. If you propose to argue that the general mass production of receivers has lessened the need for skilled men of high intelligence—and that is not true—you should remember that television has still a very long way to go!

There are so many branches of modern radio that it might become desirable to specialise in one of them sooner or later, but there is probably no better method of entering the profession than by tackling seriously the work of the service engineer. The rates of pay for this work are, admittedly, very low in many instances, but they must continue to improve as the work becomes more specialised. What is more, the first-class service man can command a far higher wage than is earned by many of the self-styled engineers who have never even studied the fundamental principles of the subject and who work by nothing better than rule-of-thumb methods.

### A Stepping-stone

But the ambitious man will often consider his initial radio work as service engineer as a means to an end—a stepping-stone to the responsible work of designer, laboratory chief or works manager. There is no harm in aiming high if your aim is true; if the full extent of your ambition is never realised you will, at least, be fairly sure of steady and interesting work for many years to come. And what is to prevent your making valuable discoveries and taking out patents which can be sold or exploited to produce a suitable reward for your endeavours? Many of the most valuable radio inventions have been produced by amateurs and "near-amateurs" who have gradually transferred their activities from the amateur to the professional field.

### Free-lance

Quite apart from the question of becoming a service engineer in the employ of a firm of manufacturers or dealers there is scope, in many parts of the country, for free-lance engineers who may or not, as they prefer, take a shop and act as retailers. There are many small dealers who would not find it economical to employ a full-time engineer, and who would be glad to pass on all repair and service work they receive to a local engineer who could prove his worth. The free-lance engineer might also find that public-address work would provide a suitable side-line and a means of gaining a valuable local reputation. Many such men have also discovered that, after extensive experience, they could act as very efficient consultants. Of course, a "name" is important if a success is to be made in this side of the business, but other men have made such a name, so why not you?

### Making a Start

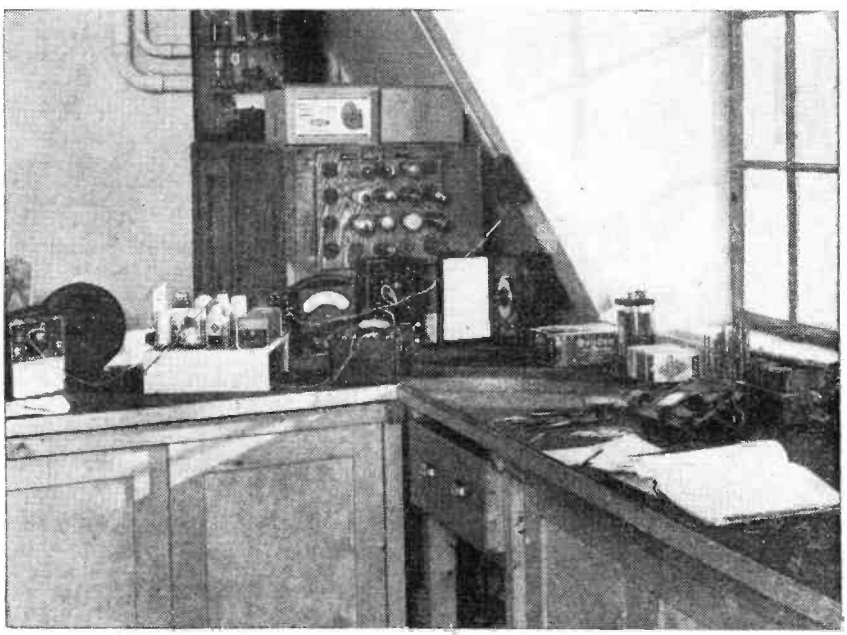
After reading the foregoing paragraphs you will probably ask: "But how can I start to make radio my career?" The answer is a long one and depends to a large degree upon individual circumstances. Here, however, I am thinking more of the keen amateur constructor and amateur than of the youth who has just left school, without having any knowledge of radio, and who is simply looking for a job. It is assumed that you have taken an active interest in radio for a few years, have gained at least a little experience in wireless-set construction and have mastered the elementary processes of fault-tracing. You are probably already at work in a field other than radio and wish to improve your position and to take up radio more seriously.

As an amateur radio engineer you would probably be looked upon with disapproval by full-time service men, who may think that you were attempting to "steal" their work. That would be a deterrent to many, and might not be entirely to your own advantage unless you were thoroughly competent and confident of your ability. A bad reputation can easily be made by passing out a single unsatisfactory job, so risks must not be taken. In other words, you should first obtain a thorough mastery of fundamental wireless theory and as much experience as possible of service methods and procedure. Here there seems to be a snag: if you do not commit yourself to undertake service work, the necessary experience cannot be gained; if you do, chances might be spoiled.

### Gaining Experience

There is a way out, though. Constant experiments in your own "den," plus the experience gained by servicing the receivers of close personal friends, will help considerably. But the job must be taken seriously. It is impossible to become a service engineer by studying books, but study combined with experimental work will take you a long way. Regular readers of PRACTICAL WIRELESS are sure to find helpful articles in every issue. This reading can be augmented by perusal of the many wireless books by the Editor of this journal, among which are "The Wireless Constructor's Encyclopædia," and "Television and Short-wave Handbook."

*(To be Continued)*



*A corner of the PRACTICAL WIRELESS laboratory. Benches are well lighted, a rack is fitted for all types of valves and the meters are carefully stored in cupboards. The large speaker baffle, test amplifiers and power units are not shown in this picture.*

# PRACTICAL TELEVISION

Sept. 2nd, 1939. Vol. 4. No. 167.

## Another Camera Suggestion

IN a recent paragraph attention was drawn to one or two disadvantages associated with the secondary emission of electrons from the camera mosaic when subjected to the impact of a high-velocity scanning beam of electrons. A little further thought will bring to light other defects that can be attributable to the same source. First of all, the presence of these released secondary electrons brings about a negative field in the immediate locality of the mosaic face and this space charge must naturally tend to prevent the emission of further electrons from the signal plate due to the presence of the focused optical image. Obviously, this reduces very materially the photo-electric current, and in consequence the output of the camera and measurement has shown that the output is only about one-third of that which would occur under conditions of saturation. Added to this, it must be remembered that those secondary electrons which do return to the mosaic face have the effect of partially neutralising the electrical charge stored on the signal plate, and this gives a further reduction factor of about the same order. The efficiency of the device, therefore, seldom exceeds 10 per cent., and this figure is borne out by measurement. Many schemes have been proposed to offset these defects, and in one of these the scanning beam of electrons is periodically cut off, while at the same time the anode voltage is increased. During the suppression period the increased voltage helps to disperse the electron space charge in the neighbourhood of the plate, and in addition to improving camera sensitivity reduces the possibility of spurious shadow signals.

## Improving Picture Definition

IT has long been realised that the limit of picture definition in the vertical direction is the restriction of the televised picture to a total dissection of 405 lines, and a percentage of these is allocated to synchronising pulses which of course reduces the active picture lines. Any increase in the number of lines, provided the receiving circuit is altered to take cognisance of the additional band width of the picture frequency, will produce a more detailed picture, and this is particularly noticeable in the case of large-sized pictures. Any change of this nature, however, really constitutes a radical alteration in existing picture standards and in consequence may not materialise for some time to come. Bearing this in mind, it is very interesting to examine some of the "subterfuges" (if such a word can aptly describe the schemes) which have been proposed and tried in order to give improved picture definition without actually bringing about an alteration in the total number of picture lines. One very promising suggestion is first of all to reduce the size of the scanning spot to less than that occupied by the depth of a normal scanning line. Now, instead of the spot moving horizontally from left to right it is made to follow an oscillatory path within the boundary limits of the original line. Depending on the frequency of its up and down movement in relation to the horizontal trace, so the very small spot area can be made to cover almost the whole picture area. The resolving power of the spot is materially increased and greater detailed definition is apparent. Naturally, the receiving equipment must be designed to follow the exact spot motion to secure the increased definition benefit, but the advantage of the suggestion is that standard forms of receiving sets will still operate on the new signal but naturally will show no benefit in the reproduced picture. If a scheme of this character can be fully developed to its logical conclusion it may provide one solution to the limits now imposed by a 405-line picture.

## Television at Olympia

THE first time that any real attempt was made to show high-definition television to the public visiting Radiolympia was in 1936. It was rather half-hearted, however, for no names of sets were allowed to be displayed, and visitors were moved past the anonymous pictures on the cathode-ray tube faces at too rapid a rate for quality to be studied. The following year fourteen darkened booths decorated externally in sombre black enabled individual manufacturers to give demonstrations of fifteen minutes' duration to ticket holders, and there was always a shortage of tickets except at the morning sessions. In 1938, however, due to a marked change of policy of the R.M.A., a determined effort was made to present television in a really effective manner. The receivers were demonstrated on manufacturers' stands, and packed gangways and stand floor space gave ample evidence of real public interest, if such was required. For the present show, however, the organisation has gone a stage farther. To prevent congestion in the gangways, sets can only be shown with the C.R. tubes facing inwards, and in this way no one walking round the exhibition can see the television pictures without actually walking on to the stand floor space. As a form of overflow, however, and to enable anyone to judge the performance of individual sets working side by side under identical conditions of reception, a special "Television Avenue" is built on the gallery, and as many as 60 sets can be seen in this section alone.

## Signal Distribution

AS last year, the arrangements for both television and broadcast sound distribution were vested in a small committee of technical experts, and benefiting from past experience the television scheme finally adopted is of a very interesting character. On a flat section of Olympia's roof a well-stayed 45ft. mast carries the half-wave aerial, and an impedance matched high-quality feeder cable carries the signals to the main distribution amplifier located in a part replica of one of the Alexandra Palace towers. After amplification the combined vision and sound signals are fed out at a high level on their proper carrier frequencies of 45 and 41.5 megacycles respectively. On each stand featuring television one or more four-way distribution boxes are fixed to the roof, and a separate feeder cable links each of these pad boxes to the multiple output circuit of the main amplifier. One, two, three or four television receivers are joined to these boxes, according to manufacturers' requirements, and in this way an approximate level of 3 millivolts is provided for each set, so that it could operate under conditions simulating those of a good reception point inside the Alexandra Palace area. The scheme is made clear by a reference to the accompanying illustration, which shows the distribution in simple schematic form. In the case of the "Television Avenue," to which reference was made earlier, two main feeder cables are linked to a small pad box, and from here two cables join a pair of thirty-way distribution boxes. Each outlet from a box is connected to the aerial terminals of a receiver, so that the two lines of thirty sets have the signal level stepped down to the normal working voltage.

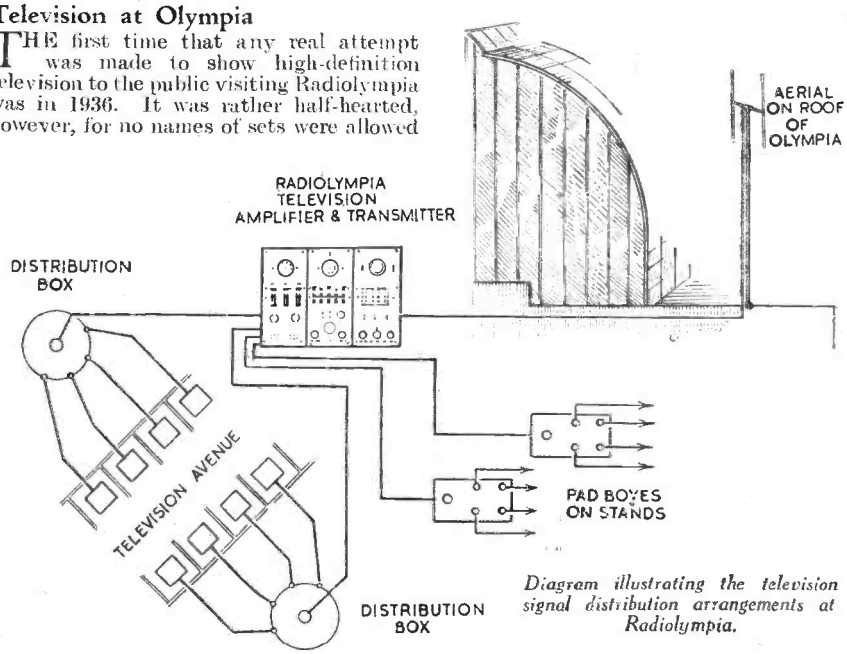



*Diagram illustrating the television signal distribution arrangements at Radiolympia.*

# ON YOUR WAVELENGTH



By Thermion

### Have You or Are You?

AT the moment of writing this I have been able to make only a preliminary examination of the Exhibition, and figures are not available for the attendance. Judging from previous years, however, I should imagine that the attendance figures are up. Many readers have already called at our Stand, and all visitors with whom I have conversed express delight at the clean, artistic yet businesslike arrangement, the ease with which they may examine the various exhibits, and their surprise at the strides which television has made.

It is quite the best exhibition of the whole series. Have you been, and if not are you going? You *must* go to keep abreast of developments. Any advice you want regarding the Exhibition or the location of exhibits will be cheerfully given if you call at Stand No. 9, Ground Floor.

### Any Old Plays?

I WAS listening to a broadcast play a few weeks ago—I will not say from which station—and was surprised to recognise it as one which had been hawked round the London publishers many years ago. This is not necessarily a sign that the play is bad, but it does mean that it could not have been good, when all publishers posted it back with a rejection slip. I have recognised on a number of other occasions plays, stories, and songs, which have been consistently rejected by publishers, but which have been accepted by broadcasting authorities. It is amusing to read the critics' reviews of such rejected matter which is finally accepted for broadcast. They usually hail it as a great success. The best the author has ever written, and so on. It seems to me that to be a successful author or song-writer you must plug away for years, knowing that your work will be returned. When finally you get one accepted which is successful, you then dig out all your rejected manuscripts, which will then be worth a considerable sum of money. In other words, you merely have to write one successful book, play or song. From that moment you retire and live on the proceeds from your worthless, rejected but now valuable work. This probably accounts for the fact that most authors only write one good book and the rest are pot-boilers.

As far as is possible, I suggest that the B.B.C. should not broadcast authors' first efforts, or alternatively if they do because of its intrinsic merits, they should ask for an undertaking when considering future manuscripts from the same authors that it is new work which has not been submitted elsewhere, and is not work which publishers have rejected. In this way the B.B.C. will safeguard itself from the charge that it will accept rejected work, and it will prevent unsuccessful authors from having a chortle at the expense of the B.B.C. Some of the plays which have been elevated to the importance of broadcasting have been the merest trash. The authors everywhere exhibit their apprentice hand. This seems such a pity, when there is such a wealth of excellent material available.

If it is necessary to have plays specially written for broadcasting, I suggest that well-known and experienced play-writers should be used. It is nonsense to think that an individual who has never written a play before can write one suitable for broadcasting. Anyone wishing to write plays should commence by writing short sketches and curtain-raisers before being permitted to take advantage of the considerable publicity which a broadcast play affords to the author. To put green authors on the air is grossly unfair to experienced writers. The B.B.C. must use some sense of proportion in these things. Many of those who have been given opportunities by the B.B.C. have merely used the B.B.C. until they were able to gain more highly paid engagements outside of that organisation.

### Radio versus Television

THIS year I have observed less opposition from manufacturers interested only in radio sets to the introduction of television. Radio is embarking upon the present almost uncharted seas of combined sound and vision programmes. The success of television in the home counties has been most encouraging to all concerned. There are those who have complained that the sales of receiving sets in 1938 were much below the figures for previous years. In my view this is a most excellent thing. It cannot be denied that the radio manufacturers were over-producing, and they were suffering from all the maladies of over-production. Last year, it is stated, production bore a reasonable relationship to sales. That is the correct basis of all production. Once you produce more than the market can absorb you must unload receivers at knock-out prices. The inevitable corollary is that the following year the public will wait until the receivers have been similarly marked down.

It is also wise for the industry to limit the number of dealers to those known to adopt correct trading methods. I do not believe in the price-cutters and the discount-dodgers.

### Our Transparent Chassis

MANY of the early visitors to the Radio Exhibition have expressed their delight at our latest idea for constructors—the transparent chassis which enables you to see every wire and every connection without having to invert the set. Many readers thought that this chassis was made of glass, but as a fact, it is composed of a new synthetic glass known as "Catalin." This has almost exactly similar characteristics to glass, but with the important advantages that it may be drilled and filed. If you have not visited the Show make a point of inspecting our new receiver on its transparent chassis. I am certain you will want to build one. The same material could, moreover, be used to make a complete chassis and cabinet.

It was this journal, of course, which standardised the chassis system for constructors. Before this journal appeared most sets were designed for

baseboard erection, and the so-called advantages advanced were that you could see every wire at once, and that it was simpler. Another parrot cry which went up from some of the so-called experts was that amateurs could not solder and therefore preferred terminals. We have most effectively laid those bogeys. I do not believe in the baseboard system of construction, for it makes an unwieldy set, long leads where long leads ought not to exist, particularly on the H.F. side, and gives the whole affair an amateurish appearance. I am not in the least surprised that these so-called "designers" and "experts" and "radio technicians," with their "radio laboratories" (usually the corner of the kitchen table—equipment consisting of a red-hot poker for boring holes, and a half-a-crown voltmeter) should advance false reasons in order to cover up their own ineptitude. Unfortunately, it has been my lot to know a few of these so called experts. They were amateurs, and presumed that none of their readers could advance beyond their own level of ability. They have gone, fortunately, to the obscurity from which they ought never to have emerged. I tremble to think of the bad language they must have caused constructors who were sufficiently misguided to build their receivers. In many cases such receivers would not work, and they were not backed by a guarantee as are PRACTICAL WIRELESS receivers. Perhaps that is one reason why this journal survives.

### Whiskers and Tripe!

APROPOS my recent remarks concerning bewhiskered youths, and the use of the word tripe, our old friend "Torch" pens the following :

WHISKEROFFSKI TRIPEOVITCH.

A FOLK SONG OF THE HUNYANIS FROM THE SIBERIAN STEPPES.

*Solo Part :*

Whiskers and tripe! Whiskers and tripe!
We, the Hunyanis, shall never affright!
Others may faint at the horrible sight,
We'll never show terror at whiskers and tripe!
Brothers, Tavaros! No whiskers and tripe!

Whiskers and tripe! Whiskers and tripe!
Over the ocean and far out of sight
Are others defiant of whiskers and tripe,
Courage, Tavaros! We know they are right
To hurl their defiance at whiskers and tripe.

Whiskers and tripe! Whiskers and tripe!
Mancunian tummies may fill with delight
When they sniff at the onions served up with the tripe,
And mossy-faced striplings grow beards out of spite.
But free men and great men hate whiskers and tripe!

## Notes from the Test Bench

### Adjusting Inductances

*WHEN some home-made receivers of the modern superhet type have been in use for some time, difficulty arises owing to mis-matching of circuits. This is found to be due to the fact that the coils are placed too close to a valve—some of the modern mains valves running very hot. The result is that the compound used to retain the coil windings in position becomes softened and the turns move slightly. Therefore, in making such a receiver, care should be taken to place the valves as far as possible from such components as coils, H.F. chokes, etc. In the event of a coil becoming mis-matched, it may be re-adjusted by moving the end two or three turns slightly, testing each adjustment* with screening cans in position. *Do not overlook the last point, as the coils have different inductance values when screened. When the correct position of the turns has been found, Chatterton's Compound or some similar medium should be lightly smeared over the winding.*

### Position of Decoupling Components

*WHEN decoupling has to be introduced the usual arrangement is a resistor and condenser. The resistor is to prevent the passage of H.F. currents, and the condenser is to by-pass them to earth. Therefore, there is a right and wrong way of placing these parts in the circuit. The two components should first be joined together, with a minimum of wire between them, and the junction point then attached to the actual valve leg or other point which is being decoupled. In this way stray H.F. currents are prevented from being radiated by the wiring and are conveyed direct to earth by the shortest possible route.*

### Earth Connection

*ALTHOUGH the earth lead has to be buried in the ground or joined to some subject which itself is buried, it is desirable to use an insulated lead so that the actual earth connection is only made at the ground point. If a bare wire is used and it touched various earthed objects, such as walls, etc., on its way to earth, it may affect results by providing alternative paths or separate closed circuits which may resonate and lead to various peculiar tuning effects, apart from the risk of introducing instability. The buried connection should, of course, be moist, and where the ground is of a rapidly drying composition some aid to the retention of moisture should be included.*

### WLW Announcer Travels 100 Miles Nightly

AN interesting report has just reached me concerning Bill Edmonds, WLW remote announcer, who hasn't a much heavier round-the-town schedule than the normal announcer heard with dance bands in the evenings. He reaches near the century mark in mileage to fill a night's schedule of remote broadcasts, and here is a typical schedule of his night's work :

Edmonds drove from the WLW studios in Cincinatti to Beverly Hills, 12 miles; then to Coney Island, 25 miles away. After a half-hour at Coney, he drove to a broadcast at the Hotel Netherland Plaza, and then went from downtown Cincinatti to Castle Farm for another broadcast. That added 30 miles to the 37 already travelled. From Castle Farm he took a long jump to Lookout House, across the Ohio River in Kentucky for an additional 17 miles. As he broadcast from there he had driven 84 miles.

But he had one more show—from Barney Rapp's, 13 miles away—and then added five more to report back to the studios before he closed his books for the night. His total mileage was 102. And he had made only six broadcasts, for a total of two and a quarter hours on the air.

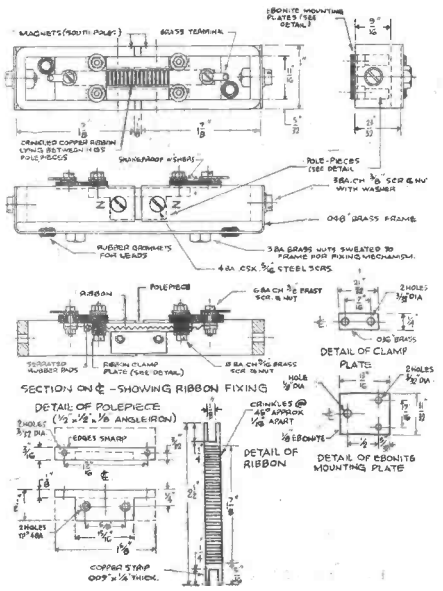
### Miss Radiolympia

I WAS present in the Bowl Theatre at Radiolympia when the judging took place to select from eleven entrants Miss Radiolympia, 1939. There were to have been twelve, but one refused to appear in public in a bathing costume. Each of the finalists was asked to sing a chorus of the theme song "Let's All Go to the Radio Show." They were also asked to parade in front of the distinguished panel of judges. It is a most surprising thing that Miss Patsy Kench, who was finally selected, was the only one who refused to sing. The remaining ten exhibited crooning voices. Thus, I take it that the judges agree with me that crooning is not an advantage! I felt somewhat sorry for these really charming and beautiful girls, however, in having to parade round the platform after the manner of prize livestock at an agricultural show. As a distraction I judged the entries myself, and awarded the honour to Miss Margaret Douglas. This just shows how amateurish I am in matters of this sort. I do not, of course, disagree with the judges' decision any more than I do the Editor's—it's final!

# Practical Hints

## Ribbon Microphone Mechanism

THE following description of a ribbon mechanism I have devised may be of interest to my fellow amateur enthusiasts. The circuit particulars comprise a straight transformer coupling (140 : 1 transformer) working into a MH4 type valve-grid/filament circuit across the secondary winding—employing 1.5 volt grid-bias. The transformer and valve should be situated as near




*Constructional details of the mechanism for a ribbon microphone.*

to the microphone as possible, and connected to it by means of a screened two-core cable (screen to be earthed).

Referring to the diagram, it is apparent that all details are designed to suit the type of permanent magnets obtainable. Overall sizes of those employed are quoted upon the assembly views, and were incidentally a pair of old instrument magnets. The magnets were braced together (like poles adjacent) by means of L-shaped iron pole-pieces, so that ⅛in. gap remained between the butts of the magnets. The extremities are rigidly held in a brass frame, upon which two units are sweated to facilitate fixing inside the microphone head: two drillings fitted with rubber grommets take the leads through at points close to the terminals. To ensure that the maximum field exists between the pole-pieces, this gapping between the magnet poles is very desirable, and also allows a little latitude in assembly.

The pole-pieces are made from ½in. x ½in. x ⅛in. angle iron, cut away to $\frac{3}{16}$in. upon their upper flange, so as to leave a $\frac{1}{16}$in. gap between them to accommodate a ¼in. copper ribbon. Copper foil (.009in.) was used; very carefully crinkled between a pair of gear wheels so that its rigidity, and effective (inductive) length was increased. Ebonite plates, supported across the ends of the pole-pieces, clamp the ribbon element between sets of serrated $\frac{5}{16}$in. wide rubber pads so that it lies central between, and is insulated from, the pole-pieces. Two terminals are provided at the outer ends of the ebonite plates, to which the free ends of the ribbon are securely bolted.

No details of the microphone head and stand are given as they are largely a matter of personal taste and surroundings, but it is preferable to mount the amplifying valve in the base of the stand to avoid losses, etc.

It will be found that this type of instrument is extremely sensitive, and amply repays the time and care spent upon the mechanism.—WM. A. HARRISON (Aintree).

### THAT HINT 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 624.

## A Sensitive Relay

WHILE experimenting some time ago with remote-control apparatus, I wished to use a micro-relay, due to the small current available. I therefore improvised one from an old wrist-watch, a headphone bobbin and a few odds-and-ends.

I just removed the escapement from the wheel attached to the hair-spring (A), thus leaving the wheel free to revolve within the limits set by the hair-spring. Next, a 3in. length of 24-gauge iron wire was fastened to the upper portion of the wheel by means of shellac and cotton. The whole assembly was then mounted on a wooden base about 4in. x 3in. The headphone bobbin was mounted near one end of the wire, and two contacts mounted on a short piece of wood at the other end. Next a contact of 24-gauge enamelled copper wire was fastened to this end of the wire, and a lead of 36-gauge enamelled wire joined to it. The two contacts and the moving contact, together with the leads to the headphone bobbin, were brought out to terminals on the baseboard.

In operation, the lower contact is adjusted to keep the other end of the iron wire close to the headphone bobbin, and the regulating lever of the watch adjusted to the position of easiest operation.

I found that this relay would work on a current of less than one milliamp., and that there were no cases of "freezing," the spring pulling back the contact in sufficient time for slow morse of ten words per minute to be sent.

In order to shield it from draughts, the relay should be enclosed in a wooden case.—S. H. WATTS (Cheltenham).




*For constructing this sensitive relay the works of an old wrist-watch were utilised.*

## Adjustable Extension Control

I RECENTLY made a receiver in which a condenser was mounted on a bracket, to be operated from an extension control. When I came to fit the control I found that it was too short, so I purchased another, but this was too long. This set me thinking, and in overcoming my difficulty, I think I have hit upon an idea which would be of use to many other constructors, as it is a form of adjustable extension control, and has been applied to the Bulgin component. As may be seen from the accompanying illustration, the smaller type of control is cut in half and a length of rod is inserted. Locking-screws are added, and if desired a "V" groove may be tooled in the rod to prevent slipping when a tight component is being operated. The one-hole bush is mounted on the panel, and the screws loosened whilst the end is slipped out and over the component spindle. This is then locked in position and the two remaining screws locked up.—T. K. VERUS (Stoke).




*An adjustable extension control.*

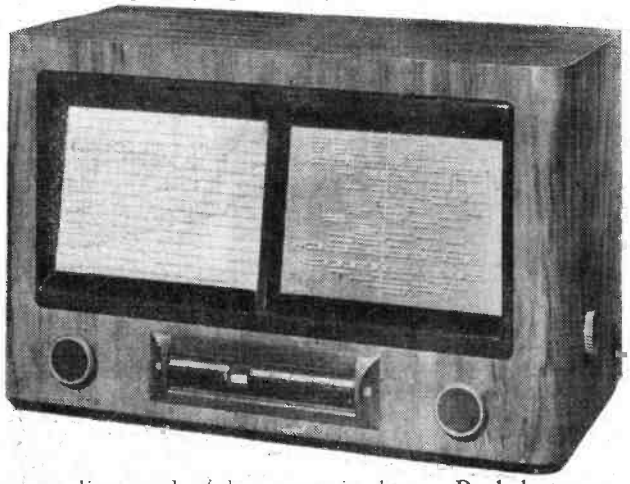
OUR STAND: No. 9 GROUND FLOOR.



# Complete SHOW REPORT

## Items of Outstanding Interest Described by THE TECHNICAL STAFF

AT a casual glance it might be said that the receivers on show this year bear an appearance very little different from those which have been seen at previous shows. A more critical examination will, however, reveal several interesting features which appear for the first time, and which mark a step forward in the design of modern radio apparatus. In general respects the styles of cabinet remain unchanged, but the earlier types of cabinet design have given way to more severe lines and styles, more in keeping with modern furnishing schemes. Moulded bakelite cabinets are not now so common, but in this connection it is interesting to note that Philips have utilised the idea of a moulding in one or two cabinets, and have produced some models in which both wood and bakelite are employed. The front portion of the cabinet is moulded, and the chassis is attached to this. Thus, by a simple movement the whole front of the cabinet may be pulled forward revealing the entire receiver chassis and loudspeaker fully accessible for test and servicing purposes. This is quite a good point. Murphy probably typify the modern trend in their particular cabinets which are entirely free of embellishments and fancy work, but nevertheless are extremely pleasing in design and colour and will harmonise with any modern furnishing scheme.



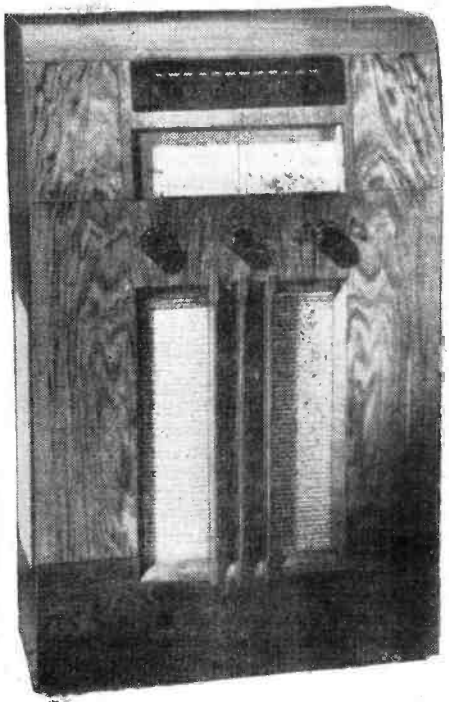
*Here is one of the modern cabinet designs referred to on this page. This is a K.B. model.*

### Speaker Frets

A further point in exterior design concerns the loudspeaker fret or opening. In the early days we had elaborately fretted fronts reminiscent of the early pianos, and gradually the woodwork has been removed until to-day the majority of cabinets have merely a rectangular opening backed by fancy silk or similar material. This is certainly a step in the right direction, but why must the opening be so prominent? This point in design has obviously been tackled by several firms and we were pleased to note that this year the G.E.C. have found at least one effective way of overcoming the trouble. They have made use of neat louvres in certain designs, and this has, in some of the cabinets, made a marked improvement in appearance and will no doubt appeal to many listeners on aesthetic grounds.

### Push-buttons

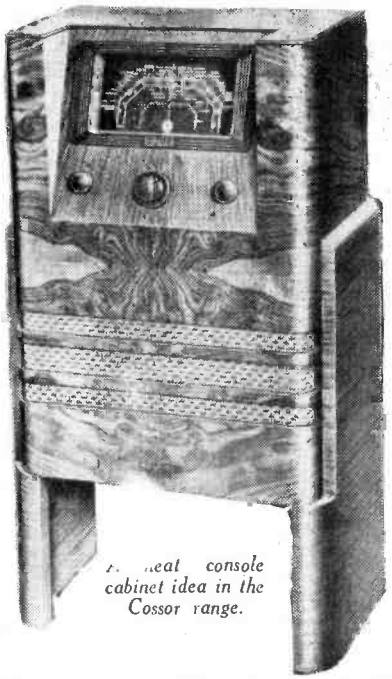
A further outward development seen this year is the remarkable array of designs in push-button controls. From the original small bell-push types, these have been modified until now there are all shapes, some sunk flush, some projecting, some requiring to be pushed in, and others which have to be depressed. Various fancy names have been given, such as organ key, piano key, press-button, push-button, etc. In all cases, of course, the idea is the same, namely, the changing of a station merely by operating a button carrying the name of the desired station. In some receivers the buttons are sub-divided into medium and long-wave stations, whilst in others a wave-change switch has to be operated separately. In view of the fact that the stations which may be pre-tuned will vary in different parts of the country, various attempts have been made to facilitate the change in setting provided for the buttons. In the early days the cabinet had to be opened and various tricky adjustments made. In some of the modern receivers small panels are attached above the buttons and by removing the panel the stations may be changed. A most ingenious and effective scheme is seen in the new Philips receivers, however, a small key being provided and retained in a clip at the rear of the cabinet. When it is desired to change a station the button required is depressed. The key is then inserted in a slot beneath the button which is down and the key turned until the desired station is heard. The key is removed and henceforth that station will be heard until changed by the key. The three left-hand buttons on these receivers may also be adjusted for long or medium waves. To change the waveband the button is not depressed, but the key is inserted and turned until the maximum travel is obtained in either direction (according to the change which is desired) and then the button is depressed and the station tuned in as already mentioned. It is thus a very simple matter and may be carried out



*This Ekco receiver has the push-buttons above the dial for ease of operation.*

by the most inexperienced person.

Motor-driven push-button operated sets are, of course, now fairly common, but when the manual control is operated the usual trouble is that of high gearing, resulting in a tiring operation when searching through the full scale for a station which is giving a programme suitable for the mood of the moment. On some receivers this is a real wrist-aching procedure. Marconiphone and H.M.V. this year have introduced "cruiser" tuning, which may be seen in addition to the Ekco device on somewhat similar lines. The idea is that the motor used for mechanical tuning is brought into circuit to rotate the condenser to avoid the normal manual process, and it may be stopped as soon as a desired station is reached.



*A neat console cabinet idea in the Cossor range.*

In connection with automatic tuning we also note that several firms now have the tuning apparatus geared up to the dial indicator. On many receivers the pointer remains stationary when the automatic tuning device is in operation, but the pointer is now being operated so that it may be seen at a glance just what station is in use. Of course, automatic-frequency control and similar devices are practically standard features with mechanically operated tuners.

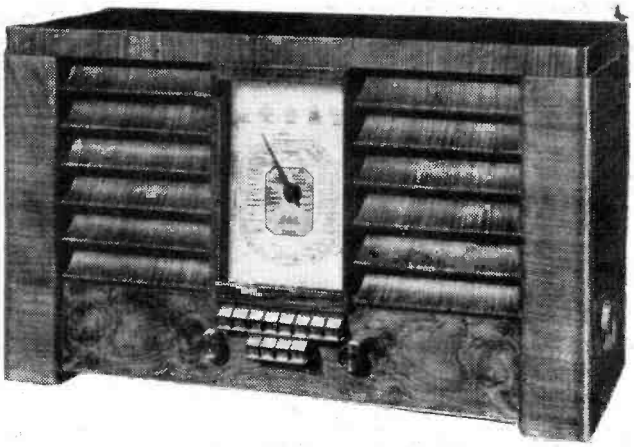
## Economy Valves

A new line to be seen this year is the economy valve, which has resulted in the introduction of special portables and batteries. This particular type of valve, which may be seen on Stand No. 52, has a 1.4-volt filament and thus may be operated from a dry battery instead of a standard 2-volt accumulator. This means that the portable receiver may be made more compact and lighter in weight, as a small dry cell only is required for the filament. An example of the new portable may be seen on Stand No. 51 (Vidor), whilst Ferranti on Stand No. 41 are also showing a superhet battery (table model) using these new valves. The new batteries are generally of an all-in type incorporating both the H.T. and L.T. sections and these are to be seen on several stands. Various plug-in or clip connections are used for the L.T. circuit.

## Components for the Constructor

This year there appears to be only Bulgin, Varley, Polar and Wearite who are exhibiting constructor components, although one or two other firms have accessories which are of use to the amateur set builder. The Bulgin range of components needs, of course, no introduction. It would be impossible to deal with all the items shown, and in fairness to all it is better to refrain from any particular mention, but the 300 odd lines are all of the greatest value to the set builder. Varley are showing coils, transformers and one or two other lines, many of which are already well known, whilst the Polar range of condensers has been augmented by one or two special lines for transmitting or ultra-high-frequency reception. Wearite are showing on Stand 102 the range of "P" coils, transformers and switches, as well as standard Service test equipment. Messrs. Ferranti are showing a wide range of their meters which, of course, every worth-while constructor finds of value in real experimental work. On the Westinghouse stand there are metal rectifiers for various purposes, and Pix on Stand 64 are showing their range of aerials. Various types of aerial may also be seen on the Aerialite stand, whilst one or two firms, in particular Antiference, are showing specially developed aerials for television or noise-free reception.

One type of receiver which is apparently alone in its class may be seen on Stand 42. This is the Pilot Twin-Miracle. It is a mains or battery indoor or outdoor set. There is one unit battery in it, and it is a five-valve A.C./D.C. superhet. If, for instance, it is plugged into the mains and the mains supply fails, or the mains lead becomes pulled out of the socket by accident, the set does not stop working. Automatically, the batteries are switched into circuit and the receiver goes on playing without interruption. It is entirely self-contained, and requires no aerial or earth. An ideal A.R.P. receiver.

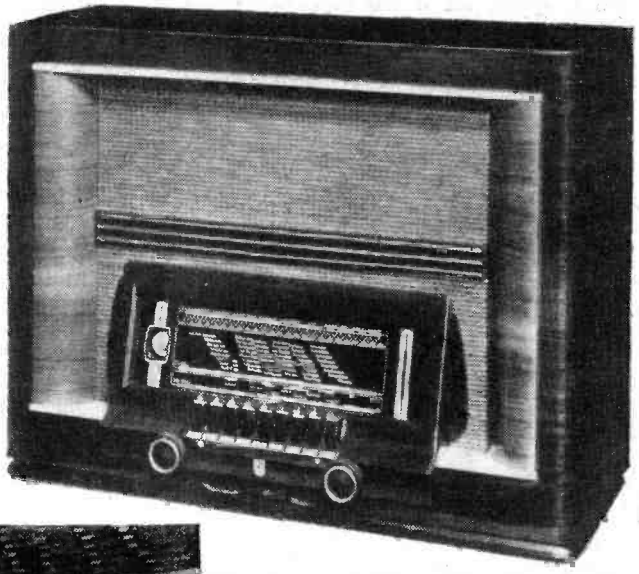


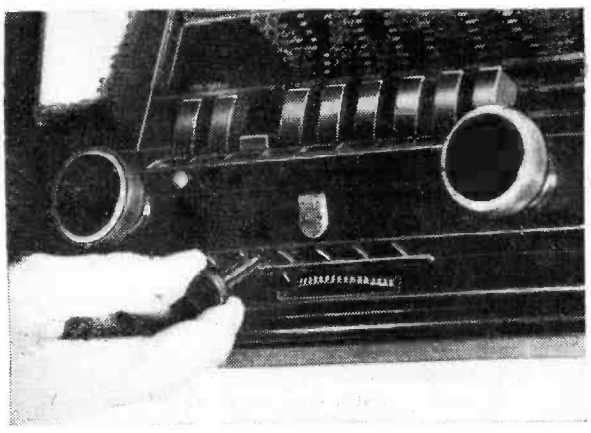
*A table model in the G.E.C. range, with the new speaker opening idea.*

## Car-radio and Television

There remains only car-radio and television apparatus to be dealt with. In the former class Cossor are newcomers, and have produced a neat two-piece receiver with readily changed station setters. Whilst motoring it is possible to pass out of the range of one station and into the range of another, and it is a simple matter in this particular receiver to make a change on the push-button mechanism whilst driving, without taking your eyes from the road. Ferranti are also showing a car-radio receiver, whilst the Philips is also to be seen on their stand. Special aerials for cars are also being developed and may be seen on several stands.

The most remarkable point about many of the new television receivers is the cutting out of the black surround round the picture opening. Cinema screens are, of



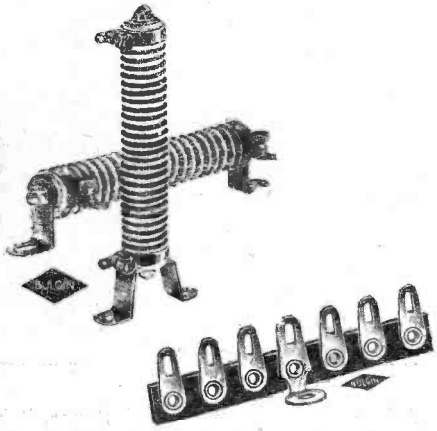


*Above is a new Philips model and on the left is seen the method of adjusting the push-buttons for different stations.*

course, provided with a black surround to throw the picture in relief, but on several new receivers the picture opening is in light wood and this has apparently in no way detracted from picture brilliancy. It does, of course, improve the general set appearance, and the modern C.R. tube is so good that in many cases it is not necessary to make any modification to the normal room lighting, and perfect pictures may be seen. The add-on unit is increasing in numbers, due to the fact that many listeners have a really good broadcast receiver and do not wish to change it for a new receiver. The only point is, of course, that the ultra-high frequencies used for television enable better sound reproduction to be obtained, and it is thus desirable to use a special set if the maximum performance is to be obtained on the television sound wavelength. Other types of unit television receiver are merely sound and vision in a small cabinet, the existing broadcast receiver being used for normal broadcasts. This is naturally higher in price than the simple add-on vision unit in which the L.F. section of the broadcast receiver acts as the reproducing medium. Several firms are showing these units and small television receivers, and the most interesting development from a general point of view is the reduction in cabinet size. The modern tube is smaller than last year's model, but the cabinets have been brought into line with standard broadcast apparatus by permitting the end of the tube to stick out at the back of the cabinet a matter of 3ins. or so. As the cabinets are not generally placed flat up against a wall this is not a very important point, and the result is that a neater-looking cabinet has been produced with some saving in cost.

The Add-on Television Units, as they are called, are proving extremely popular, and in order to increase the popularity, especially among non-technical listeners, a simple form of plug connection to a radio receiver has been adopted. In the Ekco range, for instance, the receivers are now provided with a pair of sockets marked "Add-on Television," and thus all that is necessary when a unit of this type is purchased is to plug it into the receiver and television is added to the normal broadcast entertainment. One of the new season's add-on television units in the Ekco range is to be sold at 22 guineas, and includes an 18-valve television chassis.

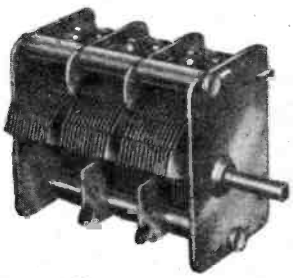
Elsewhere in this issue we describe the ingenious system which has been adopted at Olympia for the re-distribution of the television programmes to the stands and to Television Avenue, and on the upper gallery crowds may be seen viewing the television engineers at the controls of the re-distribution panels. Here there are the small monitoring tubes which enable the output to be checked and the panel is a replica of that used at the Alexandra Palace, a reproduction of this building surrounding the "studio." Walking along the Avenue, one can see the various models of the different firms all working together and can compare the various tones used for reproduction. The semi-darkened appearance of this Avenue should not, however, mislead you into thinking that it is necessary to reduce the normal room lighting in order to see the pictures. On those stands where a television receiver is working you can compare the brilliancy in surroundings which are very similar to those which will be found in the normal home, and as already mentioned in connection with the light surround now employed for the tube in the majority of receivers, the picture is sufficiently bright to enable viewing almost in full daylight. Some idea of the detail and the high degree of efficiency which has been reached in the television camera may be gained when we point out that during the preliminary tests at Olympia the Test Match was being televised. It was easily possible to follow the cricket ball as it ran along the ground after being hit, and this was a "long shot" by the camera. Furthermore, although all the players were in the usual cricketing whites, the shades formed by creases in the shirt or trousers were perfectly clearly marked, and the figures did not represent a white "cut-out" as in some of the earlier broadcast scenes which some of us remember. However, a visit to Television Avenue will soon convince you that television pictures are now perfect home entertainment, and the receivers are as simple to operate as a one-valver.

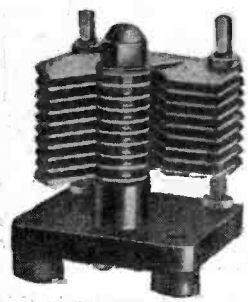


*Bulgin have made extensive additions to their range of components. Above are the wire-wound resistors and connecting lugs.*

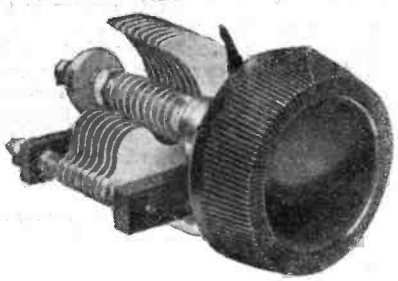


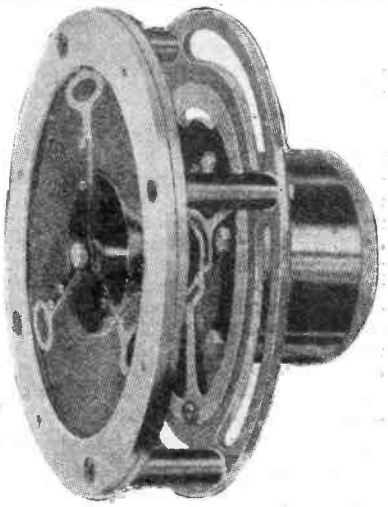
*This is one of the "National Band" concertograms and it is on view on Stand T. 4.*



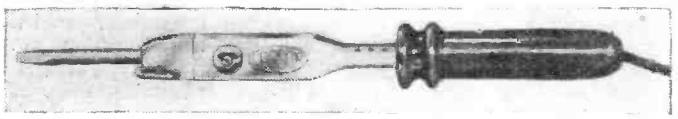


*To the Jackson range of condensers have been added several items. Some of the lines are seen here.*





*A new loudspeaker, known as the "Infinite Baffle" model has been produced by Goodmans' Industries. It is shown above and may be inspected on Stand 19.*



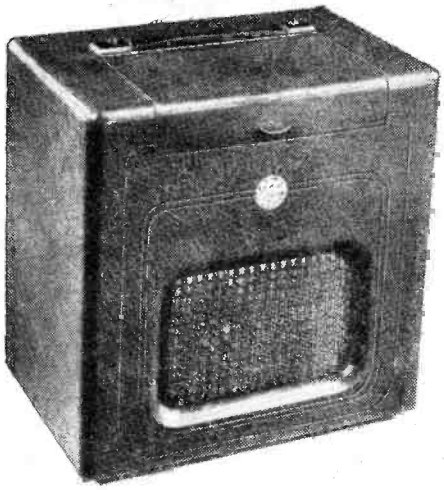
*For good wiring an electric soldering iron is indispensable. This is a Cossor product.*



*Adopting the inverted electrolytic mounting, Dubilier can now supply condensers of this type.*

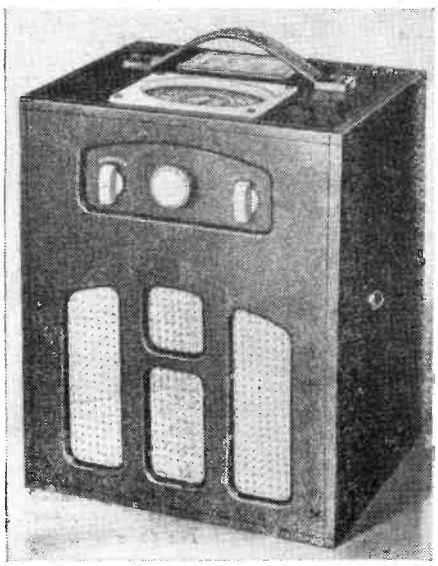
## The Factory

The special section devoted to the factory will, we hope, reawaken constructor interest, and the many interesting processes which are being carried on there, although



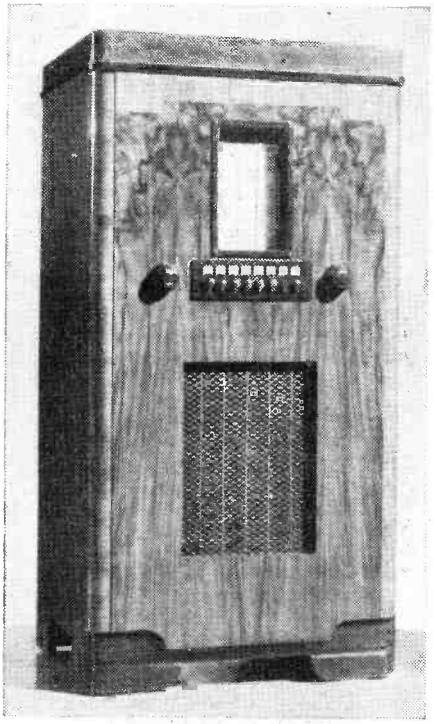
*This is the Pye Baby "Q". It measures 11ins. high by 12½in. wide by 8in. deep. Price is 8½ gns.*

in the main showing commercial work being undertaken, will give you some idea of the best way of setting about set construction. The methodical stage-by-stage wiring or assembly of parts bears no comparison to the haphazard method adopted by inexperienced constructors, and furthermore, the simplicity of soldering is fully demonstrated by the operatives. Just watch how quickly a joint is made when a really good soldering iron is employed, and the work is clean. The "hidden secrets" of some components are also revealed here and should remove the temptation which sometimes exists for screens or containing cases to be removed to see what is inside. Many components are so assembled that if the cover is removed, the component may be damaged, or in the act of replacing or removing a metal can the leads may be damaged. On no account, therefore, should such dismantling be attempted, and you can see at the Radio Factory all that you require to know in regard to these enclosed components.

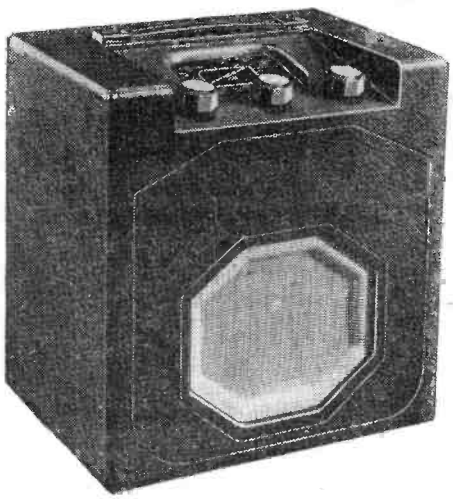


*This 4-valve portable by Cossor is a battery receiver with single-knob tuning and auto grid bias. Size is 12¾in. by 10¼in. by 7½in.*

Many listeners fail to realise how complete receivers are tested by the manufacturers, and the process of trimming and adjusting a modern multi-valve superhet appears to be a complicated process, when undertaken without suitable test apparatus. The method adopted by the makers is demonstrated here and you will see how quickly a multi-valver may be set up so that it is corrected and aligned for correct tuning over either the short or normal broadcast bands—and there are no hit or miss methods. Speaker response, too, is tested, and the receivers all have to pass a response test before they are passed to the packing department ready for sale.



*A feature of this H.M.V. console, which is to be released on September 5th, is the effective 5-valve push-button circuit. The price is 14 gns.*



*This is Invicta New Junior Portable. It employs a 4-valve circuit and has a P.M. speaker. The size is 12½in. by 12in. by 8⅜in., and the weight 20lbs. Total H.T. consumption is approximately 10 mA, and the output 200 mW.*

## Cossor Exhibit

In the factory there is a special section showing some of the machines used in the Cossor works at Highbury, including a



*The Ekco "Pick-me-up" portable—an 8-stage superhet. It measures 11⅞in. by 11½in. by 7⅜in.*

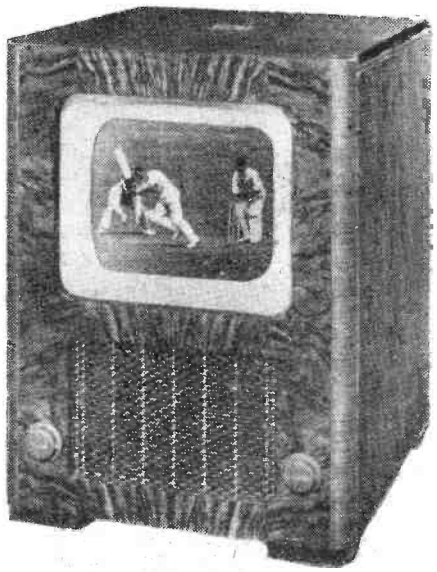
wire-joining machine, a grid-winding machine, and other winders. The wire joiner is a remarkable piece of apparatus which automatically selects and joins together three wires of differing thicknesses, length and material such as are found in the modern valve. The electrode support wire cannot be taken through the glass "pinch" because nickel has not the same co-efficient of expansion as glass. Thus a short length of borated copper wire (which has the correct rate of expansion, thereby ensuring an airtight seal) has to be joined to the end of the nickel support. Ordinary copper wire is then used for the final leading out wire. The machine which you can see in the model factory welds these three wires together as the copper wire is fed from one end, the nickle support from the other, and the small length of borated copper is cut off and carried by a pair of electrically-operated tweezers which centre it between its fellows a split second before controlled flames make two perfectly welded joints.



*This is the Invicta B29 Portable. Note the speaker opening and station-name dial.*

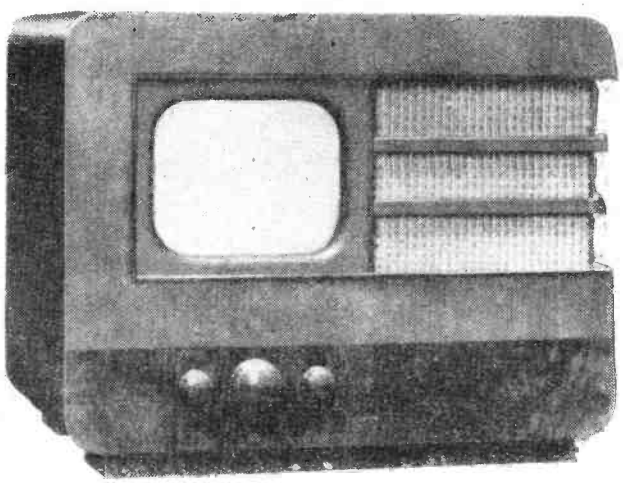
**Television receivers may be seen on the stands of the manufacturers, or all makes may be compared in the Television Avenue, situated on the Balcony behind "Broadcasting House."**

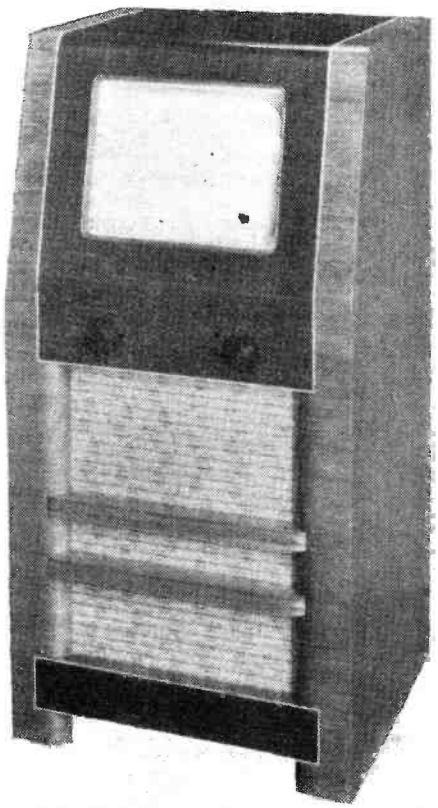
# New Season's Te



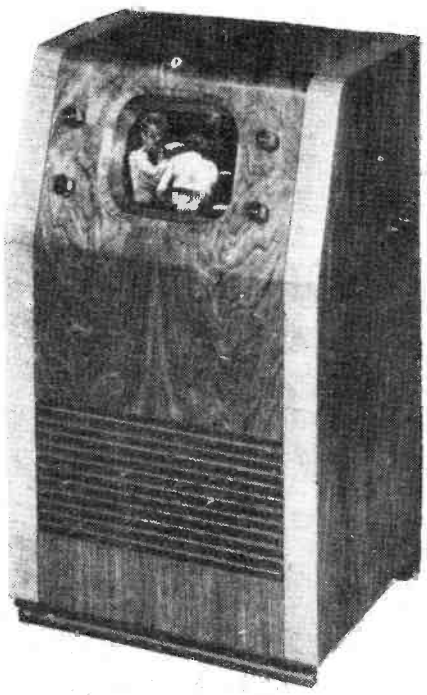
*The simplest complete television receiver. This is H.M.V. Model 1800 with a picture 8⅜ in. by 6⅜in. The price is 31 gns. Controls are "brilliancy" and "volume."*

*This Ferranti Table Model No. T10 provides a picture 7½in. by 6in. The controls are synch., volume/on-off switch, and brightness. The price is 30 gns.*

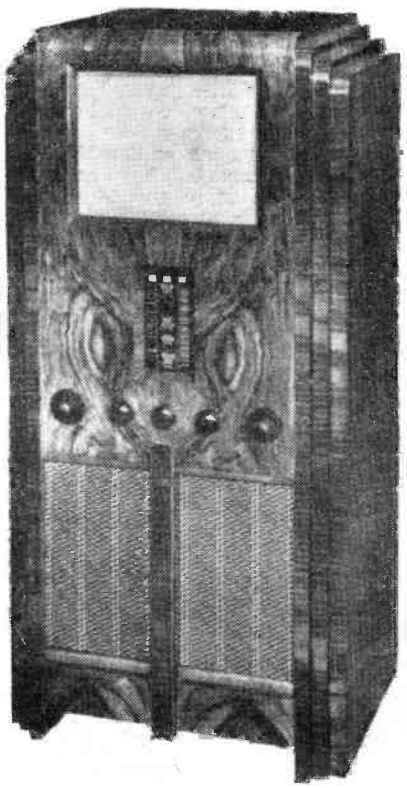




*Baird Model T26 has a 10in. by 8in. picture and two controls giving contrast and volume. The price is 40 gns.*



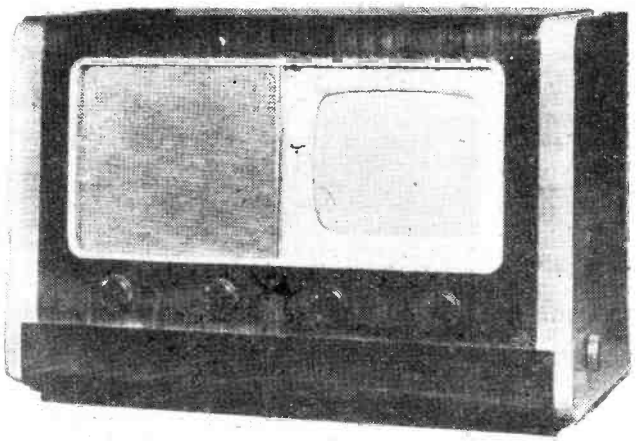
*RGD Model 391, giving a picture 7½in. by 6in. Sound louvres are provided at the speaker opening. The price is 45 gns. and the four controls are focus, brilliancy, contrast, and volume. The chassis is a 22-valve superhet, and an H.F. stage for vision and sound is provided. The same chassis is available as a radiogram, a 6-valve radio chassis being added.*



*Baird Model T25 is a combined all-wave radio and television, giving a picture 10in. by 8in. Only one television control (external), providing contrast. The price is 47 gns.*

# evision Receivers

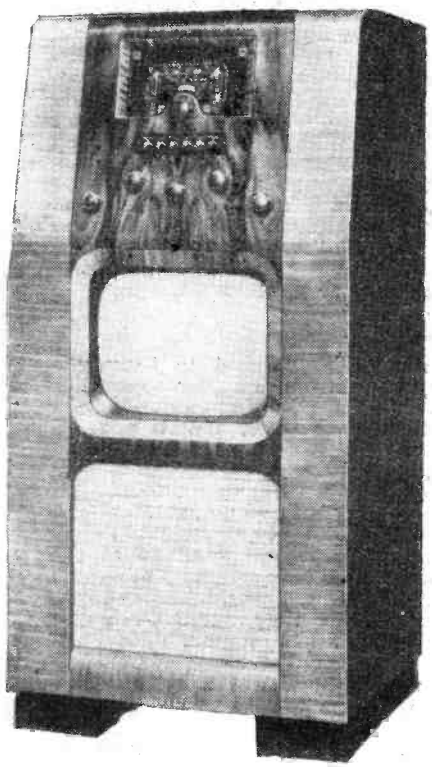
**You can be televised free during the morning sessions. Application must be made during the afternoon to Harold Cox, Reception Room, National Hall, between 2.30 and 5.30.**



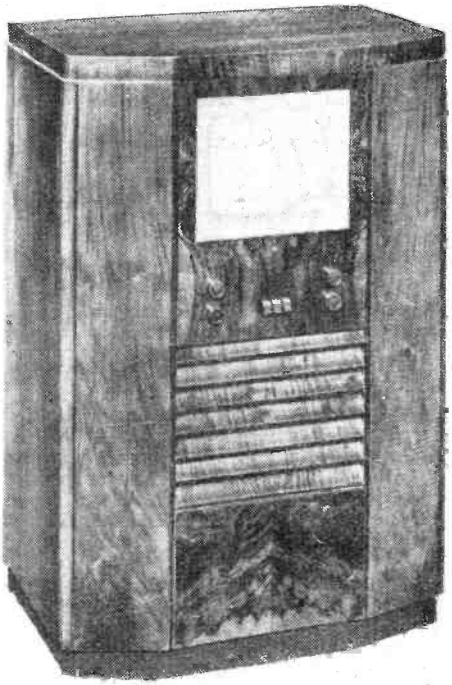
*A handsome table model in the Philips range. Picture size is 7¼in. by 5¾in., and the price 32 gns. The controls are on-off and brightness (combined), focus, volume and contrast.*



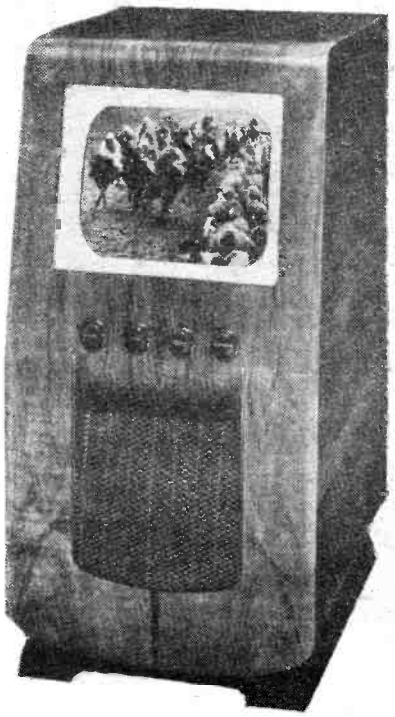
*A radiogram version of the RGD 391 chassis. The controls are focus, brilliance, contrast, volume, frame hold and line hold.*



*Decca Model 46 is a combined all-wave radio and television. Picture size is 10in. by 8in. and the price 46 gns. Television, sound and vision are pre-tuned.*



*G.E.C. Model 0091 has a picture measuring 7½in. by 6in. The three push buttons switch on the set, provide sound only and switch off. The controls are for brilliance and contrast and sound volume and tone quality. A 16-valve superhet circuit is employed, and the mains loading is 235 watts or 115 watts when used for sound only. The depth of this cabinet is 15½in. The price is 32 gns.*



*A console model in the H.M.V. range. At 44 gns. this gives a picture 11⅝in. by 9⅜in. Note the inclined front for easy viewing.*

*Criticism, Chat and Comment*

# Listening to the Proms.

## The Attractive Bill of Fare at Queen's Hall this Week is Discussed by our Music Critic, Maurice Reeve

THIS week's programmes are indeed rich in material for the connoisseur and the genuine lover of the best music. It would be difficult to imagine a wider survey packed into six programmes than this week's fare has succeeded in accomplishing. These are the chief events: Monday, Wagner; Tuesday, Tschaikovsky; Wednesday, Brahms; Thursday, Sibelius; Friday, Beethoven, with some Handel; and Saturday, Russian night including Tschaikovsky!!!

The Monday Wagner programme contains Siegfried's Funeral March—one of the most sumptuous pieces of music ever written, and a piece which seems to mourn more than the death of just one hero—the Venusberg music from Tannhäuser—which Wagner specially wrote for the Paris production of the opera. Isolde's narration, from Tristan, and that ever popular thrill, the Ride of the Valkyries. The second half of the programme includes "Mercury," "Saturn," and "Jupiter" from Holst's suite, The Planets.

The Tschaikovsky evening should be immensely popular. The centre piece is the fifth Symphony in E minor, which most people must know almost by heart now, so often has it been played in recent years. Sir Henry Wood is particularly famous for his renderings of Russian music and of Tschaikovsky in particular, and the "fifth" is one of his *tours de force*. With a motto theme that recurs in each of its four movements—its last appearance being as a kind of hymn of triumph that reminds one very much of 1812, this work would seem to symbolise the dark and broody but strong and passionate soul of the mighty country in whose hands the destiny of mankind may be, at this minute, resting.

In contrast to the wide fame of this work, Moiseiwitsch is going to play the second concerto, which I, at any rate, have never heard before. I don't think many ever have. It is the first, in B flat minor, which Moiseiwitsch himself has done more than anyone to make such a household favourite. There is also Joan of Arc's farewell song, and the swinging, fascinating lilt of the Polonaise from his other opera, "Eugène Onegin."

### Brahms Night

Wednesday is another Brahms night. After opening with the "Tragic" Overture, there are two mighty works. The second pianoforte concerto is the longest, most difficult, and most complex of all existing concertos. Let me say at the outset that it is a magnificent work, packed with everything that the musician appreciates, and an abundance of those delightful Hungarian dance and folk tunes which I mentioned in some previous remarks on Brahms. Two features call for mention. Unlike most, if not all, concertos which are works "for a solo instrument with an orchestral accompaniment," Brahms treats the piano in his concertos almost as a member of the orchestra. This not only has the effect of emphasising the symphonic character of the work and of adding to the heaviness of the texture as compared with Mozart's or Beethoven's concertos, but it multiplies the difficulties of the solo part enormously and greatly adds to his responsibility. The second point is that the work was finished in three movements, the first, third and fourth. As these were all in the same, tonic, key of B flat, and therefore apt to rob the work of sufficient key contrast, Brahms added a fourth, the second, in D minor. In my judgment it is the finest in the whole work, as it also is my favourite.

The other work in this Brahms banquet is the fourth symphony. I like this one at least as much as any of Brahm's four symphonies, and probably more. Written in the "bright, melancholy" key of E minor, it charms all the way through. The opening theme might almost have tempted the composer to style the work his Pastoral. The finale is a most unusual and exciting Passacaglia, which is a set of variations on a ground bass. I hope you will all make a note of this very fine programme.

### Sibelius

Thursday is devoted to the works of that "lion of the north," that "colossos of the snows and the red, northern sunset," one of the outstanding musicians of the present century—Sibelius. Much influenced by Tschaikowsky in his early composing days—what composer hasn't been swayed by some famous predecessor who was probably his teacher as well?—Sibelius has developed into one of the most original minds in all music. Rather like Beethoven's in their spaciousness and grandeur, his works combine a close kinship with his Slav neighbours and a passionate tempestuousness one usually associates with more southern regions. To-night's programme is very rich and varied, as follows: Symphonic Poem, "En Saga"; Tone Poem for Soprano and Orchestra, "Luonnotar" (soloist, May Blyth); Second Symphony in D; Third Symphony in D; and, in conclusion, those two wonderful numbers from the Kalevala, "The Swan of Tuonela," and "The Return of Lamminkainen." The Legend of the Kalevala bears the same relationship to Finland as King Arthur does to England or The Nibelung's Ring to Germany. The word itself means "Finland," and the story deals with the origin of the world and the seeking of eternal bliss for Finland which is achieved in the struggle to acquire the magical Sampo, which gives prosperity and happiness to whoever possesses it. Sibelius illustrated the legend in many compositions.

Friday, of course, is sacred to Beethoven. The first symphony, "Ah! Perfido," from "Leonora," the third Leonora Overture, and the greatest of all pianoforte concertos, the "Emperor," No. 5, played by Lamond. Born in Glasgow over seventy years ago, and at one time a member of Liszt's famous class, Lamond is an ideal interpreter of Beethoven, and of the Emperor in particular. I have heard him play it several times, so can vouch for the excellence of the fare that will be served up.

### Russian Music

I am looking forward to Saturday's concert very much. I have always had a great liking for Russian music—it is so tremendously colourful, and its powerful and insistent rhythms fairly sweep one along. They also have a great gift for melody. Every nation's music is indebted to its folk tunes and national dance rhythms, and the Russian people are particularly wealthy in these traditions, their huge territories containing such wild peoples as Tartars, Cossacks, Kurds, Ukranians, etc., etc., with their exotic antecedents and their wild, nomadic life. At the same time, there is always that strain of haunting fear and superstition through all their music which is not to be wondered at of a people that can scarcely ever have heard of such a word as stability, and who venerate the ikon.

The programme is: Overture, "Russlan and Ludmilla," by Glinka; "Hymn to the Sun," by Rimsky-Korsakov—sung by Noël Eadie; Borodin's second symphony; Rachmaninoff's second concerto; Stravinsky's ballet suite, "The Firebird"; and Tschaikovsky's "1812"; the soloist is Pouishnoff.

## STUDIO ORCHESTRAL CONCERTS

CONSTANT LAMBERT will conduct the B.B.C. Orchestra on September 3rd (National) in a programme consisting of the Ballet Suite, "Céphale et Procris," by Grétry (Mottl's orchestration), Honegger's "Pastorale d'été," and the "Petite Suite" by Borodin, orchestrated by Glazunov. The Orchestra will again be heard on September 8th (Regional), under the direction of Basil Cameron. This experienced conductor, who was born in Reading, was appointed conductor of the Hastings Municipal Orchestra in 1923, and for seven years he combined that task with the direction of the Harrogate Municipal Orchestra. He sailed for America in 1930, directed the San Francisco Orchestra, and became regular conductor of the Seattle Symphony Orchestra in 1932. He was made Hon. Mus. Doc. of Whitman College, Washington, for services to music in the United States. He returned to this country last year, and has been appointed director of the Hull Philharmonic Orchestra in succession to Sir Henry Wood. His programme on September 8th will consist of Weber's Overture to "Euryanthe," "Variations on a Theme of Tchaikovsky" for strings, by Arensky, and Stravinsky's latest ballet, "Jeu de Cartes," subtitled a Ballet in Three Deals. Its first performance in England took place at a Courtauld-Sargent concert in October, 1937, under the composer's direction, and has since been given with great success at Sadler's Wells Theatre.

# The 1940 "Air-Hawk" 9

## Chassis and Screen Construction Data for this New Communications Receiver.

By W. J. DELANEY

LAST week the main details of this new receiver were given, but one small point was not mentioned. It will be noted that the input circuit has now been so arranged that either a straightforward or a di-pole aerial may be used, a flexible lead being connected to the earth socket and two sockets used for connection to the ends of the primary winding of the aerial coil. Thus, by plugging the earth plug into socket A1, a single lead-in may be connected to A2, but by removing the plug and allowing it to hang loose, two leads such as would be employed with a di-pole or similar aerial may be connected to each end of the primary winding.

The chassis may be cut from sheet aluminium of 16 S.W.G., or obtained ready-made. The necessary drilling holes will be given next week and if the chassis is home-made half an inch may be left at each of the side runners for bolting to the end runners when the chassis is formed, or alternatively, short lengths of angle brass may be used to hold the chassis together with greater rigidity. The screens should be cut from the same material, and full details of these are given in Figs. 3 to 10. In all cases it should be noted that the turn-over for fixing purposes is ⅜in. The only difficulty likely to be experienced in this part of the work is the lining-up of the various fixing holes. To overcome this difficulty one plan is to drill only the two long centre strips and from these, when placed in position on the chassis, mark the holes for the remaining screens which are bolted to them, and in turn to mark the remaining strips.

### Chassis Assembly

Unfortunately, this will mean that all screens have to be bolted in their correct position and then dismantled for the complete receiver assembly, as some of the components must be mounted on the screens before they are placed in position. If you already have the original receiver, the screens will have to be cut down to enable the receiver to be placed in the T.8 cabinet which is illustrated in last week's issue, but this can be carried out without dismantling the receiver, provided that shakeproof washers were originally employed. A hacksaw may be used in a horizontal position and all screens sawn off *in situ*. The panel should be drilled according to Fig. 2, and again care is necessary to ensure that the holes in this line up with those in the front chassis runner. When satisfied that all the metal work has been correctly carried out, the receiver is ready for assembly and the tuning and band-set condensers should be mounted on the respective screens. The tuning condensers are mounted in the ⅜in. holes in the under-chassis partitions, and band-spreaders on the screens shown in Fig. 6. Make certain that the turn-overs on the screens are in the correct position when mounting these condensers.

### Extension Controls

Mount all valveholders first, then the two I.F. transformers, and attach the two

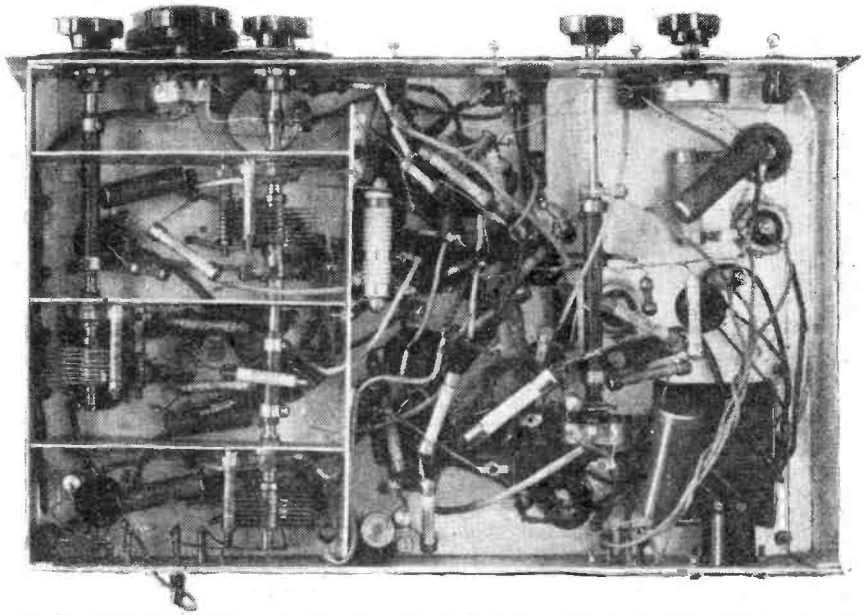


*Fig. 1.—This view of the underside of the chassis shows the network of wiring and the screened tuning sections.*

long central screens in position. Next place the rear screen carrying the band-spread condenser in position and bolt this to the chassis, at the same time attaching the lower screen beneath it. The upper screen may then be locked to the I.F. dividing screen. Attach a flexible coupler to the top condenser and put the second screen in position, engaging the spindle end in the coupler. Again bolt this partition down with the under-one in its correct position. Attach a coupler to the condenser on the remaining lower partition, and with a similar coupler on the top condenser place the remaining two partitions on the chassis and lock up. One of the extension controls must now be cut down so that it will couple the two band-set condensers on the underside, and the insulated portion of the extension outfit should be cut to a length of 1¾in. and the rod portion to a length of 1¼in. The two side-pieces may next be placed on the chassis to complete the screening of the frequency-changer and H.F. oscillator stages. A further extension control outfit must be cut down so that the frequency-changer band-set condenser may be controlled from the epicyclic gear, and in this case the insulated part of the outfit only need be cut, this time to a length of 3in. Make certain that the three ganged condensers on the top and the two ganged condensers on the underside all drive cleanly through the maximum movement from the front of the panel, and in the event of any stiffness the holes should be opened slightly so that the condensers may be locked in such a position that perfect freedom of movement takes place. Failing

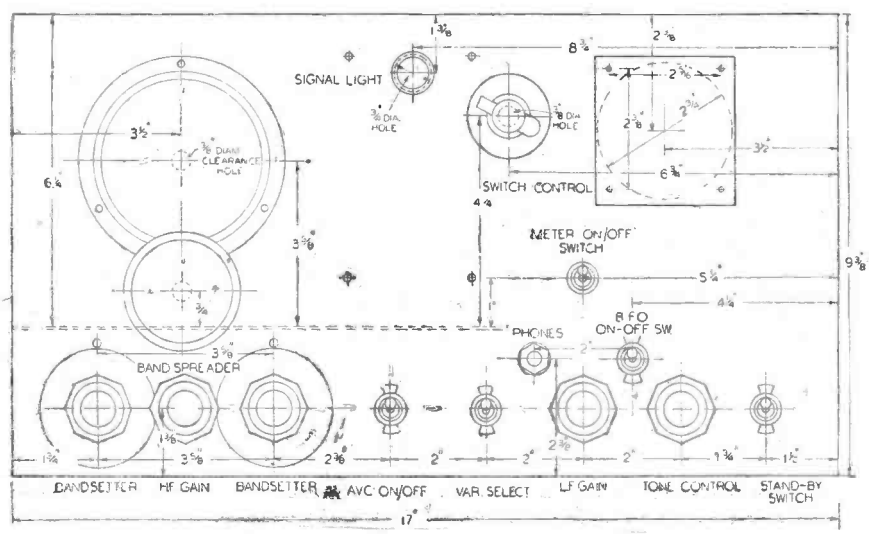



*Fig. 2.—Panel layout and drilling dimensions.*

## THE 1940 "AIR-HAWK" 9

*(Continued from previous page)*

this, the slow-motion drives will stick or slip, and settings of the condensers will not be capable of duplication, or you may find that when tuning the drives will move without the condensers and time will be wasted searching for a fault in the receiver.

### Mounting the Remaining Components

The component bracket should be mounted next, and the volume-control placed on it. The mains transformer follows, and the electrolytic condensers, after which the chassis will stand rigidly in any position and the remainder of the constructional work may be proceeded with. On the other side of the chassis the B.F.O. coil should be bolted in position,

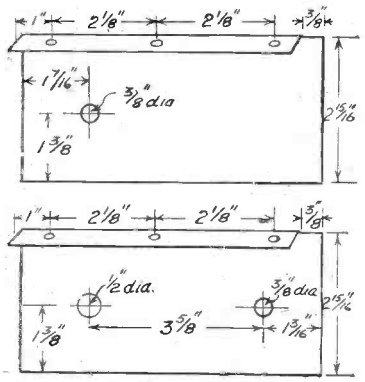



*Fig. 3.—The above are two of the underside partitions separating the band-setters. The third partition is shown in Fig. 10. The upper unit is placed nearest the rear of chassis.*

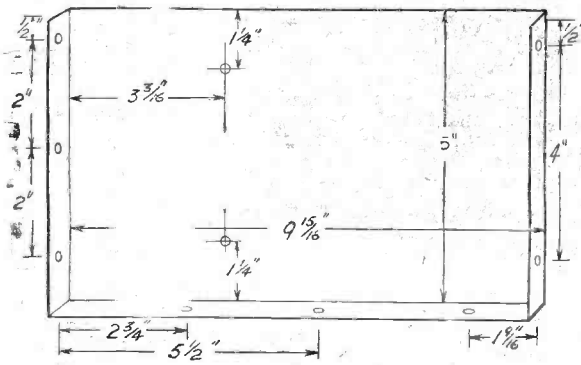
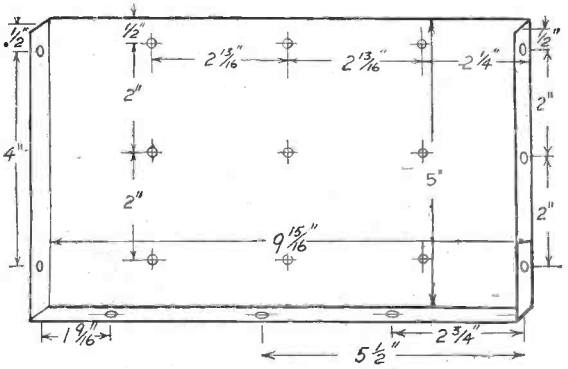



*Fig. 4. — These are the two long partitions enclosing the I.F. and second detector stages. The unit on the right is bolted to the partitions separating the bandspread condensers. Note carefully the direction of the turned-up edges. The two-hole turn is attached subsequently to the panel.*




the .0001 mfd. condenser soldered to the two tags provided and two lengths of connecting wire attached to the lugs of the condenser and left standing vertically for subsequent connection to the B.F.O. tuning condenser. The B.F.O. screen may then be bolted in position to complete assembly. It is preferable to carry out as much of the wiring as possible before the panel is placed on to avoid marking this, and in one or two points it will be

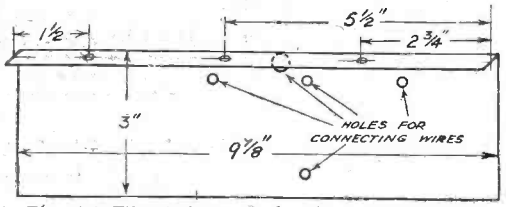



*Fig. 5.—This partition is for the underside of the chassis and separates the band-setting condenser.*

bent out so that the screened lead used to connect the first valve to the H.F. gain-control could be led along the side of the chassis. An alternative scheme is to cut out the corners. The exact position of the screened lead will be shown in the Wiring Diagram to be published next week, and it may be seen on the left of the illustration Fig. 1. Owing to pressure on our space, the chassis drilling has had to be held over this week, but for those who wish

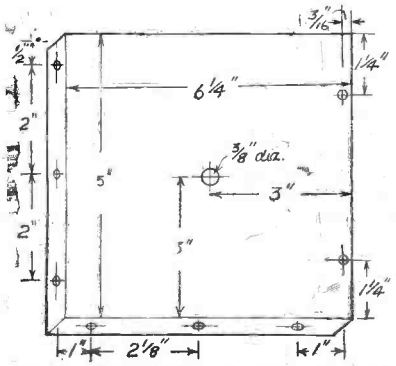



*Fig. 6.—These are the supports for the bandspread condensers. Three of these have to be made, and all are identical. The central hole must be exact to enable the condensers to be mounted in line.*

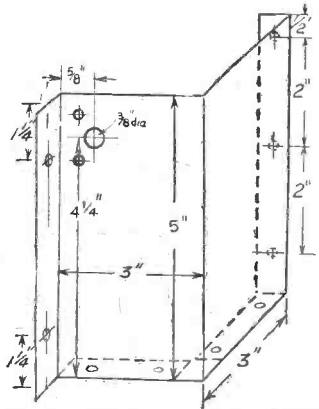



*Fig. 7.—This is part of the B.F.O. screen. It is attached to the right-hand screen in Fig. 4, and at the rear to Fig. 8.*

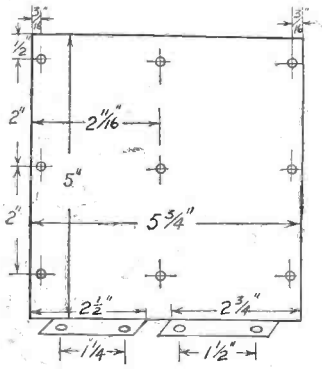



*Fig. 8.—This section encloses the rear of the I.F. screens (Fig. 4) and is also attached to Fig. 7.*

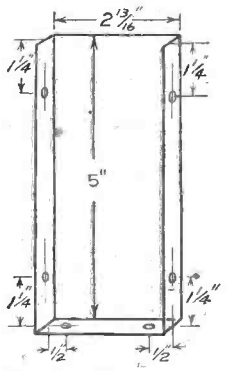



*Fig. 9.—Two units as above are required and are used to bond together the three screens, shown in Fig. 6.*

found impossible to complete assembly until wiring has been done.

The coilholders in the front and rear section must be raised so that they clear the moving vanes of the condensers mounted beneath them. The simplest way of obtaining the necessary height is to run a nut on the bolt after the bolts have been placed through the holder, and then to attach them to the chassis in the ordinary way. Make quite certain that the coil sockets then clear the condenser and allow a slight

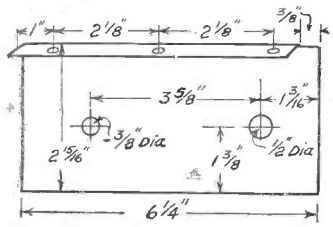



*Fig. 10.—This is the remaining under-chassis screen and is placed nearest the panel.*

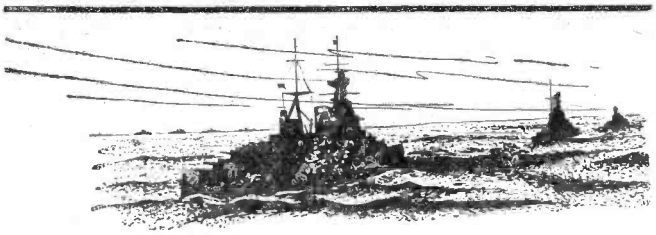
distance for any thickness the wiring may be raised by soldering.

Attach the short length of flex to the earth socket before mounting the A.E. strip, and drill a small hole to enable the flex to pass through so that the plug is on the outside of the strip. Cut off the flex to such a length that the plug may be inserted into the socket marked A.2. The components which are locked to chassis and panel must, of course, be placed into position after the panel has been drilled and care should be taken to see that the holes in both register accurately. The mains transformer should, of course, be left until last to enable the chassis to be turned about easily, and the meter should be left off the panel until the end to avoid any risk of damage to it.

In the original model the corners of the lower screens shown in Figs. 3 and 10 were

to commence the constructional work the screens may be made up and drilled. The chassis is, incidentally, cut from a sheet of metal measuring 22in. by 16in.

**Chassis Drilling Details and Wiring Diagram will be given in next week's issue.**

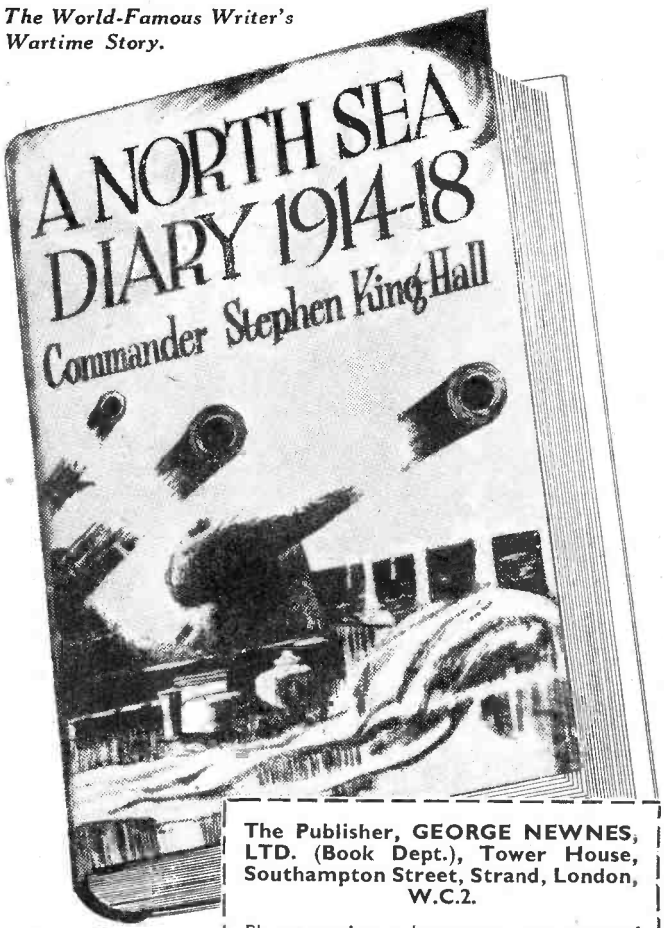


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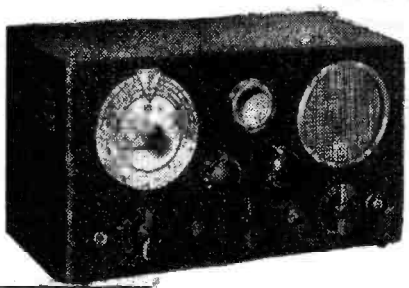
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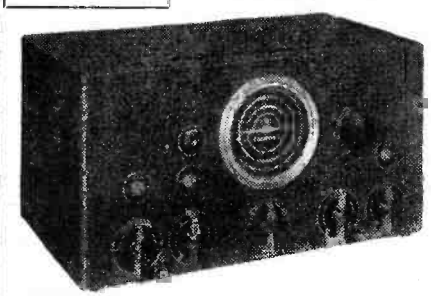


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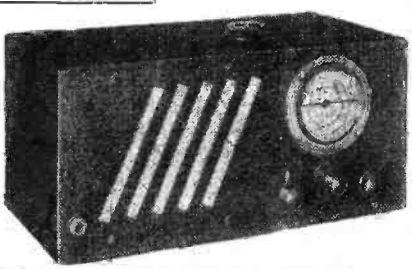


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# Leaves from a Short-wave Log

### Escalps S.-W. Station

A SMALL short-wave transmitter to work on 25.35 m. (11.835 mc/s) has been officially inaugurated near Escalps (Republic of Andorra); it will broadcast daily in French, Spanish and Catalan. Programmes are S.B. on the medium-wave station.

### Altered Call Signs

IN future, such familiar calls as W2XAF and W2XAD from the General Electric Company's transmitters at Schenectady (N.J.) will no longer be heard, as they have now been changed to WGEO and WGEA respectively. Other alterations in U.S.A. short-wave stations are WPIT (W8XK), East Pittsburgh; WCAI (W3XAU), Philadelphia and WBOS (WIXK), Boston, (Mass.).

### Broadcasts from Costa Rica

WITH the exception of TI4NRH, installed at Heredia, all Honduras transmissions emanate from the capital, San José. The principal stations are as follow: TIEP, *The Voice of the Tropics*, 31.21 m. (9.6 mc/s); TIRCC, 45.8 m. (6.55 mc/s) operated by the local Catholic Association: TIGPH, *Alma Tica*, 51.55 m. (5.83 mc/s); TI2XD, *The Voice of the Republic*, on 25.17 m. (11.9 mc/s); TIEM, *The Soul of America*, 29.87 m. (10.04 mc/s); TILS, *Radio Para Ti* on 50.8 m. (5.9 mc/s). TI4NRH, Heredia, is now said to be broadcasting on 31.02 m. (9.67 mc/s).

### And from Honduras

THE main short-wave stations in the capital city, Tegucigalpa is HRN (*The Voice of Honduras*), on 51.06 m. (5.87 mc/s). At La Ceiba, HRD2 (*La Voz de l'Atlandida*) on 48.12 m. (6.33 mc/s) provides the programmes for distant listeners. In addition, at San Pedro Sula the *Echo of Hunduras* (HRP1), broadcasts with a power of 100 watts on 47.24 m. (6.35 mc/s).

### Managua in the Log

ON a recent date a transmission from Nicaragua detailing in the English language the proceedings of a Central American Congress was picked up from YNLL (*The Voice of Nicaragua*) in the capital city, Managua, and working on 31.06 m. (9.66 mc/s), also through the Government station YNMA, on 31.35 m. (9.57 mc/s). Other Nicaraguan transmitters which are regularly on the air but seldom heard in the British Isles are YNGU, 32.26 m. (9.3 mc/s); YNLG, 45.39 m. (6.61 mc/s); YNIGG, *The Voice of the Lake*, 45.91 m. (6.53 mc/s); YNOD, *The Latin Wave*, 41.63 m. (7.2 mc/s), and YNPR, on 34.92 m. (8.59 mc/s) all situated at Managua.

### Erase From Your Lists

THE following Mexico City stations have suspended their broadcasts: XEXR, 49.46 m. (6.065 mc/s); XEXS, 48.39 m. (6.2 mc/s) and XEGW, 49.1 m. (6.11 mc/s). Latest lists show that the transmitters now working in the Mexican capital are as under: XEBT, *El Buen Tono*, 50 m. (6 mc/s), 500 w.; XECR, 40.65 m. (7.38 mc/s), 20 kw; XEWI, *Radio Mex*, 49.88 m. (6.015 mc/s), and, occasionally on 25.21 m. (11.9 mc/s), 400 w.; XEUZ, 48.94 m. (6.13 mc/s), 100 w.; XEWW, *The Voice of Latin America* on 19.79 m. (15.16 mc/s), 31.58 m. (9.5 mc/s) and 49.34 m. (6.08 mc/s) with a power of 10 kilowatts; XEYU, 31.25 m. (9.6 mc/s), 250 watts operated by the National University of Mexico and XEXA, on 48.92 m. (6.133 mc/s), 100 watts with occasional transmissions on 25.25 m. (11.88 mc/s).

### Radio Macentra

IT is reported that the French Colonial authorities have opened short-wave transmitters at Konakri (French Guinea-West Africa). The call-signs and channels allotted are: TXC5, 51 m. (5.882 mc/s); TXC6, 40.5 m. (7.407 mc/s), and TXC7, 34.5 m. (8.695 mc/s) in the traffic band.

### Curacao Changes Wavelength

*RADIO CUROM*, the 150-watt station at Willemstad, Curacao (Netherlands West Indies, has changed its channel from 31.67 m. (9.473 mc/s) to 32.95 m. (9.106 mc/s). The broadcasts now take place on weekdays between G.M.T. 1136-1336, and on Sundays from 1536-1736, the odd minutes being accounted for by the fact that standard time is four hours and twenty-four minutes *behind* G.M.T. Four chimes may be heard as interval signal and the studio closes down with the Netherlands national anthem. Willemstad is roughly distant from London by 4,400 miles.

# *TELEVISION FROM RADIOLYMPIA*

TELEVISION is much to the fore at the Radiolympia Exhibition, where more than fifty sets are continuously in action in the Television Avenue throughout the day, taking either the B.B.C. studio programmes from Alexandra Palace, relays from the Radiolympia theatre, or closed circuit relays which are not radiated to home-viewers.

The Radiolympia theatre is a reproduction of the famous "Hollywood Bowl," and has been specially designed so that every member of the audience gets an uninterrupted view of the special revolving stage. It is unique in that it is the first theatre ever to be built solely for sound and television broadcasting.

As in 1938, "Come and be Televised" is a daily morning feature of the Exhibition. Jasmine Bligh and Elizabeth Cowell, the two television announcers, are "at home" at Radiolympia during the mornings from 11 a.m. to 12 noon to welcome in front of the television cameras members of the public who would like to meet them personally. Visitors will be encouraged to chat informally to Miss Bligh or Miss Cowell on any subject which may appeal to them—their job, for instance, their holidays, or their hobbies. Amateur singers, impersonators, dancers and pianists are also invited to demonstrate their skill.

These interviews are broadcast to home viewers from the B.B.C. transmitter at Alexandra Palace and are a daily morning feature during the entire run of Radiolympia. The interviews are informal, visitors being introduced by a parlour-maid just as though they were dropping in for a chat at the announcers' own homes.

Home viewers and visitors to the Exhibition will be entertained by a whole galaxy of stars who will twinkle in the Olympia firmament. Bobby Howell and his Band will play throughout the Exhibition. The Kentucky Minstrels, with Harry S. Pepper and Doris Arnold, will be an almost daily feature, with a banjo accompaniment by Troise and his Mandoliers. Other popular radio and television stars taking part will be the Gordon Radiolympia Girls, C. Denier Warren, Adelaide Hall, Murray and Mooney, Ike Hatch, Scott and Whaley, Nosmo King and Hubert, and C. H. Middleton, just to mention a few.

Joan Miller and Leslie Mitchell are seen on the stage in "Picture Page," one of television's most popular items, and visitors to the Exhibition will be able to watch interesting personalities interviewed before the television cameras.

Production of the stage shows is in the hands of Jack Swinburne, while Harry Pringle is in charge of the television presentations, assisted by Eric Boseley and Arthur Ozmond, studio managers at Alexandra Palace.




**Mr. R. F. Campbell** has been appointed sub-editor in the B.B.C. overseas department. Mr. Campbell is at present Reuter's chief correspondent in Poland. He joined Reuters in 1936 and went to the Berlin office in 1937.

**H. T. Stott**, chief technician on the staff of A. F. Bulgin and Co., Ltd., has been elected to the board of this Company. Mr. Stott has been on the executive staff of the firm for the past eight years, and is well known in the radio industry.

**C. D. Wetton** has been appointed to the Board of the Radio Gramophone Development Co., Ltd.

A COMPLETE LIBRARY OF STANDARD WORKS.

By F. J. CAMM.

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All obtainable from or through Newsagents or from Geo. Newnes, Ltd., Tower House, Southampton St., Strand, W.C.2.

# THE TRIO-PEN THREE

## Further Constructional Details of This Simple All-wave Three

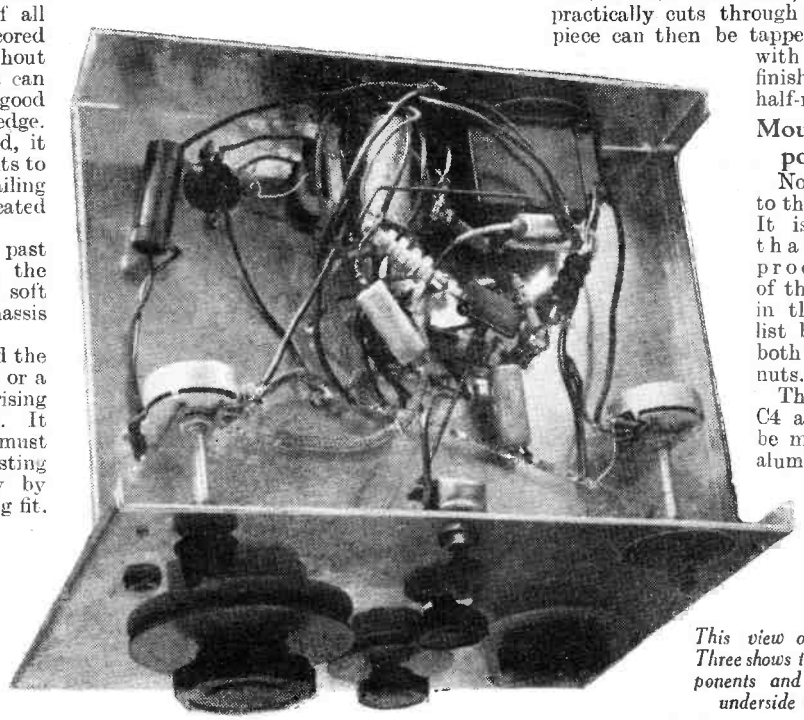
FOR the chassis a sheet of aluminium should be obtained, and first of all the bending lines scribed and scored sufficiently to facilitate bending without over-weakening each section. This can be accomplished quite simply with a good penknife blade and a steel straight edge.

If metal-cutting shears are to hand, it will be found a matter of a few moments to cut out the " V " pieces as indicated; failing this the cutting lines should be indicated and a suitable saw used.

As frequently pointed out in past issues when fashioning the chassis, the surface should be protected with a soft cloth, and the underside of the chassis used for scribing and drillings, etc.

It will be found quite simple to bend the flanges and runners if lengths of wood or a suitable vice is used methodically, prising over the various sections by hand. It should be pointed out that the flanges must be bent over before the runners, adjusting the final alignment when necessary by filing the " V " section to obtain a snug fit.

A quick method for making the large diameter holes in the front panel and chassis is to make first of all a small drilling to take the point of a woodworkers' brace bit of as near the diameter required as possible. Then, after packing the chassis under the drilling with suitable pieces of wood, the holes can be cut first one side of the chassis then the other, until the bit practically cuts through; the centre-piece can then be tapped out cleanly with a cold chisel, finishing off with half-round file.



*This view of the Trio-Pen Three shows the layout of components and wiring on the underside of the chassis.*

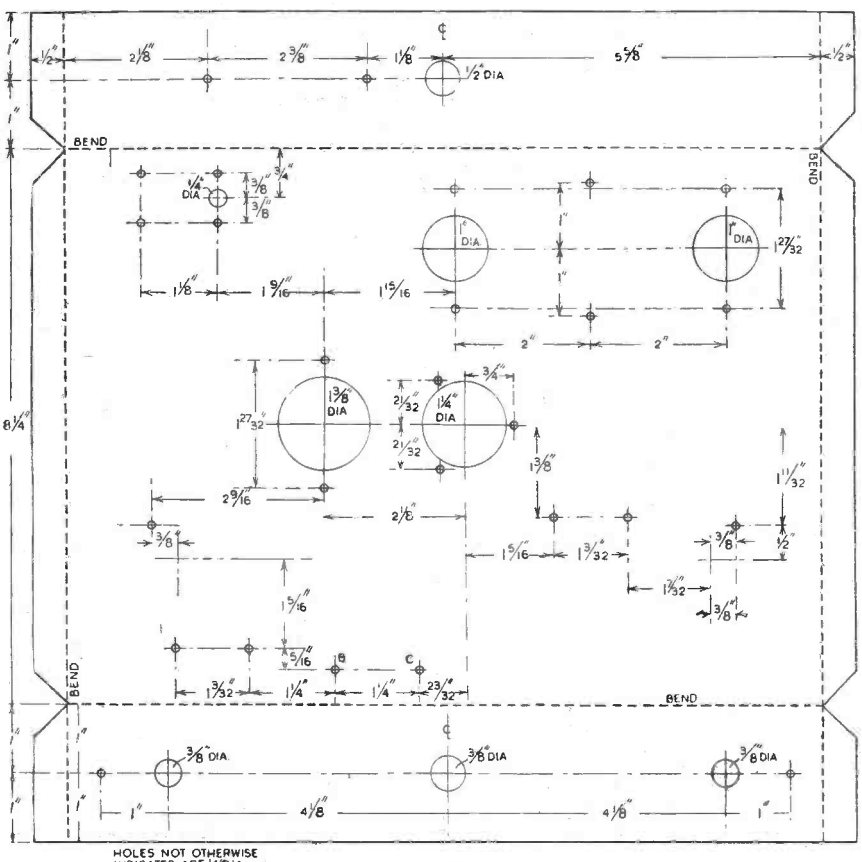
### Mounting Components

Now with regard to the components. It is essential that shake-proof washers of the type quoted in the component list be used under both bolt head and nuts.

The condensers C4 and C6 should be mounted on the aluminium bracket complete with the epicyclic drive and the flexible coupling, then on mounting the front panel, the volume-control and key-switch, and two end fixing bolts, this condenser mount can be accurately centred prior to clamping down.

The 'phone jack, reaction condenser, and bandspread condenser should then be fitted, making sure in the case of the bandspread condenser that the dial, neatly and as closely as possible, fits flush with the vernier indicator.

In the case of the bandset condenser C1, this similarly applies with regard to the hair-line indicator, and as this particular indicator is exactly the same as that used in the original Trio-Pen Short-Wave Two detailed in the November 12th, 1938, issue, readers are referred to the diagrams in Fig. 2 of that issue.




*Drilling diagram for the chassis*

### Slow-motion Drive

For the slow-motion reaction drive and dial, an Eddystone type 1027 dial plate required modifying by simply enlarging the fixing hole in the centre to 1in. in diameter. The drive is soldered to the two fixing nuts of the bolts securing this dial plate to the front panel, and in order that the flange of the epicyclic drive may protude sufficiently through the panel drilling for fitment of the pointer, which is supplied with the drive, the dial fixing bolts and nuts, which are 6BA Csk., require filing down, otherwise the pointer may foul the dial plate in its movement.

The fitment of the remainder of the components is quite straightforward and the wiring will be dealt with next week.

# The British Long-Distance Listeners' Club

News from Members and Headquarters. Preliminary Details of New Features and Awards and a Special Appeal to Those Members in London, Kent, Essex and Middlesex

IT is only fitting that the progress of the journal which sponsors the B.L.D.L.C. should be registered by some progress in the activities of this movement: therefore, with the second issue of the new PRACTICAL WIRELESS, we are able to announce certain items which we feel will meet with the approval of all members. To commence with, we are going to have a membership campaign. The membership list becomes larger and larger each week, but with the very definite and amazing increase in circulation figures, which, incidentally, is going to be accelerated considerably by the *new* PRACTICAL WIRELESS, it is obvious that quite a number of readers are missing the real thrill of long-distance listening by not signing up with the B.L.D.L.C.

Those readers who are members naturally want to see the movement get stronger and stronger and offer more facilities, support and encouragement to the real enthusiasts. Do you realise what you can do towards bringing these desires into actual being? How about those friends of yours who are interested in S.W. or medium-wave DX work; transmitting or construction? Couldn't you show them this issue and get them sufficiently interested to join you on the membership list?

As you will see later, the more members in any one area, the greater will be the enjoyment and activities of that section. To those who are not already members, we can only say, if you are really interested in your hobby of radio, send up at once for a membership certificate, *there is no entrance fee to pay*, and join in the programme of activities specially arranged for B.L.D.L.C. members.

## The A.E.L. and A.C.R.

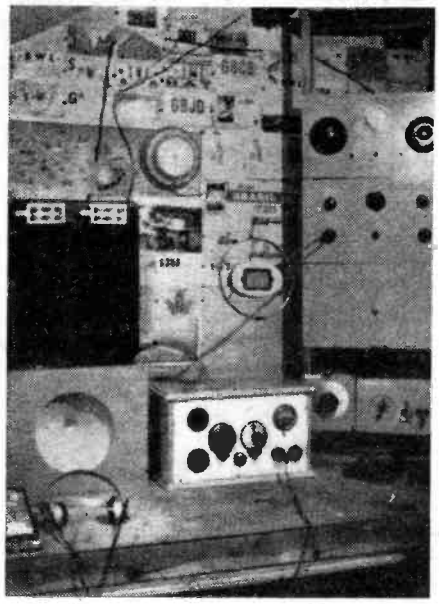
In the past, we have given an acknowledgment to all members who have sent in QSL cards from stations they have received which have been situated in the five continents, that is, one from each continent, and the acknowledgment was known as the A.E.L., or in full, All-Empire Listening.

The fact that a member obtained QSLs from each continent shows that he must be a keen and efficient S.W. listener; therefore, to make our appreciation of his interest and skill more fitting, we have decided to award in future a real certificate, of most suitable design, which will be worthy of display in any radio den. This award will be known as the A.C.R., which stands for All Continents Received.

So that present holders of the A.E.L. will not have to compete afresh for this, we are arranging to replace their existing A.E.L. acknowledgments with the certificate mentioned above. All members wishing to take advantage of this must send in their A.E.L. acknowledgment, together with three-halfpence in stamps, before September 9th, 1939. Envelopes must be marked B.L.D.L.C.

## Money for Members

In the business world, it is not unknown for a firm to have "sleeping partners," or, in other words, those who do not take an active part in directing or furthering the business of the firm. In an amateur non-commercial movement such as the B.L.D.L.C., we do not want members who are "sleeping members." The whole life of the movement, if it is to offer facilities, instruction and render possible the exchange of views and ideas, depends on the active support of *all* its members. While admitting that our postbag is pretty full, it is not good enough, so as an encouragement to those who hesitate about keeping us and all other members informed of their activities, we are now offering, through the generosity of the Editor, 10s. 6d. each fortnight to the writer of the most interesting letter describing his experiments, designs, constructional work or station operation. The letters should not be *longer* than, say, 300 words, and photos or drawings will, of course, add additional interest to the written matter. This incentive will start from September 2nd, so get busy.



*Tidiness is a* sine qua non *in the serious listener's den, as exemplified in the station layout illustrated above and operated by Mr. H. Simpson, of Bradford.*

## And Another Award

The question of inaugurating listening periods for our members has been stressed a great deal lately by many members, and below we give but one typical reply to "J. W., of Purley" whose suggestion was recently published. It is from Member No. 6,280, of Oxford, who says: "I agree wholeheartedly with J. W. and hope many other members have also written in agreement. The suggestion that you should write half a page of interesting DX news is a very good one indeed, and I hope you take note of it.

"I also think that if you held listening periods, say two a week at different times to suit all members, it would give to the Club a very keen interest and would soon increase the number of members."

Well, the idea is quite sound, provided QSL cards are sent in to prove reception. Without these, the whole suggestion would be useless, so for the present, and to indicate that we do value suggestions, we have decided on the following simple arrangement.

Every fortnight, that is from the date of publication of this issue, we will give one book free to the member who sends in the best five QSL cards, provided they have been received by him within *one month*. The points which will count will be distance, time of reception, and type of receiver used.

All cards submitted for this award *must include a stamped-addressed envelope* for their return.

Space prevents further explanation, if such is needed, in this issue, so if you want to swell your library with a good text-book, start sending for those QSL cards, but *don't forget* to also send a Reply Coupon with your report to the stations concerned.

## Members in London, Kent, Essex and Middlesex

As mentioned above, we want active members, so we have arranged to check our records in the following manner and find out if all are still interested in their hobby. Will all members in the London postal area and the above counties kindly send us a postcard giving their present address, membership number and the letters "S.W." if they are chiefly interested in S.W. reception; "General" if medium and long waves, and "T" if transmitting is their strong point. Will you please undertake to do this as quickly as you can, and thus prove that you are at least active in the interests of the movement. By the way, these details are also going to enable us to arrange matters so that the B.L.D.L.C. will soon be in a position to offer you real attractions and facilities.

### AIMS OF THE B.L.D.L.C.

THE purpose of the club is solely to bring together all those listeners who specialise in the reception of stations situated in distant parts of the world. It is intended to form a community of kindred minds, and its aims are encouragement of DX reception, mutual help and comradeship.

The B.L.D.L.C. has no commercial aims. Membership is free. Members can, therefore, still belong to all other similar clubs with similar aims without further incurring any additional financial responsibility through their membership of the B.L.D.L.C.

In order to give members the opportunity of exchanging ideas, the services of the entire technical staff of PRACTICAL WIRELESS are placed at the disposal of every member.

PRACTICAL WIRELESS, furthermore, will set aside a special section in which reports of reception, constructive articles, information, etc., and the internal affairs of the club will be discussed.

### ADVANTAGES OF MEMBERSHIP

1. No enrolment or membership fees.
2. Organisation centred in Great Britain.
3. Standardised log-books and verification sheets and badges available for members at reasonable prices.
4. Regular reports in PRACTICAL WIRELESS.
5. Interchange of ideas with fellow members.
6. Members in same district placed in touch with one another when desired.
7. Special meetings and visits to be arranged.
8. Regular problems for short-wave listeners.
9. Members' competitions and numerous other advantages to be announced.
10. Members are expected to show an active support of the Club by communicating with Headquarters periodically, concerning their experiments, logs or general radio work. They are also expected to co-operate with other members in their area to the extent of furthering the progress of their common interests in radio matters.

# PETO-SCOTT NEW PROGRAMME

## Details of the New Receivers and Accessories Now Being Marketed by Messrs. Peto-Scott

ALTHOUGH not exhibiting at Radiolympia, Messrs. Peto-Scott are still actively producing receivers and aids for the keen constructor, and on this page we show three of the lines which are of prime interest. Communication receivers are available in several types, from a simple three to an eight-valve A.C. model. The latter, known as the Trophy 8, is shown below and this incorporates one of the EF8 low-noise H.F. pentodes, followed by international octal valves. It incorporates a B.F.O. stage, separate H.F. oscillator, A.V.C. and 'phone jack. The price is £12 12s. cash, or £14 14s. with matched speaker. At the top of this page is the Trophy 6, a Junior communication model for A.C. operation, with a separate dial electrical bandspreading, as distinct from the mechanical bandspread device of the Trophy 8. The Trophy 6 also has a B.F.O., but the input is a triode-pentode. A headphone jack is also provided, and as in the "8" this is in the output circuit. The controls fitted to the Trophy 8 are, in addition to tuning and bandspreading, A.V.C. on/off, B.F.O. on/off, band selector, A.F. gain and pitch-control, whilst the usual send receive switch is also fitted.



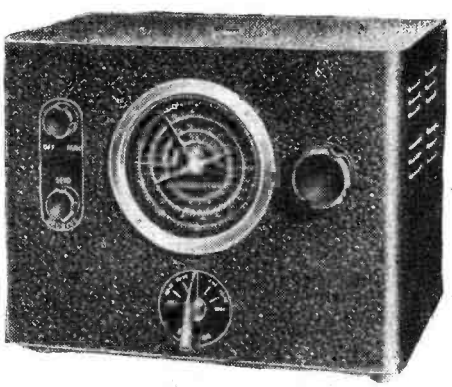
*This is the Trophy 6—An A.C. communication receiver with electrical bandspread.*



*In this Trophy 8 mechanical bandspread is employed.*

An important aid with some of the standard types of receiver is a pre-selector, and there are not many pre-selector units available in this country—other than those of American manufacture. On the right is a two-stage pre-selector for mains operation also produced by Peto-Scott. This embodies two H.F. stages and a complete mains section, the valves used being the "E" series low-noise H.F. pentodes and a standard full-wave rectifier. Mechanical bandspread is included, and the controls comprise tuning, combined gain and on/off, wave-range selector, and send-receive switch. Provision is made for a single lead or a doublet lead-in. The pre-selector may be used with any straight or superheterodyne receiver, and all that has to be done is to transfer the aerial and earth leads from the receiver to the pre-selector and two further leads are then joined from the pre-selector to the receiver (aerial and earth sockets). The price is £6 15s.

All of the Peto-Scott products are available on easy payment plans, and the range of Trophy receivers, with prices, are as follows: **Trophy 8**—Cash price £12 12s. Deposit 15s. 6d. and 18 monthly payments of 15s. 6d. With matched speaker, Cash price £14 14s. Deposit 18s. 9d. and 18 monthly payments of 18s. **Trophy 5**—Cash price £9. Deposit 10s. 9d. and 18 monthly payments of 10s. 9d. **Trophy 3**—Cash price £6 6s. Deposit 7s. 6d. and 18 monthly payments of 7s. 9d. **Trophy 3**—Cash price £5 15s. Deposit 7s. and 18 monthly payments of 7s. **Trophy 6**—Cash price £9 19s. 6d. Deposit 12s. 6d. and 18 monthly payments of 12s. 3d. **Trophy Pre-selector**—Cash price £6 15s. Deposit 11s. 9d. and 12 monthly payments of 11s. 7d.



*This is the 2-stage Pre-selector.*

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### GOODMANS' LOUDSPEAKERS

"THE Attainment of an Ideal" is a very suitable title given by Messrs. Goodmans to their twenty-page booklet which describes their latest loudspeakers.

The first eight pages of the brochure deal with the specification which has to be kept in mind to enable "High Fidelity" to become commercially possible and this, incidentally, forms very interesting reading. One is apt to overlook all the considerations which have to receive most careful thought, and too little appreciation is given to the finer details which differentiate between a speaker and a scientifically designed and produced Goodmans' loudspeaker.

Other pages deal with the complete progress of the speaker through the factory, indicating the numerous tests and examinations which have to be satisfied before the product is passed as being up to the high standard associated with this firm's reputation.

The remainder of the booklet gives complete specifications of the various models, together with prices.

### G.E.C. TELEVISION RECEIVERS

THOSE interested in television should most certainly make a point of getting hold of a copy of the latest catalogue of television receivers produced by the G.E.C.

The letters G.E.C. have been associated with the development of all matters connected with electricity for over fifty years, and in view of the laurels which already adorn the standard of G.E.C., it is only natural for their television equipment to rank high in the list of such apparatus.

The catalogue, which contains complete details of four models, shows how it is possible for the modest outlay of 22 guineas to secure an Add-on Television Unit which, when used in conjunction with an efficient broadcast receiver, will provide both television sound and vision.

For those requiring a more elaborate installation, a model is described, price 72 guineas, which provides vision, sound, push-button control for ordinary broadcasting transmissions and, to complete the specification, an automatic record-changing gramophone equipment.

### DUBILIER CONDENSERS

ONE catalogue which should be in the possession of every constructor is that issued by Messrs. Dubilier. It is formed by thirteen pages of most interesting details concerning the numerous products for which this firm is famous.

Fixed condensers of all sizes and ratings, fixed and variable resistances, suppressors for use on electrically ignited internal combustion engines, such as those used for cars, motor-boats or small electric lighting plants, power resistances and faders, give some idea of the items contained in the catalogue.

One page which will prove most useful to the constructor is that which gives a Calculator by means of which one can determine, almost at a glance, anything related to Ohm's Law.

When you are at Radiolympia, be sure you secure your copy of this most useful booklet.

### PREMIER RADIO

THE catalogue for this season received from Messrs. Premier Radio Co. is larger and more comprehensive than their previous issue, and that in itself is saying a great deal.

One hundred and eleven pages are devoted to describing and illustrating in a most generous manner components, receivers, amplifiers and all equipment associated with radio work, whether reception, transmitting or power amplification.

Cabinets, valves—complete with full data—car-radio, communication receivers, complete transmitters, and small parts down to wire and nuts and bolts, cover but the extremes of the wide range of products which are detailed in the numerous pages which form this most useful catalogue and reference book.

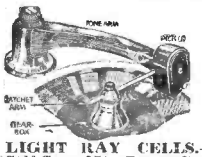
When one examines it in detail, one has to appreciate that no amateur's library would be complete without a copy of this work, which can be obtained from Premier's for the very nominal fee of sixpence.

### JACKSON BROS. CONDENSERS

MESSRS. JACKSON BROS., so well known for their variable condensers, have also sent in their latest list, and as this covers all types suitable for reception and low-powered transmitters, whether broadcast or short waves, it will prove very handy when the time comes to select an efficient component of this class. Several types of slow-motion drives are also illustrated, and while prices are most reasonable, the quality of the finished articles are well up to the high standard associated with this firm.

# ELECTRADIX

**OUR 10lb. PARCEL OF EXPERIMENTERS' ODDMENTS AT 5/- POST FREE IS THE BEST BARGAIN EVER.**



**DISC RECORDING FOR MANY USES.**—Electric FEIGH set has ball bearing centre box and geared traverse rod. Set with Tracking Gear, pick-up and Tone-arm fitted diamond. Fitted on a Radiogram enables hams to hear their own fist. **37/6.**

**LIGHT RAY CELLS.**—Selenium. **7/6.** Photronic Self Gen., 25/-. Raycraft outfit with relay and amplifier, **45/-. Photocells,** for sound on Film, Television and Ray Work. R.C.A., 25/- ; G.E.C., **£3/10.** Beck Angle Prisms, mounted in carrier, **5/6.** Eyepieces with prism and lenses for photocell inspection, **12/6.** New £5 X-ray Tubes, 15/-. **MIRRORS.** 5in. dia., Helio or Television, **1/6.** Parabolic Concave, 20in., 25/- ; Carr. fwd. Neon Lamps, 2/6 and 3/- each, with holder, Miniature Neons, **2/6.**

**CRYSTAL SETS.** Need no battery, work on mattress aerial. 5/6 and 7/6. House 'phones, table and wall, 15/-. **Bells.** Desk type with movement in gong, **2/6.** Wall bells, 3/-. Large size, **7/6.** Large ironclad, single stroke, 15/-. Mains outdoor fire alarm bells, 10, **17/6. Bell Pushes, 6d.** Heavy brass, 1/-. **Bell Wire,** Twin, 3/- 100 yds.



**HEADPHONES.** Light weight, 2,000 ohms **4/6.** Single high res. earpieces, **2/6.** Sullivan 120 ohm. W.D. model. Aluminium body and headbands. Maker's price to-day, 15/-. Our price **2/9** per pair. 3d. postage.

**VALVES.** Midget Peanut, 1 volt, 4-pin, 1¼" long, new, 2/- each, or 12/- dozen. 30 watt A.T.40, **2/6.**

**DYNAMOS and Switchboards** from 50 watts to 5 kW. 500 volt, 500 watt Petrol Engine Electric Sets for A.R.P. emergency, **£14/10/-.** 30 volt, 150 watt, **£11/10/-**

**A.R.P. ACCUMULATORS** at 6d. per cell, 3 amp. standby for HT in 24 volt 3 A.H. crates. Solo units. Suit parallel 12 volt charging. Only **6d. per 2-volt cell.** Any value up to 400 volts. Great bargain at 3d. per volt. **KEEP YOUR BATTERY FULLY CHARGED!**

**RADIO AND CAR CHARGERS.** The **A.C. NITNDAY** will keep your battery fit without attention. Model N/A6 100/250 volts A.C. and D.C. 6/8 volts ½ amp., 15/-. Model N/B6, 100/250 volts to D.C. 6/8 volts 1 amp., **25/-.** Model N/C6, 100/250 volts to D.C. 6/8 volts 2 amps., **35/-.** Model N/D12, 100/250 volts to 12 volts 1 amp., 32/-. Ditto, 12 volts 2 amps. with 6-volt tap, 55/-. ; 5 amps. **£4/10/-.**

**LARGE IMMERSION HEATERS** for tank or bath, 1,000 watts. With flex, cord, **25/-.**

**BUZZERS. BUZZERS. BUZZERS** for all purposes. The well-known robust Model D. For Morse Practice or Signals. Now supplied for 1/- only. **Morse Practice Sets,** No. 3, with key buzzer and lamp for sound and visual line plug, etc., **7/-.** Sound Type, 1A type key and buzzer, 3/-. Visual Type 2A, key and lamp, **2/-.**

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# LATEST PATENT NEWS

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

## Abstracts Published.

**TELEVISION RECEIVERS.**—White, E. L. C. No. 505764.

Line and frame sychronising signals, distinguished by duration, are isolated by a valve 1 (Fig. 1) and applied to an inductance 11, the current in which grows to a value dependent upon the duration of a signal. At the end of the signal, the inductance 11 and shunt capacity 7 oscillate to give a pulse at 13 whose amplitude depends on the duration of the synchronising signal. The larger amplitude pulses correspond to frame synchronising signals and are isolated by an amplitude filter or the whole train may be applied to a frame deflecting oscillator biased to respond to the larger pulses only. The oscillator may be of the type described in Specification 402629. The line deflecting oscillator may be controlled by pulses from 12, or 14. The condenser 7 may be the distributed capacity of the inductance. The inductance is preferably damped by a resistance 10. Specification 455375 is referred to.

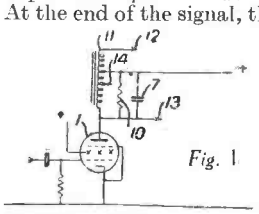



*Fig. 1*

*Reference has been directed by the Comptroller to Specification* 484412.

**WIRELESS RECEIVING SYSTEMS.**—Kinross, R. I.—No. 506063.

In order to balance out interference from atmospherics, etc., the aerial downlead 2 (Fig. 2) and a dummy downlead 3 are connected to the ends of the primary 5 of an input transformer 6 the centre tap of which is earthed. The transformer has a high permeability core. For accurate balancing, a resistance 10 or 11 and condenser 4 are connected in the primary circuit. Specifications 376670 and 481806 are referred to.

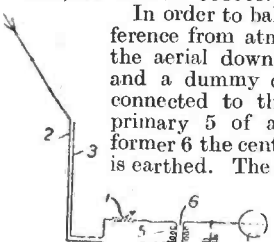



*Fig. 2*

**WIRELESS RECEIVING SYSTEMS.**—Lee, E. M. Stratford, F. R. W. Stedman, H. G., and Belling & Lee, Ltd. No. 505838.

A receiving aerial 1 (Fig. 3) is connected through the primary 2 of a transformer and lead 3, to earth, the secondary 5 being connected through an unscreened feeder

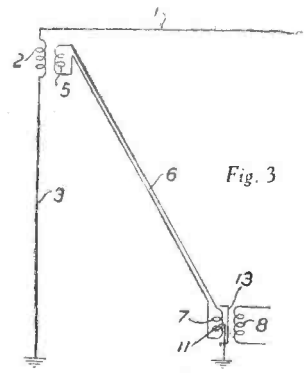



*Fig. 3*

6 to a further transformer, whose primary 7 has an earthed centre tapping 11 and is electrostatically shielded by a screen 13 from the secondary 8, which is connected to the receiver.

*Reference has been directed by the Comptroller to Specification* 427886.


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**By F. J. CAMM**

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# 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.

22543.—Baird Television, Ltd., and Baird, J. L.—Television systems. August 3.

22680.—Burndept, Ltd., and Richardson, R. P.—Electric batteries. August 4.

22476.—Keeling, C. H.—System for the reception of television, etc., signals. August 3.

22531.—Scophony, Ltd., and Okolicsanyi, F.—Television receivers. August 3.

22530.—Scophony, Ltd., and Sieger, J.—Television receiving-apparatus. August 3.

22979.—Standard Telephones & Cables, Ltd., and Smyth, C. N.—Magnetic deflecting systems for cathode-ray tubes. August 9.

*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.*

### Specifications Published.

510522.—Oelsner, W. (trading as Oelsner & Co., W.).—Acoustical arrangements for studios and concert halls.

510523.—Groves, W. W. (I.G. Farbenindustrie Akt.-Ges.).—Production of subtractive multi-colour photographic pictures.

510360.—General Electric Co., Ltd., Bloch, A., and Wells, G. M.—Tuning means for wireless receiving apparatus.

510530.—Baird Television, Ltd., Jones, V. A., and Nuttall, T. C.—Optical systems for television.

510531.—Baird Television, Ltd., and Merdler, L. R.—Synchronisation of oscillation generators.

510388.—Golviznin, V. S.—Radio frequency inductance coils and the like.

510408.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken. Protecting envelopes for high-tension discharge tubes.

# Radiolympia Conventions

THE following arrangements have been made for the Conventions which are to be held this week at Radiolympia. Two of these are open to dealers only, while the remaining four are open to both dealers and members of the general public.

Admission to the Popular Technical Conventions is open to any visitor to Radiolympia and no special tickets are required. To the Dealers' Television Convention admission is by special ticket, while to the other Dealers' Convention admission is open to those holding a dealer's season ticket for admission to Radiolympia or a trade card.

### Dealers' Convention—1

Wednesday, August 30th, 1939, 3.30 p.m.

*Subject :*
Retail sales promotion.

*Chairman :*
Sir Cecil Graves, K.C.M.G.

### Dealers' Convention—2

Thursday, August 31st, 1939, 3.30 p.m.

*Subject :*
Wavelength changes.

*Chairman :*
Sir Herbert Morgan, K.B.E.

*Speakers :*
Sir Noel Ashbridge, B.Sc., M.I.E.E.
Mr. W. E. Miller, B.A. (Cantab.), M.I.W.T.
Mr. Paul D. Tyers.

*Others on Platform :*
Members of the R.M.A. Exhibitions Committee, Mr. A. C. Crane, The Chairman (or his representative) of the National Association of Radio Retailers, The Chairman (or his representative) of the Wireless Retailers' Association.

### Popular Technical Convention—1

Monday, August 28th, 1939, 3.30 p.m.

*Subject :*
British technical progress and some comparisons with America.

*Chairman :*
Major L. H. Peter, M.C., A.F.C., A.M.I.E.E. (A Vice-President of the Radio Manufacturers' Association).

*Speakers :*
Mr. M. G. Scroggie, B.Sc., A.M.I.E.E.
Mr. T. E. Goldup, A.M.I.E.E.
Mr. G. Parr.

*Others on Platform :*
Members of the R.M.A. Technical Advisory Committee.

### Popular Technical Convention—2

Tuesday, August 29th, 1939, 3.30 p.m.

*Subject :*
Quality Reproduction and What it Means To-day.

*Chairman :*
Mr. Leslie McMichael, M.I.E.E., F.Inst.R.E. (a Vice-President of the R.M.A.).

*Speakers :*
Mr. P. G. A. H. Voigt, B.Sc., A.M.I.E.E.
Mr. C. T. Chapman.
Mr. G. A. V. Sowter, B.Sc. (Eng.) Lond., A.M.I.E.E.

*Others on Platform :*
Members of the R.M.A. Technical Advisory Committee.

### Popular Technical Convention—3

Wednesday, August 30th, 1939, 6 p.m.

*Subject :*
Short Waves.

*Chairman :*
Mr. E. M. Lee, B.Sc., Assoc. I.E.E. (Chairman of the R.M.A. Technical Advisory Committee).

*Speakers :*
Dr. R. C. G. Williams, A.C.G.I., D.I.C., Ph.D. (Engl.).
Mr. F. E. Henderson, A.M.I.E.E.

*Others on Platform :*
Members of the R.M.A. Technical Advisory Committee; Mr. N. R. Bligh; Mr. L. A. Moxon; Mr. R. A. Watson Watt.

### Popular Technical Convention—4

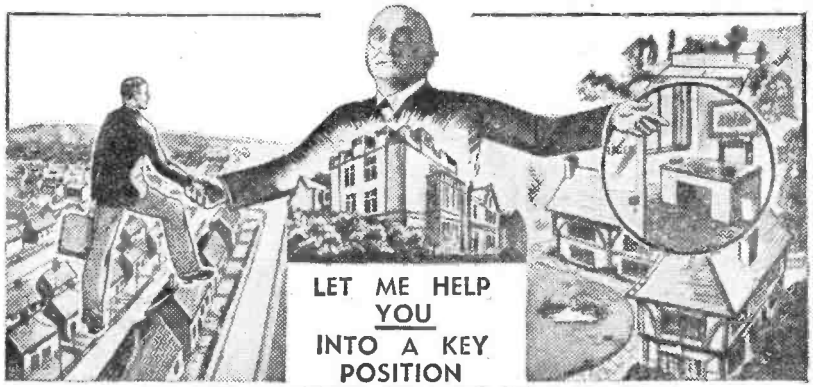
Thursday, August 31st, 1939, 6 p.m.

*Subject :*
Television.

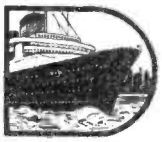
*Chairman :*
Mr. H. J. Barton-Chapple, Wh.Sch., B.Sc. (Hons. Lond.), A.C.G.I., D.I.C., A.M.I.E.E., Hon. M.I.W.T. (Chairman of the R.M.A. Television Technical Sub-Committee).

*Speakers :*
Mr. R. G. Clark.
Mr. J. H. Owen Harries, A.M.I.R.E.
Mr. T. C. Macnamara.

*Others on Platform :*
Members of the R.M.A. Technical Advisory Committee; Mr. J. L. Baird.

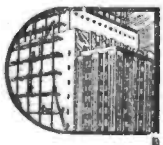




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# Open to Discussion

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).

### Proposed S.W. Club for Coal Aston

SIR,—I would like to get in touch with all short-wave enthusiasts in my district with a view to starting a short-wave club. Will anyone interested please write or call at my QRA.—C. WRIGHT (2D7X) (Oak View, Eckington Road, Coal Aston, nr. Sheffield).

### Correspondents Wanted

SIR,—I have just moved into the Ruislip district and am anxious to contact any S.W. enthusiasts or any radio society in the locality. My AA licence has just been granted, and I am now awaiting my call.—C. BAILEY, 62A, Park Way, Ruislip, Middlesex.

SIR,—I would like to exchange SWL. cards, postcards, stamps or correspondence with S.W. listeners in any part of the world. I QSL one hundred per cent.—BOB LARSON, 618, N. June Street, Hollywood, California, U.S.A.

SIR,—I am a regular reader of PRACTICAL WIRELESS and shall be glad to get in touch with another wireless enthusiast residing in England. I am fifteen years of age, and have built a few simple receivers. —O. P. ALEXANDER, 107, Hamilton Road, Tollcross, Glasgow, E.2.

### A 14 Mc/s Log from Golders Green

SIR,—I submit a log obtained on 14 mc/s ('phone and C.W.) by myself and a friend between the hours of 22.30 on Saturday, August 19th, to 07.00 Sunday, August 20th, hoping that it will be of interest to other readers living in this district.

W1 (22), W2 (19), W3 (7), W4 (16), W7FWR, W8 (9), W9 (8), K4 (3), K5 (2), CO (6), PY (3), VP7NS, LU2DM, YV (2), VE (4), ZL4BN, SV1RX, YR5IT. Near Europeans were not logged.

The receiver was an 0-v-2, aerial a 20-metre doublet. According to amateurs on the air at the time conditions were none too good. Wishing the new PRACTICAL WIRELESS the very best of luck.—T. G. DICKINSON (Golders Green).

### Battery Communications Receiver

SIR,—As a reader of your excellent journal since No. 1, may I add my plea for a battery communications receiver. My ideal set would be something like this: triode-pentode frequency changer, two I.F. stages with some form of variable selectivity, D.D.T. second det., A.V.C. and 1st audio, pentode output; controls to include A.V.C. switch, bandspread, and variable selectivity control. I have omitted an R.F. stage as it can always be be incorporated later for those who want it. —G. STONE (Plumstead).

# Prize Problems

### Problem No. 363

JACKSON had a simple one-valve detector battery set in which a home-made coil was used for short-wave reception. He decided that it would be desirable to replace the home-made coil by a standard component and accordingly purchased a standard 6-pin plug-in short-wave coil. He mounted the coil holder on the baseboard and made the necessary connections, but when tested the receiver failed to function. So far as he could see all connections were in order, and nothing had been damaged or altered in the receiver. What was the cause of his trouble? Three books will be awarded for the first three correct solutions opened. Entries should be addressed to The Editor, PRACTICAL WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 363 in the top left-hand corner, and must be posted to reach this office not later than the first post on Monday, September 4th, 1939.

### Solution to Problem No. 362

As Peters had a metal panel, and used a standard jack with metal bush "live" to one contact, he short-circuited his output. He should have used an insulating bush when mounting the jack.

The following three readers successfully solved Problem No. 361 and books have accordingly been forwarded to them: W. J. Perry, 165, Walton Lane, Liverpool, 4; W. J. Hubbard, "Newnham," Margaret Avenue, Shenfield, Essex; J. Diamond, 74, Dempster Street, Greenock.

# Radio Clubs and Societies

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

**Special Notice: Will club secretaries please send in reports in the form they appear on this page.**

#### ROMFORD AND DISTRICT AMATEUR RADIO SOCIETY

**Headquarters:** Red Triangle Club, North Street, Romford.

**Hon. Sec.:** R. C. E. Beardow (G3FT), 3, Geneva Gardens, Chadwell Heath, Romford.

THE past month was quite a hectic one, with the joint field day and the Romford fête in the same month. Despite the gloomy outlook on the Bank Holiday the club turned out in full force, and were on the field of action by 10 a.m. to erect the tent, and get the exhibits laid out, while G3CQ and G3FT, with Mr. Osborne, acted as transport, and collected the gear from the members' QRA's. By 2 p.m. all was fixed, and we were ready to tell of our experiences. We had quite a number of enquiries, and roped in three more members. 2CYW, from Brentwood, gave us a visit, and we had a Press photographer, namely G5KA, in attendance.

The history of radio was given over our amplifier run from a rotary, and although impromptu, was well received.

At our meeting Messrs. Everett Edgcumbe and Co. kindly gave us a very interesting talk on meters, and we all went away well pleased.

#### SALE AND DISTRICT RADIO SOCIETY

**Headquarters:** St. Mary's Schools, Barker's Lane, Sale, near Manchester.

**Meetings:** Weekly on Thursday evenings at 7.30 p.m.

**Secretary:** S. C. O. Allen, 2FCQ, 31, Ennerdale Drive, Sale.

AT the meeting held on August 17th it was reported that affiliation with the Incorporated Radio Society of Great Britain had been confirmed.

The usual morse tuition was given at various speeds.

Alterations are being made to the A.C. mains receiver owned by the society to enable reception of the 1.7 mc. amateur band without using a converter.

G4ND continues to give slow morse transmissions on Wednesday evenings. The frequency is 1.915 kilocycles. Reports will be welcomed from readers of this journal who receive the morse practice transmissions.

#### EASTBOURNE AND DISTRICT RADIO SOCIETY

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

AT the meeting of the above society, Mr. K. Wilkinson, A.M.Inst.E.E., gave a lecture and demonstration on "A.C. Motors."

He started by saying that there are four types of motors, namely: Repulsion, Induction, Repulsion-Induction, and Series or Universal.

Next he gave a comprehensive explanation of the Repulsion motor, and the Squirrel Cage motor; Poles, Fields, and Starting and Running Coils were also dealt with. Continuing, he explained the ingenius mechanism of the Repulsion-Induction type of motor, how, as the motor has attained speed by the Repulsion method, it automatically changes to the induction method of operation.

The Series or Universal motor was then dealt with, and commutators were also discussed.

Lastly, Mr. Wilkinson showed how armatures can be tested for faults.

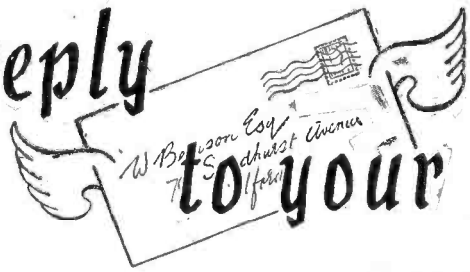
## TELEVISION AND THE BALLOON BARRAGE

THE recent tests with the balloon barrage round London has brought to light certain peculiarities of reception in some television sets. There have been distinct ghost images observed, while at times the whole screen has gone alternatively light and dark. The latter effect is always noticed when one or more aeroplanes are flying within reasonable distance of the receiving aerial, and is due to reflections from the machine body causing a rapid change in signal strength, especially if the aeroplane is banking. The combination of balloon surface and mooring cable brings about similar results as the large gas envelope sways to and fro in the wind. A steady ghost image is due to the television signal being reflected on to the receiving set, and arriving a very small fraction of a second later than the direct ray. This causes a second but reduced modulation signal to be applied to the set, and the ghost image, therefore, appears slightly to the right of the main picture outlines.

**PATENTS AND TRADE MARKS**

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

# In reply to your letter



## Vibrators

**"I have been experimenting with vibrators for H.T. work and followed the article in your July 22nd issue. I have all the parts except the rectifier. I asked my local radio dealer about one, and the most reasonable model he could offer was 12s. 6d. As I thought this too expensive when I see you used one costing 1s. 6d., I thought I might save expense by asking where you got yours. Could you give me the address of the firm, please?"—R. G. P. (Ballycastle, Co. Antrim).**

THE rectifier referred to by the author of the article in question was obtained from Messrs. Galpins, of Lee High Road, S.E.13.

## Frequency Meter

**"I am going to take up transmitting, and feel that a good frequency meter would be a valuable asset. Unfortunately I have looked through all your back numbers, but have been unable to find a design and should therefore be glad if you could give me some indication as to whether you intend to publish one, and if not could help me to make one up."—R. F. (N.W.9).**

WE have a design which will be published in the near future. This is a single valve oscillator with a home-made coil, and is designed to operate fundamentally on the 160-metre band. By the use of the harmonics this little meter may be used right down to 56 mc/s. Alternatively a crystal bar (100 kc/s) may be used in a meter to give harmonics at every 100 kc/s throughout the band. The only trouble with frequency meters is obtaining the preliminary calibration.

## Transformer Limitations

**"In several of your articles on home-made chokes and transformers you refer to No. 4 stampings. I wonder if you could tell me whose make these are and the size of the particular limbs and winding area, as I have a number of assorted stampings and should like to use them if possible"—S. L. (S.E.4).**

THE stampings referred to are standard Stalloy components, and the No. 4 type is the standard "U" and "T" assembly. The "T" has a top measuring $3\frac{9}{16}$in. by $\frac{7}{16}$in. The other arm of the "T" is $\frac{15}{16}$in. wide. The "U" section has all sides $\frac{7}{16}$in. wide and is $2\frac{3}{4}$in. high. The winding area is approximately $2\frac{3}{8}$in. by $\frac{7}{8}$in. on each side of the centre limb, and in most of the constructional data given in our pages a cross-sectional area of 1 sq. in. is assumed.

## W8JK Aerial

**"Whilst listening to some amateurs the other week I heard a reference to an aerial which was called a W8JK assembly. I cannot find this in any of my books and wonder if you can tell me what it is, and what particular advantages it possesses."—L. P. (N.W.5).**

THE aerial referred to is one developed by J. Krauss, in America, and is a directional beam array. It is generally arranged horizontally and consists of a dipole aerial with reflector each of which is crossed at the centre. In this way, instead of directing a beam only in one direction it radiates practically equally in two directions. It is generally used for 20 metres and below, as on 40 metres it would be too unwieldy. It may be fed from a tuned or untuned line, and we have found it one of the best for 20-metre transmission, although for reception it does not appear to offer any marked gain over a standard dipole without reflector.

## Simple Superhet

**"I have wanted to build a good superhet, but am doubtful regarding a suitable circuit for economy operation. I only wish to use a maximum of four valves (excluding rectifier) and should be glad if you could give some idea of the type of set I could build round that number of valves to give me as many advantages as possible of the modern superhet."—H. E. P. (Watford).**

IT should be quite a simple matter to make a good superhet on the lines indicated, using as the valve combination a heptode or similar valve followed by a pentode I.F. stage. This should feed a double-diode-triode to give rectification, A.V.C. and L.F. amplification and the output stage could be a good pentode. By using all-wave unit coils the set could be made to cover short as well as the standard broadcast wavelengths and it should be quite cheap to run.

### 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.**

## "Spares Box Three"

**"I have been looking through some of your back numbers and am interested in the "Spares Box Three." I suppose I am right in thinking that this may be made up with any type of coil, as I have two coils the same as your aerial coil, which would mean that transformer coupling would be used between H.F. and detector stages. This is all right I suppose?"—A. R. E. (Bryn).**

YES, it is quite in order to use two of the coils mentioned, and the circuit in question could be built round any spare coils you may have on hand. It is a very simple circuit, and no difficulties should be experienced either in construction or in the operation of the receiver.

## Short-wave Coil Design

**"I wish to make up an experimental short-wave receiver and propose to use a home-made coil. To avoid the trouble of winding separate reaction coils I thought of using the original Reinartz scheme. Could you give me any hints regarding the best type of coil for my purpose?"—J. E. (Barmouth).**

THE coil may be wound on standard 4-pin coil formers, and bare wire should be used to facilitate the use of tapping clips. The aerial should be tapped as well as the reaction condenser, and for maximum efficiency it may also be found worth while to tap the grid connection down the coil. We refer you to an article in our issue dated March 11th last wherein the arrangement of tappings on a short-wave coil were given.

## Mains Interference

**"I am recently experiencing interference, which apparently comes over the mains. I think this, as a simple three-valve battery set which has been tried on my aerial and earth does not give rise to the trouble. What would you suggest as the best cure. The mains are D.C., and the trouble is a low hum which sounds like a small motor running."—L. E. (Chipping Norton).**

PROBABLY the simple insertion of a special H.F. choke in each lead will prove effective. The chokes may be obtained ready-made, or you can wind them yourself, using 100 turns of 22 D.C.C. wire on a $1\frac{1}{2}$in. former. The chokes must be enclosed in a box so that no "live" terminals are left in an accessible position. A 2 or 4 mfd. condenser from each side of the chokes to earth will complete the filter. If this fails to remove the trouble we suggest that you communicate with one of the firms which specialises in the supply of interference-suppressing apparatus, and they may be able to suggest a suitable unit.

## REPLIES IN BRIEF

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

**P. B. (W. Wickham).** The trouble appears to be connected with the volume control. We would advise a proper examination by the makers.

**T. O. (York).** The Stand-by Crystal Set, described in our issue of May 13th, 1939, would be ideal for your requirements.

**H. J. (Glos.).** Sensitivity can be increased by removing a little of the carbon granules or by applying a slightly higher voltage through the primary of the microphone transformer.

**L. F. (S.E.10).** A copy of the issue containing complete constructional details can be obtained from these offices price 4d. It would appear that one or more of the smoothing condensers in the eliminator has broken down. Don't use it until you have made sure on this point.

**D. B. (Yarmouth).** The circuit is satisfactory. A chassis or baseboard can be used according to your own tastes.

**J. U. R. (Blaenau-Festiniog).** Any of the receivers could be used with the coil, but we have not used it and therefore cannot guarantee results.

**J. P. (Edwardstown, S. Australia).** All details for the coils are given on the blueprint, and this is being sent under separate cover so that you will see the points clearly.

**G. H. F. (Luton).** The coil should be suitable but we cannot guarantee it as we have not tried the set with that particular coil.

**The coupon on page 624 must be attached to every query**

# Practical Wireless
# BLUEPRINT SERVICE

These Blueprints are drawn full size.

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

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

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

Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable) to PRACTICAL 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: Blueprints, 1s. each.** | | |
| Four-range Super Mag Two (D, Pen) | — | PW36B |
| The Signet Two (D & LF) | 24.9.38 | PW76 |
| **Three-valve: Blueprints, 1s. each.** | | |
| The Long-range Express Three (SG, D, Pen) | 24.4.37 | PW2 |
| Selectone Battery Three (D, 2 LF (Trans)) | — | PW10 |
| Sixty Shilling Three (D, 2 LF (RC & Trans)) | — | PW34A |
| Leader Three (SG, D, Pow) | 22.5.37 | PW35 |
| Summit Three (HF Pen, D, Pen) | — | PW37 |
| All Pentode Three (HF Pen, D (Pen), Pen) | 29.5.37 | PW39 |
| Hall-Mark Three (SG, D, Pow) | 12.6.37 | PW41 |
| Hall-Mark Cadet (D, LF, Pen (RC)) | 16.3.35 | PW48 |
| F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three) | 13.4.35 | PW49 |
| Genet Midget (D, 2 LF (Trans)) | *June* '35 | PM1 |
| 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) | 21.3.26 | 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 |
| All-Wave "Corona" 4 (HF, Pen D, LF, Pow) | 9.10.37 | PW79 |
| "Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B) | 12.2.38 | PW83 |
| The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC)) | 3.9.38 | PW90 |

### Mains Operated.

| | | |
|---|---|---|
| **Two-valve: Blueprints, 1s. each.** | | |
| A.C. Twin (D (Pen), Pen) | — | PW18 |
| A.C.-D.C. Two (SG, Pow) | — | PW31 |
| Selectone A.C. Radiogram Two (D, Pow) | — | PW19 |
| **Three-valve: Blueprints, 1s. each.** | | |
| Double-Diode-Triode Three (HF Pen, DDT, Pen) | — | PW23 |
| D.C. Ace (SG, D, Pen) | — | PW25 |
| A.C. Three (SG, D, Pen) | — | PW29 |
| A.C. Leader (HF Pen, D, Pow) | 7.1.39 | PW35C |
| D.C. Premier (HF Pen, D, Pen) | — | PW35B |
| Ubique (HF Pen, D (Pen), Pen) | 28.7.34 | PW36A |
| Armada Mains Three (HF Pen, D, Pen) | — | PW38 |
| F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) | 11.5.35 | 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 |
| All-World Ace (HF Pen, D, Pen) | 28.8.37 | PW80 |
| **Four-valve: Blueprints, 1s. each.** | | |
| A.C. Fury Four (SG, SG, D, Pen) | — | PW20 |
| A.C. Fury Four Super (SG, SG, D, Pen) | — | PW34D |
| A.C. Hall-Mark (HF, Pen, D, Push-Pull) | 24.7.37 | PW45 |
| Universal Hall-Mark (HF Pen, D, Push-Pull) | 9.2.35 | PW47 |
| A.C. All-Wave Corona Four | 6.11.37 | PW81 |

### SUPERHETS.

| | | |
|---|---|---|
| **Battery Sets: Blueprints, 1s. each.** | | |
| £5 Superhet (Three-valve) | 5.6.37 | PW40 |
| F. J. Camm's 2-valve Superhet | — | PW52 |
| F. J. Camm's "Vitesse" All-Waver (5-valver) | 27.2.37 | PW75 |
| **Mains Sets: Blueprints, 1s. each.** | | |
| A.C. £5 Superhet (Three-valve) | — | PW43 |
| D.C. £5 Superhet (Three-valve) | 1.12.34 | PW42 |
| Universal £5 Superhet (Three-valve) | — | PW44 |
| F. J. Camm's A.C. £4 Superhet 4 | 31.7.37 | 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

| | | |
|---|---|---|
| **One-valve: Blueprint, 1s.** | | |
| Simple S.W. One-valver | 9.4.38 | PW38 |
| **Two-valve: Blueprints, 1s. each.** | | |
| Midget Short-wave Two (D, Pen) | — | PW38A |
| The "Fleet" Short-wave Two (D (HF Pen), Pen) | 27.8.38 | PW91 |
| **Three-valve: Blueprints, 1s. each.** | | |
| Experimenter's Short-wave Three (SG, D, Pow) | 30.7.38 | PW30A |
| The Prefect 3 (D, 2 LF (RC and Trans)) | 7.8.37 | PW63 |
| The Band-Spread S.W. Three (HF Pen, D (Pen), Pen) | 1.10.38 | 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)) | 19.3.38 | PW86 |

### MISCELLANEOUS.

| | | |
|---|---|---|
| S.W. Converter-Adapter (1 valve) | — | PW48A |

## AMATEUR WIRELESS AND WIRELESS MAGAZINE

### CRYSTAL SETS.

| | | |
|---|---|---|
| **Blueprints, 6d. each.** | | |
| Four-station Crystal Set | 23.7.38 | AW427 |
| 1934 Crystal Set | — | AW444 |
| 150-mile Crystal Set | — | AW450 |

### STRAIGHT SETS. Battery Operated.

| | | |
|---|---|---|
| **One-valve: 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.** | | |
| Class B Three (D, Trans, Class B) | — | AW386 |
| £5 5s. S.G.3 (SG, D, Trans) | 2.12.33 | 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) | *Mar.* '35 | 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. | — | WM309 |

### 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 | AW433 |
| 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-valver 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. | — | 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) | *Aug.* '35 | WM391 |

### MISCELLANEOUS.

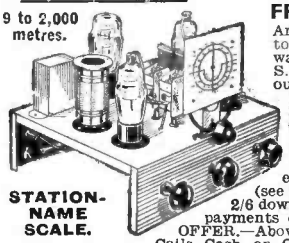
| | | |
|---|---|---|
| S.W. One-valve Converter (Price 6d.) | — | AW329 |
| Enthusiast's Power Amplifier (1/6) | — | WM387 |
| Listener's 5-watt A.C. Amplifier (1/6) | — | WM392 |
| Radio Unit (2v.) for WM392 (1/-) | *Nov.* '35 | WM398 |
| Harris Electrogram battery amplifier (1/-) | — | WM399 |
| De Luxe Concert A.C. Electrogram (1/-) | *Mar.* '36 | WM403 |
| New Style Short-wave Adapter (1/-) | — | WM388 |
| Trickle Charger (6d.) | *Jan.* 5, '35 | 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 |

# N.T.S. BARGAINS

## UNBEATABLE KIT VALUE!

**75/- ALL-WAVER for "WORLD S.G.3" CASH C.O.D. 29/6**

**FREE VALVES**

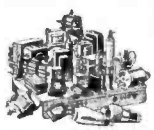



An all-waver, hard to beat in every way. Employs two S. G. and Pentode output stages. Wage-range 9 to 2,000 metres, using efficient self-locating coils. Kit comes to you absolutely complete except coils only (see below). Yours for 2/6 down and 12 monthly payments of 2/10. SPECIAL OFFER.—Above kit with set of 6 Coils Cash or C.O.D. 41/6 or 3/- down and 11 monthly payments of 4/-. If required with set of ten coils for 9 to 2,000 metres add 17/6 to cash price or 1/6 to deposit and payments. **VALVES GIVEN FREE.**

● **POST ORDERS.** Please register currency and cross P.O.'s. Carriage and C.O.D. charges paid over 10/- except for Eire and overseas.

**CALLERS.** All advertised lines available from our only London address.

**BARGAIN PARCELS. No Constructor, Experimenter or Serviceman must miss this opportunity.**



1 each 2 and 3 gang variable condensers, 1 coil, 1 transformer, 3 valve holders, 6 resistances, 6 fixed condensers, 1 doz. various control knobs and 1 brand-new ready-drilled plated steel chassis. **List value 45/-.** Bargain 5/9, plus 9d. for special packing and postage. **ORDER EARLY.** Not available to Eire or overseas.

## —More COMPONENT BARGAINS—

**Post charges paid over 10/-.**

**BAR-TYPE 2-GANG CONDENSERS.** .0005 mfd. each section. With trimmers. Brightly plated, size 3in. x 2in. x 2¼in., worth 12/-. **Bargain, 2/3.**

**METAL CHASSIS.** Brand new heavy gauge **Cadmium-plated** steel chassis, 14½ x 7½ x 2½in., ready drilled for 5 v.-holders, mains transformer, etc. **Bargain, 2/-.** Post **6d.** extra.

**COILS.** Parcel of 4 assorted screened and unscreened coils for experimenting and replacements. **Bargain, 2/-.**

**TRICKLE CHARGER.** 2 v. ½ amp. Model. Metal Rectifier, **10/-.** For A.C. mains 200/250 volts.

**KNOBS.** 1 doz. assorted control knobs, **1/-.**

**VOLUME CONTROLS, POTENTIOMETERS.** Well-known makes, all values up to 1 meg., 2/- ; with switch, **2/6.**

**VALVE SCREENS.** 3 portion, latest type, **1/-** each.

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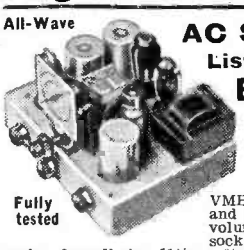
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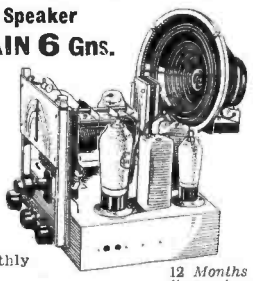
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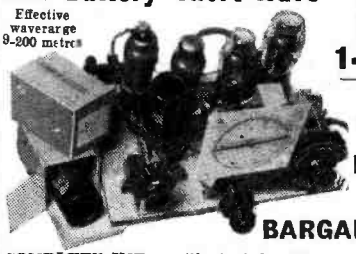
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PRACTICAL WIRELESS, 2/9/39

Practical and Wireless
PRACTICAL TELEVISION
EVERY WEDNESDAY. Vol. XIV. No. 364. Sept. 9th, 1939.
EDITED BY F. J. CAMM
Staff: W. J. DELANEY, FRANK PRESTON, H. J. BARTON CHAPPLE, B.Sc.

# ROUND THE WORLD OF WIRELESS

## Simple Transmitters

UNDER the regulations governing the use of transmitters in this country, amateurs are at first limited to a maximum power of 10 watts. In view of the fact that abroad many amateurs use powers of 500 watts and sometimes more, some beginners think that very little can be done with such a small power as 10 watts. A few evenings spent in listening to the amateur transmitters on 20 or 40 metres will convince you, however, that considerable ranges may be covered at this small power, and a one-valve transmitter may give remarkable results when conditions are favourable and when the apparatus is properly adjusted. The type of aerial is, of course, of paramount importance, and a directional beam will ensure that maximum radiation takes place in a given direction. Proper adjustment of the various voltages and loads are also essential, and in this issue we describe a one-valve unit of the tritet type which forms an ideal basis for the beginner. It is by no means a "local" transmitter, and it may be modified, if desired, at a later date by the addition of a power amplifier, building this on a separate chassis and building up on the rack principle. No changes will have to be made in the present unit, except the inclusion of a small support for a coupling winding so that link coupling may be used between the tritet and the P.A. It should be borne in mind, however, that a licence must be obtained before the apparatus may be used, and the necessary application form should therefore be obtained.

**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.**
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*Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.*

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## Secret Television Transmitter

SOME trouble has been created lately in the U.S. by an unknown television transmitter, operating late at night and completely wiping out the Canadian band. So far the station is unidentified.

## Radiotype

A NEW system of communication was recently demonstrated in New York by the International Business Machines Corporation. It functions somewhat like a teletype, receiving impulses over the ultra-short waves. Messages were sent by amateurs in all parts of America to the A.R.R.L. station at the New York World's Fair and a Radiotype transmitter relayed them to the Hotel Pierre where they were projected on a large Radiotype screen.

## Marine Radio in Eire

THE Marconi International Marine Communication Company have established new offices at 49, North Wall, Dublin, for dealing with the maintenance of wireless installations on ships calling at Dublin, and other matters relative to marine wireless in Eire.

## News of the Land

THE first of a series of monthly broadcasts, intended primarily for farmers but containing also matter of interest to urban listeners, will be broadcast on September 14th. The title is "News of the Land." The broadcasts are edited and presented by one of the best authorities in the country, Professor J. A. Scott-Watson, Sibthorpian Professor of Agriculture at Oxford, and author of several books. "News of the Land" will have a fixed time in the programmes—each fourth Thursday from September 14th, at 6.45 p.m. Another monthly programme, "Midland Farmers' Club," will also have a fixed time allotted to it.

## Senior Manx Grand Prix

THE Senior Manx Grand Prix T.T. Race on Thursday, September 14th, finds four places in the programmes. At 1.50 to 2.30 p.m. there will be commentaries by Graham Walker at the Grandstand, Tommy Spann, at Creg-na-Baa, and Harry Johnson, at Ramsey Hairpin, in the Northern programme, and again at 3.30 to 4 p.m. At 4.45 to 5.20 p.m. in the National programme, the race commentary will continue. In the evening, at 9.0, the presentation of the trophies by the Lieut.-Governor of the Isle of Man, His Excellency Earl Granville, C.B., D.S.O., will be broadcast, with Graham Walker as commentator.




*A general view of our stand, No. 9, at Radiolympia. The present range of receivers may be seen on the left.*

# ROUND THE WORLD OF WIRELESS—Continued

## Gormless Gawbies

THE half affectionate, half critical nicknames that neighbouring towns bestow on each other have already been the subject of two broadcasts from Yorkshire and Lincolnshire. On Wednesday, September 13th, Lancashire takes its turn and listeners will hear why "Tyldesley Bongs," why "Proud Preston," and why "West Houghton Keayeds..."

## Belgium's Radio Listeners

AT the end of May, 1939, Belgium numbered 1,012,879 receiving licences, of which 2,784 were for primitive crystal sets, 17,419 for free permits to blind or otherwise incapacitated persons, and 29,917 for re-diffusion services.

## The Spoken Word

THE Berlin Broadcasting House now boasts of a collection of 120,000 electrical recordings, to which many are still added daily. They include, in addition to excerpts from programmes, such items as commentaries on the 1936 Olympic Games, and last but not least, the almost innumerable political speeches made by Hitler, Goering, Goebbels and other prominent officials of the Nazi party.

## Mystery Peace Broadcasts

READERS report the reception of anti-military propaganda transmissions from a station apparently in the environs of London, and working on 48.5 m. (6.185 mc/s). The authorities are taking steps to locate and dismantle the transmitter.

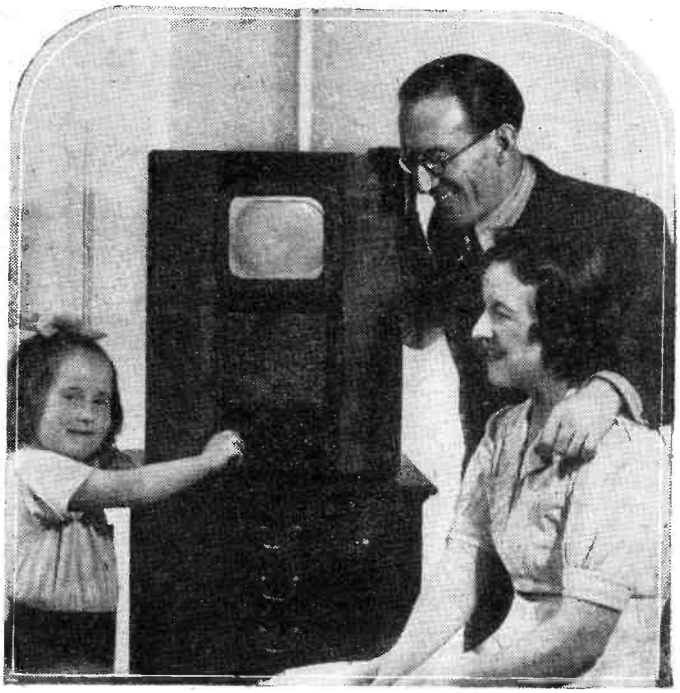
## Native Programmes from Nairobi

THE Kenya Government proposes to carry out a series of experimental broadcasts in the Kikuyu language for the benefit of the local native population. The transmissions will consist of music, short talks on hygienic matters, and news bulletins.

## Musical Comedy Favourites

NORAH MOORE, the brilliant Manx operatic singer with the Northern Orchestra, on Monday, September 11th, will render songs and selections from "Gypsy Love," "The Merry Widow," "The Dubarry," "Wild Violets," and other musical comedies.

## "I THANK YOU!"



*Yes, it's your old pal Arthur Askey, seen here at home with his family and his Ekco television set. Television is Arthur Askey's favourite pastime, but he leaves all the knob-twiddling to young Miss Askey, who seems to know all about it!*

## Variety at Home

DAVID PORTER, the North's variety producer, is at home again and 9.30 p.m. on September 15th sees "Variety at Home" on the air, with Al Reno, Mag and Alice, Mae Bamber, Gerry Chantler, and Harry Torrani, with Henry Reed's Miniature Variety Orchestra.

## The Why and Wherefore

LISTENERS are often puzzled over the fact that the news bulletins in German, French, Italian and Spanish broadcast by the British and French stations are given out on several channels simultaneously. The reason is because some States for whose inhabitants they are destined could otherwise easily jam the transmission. If an attempt were made to interfere with several channels it would result in so upsetting the medium waveband that their own broadcasts would be difficult to receive. As it is, on the short waves deliberate jamming of certain wavelengths is nightly noticeable.

## Radio Carthage

PREVIOUSLY known as *Radio Kasbah*, the small Tunisian station working on 215 m. (1,395 kc/s), is the first studio to own a Moslem woman announcer. Broadcasts are carried out daily in the French, Arabic and Italian languages.

## Hungary's People's Set

THE first Hungarian People's Set, which is mains operated, has just been issued. The cost, 48 pengos (approximately £2), which includes the licence fee, can be paid in monthly instalments.

## New Sudan Station

PLANS are being considered for the erection of a low-powered station and a short-wave receiving centre near Khartoum (Anglo-Egyptian Sudan) for the main purpose of receiving and relaying the B.B.C. Empire Service.

## Piano as Heroine

IN "Concert Grand," the repeat broadcast on September 11th of a play by Maurice Horspool, a Hull radio dramatist, which had great success at its first hearing a year ago, Gladys Young plays the lead with exceptional distinction. The heroine is a grand piano round which the whole action of the play revolves through a period of sixty years.

## Exploiting the "Fixed Time" Programme

THE B.B.C. announces that the advantages and popularity of "same-day-and-time" radio variety programmes have been exploited more fully than ever in the plans that have been made for Autumn broadcasts.

Certain programmes for which the Variety Department is responsible, notably the reminiscent "Scrapbook" productions, and two concerts by Geraldo and his Orchestra, from Queen's Hall, will be broadcast on Sundays.

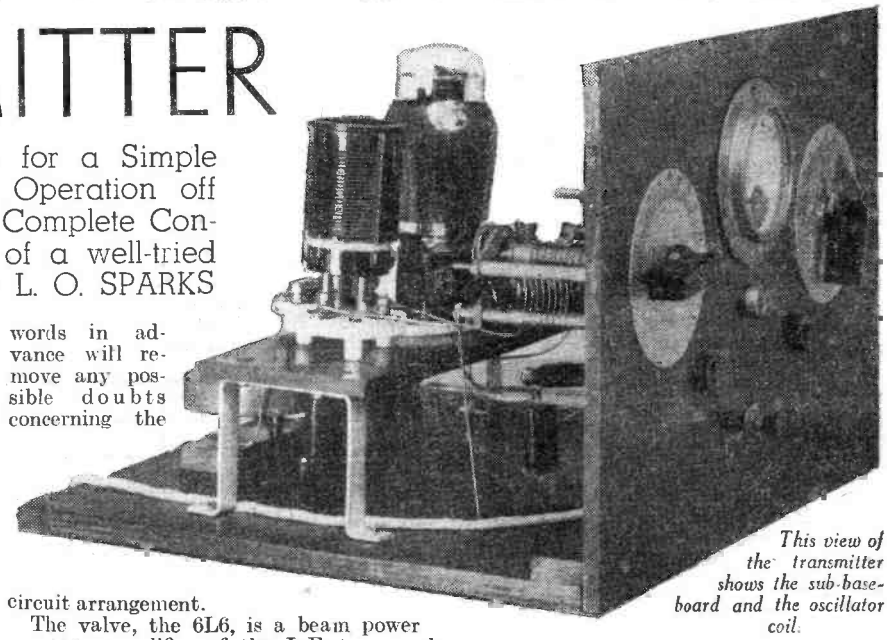



*A general view of Radiolympia, showing in the background the large model of Broadcasting House, which formed an outstanding feature of the show. The stands, with flat roofs, were all built to a uniform design.*

# A TRITET A.C. OPERATED TRANSMITTER

Frequent Requests are Made for a Simple Single-valve Transmitter for Operation off A.C. Mains, so in This Article Complete Constructional Details are Given of a well-tried Circuit

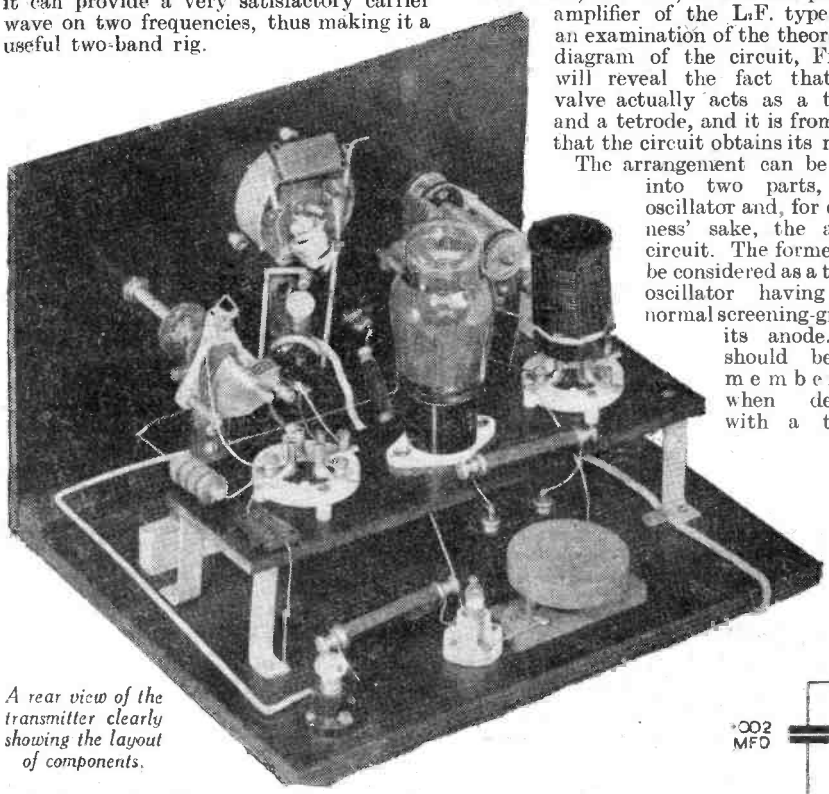
By L. O. SPARKS



*This view of the transmitter shows the sub-base-board and the oscillator coil.*

THE demand mentioned above could be satisfied in many ways, but the writer, after giving all possible arrangements careful consideration, has decided that the Tritet has so many features in its favour that it forms the most suitable design for the average A.A. holder.

To commence with, the circuit is such that it can be said with safety that no part of it calls for super-critical skill in assembly or operation. It is very reasonable as regards cost, it possesses the advantages of being reliable, is a consistent oscillator, while, last but by no means least, it can provide a very satisfactory carrier wave on two frequencies, thus making it a useful two-band rig.



*A rear view of the transmitter clearly showing the layout of components.*

It does not, of course, rank as a high-powered outfit, but the constructor can rest assured that it will give all the power he requires for A.A. work; in fact, old hands will already know what can be done with it on a radiating aerial.

To avoid any remarks from those who have a feeling to be a little "highbrow," let me add that I offer no excuses or apologies for using the good old stand-by, namely, the 6L6 valve which, incidentally, is still a hot favourite amongst many.

## The Tritet

For the benefit of those not familiar with the operation of a tritet circuit, a few words in advance will remove any possible doubts concerning the circuit arrangement.

The valve, the 6L6, is a beam power amplifier of the L.F. type, and an examination of the theoretical diagram of the circuit, Fig. 1, will reveal the fact that the valve actually acts as a triode and a tetrode, and it is from this that the circuit obtains its name.

The arrangement can be split into two parts, the oscillator and, for clearness' sake, the anode circuit. The former can be considered as a triode oscillator having the normal screening-grid as its anode. It should be remembered, when dealing with a tritet, that the cathode is virtually at high-frequency potential with respect to earth, the valve in this instance being of the indirectly-heated type. The true anode provides the second part of the circuit, and can be tuned to the fundamental frequency of the crystal or to a multiple. The first arrangement, provided the coil in the cathode circuit is bridged electrically, becomes a standard pentode oscillator, but in the second, when the cathode coil is tuned slightly off the crystal frequency, and the anode tank tuned to double the crystal frequency, the circuit adopts the normal tritet principle.

It will be noted that in the latter method the cathode circuit is tuned *slightly off* its fundamental frequency. This statement might appear rather confusing, therefore it should be realised that if the circuit is tuned to the exact frequency, quite large high-frequency currents will be created across the crystal and impose severe strains. These will not only cause very unsatisfactory operation, but will also tend to break down the crystal with dire financial results. In practice, it will be found that it is best to tune the circuit off dead tune on the *high-frequency* side, and this not only

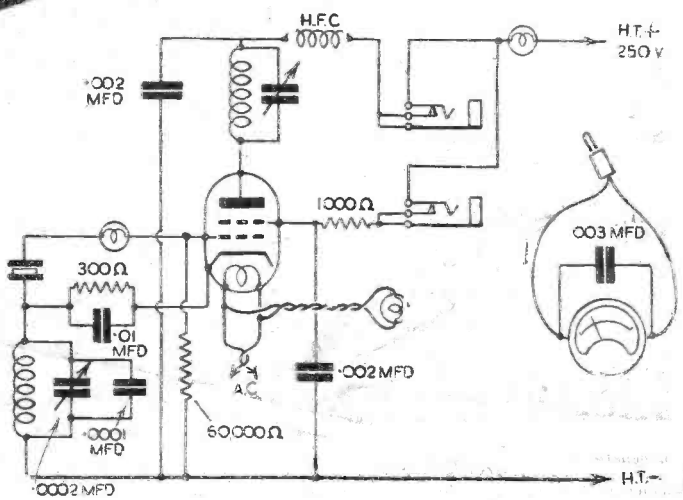



*Fig. 1.—Circuit diagram of the transmitter, and inset showing the plug-in meter with shunt across it.*

## A TRITET A.C. OPERATED TRANSMITTER

*(Continued from previous page)*

reduces load on the crystal, but also tends to increase the output. More about this, however, later.

### Construction

From the illustrations, it will be seen that the wiring is simple and straightforward, and that the valve and the two coils are mounted on a sub-baseboard to provide for short and direct connecting leads to the tuning condensers. It is necessary to take a little care with the wiring of the octal valveholder, and it is very advisable to solder suitable lengths of wire to the pins before screwing the holder and/or the sub-baseboard in position.

Ordinary Eddystone baseboard type S.W. valveholders are used as coil holders, the grid and anode terminals forming the connecting points for the associated tuning condensers, this method allowing for very short leads.

The anode tank condenser is mounted on an adjustable bracket which, in turn, is heightened by means of a small strip of wood, 2in. by ¾in. by ½in. screwed to the baseboard. By using this bracket and an extension rod complete with flexible coupling, the condenser can be mounted quite close to the anode tank coil.

As it is very essential to be able to take tests of anode and screen current, small Igranic jacks of the closed-circuit type are wired in series with the H.T. supplies to these two circuits. The latter connection, incidentally, can also be used for keying if so desired, although many may prefer placing that control in the cathode circuit.

Bias is provided by means of two resistances, one between grid and the common negative line, and one in the cathode circuit which also acts in a protective sense in the event of the grid circuit becoming open circuited.

The value specified for the grid resistance must only be taken as a guide, as in many cases considerable improvement in operating conditions can be achieved by increasing or decreasing the resistance to suit the particular valve in use.

The fuse inserted in the crystal circuit serves the dual purpose of protecting the crystal from excessive current and indicating what is happening during tuning operations of that circuit. The holder should be of good make, and care should be taken to see that the bulb forms good contact between the two points.

### Tuning Condensers

The condenser used for the cathode circuit is a J.B. Short-wave Special, having a capacity of .0002 mfds., but to provide the correct L/C ratio, a .0001 mfd. fixed condenser is connected across it in parallel. This forms a total capacity which together with the coil specified enables the correct tuning, as mentioned in the opening paragraphs, to be obtained with safety.

The tip of one of the moving vanes of the .0002 mfd. is bent outwards just a fraction so that a short-circuit is formed when the vanes are fully meshed with the fixed. This position is required when it is desired to operate the circuit as a simple pentode C.O., as the cathode coil and the condenser is then bridged.

The anode tank condenser is an Eddystone type 1093, having a capacity of 60 m.mfd. This value may seem on the low side, but it is better for doubling purposes than a larger one with a smaller inductance.

The meter shown has a maximum reading of 50 mAs, but to provide a wider margin of safety, a simple shunt is shown connected across it which is brought into circuit by means of an ordinary push-pull switch. The meter with shunt has a maximum reading of 100 mAs. As an additional precaution against H.F. currents, the meter is provided with a mica by-pass condenser.

### Coils

To take advantage of the frequency doubling properties of the Tritet circuit, three coils will be required for two waveband operation. These are wound on standard Eddystone ribbed and threaded coil formers of the four-pin type, the wire being 22 S.W.G. tinned copper or enamelled.

The winding data is given as a separate table on this page and it should be remembered that the connections must be taken to the grid and anode pins, the filament pins being left blank. When fastening the ends of the windings through the appropriate pins, care should be taken to see that the soldering is efficient without being clumsy, otherwise difficulty will be experienced in fitting the coils into their holders.

| COIL DATA | | | |
|---|---|---|---|
| A. 5 Turns | Anode | Cathode | |
| B. 25 Turns | C | A | 20 m. |
| C. 9 Turns | B | Short-circuited | 40 m. |

Assuming that the crystal is ground for 7 mc/s, as in the case of the transmitter under description, it will be necessary to fit coil B in the anode tank coil-holder and, with the cathode tuning condenser in the *closed position*, i.e., with the vanes short-circuited through the bent tip mentioned previously, the anode tank circuit can then be tuned to 40 metres.

For 20-metre operation, coil A must be placed in the cathode coil-holder and C in the anode coil-holder.

### Operation

When carrying out the initial tests of a circuit of this type, it is always advisable to commence with reduced high-tension, owing to the fact that, if the circuits are not tuned to resonance, an exceptionally high anode current will be produced which, if allowed to continue, will cause harm to the valve. This can be overcome by inserting a resistance of, say, 2,000 ohms in the positive supply *until* the circuits have been adjusted after which it can be removed and the full voltage applied.

With the mA meter in the anode circuit, plug in coil B in the anode tank circuit and adjust the associated tuning condenser until the greatest current reduction is indicated by the meter. The cathode condenser must, of course, *be closed* during this operation. The oscillator will then be acting as a pentode arrangement and generating signals on the 40-metre band.

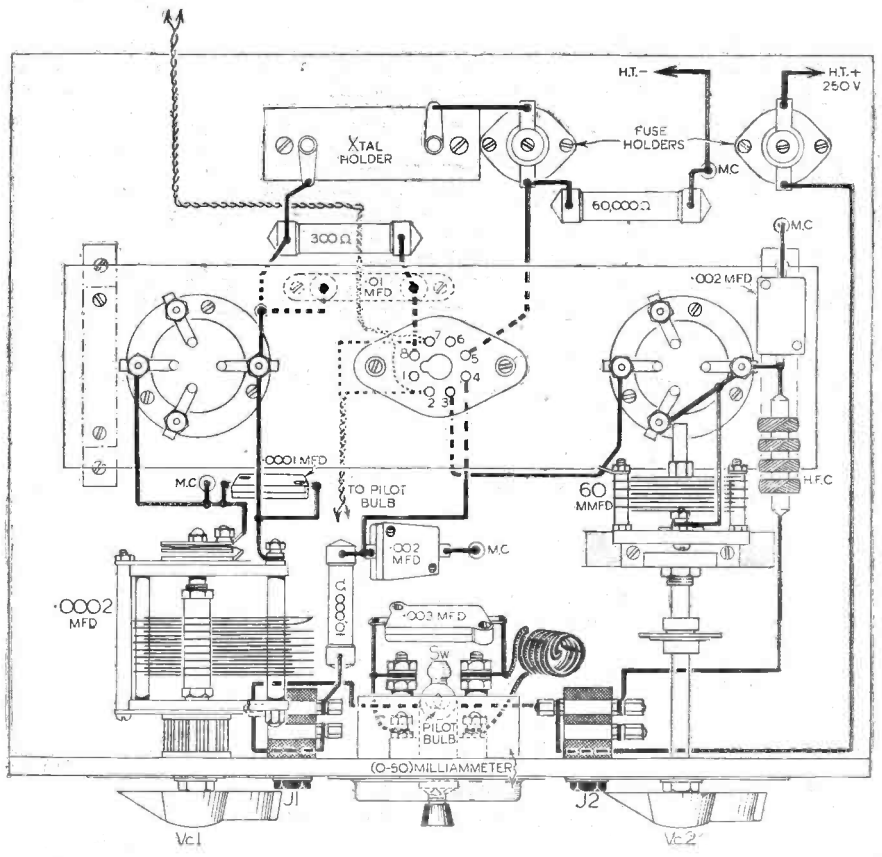
The pilot or fuse bulb in the grid/crystal circuit should be watched during these adjustments and it should be noted that any glow produced in the bulb should be kept as low as possible consistent with the most satisfactory tuning of the anode tank circuit.

For 20-metre work, coil A must be in the cathode circuit and C in the anode holder, and the following procedure adopted:

Rotate the cathode tuning condenser until the maximum current dip is produced in the mA meter and then adjust the remaining tuning control until a further dip is produced, checking all adjustments with the loop-lamp.

*(To be Continued)*

## WIRING DIAGRAM OF THE TRITET A.C. TRANSMITTER



# ON YOUR WAVELENGTH



By Thermion

### The New "P.W."

MY thanks to those many readers who have without a dissentient voice written to congratulate us on the improved form of PRACTICAL WIRELESS. It has not been possible, I gather, owing to the space occupied by the Show reports, to include all the new features contemplated, but I know that the experimenter is not to be left out of the scheme of things. Some readers have made suggestions that we should run a weekly service page, others that we should publish highly technical material. I should like to sound readers' opinions on these matters.

My gratitude also to those readers who posted letters addressed to me at our stand, and to another reader who sent me a greetings telegram. Owing to the poor response from readers I was not able to take more than a few parties round the Show, and one or two readers who desired to join I was unable to fit in.

It seemed a tragedy that with all the efforts which had been put in to make the Show a success, another international crisis should drop like a bolt from the blue on the very day that the Show opened. It did not, however, affect the attendance nor the sales as much as was first anticipated. The attendance has been gratifying, and it seemed to me that a keener public visited the Show this year.

Our staff was kept busy during most periods of the afternoon and evening. As was to be expected, the morning sessions were somewhat slow.

The model workshop attracted a great amount of attention. Its introduction was a piece of inspiration, for it has given many constructors a better appreciation of what they get for their money, and of the work which goes to make a wireless component. I understand that the work of planning and installing the model workshop was left in the capable hands of Mr. A. F. Bulgin.

The Exhibition this year had lost the appearance of a cheap-jack market. In former years the claims made for receivers were undignified, and in many cases untrue. Manufacturers this year confined themselves to a sober statement of price and performance. I did not notice any announcement to which exception could be taken. The complete re-modelling of Radiolympia is a tribute to the assiduity and ingenuity of the organisers.

### Our Catalin Chassis

SOME hundreds of constructors made a close examination of the receiver erected on our Catalin chassis. This is an artificial glass which can be drilled and sawn. It is transparent, and enables every wire to be seen without inverting the set. This is a definite step forward in home construction, and although it is a little more expensive than aluminium or metallised wood, it is well worth the extra cost. Readers who desire to utilise this material should communicate with Catalin, Ltd., Waltham Abbey, Essex.

### Varley Dry Re-chargeable Accumulator

OUR old friends Varley were welcome exhibitors at the Show. They have not shown for the past two exhibitions, but I observed that constructors gravitated towards the stand with the name so indelibly engraved on the constructor market. They have just placed on the market a dry re-chargeable accumulator. This is a 2-volt dry cell which will give three times the discharge efficiency on each of its discharges as an ordinary dry primary cell of similar size. It can be re-charged a hundred times or more, whereas the ordinary dry cell becomes useless after one discharge. An even voltage is maintained during each discharge, whereas with a dry cell the voltage rapidly falls. It can thus be used for continuous lighting. Being dry, it can be carried in any position, packed and sent to hot countries, stored and then charged, and used to give its full capacity. The ordinary dry cell would be useless under such conditions. Also, it is lighter and smaller than the free-acid types of accumulator—there is no acid, no jelly electrolyte; it can be carried and discharged in any position, even upside down, and it has a higher capacity for its size than the free-acid types. There are no plates to buckle. The necessary sulphuric acid is introduced during manufacture into the elements and a porous separator. The accumulator consists of an extruded cylindrical lead container, the interior of which is heavily coated with spongy lead. A moist, porous, flexible separator, which is unaffected by sulphuric acid, is then coated on to the interior of this negative electrode. The positive element, which is in the form of a lead cage, is inserted centrally in the cell, the whole aperture then being tightly packed with moistened peroxide of lead. The address of the company handling it is Varley Dry Accumulators, Ltd., By-pass Road, Barking, Essex.

### A Paean of Praise

OUR old friend Torch, upon seeing the new presentation of this journal, has been moved to tears or something, for a sheet of paper having the appearance of tear-stains reached me containing the following inditement:

I loved you from the hour we met,
I knew my lifetime's mate had come;
I knew that loneliness had gone,
And all my empty longing done!
You taught me things I never knew,
How you and I might best employ
The passing hours in sweet delight,
And each of them be filled with joy.

I only saw you once each week—
'Twas not enough. Had I my way
What ecstasy had then been mine
Could I have seen thee every day.
Or did anticipation mean a keener edge?
Did waiting serve to stimulate desire?
Did longing grow, through empty days between?
At this late date, it serves not to inquire

Let it suffice, that thou art with me still;
The passing years 'twixt us have made no rift,
And ever stronger thy attractions grow,
And my urge to greater deeds must lift.
Age cannot wither, nor can custom stale
The fond desires in me thou hast inspired.
I looked upon thee and I straightway knew
That thou wert all I ever had desired.

Yet as thy charms increase and still more precious grow,
In thee no selfishness is found, no mean device,
To take advantage of thy faithful slave,
Or make devotion pay a heavier price.

. . . .

Now ! Let me name thee that the world may know
To recognise thee. Let thy name be spoke !
" Miss Practical Wireless," let me introduce,
More fascinating still,
*In her new golden cloak.*

### Motor-car Ignition Interference

THE R.M.A. has addressed the following letter to the motoring journals and the Press :

" The subject of interference caused on short and ultra-short waves by the ignition systems of motor-cars has been one which, quite naturally, has engaged the attention of all interested parties—that is, the owners of the vehicles and those whose radio receiving equipment has a reduced performance standard because of the interfering signal.

" It is felt that a better appreciation of what is involved in the problem would do much to clarify the situation, and with this object in view there are one or two points that warrant special attention, especially if it is remembered that the owners of cars are the owners of or are among the prospective buyers of radio and television receiving sets and are, therefore, mutually interested in this question of interference suppression.

" Thanks to the activities of the British Electrical and Allied Industrial Research Association, as disclosed in their report M-T63 and from advice they have been able to give the motor-car manufacturers in conjunction with British Standard Specification No. 800, it is possible to remove or greatly minimise interference from this source.

" The technical report, reference M-T63, entitled ' Radiated Short-wave Disturbance from Automobile Ignition Systems,' showed quite clearly that the magnitude of the electrical disturbance radiated by the ignition system is dependent to a very large extent on the disposition of the various components. For example, a compact assembly with short H.T. leads and with the coil mounted on the engine block brings about a marked reduction in the disturbance level. This method of dealing with the trouble will not affect manufacturing costs, performance or accessibility in any way, while the electrical radiation was materially reduced in each of 32 vehicles tested.

" The conclusions drawn from these investigations are of the utmost importance and it is felt that many motorists have not yet been made aware of them. The object of this communication, therefore, is to give them the widest possible publicity through the medium provided by the columns of your journal.

" Now, while this simple reassembly produces considerable benefit to the owners of short-wave and ultra-short-wave radio receiving apparatus, and can be regarded as a material step forward in assisting in the reduction of interference, motorists are asked to give very serious consideration to any additional steps which will still further improve matters. For example, the insertion of a suppressor resistance in the coil to distributor lead will, in a very large number of cases, remove ignition interference entirely, and yet the cost is only of the order of 1s. 6d. If the motor-car user will consult any competent garage, he can be advised straight away of what steps can be taken with his particular make of car.

" We live in an age where the spirit of co-operation between parties who, at first sight, may have opposing views has been productive of much good, and although car owners would, quite naturally, view with concern any suggestion which would add materially to the running costs and/or upset the engine performance, it cannot be too strongly stressed that this need not necessarily be the case.

" May we seek the public-spirited co-operation of motorists, therefore, in the adoption of these suggestions. By so doing, they will add materially to the pleasure of radio-set users and, incidentally, extend the range and efficiency of those inter-communication systems now being employed by His Majesty's Forces for military and other purposes."




### Accumulator Difficulties

*THE normal type of accumulator can give rise to a number of troubles—due either to leakage of the acid or to spray during charging. The spray, fumes or acid will eat away many materials, but rubber is practically unaffected. Therefore, a good plan is to stand the accumulator on a rubber tray such as is used for photographic purposes, and to stand it always so that fumes and spray cannot reach thin copper wires in a receiver. A sheet of thin rubber may often be placed in a receiver to protect wiring, but if a trickle charger is employed the cell should be taken out of the set, and the vent cap removed. Remember also that soda is a handy and cheap neutraliser should the acid be spilt, but it must be applied instantly and added until frothing or effervescing ceases.*

### Drilling Glass

*SEVERAL readers at Olympia who saw our All-wave Three on the Catalin chassis asked how they could drill glass as they wished to adopt a similar scheme for receivers or panels. The usually recommended scheme is to use copper tubing of the size desired and to drill slowly, lubricating with turps. There are, however, several other schemes, one effective idea being to use the tang broken from a triangular file. The point at which the hole is to be drilled is first " spotted " and then a small rubber ring should be placed on the glass and turps dropped inside the ring. In this way the point is kept lubricated. Drill from opposite sides alternately, and the drill should preferably be " spun " in an ordinary brace, using the hand-grip as a balance to obtain the necessary rotary motion.*

### Soldering Flex

*WHEN old flex is to be used for connection, difficulty is often experienced due to the strands of wire being coated with a film of oxide and dirt due to the action of the rubber. To attempt to scrape the strands with a pen-knife will generally result in one or two being broken off and these may lead to trouble eventually. A better plan is to flatten out the stranded end of the flex and to rub it gently, in one direction, with well-worn emery cloth or very fine sandpaper. The wires should be bunched and flattened periodically to ensure that all sides of the wires are properly cleaned.*

### " Film Fans' Hour "

I AM informed by the B.B.C. that, with the object of catering for the enormous public interest in current films, and the stars who play in them, a new type of variety programme is to be introduced to B.B.C. listeners during the first week in October.

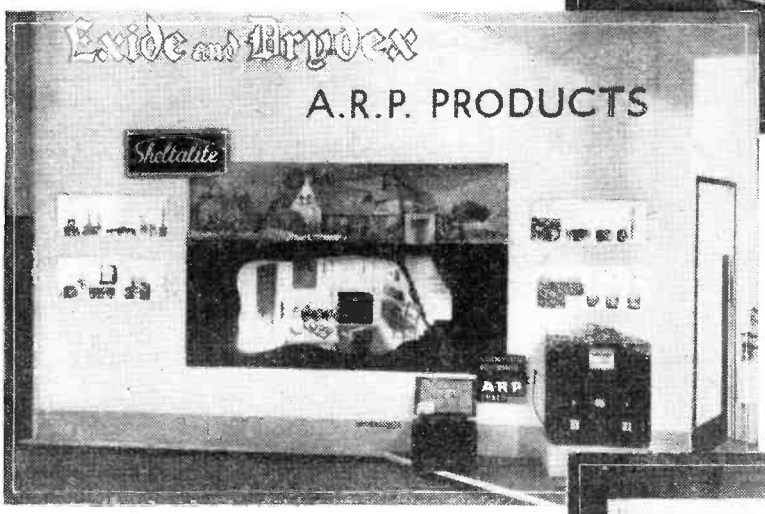
Entitled " The Picture Reporter," it will, in effect, be a film fan's hour ; it will be broadcast regularly once a month at a peak listening period.

The material for each of these programmes will reflect the many facets —personal, musical and general— of the film industry. It will be an hour's show, and will provide a vehicle, at an excellent listening time, for visiting and British film stars who hitherto have been brought to the microphone as guest artists in various other variety programmes.

# SPECIAL STAND FEATURES AT RADIOLYMPIA

*The illustration on the right shows the Chloride Electrical Storage Company's stand and gives a general idea of the neat appearance which the stands presented this year, with their simple and uniform design. The colour schemes were in green and buff with chrome ornamentation. The wide range of Exide accumulators and Drydex batteries may be seen on this particular stand.*

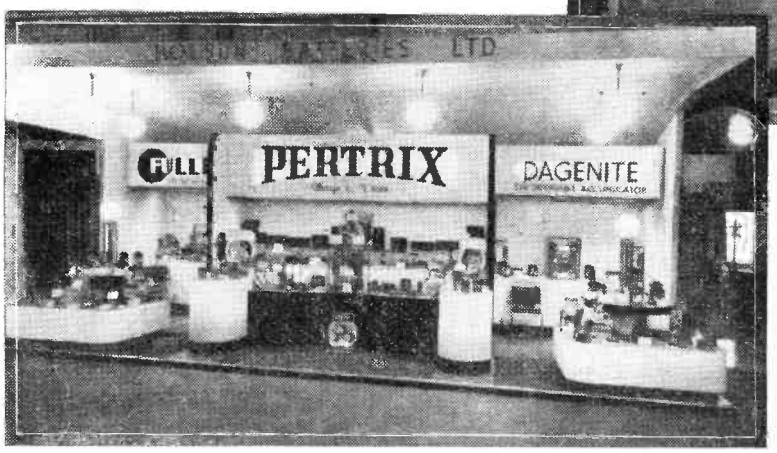



*On the left is a corner of the Exide stand where A.R.P. products were featured. The design includes a section of an Air-raid shelter, showing the application of portable lighting equipment for emergency use. Special units have been produced for this purpose, in addition to the standard torch or portable lamps.*

*On the right is the Rothermel stand upon which were featured various test instruments and the popular range of Centralab components. The large illustration on the rear wall shows how the well-known Centralab volume controls and potentiometers are constructed. The various Crystal pick-ups were also featured here.*



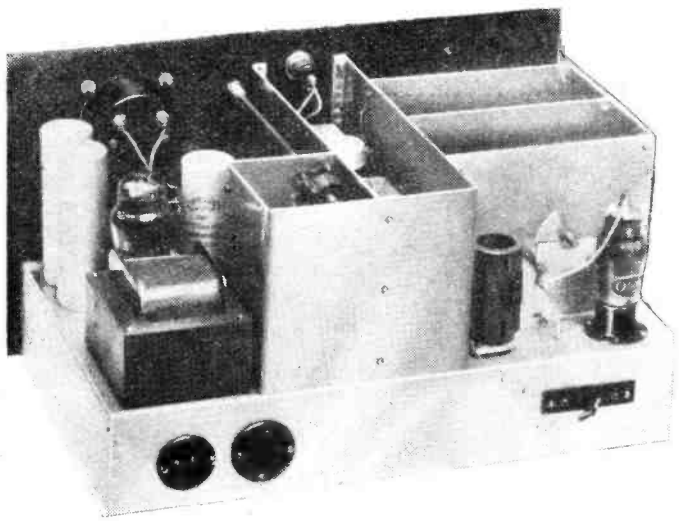

*Holsun Batteries also had a "wall stand," and the general appearance of this may be seen from the illustration on the left. Dagenite accumulators, Fuller cells and Pertrix dry batteries were exhibited in a very wide range, and in addition to the various radio units there were many other types such as are used for torches, cycle lamps and similar apparatus.*

# The 1940 "Air-Hawk" 9

## Operating Instructions and Further Constructional Details of this Receiver.

By W. J. DELANEY

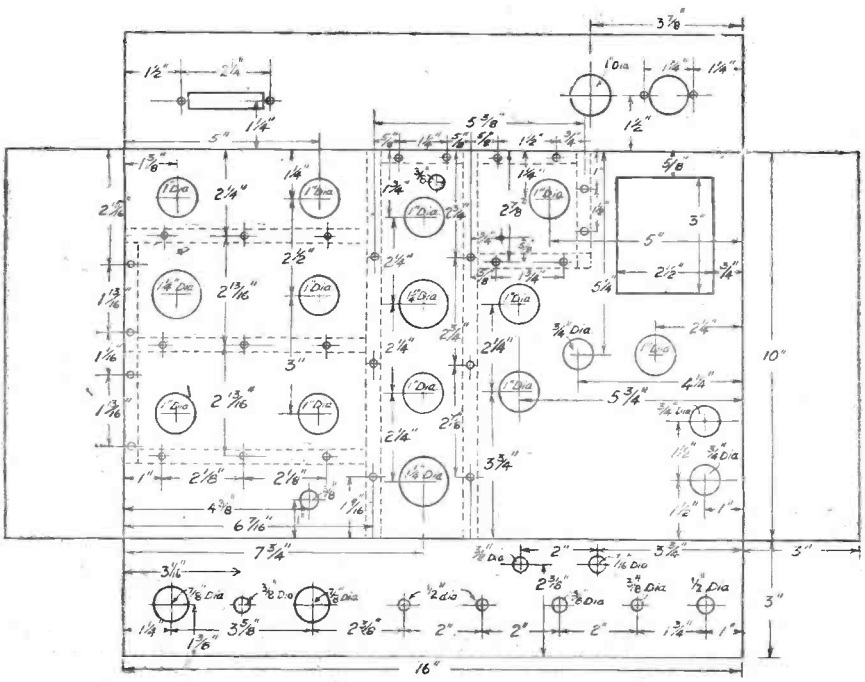
THE wiring diagram given on page 634 will make clear any points about which you may be in doubt. Note that for the H.T. positive line the two Eddystone stand-off insulators are attached at each side of the chassis, being screwed over the holding-down bolts found at the positions indicated. The base of the insulator is removed and the hole opened slightly. The bolts on the chassis will then cut their own thread. Stretch a length of bare wire across soldering tags attached to the tops of the insulators, and the various resistors and leads may then be anchored in this wire and risk of short-circuits will be removed. The position of the tapping clip on the S.G. potentiometer and the end clip on the H.T. resistance will now have to be found. In the latter case it is slipped along about half an inch, the exact resistance required being 300 ohms. In the case of the S.G. potentiometer it is desirable to have a voltmeter available, and the position of the clip should be adjusted so that 110 volts are applied to the screens. The speaker should be wired to a 4-pin plug so that it may be connected to the socket at the rear of the chassis, and care must be taken to connect the field and the transformer primary to the correct pair of pins. The speaker should also be enclosed in a small cabinet or mounted on a baffle placed in a suitable part of the room.



*A three-quarter rear view of the receiver showing the arrangement of the screening partitions.*

### Testing

For preliminary tests a single aerial lead should be used, and a short length of wire may be slung up in any convenient position in the room for this purpose. The plug on the aerial-earth socket strip should be inserted into socket A2, and the end of the aerial inserted into A1. An earth lead may be plugged into E, although it may be found that an earth makes very little difference on some of the short-wave ranges. Plug in the speaker and set all switches in the "off" position. Plug in coils for the 40-metre band (details of construction of coils will be given next week), and then switch on the mains supply to the receiver. It will be remembered, of course, that the receiver is normally switched on and off from the wall switch, the right-hand switch on the panel merely disconnecting H.T. and being therefore used as a stand-by switch in conjunction with a transmitter. After allowing a few seconds for the valves to attain maximum temperature the stand-by switch should be depressed. A rushing sound or faint hum should then be audible in the speaker to indicate that the set is "alive." If no such sound can be heard, plug in the 'phones and you should then be able to hear it clearly. It should, of course, be unnecessary to add that the L.F. gain control must be full on for the sound to be heard, although the H.F. gain may be "off." Now advance the H.F. gain to maximum and set the tone control to bass—that is, turned to its maximum position in an anti-clockwise direction. Turn the main tuning control to a central position and then turn both the band-setting condensers to approximately 40 on the dials. The left-hand control governs the I.F. and is not so critical as the right-hand control, although an adjustment of this will affect the tuning owing to the fact that it controls the oscillator tuning. Therefore the left-hand control may be swung over a few degrees in order to obtain the correct tuning setting. When the two condensers are properly adjusted the noise background will be at maximum and the two I.F. transformers may then be trimmed for maximum response. As the background noise increases in volume the H.F. gain control should be turned back so that slight changes may more easily be discerned. It should be possible to hear some kind of station at the setting mentioned, which coincides approximately with the 40-metre amateur band.



*Chassis drilling and cutting dimensions for the "Air-Hawk" 9.*

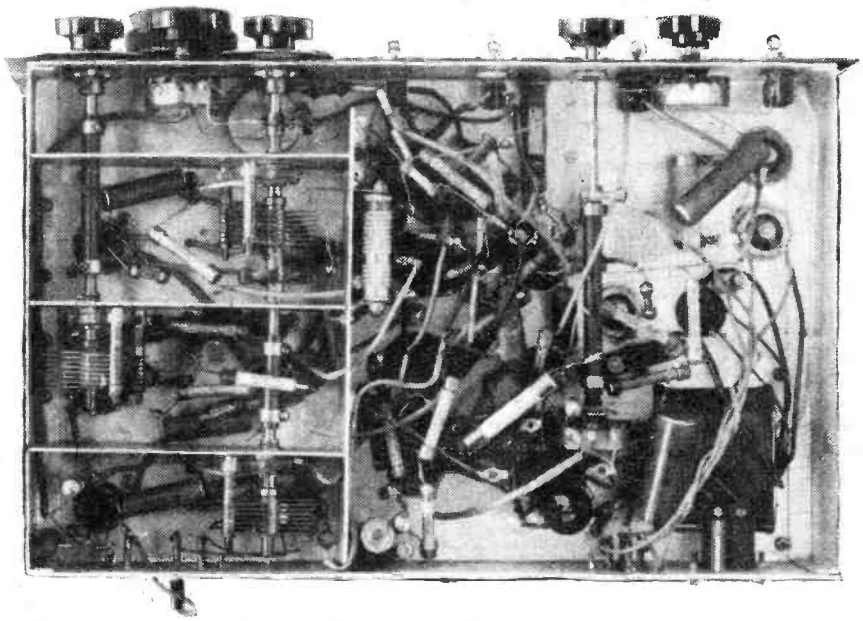
### B.F.O. and A.V.C.

When these adjustments have been found, the various controls of the receiver may be tested and adjusted. The A.V.C. control should be tested first, switching this on and noting the effect on a signal. There should be a slight decrease in volume if the A.V.C. is working, although without proper test instruments the only way to ascertain for certain that it is functioning is to note the effect on a weak station which fades. The operation of the switch will soon show whether or not the signal is being controlled. Next, test the Beat Frequency Oscillator. When this is used, the A.V.C. switch *must* be in the "off" position, otherwise the

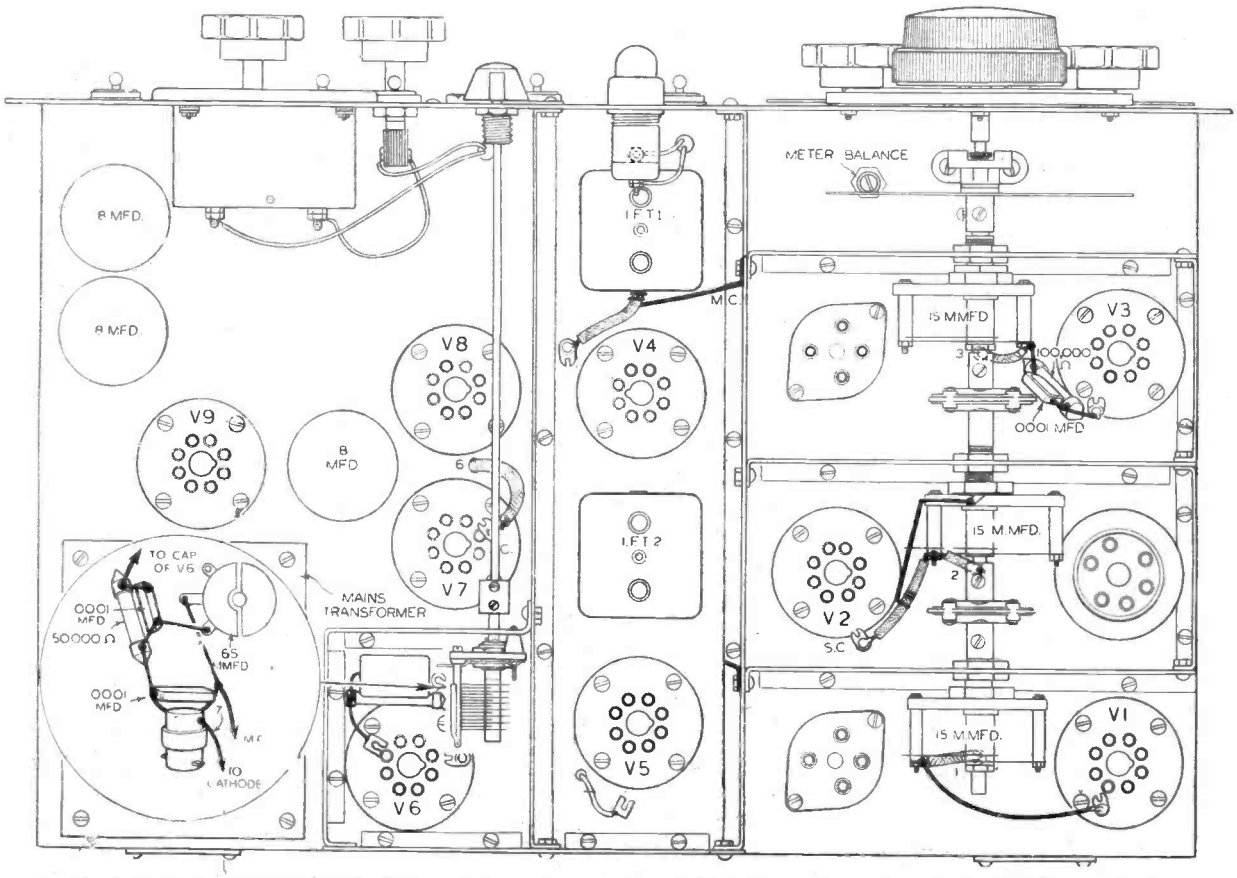
sensitivity of the receiver is reduced and very little will be heard. Twist the two short leads marked C in the circuit diagram, and which form the B.F.O. coupling condenser, for about 2ins. of their length, and then with the B.F.O. switch in the "on" position an adjustment of the control next to the tuning meter will result in an increase in the rushing noise. If a C.W. signal can be located the control will enable this to be varied in pitch from a low note to a very high musical one and usually the maximum effect will be obtained from 0 to 5 on the small dial which is fitted. This control may also be used as a station finder by setting it to about 3 on the dial and then searching on the tuning control. The carrier will be heterodyned and a whistle obtained, just as with a simple oscillating detector, but to obtain readable speech the oscillator must be switched off.

## Balancing the Meter

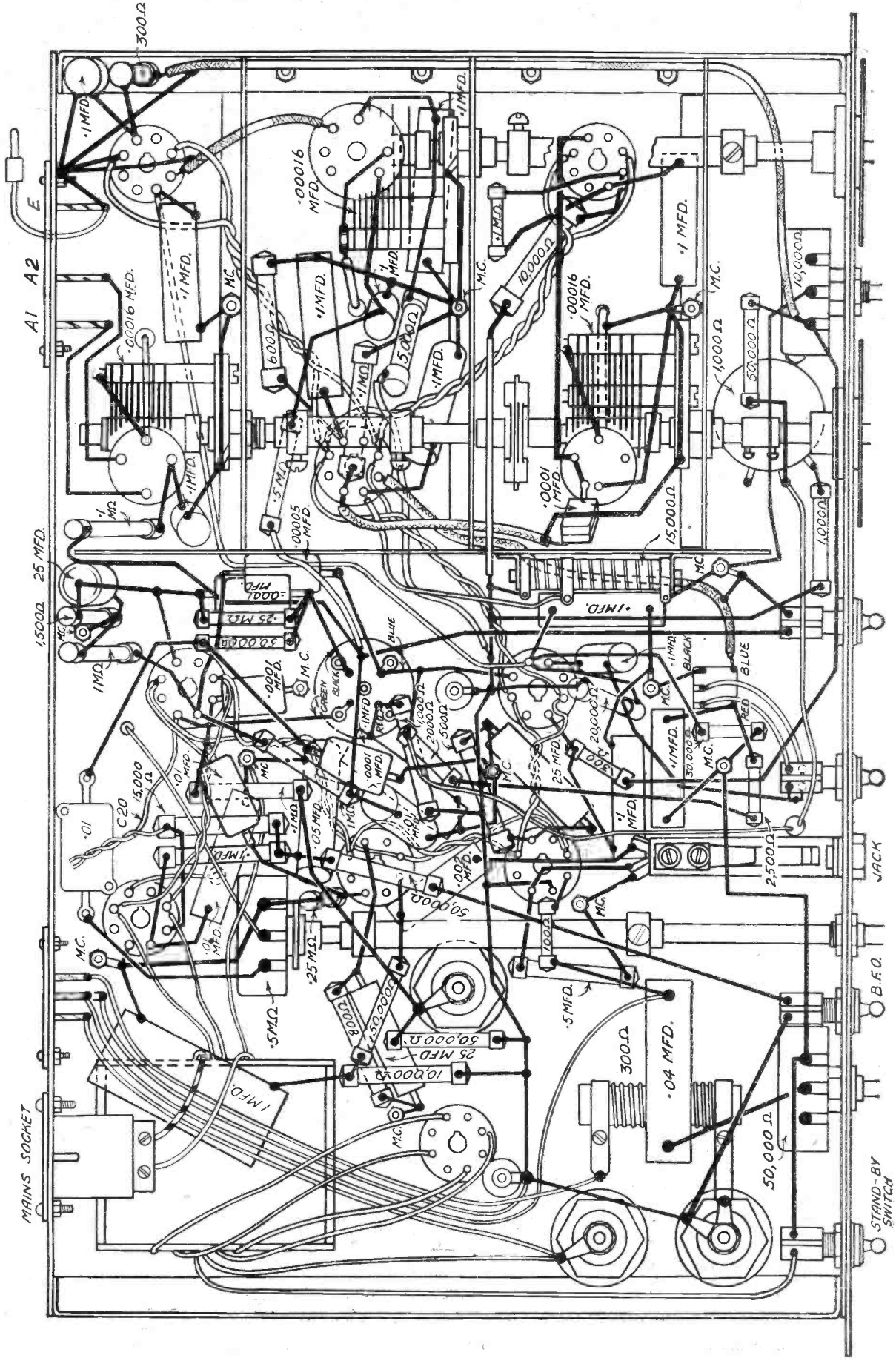
Next the signal meter should be balanced, and for this purpose the B.F.O. and A.V.C. switches must be "off." Switch on the meter switch and the needle will probably rise to some point on the dial. If it flies right over switch off the meter immediately. Place a screwdriver in the slotted top of the meter balancing switch and turn this anti-clockwise to its minimum position and again switch on the meter. It should now move very little. Turn the dial so that there is no signal, or alternatively remove the aerial lead. Now adjust the meter balancing control until the pointer is exactly at zero and switch on the A.V.C. If the meter then gives a small reading adjust the meter balancer again to half the difference between the two readings and then with a signal the meter should be capable of giving an accurate setting of signal strength. It should be noted that any adjustment of the H.F. gain control will affect the meter setting and therefore to use the meter the aerial should be pulled out and the H.F. gain control adjusted so that the meter reads zero. Now carefully mark the setting of the H.F. gain control and then in future to ascertain signal strength all that is necessary is to tune in the station, set the H.F. gain control to this pre-determined position and switch on the meter. The pointer will rise and after using the receiver for a few weeks you will be able to make your own "R" scale from the signals which you receive. On the original receiver R9 coincides with a reading of .6 mA, or nearly full-scale deflection. If the A.V.C. switch is on you will be able to see the effects of fading as the needle will rise and fall with the fading signal, although the sound from the speaker will remain practically constant, except in cases of bad fading. QSB values may thus be given by the direct meter reading, and the receiver is always adjusted to a predetermined degree of sensitivity by the H.F. gain control.



*This view of the underside of the chassis should be examined in conjunction with the wiring diagram on the next page.*



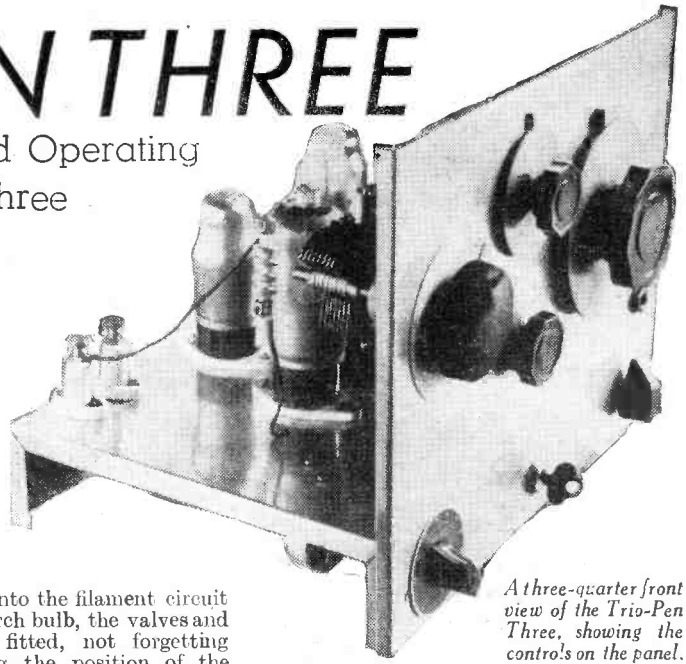

*Above chassis view of the "Air-Hawk" 9. The B.F.O. unit wiring is shown separately, on the mains transformer, for clarity.*




*Under-chassis wiring diagram of the 1940 "Air-Hawk" 9. The top chassis view will be found on page 633*

# The TRIO-PEN THREE

## Further Constructional Details, and Operating Notes of the Simple All-wave Three



*A three-quarter front view of the Trio-Pen Three, showing the controls on the panel.*

AS the condenser C7, which connects from No. 8 socket on the valveholder (V1) to No. 1 socket on the coil base, should be closely fitted and therefore will obscure sockets 2, 3 and 4 on the valveholder, this should be left until the rest of the sockets have been wired, similarly the grid-leak R3.

The filament wiring and earth returns should then be made, and for preference push-back sleeving type wire should be used, the sleeving in each connection being brought right up to the soldering point.

The transformer leads should be carefully handled and not cut too short if it is proposed at any later date to make use of this component again; the coloured leads are indicated in the wiring diagram and the points of connection should be protected by a short length of Systoflex to prevent possible drifting into short circuit with the chassis or any adjacent component.

The rest of the wiring is straightforward, and provided the metal-ended resistors are kept well clear of other components and chassis, little difficulty should be experienced. The screen leads in particular should be well anchored and well earthed to the bus-bar, and any possibility of shorting should be obviated by carefully checking over the wiring in the immediate proximity.

A 7-way battery cable should be used for all leads excepting the L.T. positive and negative, these latter should comprise twisted flex. Reference to Fig. 3 will clearly indicate the respective wander-plug and spade terminal connections.

Having satisfied oneself that the wiring is complete in accordance with the diagrams, the dials and volume control settings should be carefully adjusted, and in the case of the bandspread vernier, the 100 degree mark on the dial should be set at zero on the vernier indicator with the condenser vanes in mesh, this will leave 9 degrees to the left of the 100 degree mark reading against the 10 vernier degrees.

### Testing

Now, after making sure, and before fitting the valves, that the H.T. has not found its way into the filament circuit by testing with a torch bulb, the valves and coil can then be fitted, not forgetting the phone jack-plug, the position of the potentiometers, which should be to the extreme left, and the reaction condenser vanes, which should be completely out of mesh with the dial set to zero, and the aerial and earth can be connected and the receiver tested.

A few words now on the vernier movement. On studying the relationship of the dial divisions to the vernier divisions, setting the dial reading so that the 100 degree mark, for example, coincides with the 10 degree vernier setting, it will be seen that the 10 degrees of the vernier cover only 9 degrees on the dial, thus it will be apparent that there is a difference of $^1/_{10}$th of a degree between the degrees on the vernier and those on the dial.

When taking a reading, the degree on the dial that matches more closely a degree on the vernier (which falls anywhere between zero and 10 on the vernier) is therefore an exact reading to one decimal place of the dial reading.

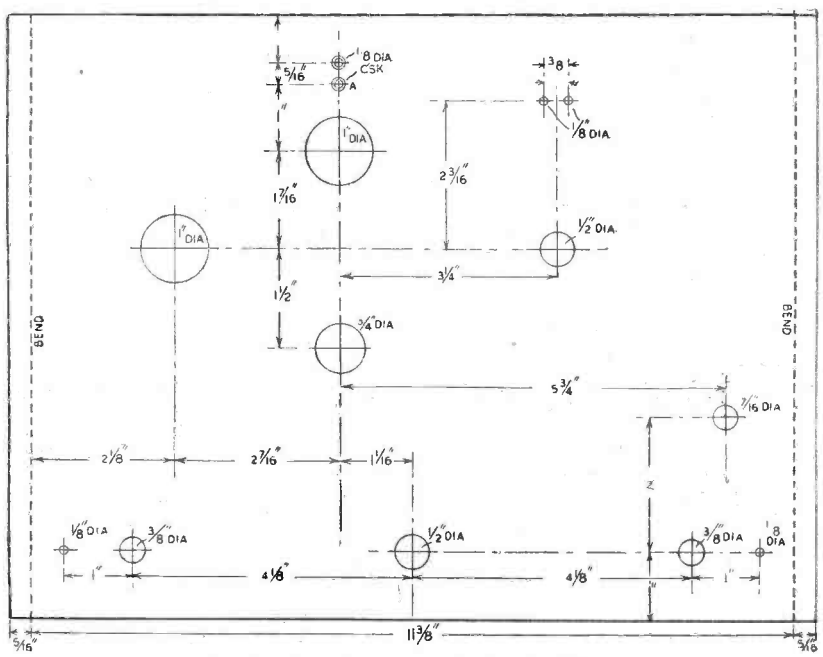



*Fig. 3.—Panel diagram for the Trio-Pen Three.*

*Example:*

Dial reading: 63 degrees before vernier zero.

Vernier alignment: 65 on the dial, at zero in vernier, 2 on the vernier.

Full reading: 63.2 degrees.

A little experiment with this dial will clarify the operation, and when one sets the 100 degree mark on the dial to the vernier zero it will be apparent how the remaining 9 degrees left of the 100 degree mark provide the decimal readings for the 90 degree settings.

Owing to the untuned H.F. stage there is considerable flexibility in the characteristics of the aerial with which this set is used and, provided the usual points are borne in mind concerning efficiency, any conventional broadcast and short-wave scheme (but preferably not of the fractional wave type unless this is of the doublet type designed for the 9-180 m. bands) will be satisfactory.

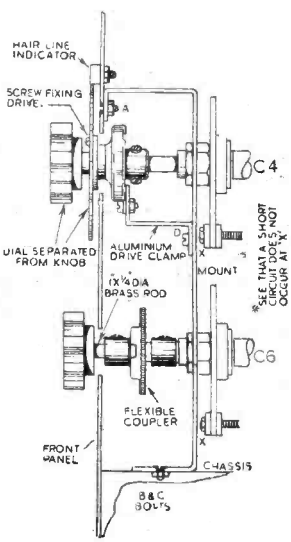



*Fig. 4. — Side view of the aluminium brackets on which are mounted the condensers C4 and C6 and flexible coupling.*

### Operating Notes

The output volume control should be handled in such a way that while "hunting," with the headphones plugged in, loud signals will comfortably be received,

## THE TRIO-PEN THREE

(*continued from previous page*)

increasing the volume to determine whether or not the signal is of sufficient power and entertainment value to change over to a loudspeaker; otherwise infrequent use of this control will result in unpleasant surprises in signal strengths.

It will be found that the location of many stations can be accomplished with the reaction condenser brought to a position of sensitivity which will provide that "Superhet" effect and, by carefully re-adjusting the coupling and variable-mu bias, maximum sensitivity can then be obtained by again slightly increasing reaction, using at the same time the band-spreader.

For the reception of C.W. it is necessary in most cases to increase reaction after adjusting the other controls in the above sequence to a point where the valve just oscillates, this state being audibly controllable so that a clear "note" is obtained and the signal key click obviated.

As it will be found that there is always a marginal adjustment for improving signals of widely different frequencies by altering the setting of the coupling condenser, owing to wide variations in the

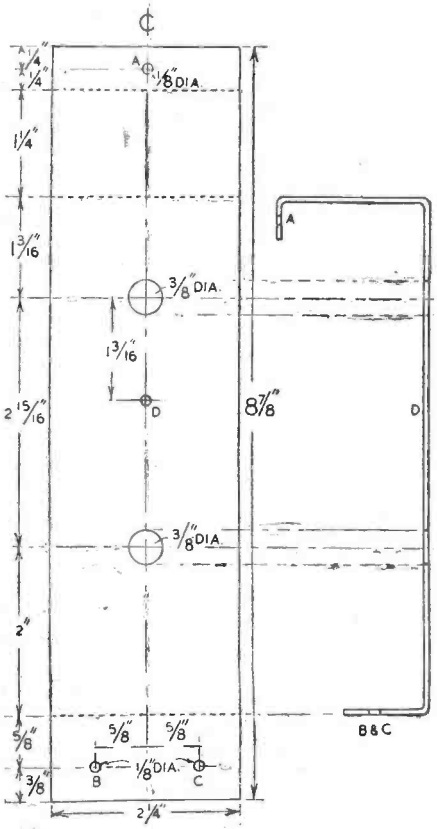


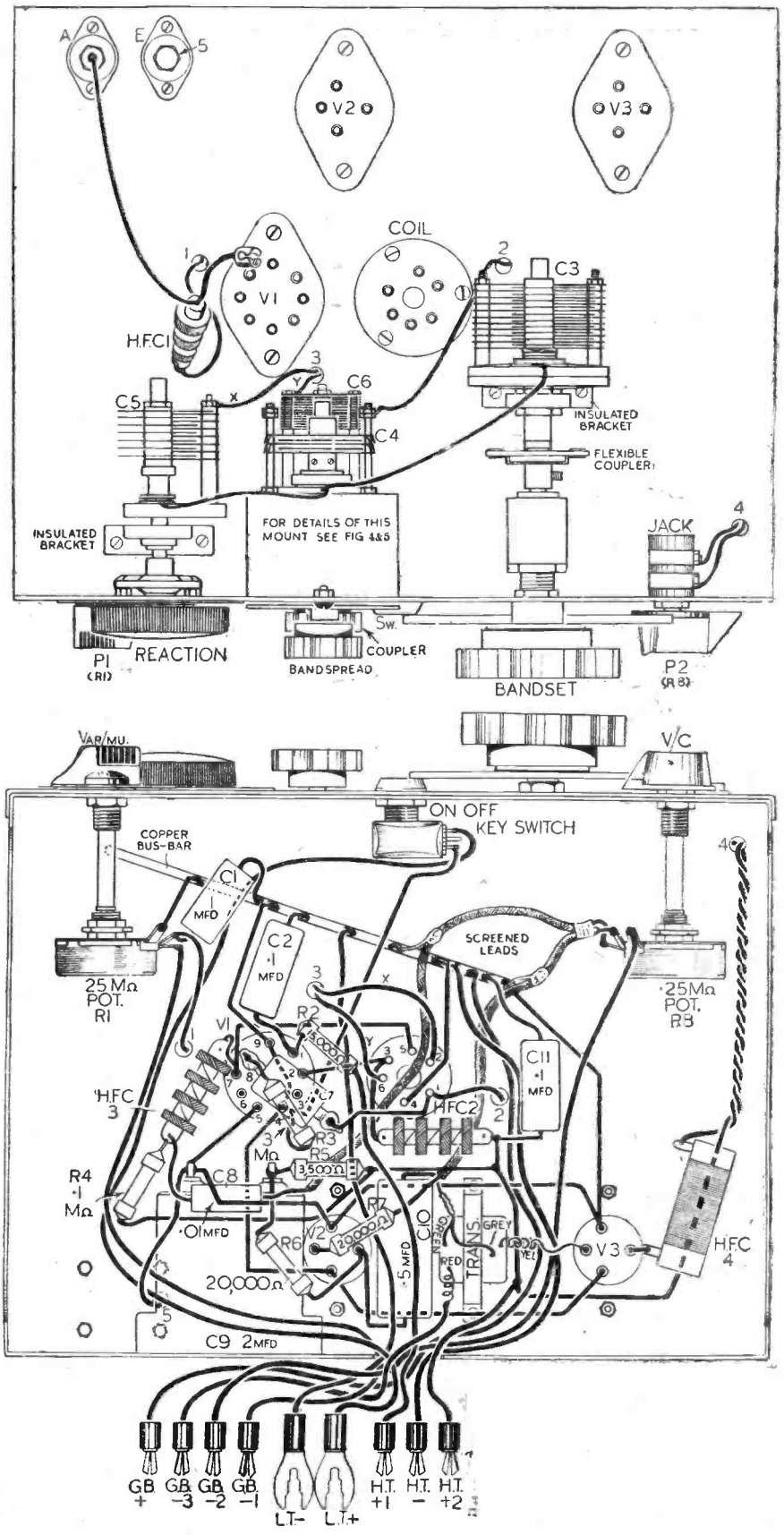

*Fig. 5.—Drilling diagram and details of the aluminium bracket.*

constants and reactance of the coupling circuit, this control should not be considered set after a signal setting has been fixed at what is assumed to be maximum sensitivity, but for logging purposes, the fact that inappreciable variation in the tuned-circuit constants is effected by alteration in the coupling, a dial for this control was deemed unnecessary.

It is important to stress here the advantages of using really good quality 'phones, as it is the sensitivity of the 'phones which ultimately governs the decipherability and logging value of not only weak signals but signals of different frequencies, and it has been proved time and again that where a transmission has been quite easily received and discernible on high fidelity headphones this same signal has been unoperable on indifferent earpieces.

Different values in H.T., with proportionate changes in grid bias, can be effected to get maximum response on D.X.

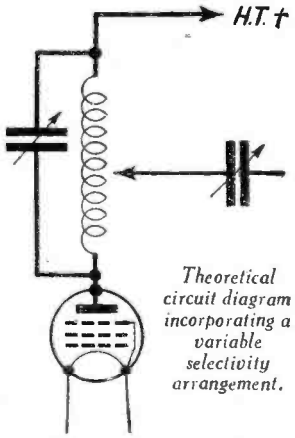
### FIG. 6.—WIRING DIAGRAM OF THE TRIO-PEN THREE



# Practical Hints

## Variable Selectivity

I RECENTLY made a short-wave receiver with H.F. stage, and as I wanted it to be as simple as possible I used a simple tuned-anode circuit. This worked as well as a parallel-fed tuned grid, but was not so




*Theoretical circuit diagram incorporating a variable selectivity arrangement.*

selective. After some experiments I replaced the fixed coupling condenser by a small semi-variable baseboard mounting component with a maximum capacity of 56 mmfd. I then made the anode coil of bare wire on a grooved former, and by adjusting the tapping point on the coil I found that I could vary the degree of selectivity, although, of course, signal strength was also affected. The accompanying theoretical diagram shows the final arrangement.—W. LANE (N.W.5).

## Improved Indicator

WHEN using some types of tuning dial, and also to some extent when using certain measuring instruments which are panel mounted, a difficulty is often experienced in seeing the exact indicating point. This may be due to the fineness of the dial engravings and thus some form of magnification is desirable. It should therefore be remembered in this connection that the small pocket magnifiers which are obtainable quite cheaply at the popular stores may often be mounted on the panel, and if the handle or stem is drilled it is in some cases possible to mount these on the panel and use the hinge movement to bring the magnifier over the required part of the dial or scale.—D. BOXOR (Perth).

## A Valve Adapter

THE accompanying illustrations show a valve adapter for voltage and current tests. It is both simple in operation and cheap to construct, practically everything being found in the average junk box. Completed, its uses are many. I procured an old type 7-pin valveholder with side terminals, a 5-pin flush type holder, 7-panel sockets, a 7-way battery cord, the base from a 7-pin dud valve, and five spring contact blades from an old wavechange switch.

A 1¼in. hole was drilled into the panel to take the 7-pin holder, the terminals of this having been reversed to fix on spring contacts. The top of valveholder is now flush with the top of panel. Next the seven

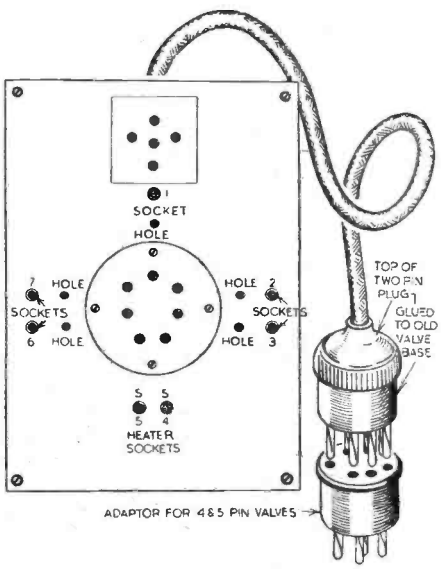
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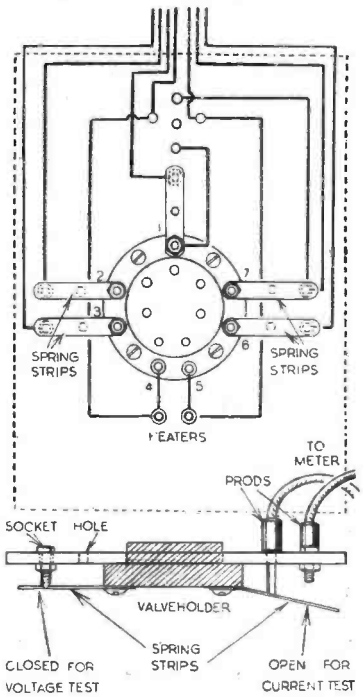
panel sockets are fixed into the panel, as shown in sketch, and a small hole drilled about ½in. in front of the socket, and in line with holder socket. This hole takes the test prod. Next, the five spring contact strips were fixed to the 7-pin holder by means of the terminals, so that they lay across the corresponding panel socket.




*A simple valve adapter for voltage testing purposes.*

A blob of solder on the end of each socket will give greater tension to the blades. The battery cord is then connected as shown, and the other end connected to valve base; each wire being a different colour enables this to be carried out easily.

For test purposes the adapter plug is inserted in the set, and valve under test is plugged into the adapter. Voltage tests are taken at various sockets in the normal way, while current is measured by inserting one test prod into the anode socket on the panel, and the other test prod into a small hole in front of socket. Pressing on this prod pushes down the contact blade which opens that particular circuit; taking out the prod automatically closes it again. All types of valves can be tested as the circuit at each pin can be opened. The 5-pin adapter is made with an old base




*Rear view of the valve adapter showing wiring connections.*

and a 7-pin flush type holder connected together to correspond to panel connections.

The whole panel fitted into a box together with a meter makes this a very useful tester.—R. BLAIR (Newcastle-on-Tyne).

## A Make-shift Potentiometer

WHEN trying out part of a high-power rig recently I found a need for a high-current potentiometer. I had nothing suitable handy and for a time was at a loss as to how to dispose of the unwanted excess. I then thought of the dimmers often used for amateur stage work and accordingly carried out the following idea. I obtained two large screw-top type glass jars and filled these three-parts full with tap water. A length of heavy-gauge bare copper wire was then placed at each end of the two jars, a single "U" inverted connecting the two jars together. A milliammeter was inserted in series with one of the outer wires and the other side of the meter and the wire in the remaining jar were used as connecting points. When switched on there was negligible current flow and accordingly the conductivity of the liquid was gradually increased by the simple process of adding ordinary table salt. This was dropped into the two jars, pinch at a time, until the current reading desired was obtained on the meter. Of course, the idea is not a permanency, but is very simple as a make-shift when proper apparatus is not readily available.—R. PERAVA (Stoke Newington).

# Radio as a Career—2

## Continued from Last Week, This Article Gives Some Helpful Advice to the Prospective Service Engineer and Explains How a Start can be Made

By FRANK PRESTON

TIME and available funds often preclude the ideal arrangement of building receivers of every type and carrying out experiments with each, but it is often possible to buy half a dozen second-hand sets with which experience may be gained. Some of these will not even be in good working order; so much the better, for they will then cost much less and will provide more scope for real service work. I know of a one-time enthusiastic amateur (he is still as enthusiastic as he was ten years ago) who holds a very good post in the radio industry due to following the suggestion just made. He bought one set at a time, completely overhauled and sold it, and with the proceeds bought another. After handling a score or so receivers he had made a local reputation, become a successful radio engineer and, incidentally, made enough profit to pay for a few pieces of good quality test gear. This procedure is not quite as simple now as it was ten years ago, for second-hand receivers in fair working order can be bought so cheaply, but I do not believe that it has become impracticable.

It would be very unwise to lay claim to the name of radio engineer until you are able to read intelligently any circuit diagram that might be placed before you, take correct and systematic voltage and current readings throughout a set—and "interpret" the meaning of the readings taken, carry out the alignment of a modern superhet receiver and make reasonable tests of any of the components. The knack of quick diagnosis of faults should also be added to this list. To some readers this will perhaps appear to be a "tall order," but the necessary proficiency can be gained if the work is taken seriously. It should be added that many manufacturers provide service data concerning their own particular receivers to accredited agents and their service staff, so that a sound foundation of radio knowledge is the only addition required.

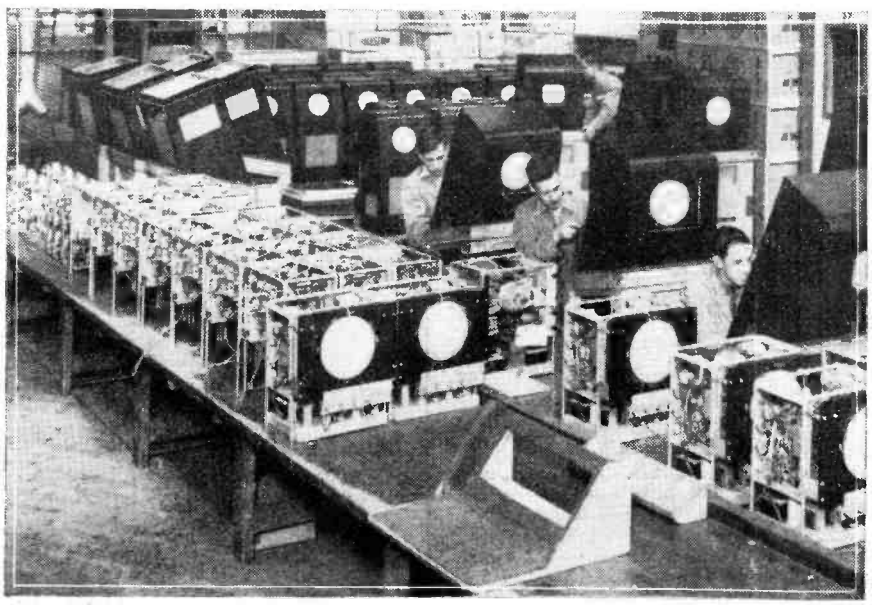
### Schools and Colleges

So far mention has not been made of the evening classes and lectures arranged by many local education authorities. Where these are available their value cannot be doubted, especially when the lectures are accompanied by practical demonstrations. In addition there are many reputable wireless colleges, including those which supply correspondence courses. Full- or part-time attendance at a well-established wireless school is obviously an advantage. To those who cannot afford this there is another course which is often open to the experienced amateur: he can obtain a job (probably at a very modest commencing salary) in a radio factory. With luck he will be able to gain some experience of both production and service work.

The ambitious man will seldom wish to stay in this job for more than a year or so unless he shows such promise that his employers give him some advancement, but he will learn sufficient to enable him to qualify as a competent service engineer—or something better—and to take up a better position when the opportunity presents; or when he makes the opportunity!

### Operators

In addition to service engineering there are often posts open to well-qualified candidates in various Government departments. These are of varied character, as will be revealed by keeping a watch on advertisements. There is also the work of wireless operator aboard ship or in the air, although these jobs do not always come up to expectations. Nevertheless, they suit the temperament of many, especially those who have gained experience as amateur transmitters. In nearly every case a certain amount of specialised training is required, this being arranged for suitable applicants by the employers. The job can well act as a good stepping-stone to others in the industry, although it is often found to be rather monotonous to the more go-ahead type of person.



*A typical view of the television benches in a modern radio factory, where final adjustments are being made to mass-produced television receivers.*

### Start at the Bottom

It is essential that a start be made at the bottom, for it is the sound knowledge of the underlying principles, combined with the ability to apply those principles in a logical manner, which enables the wireless amateur to become an efficient professional engineer. A complete knowledge of circuit diagrams is essential; the service engineer should be able to look at any diagram and, after a few minutes, have a clear idea of the precise circuit arrangement.

The radio engineer should also teach himself to think in terms of theoretical diagrams, for when he can do that he can save himself an immense amount of time in testing and checking a receiver. At the same time, he should be able quickly to make a diagram of any section of a receiver under test. Actual wiring is difficult to follow, but once a circuit diagram has been drawn the complete arrangement is straightforward.

### Practical Experience

It is desirable that the prospective engineer should have had at least a little experience in the construction of components, for he is then in a far better position to be able to make useful tests of components in a receiver which are suspect. A certain amount of mechanical ability is essential, for he must be able to build and re-build receivers in a business-like manner. The ability to make good, neat soldered joints is equally important, for all connections are soldered in commercial receivers. A knack of quick diagnosis of probable faults should be cultivated as soon as possible.

Valveholder connections should be memorised if possible, although it is easy enough to paste a chart of these inside the lid of the attache case used to carry the service kit. The resistors in all commercial sets are colour-coded, so the code should be learnt by heart. It is not proposed to go into full details concerning these points in this series of articles, for they have all been dealt with previously in the pages of PRACTICAL WIRELESS, and back numbers can be obtained if desired.

### Initial Employment

For present purposes, it will now be assumed that the prospective radio engineer has gained the initial experience referred to in the previous article, and that he is able to meet the simple requirements set out above. He should stand a good chance of obtaining employment in a radio factory, but then he might feel that there is no

scope for his ability, if he is employed as an assembly hand. That is no reason to despair; if promise is shown there will soon be a chance to obtain a better position after combining the technical, practical and experimental experience. The new work might be in the same factory, or elsewhere, but the factory experience and general knowledge of factory production methods will be invaluable.

### Free-lance Service Engineer

We might suppose that it is decided to start business as a free-lance radio service engineer. What procedure should be followed? In the first place it should be borne in mind that most dealers employ at least one service engineer, and that owners of receivers are more likely to ask the supplier than anyone else to attend to service work. That, of course, applies principally to comparatively new sets. For this reason it often pays to adopt one of the suggestions made last week; that is, to make arrangements with a local dealer who does not employ a service man to allow you to handle his service work. It might also be possible at the same time to work up a connection outside that dealer's area.

### Publicity

Should the idea of linking up with a dealer not appeal, a certain amount of capital will be required to obtain local publicity. Well-worded circular letters are often most helpful, although some prefer to send out handbills, take small advertisements in local papers and to take "space" on the screen of a local cinema. One engineer made a very good start by the obvious and rather tiring method of canvassing the area immediately after having handbills distributed. His method was to ask politely if a receiver was installed and if it was working satisfactorily. If not, he offered to make a superficial test on the spot and to suggest the probable remedy for any defects. Should he be informed that the set was in perfect condition, he asked to leave a self-addressed printed postcard on which the householder need only write his name and address, and post at any time that the set was in need of attention. The card also gave his telephone number.

### Service Charges

It is important that this method of making a test free of charge should apply only in the event of initial canvassing, since it is generally found to be bad business to offer any form of free service in normal times. Instead, a fixed charge should be made for testing and reporting on the set. It might be arranged that this charge would be deducted from the account should the engineer be given the work of effecting the necessary repairs.

In giving a report, it is desirable that it should be worded simply and that the cost of repairs should be stated. This saves trouble in collecting payments due and prevents the possibility of later ill-feeling on either side. There is seldom any justification for price-cutting on repairs; make the price a fair one and do not let there be any doubt that the work is efficiently carried out.

### Quick Service

When called upon to examine a receiver, the service man should be prepared to give straightforward and intelligent answers to the many questions he is almost sure to be asked. In the majority of cases it is wise to refrain from technicalities.

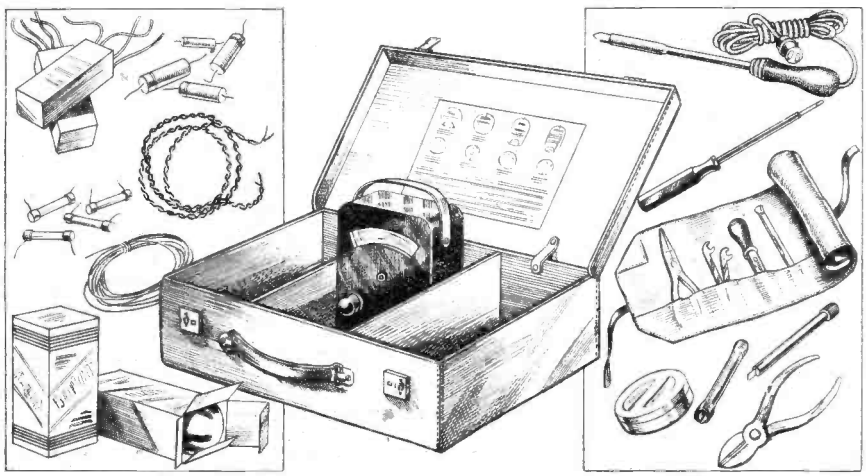
It is agreed by most service engineers that the receiver should be taken from the owner's home to the engineer's workshop for the repairs to be carried out. When other than the simplest of repairs are required this is obviously essential, but even when only a minor job is done it is a wise plan to make a thorough check and take a few measurements before passing the set as O.K. There are cases, of course, where valuable prestige can be gained by making a rapid adjustment on the spot, but they are rare. When the set is taken away, do not forget that rapid service creates a good impression.

When going out to sets it is often worth while to carry a few spare valves, especially if it is known what types are fitted. There are frequent examples of old sets which can be improved considerably by fitting new valves; those in use are still operative, but they have gradually begun to "wear out" and the change in reproduction and general performance has been so gradual that the owner has not noticed it.

### Carry a Set of Tools

There are certain service men who emulate the proverbial plumber when going out on service work. Even if there is no likelihood that they will be required, a small kit of tools and a good multi-range meter should be carried; they create a good

*(Continued on page 647.)*



*A suitably fitted-out attaché case, with good multi-range meter, small tools and a few spares, is essential to the successful service man.*


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**INFORMATION that SAVES you MONEY!**

**Free Valves and a Free Speaker . . . These are special offers N.T.S. are making with Kits and a Chassis this week.**

**If you're after an A.C. All-wave 4-valve Superhet Chassis**—fully tested and complete with valves—there's an excellent N.T.S. bargain going at **24/12/6**: you get a free matched speaker by the way. My advice to battery users is secure the N.T.S. All-wave SG 3-valve Battery Chassis model 7032, marked down this week at **47/6** (less valves) or **62/6** with British valves. Last week I saw there was a special offer of an A.C. SG 4-valver, an all-wave chassis at only **72/6** . . . this is a real snip. Amazing Bargains these.

**Don't miss** these Amplifier offers: **70/-** only, buys a 7-watts A.C. model from N.T.S., built on a steel chassis and four valves fitted. If you must use a battery amplifier, invest in a 4-watts output model going complete at **55/-**. **Recommended** lines for Public address work.

**Kit with valves given free!** Owing to the increase in short-wave listening, the N.T.S. Bandspread 4-valve SG-Pentode output model is a good "buy" at **49/6**.

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Or, for headphone use only there's the N.T.S. One-Valver with 'phones at **27/6**, both kits mentioned are supplied with coils for 12 to 94 metres. You should certainly go in for a WORLD All-Wave Kit. The 3-valve SG model is a snip at **29/6** or the more powerful WORLD SG4 is bargaining off at **42/-**. Complete set of WORLD self-locating coils for 9 to 2,000 metres, costs **17/6**. Don't forget you get FREE valves and station-name scale with all WORLD Kits.

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# *The Varley Dry Accumulator*

## Details of Another New Idea Which May Change Modern Receiver Design

EVERY amateur is familiar with the modern "Portable" accumulator, wherein the free acid is jellified to prevent spilling and other troubles. An accumulator, as distinct from a primary or dry cell, has the advantage that it offers a higher voltage per cell, and that it may be recharged when exhausted. The nominal voltage of an accumulator is 2, whilst a primary or dry cell is nominally rated at 1.5 volts. The discharge rate of a dry cell is also very different from that of an accumulator, the latter delivering its current steadily at a gradually falling voltage, whilst the dry cell gives maximum current for a short period during which the voltage drops rapidly. It then remains constant for a period at this reduced voltage before eventually becoming exhausted. For years attempts have been made to provide a rechargeable cell giving 2 volts, without the drawbacks of any form of free acid, and in the latest Varley Dry Accumulator we find the realisation of the dreams and trials of the research engineers. In addition to the advantages above mentioned it is actually as efficient as the standard acid cell, but much more portable and compact.

### How It Is Made

In its basic principles the new Varley cell is identical to the standard acid accumulator, with the difference that the acid is introduced during manufacture into the elements of the cell and a porous separator. There is an extruded cylindrical lead container, the interior of which is heavily coated with spongy lead. This is the negative electrode, and on to the interior of this is attached a moist, porous flexible separator. This separator is unaffected by sulphuric acid. For the positive plate a lead cage is employed and this is inserted centrally in the cell. The whole aperture is finally tightly packed with moistened peroxide of lead. It is obvious from these details that the entire cell is a more or less "solid" assembly and no movement of the elements can take place, enabling the cell to be turned about in all directions without trouble, and it may also be subjected to shocks without disturbing the function of the cell.

The chemical action is identical to the normal accumulator, and when the cell is discharged it may be recharged in the usual way, a small quantity of distilled water only being added to retain the moisture in the cell. The water is immediately absorbed by the elements. To ascertain the condition of the cell on charging, all that is required is a voltmeter, the hydrometer or any similar acid-testing device being dispensed with. The discharge curve is much straighter than that given by the normal accumulator, and thus the cell is admirably suited for certain scientific apparatus where a constant steady output is of the utmost importance. Sulphation and corrosion are non-existent with this new cell, and we have subjected a sample to tests which fully substantiate the makers' statements.

The advantages of the accumulator, compared with the ordinary dry cell, may be summarised as follows :

1. The cell gives three times the discharge efficiency on each of its discharges as the ordinary dry cell of similar size.
2. The cell may be recharged 100 times and more, whereas the ordinary dry cell becomes useless after one discharge.
3. The cell remains at an even voltage during each discharge, whereas the voltage of the ordinary dry cell falls rapidly.
4. The cell may be used for continuous lighting, whereas the light from an ordinary dry cell falls off during discharge.
5. The cell, being dry, can be carried in any position, packed and transported to hot countries, stored and then charged, whereas the ordinary dry cell becomes useless under such conditions.

Compared with the ordinary accumulator the advantages may be summarised as follows :

1. The cell is dry and solid.
2. It is lighter, smaller and more compact than free-acid types of accumulator.
3. There is no acid to spill ; no jelly electrolyte.
4. It can be carried and discharged in any position.
5. It can be charged and packed as ordinary dry goods, and sent to any part of the world.
6. It has a higher capacity for its size than ordinary free-acid types of cell.
7. There are no plates to buckle and it is free from disintegration.

# RADIO CLUBS & SOCIETIES

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

### EDGWARE SHORT-WAVE SOCIETY

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

OWING to the good attendances during August, it was decided to call it Member's Lecture Month, and the following members offered to discuss certain of their equipment. G6ZO on Aerials ; G6PM on his oscilloscope ; G3HT on his rebuilt commercial receiver, and a competition night on the best description of a 10-watt transmitter for the new members.

Future meetings include talks on a car radio installation, and a valve manufacturer's products.

G3HT, treasurer of the club, has now joined the staff of Messrs. Webbs Radio.

Owing to the success of the last 5-metre direction-finding competition, another is being held shortly.

### SLOUGH AND DISTRICT SHORT-WAVE CLUB

**Secretary :** K. A. Sly, 16, Buckland Avenue, Slough.
**Meetings :** Alternate Thursdays, at 7.30 p.m.

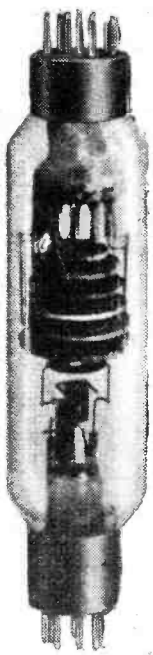
AT the last meeting held on August 17th, 1939, at the Toc H Headquarters, Slough, the chief item of interest was a talk by Mr. Bayley (2FYF) on "Test Equipment." The speaker dealt with the simplest apparatus for continuity tests. He then went on to describe a multi-purpose instrument centred around a moving-coil milliameter, showing how Ohm's Law could be applied to calculate the values of resistances for shunts and multipliers.

In conjunction with Mr. Bayley's talk a further talk was given by Mr. Houchin (G3GZ) on the "Theory and Construction of a Milliammeter."

It was decided that a discussion on 56m/cs should be held at each meeting, in addition to the usual discussion on conditions. A very successful junk sale was held, the auctioneer being Mr. Bayley (2FYF). At the next meeting a further talk will be given in the series on "Test Equipment."

# Successor to the Valve?

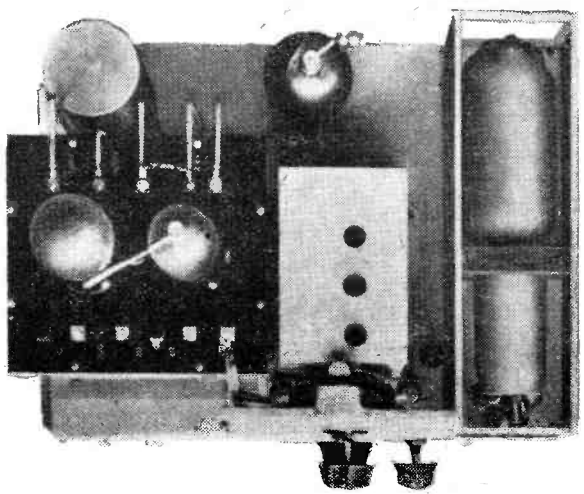
## First Details of a New Electron Multiplier Introduced at Radiolympia and its Application to Modern Radio and Television Apparatus



*The new Augetron which is described here.*

WE have already described in our pages the principles of secondary emission and electron-multiplying devices, but until this year's Radiolympia opened its doors the majority of these devices had been produced and used only in the laboratory. On Stand No. 18, however, Vacuum Science Products were showing not only a commercial version of an electron multiplier, but also broadcast and television receivers in which a standard multiplier was incorporated. The new tube is known as the "Augetron" and is an all-British invention. It is to be produced in this country (the samples on view at Olympia having been imported) and will shortly be on the market at a very reasonable cost.

For the benefit of those who are not familiar with the principle of secondary emission, it may be stated briefly that when a surface is bombarded by electron streams certain electrons are released by the surface and these are known as secondary electrons. In modern valves the electron stream from the filament or cathode is directed to the anode, and obviously any hindrance or opposition which would be set up by secondary electrons would impair the efficiency of the valve. Accordingly, various steps are taken to avoid the effect, which is also, incidentally, present in the modern cathode-ray tube.



*A land-pass radio receiver with one of the Augetrons fitted.*

### Electron Multiplier

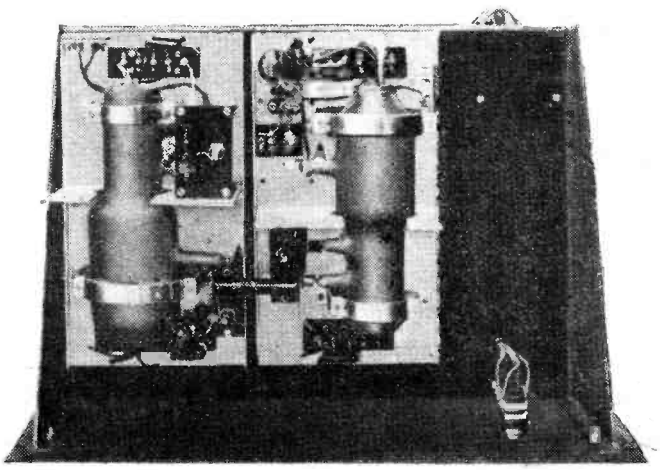
In an electron multiplier, however, the phenomenon of secondary emission has been taken advantage of, and arrangements are made to pass on the emission from one electrode to another, each adding to the stream and thereby increasing the final current which is obtained. In the "Augetron" each of the secondary electron emitting sources is in the form of a sensitised metal plate in which are a large number of holes in funnel-shaped depressions. The primary emitter, or first cathode, may be any form of electron source, such as a photo-electric or thermionic device, and grid control is provided as in the standard valve. The final collector anode is in the form of a robust flat perforated plate, and the maximum current which may be handled by this anode is of the order of 20 mA. at 250 volts. Thus, in view of the amplification which takes place, the initial current may be very low indeed. The existing multipliers are designed to provide a gain of about 1,000, and thus the current at the input end is only 10 micro-amps. The makers claim that by suitable design it has been possible to develop the device to have a mutual conductance of some four times the standing current, and thus it gives, for the desired input of 10 micro-amps., an output slope of 40 mA. per volt at 10 mA. current, a figure which is three or four times better than the best radio valves on the market.

### Six-stage Multiplier

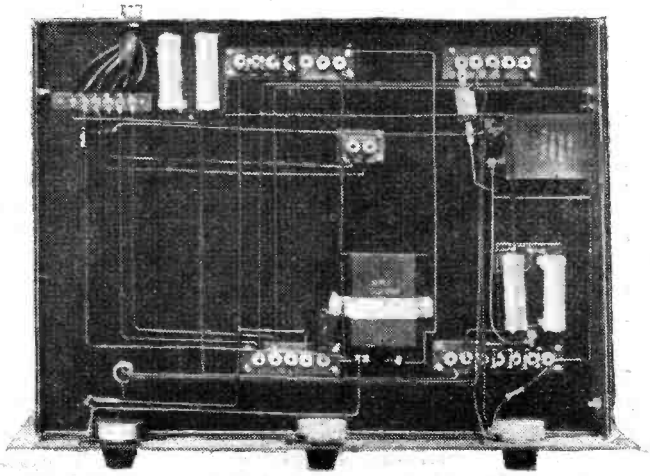
To obtain the overall gain of 1,000, a 6-stage multiplier has been standardised, and this runs at an overall voltage of about 2,000—or 300 volts per stage.

Under these conditions each normal secondary emitter gives a stage-gain of about 2½. The final anode is so arranged that it gives a gain equivalent to approximately 7. Inter-electrode capacities have been reduced and the tube is quite suitable for use on the ultra-high frequencies used for television. A complete television receiver was, in fact, in operation at the stand at Radiolympia and two of the tubes were employed on the H.F. side of the receiver, followed by the usual de-modulator, etc. Owing to the very high gain, much associated equipment found in standard radio circuits may be dispensed with, and as a result the noise level is kept down and increased amplification is possible. The essential data of the television "Augetron" is as follows:

| | |
|---|---|
| Heater voltage .. .. .. | 2.0 v. |
| Heater current .. .. .. | 1.5 A. |
| Accelerator voltage .. .. | 300 |
| Voltage per stage of multiplication .. .. .. .. | 300 |
| Maximum anode dissipation .. | 1 watt |
| Recommended anode current at 125-v. .. .. .. | 8 mA. |
| Input capacity .. .. .. | 4 $\mu\mu$f |
| Output capacity .. .. | 7.5 $\mu\mu$f |



*Here are two Augetrons in a vision chassis for television reception.*

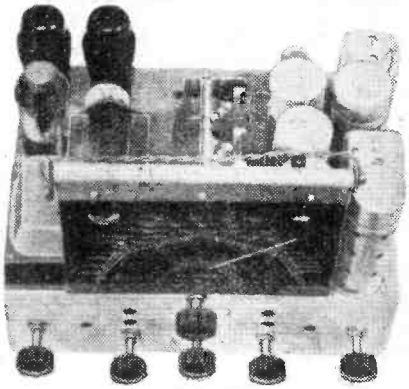


*This underside view of the chassis shown on the left indicates how wiring is simplified.*

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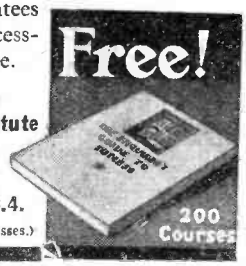
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# PROGRAMME NOTES

## Mr. Walker Wonders—

EVEN when he blends business with pleasure, Mr. Walker, radio's junkman, just cannot help getting mixed up with what he expressively calls "pretty how-d'ye-do's." Each summer, when the junk business suffers its annual slump, he joins the exodus to the coast, there to peddle novelties and toys and so keep in touch with things and provide "the milk and honey."

This year, at Brightpool, however, he became involved in a remarkable affair — so exciting that his amanuensis, Ernest Dudley, has deftly turned it into a first-rate thriller for radio, and it is to be broadcast on September 19th (National) and September 21st (National). Set against a background of concert parties, the bathing pool, fun fair, a dance hall, and all the other entertainments of the big resort, the story intermingles the plot with plenty of amusement.

Production of "Mr. Walker Wonders" will be by Gordon Crier.

## "Further Outlook Warmer"

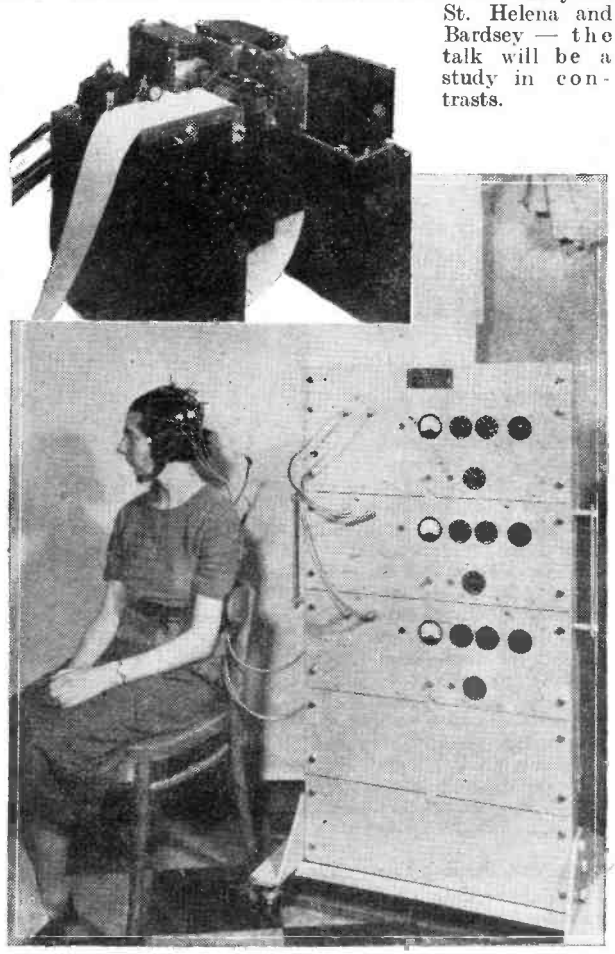
THE author of this farcical comedy for broadcasting writes comparatively rarely for radio; but when he does so a memorable production is always the result. H. R. Jeans has this time turned his impish fancy to the predicament of Sidney Tripp, schoolmaster in a small country village. Mr. Tripp is suspected by his wife one morning of a slight attack of 'flu. He protests that he feels perfectly well, but on the doctor being summoned it is found that he has rather more than a normal temperature. This rises by alarming leaps and bounds, finally breaking the thermometer. Next a slight smell of singeing is observed and people feel uncomfortably warm if sitting too near Mr. Tripp; he remains his simple and imperturbable self. Finally, a series of disastrous fires are traced to Mr. Tripp's presence in their neighbourhood. His subsequent adventures in a circus and elsewhere provide, in the play, nationwide consternation and should, in Barbara Burnham's production, prove widely amusing. Richard Goolden will find in Mr. Tripp a role after his own (and listeners') hearts. This broadcast will be given in the National programme on September 8th.

## A Student Vagabond

WHEN he was a student at Birmingham University, Gabriel Seal, now a teacher in a London secondary school, spent his vacations cycling in Poland, Russia, Scandinavia, and the Balkans. He covered more than 5,000 miles and spent less than £1 a week. In a "Seeing Life" talk on September 11th, from the Midland Regional, Mr. Seal will tell of his travels. He has broadcast before—in Midland radio plays, and while in Birmingham he undertook occasional work at repertory theatres.

## Two Islands—a Study in Contrasts

SYDNEY S. Griffith, author of the Anglo-Welsh novel "Little Calvary," will give a talk on September 13th, in which he will describe two islands he knows. They are St. Helena and Bardsey — the talk will be a study in contrasts.



*A general view of the "Electro-encephalograph" which was shown at Olympia by Ediswan, and inset is the recorder which shows graphically "brain activity."*

## POLYTECHNIC COURSES IN RADIO SERVICE WORK

THE courses in Radio and Radio-Gramophone Service Work, which are held at the Polytechnic, 307-311, Regent Street, London, W.1, begin on Monday, September 25th, 1939. Enrolment week is September 18th to 22nd, 6 to 9 p.m.

These classes have been arranged for those engaged in the service side of the radio and radio-gramophone trade. The instruction offered occupies two evenings per week for a period of two years. The course of lectures and practical work prepares for the City and Guilds of London Institute Examination in Radio Service Work, the next examination for which will be held in May, 1940.

A pamphlet containing the complete syllabus of the courses is obtainable from the above address.

# Leaves from a Short-wave Log

### Tune in Montreal

PENDING the construction of a high-power short-wave transmitter, the Canadian Broadcasting Corporation for the relay of the Montreal radio programmes continues to use the 100-watt station CFCX, on 49.96 m. (6.005 mc/s). Broadcasts may be picked up on weekdays from B.S.T. 13.45-07.00, and on Sundays from 15.00-04.15. All announcements are made by a man.

### The Voice of France in the Far East

GOOD signals are now being obtained from the 12-kilowatt Radio Saigon station FZR (French Indo-China), on 49.05 m. (6.116 mc/s). Broadcasts for Europeans, with announcements in French and English, are made daily from B.S.T. 05.45-06.15, and from 12.45-14.40, with a special English programme between B.S.T. 12.00-12.45. On 25.47 m. (11.78 mc/s), a European programme is given from B.S.T. 03.30-03.45, and between 06.15-06.45, with a transmission for English-speaking peoples between 14.30-14.45. The interval signal is one stroke on a gong, and the call as above with its French translation : *La Voix de France en Extrême Orient.*

### Haiti in the Log

HH3W, Port-au-Prince (Haiti), on 31.25 m. (9.6 mc/s), 100 watts, was recently logged after midnight B.S.T. Announcements were made by a man in French, Spanish and English, with four chimes as an interval signal. The address is Boite Postale A/117, Port-au-Prince, Haiti.

### Broadcasts from Hsinking

WITH the call : *This is the Voice of Manchukuo,* daily, on 25.48 m. (11.775 mc/s), NTCY, a transmitter at Shinkyo (Hsinking) broadcasts a musical radio programme, followed by a news bulletin in several languages, between B.S.T. 22.00-23.30. The transmission closes with the National Anthem of that country followed by a series of chimes.

### Alterations in Amateur Transmitting Band

ACCORDING to the decisions taken at the Cairo Conference the frequency bands for amateur transmitters, which came into operation on September 1st, are the following : 5 m. (60 mc/s)—5.128 m. (58.5 mc/s) ; 10 m. (30 mc/s)—10.71 m. (28 mc/s); 20.83 m. (14.4 mc/s)—21.43 m. (14 mc/s) ; 41.67 m. (7.2 mc/s)—42.86 m. (7 mc/s) ; 75.95 m. (3.95 mc/s)—81.41 m. (3.685 mc/s), with the exception of the channel 78 m. (3.846 mc/s) ; 82.53 m. (3.645 mc/s)—85.71 m. (3.5 mc/s), and 150 m. (2 mc/s)—174.9 m. (1.715 mc/s).

### Fiji Islands Calling You !

AMALGAMATED Wireless (Australasia) Ltd., of Suva (Fiji), are using a 400-watt station, VPD2, for a weekday programme between B.S.T. 11.00-13.00. The power of the transmitter will be increased to 10 kilowatts in the near future. In the meantime the channels used are 19.79 m. (15.16 mc/s) ; 25.22 m. (11.895 mc/s) ; 31.44 m. (9.542 mc/s), and 48.94 m. (6.13 mc/s).

### Listen to Guatemala

RADIO programmes from TGWA, Guatemala City, on 30.98 m. (9.685 mc/s), can now be heard at good strength on most nights after midnight, B.S.T., until 03.00, or from 04.00-08.00 on weekdays. The station also works on 19.78 m. (15.17 mc/s) on weekdays from B.S.T. 19.45-20.45 and on Sundays from 19.45-00.15. The call is *Broadcasting Nacional, La Voz de Guatemala.*

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### ARMSTRONG MANUFACTURING COMPANY

ALTHOUGH the new Armstrong catalogue only consists of sheets in a folder, it is full of most interesting details of their special series of chassis receivers. All these chassis are complete with valves and each is guaranteed accurately ganged and individually tested under actual aerial conditions. They are sent on seven days' trial and money is returned in full if the chassis does not meet all your requirements. The chassis include a 7-valve with cathode-ray tuner all-wave radiogram at £7 18s. 6d. ; a similar unit with press-button tuning ; an 8-stage all-wave radiogram chassis with R.F. stage and 3 stages of A.V.C. at £8 ; a 9-valve radiogram chassis with 8 watts R.C. triode push-pull output at £10 10s. ; a 10-valve radiogram chassis with cathode-ray tuner and 8-watt output at £12 12s. ; and a 12-valve 5-waveband chassis with 2 I.F. stages, all the usual refinements and 10 watts output at £17 17s.

### BRITISH PIX CO., LTD.

THE latest Pix catalogue details all the condensers and resistances which are available for service engineers and dealers, and supplementary lists include details of the Gripon, self-fitting outdoor aerial and the range of Pix valves. The Gripon aerial has a three-prong end by means of which it may be hooked on to a gutter or any similar projection, and it costs 4s. 6d.

### OSRAM VALVES

THE latest edition of the Osram valve guide is a neat 68-page pocket-size book containing, in addition to complete data of the entire range of Osram valves, numerous circuits showing their application. Full details, such as pin and base connections and tables of comparative types, with full details of prices, are given, and the book also includes a complete list of the valves employed in the entire range of G.E.C. radio and television receivers. This year's edition of the book also includes a transmitting circuit utilising the newly-introduced KT8 valve.

### TELEGRAPH CONDENSER COMPANY

THE general catalogue issued by the T.C.C. is a stout board loose-leaf volume divided into sections dealing very fully with all types of T.C.C. condensers, interference suppressors, etc. A number of new types and designs are noted, and special high-voltage types have been introduced for television and other high-power work. There are supplementary lists and data available for general use, and all give fully dimensioned sketches of the various components so that their suitability for various pieces of apparatus may be ascertained apart from their electrical characteristics.

### TAYLOR ELECTRICAL INSTRUMENTS, LTD.

A BROCHURE issued by this company gives full details of the various test instruments in which they specialise, including universal meters, D.C. meters, valve testers, signal generators, oscilloscopes, etc. Supplementary leaflets give more exhaustive data of the individual items, all of which may be obtained on application to the makers. The 70-range precision-built Taylor-meter is a most effective instrument rated at 2,000 ohms per volt, and measuring voltage and current (either A.C. or D.C.), resistance, and by means of a small adaptor, output capacity and inductance.



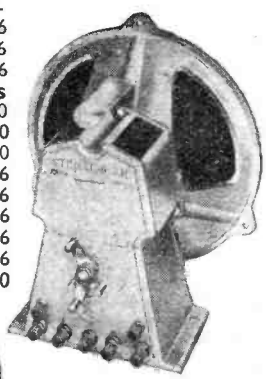

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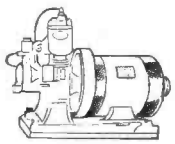
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# TELEVIEWS

## Televising Newsreels

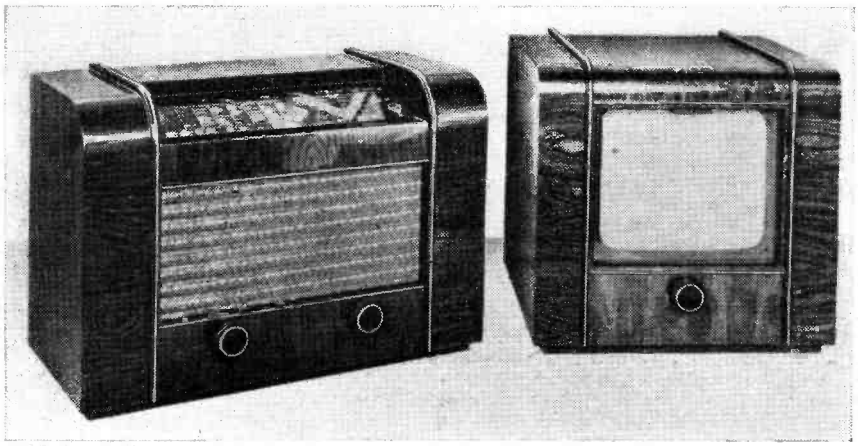
THERE is still a good deal of opposition among cinema exhibitors to the present practice of allowing the B.B.C. to televise current newsreels in the normal Alexandra Palace programme. When it is remembered that these films never last longer than ten minutes and are generally shorter even than that, it is difficult to see how this constitutes a menace to the box-office receipts of cinemas. Surely the main cinema appeal, apart from the news theatres, is with the two feature films, and since features other than those obtained from non-association sources are still barred to the B.B.C. there seems little reason for all this talk about newsreels. In any case, one supplier of the newsreel is already a company interested in big-screen television. To meet the situation, however, it has been suggested that a composite newsreel for transmission purposes should be prepared to which all the newsreel companies could contribute. That is a very co-operative suggestion and one which might very well ease the present deadlock. It must not be forgotten, however, that the B.B.C. has its own very efficient film unit, and although this at no time has been employed in opposition to established companies, if circumstances warrant such an action there is no reason why the television staff should not prepare their own news-film explicitly for transmission to viewers.

## The Add-on Unit

THE use of a separate television receiver unit which can be used in conjunction with an existing broadcast receiver is still finding a certain amount of favour in different quarters. Not long ago the columns of this journal gave a long reasoned review of this method of enjoying television programmes, pointing out the advantages and disadvantages without bias. In any case, the fashion seems to have spread to the Continent, and above is shown the latest type of vision receiver together with an all-wave superhet broadcast set. In neat table form with a single control for adjusting picture contrast, this receiver has very similar characteristics to the standard German set described in *Practical and Amateur Wireless*, dated August 19th. The "square type" cathode-ray tube is used and when viewing is not being undertaken, the white tube end can be hidden by a cloth shutter which pulls down into place somewhat like a roll-top desk. No doubt this unit will have a good public appeal together with the standard people's receiver, and according to the latest information transmission time in that country has been extended to the radiation of programmes continuously from 5 p.m. to 10 p.m. each day. In Berlin itself a second ultra-short-wave transmitter is to be erected on the top of the Karstadt store in the east end of the city. This will be used in conjunction with the Feldberg and Brocken stations which are due to be opened in the early autumn. If this does happen, then the German television station will be capable of providing satisfactory picture-signals to a quarter of the country's population.

## C.R. Tube Spot Distortion

THE standards of performance for cathode-ray tubes manufactured for television picture reconstitution need to be very stringent if the results are to be completely satisfactory. Certain characteristics must be conformed to, and one of the most interesting in this connection is that associated with distortion evident in the tiny spot of fluorescence on the screen at the point of impact of the electron beam. One important feature to guard against is astigmatism which is a distortion of the spot, such as that when it is focused to give maximum definition in one direction of deflection, it does not give maximum definition in the other direction. The extent to which this defect exists is determined by an observation of the line-width under specified conditions with an interchange of horizontal and vertical deflections but without any readjustment of focus. Then, again, under conditions of modulation it is possible for the spot area to change in size or position, and possibly the shape of the spot may be affected by modulation. This form of distortion is best observed by the application of modulation which will form a regular pattern on the screen with sudden transitions from black to white. For example, a 10-kilocycle frequency producing traverse in the horizontal direction, together with a 50 cycles linear traverse in the vertical direction, will produce a good mesh pattern for test purposes. Deflection defocusing can also occur in both electrostatically and electromagnetically-operated tubes, and with a pattern produced on the screen all the parts can be subjected to a critical examination to ensure that no serious defect is present in the completed tube. Slight alterations in electrode assembly position, the inclusion of shields, metallic screens, and so on, can be resorted to in order to overcome some of the inherent troubles to which C.R. tubes are prone, and the modern product from a manufacturer of repute is free from distortion within very close tolerances.



*A Continental version of the television add-on unit.*

# PRACTICAL TELEVISION

Sept. 9th, 1939. Vol. 4. No. 168.

## A Hope Not Fulfilled

ALTHOUGH rather forlorn, the radio industry, indeed the whole country, still hoped that Parliament, before it went into recess, would at least make some concrete statement on the television situation. This would have given an enormous fillip just prior to the opening of Radiolympia, and added materially to the business done, for it is known that the prolonged delay of provincial extensions has convinced a number of potential set-buyers in the Alexandra Palace service area that the television transmissions are still experimental and purchases have been withheld. It is impossible to find any justification for the Government's silence on this important issue, and an early opportunity is being taken by interested M.P.s to resume the battery of questions to which the Postmaster-General has been subjected during the past few months. One has given notice that he will ask the P.M.G. on October 9th whether he is now in a position to make a statement to the House with reference to the development of television throughout the country, including Wales, and whether he can state the order of priority for each of the provincial centres. Perhaps this will be instrumental in drawing forth a concrete reply instead of the evasive answers which up to the present have characterised the P.M.G.'s attitude.

## Big-screen Television in Germany

THE attitude of the German television industry towards big-screen working seems to be following on rather parallel lines to that of this country in so far as reliance is being placed in projection type cathode-ray tubes. In the north side of Berlin the Fernseh Company have installed a complete receiver, the hall accommodating an audience of between 500 and 600 people. The projector itself has an imposing appearance, as will be seen by a reference to Fig. 1. It is not of the twin type like that of the Baird Company, and the anode voltage employed is between 60 and 80 kilovolts. The large lens seen on the front sloping panel has a focal length of 16ins. and an aperture of f1. Front projection is employed, and the screen size is approximately 12ft. by 10ft., which is below the largest employed in this country. Furthermore, instead of the controls being located on the projection unit they are housed on the control desk, shown in Fig. 2. The equipment is both neat and efficient, but is rather more bulky than the commercial installations already undertaken in a number of Gaumont British cinemas in London. Cathode-ray oscillographs on the control desk enable the engineers to set up the apparatus satisfactorily, while the use of a very high anode voltage gives a bright picture, a fact which is still further assisted by 120 square feet of screen area as compared with the 180 square feet used by the latest apparatus in London.

## Shutter Working

THE Fernseh Co., who have built and installed the equipment described in the previous paragraph, are not confining their attention to projection type cathode-ray tubes wherein the small but brilliant picture built up on the fluorescent screen is lens-projected directly on to a remote screen with a prepared silver surface. As is the case with other countries, experiments are being conducted in the hope of devising a satisfactory form of electronic relay or shutter which can be opened or shut to allow a beam from a high candle power lamp to be modulated in this way. Naturally the prime difficulty associated with any scheme of this nature is to find satisfactory shutters which will respond to the modulation imparted by the rapidly moving stream of electrons. In America, for example, the suggestion was put forward in all seriousness that a relay panel made up from human hairs working on the gold leaf electroscope principle, would meet the case. In Germany, however, one idea proposed was the use of a mosaic of tiny nickel-coated shutters carefully pivoted and backed by a wide mesh grid. The scanning beam, modulated by the incoming television signals, is then directed against this series of shutters and due to their particular construction secondary emission takes place. This builds up a charge on every shutter element scanned and the electrostatic field so produced in conjunction with the wide-mesh grid imparts movement to the shutter to a degree dependent on signal modulation at the instant of impact. The light and shade of the televised picture is thereby imparted to the complete mosaic of shutters, and if this is interposed on the path of an intrinsically brilliant light beam, the emergent rays produce on a remote screen an enlarged version of the scene at the transmitting end. Naturally, the detail obtained will be dependent upon the number and size of the elemental shutters, but the scheme is certainly a practical one and capable of development.

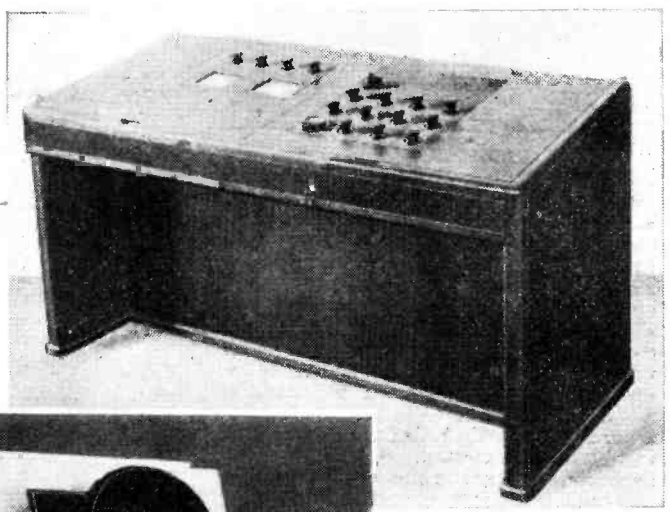
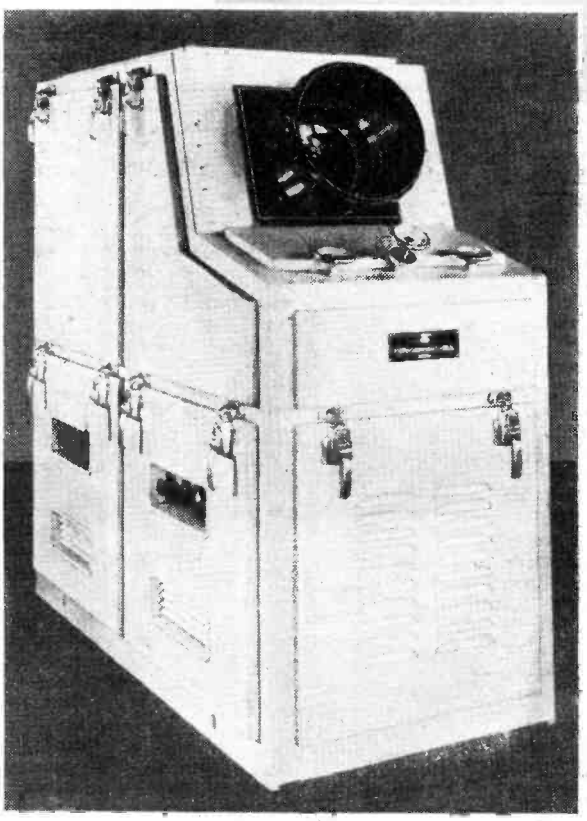


*Fig. 1 (below).— The latest form of big-screen projection unit.*

*Fig. 2 (right).— The receiver control unit used in conjunction with the projector shown in Fig. 1.*



## Service Area Range

THE recent publication of the R.M.A. service area map showing the range of reception under which satisfactory results can be anticipated with modern sensitive sets, has been welcomed by dealer and manufacturer alike. It has provided a satisfactory basis of discussion in all doubtful cases, and has served to sweep away the rather pessimistic assumptions of service range which persisted for so long, in spite of the large number of published reports that proved conclusively that good results in regard to signal strength, and picture quality, were being secured well outside the initial figure of 25 miles. Copies of the map may be obtained from the R.M.A. at 2s. 6d.

*Criticism, Chat and Comment*

# Promenade Concert Programmes

## Our Music Critic, Maurice Reeve, Discusses the Principal Items in this Week's Concerts at Queen's Hall

THIS week's programmes open with another wonderful collection from the Wagnerian treasure house. That ecstatic number from "Parsifal," the Good Friday Music, where Gurnemanz takes from Kundry's bosom a golden flask and anoints Parsifal king of the Knights of the Holy Grail; the Forging song from Siegfried. This magnificent song which, in the opera, is sung in the depths of the forest to the accompanying flames from the smithy and the blows of hammer on anvil, has few equals for dramatic effect in the whole of opera. The "Song of the Rhine Daughters," surely the most miraculous "water music" ever penned, wherein Siegfried, journeying along the banks of the Rhine, is suddenly tempted to give up the mystic ring by the Rhine Maidens, who rise from the river in all their seductive charm. The Prelude to "Tristan," Hans Sachs' Monologue from "Die Meistersinger," the Overture from "The Flying Dutchman," and "Elsa's Dream," from Lohengrin, complete a memorable evening, so far as part one is concerned. The vocalists are Isobel Baillie, Arthur Carron and Harold Williams.

### Mozart

Tuesday's concert may be said to act as a rival for our attentions—that is, if we cannot attend to both—for it is given up to the work of Mozart, music's "miracle man," who had only to pick up his pen for enchantment to flow from it. Staring me in the face, as the centre piece, is the Fortieth Symphony! Written in the last months of the master's all too brief life, and when he was wracked with that fell tuberculosis which was so soon to claim him, music never so completely belied the atmosphere in which it was created. Sparkling champagne can best describe Mozart's "fortieth"; who can imagine it being written by a dying man in extreme poverty? Truly "music's miracle man"! Then there is that aria from "Giovanni," "Il mio tesoro," which has been called the most perfect of all songs and the jewel of a tenor singer's repertory. One of the best of the piano concertos, "K. 453 in G," is also down, a bassoon concerto (bearing the number "K. 191" we can presume that the master had not yet passed his entrance for the kindergarten), and a Nocturnal Serenade for strings and tympani complete part one of an evening we must all do our very best to hear.

Wednesday is Old Man Bach again. In pressing upon you the merits of Mozart, Wagner, Beethoven, etc., I know I am doing you a service for which those of you, at any rate, who have not yet become too familiar with those Masters, will thank me when you do. But with Bach and Brahms I am more diffident. Although nurtured on them myself, and still hale and hearty in spite thereof, I recognise that the old saw about one man's meat, etc., contains a lot of truth. As the last thing in the world I want to do is to poison you, I leave it entirely up to you to experiment on it yourself. I think I can assure you, however, that you will not regret hearing the Brandenburg Concerto in D for piano, flute, violin and strings; the fifth piano concerto in F minor, the violin concerto in A minor, and the two Church Cantatas Nos. 31 and 202. The solo artists are Elsie Suddaby, William Parsons, Isolde Menges, Gerald Jackson, Angus Morrison and G. D. Cunningham.

### Chopin

On Thursday there are two major works that I shall make a point of trying to hear—Chopin's second concerto in F minor, played by Orloff, and Sir Arnold Bax's third symphony. The Chopin concerto is one of those beauteous, nostalgic affairs which one might liken to a greenhouse full of exotic flowers and overcharged with perfume. It was, in fact, once described as "a beautiful bouquet from Chopin's beautiful garden." Those of you who like Chopin—and who doesn't?—will not find a larger collection of lovelier melodies collected together in one work if you search for the proverbial month of Sundays. It is pure, unadulterated romanticism. I do not know Bax's symphony very well, but I am a great admirer of those works of his that I do. There is probably no more original mind now writing music. Although, for some, it may lack the tender wistfulness of Elgar, also that great master's "Englishness," it is great, rugged, masculine music, original in every bar, yet legitimately descended from the main historical current of music, which is not what one can say of everyone writing music to-day!

### Beethoven

On Friday we have what I venture to suggest is the most beloved work in the whole musical cosmos—Beethoven's Fifth Symphony. For over a hundred years it has been the most frequently performed work, the most widely listened to, and, consequently, the most sought after. It has been every conductor's greatest "vehicle" and every orchestra's greatest "draw." And who can say the world is wrong. There can be no work which, in the musical language, covers the whole gamut of human feeling with such completeness, and which satisfies the every want of the most insatiable appetite with such perfect satisfaction, as "Beethoven's Fifth" succeeds in accomplishing. The epicure who "dines" on this luscious *table d'hôte* satisfies himself to repletion, even to wine and cigars of the finest vintage and leaf. The Promenade season will know no bigger draw and Sir Henry Wood and his forces will receive no greater applause than when they conclude their performance of this unique work. Amongst other works down for the same night is the Overture to the "Men of Prometheus" and the Concerto for Piano, Violin, 'Cello and Orchestra, played by the Grinke Trio.

### Liszt

Saturday's programme also contains a work which might be said to rival "the Fifth's" claim to world's favourite, Schubert's "Unfinished." Perhaps it is the favourite with many, and I don't criticise those who accord it their preference. Perhaps were it not unfinished it might stand unrivalled. It does not require me to remind readers that its two movements are music of the purest and most unadulterated loveliness. Amongst many attractive things down are Elgar's brilliant portrayal of London life, "Cockaigne," Liszt's dazzling Rhapsodie for Piano and Orchestra (which should be given full justice by Clifford Curzon), and Ravel's Bolero, which, I believe, holds a unique distinction inasmuch as that on its first performance at the Proms a few years ago it created such a furore that its repetition was demanded. Have you never heard it? It's very thrilling and exciting. Commencing in the softest pianissimo, with scarcely more than the tympani audible, it gradually gets louder and louder and the rhythm harder and harder until the tremendous climax finds you just about on the point of a nervous breakdown from sheer excitement! It is meant to put you into a frenzy and to awaken your most primitive passions, and it certainly does! A bolero, by the way, is a Spanish dance in three-four time. The castanets, which were formally the dancer's personal accompaniment, have been added to the rhythm in recent years, making it, tum-tiddle-up-tum-tum-tum, as in Ravel's work. Further works will be sung by Olga Haley and Dino Borgioli, and Clifford Curzon will also play John Ireland's Concerto as well as the "Liszt."

## TWO ARTISTS AS RADIO'S GRACE MOORE

TWO artists will play the Grace Moore part when the B.B.C. broadcasts, on September 26th (National) and September 27th (Regional), Douglas Moodie's radio adaptation of the film, "One Night of Love."

Already one of them has been booked—Hella Toros, the well-known Italian operatic singer, who will take the singing part which, as cinemagoers will remember, includes a large amount of operatic work. The problem now facing the Music Productions Section is that of "matching" her singing voice in their choice of an artist to take the speaking part of the rôle.

Though an Italian artist, Hella Toros sings opera in English excellently. Born in Trieste, she began to play the piano when she was six years old; she was also very fond of singing. Her parents, intending her to study medicine, sent her to be educated in Vienna. She there sang at a children's party, with the result that someone who heard her persuaded her parents to allow her to sing at a charity concert, where, at the age of twelve, she scored a big success. After that, medicine was forgotten; her only wish was to go on the operatic stage. Emmy Destinn trained her voice so that, when she was only eighteen, she made her debut in Prague, where she worked under Alex Zemlinsky, one of the greatest Mozart conductors on the Continent. Subsequently, she was engaged as guest-artist at Berlin, Munich, and many other Continental musical centres, and was, in fact, one of the youngest leading operatic artists. Through marriage, she left her career for four years, but meanwhile studied with Amelia Torgnaglin-Borgani, last living pupil of the great singing master, Francesco Lamperti. After coming to England, Sir Thomas Beecham and Percy Heming again gave her the opportunity to appear in opera, and she made a second debut at Covent Garden.

She has also worked on the concert platform, and in television and broadcasting.

# 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).**

## The B.L.D.L.C.

SIR,—As a comparative newcomer to the band of short-wave listeners, I have regularly read your excellent magazine for several months now, and I am particularly interested in the British Long-distance Listeners' Club.

I should be very pleased to become a member of the Club, and would be very much obliged if you can forward me particulars of enrolment.

With best wishes for the success of the new PRACTICAL WIRELESS. — LEWIS MARRISON (Leeds).

[*Full particulars concerning enrolment in the B.L.D.L.C. are given in our issue dated September 2nd*, 1939.—ED.]

## From a Folkestone Reader

SIR,—I think the new form of PRACTICAL WIRELESS a great improvement.

All the wireless information I have gathered has been from your journal, and the one incorporated with it.

I am particularly interested in the short waves, and once, and only once, received a call from Sydney, Australia.—CHARLES F. READ (Folkestone).

## A 14 mc/s Log from Southampton

SIR,—I append my 14 mc/s 'phone DX log in the hope that it will be of some interest to other readers. Reception was, as usual, on an S.G.-v.Pen. (commercial) set with 'phones:

| *Date* | *Time* | *Call* |
|---|---|---|
| 14.8 | 22.24 | HK1AE |
| ,, | 22.48 | VP6MR |
| 16.8 | 22.13 | K5AM |
| 18.8 | 23.04 | W8AAR |
| 20.8 | 05.55 | W9BEU |
| ,, | 06.00 | W9VXV |
| ,, | 06.08 | YV4AE |
| ,, | 06.12 | W7DC |
| ,, | 06.13 | K5AM |
| ,, | 06.23 | K4ENT |
| ,, | 06.24 | VE5EF |
| ,, | 06.29 | W5BSF |
| ,, | 06.40 | XE1BG |
| ,, | 06.53 | W5FUW |
| ,, | 06.55 | XE1GE |
| ,, | 07.08 | HR5C |
| ,, | 07.18 | VK2GM |
| ,, | 07.25 | VK2AGJ |
| ,, | 18.00 | VE3ANF |

I will gladly exchange my QSL with anyone interested.—R. D. GAIGER ("Holmsdale," Albany Road, Bishop's Waltham, Southampton).

## The "Air-Hawk 9"

SIR,—I think the new PRACTICAL WIRELESS is a great improvement, and wish it every success.

I notice you are still publishing photos of readers' dens, so enclose mine. My set is now a 9-valve superhet, with bandspread and 5-metres.

Until recently it was but a modest 8v. without any trimmings. An extra I.F. stage made a vast difference; it is definitely worth the extra trouble, and the cost is very moderate.

I am very interested in the modified "Air-Hawk 9" and notice that an extra A.F. stage is provided for higher gain. My set actually is modelled roughly on the lines of the original "Air-Hawk," and this new version comes very close to my circuit, except that I use regeneration in the second I.F. for high selectivity.

Turning to aerials, I used a doublet for a long time, but lately have changed to a 60ft. inverted-L which gives rather better results, because the doublet was directional, almost due N. and S., where there are far too few stations or amateurs.

Wishing the new PRACTICAL WIRELESS even greater success than before.—W. J. MARIWICK (Windsor).

[*We were very interested in the photo of your den, but regret it was not clear enough for publication.*—ED.]

## Exchanging QSL Cards

SIR,—I have been a regular reader of your paper for more than a year now, and being a short-wave enthusiast I should like to exchange cards with any A.A. or full ticket "ham" or short-wave listener in the world. All cards will be acknowledged by return of post with one of my own cards.—S. R. POULTON, 57, Edgehill Road, Winton, Bournemouth, Hants.

# Prize Problems

### PROBLEM No. 364

JASON had a four-valve A.C. mains receiver which had worked well for some time, but suddenly developed a fault which took the form of distorted signals and increased hum. He inserted a milliammeter in the H.T. negative lead and found that the current was much in excess of that which normally should be indicated. He tested all valves and found these in order. He placed the meter in each anode circuit and the current readings were more or less correct. What was the most likely cause of the trouble? Three books will be awarded for the first three correct solutions opened. Entries should 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. 364 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, September 11th, 1939.

### Solution to Problem No. 363

When Jackson wired his coil-holder he overlooked the fact that the wiring instructions given related to the pins as viewed from the pin end of the coil, and accordingly they should have been reversed when wiring a baseboard-mounting coil-holder.

The following three readers successfully solved Problem No. 362, and books have accordingly been forwarded to them: L. Swettenham, 7, Palm Street, Bow, E.3; J. Higham, 14, Kingsmead Avenue, Tolworth, Surrey; R. Lloyd, 58, Claremont Road, Tunbridge Wells, Kent.

## RADIO AS A CAREER—2

*(Continued from page 639)*

impression and might be useful, It is best to have the tools neatly arranged in one compartment of the case, the other compartments being used for the meter and a few spare parts. An ordinary attaché case lined with baize, felt or velvet is probably most suitable for housing the "emergency" kit.

### "Loan" Receivers

When the engineer also acts as a seller of receivers it is often a good plan to have a receiver always available when going out on service work. Should the instrument to be tested be an old one in poor condition a sale can often be effected at a time when the old set has "packed up." In other cases it might be considered desirable to loan a new set to the owner while the old one is being repaired. Many sales have been effected through following this course, when the owner had, in the first place, no idea of exchanging. After hearing an up-to-date receiver in his own home he appreciates the vast improvements that have been made and realises that he would be better off with the new receiver than by keeping the old one. Incidentally, those service men who—perhaps due to lack of capital—not do propose to specialise in the sale of receivers, can often obtain supplies as required from a local dealer, an arrangement being made to split the profit.

It is hardly necessary to point out that courtesy and an obvious interest in the customer's pleasure are sound assets of the service engineer. An off-hand manner is a serious disadvantage, as is volubility.

# IMPRESSIONS ON THE WAX

## H.M.V.

ONE of the new season's films is "Naughty But Nice." Maxine Sullivan has recorded two songs from this particular movie: "Corn Pickin'" and "I'm Happy about the Whole Thing"—*H.M.V. B* 8933.

Also in the August lists appears records by that inimitable pair Jack Hulbert and Cicely Courtneidge. They don't appear on the same record, though. Jack and the Rhythm Brothers give a riotous rendition of that nonsense song "Hold Tight—I want some Sea Food, Mama." On the reverse side he, quite rightly, sings "You're Driving Me Crazy"—*H.M.V. B* 8942.

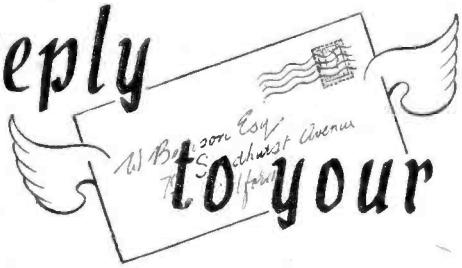
Cicely Courtneidge changes the mood with "The Birthday of the Little Princess" and "The Little Toy Train"—*H.M.V. B* 8941.

Making its bow in the H.M.V. list is one of the most famous of Continental orchestras. For his first record George Boulanger leads his little band through two delightful performances of his own compositions. These are "Dream Serenade" and "When I'm Happy" on *H.M.V. B* 8943.

"Dream Serenade" was also part of the programme by the Hungarian Gipsy Band that was actually recorded at the Hungaria Restaurant, London. On the other side of the record, Bela Bizony directs a medley of his own arrangement which he calls "The Soul of Roumania"—*H.M.V. BD* 728.

READ
"THE CYCLIST"
2d. Every Wednesday

# In reply to your letter



## Kestrel Tuning Control

**"I wish to build the Kestrel S.W.4, but I note that you give no maker's name for the special mechanical band-spread tuning control, or the price. Could you tell me who makes this and how much it costs?"—T. R. (Barnsley).**

THE dial in question is supplied by Messrs. Peto-Scott, and the price is 12s. 6d.

## Detector Anode Circuit

**"In some of the circuits you have published recently I note that you use a resistance where I am accustomed to see an H.F. choke. I should be glad if you could tell me the purpose of this resistance, as it is obviously not the anode load component, which is joined to it."—P. P. R. (Plymouth).**

THE resistance in question is often employed in a short-wave receiver, where it fulfils the same function as an H.F. choke. It has the advantage, however, that it is not resonant to any particular frequency, which is sometimes the case with a choke, and thus reaction is likely to be more smooth, and erratic tuning points are avoided. Of course, a non-inductive resistance must be employed for the purpose.

## Plug-in Battery Leads

**"In a recent set you used a plug and socket idea for the connection of battery leads. I should think that this was a much more effective scheme than the usual soldered-on flex lead idea, and wonder why it is not more generally employed. Is there any reason for this?"—W. J. T. (Hythe).**

THE only drawback to the plug-in system is that dirty contacts can give rise to trouble due to the high resistance which might be set up. As the H.T. battery relies for connection upon plugs and sockets it is obviously not always desirable to add to the "friction" form of connection in those circuits and therefore a properly made joint to the wiring is desirable. The plug-in idea is perhaps neater and lends itself more readily to circuit modifications, but the utmost cleanliness must be maintained at all times.

## Padder Tuning

**"In one of your articles (I forget which) there was some reference to a padder form of tuning, as distinct from the padders or trimmers in a superhet circuit. I should be glad if you could give me some idea what this was about and how to apply it to any given circuit."—P. R. T. (Gloucester).**

THE idea was presumably mentioned in connection with some circuit where a minimum tuning width was required. For instance, if you examine the circuit of the Air-Hawk 9 recently published you will see the idea incorporated in the Beat Frequency Oscillator circuit. Here there is a coil with a fixed condenser across it. The condenser has a value of .0001 mfd. In parallel with the fixed condenser is a small variable and this gives the necessary variation to provide the note required. In a frequency monitor which will shortly be described a similar idea is used, the necessary coverage being obtained in exactly the same way. It is, in effect, a band-spreading idea with a fixed band-setter.

## Speaker Cabinet

**"I have recently made up a fair-sized box in which to place the speaker. The size is approximately 2ft. cube. I find, however, that there is an unpleasant bass resonance, and I wonder if you can tell me how to overcome this. I want the box back closed in to keep out dust, and the speaker sounded all right before putting it in the box."—E. E. (Dewsbury).**

### 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.**

ALTHOUGH the speaker may have sounded good when standing alone, it may have a prominent bass resonance. This would not be very noticeable without a baffle. An enclosed box will, however, give rise to resonance and special precautions must be taken. The sides of the cabinet should be lined with thick felt, or the entire inside filled with kapok or similar material, leaving a space round the speaker to prevent the cone movement from being restricted. It may be necessary to cut holes in the back of the cabinet and cover these with gauze or other dust-proof material.

## Crystal Damping

**"I have read that a crystal detector imposes very heavy damping on a circuit and accordingly the tuning is very flat. Is this true? If so, how can it be overcome, as I wish to make an efficient crystal receiver which will not tune flatly?"—L. P. (Barnet).**

THE damping effect is certainly very marked, but it may be overcome by tapping the coil. The tuning condenser is joined across the ends of the coil, but the crystal should be connected to a point some distance from the "top" of the coil—that is, the end opposite the earthed end. This procedure is also often adopted with some valve rectifiers for the same reason. The damping effect may also be varied by using a carborundum crystal with an applied potential.

## Low-resistance 'Phone

**"I attach a sketch of a single 'phone receiver which I have and I should like to use with my home-made crystal set. I am told that it is not suitable and I should be glad if you would confirm this or tell me how to use it."—F. S. (Preston).**

THE 'phone is apparently an ex-Government standard earpiece and as such will have a low resistance. To use this in the output circuit of a crystal receiver you will have to obtain a step-up transformer having a ratio of at least 10 to 1. Low-resistance 'phones are sometimes recommended on account of their robustness, but they are generally not so sensitive as high-resistance components and these are, therefore, to be preferred.

## Trimming Necessary

**"I have a commercial superhet, and there has developed a peculiar fault. When tuned direct to a station according to the scale there are very weak signals. As soon as I detune slightly the signals increase in volume but suddenly cease as though there is a short-circuit across the condenser. Can you explain this?"—J. R. (Merthyr Tydfil).**

THE trouble may be that the circuit is in need of retrimming. When a superhet is not trimmed properly there is sometimes instability. As you detune the circuits are gradually brought into resonance, giving the increased volume, and then oscillation takes place, resulting in absence of signals. We advise you to have the set inspected by an engineer who is familiar with the particular make.

## REPLIES IN BRIEF

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

**J. C. (Broadstone).** The coil could be used in conjunction with a simple L.F. amplifier. We cannot give constructional details but you should carry out one or two tests with a standard broadcast receiver, connecting the coil to the pick-up terminals.

**J. McK. (Bearsden).** The majority of the details are explained in our Book, "Wireless Transmission for Amateurs," but for addresses you must obtain the "Radio Amateur Call Book." This costs 6s., post free from P. L. Postlethwaite, H, Kinfauns Road, Goodmayes, Ilford, Essex.

**B. E. (Ammanford).** A higher pole might improve results, but a lot depends upon local conditions which only an actual test can prove. You cannot transmit with a standard communications receiver. You are confusing this with a transceiver. A licence must be obtained first. Can you explain your query regarding Morse more clearly.

**J. L. (W.6).** The coils may be faulty or some component may be missing. A circuit would help us to trace the fault.

**E. B. (Salford, 3).** The reference to a humming sound indicates that there is probably an open grid-circuit, and you should check carefully all wiring, especially the L.F. transformer secondary.

**D. N. S. (Burgess Hill).** We regret that we are unable to obtain a copy of the print in question.

**E. M. (Rotherham).** The speaker is no doubt an energised model and must be connected so that the field is joined to two of the leads. We have no data of the set and the makers are apparently no longer in business.

**H. M. (nr. Sheffield).** The apparatus may be obtained from Messrs. Gamage.

**T. K. (Sutton).** The coils may be wrongly wired or defective, but you give no details of them and thus we cannot advise definitely.

**W. G. (Holyhead).** As transferring the aerial improves results the trouble must be in the first stage. It may not be trimming trouble, but may be some defect in a component or the H.F. valve.

Practical and Wireless
PRACTICAL TELEVISION
EVERY WEDNESDAY.
Vol. XV. No. 365. Sept. 16th, 1939.
EDITED BY F. J. CAMM
Staff: W. J. DELANEY, FRANK PRESTON, H. J. BARTON CHAPPLE, B.Sc.

# ROUND THE WORLD OF WIRELESS

## Servicing

THE radio service engineer is now a skilled technician, and modern receivers can only be serviced satisfactorily when a sound electrical knowledge has been obtained and proper equipment is used. The old type of receiver could be "serviced," or at least put into working order, with the aid of a simple voltmeter. But the modern receiver is so complicated and the valves which are employed perform dual functions, with the result that special knowledge is necessary in order to locate faults and remedy them. There is an increasing demand for service men who can quickly handle a complicated modern receiver, and in America, where this branch of radio has reached a high standard, technicians visit the houses of listeners with portable equipment and carry spare parts with the result that in a few minutes they can trace a fault and replace the defective part and be out of the house within a very short time. A modern television receiver, however, could not be handled quite so easily, but when the subject is studied properly the process is not a difficult one.

## Amateur Transmitters

ON August 30th the Postmaster-General withdrew all licences relating to the use of amateur transmitters owing to the outbreak of hostilities. In last week's issue we published details of a transmitter, but this had already gone to press before the permission to use such apparatus had been withdrawn. It should therefore be noted that it is now illegal to make up or use such equipment, and all licensed transmitters have been impounded by the authorities.

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**Telegrams:** Newnes, Rand, London.
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*Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.*

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## New Australian Stations

THE new Australian Broadcasting Company's station in Perth will, it is understood, shortly be on the air with the call VLW. The frequencies which have been allocated are 6,130, 9,560 and 11,830 kc/s, corresponding to 48.94, 31.38 and 25.36 metres.

## Indian Radio Papers

FROM Bombay comes news of three new publications, all devoted to radio. Under the titles *The Indian Radio Review* and the *Bombay Radio Times*, the former is to act as a link between listeners and the broadcasting organisation, whilst the latter will provide technical material and short-wave programmes. The remaining journal is *Radio Services*, full details of which are not yet available.

## Hollywood Studio Honour

THE Hollywood studio headquarters of the Columbia Broadcasting System, which were opened early this year, have been awarded the distinction of being held as an outstanding example of modern architecture by the Southern California Chapter of the American Institute of Architects.

## New Sets for Old

AN interesting scheme is being tried out in Switzerland to encourage listeners to purchase new receivers. Upon giving their old equipment to a recognised benevolent organisation the listener is given a coupon which entitles the holder to a 15 per cent. reduction on the purchase price of a new receiver.

## American Radio Profits

IT is announced that the net profit for the first half of this year made by the Radio Corporation of America was more than $350,000 less than the corresponding period last year.

## Experimental Licences Withdrawn

BY an official notice in the *London Gazette* dated August 30th, the P.M.G. announced that all experimental transmitting and A.A. licences, as well as those for wireless telegraph sending and receiving stations for Royal Naval Wireless Auxiliary Reserve purposes, are withdrawn. The notices do not, of course, apply to the ordinary broadcast receiving licence issued to the general public.

## Luxembourg on Short Waves

IT is understood that Radio Luxembourg is to use a wavelength of 31.49 metres (9.527 mc/s), and that transmissions will be given between 4 and 6 p.m. G.M.T. in five languages.



*"Blondie," Radio's only performing dog, at a rehearsal in the C.B.S. programme. She is watching her cues given by her trainer, Rennie Renfro, on the left.*

# ROUND THE WORLD OF WIRELESS—Continued

## New C.B.C. Station

THE opening ceremony of the Canadian Broadcasting Corporation's new 50kW prairie station in Saskatchewan took place recently. This is the fourth of the proposed chain of high-power stations across the Dominion. It is situated at Watrous, near Saskatoon, and will use the call-sign CBK.

## Marconi Museum

IT is reported from Italy that the villa in Pontecchio, near Bologna, where Marconi conducted his early experiments, is to be maintained as a museum. The villa has been given to the "Guglielmo Marconi Foundation," created by Signor Mussolini shortly after Marconi's death.

## The Praying Mantis Got a Shock

THE huge WLW (Cincinatti) transmitter went off the air for four minutes recently, owing to one of the oddest accidents ever reported at a radio station. According to the station engineer, a praying mantis crept into a 12,000-volt filter condenser in the basement of the transmitter building at Mason, Ohio, and caused a short-circuit. A discharge of 220 microfarads of energy from the condenser produced a sound like a thunderbolt.




*Arthur Askey (Big-hearted Arthur) has started work on a film version of his popular B.B.C. and stage show "Band Waggon." On the roof of the Shepherd's Bush studios is erected the legendary flat that Askey is supposed to have on the top of Broadcasting House. With Askey in "Band Waggon" will be Richard "Stinker" Murdoch and Jack Hylton and his Band. Our illustration shows "Stinker" Murdoch (left) and Big-hearted Arthur busy with the "washing."*

## W8XAL Changes Call Letters

CALL letters familiar to short-wave listeners throughout the world were changed last month when the Federal Communications Commission changed the identity of the Crosley Corporation's International broadcasting station from W8XAL to WLWO. The assignment of the new call letters indicates that the station has been removed from the experimental classification, and may transmit commercial programmes internationally, in line with a recent decision of the F.C.C. Upon completion of a 50,000-watt transmitter, WLWO will be one of the most powerful international stations in the United States, and by use of a beam antenna will be able to concentrate its signal in a given area.

WLWO, under the name W8XAL, began operation in 1924, and is one of the pioneer international broadcasting stations of the world. When its power is increased to 50,000 watts, it has been given authority to broadcast on all six international short-wave bands. The frequencies at which it will operate are 6,060, 9,590, 11,870, 15,270, 17,760 and 21,650 kilocycles. The increase in power is scheduled to be effective during the autumn.

## Swedish Licences

IT is estimated that there are approximately 206 receiving sets per 1,000 inhabitants in Sweden, where the total number of licences in force at the end of June was 1,301,656.

## High-power Station in Pyrenees

ANDOVA, the small State in the Pyrenees, now has a powerful broadcasting transmitter, which was opened recently by the Minister for Public Works. The masts at the station are nearly 5,000 feet above sea-level. The programmes from this station, which will be in three languages—French, Spanish and Catalan—will be radiated on 410 and 25.35 metres. It is reported that its medium-wave power will be 350 kW.

## Borough Polytechnic Radio Courses

THE Radio Engineering and Television Courses at the Borough Polytechnic, Borough Road, London, S.E.1, open Monday, September 25th. Prospective students can be enrolled on September 18th, 20th and 22nd.

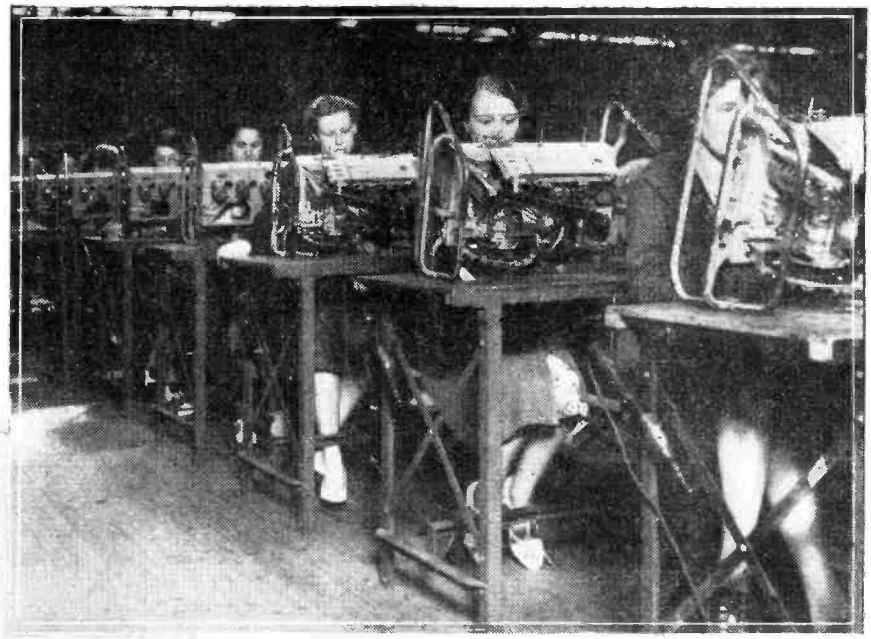
A five years' Course, including Radio-Communication, Television, Acoustics, Electrical Engineering, etc., has been arranged for Ordinary and Higher National Certificates, City Guilds Examinations, etc. Special attention is given to latest developments in Television.

There are part-time Day and Evening Courses for Radio Service Engineers.

SESSIONAL FEES:

Students under 18 .. 8s. 6d. to 12s. 6d.
Students over 18 .. 10s. to 30s.

Further details are obtainable by quoting reference No. 301.



*This novel view of production desks at Ekco Works shows new motor-controlled models nearly ready to leave their "cradles" for their cabinets. The cradles are clamped to the chassis at the start of the assembly process and remain until the end. Note the temporary pillars on the chassis, protecting the press-button units from damage before they are actually mounted in the cabinet.*

*NOW READY!*

**WORKSHOP CALCULATIONS, TABLES AND FORMULÆ**

**By F. J. CAMM**

*3/6, by post 3/10, from George Newnes, Ltd., Tower House, Southampton St., London, W.C.2.*

# Automatic Frequency Control

## Operating Details of a Useful Unit of Special Interest to the Experimenters

IN connection with automatic frequency control circuits for superheterodyne receivers the following description of a proposed discriminator unit may be of interest. A direct current voltage is derived from the intermediate frequency energy when the latter shifts from the assigned intermediate frequency value. In addition to the discriminator unit a frequency control valve is provided, electrically connected across the local oscillator tank circuit in such a manner as to simulate across the tank circuit a reactance of a predetermined sign. The direct current voltage output of the discriminator unit is employed to regulate the magnitude of the simulated reactance across the oscillator tank circuit by varying the operating characteristic of the control valve, and the regulation is such that the oscillator frequency is shifted to a frequency depending on the setting of the receiver tuning device, the frequency and strength of the station being received and the discriminator unit characteristic.

It has been found that the frequency control valve may have an adverse effect upon the strength of the signals generated in the local oscillator circuit, intermittent instead of continuous oscillation sometimes occurring, or in some cases complete cessation of the generation of the local oscillations. The adverse effect is due to damping introduced by the frequency control valve and may be effective over the whole of the range of frequencies covered by the system, the oscillator being in some cases completely damped out on the short-wave range.

### Out-of-phase Component

Experiments have shown that, due to capacity coupling between the local oscillator and frequency control valve circuits, there exists an out-of-phase component in the voltage which it is intended to apply to the control valve from the oscillator. The value of this out-of-phase component is increased due to the wavechange switching arrangements employed in multi-wave range receivers.

### Circuit Modifications

This difficulty can be overcome by modification of the conventional circuit as shown in the accompanying illustration.

Referring to the drawing, a local oscillator valve 1 is shown having its control grid 2 connected through a switch 3 to one of alternative tuned circuits of which two, 4 and 5, are shown, a tuning condenser 6 serving to adjust either of these circuits.

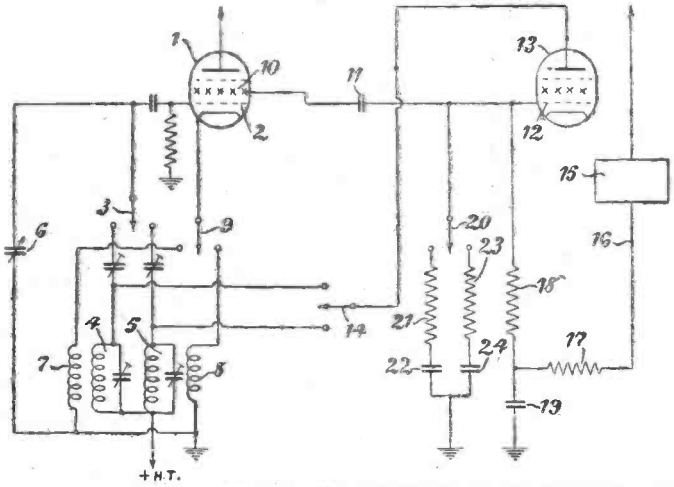
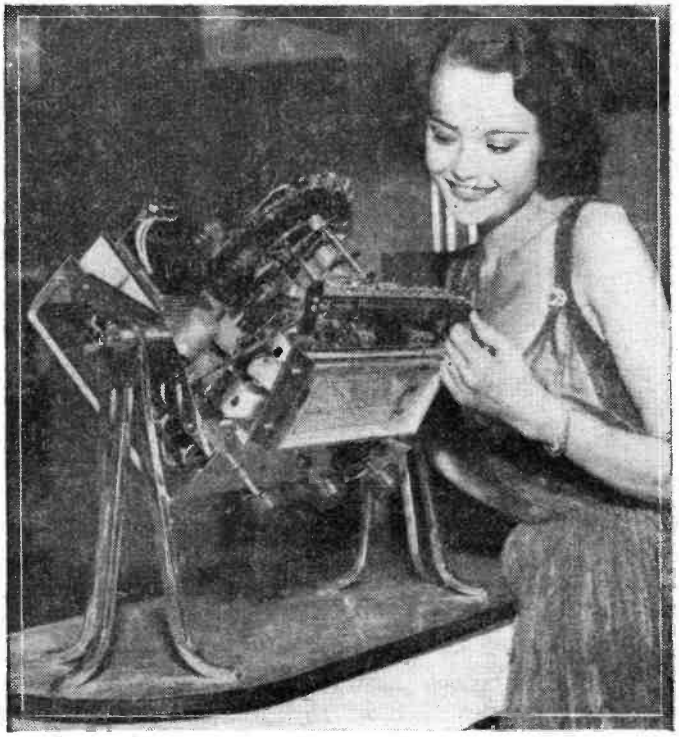



*Fig. 1.—The modified circuit to which this article refers, the first valve being the local oscillator.*

It will be understood that the selection of such tuned circuits depends upon the different ranges of wavelength over which the receiver is intended to operate. In the particular circuit shown reaction for the local oscillatory circuits is effected by one of two coils, 7 or 8, which may be connected with the cathode through a switch 9. The grid 10 of the valve 1, acting as an output electrode, is connected through a by-pass condenser 11 to the control grid 12 of a frequency control valve 13. The anode of the frequency control valve 13 is connected through a switch 14 to one or the other of the local oscillator circuits, 4 or 5.

The rectangle 15 represents a frequency discriminator circuit which provides controlling potentials which are conveyed by a conductor 16 through a resistance 17 and leak resistance 18 to the control grid 12, a condenser 19 being connected between the end of resistance 18 and earth. A switch 20 serves to connect one or the other of two resistance/condenser combinations 21, 22 or 23, 24 in series in the control grid circuit. The values for the resistances and condensers included in the combinations 21, 22 and 23, 24 are selected to effect compensation for phase shift due to capacity coupling between the control grid of the oscillator valve and the control grid of the frequency control valve so that the control valve appears as a substantially pure reactance, and does not introduce damping into the local circuit. The values will, of course, be finally determined by local circuit conditions, but in a particular example for the long-wave range, the condenser 22 is of .01 microfarads, the resistance 21 of 10 ohms and in the case of the medium-wave range the condenser 22 is of .001 microfarad, the resistance 23 being of 75 ohms. The condenser 11 may conveniently be of 0.1 microfarad, the leak resistance 18 of .5 megohm, and the resistance 17 of 1 megohm.

While in the arrangement described the desired correction has been effected in the grid circuit of the control valve, it will be understood that the desired effect may be produced in other ways.



*A visitor to Radiolympia inspecting an Ekco "Radio Brain" press-button set in chassis form. It has fifteen press-buttons.*

# The 1940 "Air-Hawk" 9

## Coil Winding Data for This New Communications Receiver

By W. J. DELANEY

THE waverange covered by this receiver extends normally from 9 metres. As it is primarily for short-wave work the bands terminate at 170 metres, thereby including most of the useful amateur transmitting bands. Furthermore, these ranges are covered conveniently by standard commercial plug-in-coils, and accordingly they may be purchased for the aerial circuit. For the first detector and oscillator, however, the coils must be made up as there are not suitable commercial products on the market. In the original model described last year a 6-pin coil was employed in the first detector stage, as a tapping point was provided on the secondary winding. This tapping is not now needed, but the 6-pin holder has been retained, and this is utilised for a 4-end winding. If desired, of course, a 4-pin coil could be used as replacement and then the standard commercial components could be used. The connections to the coil-holder would be standardised. In the Eddystone range, the coils needed for the aerial circuit are types BB, LB, Y, R, W, these splitting up the bands into 9 to 14, 12 to 26, 22 to 47, 41 to 94 and 76 to 170 metres. Similar coils will be needed if the 4-pin arrangement in the first detector stage is adopted. For the oscillator winding a single solenoid with a tap is needed and the data for this, together with that for all the remaining coils, if you wish to wind them yourself, are given below:

**COIL L1**

| Range | Primary | Grid | Wire Gauge |
|---|---|---|---|
| 9-14 | 3 | 2⅜ | 20 Enam. |
| 12-26 | 2 | 3⅞ | 20 Enam. |
| 22-47 | 4¼ | 8¼ | 26 Enam. |
| 41-94 | 9¾ | 23⅞ | 28 Enam. |
| 76-170 | 15 | 35 | 30 Enam. |

**COIL L2**

| Range | Primary | Grid | Wire Gauge |
|---|---|---|---|
| 9-14 | 3 | 2⅜ | 20 Enam. |
| 12-26 | 2 | 3⅞ | 20 Enam. |
| 22-47 | 4¼ | 8¼ | 26 Enam. |
| 41-94 | 9¾ | 23⅞ | 28 Enam. |
| 76-170 | 15 | 35 | 30 Enam. |

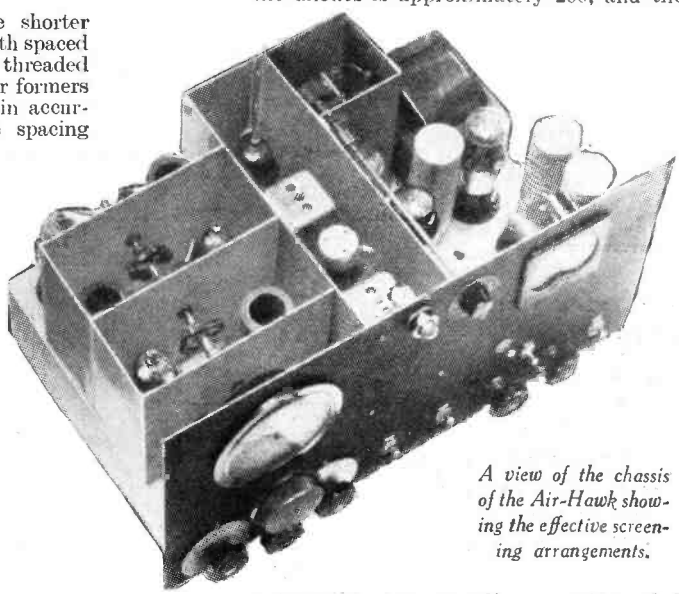
**COIL L3**

| Range | Grid | Cathode Tap | Wire Gauge |
|---|---|---|---|
| 9-14 | 2⅜ | 1 | 20 Enam. |
| 12-26 | 3⅞ | 1¼ | 20 Enam. |
| 22-47 | 8¼ | 2½ | 26 Enam. |
| 41-94 | 23⅞ | 9 | 28 Enam. |
| 76-170 | 35 | 10 | 30 Enam. |

The coils for the shorter ranges are wound with spaced windings, and the threaded Eddystone or similar formers are needed to obtain accurate winding. The spacing provided should be 14 turns to the inch. The largest two coils are wound with turns touching. If desired, the primary windings may be interwound on these two coils, and tests have shown that there is not a great deal of difference in performance with this particular range. The position of the cathode tap is quite important, and if for any reason the point indicated does not provide perfect oscillation throughout the band covered by each coil, the position of the tap should be modified, rather than make a modification in the voltages applied to the oscillator valve.

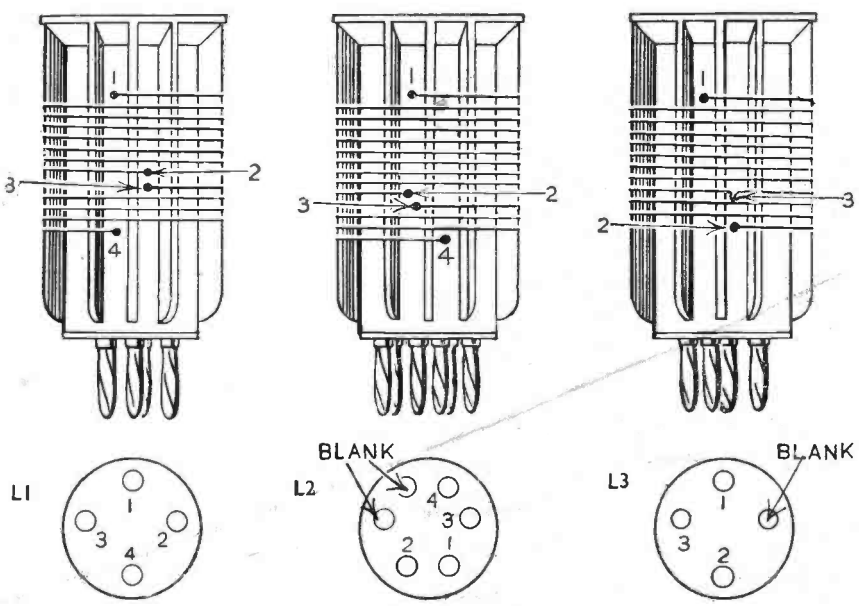
### Service Data

The working voltages applied to the anodes and screens of the valves in this particular receiver are all exactly as recommended by the makers. H.T. on the anodes is approximately 200, and the



*A view of the chassis of the Air-Hawk showing the effective screening arrangements.*

only point where an adjustment is needed and which will affect results is the screen voltage for V2. As already mentioned, the voltage is obtained by a potentiometer of the "fixed" type, and a spare clip is specified in the list of parts. The total resistance of the component is 15,000 ohms, but the extra clip will short a portion of the winding thus providing a resistance of about 10,000 ohms across the H.T. This will pass a very high current and will ensure that the valve operates more efficiently than when a high-resistance potentiometer is used for the supply of the screen voltage. The exact position of the tapping clip is best found by connecting a reliable meter between earth and the clip, and moving it until a reading of 110 volts is obtained. This will be with the clip approximately one-third of the distance from the right-hand end as seen in the wiring diagram, which was published last week. The total anode current is approximately 88 mA and the meter reading on average good signals (R9) was .6. On very powerful stations and local amateurs the needle will give full scale reading, and it is therefore essential to make use of the meter on/off switch. If for any reason the meter does not give the desired reading, or the balancing resistance does not enable the pointer to be brought back to zero, then the value of resistance R15 should be modified. A value between 30,000 to 75,000 ohms may be tried.




*The above illustrations show the three coils needed for each waveband, with the connections to the pins. The lower illustrations show the pins, viewed from below the coils—that is, the under-chassis view of the coilholders. For the three smallest coils threaded formers should be used, and for the remainder plain formers are required. Note that all windings are in the same direction.*

# Radio as a Career—3

## Cultivating the "Knack" of Rapid Fault Tracing
## Choice of an Efficient Multi-range Meter.

REFERENCE was made last week to the "knack" of recognising and diagnosing the cause of different faults. The service man who can develop this will find it a great asset, because of the time-saving which it effects in making laborious tests throughout the circuit.

It would be difficult to give an accurate description of this "knack," for it is something which is gained by experience. But examples of its use are not difficult to find. Thus, one service man might immediately think that a certain form of distortion was due to a defective output valve, or to a fault in the loudspeaker, whereas another would be compelled to start at the beginning of the circuit and work right through it with meters and other test gear before he could ascertain the source of trouble.

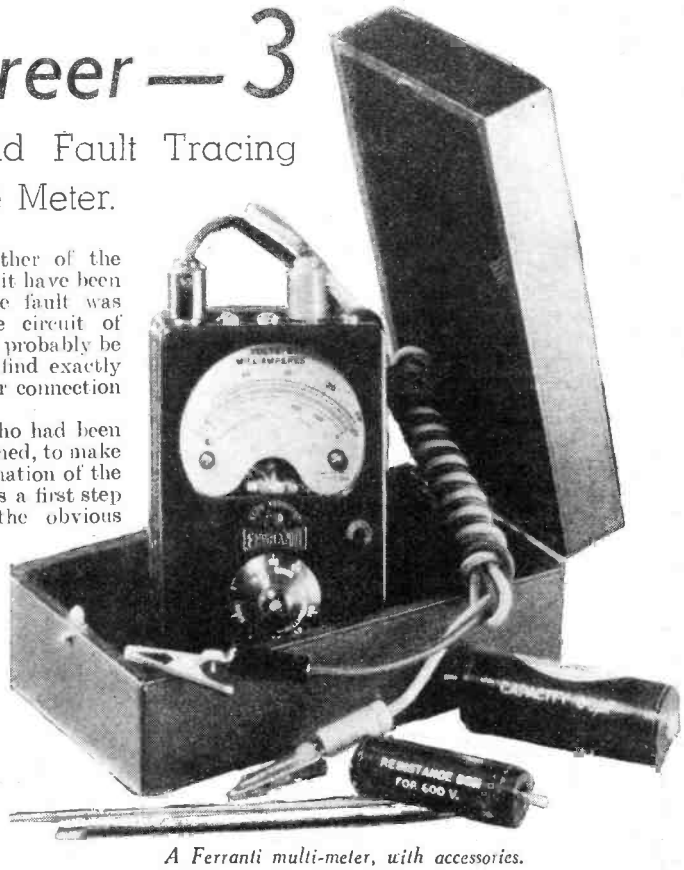


*One of the popular Avometers, designed for A.C., or D.C. use.*

### Systematic Tests

Of course, a "feeling" that any particular trouble is due to a certain cause must not be allowed to interfere with the more accurate checking afterwards. Thus, if it were considered that the output valve were at fault, the proper course would be to take some measurements of anode current, anode voltage and heater current. It might then be found that the trouble was in one of the external circuits of the valve; if not, it would then be feasible to try the effect of replacing the valve by another of the same type. Should it have been determined that the fault was in, say, the anode circuit of the valve it would probably be an easy matter to find exactly which component or connection was defective.

A service man who had been taught, or had learned, to make a systematic examination of the complete receiver as a first step might well miss the obvious and therefore spend a considerable amount of time unnecessarily. As an example, I remember a case where a competent, though "rule-of-thumb," engineer tested throughout a receiver from which reproduction was accompanied by a very "mushy" background, only to find eventually that the aerial lead-in had become detached from the plug connector inside the latter component. A more experienced man would probably have noticed the low sensitivity of the set and checked the external connections before proceeding further.



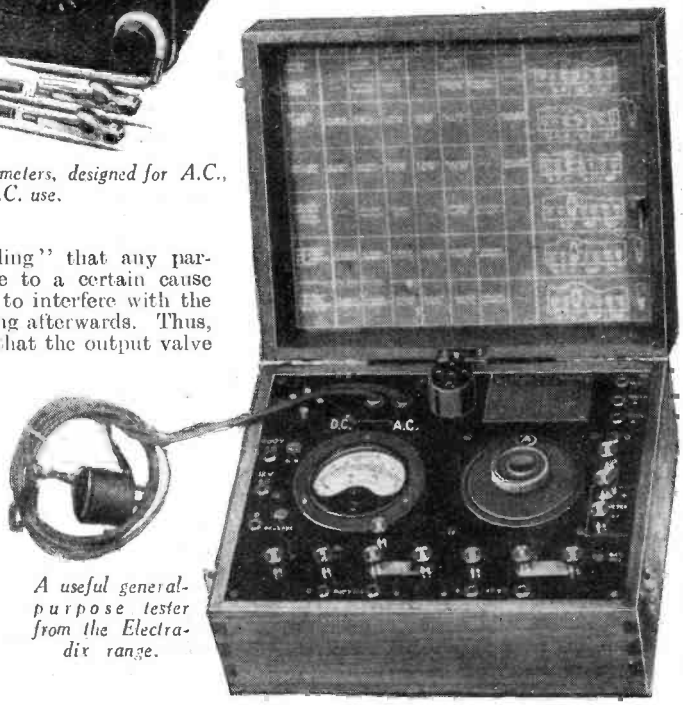

*A Ferranti multi-meter, with accessories.*

### An Easy One!

Another engineer spent a good deal of valuable time making voltage and current tests through a superhet that would not receive any good signals, despite the fact that it sounded to be "alive" and there was a peculiar form of heterodyne whistle which was unaffected by movement of the tuning condenser. This would at once have been recognised by a better man as a sign that the tuning condenser was not operating, and, after investigation, that the condenser drive was not gripping on the spindle of the gang condenser!

An experienced engineer would not waste much time testing the low-frequency end of a receiver which failed to bring in any broadcast transmissions, and yet would operate when a gramophone pick-up was connected. Similarly, he would know that if the bulb of one of the valves in a mains set (excepting a diode, of course) was quite cold while all of the others were warm, that valve was probably at fault; it might be making poor contact with its holder or the fault might be internal.

Then again, many a service man has wasted a lot of time testing the L.F. stages when distortion has been troublesome, only to find that the speaker cone was in need of centring or that there was some dirt in the air gap. This would generally be looked for if the reproduction was "scratchy," and sometimes if it "cracked" on high or loud notes.




*A useful general-purpose tester from the Electradix range.*

### Useful Experience

Those are just a few of the instances—all so simple that the points are easily missed when testing—which come to mind. If a real attempt is made in every case of trouble to determine the exact cause, rather than to effect a cure by any means, a considerable amount of useful knowledge will be accumulated. And it is knowledge that could not be gained by reading all of the technical books which are published, nor by making an assiduous study of every article that has been written on service work.

This "knack" is valuable, but it is far from sufficient in itself. There are many

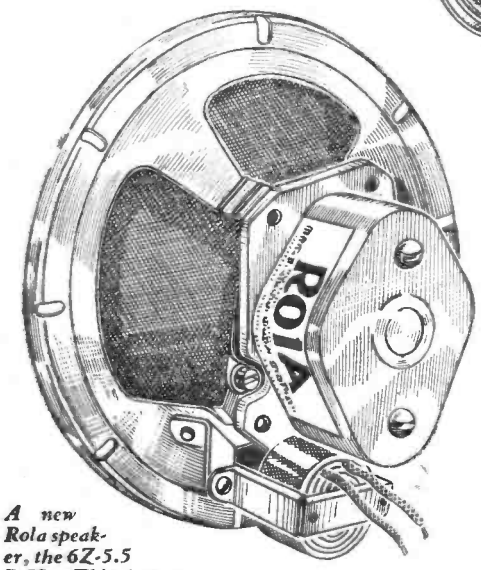
*(Continued on page 10)*

# SEEN AT THE SHOW

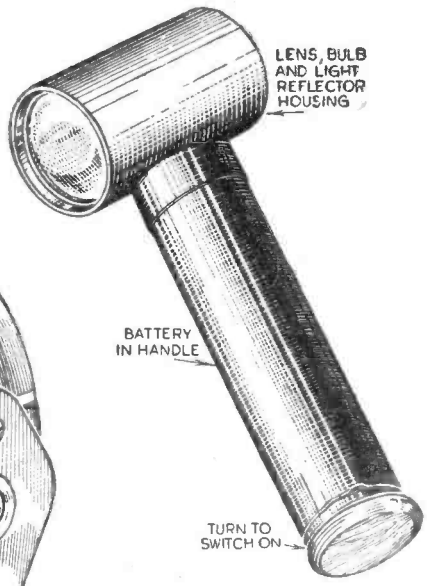
## Some Highlights Sketched by Our Artist



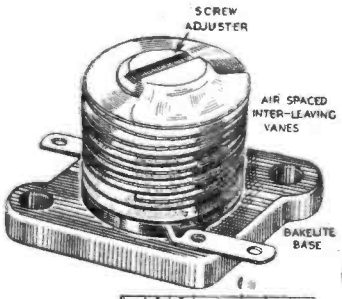

*A new type of mica condenser in which, instead of alternate layers of foil and dielectric, the makers employ mica sheets which are metallised by a special process. These condensers are assembled with high insulation stiffening members, thereby affording mechanical strength, and are ideal for circuits where extreme stability and close accuracy are required. They cost 1s. upwards according to capacity.*

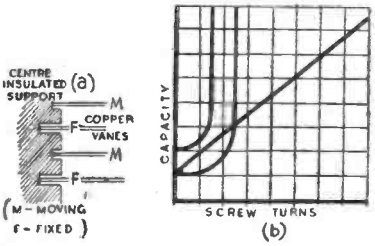



*A new Rola speaker, the 6Z-5.5 P.M. This has a 4¾in. cone and weighs 1¾lb. It is an excellent model for portable or similar receivers where the space available is limited, the overall diameter being 6⅝in. and the overall depth 2⅜in. The speech coil has an impedance of 3 ohms and the price of the speaker is 16s.*

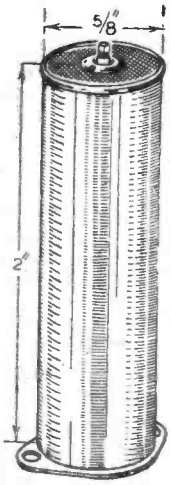


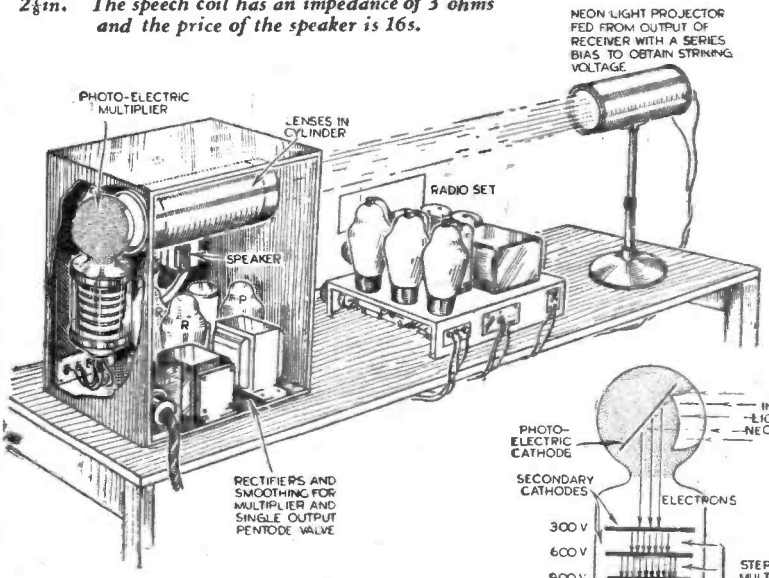

*An ideal accessory for the serviceman, this magnifier incorporates a powerful light source. The magnification is approximately 20 diameters and the handle houses the battery. This is a Servisol product, and the length is 7in. The handle is 1⅛in. diameter and the price is 15s. 6d.*

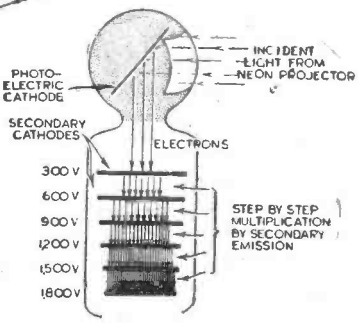


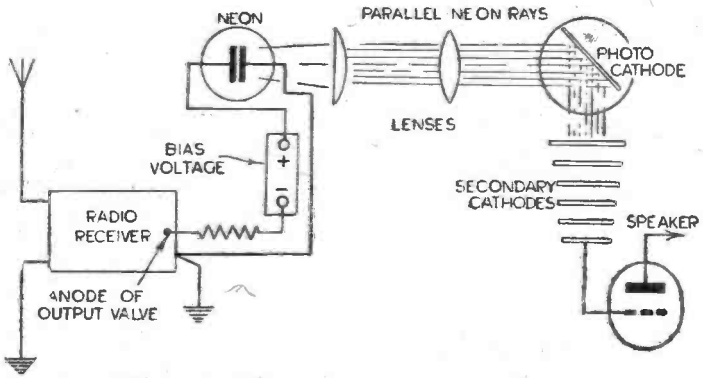




*An air-dielectric trimmer of novel design produced by T.C.C. By means of an ingenious threaded device the action of rotating the screw results in successive interleaving of the vanes somewhat in concertina fashion. The graph shows the comparison between the condenser and ordinary types. The straight line is the capacity variation plotted against screw turns. High smoothing properties, with compact size, are the main features of this neat electrolytic condenser. These Midgets are produced by T.C.C.*




*A pictorial illustration and theoretical circuit of a light-sensitive set-up which was exhibited on Stand No. 18, and which included the new electron multiplier described in these pages last week. The small diagram shows the general principles upon which the electron multiplier operates, and in the example a photo-electric cathode is indicated.*

# ON YOUR WAVELENGTH



By Thermion

## Keep Going!

ONCE again we find ourselves engaged in hostilities, but under somewhat different circumstances to those which obtained in the last. Wireless was not born until after the last war, and the Government relied upon the newspapers for the dissemination of news. I do not know how many of my readers can recollect the last war. It was not until 1916, two years after the war started, that for the first time in the history of this country conscription was introduced. This time conscription was in force on the outbreak of hostilities. During the last war there were a few amateur transmitters struggling along with coherer-type apparatus. This time some thousands of amateur transmitting sets were immediately confiscated. All licences for the establishment of wireless telegraph, sending and receiving stations for experimental purposes, wireless telegraph receiving stations for experimental purposes, and the use of wireless sending apparatus in conjunction with artificial aerials, and wireless telegraph sending and receiving stations for Royal Naval Wireless Auxiliary Reserve purposes are withdrawn. In the last war wireless receiving sets were confiscated, but in this we are enabled to retain them. We should be sufficiently grateful that we can immediately get official news within a few minutes of its receipt, and at regular periods throughout the day. It has exerted a remarkable influence on the preparedness of the nation. It has been used to instruct the public on air raid precautions, and what to do and where to go. It has been able to warn shipping, to announce the result of international discussions, and we have been enabled to hear the Prime Minister and the King. It will play a most important part in bringing this war to successful fruition. There cannot be any doubt that the war will end in success for this country. There is a possibility that, in view of the shortage of wireless receiving sets, because most firms will be turned over to the production of war materials, home construction will revive. Those odd parts that you have lying around in a junk box will, therefore, stand you in good stead. If you have not a stand-by receiver it is your duty to build one at once.

I am told by the Editor that this journal will do its best to carry on. It has an important part to play as one of the few technical journals dealing with wireless. I suppose that there will be difficulties in the way of publishing details of new inventions. My readers will understand, therefore, why on particular occasions I may not be able to refer to particular aspects of radio. As in the past our readers will loyally support us, I know, in our efforts to carry on under these difficult circumstances. I, for my part, will do my utmost to keep alive the interest which every reader of this paper, in the Services and out of it, has in radio.

It is the fervent wish of all that hostilities may soon cease. We can help at this end by endeavouring as far as is humanly possible to carry on as usual. You will help us if you endeavour to do the same. Difficult times lie ahead. Wherever my readers are I want them to feel free to write to me in the knowledge that I shall individually reply to each of their letters.

## Wizardry

HEREWITH a letter I have received from K. H., of Blackrock :

"I was rather intrigued with the Editor's description in his open letter in the first issue of the new PRACTICAL WIRELESS of the radio industry, as one of 'wizardry.'

"I wonder if others who have been 'fiddling' in the web of the 'constructor-experimenter' since 1924 sometimes feel that they can scarcely keep pace with the progress of the developments in what is our hobby, as we think of the old neutralised H.F. valves, then the S.G.'s, and now multi-electrodes of every design, to mention only one vital part of it.

"I suppose the trade naturally likes to sell trade sets, but there have been many new constructors won by receiving a home-constructed set, and knowing a lot about it eventually. And, must it be said, there has in many instances been much more spent by the home-constructor.

"Well, and we sometimes ask : 'Is it worth it?' Time, trouble, thought and handiwork also. But whether it is or not, we are still 'fiddling'!

"Wishing PRACTICAL WIRELESS continued success."

## Our Transparent Chassis

H. J. W., of Bristol, writes as follows :

"With reference to your remarks in this week's issue under the heading of 'Our Transparent Chassis,' in my own opinion a baseboard-built set need not be either 'unwieldy' or 'amateurish,' or even have long leads where it is important that they should be short. In some places long leads do not matter, as you must know.

"Your transparent chassis you say 'enables you to see every wire and connection.' Can you deny that a baseboard set does the same? I have nothing against the chassis method, so long as I can get what *I* want, and not what the designer thinks I ought to have.

"Having been a constructor for some years, taking a designers' idea and altering it to suit my own requirements, I shall probably continue to do so. For instance my present set is a straight 4, but I can use the H.F. valve or completely isolate it and use Det and 2 L.F.; or I can use Det and 1 L.F. on 'phones, when the L.S. might be objectionable. How many chassis sets offer these advantages? My set may not be extra pleasing to the eye, but it is easily kept out of sight, and it *is* pleasing to critical ears."

### That Rejected Manuscript

JUST to please many thousands of readers, and I hope not to annoy those who do not like Torch's style, I print the following from his pen :

If you've written a play that's turned out a dud,
And is always rejected because it's no good,
No sad disillusion need this ever bring—
It may still win you fame—if you pull the right string.

When the "right string's" been pulled and the play is broadcast,
The critics exclaim, with amazement aghast :
"Oh, can it have been that this genius we missed ?"
And they offer "Glad Hand," and not tightly-closed fist.

They laud you, and praise you, your talents they sing.
You've a wonderful time—when you've pulled the right string ;
And from that day forward, whatever you write
Will be brilliant, stupendous, delightful and bright.

From the instant it's published, it's certain of fame,
Though there isn't much in it—it still bears your name ;
P'raps not a play, but only a song,
Still, the same careful "pulling" will boost it along.

If you once get it "broadcast" you'll wallow in riches,
And may use diamond buttons to hold up your breeches,
On the top of the world you may ride like a king,
If at Broadcasting House you can pull the right string.

And all the old rubbish you wrote in the past
So often rejected, will win fame at last ;
Works which the experts have turned down in scorn
Win the B.B.C. "cachet"—and at once are re-born !

### Artificial Aerial Amateurs

THE new regulations relating to amateur transmitters will affect each of the three classes of amateur—about 2,000 beginners who are allowed to operate sets on a closed circuit with an artificial aerial which does not radiate signals, about 1,700 who may use real aerials but must not use a power of more than 10 watts, and about 800 licensed transmitters using more than 10 watts. Most of the latter, of course, are operated by firms manufacturing wireless equipment. Post Office officials have already collected the equipment of two members of the staff of this journal.

Post Office engineers are always on the look-out for unauthorised transmissions, and it is thought that with all amateur work closed down, the Post Office engineers would be able to detect any secret transmission by means of direction-finding apparatus. Many amateurs, of course, have already volunteered for specialised war service. For the last five years they have been under a gentleman's agreement to work for the Navy in time of war, and in return for this they have received free licences. At the beginning of this year the system was put on a regular basis by the formation of the Royal Naval Volunteer Wireless Reserve. The full strength of the R.N.V.W.R. is adequate for the purpose in view. I am not permitted to give the exact figure.

## Notes from the Test Bench

### Reduced Surface Losses

*IT is well known that high frequencies travel on the surface of a conductor, and in certain short-wave apparatus the coils and some other components are silver-plated to ensure high conductivity which will not be marred by oxidation. In some cases experimenters have attempted to obtain the desired effects by using ordinary brass or copper components and polishing with a chromium "plater" or similar liquid artificial plating chemical. The majority of these chemicals are, however, mercury in solution, and although when first applied they may fulfil the desired purpose, there is a risk of deleterious chemical action at a later date which will be worse than the trouble which it is intended to overcome. A better plan is to clean the parts very thoroughly and then paint with clear lacquer or celluloid in solution to prevent oxidation.*

### Lubrication

*MANY moving parts in modern receivers are employed as conducting paths and thus in addition to good contact between the adjacent surfaces, it is essential to keep them clean and free from foreign matter. Switches, for instance, are a typical instance of a moving contact surface, and many amateurs clean these periodically by rubbing with emery or fine sandpaper. Whilst this may be in order in some cases, the metal dust which is thereby obtained may find its way into some place where it will introduce trouble and the procedure is not therefore ideal. Special chemical cleaners are available for the purpose, and these should be used. Where lubrication is necessary colloidal graphite is a very good material to use, but it should be applied sparingly.*

### Valve Positions

*IN many modern receivers valves are placed in a horizontal position. This procedure is quite in order with the majority of modern valves as the filament suspension is well designed. In an A.C. or indirectly-heated valve, of course, the question of a sagging heater or filament does not arise, but in some of the older types of valve this may prove a source of trouble. The filament may sag and come into contact with the grid, and therefore care should be taken when designing a receiver where the valves will not take up the usual vertical position. Electrolytic condensers must also, in some cases, be mounted in a vertical position and this is indicated on the containing case.*

### Broadcast of the King's Speech

AS soon as King George VI ended his broadcast in the Home and Empire Service on Sunday evening, September 3rd, a translation of his message was transmitted in French, German, Italian, Spanish and Portuguese by B.B.C. stations for reception overseas. Thus, within half an hour of his Majesty's address, which was also broadcast by the American networks, the King's words were made known to a large part of the listening world. Later, translations of his Majesty's message were broadcast in Arabic and also in Spanish and Portuguese for Latin-American countries.

The B.B.C. has already received reports of good to excellent reception of the King's speech from Australia, India, Bermuda, Hong Kong, Jamaica, Kenya, Sierra Leone, the United States of America, the Argentine and Brazil.

Until further notice, news bulletins broadcast on short-wave from London in English and foreign languages are available for re-broadcasting from any station in all countries of the world, except in certain Empire countries to which notification to the contrary has been sent. Re-broadcasting from stations in Australia, India and Ceylon is now permitted. These bulletins are also available for re-publication in Latin-American countries only, and for public audition on board all ships at sea.

As this notice gives unrestricted permission, it is impossible to say accurately how many stations are making use of it. From inquiries which have reached the B.B.C. it can be stated beyond doubt that the bulletins are being re-broadcast very widely in all Empire countries where permission has been granted. It is also known that both the English and the Spanish bulletins are being re-broadcast in a number of South American countries.

# Volume Control Arrangements for Remote Loudspeakers

## Details are Here Given of a Motor-driven Gain Control for an Amplifier

PRESENT-DAY wireless receivers and radio-gramophones are usually arranged so that the volume of sound from the loudspeaker is adapted to be adjusted by varying the gain or amplification factor of the amplifier, and it has been suggested to control the volume of sound from a remote point by connecting a secondary volume control situated at the remote point in circuit with the windings of the loudspeaker. Again, when an extension loudspeaker has been used, a proposal has been made to vary the volume of sound from the extension or remotely situated loudspeaker relative to that of the local loudspeaker by means of a secondary or independent volume control connected to the leads for the remote loudspeaker. With either arrangement the maximum volume of sound which can be obtained for any given strength of received signal is governed by the position of the gain control for the amplifier, the secondary volume control merely being effective to reduce the sound to a desired level below that which would be obtained in the absence of the secondary volume control. There is, in consequence, a tendency to operate the receiver at or near the point of maximum gain, and this may result in the amplifier being overloaded, and the reproduced sounds distorted during reception of local or powerful stations.

### Gain Control Adjustment

According to the improved scheme of volume control here outlined, the secondary volume control—to be referred to simply as a volume control—or each volume control in the case in which a number of loudspeakers is employed, is associated with the gain control for the amplifier in such a manner that it may be moved between the positions of maximum and minimum volume to increase or decrease the sound level at the loudspeaker it controls, and beyond these positions to cause the gain control to be adjusted. This arrangement ensures that the sound level of any selected loudspeaker will be at a maximum during adjustment of the gain control to increase the gain of the amplifier, and, by choosing suitable values for the gain control and the volume control or volume controls, it is possible to ensure that local or powerful stations can be received at normal volume of sound with the gain control some distance away from the position of maximum gain, so that the risk of overloading the amplifier under these conditions is eliminated.

### Motor-driven Control

The scheme will first of all be described with reference to a wireless receiver provided with a local loudspeaker incorporated in the cabinet of the receiver, and with one or more extension loudspeakers situated at a position or positions remote from the receiver; the gain control for the amplifier is adapted to be driven by a reversible electric motor, and volume controls arranged in the circuits of the loudspeakers are adapted to be operated manually. Each volume control is arranged to close switches or contacts when moved to its positions of maximum and minimum volume, and these switches or contacts are connected by leads to the windings of the reversible electric motor; thus, all the switches or contacts which are closed when the volume controls are moved to the positions of minimum volume will be connected in parallel and in series with a winding of the motor which is adapted to cause the motor to rotate, for example, anti-clockwise, and drive the gain control in a direction to reduce the gain of the amplifier; and the switches or contacts which are adapted to be closed by movement of the volume controls to their positions of maximum volume will be connected in parallel and in series with the winding of the motor which produces clockwise rotation, and causes the gain of the amplifier to be increased.

The gain control for the amplifier will usually be set initially in a position such that a normal volume of sound is obtained from each loudspeaker during reception of a local station when the volume controls for the loudspeakers are set in their median positions, and thereafter the sound level of any loudspeaker may be increased or decreased independently of the remaining loudspeaker or loudspeakers by moving the appropriate volume control towards or away from its position of maximum volume. If, however, the volume of sound from one loudspeaker is insufficient when its independent control has been moved almost to its position of maximum volume, a further movement in this direction causes the motor to be energised to drive the gain control of the amplifier in a direction such that the gain of the amplifier is increased; when the gain of the amplifier has increased to such an extent that the sound level is somewhat in excess of that required, the independent control may be moved away from the position of maximum volume to open the circuit of the electric motor, and make the final adjustment of the sound level.

### Readjustment of Controls

The increase of the gain of the amplifier will increase the volume of sound from all the loudspeakers, and this may be counteracted where necessary by readjustment of the local or independent controls from each loudspeaker.

Conversely, if the sound level for a particular loudspeaker is too high when the volume control for that loudspeaker has been moved almost to the position of minimum volume, a further movement of the control to lower the volume will result in the gain control being driven in a direction to reduce the gain of the amplifier.

Each volume control may conveniently be located in the cabinet of the loudspeaker which it controls, and the values of these components may be so arranged that local or powerful stations can be received at normal volume when the controls are set to their median positions, and the gain control of the amplifier is set to a position some distance away from that of maximum gain, thereby ensuring that overloading of the amplifier will not occur during reception of strong signals.

### Remote Motor Control

In a further arrangement a wireless receiver is provided with a local loudspeaker mounted in the cabinet of the receiver and one remotely situated loudspeaker, the independent volume control for the local loudspeaker is controlled manually, and the volume control for the remote loudspeaker is driven by a reversible electric



*The Emir of Katsina, the African ruler, is here seen with his two sons when he visited Broadcasting House recently and spoke into the mike. His speech was recorded, and was broadcast later.*

## VOLUME CONTROL ARRANGEMENTS FOR REMOTE LOUDSPEAKERS.

*(Continued from previous page)*

motor which may be controlled from the remote point. The adjustable member of the gain control for the amplifier is mounted intermediate the ends of a shaft which is rotatably mounted within the cabinet of the wireless receiver, and the adjustable contact carrying arms for two rotary controls, forming respectively the independent volume controls for the local and the remote loudspeakers, are supported one at each end of the shaft. The resistance element of the control for the local loudspeaker is mounted on a control spindle coaxial with the gain-control shaft, and this spindle projects though an aperture in the cabinet and is provided with a manual control knob at its outer extremity. The resistance element of the control for the remote loudspeaker is mounted on a further spindle located adjacent to the opposite end of the gain control shaft and concentric therewith, and this further spindle is coupled to a reversible electric motor. Leads from the reversible motor may be taken to the remote loudspeaker and connected to a pair of press-button switches mounted on the cabinet of the remote loudspeaker, the arrangement being such that one button may be pressed to cause the sound level at the remote loudspeaker to be reduced and the other button may be pressed to obtain an increase in the sound level. Each resistance element of the volume controls is provided with a pair of stop members, arranged respectively at the positions of maximum and minimum volume, which stops are adapted to be engaged by the adjustable contact-carrying arms mounted on the gain control shaft so that upon rotation of one or other of the spindles carrying the resistance elements the selected resistance moves relative to its contact arm until the position of maximum or minimum volume is reached; at this point a stop engages the contact arm and further movement in the same direction causes the contact arm, and thus the gain control shaft, to be rotated. The controls are arranged so that upon movement of a volume control to maximum, a further movement of the control in the same direction will cause the gain of the amplifier to be increased, and upon movement of the control to minimum, further movement in the same direction will cause the gain of the amplifier to be reduced.

The gain control of the amplifier may be set initially so that a normal volume of sound is obtained from the loudspeakers during reception of the local station when the volume controls are in their median positions.

### Operating Details

In operation, if, for example, it is desired to increase the sound level at the local loudspeaker, the control knob of the volume control at the receiver is rotated to increase the volume of sound from the local loudspeaker, and if the sound level is insufficient when the maximum position is reached, continued rotation of the control knob in the same direction causes rotation of the gain control shaft to increase the gain of the amplifier; when the sound level at the local loudspeaker is somewhat greater than that required, the direction of rotation of the control knob is reversed, lost motion occurs between the stop on the resistance element and the contact arm and the sound is reduced to the required level by means of the volume control. The sound intensity at the remote loudspeaker may be controlled by operation of one or other of the press button switches mounted on the cabinet thereof. If, for example, it is necessary to increase the sound level, a press button is held down, the appropriate winding of the reversible electric motor is energised and the motor operates to move the resistance element of the volume control for the remote loudspeaker relative to its contact arm and in a direction to increase the volume; if the position of maximum volume has been reached before the press button is released, the stop on the resistance element engages the contact arm and moves the arm and, consequently, the gain control shaft in the direction required to increase the gain of the amplifier. The press button is held down until the required volume of sound is being received, and it will be apparent that the volume of sound may be reduced at any time by actuation of the other press button which controls rotation of the motor in the opposite sense.

### Varying Sound Level

An important advantage of the arrangement resides in the fact that the gain of the amplifier may be increased or reduced within limits to increase or reduce the sound level at one of the loudspeakers without materially altering the sound level at the other loudspeaker; thus, if the gain control shaft is moved by the volume control for the remote loudspeaker in a direction to increase the gain of the receiver for the purpose of increasing the sound level at the remote point, the contact arm of the volume control for the local loudspeaker is moved in the same direction, since it is mounted on the gain control shaft, and this movement is such as to move the volume control for the local loudspeaker towards the position of minimum volume. The increased volume of sound at the local loudspeaker, due to an increase in the gain of the amplifier, is thus compensated automatically within limits by the reduction in the sound level due to the volume control being moved towards the position of minimum volume.

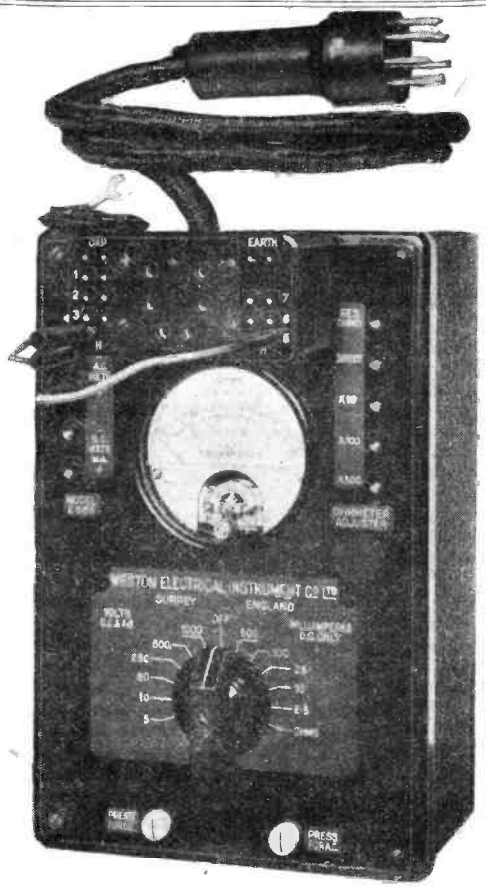
## RADIO AS A CAREER

*(Continued from page 5)*

occasions on which there are so many possible causes of the fault that is experienced that to investigate each one separately would take far longer than would be required to make a few systematic tests and to take meter readings at all of the important points throughout the circuit. Besides, even when the fault has been localised it is necessary to track it to its source before a cure can be effected. That is why a first-class meter, and a first-class and intelligent knowledge of its use, is an absolute essential.

### A Good Meter is Essential

For normal experimental work a good milliammeter will serve most purposes, but for efficient service work a good multi-purpose instrument is necessary. In addition to its undoubted value in testing, a business-like meter creates a good impression on the client. One of the best-known multi-purpose meters is the "Avo-meter," and an A.C./D.C. model of this will serve for almost every need. There are other instruments of similar utility and a few are illustrated here; when it is essential to cut down initial expenditure an "Avo-minor" is a good compromise. All of these multi-purpose meters are accurately calibrated and have all the necessary self-contained resistors for the different ranges. Some of them can be used for simple resistance measurements, in addition to their use for voltages and currents, but an inexpensive resistance and condenser bridge is often useful in the workshop.




*A typical set analyser, made by the Weston Electrical Instrument Co.*

### Resistance and Capacity Tests

It is not very difficult to make a bridge if a good multi-range meter is available for test purposes, but most engineers will prefer to buy a ready-made unit unless they have had at least a little experience of instrument-making. Those who do propose to make some of their own equipment will find full instructions in "The Practical Wireless Service Manual," which is obtainable from the publishers of this journal or from a bookstall; the price is 5s. 6d. post paid. This book also gives instructions for the use of the various test instruments — instructions which could not be dealt with fully in this short series of articles.

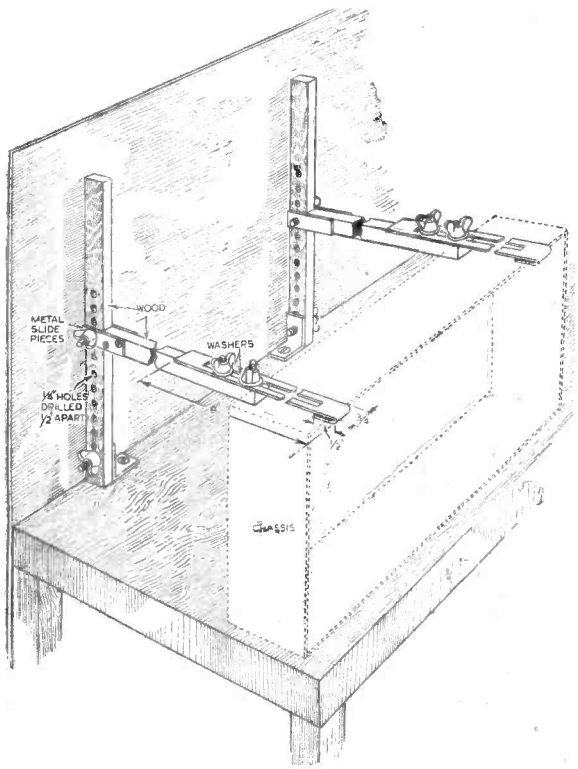
One of the most important instruments, excluding a multi-range meter of the pattern referred to above, is a simple modulated oscillator. This is invaluable when aligning and ganging a modern superhet; in fact, accurate alignment is well-nigh impossible without an oscillator of this kind. Some notes on its use will be given in a later article in this series.

# Practical Hints

## A Servicing Stand

I DO a lot of servicing and as this involves sub-chassis testing, I devised the following stand to prevent the chassis toppling backward and damaging the valves, etc., but at the same time leaving both hands free to undertake the necessary tests.

Two lengths of ½in. quartering were drilled with ¼in. holes ½in. apart along their length, and were screwed to the back of the bench about 7ins. apart, in a perpendicular position. Two more lengths were drilled with ¼in. holes 1in. and 2½in. from one end. Four ¼in. metal strips were drilled with ¼in. holes ¼in. from the end, and were fastened to the other ends of the lengths of wood, two to each end, leaving about ¾in. protruding. A ¾in. strip of brass, or any other workable material, was bent as in the drawing, and a ¼in. wide slot was cut as shown. There were two of these strips needed, one for each arm. The back stays can be any height to accommodate any size chassis, and to enable it to be held on its end, or on its side. To secure the chassis adjust the arms to the height (or width) of the chassis, place the top of the chassis against the ends of the arms, and push back the metal strips until the chassis is fast; then tighten the wing nuts to fasten the strips in position. Make sure all nuts are tight, and there will be no danger of the chassis toppling over.—G. S. DOBINSON (Stepney).




*A handy stand for use when servicing receiver chassis.*

### *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.**

## Shock Absorbers

MODERN receivers are generally susceptible to effects of vibration, especially where tuning is very sharp. This may be avoided by mounting the tuning condenser on a resilient platform. One way of doing this is to bolt the condenser to a flat plate and to support this on the chassis by long bolts, over which are placed standard rubber grommets, and another way is to use thick sponge rubber. Kneeling pads are obtainable quite cheaply and may be cut up for the purpose. This material is also useful to place beneath an existing chassis to minimise the effects of vibration, and this helps to reduce microphony in old model receivers. The material may also be used in the large sheets for supporting speakers, car radio apparatus and similar equipment. If the kneeling pads are not large enough, or a thicker material is required, it may be purchased in the flat sheet in all thicknesses up to 2in., the price of the latter being about 4s. per square foot.—D. FRANCIES (N.W.).

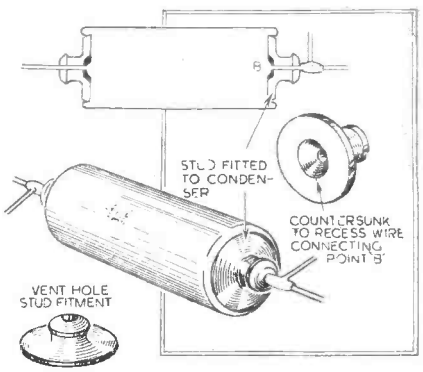
## Class B Transformer

THE standard mains transformer has a primary winding suitable for a maximum input of 250 volts, and is generally provided with tapping points so that it may be used on voltages down to 200 volts. In some of these transformers one of the secondary windings is rated at 250 volts and a winding with a centre-tap is generally provided for this. The ratio of this winding to the primary is approximately 1 to 1, and therefore it may often be used as a make-shift Class B input transformer with quite satisfactory results. A 350-volt secondary may also be similarly employed in some cases where a slightly different ratio is required. The primary is, of course, treated as the normal primary winding, and the secondary connected in the standard manner. The remaining windings on the transformer are ignored.—J. F. (Watford).

## A Novel Protection for Tubular Condensers

WHEN soldering certain types of wire-ended tubular condensers, and particularly when more than one connection has to be made close to the component, the heat of the soldering iron can soon render the condenser useless by melting the wax, and loosening the connecting point to one "plate."

To meet this possibility in the .1 mfd. range, I have used to advantage a few vent hole studs obtained from two old trilby hats, in the manner illustrated. In order that each solder or pinch connection can be recessed when fitting the studs, I countersunk the base of each stud as depicted. Not only does the use of these studs facilitate soldering, but any "play" in the wiring is prevented from immediately affecting the condenser connections.—C. J. Vern (Gloucester).

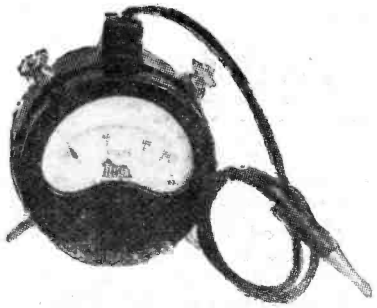



*A simple method of protecting tubular condensers.*

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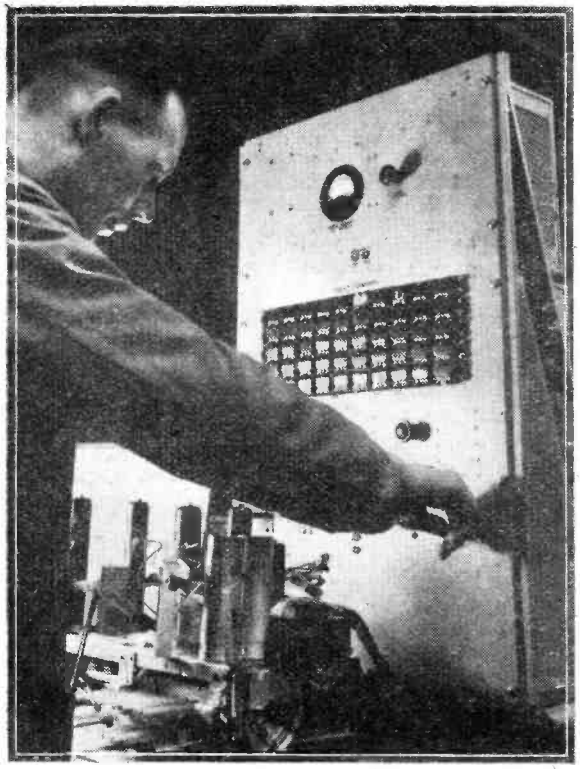


*A simple 3-range tester such as is used by many listeners for general test purposes.*

TO be a successful serviceman, a good preliminary groundwork is essential, and haphazard servicing leads not only to inefficient repairs but also to needless or unnecessary expense. As we have already mentioned, a properly trained serviceman can call at the house of a listener, locate a fault and replace the defective part without putting the listener to any inconvenience. The old days of collecting the receiver and holding on to it for weeks or even months and then returning it only half done, are now a thing of the past. Dabblers will still, however, work on these inefficient lines and, therefore, if you wish to obtain a successful connection as a serviceman it is essential to cover the preliminary groundwork, although this may for a time appear boring. Apart from the use of instruments a certain amount of mathematical knowledge is is necessary, although for all normal work there is no need to go into the Higher Calculus or any such branch of maths. Ohm's Law, which is such a stand-by in radio practice, is a simple calculation which should be capable of application by even the youngest schoolboy. If you intend to plod steadily along you may need a little more mathematical knowledge than this, and this will be desirable if you intend to make use of very simple instruments. If, of course, you intend to obtain a modern Fault Finder such as is marketed under various names, very little technical knowledge or similar capabilities are needed, beyond a little common-sense in the application of the tester. These multi-purpose units enable every part or even the most complicated modern receiver to be properly tested stage by stage and very little, if any, calculation is needed.

### Colour Codes

The serviceman must, however, also make himself perfectly familiar with the various colour codes which are employed in modern components and wiring, and although it is possible to carry data sheets of these about with you, the load may be reduced if they are memorised. A little practice will soon enable them to be grasped and the components may be identified rapidly. Components such as valves need exhaustive tests in some cases, whilst in others a mere check for filament continuity will suffice. A modern receiver may, however, be giving a poor performance, and a proper valve tester may locate the source of the trouble without the need of checking each part of the circuit. Calculation may be necessary to work out certain valve characteristics, but generally a "goodness" test for the valve will suffice. Individual component tests are possible with some testers, whilst in other cases current or similar tests will enable the component to be checked—again with a little mathematical aid. It will be seen, therefore, that servicing is not really a difficult task, but, like every other job which has to be done well, it has to be tackled properly.



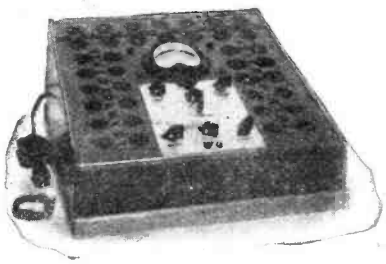
*Here is a factory tester which does all circuit testing without dismantling any parts or leads. It is in the G.E.C. factories.*



### Formulae

For the start we must, therefore, tackle the essential formulæ which will be needed, our old friend Ohm's Law taking pride of place. This states that Current equals Voltage divided by Resistance. This is normally expressed by the formula $I=\frac{E}{R}$ This brings us to our first difficulty, the substitution of letters for various factors used in radio work. They should be memorised as far as possible, although many of them may not be needed except on very rare occasions. The full table is as follows:

| | |
|---|---|
| Amplification .. .. | A |
| Amplification Factor .. | $\mu$ (Mu) |
| Ampere .. .. .. | A |
| Anode A.C. resistance (impedance) .. .. | Ra, Ro |
| Anode Current .. .. | Ia |



*A modern valve tester which checks all types of valves and which should be in the possession of every serviceman.*

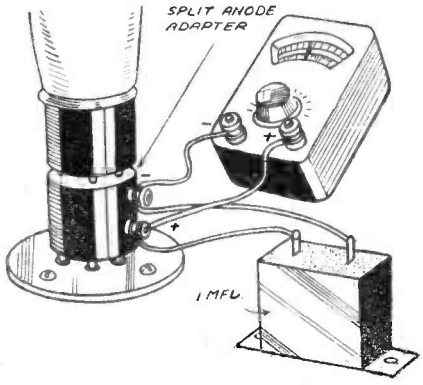
| | |
|---|---|
| Anode Potential .. | Va |
| Anode Circuit Inductance | La |
| Current (R.M.S. Value) | *I* |
| Current (Instantaneous) | i |
| Capacity .. .. | C |
| Dielectric Constant .. | s |
| Energy .. .. .. | W |
| E.M.F. (R.M.S. value) .. | E |
| E.M.F. (Instantaneous) .. | e |
| Frequency .. .. | f |
| Farad .. .. .. | F |
| Grid-anode Capacity .. | Cga |
| Grid Circuit Inductance | Lg |



# SERVICING —New Series

**A Solid Foundation is Necessary if a Really Good Servicing Connection is to be Built Up. The Main Details of Modern Servicing and Some of the Groundwork is Dealt With in This Article.**

| | |
|---|---|
| Grid Current .. .. | Ig |
| Grid Potential .. .. | Vg |
| Henry .. .. .. | H |
| Impedance .. .. | Z |
| Inductance .. .. | L |
| Length .. .. .. | l |
| Mass .. .. .. | m |
| Mutual Inductance .. | M |
| Magnetic Flux Reluctance) .. .. .. | $\Phi$ (or S) |
| Magnetic Flux Density .. | B |

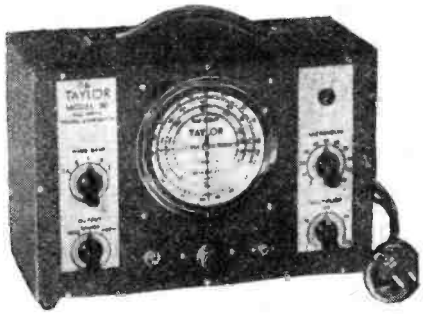



*The simplest way of testing a valve by means of a "split leg" adapter.*

| | |
|---|---|
| Magnetic Field .. .. | H |
| Ohm .. .. .. | $\Omega$ |
| Permeability .. .. | $\mu$ |
| Power .. .. .. | P |
| Power Output .. .. | Po |
| Phase Angle .. .. | $\varphi$ |
| Quantity of Electricity .. | Q |
| Resistance .. .. | R |
| Resistivity (specific resistance) .. .. .. | $\rho$ |
| Resistance at Resonanace | R |
| Reactance .. .. | X |
| Self-inductance .. .. | L |
| Susceptibility .. .. | x |
| Time .. .. .. | t |
| Velocity .. .. .. | v |
| Volt .. .. .. | V |
| Watt .. .. .. | W |
| Wavelength .. .. | $\lambda$ |
| 2 $\pi$f .. .. .. | $\omega$ |

## Codes

The colours adopted for resistances are the most important in the codes, although mains transformers and



*Modern test equipment is compact but with a high degree of efficiency.*

fuses also have coloured leads which must be capable of identification. The resistance colour code is as follows :

| Colour | Fig. | No. of Noughts. |
|---|---|---|
| Black .. .. | 0 .. .. | None |
| Brown .. .. | 1 .. .. | 0 |
| Red .. .. | 2 .. .. | 00 |
| Orange .. | 3 .. .. | 000 |
| Yellow .. .. | 4 .. .. | 0000 |
| Green .. .. | 5 .. .. | 00000 |
| Blue .. .. | 6 .. .. | 000000 |
| Violet .. .. | 7 .. .. | |
| Grey .. .. | 8 .. .. | |
| White .. .. | 9 .. .. | |



*Another all-purpose tester in compact form.*

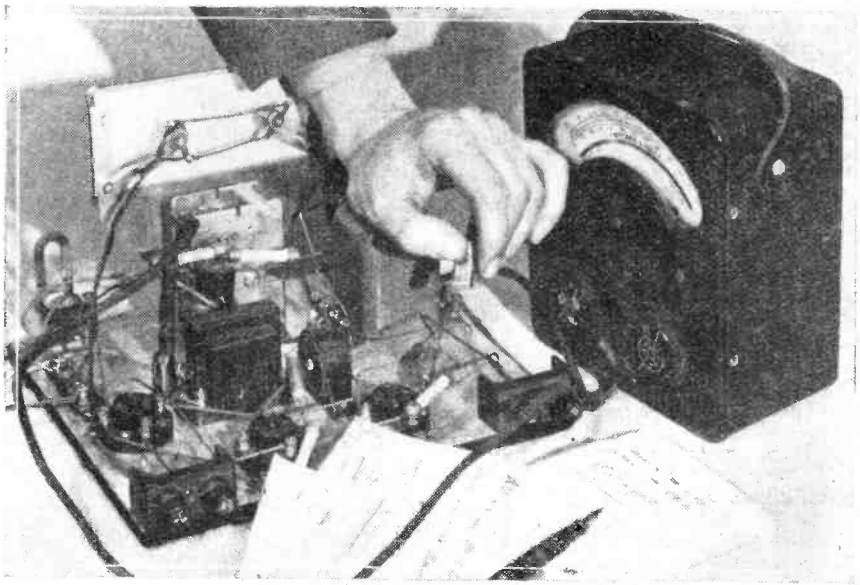
The order of reading these colours is : Body, Tip Dot. An example should make the idea clear. A resistance with a red body, a black tip and an orange spot or band will have a value of 20,000 ohms. If there is no dot on the body then it is assumed that the dot is of the same colour as the body.

A code is used in multiple condenser blocks and this is as follows :

| | |
|---|---|
| The highest capacity positive voltage .. | Red |
| The second highest positive voltage .. | Yellow |
| The third highest positive voltage .. | Green |
| The fourth highest positive voltage .. | Blue |
| The fifth highest positive voltage .. | Violet |
| Principal negative connection .. .. | Black |
| Second negative connection .. .. | Brown |
| Third negative connection .. .. | Grey |
| Centre connection for voltage doubler condensers .. .. .. .. | White |

## Fuses

Fuses for use in battery or mains receivers are also coded to indicate the value and this code will be given next week.



*A multi-range tester can be used for all normal tests. Here is a set being tested.*

# PRACTICAL TELEVISION

Sept. 16th, 1939. Vol. 4. No. 169.

## Vision by Cable in the U.S.A.

BEARING in mind the recent developments in this country for the distribution of sound signals into the home by cable, it is not without significance that in the United States "wired television" is being regarded as a distinct possibility of the near future. One large company has already been formed solely to deal with this development, it being pointed out that whereas up to a few months ago technical opinion was in favour of a costly coaxial cable, or a series of relay stations for a network distribution of television signals, the special experiments recently concluded by A. T. and T. have pointed the way to the use of existing telephone wires as video signal carriers. This new company has been formed as a result of the information obtained on this subject. It is pointed out that in the principal American cities television reception on the ultra-short waves is proving difficult, because of the very nature of the skyscraper buildings, and the multitudinous reflections which occur unless a very elaborate receiving aerial array is employed. As against this it is suggested that a wire network within the city will bring into any home, from a central point, both radio and television without interference from static, or any other form of electrical disturbance. At the same time as this development is taking place it is learned that the sales of television sets in America, since the service was inaugurated on April 30th by the National Broadcasting Co., has been very disappointing, and now indicates a sharp decline. This is a direct contrast to the very optimistic figures mooted earlier in the year, where a total of 10,000 in a few months was glibly talked about. This disappointment is attributed to a vicious circle, for while the set manufacturers realise that sales will only become worth while when prices are lowered, this cannot be undertaken until the consumers' demand increases. The potential viewer will remain potential until the programmes show considerable improvement, for whereas the radiated pictures are good technically, their programme value is rated at a very low level. The transmitting companies under the national scheme which holds in America cannot spend money on giving better programmes without the support of sponsors, but permission to radiate an advertising programme is vested in the Federal Communications Commission. This ruling body so far has refused to grant commercial licences until the industry is standardised in every aspect, and also full grown, so that this state of impasse shows no sign of breaking, and will not do so until one of the parties involved takes a long view and makes a drastic change.

## An American Proposal

THE Americans show every symptom of making a determined effort to take the lead in television in so far as a national signal coverage for a large proportion of the whole country is concerned. They realise only too well that the radiation of television programmes from one or more transmitting centres, in addition to that of New York, is one of the surest ways of bringing about a rapid expansion in sales of sets, for it will convince the public that the service so recently inaugurated in that continent is by no means experimental. According to the latest reports the plan now being formulated provides for the direct linking up of the R.C.A. station built on the Empire State Building, with the G.E.C.'s transmitter at Schenectady. This is only the first step in the network, and for many months engineers have been engaged in finalising all the details. The scheme is scheduled to be put into operation before the end of this year, and each station will be capable of providing broadcast programmes for radiation by both. This information would seem to show that the Americans are satisfied with the methods they have developed for the transference of signals from point to point. It is a matter of deep regret that such a state does not exist here. At the Radiolympia Television Convention, Sir Noel Ashbridge stated that either the cable or radio link would be suitable, but consideration of first cost, running costs, control and so on, had still to be settled, and we are therefore as far off as ever regarding any final decision in the matter. At the same convention the G.P.O. were castigated very thoroughly by one speaker, it being said that the delay in connection with the development of provincial television was entirely due to their efforts in postulating the claims of cable links so that the Post Office would maintain the control of signal distribution in their own hands, and derive revenue on a rental basis.

**SPECIAL NOTICE.**

**Owing to the outbreak of hostilities and the consequent suspension of the television broadcasts, this page will, in future, be devoted to news of technical developments which have taken place, or which may take place in the research laboratories. Although television entertainment has been suspended, research work will, of course, carry on.**

## In Canada

FOR many years the Canadian authorities, that is, Government officials and certain of the engineering staff, have been conducting experiments in television, and it was felt that ultimately the public would be given demonstrations of high definition equipment using English apparatus. This hope has not materialised, however, for it is now learned that the formal introduction of television to the people of Canada is to be undertaken by the United States. At the annual Toronto Fair, which usually attracts at least two million visitors, R. C. A. Victor are to have a complete television installation housed in the National Industries building. This is yet one more case where the lethargy of the British Government has prevented the television industry in this country from giving attention to export matters, due to the absence of news concerning provincial extensions.

## Polytechnic Courses

THE Radio Engineering courses for session 1939-1940 at the Polytechnic, Regent Street, will include a Television section. The courses commence on September 25th, 1939, and the Syllabus, under lecturer D. C. Espley, M.Eng., A.M.I.E.E., is as follows:

Definitions and analogies. Principles of scanning. Television and photo-telegraphy compared and contrasted. Synchronism between transmitter and receiver.

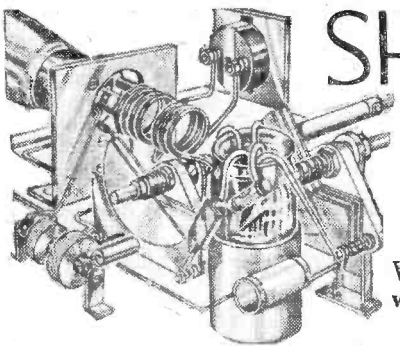
Image structure. Picture ratios. Image distortion. Mechanical scanning. Disc, mirror drum and screw. Outline of television reception. Light modulation devices. Photo-electric cells. Construction and operation. Photo-cell amplifiers. Cathode-ray tubes. Gas-filled and vacuum types. Construction and operation. Time-base circuits. Use of receivers. Intensity and velocity modulation. The Iconoscope. Intermediate film transmission and reception. Electron multiplication, and application in modern devices. Ultra-short waves. Transmitters, receivers and amplifiers. Aerial systems. Optical principles and definitions. Theory of lens and mirror systems. Measurement of optical quantities.

Enrolment is from September 18th to 22nd.



*A visitor inspecting a skeleton chassis of the new H.M.V. 44-guinea television set at Radiolympia. The new large screen, 12 by 10 inches in size, brings heads up to life size.*

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# SHORT-WAVE SECTION

## TUNING THE AERIAL

**Various methods of improving short-wave reception are dealt with in this article.**

WHILST the majority of short-wave enthusiasts follow with interest and appreciate the rapid strides which are being made in the design and development of short-wave receivers and circuits, many cannot afford to take advantage of them in the practical sense, and must perforce remain satisfied with the equipment to hand.

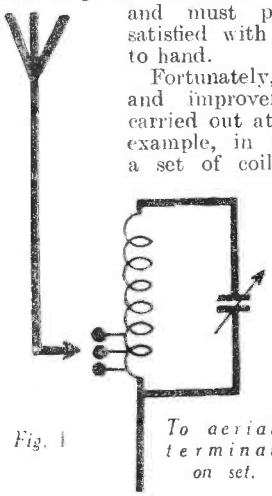



*Fig. 1*

Fortunately, modifications and improvements can be carried out at low cost. For example, in some instances a set of coils are to hand which enables the experimenter to use his short-wave T.R.F. or regenerative detector and L.F. stage receiver for medium-wave broadcast reception. As explained in a previous article, selectivity is of a very low order, due to high ratio of inductance to capacity. Under these circumstances the enthusiast requires some means or other whereby the selectivity may be improved on medium waves which will not introduce complications, or prove detrimental with respect to the overall efficiency of the receiver, when used for short-wave reception.

### Selectivity Problems

Before going further, let us take into consideration the common defects associated with the straight regenerative short-wave receiver and the tuned radio-frequency type. Selectivity is mediocre in both instances, compared with that of the superheterodyne. I do not mean to infer that short-wave receivers other than the superhet are useless, because the degree of selectivity obtainable when using either a regenerative detector or T.R.F. receiver, depends upon its general design, layout, wiring, and efficiency, or otherwise, of the tuning coils used. Nor must we overlook the importance of the aerial and earth system used in conjunction with it; also aerial coupling arrangements.

This brings us to a very important point often ignored when discussing short and medium-wave selectivity problems. It is that, in many instances, poor selectivity is the price paid for simplicity of control. Take, for example, single and two H.F. stage T.R.F. type receivers. The aerial circuit is usually made aperiodic, and thus receives all signals at equal strength.

Thus we have the desired and undesired signals picked up and passed on to the first H.F. valve and amplified, causing cross modulation when band-pass or variable-mu are not features of design.

### Using a Wave-trap

This state of affairs, however, may be overcome in a very simple manner. Fig. 1 shows in theoretical form a rejector wave-trap fitted in series with the aerial. All that is required is a .0003 mfd. variable condenser, a coil mounting, a medium-wave coil and three or four single winding short-wave coils, which may be of the now obsolete two-pin type.

The idea is an old one, but when used in conjunction with short-wave receivers, serves a number of different purposes. It can, of course, be used as a wavetrap on all bands, and will prove worth while.

When inter-station interference is experienced, the unwanted signal may be tuned in at full volume on the receiver, and then reduced to the minimum, or completely cut out with the trap circuit, after which the set should be re-tuned to the desired signal.

The writer has always been, and still is, a strong advocate of tuned aerial systems. Quite apart from man-made static and integral receiver noises, we experience natural static or background noise.

Background noises are experienced by everyone to a greater or lesser degree, and the same applies to integral receiver noise, but man-made static is not universally experienced.

### Reducing Interference

If man-made static is experienced, there are special aerial systems which may be used in order to reduce such interference, but there is no system available which will totally eliminate it, and one must be prepared to sacrifice a reduction in signal volume to some degree, and view the subject from the point of clearer signals due to the reduction of interference of the man-made variety originating close to the lead-in. Should such interference be a quarter of a mile away, things are pretty hopeless.

Natural static or background noise external to the set is, however, a different proposition altogether, and not only can it be considerably reduced, but completely eliminated in certain instances, but so also can signal volume be increased at one and the same time.

For example, whilst it may appear paradoxical, natural static may be experienced on a particular frequency which in itself is free from interference. Such interference being spread over from adjacent frequencies. Our receivers discriminate between wanted and unwanted signals, therefore, we must arrange matters so that the aerial system will discriminate between wanted signals and unwanted interference.

Provided that we can accomplish this most desirable state of affairs, sufficient voltage will be obtained to totally override noise, and by tuning the aerial system to resonance, we can achieve our objective. This is not high-sounding theory, but a fact all too little appreciated.

### Aerial Resonance

There are various methods, complicated and otherwise, from which to choose. Using the coil and tuning condenser arrangement described is the most simple, and does not make for tricky operation. For example, suppose we tune the set to 31.28 metres with aerial tuner unit condenser at zero and get our signal up to maximum volume. Now follow by tuning the aerial tuner unit. It will be noted that as the aerial system is brought into resonance, volume definitely increases until a point is reached where the signal is cut out and then as we continue aerial tuning, comes in again.

The point of maximum sensitivity falls a fraction below resonance, therefore, we must tune carefully for maximum signal volume which denotes that point by adjusting the aerial tuner unit and slightly correcting the receiver tuning and reaction condensers. By following this procedure, we not only obtain maximum volume, but override noises which spread over from adjacent frequencies.

An important feature to note is that this tuner or trap arrangement enables one to reduce the input to the H.F. stage, and is especially useful in this respect when screen voltage is controlled by a potentiometer acting as a pre-detector volume control. In some measure this allows maximum sensitivity to be obtained or decreased at will, avoiding excessive noise on the one hand, together with freedom from what may be described as knock reaction effects on the other.

In conclusion, it should be understood that a unit of this type will prove to be an asset when used with either straight regenerators or T.R.F. receivers.



*A wireless set for the blind seen at Radiolympia. The dial is engraved in braille.*

# Leaves from a Short-wave Log

## U.S.A. News Bulletins

IT is often useful to secure the latest news of happenings in European countries at times when no broadcasts from Great Britain or the Continent are available. In such circumstances it is possible to turn to a number of transmitters in the United States which, at stated times, put out news bulletins in English. The following will be found a useful list of times: In week-days only: G.M.T. 12.00 and 13.00 from WPIT (late W8XK), East Pittsburgh (Pa.), on 13.93 m. (21.54 mc/s); at G.M.T. 13.00, also from WNBI (late W3XL, Boundbrook (N.J.), on 16.87 m. (17.785 mc/s): at G.M.T. 16.15 through WCAI (late W3XAU), Philadelphia (Pa.), on 19.65 m. (15.27 mc/s), at 17.30 through W2XE, Wayne (N.J.), on 16.83 m. (17.83 mc/s). Saturdays Excepted; also at 20.55 through WGEA (late W2XAD) Schenectady (N.Y.), on 19.57 m. (15.53 mc/s). There are transmissions DAILY from WNBI (16.87 m.—17.785 mc/s), and WPIT on 19.72 m. (15.21 mc/s), and also at 17.00 from the same studios. Special broadcasts are made by W2XE, Wayne (N.J.), on Monday, Tuesday, Thursday and Friday, on 16.83 m. (17.83 mc/s) at G.M.T. 21.50, and at 23.00 on Wednesdays, when a special commentary on topical events is also given. Special news bulletins are also broadcast on Monday and Friday every week by WPIT on 25.27 m. (11.87 mc/s) at G.M.T. 22.45, and at G.M.T. 02.30 on Sundays only by WCAI, Philadelphia, on 49.5 m. (6.06 mc/s).

## Treasure Island Broadcasts

THE General Electric transmitter on Treasure Island (San Francisco), California (U.S.A.), so far known as W6XBE, has adopted the call-letters KGEI. During the past few days simultaneous transmissions have been carried out on both channels, namely, 31.48 m. (9.53 mc/s), and 19.57 m. (15.53 mc/s), and the broadcasts have been extended to G.M.T. 04.00.

## Good Signals from Caracas

WITH its slogan: *The City of Perpetual Spring*, YV5RC, at Caracas-Catia (Venezuela), now provides regular musical programmes nightly until, roughly, G.M.T. 03.00. On 51.72 m. (5.8 mc/s) this 2.5 kilowatt station puts out powerful and well-heard signals, and the broadcasts, in addition to the call in Spanish and English, can be identified easily by the four deep-toned bells used during the intervals, and preceding or following an announcement.

## Siam Now Thailand

THE name of Siam will shortly disappear from the map as the Kingdom has now adopted a new title: *Thailand*. HS8PJ, the 10-kilowatt station at Saladeng, Bangkok, continues to broadcast at B.S.T. 14.00 on 31.55 m. (9.51 mc/s); HS6PJ, on 19.7 m. (15.23 mc/s) is not so regularly on the air. Bangkok is roughly 5,750 miles from London, and the local time is seven hours ahead of G.M.T.

## Broadcasts from Formosa

ON 31.13 m. (9.64 mc/s) a news bulletin in the English language is broadcast daily through JFO, Taihoku, Taiwan (Formosa), at G.M.T. 13.00. During the past few days a simultaneous transmission appears to have been made through another station working on 30.96 m. (9.69 mc/s). The studio uses a gong to open and close the broadcast, all announcements being made by a woman.

## Daventry's New Channels

FROM September 1st, two new channels are to be used in the Empire Service, namely, GSU, 41.32 m. (7.26 mc/s), and GSW, 41.49 m. (7.23 mc/s). The schedule is now as under: G.M.T. 11.00-17.45, GSE on 25.3 m. (11.86 mc/s), and GSW; GRX, 30.96 m. (9.69 mc/s), and GSA, 49.59 m. (6.05 mc/s) taking the G.M.T. 18.00-23.00 transmission. Both are destined to European listeners.

## Rome Tests on New Frequency

I2RO16, Rome (Italy) has been carrying out experimental broadcasts on 13.95 m. (21.51 mc/s), between G.M.T. 14.00-14.50, with a power of 25 kilowatts.

## A Siren Wail from Trujillo City

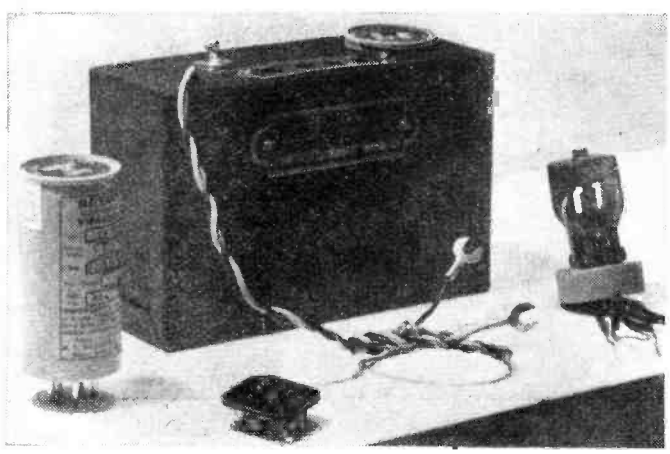
JUST below the 25-metre band on a recent evening a clear call was heard from the Dominican Republic; it emanated from HIN, Cuidad Trujillo, on 24.03 m. (12.49 mc/s), which announces itself as the *Broadcasting Nacional de la Republica Dominicana*. The wail of a siren precedes all announcements.

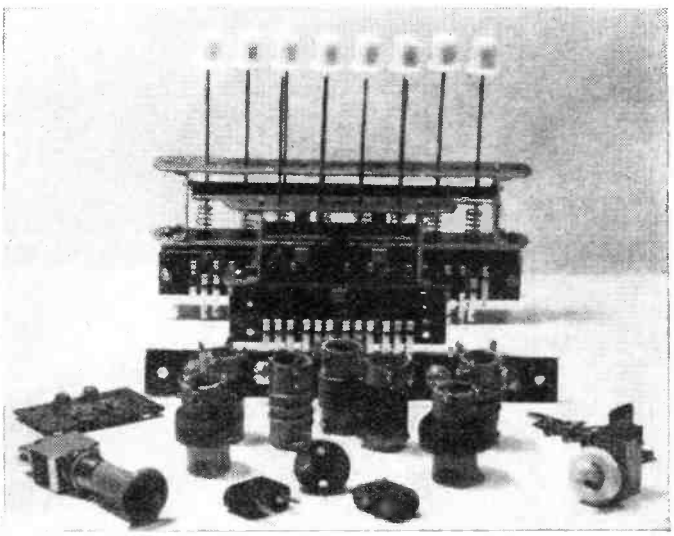
## Havana Wobbles

THE regular logging of COBC, Havana (Cuba) is not always an easy matter as the station frequently deserts its original and advertised wavelength. It has been found on channels varying between 29.97 m. (10.008 mc/s), and 30.06 m. (9.98 mc/s), although the latter frequency is given in its announcements. The call is a long one as it is coupled to that of the medium-wave transmitter: *Estaciones CMBC del Progresso Cubano y los Grandes Almacenes el Gall en 69 kilocycles y COBC de los cigarros Trinidad en 998 megacycles ambas en la Habana, Republica de Cuba*—Stations CMBC of the *Progresso Cubano* (a daily paper), and of the Cockerel Stores on 690 kc/s), and COBC of the Trinidad Cigars on 998 mc/s in Havana, Republic of Cuba. The interval signal, as one would expect in these circumstances, is a cockcrow every fifteen minutes.

# New Season's Components

*Below is one of the new 2-volt vibratory H.T. eliminators recently produced by Messrs. Bulgin. This is rated at 10 mA at 120 volts. Also seen in the group is one of the new model vibrators and its holder, and on the right the element of the vibrator removed from the containing case.*





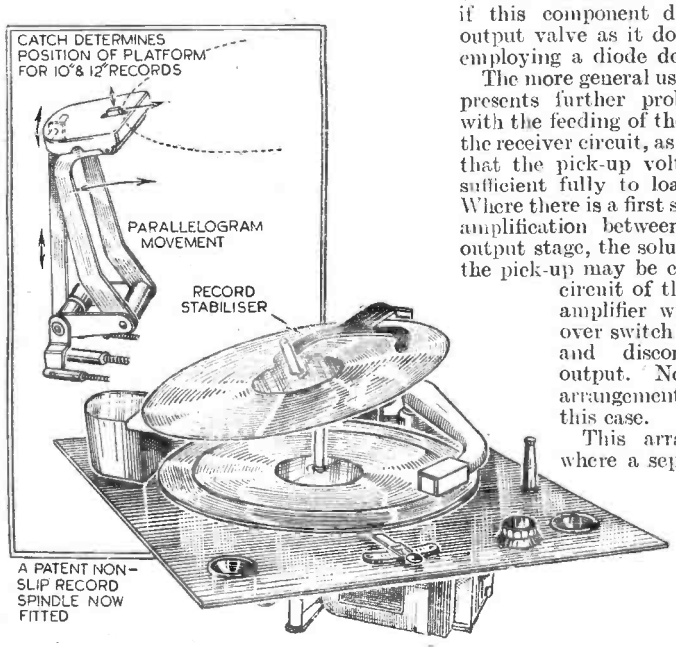
*Above is one of the push-button tuning switch units including a new 4-way type. In the foreground are the new Unit coils which are available for straight or superhet receivers for tuning from 6 to 2,600 metres. Midget plugs and sockets and strip connectors may also be seen.*

# INTERESTING PICK-UP CONNECTIONS

## Some Useful Suggestions Regarding Pick-up Connections for Various Types of Radio Receivers.

THE usual method of connecting a gramophone pick-up to a receiver employing a triode or pentode detector valve is well known, and in the case of the simplest sets it is usually sufficient to shunt the pick-up across the grid leak, without the complication of switching, but it is generally considered good practice to disconnect the detector grid from the radio-frequency circuits in order to prevent break-through of radio programmes when records are being reproduced. The basic circuits of these conventional arrangements have been published in these pages from time to time.

Recent developments in receiver design have rendered it necessary to modify the pick-up arrangements in many circumstances, while the characteristics of the pick-up itself must also be taken into consideration when deciding the actual circuit to be employed. One of these developments is the steady increase in the sensitivity of the modern superhet receiver as a result of which it is found that, unless special precautions are taken, radio programmes are liable to impose themselves upon the gramophone reproduction, even although a switch is incorporated to isolate the grid of the valve to which the pick-up is connected from the radio-frequency portion of the receiver. This break-through is probably due to capacitative coupling, and in order to avoid this risk, it is good practice to omit the isolating switch, merely

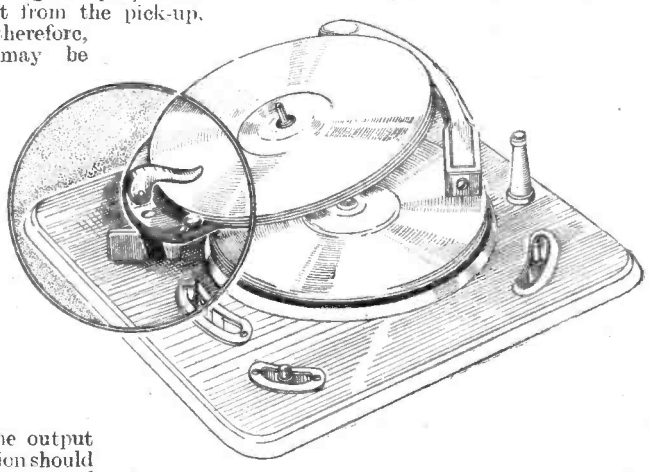



*One of the new Garrard auto-mixed record changers seen at the recent Radio Exhibition.*

connecting the pick-up to the control grid of the appropriate valve, and silencing the radio-frequency and intermediate frequency section by disconnecting the aerial, short-circuiting the control grid of the frequency-changer, and disconnecting its anode. These operations call, of course, for fairly complex switching, but the multiple radio-frequency switch units now available can be readily pressed into service, and the necessary connections furnish an interesting problem for the amateur.

### With Output Pentodes

Another development which has had considerable effect upon pick-up practice is the introduction of the high-sensitivity output pentode, which in many cases (particularly in the battery types), give their normal output for a grid input, which can be supplied direct from the pick-up. These are instances, therefore, where the pick-up may be switched direct to the output valve, but this connection should be taken to the volume control if this component directly precedes the output valve as it does in most superhets employing a diode detector.



*The improved Garrard auto-changer showing the special record grip.*

The more general use of a diode detector presents further problems in connection with the feeding of the pick-up output into the receiver circuit, as it sometimes happens that the pick-up voltage available is not sufficient fully to load the output valve. Where there is a first stage of low-frequency amplification between the diode and the output stage, the solution is quite simple—the pick-up may be connected to the grid circuit of the first low-frequency amplifier with a simple change-over switch to insert the pick-up, and disconnect the detector output. No change in grid-bias arrangements will be necessary in this case.

This arrangement is for use where a separate volume control for the pick-up is fitted, as is often the case, the volume control being incorporated in the base of the tone arm, or supplied as a separate unit. In receivers where the manual volume control for radio is included in the diode detector circuit, it may be desirable to use this to control the pick-up also, in which case the pick-up must be switched across this control, and steps similar to those already described taken to prevent radio break-through.

### Special Cases

In many cases, a double-diode-triode valve is used in place of a separate diode and low-frequency amplifier, and in such instances the pick-up can again be connected across the grid circuit of the triode portion of the combination valve. The actual arrangement will depend, to some extent, on the design of the low-frequency section of the receiver. If the volume control of the receiver is connected between the diode detector portion and the triode amplifying portion of the double-diode-triode valve, it may be employed as gramophone volume control, or switching may be so designed that a separate volume control for the pick-up is used. In some circuits, however, the volume control of the receiver is placed between the triode amplifier and the output stage. While in this position it certainly controls the volume on gramophone, but it may fail to fulfil the other function of a volume control, namely, to avoid overloading. If the pick-up is connected directly to the grid of the triode section of the double-diode-triode, it is possible that with a sensitive pick-up, or on certain classes of record, the pick-up voltage will be too large to be handled without introducing distortion by the triode. It may be advisable, in such circumstances, to fit a separate volume control directly across the pick-up itself.

There are two other cases in which the inclusion of a separate pick-up control may be necessary. The first is where the only manual volume control for radio is a potentiometer or variable resistance controlling the grid bias to variable-mu H.F. or I.F. valves. This practice is found usually in straight T.R.F. sets employing an amplifying detector. In order to avoid the complication of two volume controls on the panel, the gramophone volume control may conveniently be ganged with the radio volume control, unless it is incorporated with the gramophone tone-arm or mounted on the motor board.

The other case where separate gramophone and radio volume control may be required is when the pick-up manufacturer recommends a total resistance for the volume control which is much smaller

(*Continued overleaf, col. 3*).

# Points About R.-C. Coupling

## Some Details Regarding Component Values in the Quality Type of Low-frequency Circuits

THE relative merits of transformer and resistance-capacity coupling are still matters of serious controversy. Some few years back R.-C. coupling was unquestionably superior, but the very great improvement in transformer design in recent years leaves little to choose between the two. Nevertheless, a properly designed R.C. circuit usually scores inasmuch as the response curve is practically straight, apart from the inevitable tailing off in the extreme bass and treble. There are certainly no resonances which, however slight, are inseparable from even the first-class transformer. The chief requirements of any L.F. stage are good amplification and a faithful reproduction of the original signal.

### No Step-up

With an R.-C. stage we must remember that there is no transformer step-up; consequently, the theoretical voltage magnification can never exceed the amplification factor of the preceding valve, and in practice it is, of course, very much less.

In order to obtain the maximum voltage step-up, the anode load must be as high as possible, and theoretically an infinite resistance would give the maximum step-up equal to the valve amplification factor. In practice it is unwise, from a quality standpoint, to exceed 25,000 ohms, even though this may mean a loss. The self-capacity of the resistance, together with the associated wiring, may be considered as a condenser in parallel with it, and if we use a high value of resistance, the reactance of the capacity in the extreme treble may be comparable with the resistance itself. The anode load is thus reduced, and the amplification of the higher audio-frequencies suffers. If, however, we keep the coupling resistance low, the by-passing effect of a small capacity is unimportant, and is only noticeable at a point well outside the audio-spectrum. Similarly, one should never choose a value of coupling condenser which necessitates a high resistance grid-leak.

### Signal Loss

Unfortunately, only part of the signal appears at the grid of the following valve. The coupling condenser and grid-leak form a potentiometer, and only the voltage developed across the resistance is accepted by the L.F. valve. At low frequencies the reactance of the coupling condenser increases, which in effect means a lower voltage developed across the grid leak. In order that amplification shall not suffer in the bass, the grid-leak should be as high as possible and the coupling condenser large, but there are two important reservations. As pointed out above the leak must be kept reasonably low to avoid high-note loss. The second reservation needs more investigation.

After each successive wave-train the grid potential of the L.F. valve must return to its normal value, *i.e.*, as determined by its normal negative bias. One of the functions of the leak is to allow the charge to leak away sufficiently quickly to attain this desirable state. Unfortunately, the condenser takes a very definite time to discharge, which is determined by its own capacity in microfarads multiplied by the leak resistance in megohms. The result, the "time-constant," is in seconds, and indicates the required interval for the condenser charge to fall to 37 per cent. of its initial value.

### Avoiding Distortion

In order to avoid the distortion known as "grid-blocking," indicated by a strangling effect, it is important that the time-constant shall be short compared with the shortest interval likely to be experienced between two successive oscillations. As modern amplifiers and speakers often show a good response as high as 12,000 cycles, the problem is not an easy one.

In practice it is customary to tolerate a little grid-blocking in order to preserve the lower frequencies; furthermore, this trouble is rarely noticeable unless the signal is loud and the time-constant very high. A good rule is to choose a value of leak and condenser which will give 90 per cent. of the theoretical amplification at 50 cycles. Such a combination will have a time-constant of approximately .0066, and any values of leak and condenser may be chosen to give this product, with the reservation as to too high a resistance.

### INTERESTING PICK-UP CONNECTIONS—*(Continued from previous page.)*

than that used for the normal radio volume control. In some cases, however, this difficulty may be overcome by shunting the pick-up by a resistance equal to that recommended for the volume control, and connecting the whole in parallel with the radio low-frequency volume control.

### A Modern Method

Possibly the most interesting of the problems connected with gramophone pick-up switching is that which arises when the diode is followed immediately by the output valve and yet an additional stage of low-frequency amplification is required for gramophone reproduction. In a number of cases the intermediate-frequency amplifying valve can be pressed into service, the pick-up voltage being applied to its grid, and the connections of the valve altered by suitable switching to permit the valve to act as a low-frequency pentode amplifier, resistance-capacity coupled to the output valve.

A very ingenious adaptation of the idea has been used in some of this season's commercial models. It consists of using the intermediate-frequency valve, which is a variable-mu screened pentode, for amplifying the pick-up voltage, but the pentode characteristic of the valve is not employed. Instead, the valve is made to function as a triode amplifier, its auxiliary grid or screen being used as the anode, and the radio-frequency and intermediate-frequency signal circuits being rendered inoperative by disconnecting the aerial and frequency-changer anode, shorting the frequency-changer control grid, and increasing the negative bias to the frequency changer.

## *"BROADCASTING IN EVERYDAY LIFE"*

THE B.B.C. announces that the results of a survey undertaken for the Corporation by two women in a typical working-class neighbourhood—probably the first experiment ever undertaken—to discover what social changes had been brought about by broadcasting in this country are now complete.

As Mr. F. W. Ogilvie, Director-General of the B.B.C., says in a foreword, their report. "Broadcasting in Everyday Life," published on September 1st, is of practical concern to the Corporation and may very well be of historical interest in years to come.

The investigators were Miss Hilda Jennings and Miss Winifred Gill, of the Bristol University Settlement, and, in view of the importance of finding how far broadcasting is helping to level up the interests and cultural opportunities of the less privileged sections of the community, a comparatively small, thickly-populated working-class neighbourhood in East Bristol was selected for their survey, in preference to one which was predominantly middle-class.

They declare that, for the wage earner of all grades, broadcasting has taken its place as a normal feature of home life.

It was found that certain annual broadcast events keep most people at home. A local headmaster who fixed his Sports Day one year on Derby Day will not make that mistake again. Some popular artists exert the same power—"I reckon Gracie Fields fetches us all home." Broadcasts of national importance, especially those which touch the popular imagination, keep nearly everyone in. At the time of the Duke of Windsor's Abdication speech, the streets are said to have been deserted.

The investigators found that broadcasting was partly responsible for the fact that families keep much later hours than formerly, while some listeners volunteered the information that broadcast services were foremost among the civilising influences which had brought about so great a change since the War.

Copies of the booklet, "Broadcasting in Everyday Life," may be obtained on application by post, price 1s. 1d., to B.B.C. Publications Department, 35, Marylebone High Street, London, W.1. or, price one shilling, on personal application to the B.B.C. Bookshop, Broadcasting House, Portland Place, London, W.1, or to any B.B.C. Regional office.

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*Criticism, Chat and Comment*

# Nationalism in Music

## Our Music Critic, Maurice Reeve, Discusses the Merits of the Music of Other Countries

NATIONALISM "will out". And that truth applies in music as instinctively and spontaneously as in any other walk of life. Just as people are impelled to help their country at a time of need when, perhaps, they haven't resided within a thousand miles of it since they were children, and feel it necessary to enter any quarrel in its behalf. No matter how long it may have been since they so much as gave it one serious thought, so will a musician be led to betray his origin, the moment he sits in front of his music paper and commences writing on it, by including some "tum, tiddle-e-tum, tum" in his composition. If you were to ask him why he wrote it I don't suppose he could tell you any more than a dog could tell you why he turns round three times before finally settling down to go to sleep. "Because I'm a Spaniard," or "Because I'm a Russian," would be the only practical one.

As with so many things in music, and in all the arts for that matter, the real answer lies way back in the ages when the minstrel, the troubadour and the minnesinger wended their way along the countrysides singing their "chansons" and playing the tunes current in those times. And to the bands of folk dancers who used to make parade of their skill in their native dances on every possible occasion, and in which everyone was eager to join. Instead of hiking or scorching down the Brighton road on a tandem, our forefathers would dance round the maypole, or honour and praise the harvest, the Yule log, or the spring cuckoo in verse, song, and dance. In consequence, distinct traditions of melody and rhythm were bred into the peoples of the various nations, which have been handed down to the present day by each succeeding generation, until now, these little twists and turns that make one piece "so Spanish" and another "so French" etc., are more or less instinctive with most writers.

### National Idioms

I think it will be generally agreed that easily the most pungent and the strongest-flavoured of all the national idioms in music is the Spanish. The reason is not far to seek. Spanish music is almost exclusively written in dance rhythms confined within the smaller musical forms such as were used by Chopin. It is the least symphonic of music. I don't think there is one single work, at least of merit, in one of the larger forms used by Beethoven and the greatest masters. Consequently it lacks all the depth and profundity of the greatest music, and is entirely like sparkling champagne. Of the leading Spanish writers, Albéniz, Granados, Turina, de Falla, Nin, etc., only de Falla has attempted to use the sonata form. He has written some fine chamber music and a large scale work for piano and orchestra. "Nights in the Gardens of Spain," whose very title will confirm most of what I have just said. Spanish music is a veritable microcosm. The bolero, the tango, the zapateado, etc., with castanets and tambourines either constantly in use or being imitated, as in the piano works. Picturesque, dreamy, passionate by turns, and always seductive.

Because of its insistence on these dance rhythms, it would naturally stand to be easily imitated. Every literature contains some "imitation" Spanish music—even Chopin wrote a bolero—and "Midnight in Madrid," "Sunshine in Seville," or "Caprice Espagnol," is an easy way to popularity. But of all its copyists, none, strange to say, can compare with the Russians in catching the true Iberian lilt and gaiety. The "Spanish" works of Rimsky-Korsakov, Balakirev and several others are truly remarkable in their fidelity to alien origin.

### Russian Music

Next to the Spanish in atmosphere and pungent flavour is, probably, Russian music. And for the same reason. Although there are several fine Russian symphonies—notably by Tchaikowsky and Borodin, the dance is ever present. But here the folk dances, or rhythms, are used rather than the set dances as in Spanish music, such as that haunting example in "1812," just before the final Russian onslaught on Napoleon commences. Even a scherzo in a Russian master's symphony is a dance—a Cossack stamp or something—and not the "form" as in Beethoven or Brahms.

French music, too, has a very personal flavour, but the difference between it and the others is this: most of the dance rhythms it employs, such as the gavotte, minuet, bouree, etc., are extinct as dances, and are now just musical forms. It is the same with English music, and, I believe, with Italian. The German would seem to be the least flavoured with any particular "nationalist" bias, and the reason is most interesting, because the exact opposite of what I have just mentioned. It is essentially symphonic in character, and, consequently, furthest removed from primitive origins. It is the grandest, most profound and the most consistently and continuously developed music in the world. It is almost like a scientific invention, such as the motor car or the aeroplane. Never satisfied, no matter how wonderful the examples to hand may be, it must always be seeking greater perfection. Even those among the German writers who completely fail fondly think they have succeeded: they set out on their path of conquest with all humility! The few "German Dances" which Beethoven, Schubert, Brahms and some others wrote, are the most insignificant trifles when compared with their major works. And the dance, as such, hardly ever gains a footing therein.

Hungarian music is similar to Spanish inasmuch as it is based exclusively on such national folk dances as the czardas and the polka, and eschews the classical forms, but it is inferior because poorer melodically and harmonically. It is rhythm, rhythm, all the way, and those exotic and nostalgic harmonies—especially when they pass through the melodic minor—which endear Spanish music to most of us, are largely absent. But the "collections" or "pots-pourris" of Hungarian folk music, such as Liszt dished up in his famous Rhapsodies, are very insinuating, and the characteristic figure, "dum-dum-dum dum," is one of the most forceful, and widely imitated, there is.

### American Music

American negro "music" is still in a very primitive stage. It is 90 per cent. rhythmical, in fact; the musical side of it is seldom little more than a "chant" or a "wail," such as one might have heard in the very dawn of things musical. Gershwin's effort to use it in a classical form—his "Rhapsody in Blue"—was brilliantly clever. But whether it will ever spread or develop is another matter. I should very much doubt it. It is far too potent—all these rhythms are—for making of them the sole ingredient of a meal. Like paprika, the dish wants the merest touch of it, and this is where the great masters excelled. They always knew just the right quantity to use of each of their ingredients.




**Gideon Fagan,** has been appointed conductor of the B.B.C. Northern Orchestra in succession to H. Foster Clark, resigned. Gideon Fagan was born in 1905. He was educated at the South African College of Music and also studied conducting at the Royal College of Music under Sir Adrian Boult and Dr. Malcolm Sargent. He has been sub-conductor for Mr. Ernest Irving in films and theatrical productions; music director for various theatrical productions in London and the provinces, and music director for Messrs. Fitzpatrick (Pictures), Ltd., during their two years' production for Metro-Goldwyn-Mayer in England. He has also conducted symphony and light concerts with the Cape Town Municipal Orchestra and studio concerts with the B.B.C. Orchestra.

**Miss Ethel Fouracre,** inventor of the well-known Pioneer switch and trading as the Pioneer Manufacturing Co., televised on her early experiences in the radio industry in the morning programme from Radiolympia on the opening day of the show.

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# LATEST PATENT NEWS

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

### Abstracts Published.

**LUMINESCENT INDICATING APPARATUS.**—Telefunken Ges. Fur Drahtlose Telegraphie. No. 506648.

A dial and pointer indicator comprises a source of radiant energy emitting a high proportion of waves towards the violet end of the spectrum, for illuminating the dial or the pointer either of which is coated with luminescent material, for example, a composition having a radium content or a phosphorescent paint. Thus, the whole dial may be coated with phosphorescent paint and then coated, for example, blackened, to leave luminescent scale indicia exposed, or, a glass scale to be illuminated from behind may be formed by coating the back thereof with black material except at the scale indicia and then coating the whole back surface with phosphorescent paint. A glow discharge tube with a luminescent blue gas is preferably used as the source of radiant energy.

**CATHODE RAY TUBES.**—Ring, F. No. 506911.

To obtain a persistent image on the fluorescent screen 2 (Fig. 1) it is scanned by a modulated beam from a gun 10 to produce a charge distribution on the screen, which is then diffusely irradiated by electrons from a flooding cathode 6, these electrons being accelerated by an electrode 4 in front of the screen. The potentials of the electrodes and the screen material are chosen so that—due to secondary emission resulting from the impact of the scanning beam—the charges on the screen are above or below a critical datum potential; the flooding electrons from the cathode 6 will take the areas above this critical potential to an upper datum level determined by the potential of the electrode 4 while those areas below the critical potential will sink to zero potential. The electrode 4 collects secondaries emitted from the screen. The screen is returned to a datum potential which may be zero or the upper datum set by the electrode 4; the return to a datum may be effected by a

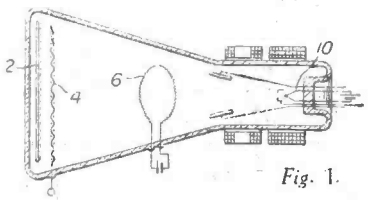


*Fig. 1.*

beam preceding the scanning beam, by a light ray or by lowering temporarily the potential of the electrode 4.

*Reference has been directed by the Comptroller to Specification* 481094.

**AUTOMATIC VOLUME CONTROL.**—Spencer, R. E. No. 507077.

A thermionic amplifier with automatic gain control comprises a high frequency stage including a valve 1 having at least three grids, from one of which is derived an A.V.C. voltage which is applied to a grid between that last mentioned and the anode. The valve shown is a special hexode with two separate screen grids; the tuned circuit 8 (Fig. 2) is broadly resonant to the same frequency as the output circuit 9 and is common to the circuits of the screen grid 5 and the anode, its impedance being small compared with that of 9. The voltage across 8 is rectified at A.V.C. and applied to the outer grid 6. The circuit 8 may be a series resonant circuit and the valve 1 may be a standard hexode with two connected screen grids separated by a control grid to which the A.V.C. voltages are applied. The invention may be applied to a frequency changing stage.

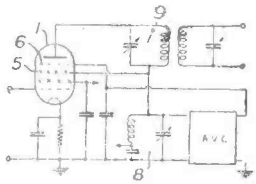


*Fig. 2.*

## 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.

23599.—Baird Television, Ltd., and Ridgeway, D. V.—Cathode ray tube, etc., apparatus. August 16th.

23600.—Baird Television, Ltd., and Ridgeway, D. V.—Deflecting arrangements for use with cathode ray tubes, etc. August 16th.

23368.—Baird Television, Ltd., and Willans, P. W.—Cathode ray tubes. August 14th.

23587.—Cole, Ltd., E. K., and Martin, A. W.—Systems for transmitting radio signals from submarines, etc. August 16th.

23482.—Cook, H. M.—Automatic station pre-selecting control for wireless receivers. August 15th.

23117.—General Electric Co., Ltd., and Biggs, A. J.—Automatic volume control of radio receiving sets. August 10th.

23556.—Siemens, Bros. and Co., Ltd., Long, D. P., Peters, C. L., and Crutch, L. S.—Thermionic valve circuits. August 15th.

23589.—Wakefield Relay Services, Ltd., and Haigh, F.—Wired transmission systems for wireless programmes, etc. August 16th.

*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.*

### Specifications Published.

510710.—Standard Telephones and Cables, Ltd., and Braendle, E. W.—Thermionic valve cyclic control arrangements.

510715.—Kolster-Brandes, Ltd., and Smyth, C. N.—Television receivers.

510895.—Radio Gramophone Development Co., Ltd., and Parkinson, W. R.—Control of radio receivers.

511048.—Baird Television, Ltd. (Fernseh Akt.-Ges.).—Television and like systems.

510897.—Cole, Ltd., E. K., and Brooke, H. A.—Radio receivers.

510819.—General Electric Co., Ltd., and Peters, W. H.—Tuning devices for wireless receivers.

510831.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Wireless receivers with fading compensation.

511121.—Ideal Werke Akt.-Ges Fur Drahtlose Telephonie.—Broadcasting receivers.

510865.—Sundberg, H. E.—Luminescent or light valve screens, more particularly for television purposes, (Divided out of 12169/37.)

## B.B.C. Wavelength Changes

THE B.B.C. recently found it necessary to make the following changes in its programme service to home listeners. It is recognised that these changes, which are due to the national emergency, will cause less satisfactory reception in certain areas.

All listeners are asked to adjust their sets to a wavelength of 391 metres or 449 metres. This means that they should tune in on one of two points on the dial of the receiver—either that marked Scottish Regional or that marked North Regional—and select whichever is found to give the best results, without regard to past experience.

Until further notice a single programme, without alternatives, is being broadcast continuously, on these two wavelengths only, from 7.0 a.m. to 12.15 midnight.

There are news bulletins at: 7.0 a.m., 8.0 a.m., 9.0 a.m., 12.0 noon, 1.0 p.m., 2.0 p.m.

In addition there may be news announcements at the following hours: 4.30 p.m., 6.0 p.m., 9.0 p.m., and 12.0 midnight. The bulletins at 7.30 p.m. and 10.30 p.m., will henceforth be devoted to announcements.

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# 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 Helping Hand

SIR,—Some time ago you published a letter of mine in which I stated my willingness to give what help and advice I could to beginners in wireless. As a result of this, I received about fifty letters, three-quarters of which were requests for wiring diagrams of "a simple two- or three-valve set." One person even went so far as to ask me for complete wiring diagrams of a mains-driven transmitter, receiver, 'phone monitor and power pack. It so happens, however, that I have had time to answer only thirty of them, and I should be very grateful if you would let those readers who have written to me know that they can now expect a reply within a fortnight's time. Owing to the rising cost of living, I cannot guarantee a reply unless postage on it has been prepaid!—P. WHITTLE (Southgate).

## Another Reader's Den

SIR,—At long last I am able to forward a photograph of my radio den. Since the photograph was taken a gramo. turntable has been mounted on the top of the cabinet which, by the way, is of wood.

A brief description of the apparatus is as follows:

The top drawer houses the power pack (batteries) and the meter shown in the centre of the panel indicates the H.T. current consumption.

The second drawer down is a mixer panel, and also houses the input transformers from mike, etc. The six rather indistinct blobs each side of the knife switches are sixpenny metal switches (English manufacture), and when heavily lacquered with cellulose varnish proved to be insulated well enough for the fairly low voltages used.

The third drawer contains a two-valve, R.C. coupled amplifier; the fader and tone control potentiometers being visible, together with further mixing switches and indicator bulb-holders.

In the drawer beneath this is housed a medium-wave and short-wave detector unit, the S.W. unit having a valve detector while the medium wave unit has a semi-permanent crystal. The outputs from these two units are fed to the second drawer mixer panel, and from there to the amplifier.

Head telephones are used for reproduction and very good quality is obtained from the crystal detector unit. The microphone shown is home-constructed, from an ex-R.A.F. chest mike.

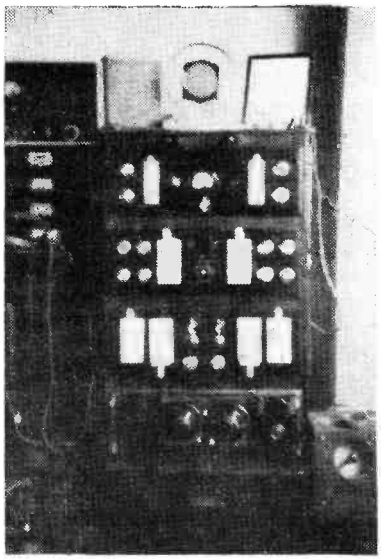
At the bottom right-hand corner is the mains check meter and under this in the box are a charger unit and bell-transformer, the outputs of which are fed to the top panel through a screened cable.

The receiver on top of the filing cabinet is a home-constructed S.W. portable of the Det. 2 L.F. type.—A. W. MILLET (Edgware).

## Proposed S.W. Club for West Bridgford

SIR,—I would like to get in touch with all short-wave enthusiasts who reside in West Bridgford, with a view to forming a short-wave club.

Will anyone interested please communicate with me, at the address given below.—GEOFFREY REDFERN, 14, Patrick Road, West Bridgford, Nottingham.



*A compact arrangement of apparatus in the den of Mr. A. W. Millet, of Edgware.*

## A Reader's Experiments

SIR,—With reference to your request for listeners' experiments, etc., perhaps some of mine may be of interest to other readers.

My first introduction to wireless was when a neighbour asked me if I could improve the station-getting quality of his two-valve commercial set of a good vintage. I undertook the job, and stripping the old set I began to look round for a good, new circuit. Having found one to suit my requirements I collected the necessary components, mostly from the junk box. I then purchased a walnut cabinet and oak-faced plywood panel for 17s. and proceeded to wire up. I did not possess a soldering iron so nuts and bolts were used. The set was completed and after four or five hours of tracing minor troubles, it worked. On that receiver I logged 33 stations, whereas before the people were getting only three to four. I recently built a two-valve short-wave set, using one of the PRACTICAL WIRELESS circuits, and a Telsen short-wave coil with SPST switch for two bands. Upon completion of the set (still using nuts and bolts), the first station received was Luxembourg on the 25-metre band, at R 8-9. A milliammeter was used to try the consumption and, believe it or not, it was ½ *mA*.

I varied the G.B., and with only 4½ volts, the consumption was 6 mA. Putting back full G.B. again, I tested with the meter again, but it still showed ½ mA, and the stations were coming in well. Eventually I got tired of the slightly erratic reaction and the set was dismantled. Finally, I received a letter from TAP Turkey, on August 28th, asking me to become official observer to their stations TAP and TAQ.—T. H. PLATER (Cambridge).

## Exchanging S.W.L. Cards

SIR.—I have been intensely interested in short-wave radio for a long time, and I would welcome any correspondence with regard to any radio matters. I will exchange my S.W.L. card for any other similar card. Anyone who writes will be promptly answered.—C. MERRETT, 9, Willson Road, Englefield Green, Egham, Surrey.

SIR,—I would be very pleased to exchange S.W.L. cards with S.W. enthusiasts in any part of the world.—A. SUTTON, 32, Windsor Street, Glasgow, N.W.

# Prize Problems

### PROBLEM No. 365

ORPEN made up a simple three-valve battery set, using one R.C. and one transformer stage. Quality was not too good, so he decided to parallel-feed the transformer, which was a very well-made component. He did this, and although quality seemed to be generally improved there was a bad bass resonance. What was the reason? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 365 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, September 18th, 1939.

### Solution to Problem No. 364

A leaky electrolytic condenser was the cause of the trouble in Jason's receiver. The leak did not occur until the set had been switched on for some minutes.

The following three readers successfully solved Problem No. 363 and books have accordingly been forwarded to them: D. Abelson, 18, Hillcrest Avenue, Edgware, Middx; A. J. Litchford, 3, Mount Vernon Cottages, Batchworth Heath, Nr. Rickmansworth, Herts; A. Millington, 31, Mill Lane, Darton, Barnsley, Yorks.


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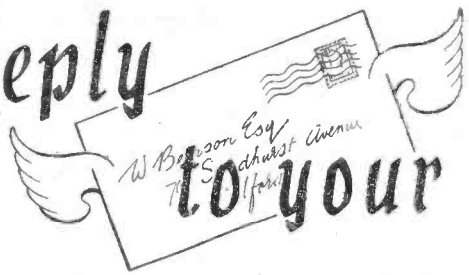
The only English journal of its type. It deals with every branch of Science, Mechanics, Invention, Model-making, Chemistry, Astronomy, Photography, Television.

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**THE CYCLIST**

The leading weekly for every Cyclist, Clubman, Utility Cyclist or Tourist. Join "The Cyclist" Road Club and also take advantage of the FREE Insurance.

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## Earth Connection

**"I took some pains to make a really good earth connection when I moved into my present house. I used a roll of new galvanised iron, and soldered the connection to it. This was buried end on in the ground and is at least 18in. deep. I noticed the other day that the lead had come off, and when I fixed it on again there was no improvement in reception. The connection is good and the lead is not broken. Can you suggest the cause of the failure of the earth to give improved results?"—B. K. A. (Shrewsbury).**

ALTHOUGH the earth connection may be well made and soldered you must bear in mind that it is essential for the buried mass of metal to make good contact with the actual earth. Your earth may be in a dry condition and this could cause the inefficiency. Thoroughly moisten the earth surrounding the plate and you should note some improvement. On some circuits, of course, an earth does not greatly affect results.

## Speaker Smoothing

**"I have an old energised speaker, designed for a 6-volt accumulator energising. I am building a mains set, and I wondered if this would be good enough to put in the H.T. positive lead with the necessary series resistance to drop only 6 volts across the field. Can you advise me regarding this point?"—K. L. E. (S.E.5).**

THE field is probably of the type requiring .5 or 1 amp. field current and, therefore, you could not use it in the manner you suggest. The H.T. current is only of the order of .06 amp. or so and consequently, apart from the fact that the field would not be properly energised, the winding would not be large enough to provide normal H.T. smoothing.

## Accumulator Connection

**"When I received my accumulator back from the charging station the other day I connected up in rather a hurry. I noted that signals were not so clear, but as I was listening to the news I did not worry. At the end of the news, however, I was looking round and then found that the accumulator was connected wrongly. Have I done any damage to the battery or the set in connecting it in this manner?"—L. P. (Edmonton).**

IN most normal circuits no trouble should arise from the wrong connection, and accordingly it is only necessary to reconnect the accumulator in the correct manner and carry on as usual.

## Extension Speakers

**"I wish to use three or four loudspeakers in different rooms and wonder if there are any special precautions to take. I have two extension speakers already and should buy similar models for my purpose, but I am not certain whether all speakers working together will affect results."—Y. E. (Norwich).**

THE speakers should be chosen so that the output load is kept at the correct value. This may be done by using proper matching transformers, or by using low-resistance speakers with a special output transformer connected to the receiver. There are many schemes which can be employed to provide perfect matching, but these will be dealt with in a subsequent article in these pages.

## Series Aerial Condenser

**"When I connected my lead-in recently I made a very poor joint and I found this out subsequently when cleaning up. I remade the joint but then signals were much louder, but the set tuned very flatly. Is there any reason for this and can you explain how to get back to the original condition, which made the set much more useful?"—L. S. P. (Kirby).**

### 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 poor connection undoubtedly gave "contact" by a capacity effect, and thus you were including a series-aerial condenser in the aerial lead. This would give the slightly reduced signal strength and the improved selectivity. You can obtain the same results, but more efficiently, by using a small variable or semi-variable condenser, joining one side to the aerial lead and the other to the aerial terminal. The condenser should be adjusted to give the desired results.

## Valves in Parallel

**"I have a four-valve set which gives quite a good output but is not capable of delivering the signal which I am sure the H.F. and other stages will produce. I have a good triode in the output stage and a similar spare on hand. Could I include this in any way to increase the output? I believe the idea is known as parallel output."—T. A. (Highbury).**

IF the valve you have spare is exactly similar to the one in use you can certainly parallel the two. They are merely joined filament to filament, grid to grid and anode to anode. Of course, double the normal current will be taken, but the output may not necessarily be improved as the valves will not handle a greater input. The increased amplification may, however, be of use. Push-pull is the only satisfactory solution where overloading is present and a greater output is desired.

## Short-wave Adapter

**"I have built a short-wave adapter as per the enclosed circuit. I am using this coupled to the gramophone pick-up terminals of a commercial all-mains set, but as the adapter requires battery supplies I should like to take all current from the mains set and so do away with all batteries. How can I do this?"—J. G. W. (Dublin).**

THE adapter circuit is quite standard except that an L.F. coupling component has been included with a coupling condenser and grid leak. It is thus in order to connect this type of adapter to the pick-up terminals of a receiver. To use the mains supply of the receiver it would be preferable to dispense with the valve now used in the adapter and to use a mains type valve in its place. Between the valve and the valveholder a special adapter should be connected, and this in turn should be wired to a similar adapter inserted between the detector valve in the mains receiver and its valveholder. The provision of the H.T. voltage may occasion some difficulty, and experiments should therefore be made with a view to obtaining a stable output, for which purpose a flexible lead may be attached to the H.T. positive point on the adapter and connected to various points in your mains set. The adapter may be of the type supplied by Messrs. B.T.S. of Bulgin.

## Pick-up Leads

**"I have been trying to get my radiogram. working but cannot make certain regarding the pick-up connections and most suitable arrangement for this component. I have tried short and long leads and there appears to be no difference in results, but there is a faint background whistle all the time. I do not get this on radio reception, and the quality on gramophone is not so good as radio. Can you suggest anything?"—B. E. E. (Bristol).**

THE fact that you mention a faint whistle leads us to suppose that you have not broken the grid circuit when connecting the pick-up, although you give no details at all concerning the circuit arrangements of the complete apparatus. You are probably including the pick-up in the grid circuit in addition to the normal tuning coil, and thus are getting a certain amount of H.F. inter-action due to coupling between the present H.F. circuit and tuning coils and the long pick-up leads. The grid circuit should be broken and a change-over switch fitted so that the tuned circuits are cut out, whilst the pick-up is in use. It may be found worth while also to reverse the connections to the secondary terminals of the L.F. transformer.

## REPLIES IN BRIEF

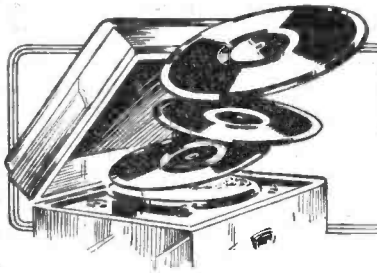
*The following replies to queries are given in abbreviated form either because of non-compliance with our rules, or because the point raised is not of general interest.*

**F. D. (Bwlch, S.O.).** Write to the Armstrong people, who specialise in chassis.

**H. B. (Belfast).** The receiver is now out of date and we are unable to supply a blueprint of this or anything similar.

**W. C. P. (Lymington).** We suggest the Beginners One-valver, blueprint PW.85.

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



# Impressions on the Wax

## A REVIEW OF THE LATEST GRAMOPHONE RECORDS

### Dancing Time

ONE of the loveliest of the new dance hits has undergone a series of bewildering title changes before finally emerging under the present one of "Why Begin Again?" Originally composed by a young coloured trumpet player named Charles Shavers under the name "Blue Dilemma," it was heard by Artie Shaw, and after a slight modification he broadcast it under the title of "Pastel Blue." Now Artie has again changed the title to the present one. You can either have it sung by Dick Todd on *H.M.V. BD* 730, or played by Artie Shaw and his Band on *H.M.V. B* 8936.

Another new record by Artie Shaw contains swing versions of two musical comedy tunes. These are Noel Coward's "Zigeuner" and the popular "Lover Come Back to Me"—*H.M.V. B* 89377.

"Undecided" has been recorded by Benny Goodman and his Orchestra on *H.M.V. B* 8938. Aside from Benny's clarinet playing in this number, the "fans" will welcome a brilliant piano solo by Jess Stacy, the Goodman pianist. For the reverse side of this disc the band have recorded "The Lady's In Love with You," which comes from the film "Some Like it Hot," which features Gene Krupa, who until recently was the drummer in the Goodman band.

For No. 3 in their series of Jazz Classics, H.M.V. have chosen to revive a ten-year-old disc, by Paul Whiteman's Orchestra, of "Ol' Man River" and "There ain't no Sweet Man that's Worth the Salt of My Tears." In addition to the vocal choruses by none other than Bing Crosby, this record features superb solos by the late Bix Beiderbecke, the famous trumpet player. Yet another version of "Why Begin Again?" is the one by Geraldo and his Orchestra. This is coupled with "Ain't cha Coming Out?" played as a comedy waltz on *H.M.V. BD* 5502. The latest novelty dance is "Boomps-a-Daisy." This has been recorded in strict dance tempo by Jack Harris, on *H.M.V. BD* 5505, and as a comedy waltz by Jack Hylton on *H.M.V. BD* 5499. Jack Hylton has also made a lovely recording of "Our Love," which is based on a famous Tchaikovsky melody—*H.M.V. BD* 5500.

## SUSPENSION OF EMPIRE AIR MAIL SCHEME

THE Postmaster-General announces that the arrangements whereby all first-class mail has been forwarded by air for Empire destinations served by the England-India-Malaya-Australia and England-South Africa air mail services, and for Egypt and Iraq, have been suspended. Subject to what is stated below, all first-class mail for the countries in question will be forwarded by surface route, the rates of postage being:

For all the Empire destinations in question and Egypt: Letters—first ounce 1½d.; for each subsequent ounce, 1d.; postcards, 1d.

For Iraq and Kuwait: Letters—first ounce, 2½d.; for each subsequent ounce 1½d.; postcards, 1½d.

Correspondence for any of the countries hitherto served under the Empire Air Mail Scheme can still be forwarded by air mail, if the sender so desires, in which case it must be fully prepaid at the rate of 1s. 3d. per half ounce (postcards 7d.) and a blue air mail label must be affixed at the top left-hand corner of the address side of the envelope.

The latest times of posting air mail correspondence at the Head Post Office, London, E.C.1, will be as follows, with correspondingly earlier times elsewhere:

England—East Africa: 12 noon Tues-

(*Continued at foot of next column*)

(*Continued from first column*)

days; England — East Africa — South Africa: 12 noon Fridays; England — India —Malaya—Australia: 12 noon Wednesdays and Saturdays. Approximate times of transmission cannot be quoted.

The air postage rate to the West African colonies and to certain foreign countries served by the Empire air services for which the rate has hitherto been less than 1s. 3d. per half ounce is increased to 1s. 3d.

## RADIO CLUBS & SOCIETIES

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

### WATFORD AND DISTRICT RADIO AND TELEVISION SOCIETY

**Hon. Sec.:** P. G. Spencer (G8MH), 11, Nightingale Road, Bushey Herts.

The August meeting, which was very poorly attended, was held on the 21st. Two short talks were given, the first by M. N. Salmon (2CKM) on amateur radio in Cornwall, and the second by the Hon. Sec. on impressions gained from the various amateurs he met in Zürich, Geneva and Paris on a recent visit to these towns.

The next meeting is on September 18th at the Carlton Tea Rooms, 77A, Queens Road, Watford, at 8 p.m. Mr. A. W. Birt (G3NR) is to give a talk on the Civil Wireless Reserve.


## A.R.P. HELPS

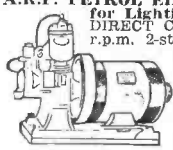
**RAID BELLS, ALARM BELLS.** Mains, battery or magneto waterproof types. Priority for A.R.P.
**GENERATORS.** H.T. for emergency outdoor field transmitters. Portable Hand Generators in teak cases by Evershed, 800 and 1,500 volts.
**SHELTER 'PHONES.** Portable Emergency Telephone stations in case, 60/-. D.135, X135, 110 and other Army Field 'Phones; few only left. 5-line Exchanges for large A.R.P. Shelters.



**POCKET HEADPHONES.** W.D., all leather headband, strap and cords, 2/6 pair. Wireless type with aluminium headbands, 2/9; 4,000 ohms, 4/6.
**CABLE.** Lightweight twin field cable unbreakable Army steel reinforced, 55/- mile. Heavier types, 65/- and 70/-.
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| F. J. Camm's "Sprite" Three (HF Pen, D, Tet) | 26.3.38 | PW87 |
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| 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 |
| All-Wave "Corona" 4 (HF, Pen D, LF, Pow) | 9.10.37 | PW79 |
| "Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B) | 12.2.38 | PW83 |
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| F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) | 11.5.35 | PW50 |
| "All-Wave" A.C. Three (D, 2 LF (R.C.)) | — | PW54 |
| A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen) | — | PW56 |
| Mains Record All-Wave 3 (HF Pen, D, Pen) | — | PW70 |
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| A.C. Fury Four Super (SG, SG, D, Pen) | — | PW34D |
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| Universal Hall-Mark (HF Pen, D, Push-Pull) | 9.2.35 | PW47 |
| A.C. All-Wave Corona Four | 6.11.37 | PW81 |

| | | |
|---|---|---|
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| F. J. Camm's 2-valve Superhet | — | PW52 |
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| F. J. Camm's A.C. £4 Superhet 4. | 31.7.37 | PW59 |
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| Simple S.W. One-valver | 9.4.38 | PW88 |
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| Midget Short-wave Two (D, Pen) | — | PW38A |
| The "Fleet" Short-wave Two (D (HF Pen), Pen) | 27.8.38 | PW91 |
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| Experimenter's Short-wave Three (SG, D, Pow) | 30.7.38 | PW30A |
| The Prefect 3 (D, 2 LF (RC and Trans)) | 7.8.37 | PW63 |
| The Band-Spread S.W. Three (HF Pen, D (Pen), Pen) | 1.10.38 | PW68 |
| **PORTABLES.** | | |
| **Three-valve: Blueprints, 1s. each.** | | |
| F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) | — | PW65 |
| Parvo Flyweight Midget Portable (SG, D, Pen) | 3.6.39 | PW77 |
| **Four-valve: Blueprint, 1s.** | | |
| "Imp" Portable 4 (D, LF, LF, Pen) | 19.3.38 | PW86 |
| **MISCELLANEOUS.** | | |
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| Melody Ranger Two (D, Trans) | — | AW388 |
| Full-volume Two (SG det, Pen) | — | AW392 |
| Lucerne Minor (D, Pen) | — | AW426 |
| A Modern Two-valver | — | WM409 |
| **Three-valve: Blueprints, 1s. each.** | | |
| Class B Three (D, Trans, Class B) | — | AW386 |
| £5 5s. S.G.3 (SG, D, Trans) | 2.12.33 | 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* '35 | WM327 |
| Economy-Pentode Three (SG, D, Pen) | *Oct.* '35 | WM337 |
| "W.M." 1934 Standard Three (SG, D, Pen) | *Mar.* '34 | 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 |
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| 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) | *Mar.* '35 | 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 |

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| **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 |
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| All Metal Four (2 SG, D, Pen) | *July* '35 | 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.** | | |
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| 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 |
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| World-ranger Short-wave 3 (D, RC, Trans) | — | AW355 |
| Experimenter's 5-metre Set (D, Trans, Super-regen) | 30.6.34 | 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-valver Short-waver (SG, D, LF, P) | 22.7.39 | WM383 |
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| Emigrator (SG, D, Pen) A.C. | — | WM352 |
| **Four-valve: Blueprint, 1s. 6d.** | | |
| Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) | *Aug.* '35 | WM391 |
| **MISCELLANEOUS.** | | |
| S.W. One-valve Convertor (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 |
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| Trickle Charger (6d.) | *Jan.* 5, '35 | AW462 |
| Short-wave Adapter (1/-) | — | AW456 |
| Superhet Converter (1/-) | — | AW457 |
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| Wilson Tone Master (1/-) | *June* '36 | WM406 |
| The W.M. A.C. Short-wave Converter (1/-) | — | WM408 |

Practical and Wireless
★ PRACTICAL TELEVISION ★
EVERY WEDNESDAY.
Vol. XV. No. 366. Sept. 23rd, 1939.
EDITED BY F. J. CAMM
Staff: W. J. DELANEY, FRANK PRESTON, H. J. BARTON CHAPPLE, B.Sc.

# ROUND THE WORLD OF WIRELESS

## Power Packs

A GOOD power pack or mains unit is always a useful piece of apparatus, and if made up from spare parts which you may have on hand, you will often find that it may be called into use with the utmost satisfaction. You may be testing out some new circuit or piece of apparatus, and need a good H.T. supply. If batteries are not available, a good power pack will, no doubt, deliver the necessary H.T. or at least will have a source which may be used for the purpose. Similarly, you may wish to try out some new valves, and the low-tension windings provided on a standard unit will undoubtedly be found of use. In the unit described in this issue there are both H.T. and L.T. windings available, and the latter are suitable for English or American valves. Such a unit will find a valuable position in the experimenter's workshop, and although it may not be needed at the moment, it will, no doubt, come in handy at some time or another.

## Travancore Radio

IT is announced that 100 community receivers are to be installed in all the important towns and villages in the Travancore State in preparation for the opening of the new broadcasting station which is being installed there at a cost, it is stated, of Rs. 280,000.

## Indian Licences

AT the end of June the total number of licences in force in British India was 76,841. The increase for the first half of the year was 12,361, compared with 4,739 for the same period last year. There were 18,117 sets imported into India during the half-year ending June, 1939.

## Bournemouth Studio

NEW studios and a control room were formally opened recently at Bournemouth in connection with the new Start Point transmitter. The studios are situated in Majestic Chambers, Westover Road, and were opened by the Mayor. The output from the control room is fed to Bristol by Post Office land lines.

## German Radio

IT is announced that all broadcast receivers in Germany, other than the People's set, have been confiscated. This is stated to have been done to prevent the German people from listening to broadcasts from other countries, as the People's set will only receive the local stations.

## New York Television

A THIRD television transmitter is proposed for New York, and the Mutual Broadcasting System has applied to the Federal Communications Commission for a licence to operate this on a power of 10 kW.

## B.B.C. German Broadcasts

AN increase in the number of broadcasts in German to be made by the B.B.C. is anticipated. Already there are six short wavelengths in use for these, and in addition there are broadcasts in ten other languages. The original London National wavelength is also being used for broadcasts in German, and it is anticipated that more medium-wavelengths will be used, as the majority of German receivers are unable to pick up the short-wave stations.

## Loudspeaker Nuisance

IN view of the fact that many people are now working through the night on A.R.P. and similar work, the B.B.C. is repeatedly asking listeners to keep the volume of sound as low as possible in the daytime, so that these night workers may obtain the necessary undisturbed sleep. Perhaps readers would assist in complying with this request.

## Pirate Wavelengths

ONE feature which has already been brought out by the war is the pirating of wavelengths by one country in order to broadcast news and give the impression of military occupation of that place. Warsaw, for instance, was reported in German hands and broadcasts were apparently being made from Breslau on Warsaw's wavelength.



*A camouflaged army signal post, which was one of the features at Radiolympia.*

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.

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# ROUND THE WORLD OF WIRELESS—*Continued*

## World's Broadcasting Stations

IT is estimated that there are about 36,000 broadcasting stations in the whole world, of which about 8,000 are land stations, and the rest are mobile installations in ships, etc. Of these 8,000 land stations, 1,800 are regularly used for entertainment, and the rest for communications purposes. Moreover, over two-thirds of these are American stations.

## Masteradio : Change of Address

WE are informed that Masteradio, manufacturers of radio and electrical appliances, have now taken possession of a new factory and offices at 193, Rickmansworth Road, Watford. Telephone : Watford 9885. Their premises at Newton Street will be closed pro-tem.

It will be the firm's policy to carry on business as usual during the present emergency.

## Hunting for Cosmic Rays

DR. ROBERT A. MILLIGAN, of the California Institute of Technology, has recently set out from Los Angeles on a cosmic ray hunting tour of the Equator and adjacent countries. His equipment will include the world's smallest radio station, and 225 balloons. The balloons are capable of reaching a height of 20 miles and they will be released in Australia, New Zealand, the East Indies, India and Egypt. The balloons will carry delicate recording instruments up to altitudes which receive the full force of the bombardment of this planet by the mysterious rays from outer space.

## B.B.C. Foreign Broadcasts

WITH the start recently of news bulletins in Polish, the B.B.C. is now using nine foreign languages daily in its service for reception overseas.

The nine languages, in effect, mean working in eleven different tongues, as the idiom and accent used in Spanish for Spain, and Portuguese for Portugal, are very different from that required for the Spanish and Portuguese broadcasts for Latin America.

These are the languages in which news bulletins are now broadcast daily : Afrikaans, Arabic, French, German, Italian, Magyar, Polish, Portuguese, Spanish.

Reports from Hungary state that the news in Magyar is arousing considerable interest, and is being quoted extensively.



*The experiences of children evacuated to Bacup, Lancashire, will be the subject of a broadcast by the B.B.C. in the near future, and Miss Olive Shapley's interview recently with the children was recorded.*




*Solemn looks are appropriate to men as familiar with crime as these (in the radio studio). They are William Green, left, who is starred as the Doctor in WLW's "Unsolved Mysteries" programme, and Charles Seel, who plays the part of Skeets, his assistant. The programme is heard each Friday from 9 to 9.30 p.m., E.S.T.*

## "Do We Make Up Our Minds?"

PETER GRANT, WLW news announcer, will be one of the speakers at the first Luncheon Forum of the Woman's Club of Cincinnati, on October 6th, discussing "Do We Make Up Our Minds?" His talk will concern the influences of press, pulpit, radio, cinema and stage in moulding popular thought.

## The King's Portable Radio

IT is reported that additional radio sets, including portables, have been bought by the King for use at Buckingham Palace. The orders will ensure that the King and Queen, and the staff at Buckingham Palace, will have radio everywhere, including the Royal A.R.P. centre.

## B.B.C. Appointments

WE are informed that all appointments to the B.B.C. permanent staff are now suspended. With regard to posts advertised in recent weeks and still unfilled, applications already submitted must be regarded as cancelled.

The Corporation is receiving many offers of temporary help from the public. While these are welcomed and are being scrutinised, they cannot, owing to pressure of work, receive individual acknowledgment. Any person who has made such an offer and whose services are required will be notified in due course.

## A.R.P. Loudspeakers at Hove

IT is reported that eleven loudspeakers have been placed on roof-tops in Hove, so that information on A.R.P. matters can be broadcast. The air-raid warning sirens will also be relayed through these speakers.

## Chinese Radiophone Service

FOLLOWING the opening of the radiotelephone link between Chungking and Hong Kong recently, it is reported that preparations are in hand for linking Chungking with Hanoi, Rangoon, Singapore, Manila and Bombay.

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# The "Home Service" Two

## A Simple Two-valve Battery Receiver, Designed Mainly for the Reception of the Special Home Service Broadcasts

THE readjustment of broadcasting in this country, and the adoption of only two wavelengths (391 and 449 metres) has made the use of many multi-valve receivers unnecessary. There are also many listeners who now require to listen to one of these stations in order to obtain the News Bulletins or Special Announcements, and who previously have not made use of a broadcast receiver. A simple two-valve receiver is, therefore, quite a valuable piece of apparatus at the present time, and many requests have already been received for a set on these lines. The theoretical circuit shows that the simplest possible arrangement has been adopted, and instead of the customary dual-range coil we have used a 6-pin medium-wave coil of the B.T.S. "One-Shot" Inductor type. This fits into a standard 6-pin coil-holder, and thus, if desired, it is possible to use the receiver on other wavelengths merely by changing the coil. The standard detector and L.F. arrangement is utilised, with transformer coupling, and a plain baseboard assembly has been adopted in the interests of simplicity and cheapness. As a further aid to low cost of construction, a plain wooden panel has been employed, with solid dielectric tuning and reaction condensers.

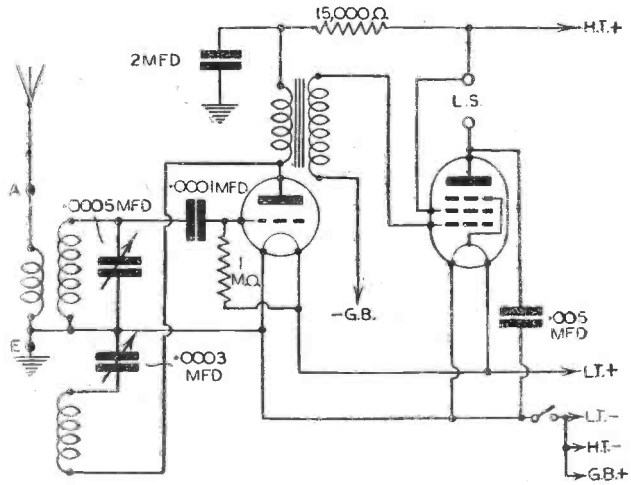



*Fig. 1.—(left) Theoretical circuit diagram of the "Home Service" Two.*

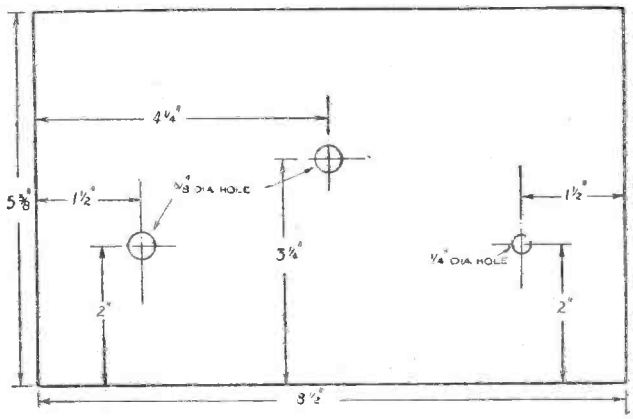



*Fig. 2.—(above) Panel drilling diagram.*

### Construction

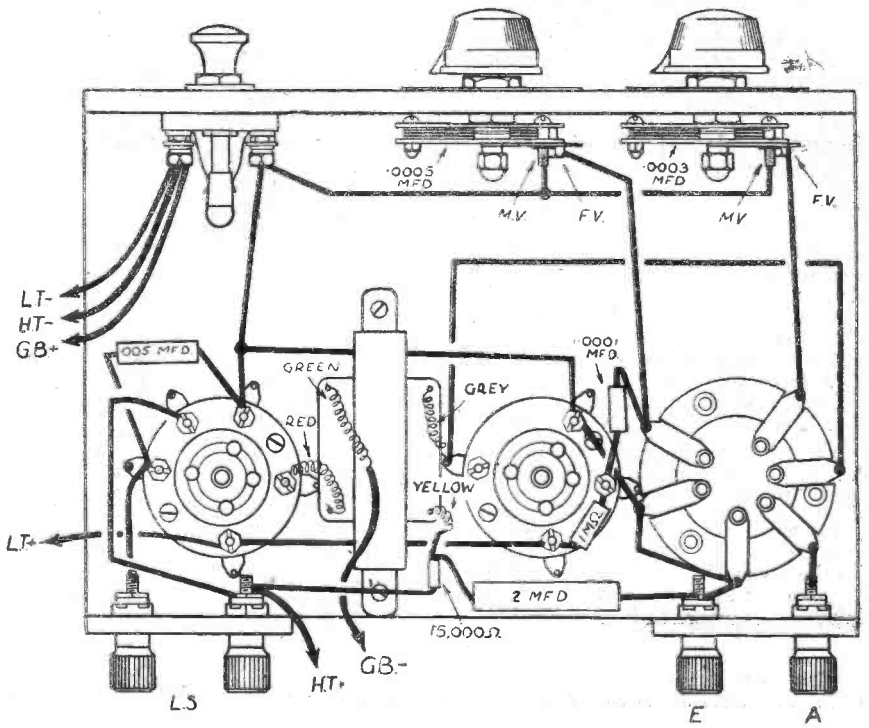
The baseboard is made from plain ⅜in. plywood, measuring 8½in. by 5½in. The panel is of thinner ply, ¼in. being suitable, and measures 8½in. by 5½in. As there is little weight on the panel it may be attached to the baseboard by ordinary screws driven in at the lower edge, but if a stronger job is required standard panel brackets may be attached at each end. At the rear edge of the baseboard two terminal mounting strips are fitted, and these are cut from a strip of ebonite 2in. wide. Alternatively proprietary terminal strips may be used, and these may be of the type having terminals or plugs and sockets. The coil-holder, valveholders and transformer are mounted in line, the approximate positions being shown in the Wiring Diagram. In a simple set of this type there is no need to adopt rigid measurements, and provided that the parts in question are laid in position so that it is ascertained that they will all go on the baseboard, no other precautions need be taken. Place them as shown and mark out the fixing holes with an awl or similar sharp-pointed tool. Screw them down and mount the panel components, after drilling the panel from the details given in Fig. 2. It is possible to carry out all wiring in this simple receiver without calling in the aid of the soldering iron, all components, except the transformer, fixed resistances and condensers being provided with terminals. The wire ends of the smaller components may be attached beneath terminals, and the wiring diagram illustrates this. Connect up, following the details given in the plan, and note that flexible leads have to be attached for the battery supplies. A standard 2-volt accumulator and 120-volt H.T. battery are needed, with a 9-volt grid bias battery for the output valve. The valves specified are Cossor 210 H.F. and 220 HPT, the grid bias rating for the latter at 120 volts being 4.5 volts. The resistance in the anode circuit of the detector valve will ensure that the H.T. applied to the detector is adequate for smooth reaction effects and at the same time enables a single H.T. positive lead to be employed.

### Operation

There is nothing difficult in operating a receiver of this type, as tuning is carried out on a single centre control and signal strength boosted as desired by means of

(*Continued on page 34*)

### WIRING DIAGRAM OF THE "HOME SERVICE" TWO



# CONSTRUCTOR HINTS

## A Discussion of Simple Points Often Overlooked by the Constructor when Building a Receiver

ALTHOUGH the construction of a receiver is a comparatively easy job provided that a full-size blueprint is available, we find that there are several important points in connection with the work which are often overlooked by beginners. These are mostly simple points which are guarded against as a matter of course by the experienced constructor but which, if not carefully attended to, can spoil the beginner's first effort at set-making.

### Chassis

The metallised wooden chassis is very popular nowadays owing to the ease with which it can be worked. When one of these is used, however, care should be taken to see that it is of reliable make and is effectively metallised on the upper surface; in this connection it is emphasised that aluminium paint should not be used for metallising an ordinary wooden baseboard, as this type of paint cannot be relied upon to provide good metallic contact. It is also necessary to use a clean chassis as the metallised covering loses its effectiveness if covered with a layer of dirt, and therefore constructors should work on a clean table or bench and the hands should be kept reasonably clean. If there is any doubt concerning the effectiveness of the metallising the points shown connected to the chassis on the blueprint should be joined together by means of ordinary connecting wire.

If a receiver of the simple type having only one tuning condenser and tuning coil is being made it is unnecessary to use a metal chassis, but if two coils are used a metal covering for the baseboard is desirable and if the coils are not of the screened type they should be separated by a vertical screen of aluminium or copper. As with the metallised wood chassis, cleanliness is again of great importance as an aluminium sheet covered with dirt or grease may be a very unreliable conductor.

### Coil and Condenser Chassis

Most modern coils and gang condensers are of the screened type with the earth connection joined to the screening can. When components of this type are used, great care should therefore be taken to ensure good contact between the coil or condenser chassis and the receiver chassis. If the coil cans are painted the paint should be scraped off underneath before they are screwed to the chassis. In the case of gang condensers the chassis are sometimes supported on legs, but these legs cannot always be relied upon to provide good contact between the condenser and receiver chassis. Constructors are therefore advised to connect a length of wire between the condenser chassis and the metal or metallised chassis of the set.

The fixed vane tags or terminals of the gang condenser must be kept clear of the set chassis, however, and in cases where two sets of fixed vane tags are provided for ease of wiring the unused tags should be bent up so as to avoid the possibility of a short-circuit occurring between them and the chassis. The same warning applies in connection with valve holder and terminal strip sockets; care should be taken to keep these clear of the metallised covering of the chassis.

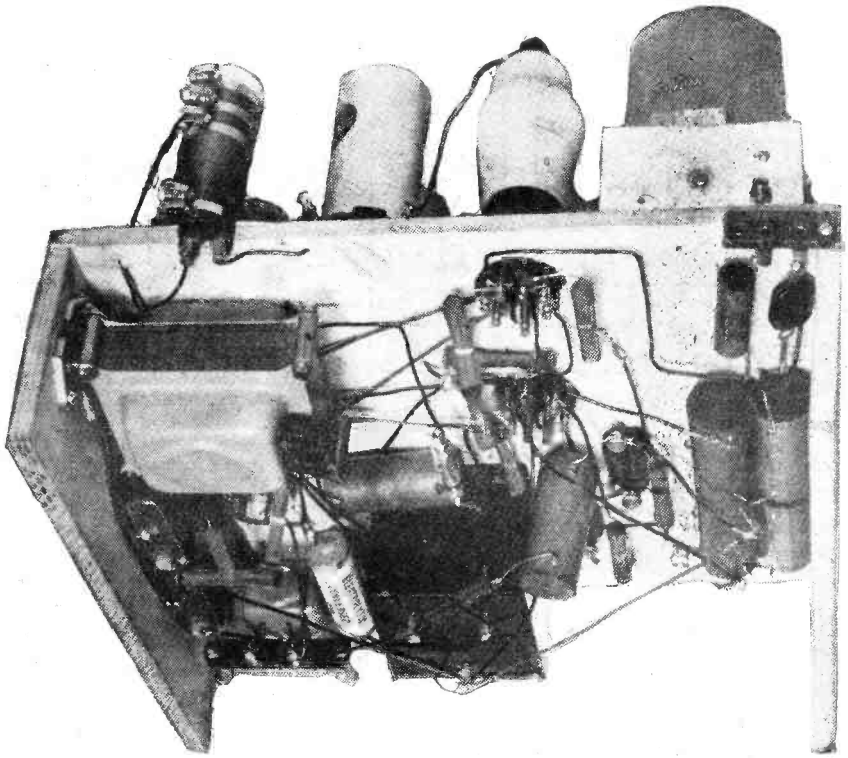
### Joints

All constructors are not agreed concerning the best type of joint to adopt; some prefer pressure joints, whereas others favour soldered joints. Unless the beginner is an experienced solderer, however, pressure joints should be used where possible. If terminals are not provided it is better to twist the wires tightly together than to apply solder incorrectly; a soldered connection is preferable to the pressure type only if effectively done. The wire to be soldered should be perfectly clean before the solder is applied, and the tip of the soldering iron should be well tinned and at the right temperature—just sufficiently hot to make the solder run.

### Wiring

Care should be taken to keep the wiring short, avoiding straggling wires and loops, especially in the H.F. stages, and wires associated with tuned circuit components (gang condensers and coils) should be kept clear of each other. If long leads cannot be avoided in the H.F. stages it is advisable in some cases to enclose the leads in screening covers. The cap lead of the S.G. or H.F. pentode valve is often screened in this way, as shown above. This type of screen covering is generally made of braided wire, which can easily be soldered. Great care should be taken not to apply too much heat when soldering, however, as the insulation covering the wire may become damaged and a short-circuit will occur. In some cases we have found that constructors have connected the lead to the metallised chassis instead of the screening cover; it is emphasised that the lead passing through the metal covering must not be in contact with the latter, and only the covering should be connected to the chassis.

In mains receivers of the A.C. type the valve heaters are fed from raw A.C. and therefore it is customary to twist the heater leads together. Usually, by this means the fields around the two leads are balanced out and interaction is avoided. If this precaution is not taken excessive hum is likely to occur. In receivers of the universal type the best procedure to prevent hum from this source is to pass the heater leads through a screening cover and then connecting this cover to the metal chassis.



*Chassis construction simplifies wiring and enables a compact receiver to be made up, bulky components being accommodated beneath the chassis.*

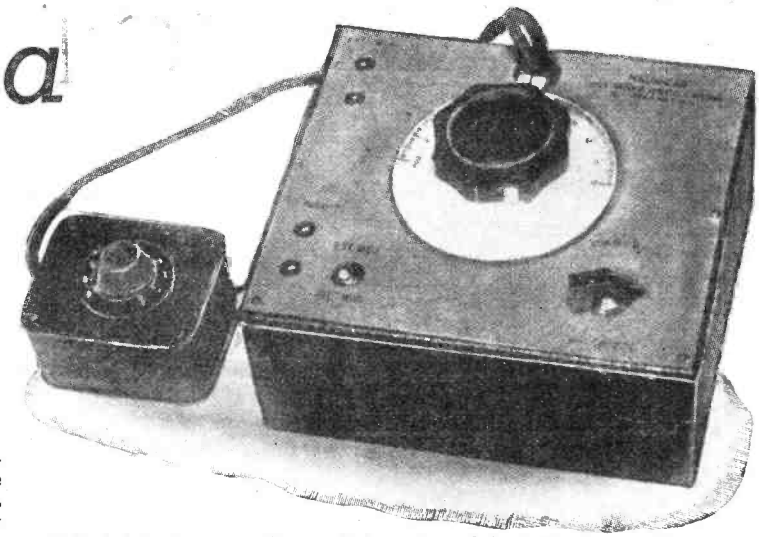
**PATENTS AND TRADE MARKS.**

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

# Radio as a Career—4

## Some General Notes on the Trimming and Aligning of the Tuning Circuits of a Modern Receiver. Reference is Made to the Most Suitable Types of Meters and Instruments

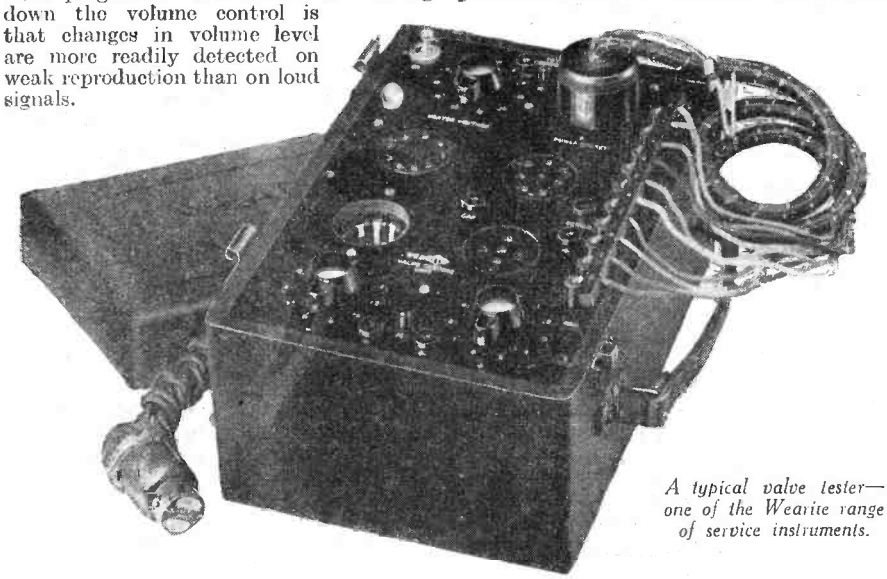
By FRANK PRESTON



*A Radiolab all-wave oscillator which can be used for testing down to 10 metres. The batteries are contained in the small case.*

REFERENCE has previously been made in this series to the ganging and aligning of receivers. This is an aspect which is of extreme importance to the modern radio engineer, for great accuracy in this respect is essential if the receiver, especially if a superhet, is to operate satisfactorily.

The average home constructor carries out the ganging, trimming and tracking simply by adjusting the various trimmers until maximum signal strength is obtainable from any particular transmission, the volume control being turned down as the work progresses. The reason for turning down the volume control is that changes in volume level are more readily detected on weak reproduction than on loud signals.



*A typical valve tester—one of the Wearite range of service instruments.*

### Use of a Modulated Oscillator

This simple method is, of course, entirely unsuited to the needs of the engineer, who must work with a far higher degree of accuracy—the actual degree depending to some extent on the design of the set—and who must, therefore, be equipped with suitable test gear. Basically, what is required is a generator which will provide a steady modulated signal and also an A.C. voltmeter or corresponding device to measure the output from the set.

It will be clear that if a steady input is provided, the H.F. being modulated with a pure audio-frequency note, any errors due to the possible fading of the transmission from a broadcasting station, and due to variation in the audio-modulation is completely avoided. First, then, it is necessary to consider what type of equipment is required. A completely calibrated modulated oscillator is an expensive instrument, but its purchase is justified if the user is taking up service or research work seriously.

It is, however, possible to obtain a moderately priced instrument, made by a reputable firm, for less than £10 if an extremely wide band of frequencies is not considered essential. A modulated oscillator of this type is quite good enough for most requirements. Many prospective engineers will prefer to build most of their own gear, and this is possible, especially if it is possible to borrow a "standard" instrument for calibration purposes. This is not the place to give full constructional details, but the necessary information has previously been given in these pages and in books published from the offices of PRACTICAL WIRELESS.

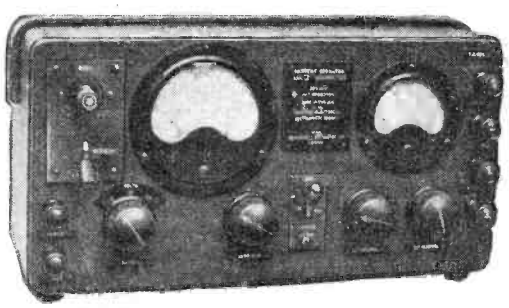
### Method of Connection

With most types of modulated oscillator it is necessary only to connect the output between the aerial and earth terminals (after disconnecting the aerial lead), or between the grid and earth of the first I.F. valve. Alternatively, connection can be made to the anode of the frequency-changer and the earth line, so that the modulated signal is passed through both windings of each I.F. transformer. It is generally found most satisfactory to line-up the intermediate-frequency transformers first, and then to deal with the signal-frequency input circuits.

It should be made quite clear that there is no point in attempting to re-align a receiver unless there is good reason to suppose that the original setting has been lost, due to the fitting of a new valve or other component in the tuning circuits. At the same time, there are occasions on which the alignment has been disturbed due to the receiver having been dropped or tampered with by the owner.

### A.V.C. Disconnection

Before starting to align and track a receiver with A.V.C. it is generally best to put this out of action first, for otherwise false settings might be made, especially if an output meter is being used. This is because the sensitivity of the controlled stages increases as the tuning is moved slightly away from the resonant point. In most instances the A.V.C. can be disconnected most effectively by breaking the lead between the A.V.C. feed or decoupling resistor and the A.V.C. load resistor, and connecting it to the earth line. In other words, by returning the grid of the controlled valve (or the grids if there is more than one) to the earth line. In doing this, care should be taken that no other wiring is modified so that the constants of the circuit are changed.



*A G.E.C. valve-voltmeter for battery operation.*

### Practical Points

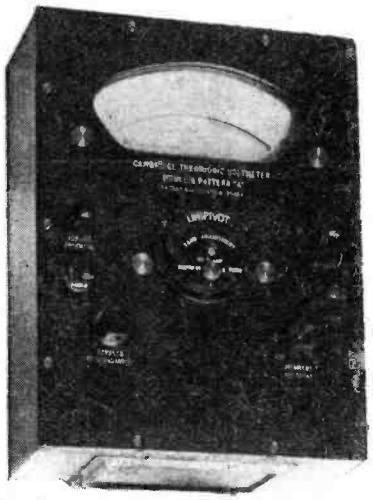
When adjusting I.F. trimmers take care that the coil cans are not disturbed or moved so that they fail to make perfect contact with the chassis. Also remember that if the trimming screw is in contact with the H.T.+ line, a short-circuit will occur if the trimming tool or screwdriver touches the adjusting screw and the side of the hole in the screening can at the same time.

*(Continued on next page.)*

## RADIO AS A CAREER

*(Continued from previous page)*

Once the I.F. stages have been brought into line, the input tuning and oscillator tuning circuits can be dealt with, if necessary. In doing this it is generally best to concentrate on the oscillator circuit, the tuning of which is sharper than that of the other tuned circuits. When the condenser is provided with a wavelength or station-calibrated scale it is important



*The Cambridge thermionic or valve voltmeter.*

that the pointer should read accurately, and this must have a bearing on the setting of the condensers. There should not be much difficulty if care was taken in adjusting the I.F. transformers to the exact frequency at which they were intended to operate by the set manufacturer. It should not be forgotten that in many instances there is provision for moving the tuning scale itself over a small range; when the tuning settings do not "hold" as between stations at the top and bottom of the scale the need for movement is usually indicated.

Especial care is required in dealing with a condenser having a split end vane, because each sector requires individual attention. Only very slight movement is permissible if the parts of the vane are not to touch that adjacent to it. A pair of very fine, flat-nosed pliers is often found useful for dealing with these split vanes, but the possibility of hand capacities must not be overlooked.

When separate padding condensers are used they require special attention, this being governed largely by the particular circuit arrangement. For this reason it is important to make a careful study of the circuit (which will be supplied by the manufacturers to recognised service men or accredited dealers).

After setting the trimmers always cover the adjusting-screw heads with a spot of sealing wax; this not only prevents the screws from moving, but also discourages an over-enthusiastic owner from tampering with them and undoing your work.

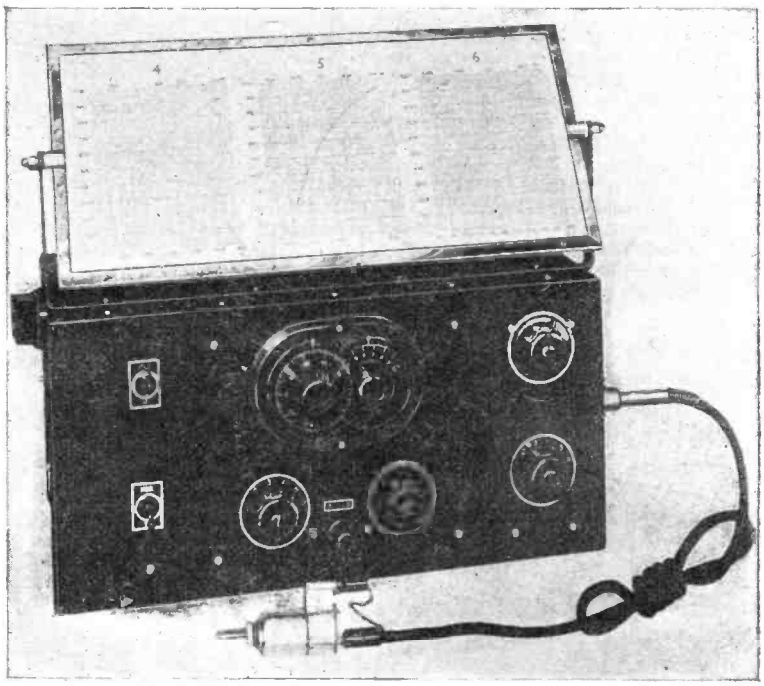
### A Simpler Oscillator

Those who wish to avoid, for the time being, the expense of a modulated signal generator will find that a simple neon oscillator known as an I.F. liner and made by Bulgin sufficient for many requirements. It can be fed from any D.C. supply having a voltage of 200 to 250 and generates a signal at 465 or 110 kc/s (according to the model used), modulated by a note of approximately 1,000 cycles. These liners are sufficiently accurate for all purposes, provided that the I.F. stages of the set operate at one of the frequencies mentioned. The liner is used in the same manner as a signal generator, and in most cases the input can be taken directly from the H.T. supply to the set, whether this is external or from a power pack built into the receiver.

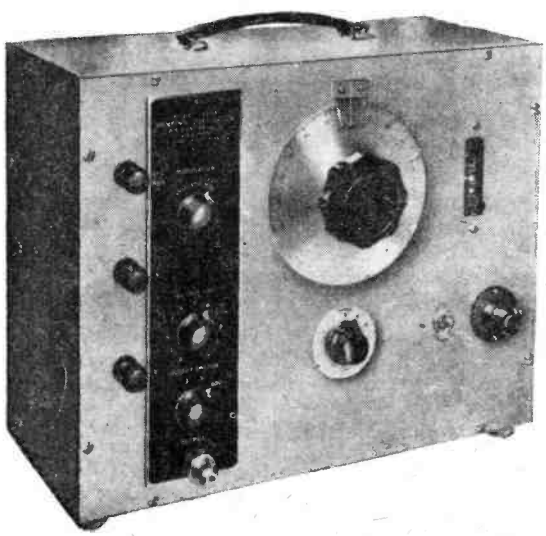
### Checking Output

Measurements of output can be made only with a reliable—and rather expensive—output meter. Constructional details of such a meter have been given in back numbers of PRACTICAL WIRELESS for those who propose to make their own, whilst meters are available from various instrument makers. Actually, it is seldom that there is any need to measure the output, for all that is required is a means of comparison, so that the trimmers can be set until the maximum output is obtained. In that case use can be made of a neon output unit, which consists of a miniature neon tube behind a viewing window, a small transformer and a potentiometer which serves as an attenuator. The output from the receiver is applied across the neon tube, through the potentiometer. Consequently, the tube glows when the output is sufficient. The method of use is, therefore, to set the attenuator until the glow just disappears, and then attempt to trim until the light just reappears. Next the attenuator should be turned down again and further adjustment made. This process can be repeated indefinitely.

When using an output meter the procedure is, of course, to trim until the highest possible reading is obtained, while the input remains constant. If the output is checked by ear, using the loudspeaker, it is generally found most satisfactory to adjust the input device until the note can only just be heard when trimming commences. As the work proceeds and the output is increased, the input should gradually be reduced. By following this procedure the aural judgment of output is considerably simplified and rendered more accurate.



*The Mullard service signal generator (mains operated.)*



*This ganging oscillator by Cossor will prove invaluable for trimming receivers.*

## Its a fact!

—THAT high-frequency currents travel on the surface of a conductor and therefore the largest possible surface should be provided.

—THAT a reflector used in conjunction with a dipole or short-wave aerial increases the signal-noise ratio.

—THAT the magnetic field round an energised speaker can introduce troubles and therefore care should be taken in placing such a speaker in a self-contained receiver.

—THAT an ordinary pocket compass may be used for testing inductive components such as H.F. chokes and coils.

—THAT the grid bias battery often needs replacement when an H.T. battery is replaced and therefore its output should be checked at this time.

# ON YOUR WAVELENGTH



By Thermion

### The Position of the Clubs

MANY of the wireless clubs will be in exactly the same position as other clubs, namely, their membership will be depleted by the requirements of the Army and the war. Club officials should, therefore, assure the continuity of the club's activities by delegating their duties to those under or over military age for the period of hostilities. This will avoid disbanding the club and the difficulty of getting the members together again when the war ends.

It appears that many social events have been abandoned, although some of the clubs are, as far as possible, endeavouring to carry on. The confiscation of all amateur transmitting sets will seriously affect the R.S.G.B. The hope of all is that in spite of the Cabinet's announcement the war may be of short duration. I shall be glad to receive letters from readers on war service. I shall reply to each.

### The Doctor Johnson Broadcast

I HAVE always looked upon Doctor Johnson, who compiled the first English dictionary, as a self-opinionated, gluttonous, and disgustingly fat old man, undeserving of the fame which has been accorded to him. He was as a man the earliest example of the literary poseur. Wherever he was he wished to dominate the conversation, and to use it to get in a few cracks about everything — usually meaningless cracks. He must have been the earliest example of the jack of all trades, for his dictionary was not a good dictionary, and his definitions were not good definitions. It was he who defined patriotism as the last refuge of a scoundrel. I have always imagined that when he ate or drank he snorted and puffed like a grampus, and had the most disgusting table manners—even worse than those of Henry the Eighth. He was, in short, a know-all who knew little. I listened in, therefore, the other evening to the Johnson broadcast, to see how far my impressions of the man agreed with those who produced it. I find that my judgment was deadly accurate.

There is one other aspect of Dr. Johnson's life which has always nauseated me, and that is the associations with that barnacle like sycophant Boswell, who wrote the life of Dr. Johnson. Apparently he made it his life's work. He came to London, fastened himself on to Johnson, and resided at the same house. He was a little hero worshipper, and the broadcast demonstrated that most aptly. Whatever the Doctor said or did, to Boswell was marvellous. The B.B.C. broadcast conversations between Johnson and Boswell, even to the Scottish accent of Boswell. Johnson was not in my view a great man. He wasted most of his time in pubs, aping the wisdom of the owl. In company he would stroll in and ignore everyone, and either appear to be wrapped in thought, or read a book to give the necessary impression of profundity. Thus, the opinion I formed as a boy, when I was compelled by an ignorant school teacher to learn the life of Dr. Johnson and was expected to worship at his shrine, was confirmed. I remember as a schoolboy writing an essay on Johnson and Boswell in which I said that, but for the hero worship of the ignorant Boswell who apparently came down South with a desire to be kept at somebody else's expense, we should never have heard of Dr. Johnson. I retain that opinion to-day, and thank the B.B.C. for their broadcast. The person who took the character of Boswell gave a perfect representation of the sychophantic sponger who earns his keep by flattery.

### Rush to Buy Radio Sets

ONE aspect of the war is that the public have been rushing to buy bicycles and radio sets. It is rather amusing that they can buy both from the same stores. An enormous sale has been made in portables, and I can well understand that those wishing to keep in touch with events, and who are separated from the family receiver, would need to have a set which is independent of the mains. We have had a steady demand for blueprints for many of the cheap receivers designed in our famous Leader series. The public have considered the possibility of the mains either being put out of action, or current rationed. They realise that the accumulator and battery is a useful standby. Some of the manufacturers have raised the prices of their sets, and some have withdrawn models which are unlikely to be sold during the War. There will obviously be a restricted output in view of the fact that most firms will be on war work. I learn that His Majesty the King purchased Pilot receivers for his use during the War.

One wireless trade paper has been amalgamated with an electrical paper.

### Stolen from Our Stand

THIS year the usual number of light-fingered gentry visited the Wireless Show. One of them recognising a good thing purloined our demonstration model of the 1940 All-Wave Three, mounted on its transparent chassis. We ask any reader who knows of its whereabouts to communicate with us.

### Back Issues

ONE of my readers says that he has nine volumes of *Practical and Amateur Wireless*, and he is prepared to dispose of them free of charge to anyone who pays carriage. If any reader therefore cares to send me a postal order for 3s. 6d. I will see that the issues are sent on to him. I will return stamps to unsuccessful applicants. Application should be made by Thursday morning, September 21st, not later. Mark envelopes "D."

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# Radio Emergency Aids

## Economising in Battery Consumption, and Rapid Repairs or Makeshift Aids

By W. J. DELANEY

NOW that we are in a state of emergency there are a number of points which vitally concern the average listener—as distinct from the real experimenter. Firstly, economy has to be effected in various directions, either on account of the difficulty of getting battery replacements or accumulator charging. Secondly, if the set goes wrong just before a news or special announcements broadcast is to take place, some idea as to the best method of hearing those broadcasts should be previously obtained. Dealing first with the economy idea, the only effective scheme is, of course, to cut out one or more stages. Although this will mean a limitation in the number of stations which can be received, it is apparent already that not so much long-distant listening is being done. There are, of course, several foreign news broadcasts being given from time to time, but the news is so contradictory and conflicting that it appears to be desirable to limit the amount of listening in this direction. Even so, it may be possible with many receivers to cut down the L.F. stages without seriously affecting the range of the receiver, and the only effect on long-distance stations will be to limit the volume. This drawback may easily be overcome by using headphones in place of the loudspeaker. Obviously, economy schemes cannot be applied to simple one- or two-valve receivers, and therefore we are concerned with multi-valve sets.

### Cutting Out a Stage

If there are two L.F. stages, all that is necessary to cut out one, is to take the anode connection of the detector straight to the output grid circuit, retaining the resistance or transformer coupling already included in the output stage. Figs. 1 and

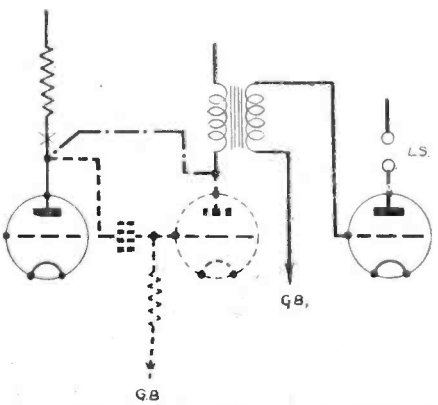



*Fig. 1.—Cutting out an L.F. stage which is R.-C. coupled. The H.T. feed should be disconnected at the point marked "X."*

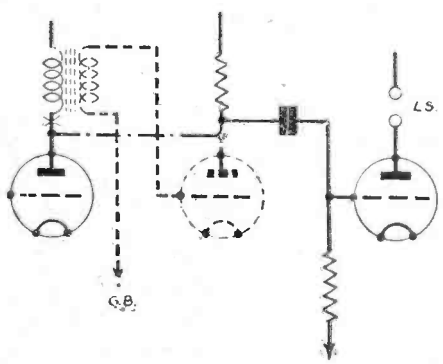



*Fig. 2.—A transformer-coupled L.F. stage and arrangements for cutting it out.*

2 show the arrangements for both forms of coupling, the stage which is cut out being indicated by broken lines. This scheme will only slightly reduce the H.T. consumption but may make an appreciable difference to the L.T. consumption—dependent upon the valve in use and the size of the accumulator which is employed. If the receiver utilises a Class B or Q.P.P. output stage it may be possible to replace this by a simple triode, the filament consumption then being lower and the total H.T. consumption also being reduced. Such a change would mean fitting a new valve-holder and slightly modifying the wiring.

If it is desired to cut out H.F. stages all that is necessary is to transfer the aerial lead to the grid of the second H.F. stage or the detector, interposing a fixed or semi-variable condenser having a maximum capacity of .0001 mfd. This is not a selectivity aid so much as an essential to bring the stations within the tuning range of the condenser in use.

### Makeshift Repairs

Now let us consider how to make a rapid repair in the event of the receiver breaking down. If signals suddenly cease, without any preliminary crackles or other warnings, it may be fair to assume the failure of a valve. A loose connection which comes adrift or a transformer or resistance which fails generally gives warning of the impending breakdown by crackles or similar noises. On the other hand, if one of the accumulator leads comes off, or a plug falls out of the H.T. battery this will give rise to a sudden cessation of signals without preliminary warning. Therefore, in such a case the first thing is to look at both batteries. If all plugs and leads are in position, look to the aerial lead and make certain this is firmly attached to the aerial terminal. If the lead-in is attached to a lead-in tube at the window, also examine this on both sides. If in order, then the most likely trouble is a valve—assuming, of course, that the speaker is correctly connected. If you have a pair of 'phones handy connect them in place of the speaker. If the receiver is a mains model, care should be taken not to cut out the field winding of the speaker, and also not to get a shock from the H.T. which will be present in the output stage. It is advisable in this case to use a transformer to couple the 'phones to the output circuit.

A quick check for the valves is to connect the 'phones in the anode circuit of the detector stage and if signals are still unobtainable, to connect the aerial to the detector circuit—assuming, of course, that an H.F. stage is fitted to the receiver. If signals are still unobtainable, replace the detector valve by one of the remaining valves in the set, preferably by the L.F. valve. If signals are still unobtainable, test the filament of the valve with a battery and meter for continuity. If the filament is intact, then the breakdown is in the detector stage, and the components will have to be checked—preferably by replacement. It will be realised that this will take time, but in most cases the use of the detector stage as already mentioned will enable signals to be received. If the valve is found faulty, the replacement from another stage will provide signals. If the output valve is found faulty the 'phones may be left in the detector stage for the temporary repair.

### Makeshift Components

If there is time, and it is found that a transformer has broken down, and it is necessary to replace this to obtain adequate

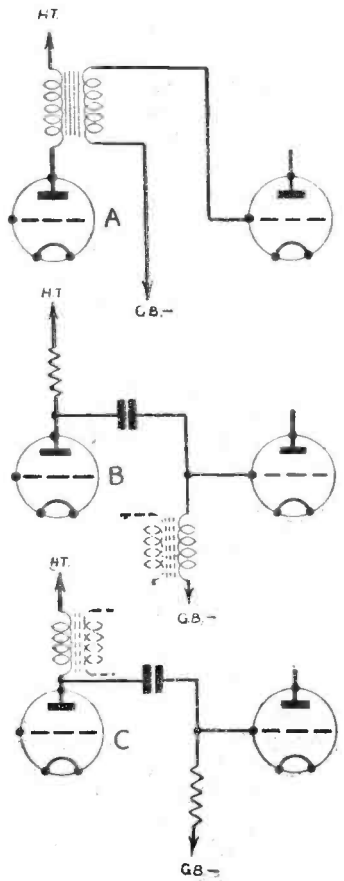



*Fig. 3.—Using a faulty L.F. transformer, showing the two methods of connection at B and C.*

volume, remember that it is generally only the primary winding which will fail. Therefore, the secondary may be retained as an L.F. choke and connected in either the anode or grid circuit, converting the coupling by the addition of a resistance and condenser as shown in Fig. 3. In one

*Continued on page 40)*

# Putting Overseas Radio to the Test

## *An Interesting Account of the Various Tests which are Given to G.E.C. Receivers Destined for Use Abroad*

IT is the envy of nations throughout the world that this country can radiate from its Empire Station at Daventry, programmes that are technically perfect in production and transmission. From the tomfooleries of Dick Bentley and George Moon in "Lucky Dip," to the sweet tones of soprano Isobel Baillie, an amazingly wide variety of radio entertainment is available, and by virtue of the fact that the most progressive minds of the B.B.C. have been enlisted in organisation and many thousands of pounds expended on equipment, every facility for perfect long-distance listening has been provided.

Manufacturers have realised for some time that Overseas markets, especially those provided by the countries of the Empire, are an increasingly important source of good business. But to maintain this advantage they have realised also how necessary it is that the receivers they send abroad shall function as efficiently and reliably in foreign climes as they do at home.

To ensure such a standard, it is necessary to carry out exhaustive tests, reproducing the conditions prevailing in the countries to which the set is to be exported.



*Fig. 3.—Microscopic defects in the enamel insulation are revealed by this testing machine.*



*Fig. 2.—The perishability of rubber insulation is quickly gauged by accelerated life test to which it is subjected in the chamber of this humidity cabinet.*

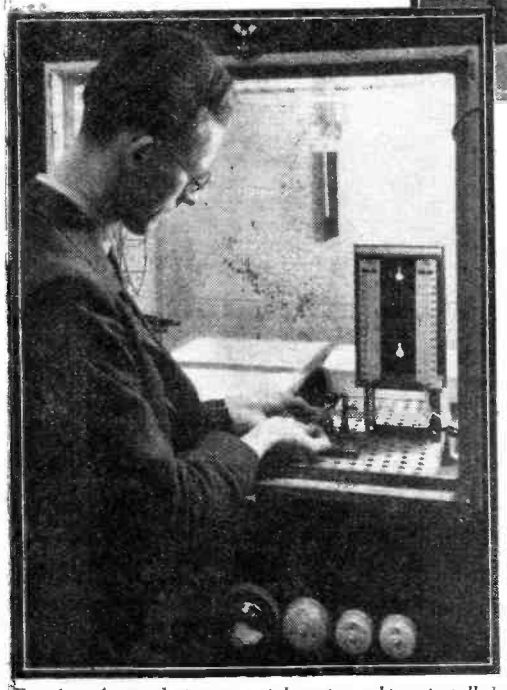


*Fig. 1.—An insulation material testing cabinet installed by the G.E.C. for making sure that their sets function properly in foreign climes.*

In the G.E.C. workshops and laboratories at Coventry, for instance, tests are first made on raw materials: then on components; next on the chassis: and finally on the finished receiver.

The illustration (Fig. 1) shows the chamber in which insulating material used in a wave-change switch is tested. In this cabinet, which is sealed by a glass-panelled door for observation purposes, the exact conditions of humidity and heat obtaining in any part of the world can be reproduced by suitable manipulation of the controls. Wet and dry thermometers can be seen at the right of the chamber.

The durability of rubber insulation is checked by apparatus such as that depicted in Fig. 2. In this case oxygen is also introduced to accelerate the process.

In Fig. 3 a girl is seen running wire through a machine which registers the most minute defects in its insulation. The slightest break in the enamel covering is indicated on the meter, which is in circuit with the mercury bath through which the wire is passing.

Just how much care is taken in assembling components is indicated by the fact that dielectric condensers are

(*Continued on next page*)



*Fig. 4.—Even the breath of the operator is shielded from the work in this air-conditioned assembly room.*

## PUTTING OVERSEAS RADIO TO THE TEST

(*Continued from previous page*)

made in air-conditioned rooms. Even the breath of the worker is shielded from the materials (Fig. 4), which are handled with tweezers. The assembly platform is also warmed as an extra precaution.

The mechanical tests applied are typified by the operation shown in Fig. 5. Here a multi-contact switch is undergoing a life trial of a minimum of 25,000 efficient operations.

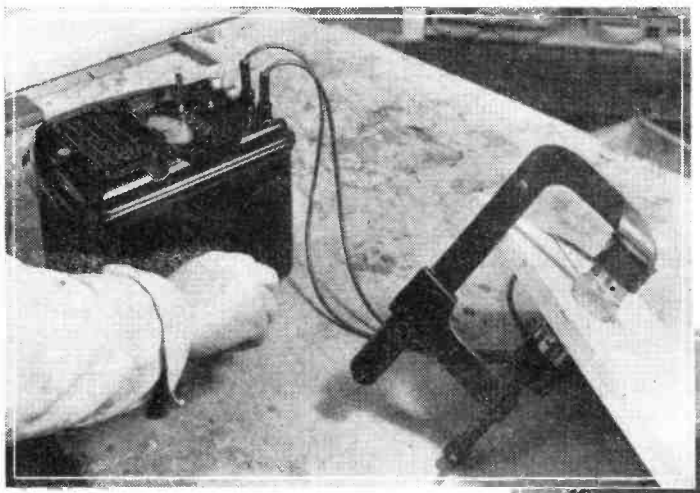


*Fig. 6.—Testing the humidity of wood used for overseas radio cabinets.*

There is even apparatus (Fig. 6) for checking the humidity of wood for the cabinets. Smart appearance and finish are no less sought after in Malaya than in Mayfair,
and wood warping has obvious dangers.

One of the most ingenious machines invented, the "Robot tester," quickly runs over thirty to forty routine circuit tests. Motor-driven selector switches pass current through every wired connection, and any fault is immediately identified by a numbered signal flag.

This test prepares the way for the more discriminating checks, which are electrical tests made on the interlock principle: that is, no tester can complete his analysis until the previous man has correctly executed his part. A fourth operator has a roving commission enabling him to go over any part of the chassis for a double check.

Before the final customer tests are made, sets from each production batch are subjected to a life "soak" trial. The current is switched on and off continuously for varied periods of use and rest, the number of operations being automatically recorded. One interesting point is that reproduction volume can also be checked during any desired period of the test.

And so on to final "customer test," which is a soundproof room with the G.E.C. Coventry aerials 2,000 feet away. Tests are carefully carried out to discover just how the set will perform in the listener's home.

A last "bump" test follows in which the chassis is subjected to a far more arduous shaking-up than it will receive on its voyage to its destination, and the set is passed finally for despatch.

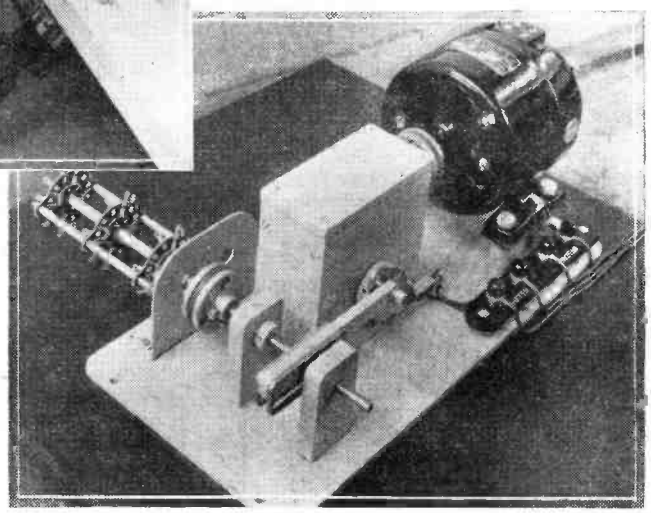


*Fig. 5.—Every G.E.C. component that is mechanically operated undergoes a stringent test in which it is manipulated several thousand times.*

# Some Constructor Pitfalls

### Do Not Attempt to Improve on Published Designs, or Fit Improvements Unless You Appreciate the Full Extent of the Alterations

WHEN you see a design published in a technical paper, or purchase a commercial receiver you may take it for granted that all points of design have been considered before the receiver has been released to the public. If, therefore, you find, when trying either of the receivers above mentioned, that results are not up to standard or what is expected from the circuit, it is very tempting to attempt to trace the cause of the trouble and fit what might be thought to be an improvement. Such a course may bring disappointment, not only from the point of view of actual damage to a component due to wrong use, but from loss of signal strength, loss of stability, or some other drawback. An example will probably make the point clear. Suppose, for instance, that a receiver has been built from a published design and proves unstable when put into use. The first thing an amateur might do in such a case is to assume that the screening is insufficient. If the receiver employs an H.F. stage the simplest modification that an amateur could carry out would be to screen the anode lead, and in most commercial receivers such a scheme is, of course, adopted in practically every case.

### Capacity Losses

Now such screening is perfectly legitimate, but there is a right and a wrong way of carrying out such screening. The lead from the anode is carrying H.F. currents and it is the desire of the user of such apparatus to carry these currents through the H.F. transformer or other coupling component in order to transfer the signal variations to the next stage. Obviously, therefore, it is necessary to get as great a proportion of the H.F. currents through the transformer as possible, and any loss introduced before that component will result in ultimate loss of signal strength. As the majority of constructors are aware, H.F. currents are difficult to keep in their proper place and they will pass to earth if the slightest capacity is introduced between an H.F. lead and earth.

### Screening

In view of the above remarks, the same general precaution may be applied to the entire receiver, namely, do not introduce screening if it is not shown in the design. Where a receiver has been home-designed, of course, such a course may be necessary, but if a designer has found it possible to build a receiver without the screening then it should not be subsequently introduced even to prevent instability. The reasons for the instability should be ascertained and they will generally be found to be due to other causes than interaction between leads. The leads to a gramophone pick-up or switch may also be screened to prevent instability, but as H.F. currents may be present in such leads the same precautions must be taken, i.e., the capacity between the lead and screening must be kept low.

## THE "HOME SERVICE" TWO

(*Continued from page 27*)

the left-hand control, or reaction condenser. This will sharpen tuning, although for normal purposes a high degree of selectivity is not required. The aerial may be of any type, either indoor or outdoor, the locality in which the receiver is used governing the need or otherwise of an outdoor aerial. In most places the set will give adequate volume (on 'phones) with a simple indoor aerial, but if, of course, loudspeaker signals are desired, then as good an aerial as possible should be erected and a really good earth connection obtained. It is quite possible that in some parts a simple indoor aerial will permit loudspeaker reception to be obtained, but this will only be in close proximity to the actual transmitters.

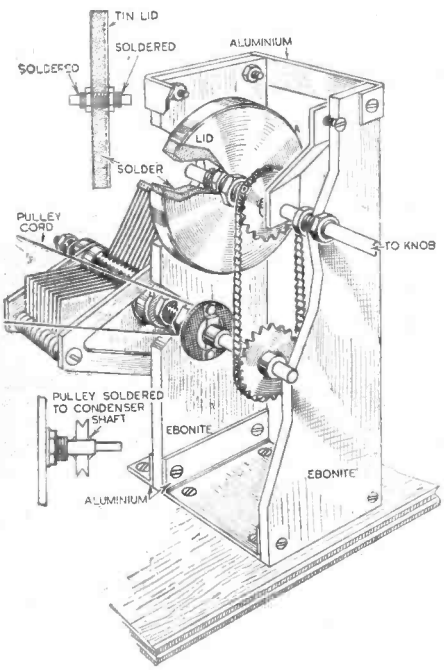
**LIST OF COMPONENTS**

- One Dubilier condenser, 2 mfd. Type 3016.
- One Dubilier condenser, .0001 mfd. Type 4601/S.
- One Dubilier condenser, .005 mfd. Type 4601/S.
- One Erie 15,000 ohm, ½ watt resistance.
- One Erie 1 megohm, ½ watt resistance.
- One variable condenser, J.B., .0005. Type 2093.
- One variable condenser, J.B., .0003. Type 2094.
- One L.F. transformer. Type LF 37. Bulgin
- One push-pull on-off switch, Bulgin. Type S39.
- One B.T.S. medium-wave coil.
- One B.T.S. coil-holder, baseboard type.
- One four-pin valveholder. V.H. 19. Bulgin
- One five-pin valveholder, V.H. 19. Bulgin
- One Cossor 210 HF.
- One Cossor 220 HPT.
- Terminals, wire, etc.
- One baseboard.
- One panel.
- Batteries.

# Practical Hints

## A Simple Flywheel Tuning Movement

USING a condenser having an incorporated slow-motion drive, I decided that by modifying the drive to include a reasonably heavy flywheel, I should then be able to dispense with the two-knob control which normally provided coarse and fine tuning, the fine tuning ratio being only about 10 : 1 and anything but free of backlash.




*A part sectional view of a simple flywheel tuning movement.*

I was puzzled as to the type, weight and coupling of the flywheel to use, and after weighing up the pros and cons of various arrangements, I hit upon the idea of making a flywheel by melting some stick solder in a suitably-sized tin lid.

First of all, I drilled a ⅜in. hole in the exact centre, then fitted a ¼in. bore brass bush, as shown in accompanying sketch. I next tinned thoroughly the inside of the lid and, after fixing it in a vice, proceeded to melt the solder with a blow lamp until I had an evenly distributed and balanced filling. The inset sketch gives details of the construction.

Fortunately the location of the components behind the front panel did not prohibit the chain drive assembly decided upon, but instead of the original tuning scale, I soldered a brass pulley to the main condenser shaft (see inset) after re-drilling the pulley fixing hole to ¼in. diameter.

A cord was then passed round this pulley twice and round a simple indicator pulley, to the shaft of which I soldered a pointer. An instrument dial plate fixed to the front panel completed the dial assembly. The essential principles of the flywheel movement and cord drive only are shown, and are self-explanatory so far as the mounting is concerned.—G. I. LONGHEATH (Edmonton).

### *THAT DODGE OF YOURS!*

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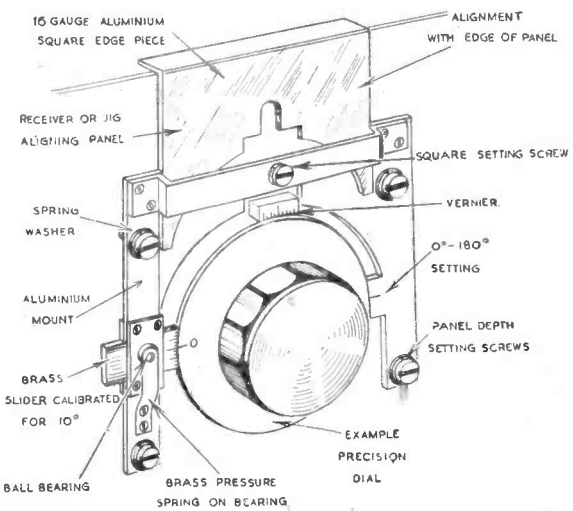
**All hints must be accompanied by the coupon cut from page iii of cover.**

## A Calibrating and Checking Dial Jig

WHEN designing a new short-waver recently, I found that quite an appreciable error resulted if the vernier dial movement was not accurately centred, due both to inconsistency of comparison between the plate and the vernier indicator which makes reading difficult, and also the variation in extreme settings.

For obtaining fine movement in any future designs, and also as close a setting between the periphery of the dial plate and vernier or hair-line indicator, I decided to make up the jig illustrated.

It also occurred to me that I could obtain further advantage from this jig by marking out a secondary vernier indicator on an adjustable brass plate located at the zero side of the dial, as depicted, thus with a scribing tool, an existing dial or a new aluminium dial plate could be quite accurately and easily calibrated or remarked.




*A novel jig for calibrating and checking dials.*

Four 2BA setting screws are used for alignment on either the jig or receiver panel, these being fitted into tapped holes, and stabilised with spring washers. The whole assembly, unless otherwise indicated, is made with 16-gauge plain aluminium.—L. E. SMITH (East Ham).

## Simplified Connections

I AM interested in experimental work, and find that the continued removing and replacing of battery cords leads not only to delays but sometimes to poor results due to fraved leads, etc. I therefore built up the following simple but effective arrangement. At the back of the work bench I fitted a raised step to which a length of ebonite fitted with sockets was attached. These are permanently joined to tappings on the H.T. supply and to the L.T., and aerial and earth. When I rig up a receiver or other apparatus I provide at the back of it a strip of ebonite to which plugs are fitted, and it will therefore be seen that all that is necessary is to push the apparatus to the back of the bench when the plugs will go into the sockets and the various connections will be made instantly. Rapid changes and tests may be carried out by using this device.—L. WALDE (Hendon).

## Drilling Glass

SOME constructors may like to employ a glass panel or even a glass cabinet for their well-built receiver, and it should be remembered that glass may be drilled just as easily as ebonite, provided the right drill and lubricant are employed. The broken-off point of a triangular file makes a very good drill, and it should be turned slowly, without undue pressure, and at the same time lubricated with copious supplies of ordinary turpentine. When through, turn the glass over and finish from the opposite side.—D. WATTS (Southgate).

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# AN ALL-PURPOSE

## Complete Constructional Deta the Experimenter are Given in

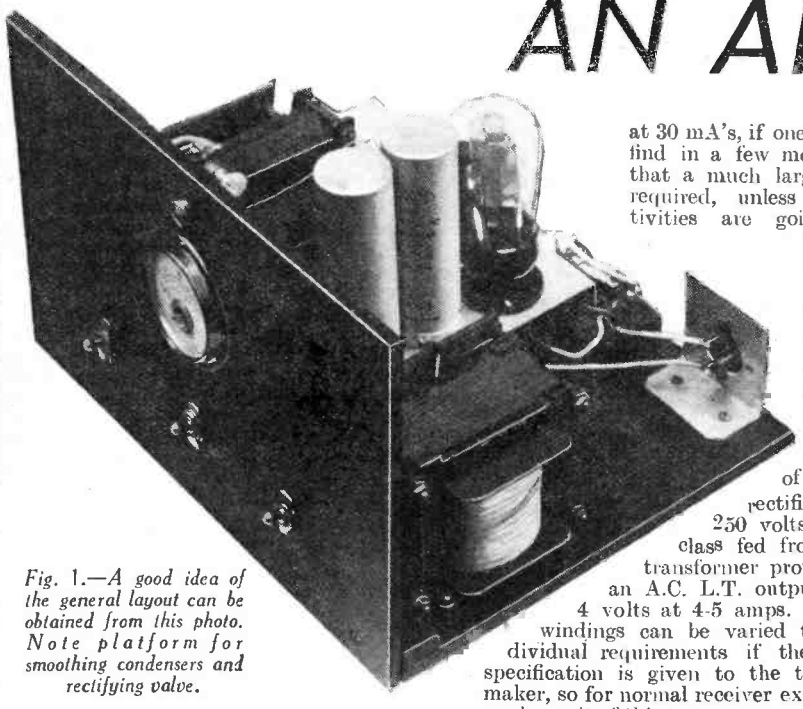


*Fig. 1.—A good idea of the general layout can be obtained from this photo. Note platform for smoothing condensers and rectifying valve.*

EVERY enthusiastic experimenter who is fortunate enough to have an A.C. mains supply available, desires, sooner or later, an efficient power pack capable of being used in a universal sense so far as experimental work is concerned. While admitting that it is not a difficult matter to design and construct a unit which will satisfy most requirements, there are certain factors, however, which have to be considered; therefore, the apparatus described below is intended to provide a unit which will appeal to the majority of readers who have requested such information.

### General Considerations

One of the first things which has to be settled by the constructor when he is considering the construction of a power-pack is what A.C. and D.C. output will be most suitable for immediate and future requirements.

It is highly possible that the work or circuits in hand only call for, say, a very modest output of voltage and current and, for example, no A.C. supply for heater circuits. If such demands are not likely to be exceeded, then, of course, a small unit having a very low initial cost will be quite satisfactory, *but* if the constructor is of the keen experimental class, then it would be wise for him to look ahead and make provision for the future.

It would be very false economy to go to the expense of making an eliminator having, say, an output of 150 volts at 30 mA's, if one is going to find in a few months' time that a much larger unit is required, unless one's activities are going to be seriously restricted.

A unit which appears to enjoy considerable popularity is that which makes use of a valve rectifier of the 250 volts 60 mA's class fed from a mains transformer providing also an A.C. L.T. output of, say, 4 volts at 4-5 amps. The L.T. windings can be varied to suit individual requirements if the necessary specification is given to the transformer maker, so for normal receiver experimental work a unit of this type can prove quite useful. If, however, one is likely to be concerned with quality outputs, L.F. amplifiers or energised loudspeakers, then it is far better to lay out the slight additional purchase price involved, and construct a unit similar to the one described below and have available a handy reserve of voltage and current.

### Design

The complete theoretical circuit of the all-purpose power pack is shown by Fig. 2. It should be noted that it is a perfectly standard arrangement plus an additional mains transformer for an extra L.T. supply, about which more will be said later. The circuit has been purposely kept as free from elaborations as possible, as at this stage it is only intended to be the means of supplying well-smoothed D.C. at a moderately high voltage, and several sources of A.C. L.T. to make it as universal as possible.

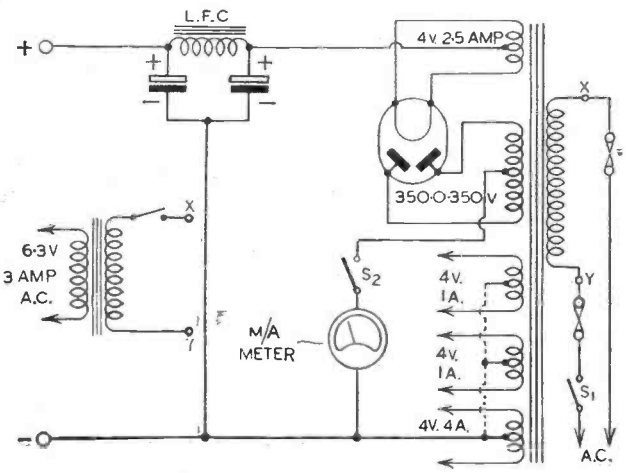
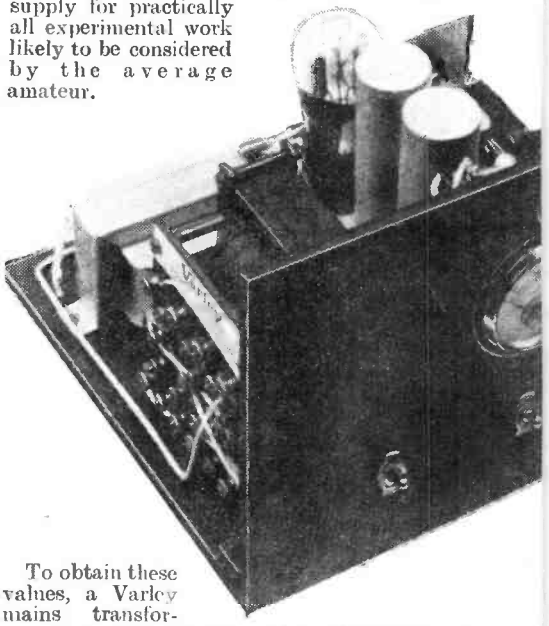



*Fig. 2.—Theoretical circuit diagram of the All-Purpose A.C. Power Pack.*

It must be appreciated, and it would appear from the many letters received that the point is not fully understood, that a unit having a high voltage and current output can always be used in conjunction with circuits requiring much lower values by employing suitable networks of resistances. These can be formed from simple series resistances or fixed or variable potentiometers across the output of the unit or other parts of the H.T. supply. This procedure will be described in detail at a later date.

The rated output of this unit is 350 volts at 120 mA's, a value which, while not being too costly to obtain, does provide a handy supply for practically all experimental work likely to be considered by the average amateur.



To obtain these values, a Varley mains transformer, Type E.P. 40, is used in conjunction with a Cossor rectifying valve of the indirectly-heated class, namely, their 43 I.U.

An indirectly-heated valve was selected owing to the fact that it does help to prevent those very undesirable voltage surges produced when the valves in the apparatus being fed from the unit are reaching their operating temperatures.

In addition to the windings supplying 350-0-350 volts and 4 volts 2.5 amps. for the rectifying valve, three other windings are incorporated in the transformer.

These are wound to give 4 volts at 1 amp. (twice) and 4 volts at 4 amps., all windings being centre tapped.

This combination should provide adequate L.T. supply for all normal purposes, together with the advantage that separate windings are available for feeding two valves of the 1 amp. heater type in push-pull, thus allowing individual control to be obtained as regards biasing.

As it was intended to make this unit as universal as possible, and owing to the fact that many constructors now make use of valves having American ratings, it was

# A.C. POWER PACK

## s of a Unit So Essential to his Article by L. O. SPARKS

decided to embody a supply for those valves requiring 6.3 volts across their heater circuits. This supply is provided by a separate mains transformer having an output of 6.3 volts at 3 amps. A suitable component can be obtained from Messrs. Premier Supply Co., Ltd., and wired in the unit as shown by the plan drawing.

### Switches

It will be noted that three panel mounting switches of the Q.M.B. type are mounted on the front panel and these enable the very essential controls as mentioned below to be obtained by a flick of a finger. (1) Mains supply to rectifying circuit on-off, (2) H.T. (D.C.) output on-off, and (3) mains supply to 6.3 volt transformer on-off.

This arrangement allows rapid control of all supply circuits and thus offers safer and quicker facilities to the operator for carrying out modifications or tests.

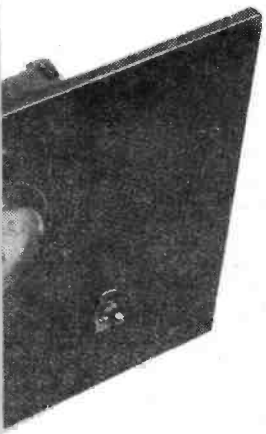


*Fig. 3.—This illustration shows the location of the two mains transformers, the small one in the rear being for 6.3v L.T.*

### Smoothing

Adequate smoothing is provided by the two Dubilier dry electrolytic condensers, together with the L.F. choke in the positive H.T. supply.

For effective operation it is essential for the choke to possess an inductance of at least 25 to 30 henries at the rated current output of the rectifier; therefore, care must be taken when selecting this component to see that its specified inductance is that at 120 mA's. An inferior component will not only allow a hum ripple to be present in the D.C. output, but there will also be the danger of it breaking down due to poor insulation and the use of wire not capable of carrying the required current.

If for any particular reason additional smoothing is required, though this is not likely, another L.F. choke can be introduced in series with the one shown, plus another smoothing condenser, or in series with the negative lead.

### Meter

With a unit of this type it is very advisable to provide some means of indicating the total current flowing in the output circuit or, in other words, checking the operation of the rectifier. This can be quite easily done by inserting a reliable milliammeter in series with the negative lead, as shown in Fig. 2. The meter in question should, of course, not have a lower maximum reading than 120 mA's, unless a dual range meter is used with its correct shunts.

### Construction

If the wiring plan (Fig. 4) is examined, it will be seen that there is little need for any explanation concerning layout or wiring. The only item calling for mention is the metal platform which holds the two electrolytic condensers.

This is made from a strip of aluminium which is bent at each end to form supporting pieces, after two holes have been drilled or cut in the horizontal strip to hold the condensers. Care should be taken to see that those parts connected to the common negative side of the circuit have connections which are electrically perfect. Note that the twin fuse-holder is connected in each side of the mains supply, and that the pilot light can be connected across any of the L.T. windings of the rectifier mains transformer. This last item might seem to many to be an unnecessary fitting, but as there is always a danger of not knowing whether the unit is *alive* or not, unless some visual indication is provided, it is well worth while employing a pilot light, if only to avoid finding out whether the unit is on or off by the rather annoying method of shocks. A complete list of the component parts required is given on this page, and a complete kit may, as usual, be obtained from Messrs. Peto Scott.

### LIST OF COMPONENTS

- One mains transformer. Varley. E.P.40.
- One Cossor rectifier. 43.I.U.
- Two Dubilier condensers. 8 mfd. Type 0281.
- One L.F. choke. Premier. C.150-185.
- One L.T. mains transformer. Premier. 6.3 v. 2-3A.
- One dual fuse-holder and fuses. Bulgin. L.F.11.
- One pilot light holder. Bulgin. D.19.
- One milliammeter (see text). Premier or Bulgin.
- Three switches. Type S80. Bulgin.
- One 5-pin valveholder. Clix.
- One 4-pin valveholder. Clix.
- One baseboard 12ins. x 10ins.
- One panel, 12ins. x 8ins.

### WIRING DIAGRAM OF THE ALL-PURPOSE A.C. POWER PACK

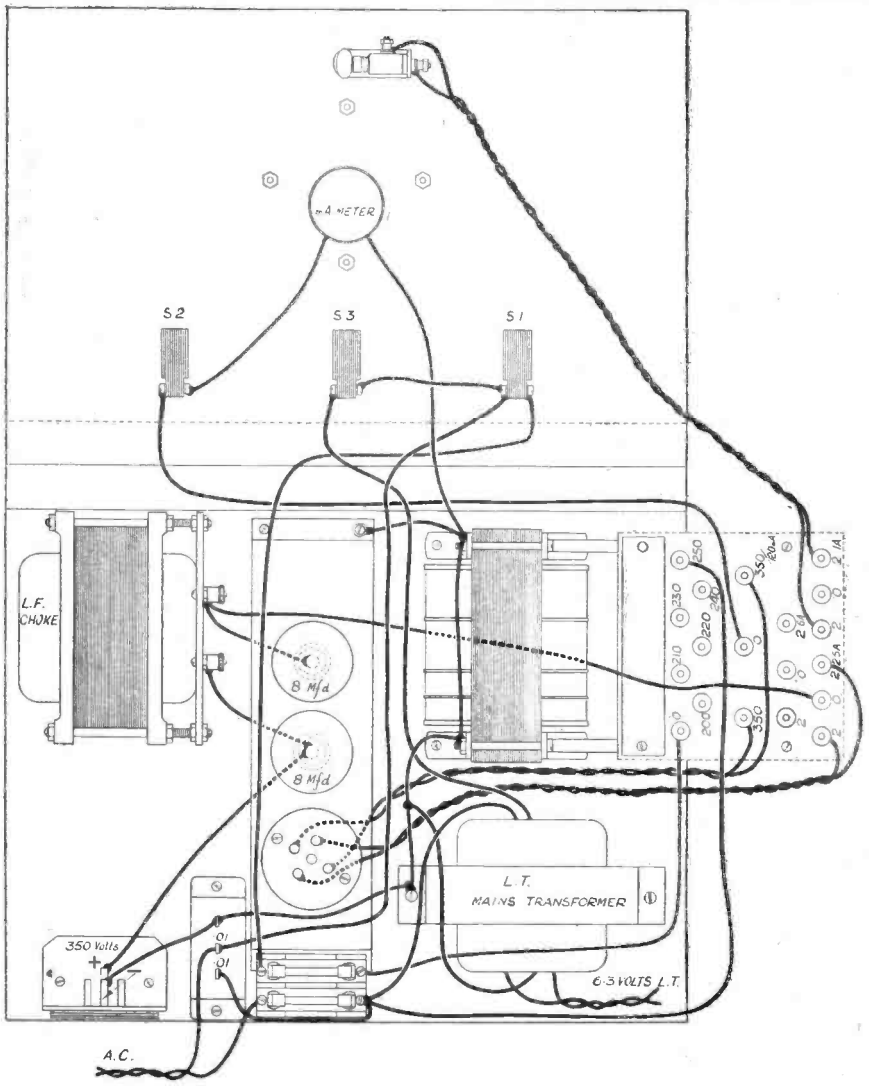
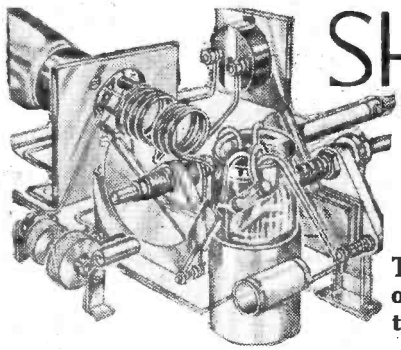



*Fig. 4.—The fixed condenser .01—.01 mfd. across the mains is optional. If any hum is present, then it should be employed. The Varley E.P.40 has a different terminal panel than that shown.*



# SHORT-WAVE SECTION

## UNCONTROLLED H.F. CURRENTS

**Tuned H.F. stages, and the elimination of hand-capacity effects are amongst the subjects dealt with in this article.**

TO build a short-wave receiver which on test appears to be satisfactory and find later that there still remains room for improvement is an experience common to the short-wave enthusiast. In spite of careful work and attention to detail, little snags appear, which later assume a serious aspect, especially when the application of well-tried preventatives fails to effect a cure.

One of the most common and, from the beginner's point of view, most baffling is known as hand-capacity effects; for example, detector and two L.F. sets may be sensitive, fairly selective, and stable when operating above 20 metres, yet below this wavelength headphone capacity predominates. Sometimes, even when the most thorough by-passing and decoupling precautions have been taken and an R.C.C. L.F. stage introduced, the symptoms are noticeable.

Series headphone H.F. chokes and the fitting of an L.F. output choke respectively appear to be of little benefit. In this instance we are dealing with a really bad case, because the L.F. output choke usually effects a complete cure.

It does not follow that the set is really bad, and it is quite possible that hand-capacity and threshold-howl effects will be experienced. Instances of this nature are not uncommon, and taking the broad view, we may assume that the set will prove to be a good proposition, provided we can prevent the straying of H.F. currents into the low-frequency circuits.

The H.F. choke, whilst it certainly does choke, does not function in this respect as efficiently as many imagine. The introduction of additional by-pass condensers and filters depends largely upon circuit considerations with respect to their effectiveness. There is, however, one method which is usually successful when others fail, and that is the fitting of grid-stopper resistances and series grid-lead chokes.

### Grid Stoppers

Before going into details, the selection of grid-stoppers may be considered. Remember, in case of doubt, that the most suitable value is that which when fitted prevents the H.F. currents straying, yet does not reduce signal volume to any appreciable extent. Various values between ¼ megohm and 1 megohm should be tried and the effects noted.

A grid-stopper may be inserted in series with the grid lead of each L.F. valve, or alternatively, an S.W. type H.F. choke may be used in the second L.F. valve grid lead. This method is to be recommended, especially if the second L.F. stage is R.C.C. coupled.

Check up on the various remedies outlined in turn, and if the trouble still persists rest assured that nothing short of rebuilding the set and altering the layout will improve matters. Years ago, the incorporation of a really first-class L.F. transformer meant trouble. Instability was the result, and so cheap transformers were necessary, stability being obtained at the expense of L.F. amplification.

Decoupling, and the use of by-pass condensers were unknown. Briefly, the methods of putting the best into S.W. receivers in order to get the best results was also unknown. Nowadays it is different, a good L.F. transformer, efficient decoupling and by-passing are to be recommended.

### Tuned H.F. Stages

Opinions as to the advantages of tuned high-frequency stages in short-wave receivers are divided.

During the early days of the S.G. valve it was found that little in the way of H.F. amplification was obtainable, and as wavelength decreased, so did H.F. amplification. Whilst the same applies today to a lesser degree, it should not be forgotten that the screened-grid valves now available show vast improvement compared with the early types, and quite a useful measure of amplification ahead of the detector is obtainable.

Choice of coupling is left to the individual, but in most instances where tricky operation is experienced, the coupling from the S.G. valve to the detector will be found too tight. Interlocking and self-oscillation in the H.F. amplifier are also common troubles, more especially when two or more stages of high-frequency and gang control are used.

Whilst sharp-tuning, undamped H.F. stages (within practical limits) are an advantage in broadcast receivers, they are pretty hopeless so far as short-wavers are concerned; and in order to derive any benefit from a tuned H.F. stage, damping is necessary. By increasing the aerial coupling, effective damping is obtained.

One of the most effective tests is to set the detector oscillating on a code signal and follow this by tuning the H.F. stage. If when this is done the signal pitch changes considerably, the S.G. stage tuning is much too sharp. Adjustments should be made relative to the aerial coupling until it is noticed that H.F. tuning increases volume, yet does not change signal pitch.

### Trimmer Adjustment

When correct adjustment has been made, it will be found that the H.F. tuning control in single H.F. receivers has the same effect as a volume control when detuned. In multi-stage H.F. receivers with ganged tuning, and a separate panel-mounted trimmer across the first H.F. section of the gang condenser, a true vernier and selectivity effect will be obtained when the separate variable trimmer is operated, if the ganging is correct.

If it is found that separate trimmer adjustment causes interlocking, denoted by a plonk or burble, pay attention to the second H.F. stage. It is probable that it is out of gang sufficiently to cause self-oscillation when the preceding stage is brought into tune, in which case, slack back the second H.F. section trimmer one quarter turn. Sometimes experimenters, when wiring up H.F. receivers using screened coils with leads passing through the screening cans, add additional insulation the full length of each lead. This should not be done, as the damping noticeable, especially below 20 metres, is most marked. A short piece of extra insulation over existing insulation is all that is necessary in the interests of safety. In any case fit fuses—not flash-lamp bulbs.

The H.F. pentode is undoubtedly the valve of the future relative to pre-detector amplification and detection in short-wave receivers. It possesses a number of advantages over the screen-grid type, and can do everything the latter is capable of doing with a greater resultant efficiency.



*A new Dynatron receiver in which the short-wave tuning range goes down to 9 metres. Note the very large tuning scale and pointer to simplify short-wave tuning.*

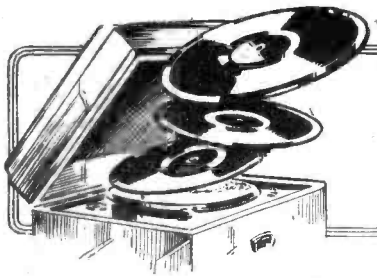
Nevertheless, a stage of tuned radio frequency using the S.G. valve is worthy of consideration. Careful attention to detail as outlined will remove all possibilities of tricky operation and assure ease of operation, together with a fair measure of H.F. amplification.

*NOW READY!*

**WORKSHOP CALCULATIONS TABLES AND FORMULÆ**

**By F. J. CAMM**

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# Impressions on the Wax

## A REVIEW OF THE LATEST GRAMOPHONE RECORDS

CONTINUING their series of Kenneth Alford's own performances of his compositions, H.M.V. have recorded that composer's "The Smithy" which he describes as a pastoral fantasy. This will be a prime favourite with all those who like their military band music plentifully spattered with "effects" and "noises off."

On the other side there is "The Two Dons" which features a brilliant xylophone duet by B. Wright and L. Wegus. Both of these Alford compositions are played by the Band of H.M. Royal Marines, Plymouth Division, conducted by Major Ricketts. Under his pen name of Kenneth Alford, Major Ricketts has an international reputation as "The British Sousa"—because of his immortal "Colonel Bogey."—*H.M.V. B* 8935.

Reginald Foort has found ideal material to show off his giant Moller Concert Organ in a new record of the "Pilgrim's Chorus" from "Tannhauser" and the Introduction to Act 3 of "Lohengrin."—*H.M.V. BD* 735. Al Bollington has devised two ingenious medleys around the words "moon" and "blue" on *H.M.V. BD* 712. He calls them "Moonlight Rhapsody" and "Shades of Blue." This is a fine cinema organ recording.

### Old Songs Revived

Outstanding vocal successes of this month's list are modern recordings of older songs. Maxine Sullivan, the dusky singer, has made a recording of Stephen Foster's song to his wife, "Jea e with the Light Brown Hair." This is coupled with "Drink to Me only with Thine Eyes."—*H.M.V. B* 8953.

Next come two tunes from "The Mikado." These are sung by Kenny Baker, who starred in the film. He gives a good rendering of "A Wandering Minstrel" and "The Sun Whose Rays."—*H.M.V. BD* 741.

Dick Todd—the Canadian Crosby—chooses for his latest disc—*H.M.V. BD* 737—"Girl of My Dreams" and "You've Got Me Crying Again." Two records you really must hear are Arthur Askey's "The Worm" and "Knitting" on *H.M.V. BD* 739; and a new disc from Ethel Walters, "What Goes Up Must Come Down" and "If You Ever Change Your Mind."—*H.M.V. BD* 740.

### Swing Music

Heading the swing releases this month are a pair of discs from Artie Shaw and his Orchestra. The new Shaw titles are old favourites. On *H.M.V. B* 8948 you will find "It Had to be You" coupled with "I Can't Believe that You're in Love with Me." Both of these reveal the orchestra's fine saxophone section at its best.

It is in "Roseroom," which is coupled with Lehar's "Vilia" on *H.M.V. B* 8949, that the remarkable clarinet virtuosity of Artie Shaw himself will be apparent to every listener.

Benny Goodman who says he is all set to build his finest band ever, has recorded "Make Believe" and "I'll Always be in Love with You"—*H.M.V. B* 8950. The second side features a long solo passage by his pianist. Jess Stacey. This solo is a fine example of the logical melodic development shown by the best swing players. Finally, there is a record by Tommy Dorsey and his orchestra. This contains a new composition called "Peckin' with the Penguins" and an old one, "Davenport Blues"—*H.M.V. B* 8951.

"F. D. R. Jones" coupled with "Sunrise Serenade" has been recorded by Hall Kemp, the American band leader who played at London's Café de Paris in 1930. Both of these tunes are the most notable numbers from the musical show "The Little Dog Laughed."—*H.M.V. BD* 5516.

Both of the tunes recorded by Kemp have also been recorded by British leaders. Jack Hylton has coupled "Sunrise Serenade" with the lovely "Stairway to the Stars"—*H.M.V. BD* 5513. Geraldo has taken "F. R. D. Jones" with another tune from the same show called "On the Outside Looking In."—*H.M.V. BD* 5510.

On top of these, there are several more grand tunes in the complete list for September which includes "There's Something Wrong with the Weather" done by Harris's Orchestra on *H.M.V. BD* 5512.

### Release of a Classic

A jazz classic released this month is "One Hour" and "Hello Lola" by Red McKenzie and the Mound City Blue Blowers on *H.M.V. B* 8952. This record features the great Coleman Hawkins, he plays tenor saxophone, as well as Gene Krupa, the famous drummer, and Pee Wee Russell, the clarinettist.

But there were many difficulties. The record was originally made in 1929 and was so much in advance of its time that it was not a success. It was withdrawn and the negatives lost or destroyed. Years passed and swing became popular and people began to want the record they had at first despised. It was thought to be too late until a search of the files in America produced two more negatives. These were immediately rushed to Europe with the result that a jazz classic thought to have been lost for ever is once again available.


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By F. J. CAMM.

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*Comment, Chat and Criticism*

# Colour and Impressions in Keys

## Our Music Critic, Maurice Reeve, Discusses the "Perfect Art Form in Music"

AT the time of his death in 1915, Scriabin, the very mystical and abtruse Russian composer, whose works had such a tremendous vogue just after the war, was engaged in the task of uniting sound with colour. By a scientific process, and the enrolment of a new scale, he hoped to unite each ray of the spectrum with its "twin" in sound waves, thus producing what he prophesied would be the perfect art form. Although Wagner, in his titanic "music dramas," has probably said the last word on the subject of the "perfect art form," and as I don't profess sufficient competence to say whether Scriabin's theory was capable of realisation, it does seem to give food for interesting speculation. On the occasion of the first production of some of his major works, they were performed in front of coloured backcloths which were meant to correspond with the moods, or colours, of the works themselves. This device has never been resorted to in London, at least not at performances at which I have been present, so that the argument I used in a previous article in favour of listening to all music as "absolute," probably applies to Scriabin's as much as any.

### Individuality

Each key—twelve major and twelve minor—has its own individuality and composers have always been very sensitive of this fact. It is only in the realm of songs that the music is transposed to suit vocal requirements. But over here it only happens very seldom, as the great classical "lieder" are very rarely sung by any but the voice originally chosen by the composer. We take it as universally agreed that the sharp keys express a greater degree of brightness, gaiety and "good nature" than the flat ones, which rather bespeak sadness, melancholy, or pensiveness, in varying degrees. Also that the major keys favour the former types of moods and the minor the latter. Let us recall some famous works and see how far this theory is borne out in practice.

Our thoughts naturally turn to "programme" music where the composer "lays his heart on his sleeve," as it were, and proclaims his intentions just like a painter or a writer. Here are six pieces in major sharp keys: Mendelssohn's "Spring Song"; Wagner's "Prelude to Act III of 'Lohengrin'"; Part 2 of Liszt's second "Rhapsodie"; Grieg's "Wedding Day" or "Norwegian Bridal Procession"; Tschaikowsky's "Valse des Fleurs," from "Casse-Noisette," and any of Rossini's overtures.

Now all these pieces are the quintessence of vivacity, gaiety and high spirits. We cannot think of them in any other key, any more than we can imagine a green violet or a blue daffodil.

### Contemplative Music

By way of contrast, here are six world-famous compositions of a sad, broody, or contemplative character. Each one of them has been pitched in a minor key: Chopin's "Funeral March"; Beethoven's "Funeral March," from the third symphony; Rachmaninov's "Prelude" (*the* prelude!); Sibelius' "Valse Triste"; Grieg's "Solveig's Song," and part *one* of the Liszt "Rhapsodie," part two of which was in the "major" group, an interesting comparison. I would have included Beethoven's "Moonlight Sonata," but for the fact that it comes under the heading of "absolute," and not "programme" music.

I will form one more group of representative pieces of a tender, wistful or appealing nature, as apart from the grave and sad character of the last one. Each one of these is in a flat major key: Schumann's "Träumerei;" Liszt's "Liebestraum"; Chopin's "Nocturne in E flat"; Puccini's aria from "Madame Butterfly," "One Fine Day"; Saint-Saëns' aria from "Samson and Delilah," "Softly Awakes My Heart," and Schubert's song "Thou Art Repose."

### Handel and Beethoven

Whilst there is no hard and fast rule, the evidence proves that certain keys mean the same thing, or symbolise the same emotions and feelings, to all musicians. One could easily cite exceptions. Händel's "Dead March" from "Saul," for instance, is in the key of G. I have been compelled to omit the, perhaps, most beautiful of all the keys, C major, because I specified keys with sharps and flats! But a study of works in this key, especially those coming under the head of "absolute" music, would show that composers evidently consider it expresses an exceptionally wide range of emotion. Beethoven was particularly fond of it and we have works of his as wide apart in feeling as the "Waldstein Sonata," the "Ariette" from the last Sonata and the finale of the 5th Symphony pitched in it. It is a key that is frequently used to express triumph and rejoicing. Mendelssohn's "Wedding March" and Wagner's "Procession of the Mastersingers," readily come to mind. The finale of the 5th Symphony is also one of the most "triumphal" movements ever penned.

### Absolute Music

When we come to "absolute" music we are on debatable and speculative ground, because the composer has kept his thoughts strictly to himself. Sometimes his secret has been revealed to an intimate through a letter or a fragment of conversation. At others we have, perhaps, merely the tempo indication at the head of a movement, as in Beethoven's sonata "Les Adieux." Usually there is nothing, as in most of Bach's music. Works like the "Moonlight Sonata" are styled Moonlight without any foundation, whilst others like the "Appassionata" derive their title from the tempo indication at the head of the first movement, Allegro Appassionata. The "Waldstein Sonata" and the "Archduke Trio," are universally spoken of by those titles in virtue of their respective dedicatees, Count von Waldstein and the Archduke Rudolph. But such titles mean nothing whatsoever and bear no indication as to the character of the music. Chopin's "Raindrop" prelude and "Butterfly" study, and Bach's "Ave Maria"—so-called because Gounod superimposed a melody with words on to the first of the 48 preludes—are three out of hundreds of examples of which I could cite of absolute music unwarrantably given a "programme."

### Debussy

A final word can concern the works of an acknowledged master of programme and impressionistic music, Debussy. Amongst his many collections of pieces are twenty-four preludes, each with a title ("Fireworks," "Dancers of Delphi," "The Wind on the Plain," etc.) and each, when you know what they are meant to portray, lifelike in their fidelity and realism. But to each one Debussy put the title at the *end* of the piece purposely so that the listener should place the music *first*, and make the subject of the picture of secondary consideration!

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### RADIO EMERGENCY AIDS

(*Continued from page 32*)

case the secondary is used as an anode load and in the other case as a grid load. Owing to the high resistance of the average secondary winding it is preferable to use the second method, placing a resistance of about 30,000 ohms in the anode circuit in place of the primary, and a fixed condenser with any value from .001 mfd. to .1 mfd. in between anode and grid. If there is plenty of time and components are being checked, replacements may be made in various ways. For instance, a broken-down condenser may often be replaced by any value and working results obtained, although efficiency may be reduced by an unsuitable value of the replacement. Small value fixed condensers may be replaced by lengths of flex twisted together, precautions being taken to prevent the ends of the flex from making contact and thereby short-circuiting the temporary "condenser." Chokes may be replaced by old plug-in coils of high inductance; tuning coils may be replaced by substitutes of any make, making the necessary tuning adjustment to suit the different characteristics of the coil.

# *RADIO CLUBS & SOCIETIES*

### GLOSSOP AND DISTRICT RADIO SOCIETY.

**Acting Secretary:** J. C. Moore (2FXW), 33, Bank Street, Hadfield, Manchester.

AT the last meeting of the above society a lecture was given by 2FLI on "Frequency Measurement." Due to the recent outbreak of war, and the calling up of several members, all future meetings have been postponed for the time being. 2DXA has gone to the R.A.F. Wireless Reserve, the chairman (V. Morris), the secretary (K. C. Sidebotham), A. Taylor and 2FLI have been called up to join the local Corps of Signals, and 2AJP is busy with A.R.P. work. The H.Q. is at present closed, and all communications should be addressed to the acting secretary at the above address.

### EASTBOURNE AND DISTRICT RADIO SOCIETY

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

AT the society's meeting held recently a cinematograph film display was held. The following films were shown:

"Milestones of Radio." The story of Marconi's first experiments before 1900 to the present-day progress of the Marconiphone Co., Ltd.

"City of Sound." The story of the vast 60-acre factory of the Marconiphone Co., Ltd.

"Mazda in the Making." The story of how Mazda radio valves are manufactured.

# 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).**

## What Do You Think?

SIR,—As you express a wish for readers' opinions as to what PRACTICAL WIRELESS should contain, I send mine, as follows:

1. For the benefit of new readers a good series of articles on the theory and practice of reception. It should deal with both straight and superhet principles.

2. Articles dealing in fair detail with particular parts and components of receiving circuits, e.g., A.V.C. systems; beat frequency oscillators: feed-back; methods of detection: valves; loudspeakers, etc.

3. Articles on commercial receivers. How many amateurs on looking at the "works" of a commercial receiver can identify even the various valves and coils? The theoretical circuit of a commercial receiver should be taken, and the whys and wherefores of the various components and of their values explained in fair detail. The explanation could be in serial form, covering new circuits in turn.

4. Articles on elementary principles of electricity should be published.

5. When giving details of battery receivers for construction *always* state the H.T. consumption. Anyhow, I think there are too many battery receivers being described. What about A.C. and universal sets for construction?—J. J. BEIRNE (Bath).

## Correspondent Wanted

SIR,—I have been a regular reader of your paper for about six months now and would like to correspond with any young reader in any part of the world who is interested in any branch of radio.—JOHN C. SMITH, 59, Reynolds Street, Burnley, Lancashire.

## Curtailed Activities

SIR,—Now that the amateur transmitter cannot carry out his experiments I wonder what form of experiment can be taken up. I have lost my transmitter and find that listening alone is very uninteresting. I have plenty of gear and wonder if any other amateur transmitter has discovered any new field which may be explored without necessitating transmitting apparatus, which is, of course, now illegal. I must take this opportunity of congratulating you on the new cover and contents, which I think make the paper even more presentable than it was before—if such a thing is possible.—D. GORDON (N.W.9).

## Short-wave Battery Super

SIR,—I believe I have previously seen in your pages a request for a short-wave super for battery operation. I was very interested in your recent Air-Hawk, and should like to see a description of a battery set on similar or even more ambitious lines. It can be done, and has been done in America, but I should like British. One of the L.F. stages could, perhaps, be cut out in the interests of battery economy, but this does not worry me as I have a wind generator and wet H.T. cells. Can you see into this and let us have a design soon?—F. GRAEME (Kenya).

## Servicing

SIR,—I note that you are running a new series on Servicing. I wonder if it would be possible to let this series include blueprints of commercial sets and makers' data material so that all servicemen could make use of the article. A photo of the inside of the set, showing the disposition of the important parts would also be of use.—L. DRAKE (Gloucester).

*[We regret that we are unable to obtain data from all manufacturers to enable us to carry out the idea mentioned, but the makers are usually able to assist by supplying essential data to servicemen upon request.*—ED.]

## "Home-Service" Broadcasting

SIR,—It will probably not be news to you that the "Home Service" broadcasting is far from satisfactory. I find in common with many neighbours and the local wireless dealers that with efficient sets some form of A.V.C. is essential. The reception varies two or three times every minute from fortissimo to distorted pianissimo. I find, however, that a simple old 2-valver with plug-in coils, made some seven years ago for a deaf friend to use with 'phones, after touching up a little and fitted with a P.215 valve, gives excellent results quite free from the variation and distortion on a W. B. Stentorian speaker.

I think many old sets will come down from the top shelf while the present state of things endures, while 4-stage "straight" quality sets like mine will be reserved for the Continental concerts.—T. H. PETTIPHER (Chipping Norton).

# Prize Problems

### PROBLEM No. 366

JACKSON had a three-valve battery set on a baseboard and decided to convert to chassis construction, retaining the same circuit. He did this, making as far as possible, a careful copy of the original wiring. When he switched on he could obtain no results, and therefore made a stage-by-stage test. Signals were present at the detector anode, but not at the anode of the first L.F. stage. He followed out the wiring and this was correct. What was the most likely cause of the trouble? Three books will be awarded for the first three correct solutions opened. Entries should 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. 366 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, September 25th, 1939.

### Solution to Problem No. 365

The cause of the bass resonance was the coupling condenser used in the parallel-fed transformer stage. This condenser forms, with the primary of the transformer, a resonant circuit, and the capacity of the condenser should have been changed to avoid the resonance.

The following three readers successfully solved Problem No. 364, and books have accordingly been forwarded to them: L. Keen, 56, Alma Avenue, Hornchurch, Essex; F. W. York, 177, Thirlmere Avenue, Tilehurst, Nr. Reading; C. Hoyle, 165, Barkerend Road, Bradford, Yorks.


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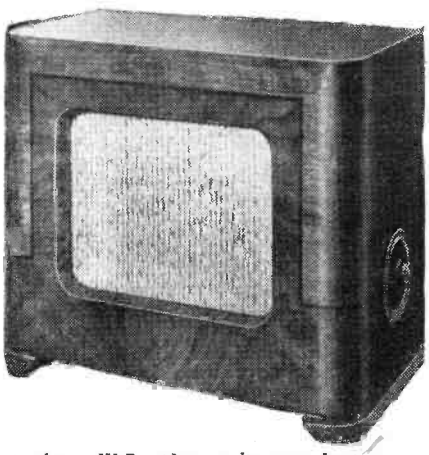
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# QUALITY REPRODUCTION

## In this Article Some of the Methods Adopted by Set Manufacturers for Obtaining Quality Reproducion are Discussed

ON many occasions, articles in these columns have stressed the suggestion that the development of high quality reproduction provided a field for experiment which is particularly suited to the radio amateur. It was also stated that, in general, the amateur had a better chance of making a good high-fidelity set than the ordinary listener had of buying one, since the almost universal cry from the man in the street was for sets sufficiently sensitive and selective to give him large numbers of stations, almost irrespective of the quality of reproduction. Finally, it was suggested that the time would come when the commercial set manufacturer would find it necessary to pay more attention to fidelity of reproduction, and to put on the market at least a proportion of models having some claim to realism of tonality.

While we lay no claim to the gift of prophecy, and are quite content to suggest that our previous articles were based upon



*A new W.B. aid to quality reproduction—Stentorian cabinet model 40SC.*

pure reasoning, we cannot refrain from pointing out that the state of affairs which we then forecast has now come about. A very large proportion of the principal manufacturers are now advertising receiver models which are described as "fidelity" sets and, from our own observation, these quality models do represent a very substantial advance in reproduction. Not only so, but the general standard of quality in all reputable makes has very definitely advanced.

It may be said at the outset that this article will exclude all those luxurious fidelity sets which are sold at prices between 30 and 150 guineas because they are quite beyond the reach of the average listener and, moreover, are usually attempts to combine high performance by way of the number of stations receivable with naturalistic reproduction, and include gramophone equipment with auto-record changing, and most elaborate and expensive cabinet work. We will confine our remarks to ordinary table models costing, at the most, 20 guineas, and it must be remembered that even at that price, which includes cabinet work, cost of assembly and advertising charges, the design must be such that the intelligent constructor should be able to produce as good at lower cost.

### The Superhet

There has been a general impression that really high quality reproduction cannot be obtained in a superhet., and it therefore may come as something of a shock to find that quite a number, in fact the majority, of sets advertised as of the high-fidelity type, come under the superhet class. It will therefore be necessary to describe both straight and superhet sets in the quality range.

Analysis of a large number of commercial sets brings out one point which is common to practically all makes, and that is that set makers as a whole have realised what we have pointed out on so many occasions, namely, that the loudspeaker is still by far the weakest chain in the link. It is simply useless, and a waste of time and money, to provide circuits of wide frequency response, to design receivers with nicely adjusted values and automatic devices for avoiding overloading, and to fit last stage valves giving a large output of undistorted power, if the speaker cannot reproduce the extreme top and bottom frequencies or if it produces a crop of resonances at all sorts of places in the musical scale. There was a time, and that not so very long ago, when the speakers commonly fitted in commercial sets were tiny little units of poor performance, which could be made at the cost of only a very few shillings apiece. To-day, any set put forward as a quality receiver will be found to contain a speaker of generous design and having a really good performance characteristic. For the sake of cheapness, energised models are chiefly used in mains sets, but with the latest improvements in special magnet alloys, the permanent magnet models are of almost identical performance.

### The Choice of Speaker

The lesson which the constructor must learn from the set maker in this connection, therefore, is to start designing his quality set from the output end. Obtain the best speaker you can afford, and design your set around it. A speaker of this year's, design, costing in chassis form from 1½ to 2 guineas, may be taken as fully equivalent in performance to the speakers employed in the average commercial fidelity table model, so that the constructor is at no disadvantage on the score of the speaker.

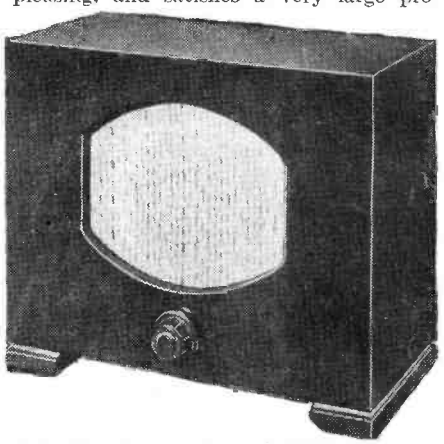
Working back from the speaker towards the aerial, we next come to the output stage. Two factors have to be considered here, the actual power output in milliwatts, and the class of valve, namely triode or pentode and, in the case of battery sets, whether Class "A," Class "B," or Q.P.P. working.

With respect to total output, a last stage capable of a big undistorted output is advisable so that even on the loudest passages there will be no distortion. Bearing in mind that 50 milliwatts represents the minimum for reasonable volume for quiet passages, a 2½-watt output valve gives a factor of safety which is adequate where only moderate volume is required, but a 5-watt output stage is generally considered the minimum for serious high-fidelity work. There are, however, very few commercial sets at prices up to 20 guineas giving more than 3 to 3½ watts undistorted output, and practical tests show that while such sets do give really good reproduction so long as volume is kept within reasonable limits, there is a tendency to overload if the volume control is advanced too far. We therefore repeat our own conviction that the constructor desiring quality must exercise his discretion in handling the volume control if he confines himself to a 2½ to 3-watt output stage, and that he will be well advised to go one better than the commercial makers and fit at least a 5-watt valve.

While there is little question that a triode output stage has the best possibilities with respect to tonal fidelity, and is also less easily overloaded, quite a large number of commercial fidelity sets use pentodes. The rather greater sensitivity of this type permits some saving in cost, and manufacturers have succumbed to the temptation. The pentode has a further allure in this connection, since the higher top-note response of this type of valve compensates in part for the attenuation of upper frequencies brought about by the sharpness of the tuning.

### Comparisons

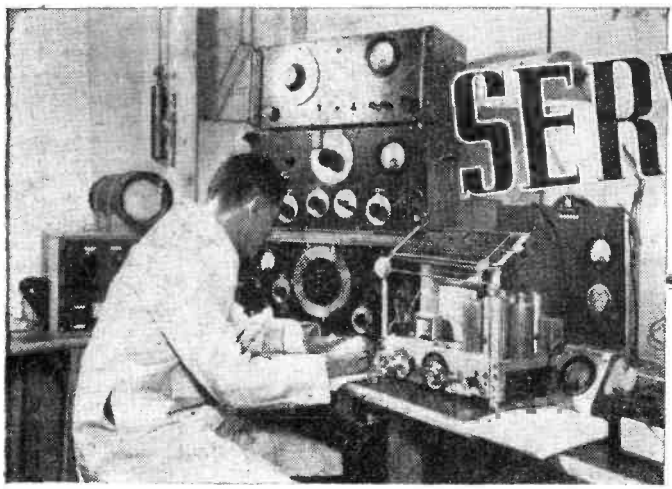
This brings us to the fundamental difference between the average commercial fidelity set and the average amateur fidelity set. The former is an attempt to combine a better standard of quality with a degree of selectivity which will still give a very large selection of stations, while the quality enthusiast who builds his own set is usually perfectly willing to sacrifice stations for still better reproduction. As a result, the commercial quality set is usually crammed with tone compensating devices calculated to provide a final output containing a reasonably balanced quality, but not necessarily a faithful replica of the original performance. The net result is certainly pleasing, and satisfies a very large pro-



*A baby cabinet speaker in the W.B. range—type 40BC.*

portion of listeners, but it lacks the individuality and naturalness which can undoubtedly be obtained in a simpler and far less expensive way if only the desire for wide-world listening can be put aside. Again we say, stick to the triode—a good hefty fellow or, better still, two in push-pull, and avoid as far as possible all tone correction circuits.

*(Continued on page 44.)*



# SERVICING —New Series

**In this Second Article of the Series we Give some Further Colour Codes, and also Some Simple Forms of Receiver Testing**

IN addition to the colour codes given last week there is a code for the small cartridge fuses used in battery and mains receivers. The colour is usually shown by a small strip of coloured paper inside the tubular container, and the code is as follows:

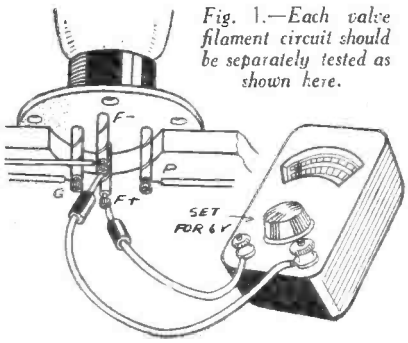



*Fig. 1.—Each valve filament circuit should be separately tested as shown here.*

| | | | | | |
|---|---|---|---|---|---|
| 60 mA | .. | Black | 1 amp. | .. | Dark Blue |
| 100 mA | .. | Grey | 1½ amp. | .. | Light Blue |
| 150 mA | .. | Red | 2 amp. | .. | Purple |
| 250 mA | .. | Brown | 3 amp. | .. | White |
| 500 mA | .. | Yellow | 5 amp. | .. | Black & White |
| 750 mA | .. | Green | | | |

Many modern receivers include a multiple condenser block, and some of these are of the cardboard carton type, flexible leads being brought out for the appropriate sections. These have a code, and where the condenser is of the simple type consisting of only one unit the leads will be red and black, indicating positive and negative—assuming, of course, that the condenser is an electrolytic component. Ordinary paper condensers will not have any marking as there is no need to observe polarity. Where two capacities are equal, the higher voltage shall be given the higher colour in the code table. In addition to the colours it is also necessary to mark the condensers in which two or more complete units are embodied and the following marks are therefore adopted:

Common positive junctions shall be marked +.

Common negative junctions shall be marked —.

Series connections shall be marked ±.

From this it will be seen that:

8+8 denotes two sections with a common positive connection.

8—8 denotes two sections with a common negative.

8±8 denotes a series voltage doubler connection.

8 & 8 denotes two isolated sections.

## Mains Transformers

Mains transformers in commercial receivers are provided with coloured leads or small tags fastened to the leads. The primary has a black lead for the connection usually marked 0 (one side of the primary) and the remaining tappings are a combination of black and another colour. Usually the lead is striped and black and green indicates 10 volts, black and yellow 210 volts, black and red 230 volts, and black and brown 250 volts. If a screen is interposed between primary and secondary this is generally a bare wire.

On the secondary side red is employed for the high voltage, the centre tap being red and yellow. The rectifier heater winding is green, with a green and yellow centre tap, and for the normal heaters the leads

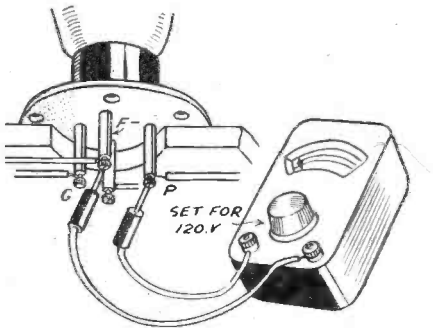



*Fig. 6.—Test for H.T. at each anode with a high-resistance voltmeter.*

are brown, with brown and yellow centre tap. Any additional low-tension heater winding will be blue, with blue and yellow

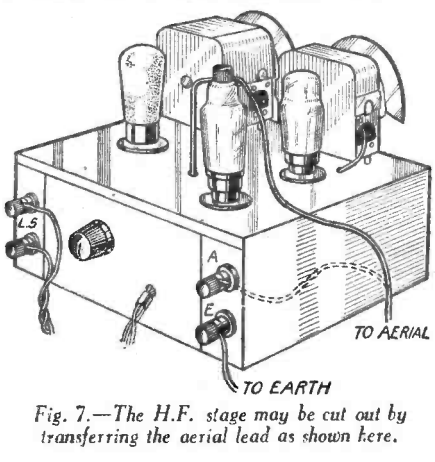



*Fig. 7.—The H.F. stage may be cut out by transferring the aerial lead as shown here.*

centre tap. It is thus obvious that all centre taps are yellow, striped with the colour of the winding from which the tap is made.

## Battery Leads

Multi battery leads are also colour coded, and the highest positive voltage is red, the second yellow, the third green, and

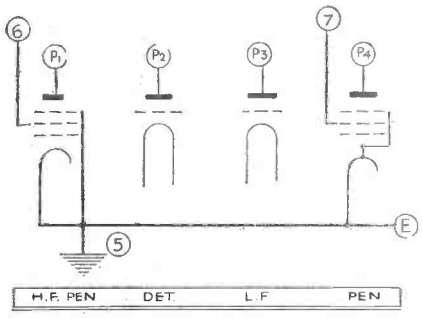



*Fig. 2.—Circuit junctions for individual voltage measurements.*

the fourth blue. The L.T. positive is coloured pink, common negative leads are black and the G.B. negative leads are brown for the maximum voltage, grey for the next and white for the lowest. Any additional point, such as the fourth greatest G.B. negative or fifth highest H.T. positive is violet, and any centre tap is white.

## Simple Tests.

Dealing now with the simplest form of test we will take a standard battery receiver which will give no signals of any kind. Obviously, the first test is to ascertain that the H.T. and L.T. voltages are correct and continuous. The L.T. may be tested at each valveholder and this should be done after the battery itself has been tested to make certain that it is fully charged. Place the simple test meter, adjusted to give a suitable reading, across the valve sockets as shown in Fig. 1, and it may be necessary to check each holder to ensure that the L.T. supply is continuous to all valves. If the test shows that L.T. is in order, the next test is for H.T., and it is not sufficient to test each H.T. lead at the points where it is joined to the receiver In any standard receiver the H.T. must be applied to the actual valve anodes or screens and therefore tests must be made at the points indicated, for example, in Fig. 2. The negative lead of the tester

(Continued on next page.)

## SERVICING
(*Continued from previous page*)

should be joined to the earth line and then tests made at P1, P2, P3, P4, 6 and 7. Here it is necessary to point out that the meter used must have a very high resistance, preferably greater than 1,000 ohms per volt. If this is not so, the readings will be very much out in some stages. As an example, Fig. 3 shows a normal valve stage with anode resistance and low-current reading. If now a low-resistance meter, as shown in Fig. 4, is joined across the valve there will be a much greater current drop across the anode load. If a 1,000 ohms-per-volt meter is used the drop will be less, and to approximate to the actual

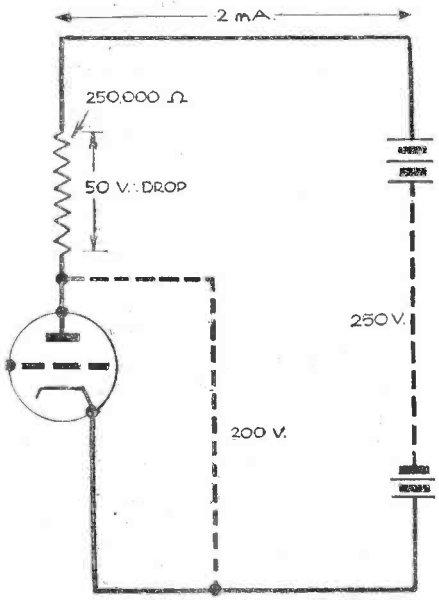



*Fig. 3.—Circuit data of an R.C. stage, showing actual voltage and current readings.*

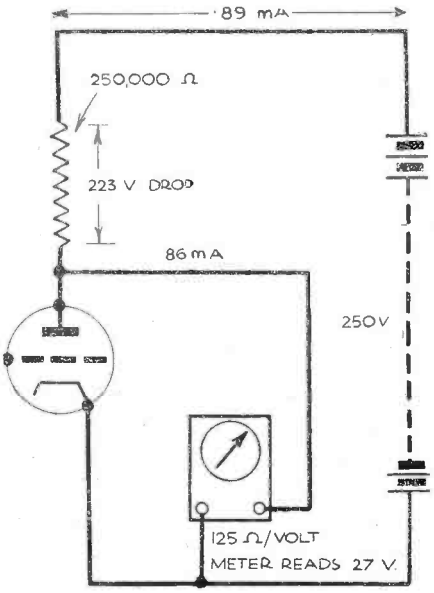



*Fig. 4.—How a low-resistance voltmeter will give false readings from the circuit shown in Fig. 3.*

figures it will be seen that a 20,000 ohms-per-volt meter is needed, as shown in Fig. 5. Therefore, unless such a meter is in use the only effect of the test shown in Fig. 6 is to make certain that H.T. is being applied to the anode and that anode components are in order. They will probably have to be tested separately at a later stage if it is found that all valves are receiving H.T. and L.T.

One quick way of then ascertaining in which stage the breakdown occurs is to touch the grid terminal of the valves, starting from the output valve. A plonk, hum or similar sound should be emitted when the grid is earthed in this manner, and if this occurs with the output valve but not with the next stage it will be known that the break occurs between the two stages. On the H.F. side the first stage may be checked by transferring the aerial to the anode lead of the valve as shown in Fig. 7, and if signals are then obtainable—although a different tuning setting will have to be obtained—it will be obvious that the first stage is at fault. This form of stage by stage-testing is often adopted even by experienced servicemen as a quick first course, and although it will not in many cases locate the trouble, it may often be possible to put a set in working order again merely by testing on these lines, without any further test equipment.

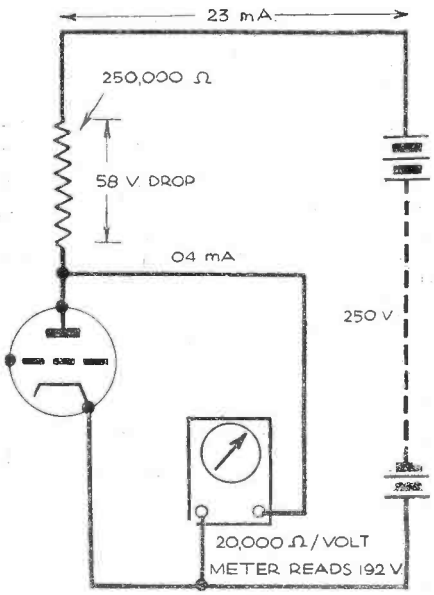



*Fig. 5.—A very high-resistance voltmeter gives practically correct readings as shown here.*

## QUALITY REPRODUCTION
(*Continued from page 42*)

In practically every commercial fidelity set the speech detector is a diode, and here we are in thorough agreement with the set maker. Usually there is no other L.F. amplification between the diode and the output stage, but in some instances a double-diode-triode combination is employed. It is probable that the degree of amplification obtained in the L.F. stage is obtained a little more cheaply than is possible in the pre-detector stages, but even so, for the amateur builder, an additional L.F. stage is not a very good proposition as it is easily the most prone to introduce hum, and calls for great care in both design and layout. Get all your voltage amplification in the high-frequency stages is a good motto for the home constructor.

### The H.F. Stage

There is a little to be said about the high-frequency side of those commercial receivers using a straight circuit. In most cases the aerial input is of the band-pass filter type and the intervalve couplings high-frequency transformers of conventional type. The superhets, on the other hand, have interesting features. The aerial input circuit is again of the band-pass type, but the intermediate-frequency transformers, which are, in effect, additional band-pass filters, are so designed that the width of the band accepted is variable. This variable selectivity, as it is termed, is achieved by adjusting the coupling between the two windings, either by variation of the value of one of the coupling components or by adjusting the position of one of the coils with respect to the other. By these means the set can be used as a conventional highly selective superhet for "all stations" listening, or, with the band width increased to maximum, as a less selective set for quality reproduction.

The snag in this arrangement is, of course, that as soon as the selectivity is reduced for quality reception, in come the interfering stations—a difficulty also experienced by constructors who interest themselves with fidelity reproduction. As a result, the commercial quality sets are for the most part so designed that even at minimum selectivity there is a considerable degree of high-note attenuation, which accounts, no doubt, for the readiness with which tone-compensating devices and similar aids to synthetic "quality" have been adopted.

While, therefore, set makers must be given due credit for their efforts to improve the general standard of reproduction, and while it must be admitted that they have been successful up to a point, it must not be imagined that the fidelity problem has been brought very much closer to solution. The whole problem simply bristles with difficulties, most of which are so far, not within either the manufacturer's or the listener's control, being due to the existence of far too many stations. At the best, a quality set must be a compromise between conflicting conditions. The commercial solution is synthesis—the building up of pleasant quality without too much heed to fidelity of reproduction of the original. This is perhaps unavoidable, since the commercial set must be capable of satisfactory operation under all conditions, anywhere. But the home constructor, who has only to cater for his own personal and local conditions, can often achieve far better results, more cheaply, and without too many correcting and compensating circuits.

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# PRACTICAL TELEVISION

Sept. 23rd, 1939. Vol. 4. No. 170.

## A Good Effort

THERE is not the slightest doubt that the efforts made by the various committees of the R.M.A. appointed to deal with certain specific matters associated with the organisation of Radiolympia for 1939 were most praiseworthy. No hitch occurred prior to the opening day with the result that the first visitors saw a finished show. As far as the broadcast distribution of sound on a carrier frequency of 850 kilocycles was concerned, the scheme worked out was most satisfactory, and the same applied to the arrangements for vision and sound distribution on carrier frequencies of 45 and 41.5 megacycles.

A really determined effort to suppress interference was made this year, and apart from one or two cases of commutation interference from fans, which were quickly traced and appropriately dealt with, and occasional diathermy, the pictures seen on the sets in any part of the Exhibition were of a high quality.

For television signal distribution between four and five miles of high quality coaxial cable was used by the authorities, and the technical officer appointed for duty each day to deal with any complaint was able to handle each matter that arose in a very satisfactory manner.

One of the most interesting television transmissions was the morning "Come and be televised" feature, and although the mush level for the signal during this hour of the day seemed a trifle higher than for any other programme, the versatile nature of the subjects who appeared fully compensated for this.

The amplifier situated in the Alexandra Palace feature worked continuously from 11 a.m. to 10 p.m. and the committee responsible for this side of the work are to be congratulated on their fine effort.

No startling television item was evident, and the performance standard of the two hundred television sets displayed by the various manufacturers was of a very high order. On the H.M.V. and Baird stands big-screen equipments for cinemas was shown, and a new television set on show for the first time was featured on the Baird stand. This has been designed for use in clubs, hotels, small halls and schools, and employs a cathode-ray tube for projecting a brilliant picture 5ft. by 4ft. on to a remote screen. Known as the M/P9 model it is very compact and simple to operate, quite being self-contained, and as far as can be ascertained the price is a little below £400.

## Cathode-ray Tubes

THE technically minded visitor found much to interest him at this year's radio show, and not the least of these was the various examples of cathode-ray tubes used for both television and oscillographic purposes. It was noticed that in the majority of cases those tubes designed for television picture reconstitution purposes employed electromagnetic focusing and deflection.

Manufacturers had succeeded in reducing the lengths of the tubes, and this enabled the sets to be more compactly designed even when a 15in. diameter tube screen was employed for direct receiving. There did not appear to be any effort, however, in developing the wide angle cathode-ray tube with rectangular screen as was shown on the continent quite recently. In the accompanying illustration is shown one of these tubes having a diagonal length of over 16in., and the tube shape is particularly interesting. The relatively short tube neck has a conical section welded to it, and from the open end it joins to the wide angle glass section having an almost flat face. Previously, considerable difficulty had been experienced in obtaining satisfactory deflection in both line and frame directions with short wide-angle tubes, but the problems associated with this branch of the work appears to have been solved successfully. It will not be surprising, therefore, if tubes of a somewhat similar shape make their appearance on the English market by the time the next season's television sets are designed.



*The short-necked, large-faced flat tube which has been developed successfully abroad.*

## Better Lighting

IN some quarters the opinion was expressed that the slightly inferior quality of the B.B.C. "Come and be televised" feature at Olympia was due to insufficient lighting. It was staged in a small studio with glass windows on two sides so that members of the public could see exactly what was happening as item followed item at five-minute intervals. There is no doubt that those working in the studio found it rather hot and any additional lighting would certainly have added to the discomfort if ordinary spots or floodlights had been added. On the other hand, it was announced recently that the General Electric television station at Schenectady had produced a new form of lighting which reduced the heat discomfort to the barest minimum, and if a similar scheme could be adopted in this country there is no doubt that an important television problem, namely adequate light without undue heat, would be solved. It is understood that these new lights comprise a battery of water-cooled quartz arc units. The actual lamp is very small indeed, and is positioned in a large bowl reflector, and the flow of water is adjusted at such a rate that the lamp is not destroyed by the heat generated.

## A Loophole

IT was announced recently that one major organisation in the United States intended to stop the televising of films because of the damage likely to accrue to the cinema industry. This has been quickly followed, however, by the decision of another network to televise one feature film a week during the autumn. The opposition of the distributors was responsible for the former decision, and this follows on similar lines to the refusal of renters to allow the B.B.C. to use films. In the case of the latter, however, the loophole provided by independent sources is being exploited in just the same way, as the B.B.C. is able to obtain films from independent renters who do not conform to the combined recommendations of the K.R.S. and the C.E.A. There is a feeling gradually gaining ground, however, that this state of impasse will be removed, and a satisfactory compromise be worked out by the parties immediately concerned.

## Eliminating C.R.T. Screen Damage

IT is well known that a stationary bright spot on the fluorescent screen of a cathode-ray tube at the point of electron impact will burn the screen, and many schemes have been devised to ensure that any failure of the deflecting circuits will not bring about screen damage. In the case of one projection receiver produced on the continent where the anode supply is one of 25,000 volts, the protection is undertaken in a simple but ingenious way. The voltages generated during the flyback periods are made to operate relays which interrupt the electric mains supply to the primary of the E.H.T. transformer. Should the deflecting circuits fail, therefore, the relays are brought into action in 0.2 second. The H.T. voltage is discharged through shunt resistances, and this causes the tube to defocus at once. It will be noticed on many domestic receivers that as soon as the set is switched off the scanning spot becomes stationary, but assumes a very large diameter. This is the same defocusing effect just referred to, but due to the very much higher anode voltages employed for the successful operation of sets using projection cathode-ray tubes, every precaution must be taken to ensure the tube's absolute safety under all conditions.

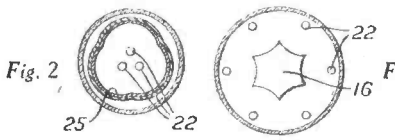
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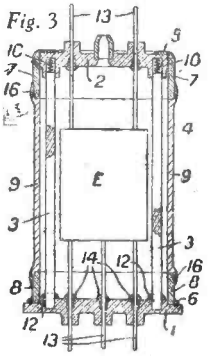
The cathode 16, Fig. 1, has a number of straight or curved emitting surfaces opposite each of which and parallel thereto is a rod-like anode 22. Rod form control electrodes




may be interposed between the cathode and anodes; the latter may be independently connected to circuit elements or connected together. The anodes 22, Fig. 2, may be arranged inside the cathode, which as shown has three curved emitting surfaces 25.

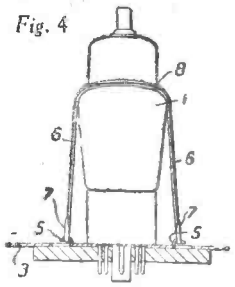
**DISCHARGE APPARATUS.**—Lorenz Akt. Ges., C. No. 507462.

The electrode system E, Fig. 3, is supported by leads 13 from ceramic discs 1, 2 which form closure members for the envelope 4 surrounding the electrodes. The members 4 may be of ceramic material or consist of a metal glass cylinder 9 with end rings 7, 8 of ceramic material. The parts are joined and the leads sealed by glass seals 5, 6. 12, 14, 16. Ceramic rods 3 are secured to one disc 1 and are slidably engaged in




recesses in the other disc 2 with the interposition of springs 10.

**THERMIONIC VALVES.**—Long, E. S. No. 507440.




In order to retain a radio valve 1, Fig. 4, or the like in position in the holder, a flexible resilient retaining band is used. The band is apertured at 7 to engage hooks 5 on the chassis 3, and is slotted at 8 to accommodate the reduced part of the valve. Alternatively, the central part of the band may be shaped.

## 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.

23785.—Baird Television, Ltd., Szegho C. S.—Cathode-ray tube, etc., apparatus. August 17.

24043.—British McMurdo Silver Co., Ltd., and Maconochie, H. C. E. Erskine.—Thermionic amplifiers. August 21.

23882.—Standard Telephones and Cables Ltd., Beatty, W. A., and Chatterjea, P. K.—Aerial coupling circuits. August 18.

23761.—Steatit-Magnesia Akt.—Ges.—Tuning devices. August 17.

23762.—Steatit-Magnesia Akt.—Ges.—Tuning devices. August 17.

### Specifications Published.

511178.—International Resistance Co.—Rheostats or potentiometers.

511362.—Baird Television, Ltd., and Jones, V. A.—Electron-discharge for use in television or like systems.

511363.—Fernseh Akt.—Ges.—Television and like systems.

511444.—Broadway, L. F., and Klemperer, O.—Cathode-ray tubes.

511503.—Cole, Ltd., E. K., and Martin, A. W.—Tuning of radio-receivers.

511508.—London Electric Wire, Co., and Smiths, Ltd., and Starling, J.—Earthing devices for use with electrical systems.

511519.—Kolster-Brandes, Ltd., Smyth, C. N., and Berry, R. J.—Television receivers.

511533.—Telefunken Ges. Fur Drahtlose Telegraphie.—Tuning arrangement for wireless receivers. (Addition to 505896).

511309.—Soffietti, G., and Ricchiardi, P. C.—Means for tuning-in wireless receiving apparatus to given broadcasting stations.

511386.—M. -O Valve, Co., Ltd., and Smith, H. S.—Tuning and indicating devices for radio and similar carrier-wave signal receiving apparatus.

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

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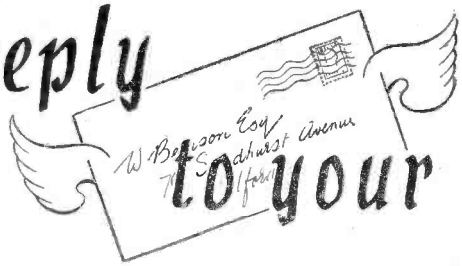
## RECEIVER SENSITIVITY

IT used to be the custom, several years ago, whenever longer range or greater sensitivity was required, to increase the number of high-frequency-amplifying stages. It was not always realised that when more than two or three such stages were used the efficiency of each stage had nearly always to be reduced in some manner or other in order to maintain stability. The writer well remembers building and using for several weeks an eight-valve set with four H.F. stages before discovering that results were somewhat better after two of these stages were eliminated! The position to-day is rather different due to the vast improvement which has been made in valve design, but it is still true that if more than two H.F. stages are employed the efficiency of each is nearly always impaired.

Even if this were not so there would still be a practical limit to the amount of useful H.F. amplification, because if sensitivity is increased beyond certain limits, background noises become so prominent that reception cannot be enjoyed. The range might be increased, but if "interference" noises are amplified to the same extent as the received signals, the net result is hardly changed. How can we measure sensitivity? This can be done with great accuracy by measuring the input voltage which must be applied to the aerial and earth terminals in order to produce any given output wattage at the speaker terminals. The generally accepted method is to determine the number of microvolts which must be applied to the input terminals to produce an output of 50 milliwatts. Using this method of computation it is found that a simple type of superhet or two-H.F. receiver of good design has a sensitivity factor of about 50 microvolts per 50 milliwatts output, whilst a highly-efficient superhet of advanced design may provide the standard output with an input of as little as 10 microvolts. Generally speaking, a sensitivity factor in excess of this is neither obtainable nor desirable, for the reason given above.

In making the sensitivity tests the volume control, where fitted, is turned full on, and the input from the aerial to the aerial-earth terminals is varied. By following this system the method holds good, and provides a convenient standard of comparison, regardless of the type of low-frequency amplifier.

# In reply to your letter




## Fault Location

**"My commercial 6-valve superhet has developed a peculiar fault in the form of erratic tuning settings. I have examined the tuning dial and this is not slipping. The condenser actually turns with the pointer, but the stations do not always come in at the same point. Can you give any indication as to the cause and cure."—L. E. R. (Barnsley).**

THE trouble may be tuning drift due to the effects of heating in a coil or component, or to movement of the turns on one or more of the coils. Only a systematic test will indicate the exact trouble and probably a proper circuit tester will be needed to find the exact reason. The full details of methods of testing a circuit of this type will be included in our series of articles on Servicing.

## Measuring Resistance

**"I have a small test meter of unknown make, but the scale in addition to current and volts is marked in ohms. I wish to measure grid leaks of the order of megohms and wonder if you can tell me the best way of doing this without altering the instrument."—A. S. P. (Deal).**

WITHOUT full details of the instrument exact details cannot be given. It may be possible to include an ordinary H.T. battery of 100 volts in series with the resistance under test and then to read off the values direct, or on the other hand a fixed resistance of 900,000 ohms could be included in series with a battery of 100 volts to leave the resistance under test capable of being read direct on the scale.

## Telsen Coil Connections

**"I am trying to make up a stand-by receiver and have found in my spares box a Telsen iron core coil type No. 478. I cannot, however, find the connections and wonder if you could assist me in joining up these. They are in the form of a two-gang unit with self-contained switch."—D. W. (Birmingham).**

BOTH coils are identical and consist of an H.F. transformer with reaction winding. The primary is between terminals 4 and 6 and the secondary between 1 and 3. The reaction winding is between 5 and 3, the latter point being earthed. The reaction condenser must, therefore, be insulated from the panel if an earthed metal panel is used. The high potential end of the primary is No. 4 and the grid is joined to terminal 1. Ignore the reaction winding in the coil which is used in the aerial circuit—in other words, nothing is joined to terminal 5 in this particular coil. You can also ignore the primary in the second coil and use a parallel tuned anode (or tuned grid) circuit if you so desire.

## Modifying a Meter

**"I saw in your paper some time ago that a resistance placed across a meter would alter the reading. I have a —— meter and wish to raise the six volt reading three and four times (i.e., 18 volts and 24 volts). Will you please advise me what resistance values are necessary to obtain these readings."—W. G. K. (Swanley).**

AS we have no details of the actual meter we cannot give you accurate information. You may carry out the conversion, however, in the following manner. Obtain a quantity of resistance wire and join one end to one terminal on the meter. Apply the full six volts, when, of course, the needle will rise to the 6 volt mark on the scale. Now take the resistance wire and touch it on the other terminal, when the needle will fall back on the scale. By carrying out one or two tests you will soon find the amount of wire which is necessary to bring the needle to 2 volts, and this quantity may be wound round a suitable former and joined to a switch or other selector to provide the "three times" scale. By then applying 6 volts and connecting a further quantity of wire you may bring the needle down to the 1.5 volt mark on the scale and this will provide the "4 times" reading. Some precautionary measure is advisable to prevent the application of high voltages when the resistances are not in circuit.

### 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.

## Accumulator Connections

**"I find difficulty in obtaining satisfactory connections to my accumulator due to the effects of the acid. The ends of the battery cord have already been cut and joined three times and are now getting too short to reach down to the shelf on which the battery is placed. The thin copper wires of the flex seems to be eaten away in a very short time and I should like to know whether there is any way of preventing this."—L. C. E. (Morpeth).**

THERE are several ways of overcoming the difficulty you mention. The simplest is to slip lengths of rubber tubing (cycle valve rubbers) over the ends of the leads and to smear with Vaseline. A much better plan, of course, is thoroughly to clean the terminals and to place on them the special lead-coated connectors sold by Clix. The ends of your battery cords are then fitted with bakelite tube connectors which push over the other portion fitted to the terminals and thus give good contact and keep the leads free from the effects of the acid. Make certain that your accumulator terminal is tightened up properly, so as to prevent the acid creeping up and round the terminal base, and a layer of Vaseline here will help to keep the terminal clear of corrosion.

## Obtaining Large Output

**"I enclose a circuit of my receiver which is S.G., anode-bend detector and output pentode. I have 90 mA at 250 volts H.T. available and should like to know whether the 362 ME25 valve would be fully loaded so as to deliver 9 watts, if I used it in the output stage of this receiver. If not, could you recommend a 4, 5 or 6 watt pentode which would be suitable for me?"—G. S. B. (North Shields).**

IT is hardly likely that your present arrangement would enable the valve in question to be fully loaded. At least one more stage of L.F. amplification should be employed, and a volume control should be included between the detector and the additional stage. The anode current of the ME25 is only 60mA, so that your present H.T. supply should prove quite adequate for the amended circuit. Your local station would then provide sufficient volume to obtain your desired results, but for reception over greater distances we would also suggest that you consider the addition of a further H.F. stage, thus making the complete receiver into a 5-valve set. By adopting the variable mu characteristics in the first two stages the local could be kept under control, and you would then have your full 9 watts on a fair number of stations.

## Speaker Volume Control

**"I have a well-known speaker to which I want to fit a volume control solely to speaker. Could you give me type of control and where to fit it?"—R. H. T. (Thornton Heath).**

YOU omit the important details concerning your equipment. Is the speaker used in conjunction with other speaker or speakers, or is it the only speaker with the receiver? In the latter case, of course, it would be preferable to fit the control on the actual receiver circuit to avoid overloading of the output valve. If, however, the speaker in question is used as an extension speaker certain precautions may be necessary to avoid affecting the remaining speakers which may be in use and for avoiding distortion due to mis-matching. In general, a control across the secondary side of the speaker transformer should be adopted, and the value of this will depend upon the value of the speech coil.

## Frame Aerial

**"I have seen particulars of the £4 Superhet Four and wonder if it is possible to utilise the same circuit in a portable, using a frame aerial instead of the first H.F. coil. The only likely difficulty that I can see is that there will probably be interaction between the set and the frame aerial, thus setting up instability. Also could you tell me if it would work successfully as a mains set."—S. D. G. (Leeds).**

THE use of a frame aerial would not be difficult, but it would be necessary to use a separate tuning condenser for this as the inductance would not be satisfactorily wound to match the oscillator coil and thus permit of tuning with a two-gang condenser. The receiver will function perfectly well as a mains receiver, and blueprints are available for A.C. and universal models.

# Practical Wireless BLUEPRINT SERVICE

These Blueprints are drawn *full* size.

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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.

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|---|---|---|
| **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 : Blueprints, 1s. each.** | | |
| Four-range Super Mag Two (D, Pen) | — | PW36B |
| The Signet Two (D & LF) | 24.9.38 | PW76 |
| **Three-valve : Blueprints, 1s. each.** | | |
| The Long-range Express Three (SG, D, Pen) | 24.4.37 | PW2 |
| Selectone Battery Three (D, 2 LF (Trans)) | — | PW10 |
| Sixty Shilling Three (D, 2 LF (RC & Trans)) | — | PW34A |
| Leader Three (SG, D, Pow) | 22.5.37 | PW35 |
| Summit Three (HF Pen, D, Pen) | — | PW37 |
| All Pentode Three (HF Pen, D (Pen), Pen) | 29.5.37 | PW39 |
| Hall-Mark Three (SG, D, Pow) | 12.6.37 | PW41 |
| Hall-Mark Cadet (D, LF, Pen (RC)) | 16.3.35 | PW48 |
| F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three) | 13.4.35 | PW49 |
| Genet Midget (D, 2 LF (Trans)) | *June* '35 | PM1 |
| 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) | 21.3.26 | 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 |
| All-Wave "Corona" 4 (HF Pen D, LF, Pow) | 9.10.37 | PW79 |
| "Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B) | 12.2.38 | PW83 |
| The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC)) | 3.9.38 | PW90 |

### Mains Operated.

| | | |
|---|---|---|
| **Two-valve : Blueprints, 1s. each.** | | |
| A.C. Twin (D (Pen), Pen) | — | PW18 |
| A.C.-D.C. Two (SG, Pow) | — | PW31 |
| Selectone A.C. Radiogram Two (D, Pow) | — | PW19 |
| **Three-valve : Blueprints, 1s. each.** | | |
| Double-Diode-Triode Three (HF Pen, DDT, Pen) | — | PW23 |
| D.C. Ace (SG, D, Pen) | — | PW25 |
| A.C. Three (SG, D, Pen) | — | PW29 |
| A.C. Leader (HF Pen, D, Pow) | 7.1.39 | PW35C |
| D.C. Premier (HF Pen, D, Pen) | — | PW35B |
| Ubique (HF Pen, D (Pen), Pen) | 28.7.34 | PW36A |
| Armada Mains Three (HF Pen, D, Pen) | — | PW38 |
| F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) | 11.5.35 | PW50 |
| "All-Wave" A.C. Three (D, 2 LF (R.C.)) | — | PW54 |
| A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen) | — | PW56 |
| Mains Record All-Wave 3 (HF Pen, D, Pen) | — | PW70 |
| All-World Ace (HF Pen, D, Pen) | 28.8.37 | PW80 |
| **Four-valve : Blueprints, 1s. each.** | | |
| A.C. Fury Four (SG, SG, D, Pen) | — | PW20 |
| A.C. Fury Four Super (SG, SG, D, Pen) | — | PW34D |
| A.C. Hall-Mark (HF, Pen, D, Push-Pull) | 24.7.37 | PW45 |
| Universal Hall-Mark (HF Pen, D, Push-Pull) | 9.2.35 | PW47 |
| A.C. All-Wave Corona Four | 6.11.37 | PW81 |

## SUPERHETS.

| | | |
|---|---|---|
| **Battery Sets : Blueprints, 1s. each.** | | |
| £5 Superhet (Three-valve) | 5.6.37 | PW40 |
| F. J. Camm's 2-valve Superhet | — | PW52 |
| F. J. Camm's "Vitesse" All-Waver (5-valver) | 27.2.37 | PW75 |
| **Mains Sets : Blueprints, 1s. each.** | | |
| A.C. £5 Superhet (Three-valve) | — | PW43 |
| D.C. £5 Superhet (Three-valve) | 1.12.34 | PW42 |
| Universal £5 Superhet (Three-valve) | — | PW44 |
| F. J. Camm's A.C. £4 Superhet 4. | 31.7.37 | 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.

| | | |
|---|---|---|
| **One-valve : Blueprint, 1s.** | | |
| Simple S.W. One-valver | 9.4.38 | PW88 |
| **Two-valve : Blueprints, 1s. each.** | | |
| Midget Short-wave Two (D, Pen) | — | PW38A |
| The "Fleet" Short-wave Two (D (HF Pen), Pen) | 27.8.38 | PW91 |
| **Three-valve : Blueprints, 1s. each.** | | |
| Experimenter's Short-wave Three (SG, D, Pow) | 30.7.38 | PW30A |
| The Prefect 3 (D, 2 LF (RC and Trans)) | 7.8.37 | PW63 |
| The Band-Spread S.W. Three (HF Pen, D (Pen), Pen) | 1.10.38 | 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) | 19.3.38 | PW86 |

## MISCELLANEOUS.

| | | |
|---|---|---|
| S.W. Converter-Adapter (1 valve) | — | PW48A |

## AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.

| | | |
|---|---|---|
| **Blueprints, 6d. each.** | | |
| Four-station Crystal Set | 23.7.38 | AW427 |
| 1934 Crystal Set | — | AW444 |
| 150-mile Crystal Set | — | AW450 |

## STRAIGHT SETS. Battery Operated.

| | | |
|---|---|---|
| **One-valve : 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.** | | |
| Class B Three (D, Trans, Class B) | — | AW386 |
| £5 5s. S.G.3 (SG, D, Trans) | 2.12.33 | 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) | *Mar.* '35 | 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-valver Short-waver (SG, D, LF, P) | 22.7.39 | WM383 |
| **Superhet : Blueprint, 1s. 6d.** | | |
| Simplified Short-waver Super | *Nov.* '35 | WM397 |

### Mains Operated.

| | | |
|---|---|---|
| **Two-valve : Blueprints, 1s. each.** | | |
| Two-valve Mains Short-waver (D, Pen) A.C. | — | AW453 |
| "W.M." Long-wave Converter | — | WM330 |
| **Three-valve : Blueprint, 1s.** | | |
| Emigrator (SG, D, Pen) A.C. | — | WM352 |
| **Four-valve : Blueprint, 1s. 6d.** | | |
| Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) | *Aug.* '35 | WM391 |

## MISCELLANEOUS.

| | | |
|---|---|---|
| S.W. One-valve Convertor (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/-) | — | WM338 |
| Trickle Charger (6d.) | *Jan.* 5, '35 | 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* '35 | WM406 |
| The W.M. A.C. Short-wave Converter (1/-) | — | WM408 |

Practical and Wireless
★ PRACTICAL TELEVISION ★
EVERY WEDNESDAY. Vol. XV. No. 367. Sept. 30th, 1939.
EDITED BY F. J. CAMM
Staff: W. J. DELANEY, FRANK PRESTON, H. J. BARTON CHAPPLE, B.Sc.

# ROUND THE WORLD OF WIRELESS

## Using Spare Parts

THERE are hundreds of amateurs who have available various pieces of apparatus which are not of modern design or for which they have no immediate use. Owing to the present situation there are, however, many interesting little receivers which may be built up from such parts, either to form a stand-by receiver for their own use, or from which they can make a small receiver to present to some not-so-fortunate acquaintance. The sets may be of the simplest type in view of the limitation of broadcasting in this country, and last week we described a two-valver, and in this issue there is a one-valver, which may be built from such parts. There is no need to give up radio experimenting, although certain difficulties may be experienced in obtaining some types of apparatus. As prices of complete receivers will naturally rise as material shortage makes itself felt, there should be a return to general home-construction and to the days when every listener found pleasure in making a receiver for the general reception of broadcast programmes. Already certain manufacturers have announced a rise in the price of their sets and further rises may take place. We shall describe periodically various types of receiver which may be built from spare parts which are easily obtainable or which are likely to be on hand.

## Paris Bans Car Radio

IT is announced from France that radio sets on cars or motor-cycles are now forbidden under an order issued by the Prefect of Police and at the request of the military authorities. Sets already installed must be removed withing forty-eight hours from the publication of the notice of the ban.

## Hire Purchase

FINANCIERS announce that hire-purchase agreements for radio apparatus may still be entered into, but an increase in the finance charge for such agreements will have to be made in view of the rise in the Bank Rate. The increase at present is 1 per cent. for each twelve months of the currency of the agreement, calculated on the amount of agreement balances, less deferred payment.

**IMPORTANT NOTICE TO OUR READERS**

Elsewhere in this issue you will find a leaflet explaining that owing to the restriction of paper supplies during war-time every reader can help by giving a newsagent or bookstall a regular order for "Practical Wireless."

Such an order eliminates waste of surplus copies in the shops, and ensures regular delivery during war-time.

Readers who do not give an order NOW may find the greatest difficulty in getting copies in future, and the Editor asks you to help in this way.

**Please order "Practical Wireless" now, and use the order form enclosed.**

## Relays at Wrexham

FOR the third time the Town Council at Wrexham have rejected the proposal to install a relay system in the town. On this occasion discussion arose on a request from the Home Office that the proposal should receive favourable consideration, but by a large majority the Council decided to adhere to previous decisions.

## Television Society

THE Television Society announce that as a result of the present situation there will be a temporary suspension of their lecture arrangements and other activities. The society's library is remaining open in the daytime, and when the necessary A.R.P. arrangements have been carried out it will also be open in the evening.

## Sealed Radio

AS a further safeguard the Postmaster-General announces that when in territorial waters of Great Britain and Northern Ireland the use of wireless telegraphy apparatus on board vessels will be subject to rules made by the Admiralty. On entering any port or harbour the WT office will be sealed by the customs officer boarding the vessel.

## Clock Sign Attraction

AN electric clock sign was installed some time ago in a city in America, but failed to attract the necessary public attention. After some consultation it was decided to install chimes to mark the quarter hours to attract attention to the clock. This was carried out by installing a chiming clock in front of a microphone feeding speakers behind the sign. This attracted the necessary attention and the sign is now fully effective.



*Max Miller entertaining some of London's evacuees somewhere on the South Coast.*

**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.**

*The Editor will be pleased to consider articles of a practical nature suitable for publication in* PRACTICAL WIRELESS. *Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor,* PRACTICAL WIRELESS, *George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.*

*Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.*

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## ROUND THE WORLD OF WIRELESS—Continued

### Indian Broadcasting

IT is expected that the scheme for the centralisation of the news bulletins broadcast by the stations of All-India Radio, will be completed by next April. News broadcast from Delhi will then be relayed by all A.I.R. stations.

### The P.M.G.

THE war cabinet appointment did not bring about any change in the office of Postmaster-General, which is retained by Major G. C. Tryon, and Assistant P.M.G., which is held by Mr. William Habane, who was appointed in May to succeed Sir Walter Womersley, who is now Minister of Pensions.

### Nine Million Wireless Licences

THE Post Office issued 387,882 wireless receiving licences during August, showing a net increase of 24,768 in the number of licence holders during the month.

The approximate number of licences in force at the end of August was 9,044,100, compared with 8,689,188 at the end of August last year, an increase of 354,912.

### Radio Without Static

THE National Broadcasting Company of America is planning to build a radio station and research laboratory on top of the Empire State building in New York to test a new type of broadcasting devoid of "atmospherics."

Major Armstrong, electrical engineering professor at Columbia University, believes that he has solved this problem. Specially designed radio receivers, tested during thunderstorms, gave clear reception when operated by Major Armstrong's method of "frequency modulation."

### Radio Training in Cincinnati College of Music

ONE of the most comprehensive courses in radio training in the United States will be offered in Cincinnati this autumn through the Radio Extension Department of the College of Music.

Designed to present opportunities in the fundamentals of production, continuity writing, microphone technique, programme building, conducting and music arranging under the guidance of professional instructors, the plan provides for lecture courses combined with laboratory studio work to provide the student experience in radio problems.

The new college radio school will be divided into two general classifications, according to Uberto Neely, director of the Radio Extension Department. There are courses pertaining to music, and courses dealing with non-musical aspects of broadcasting.

Among the latter is the course in radio-script writing scheduled by the Evening Division of the University of Cincinnati, under the direction of Arthur Radkey, member of the WLW Educational Department. Credit for the course is to be transferable to the College of Music Radio Extension Department and may count, as will credit in all classes at the radio school, toward a bachelor of music degree at the college.

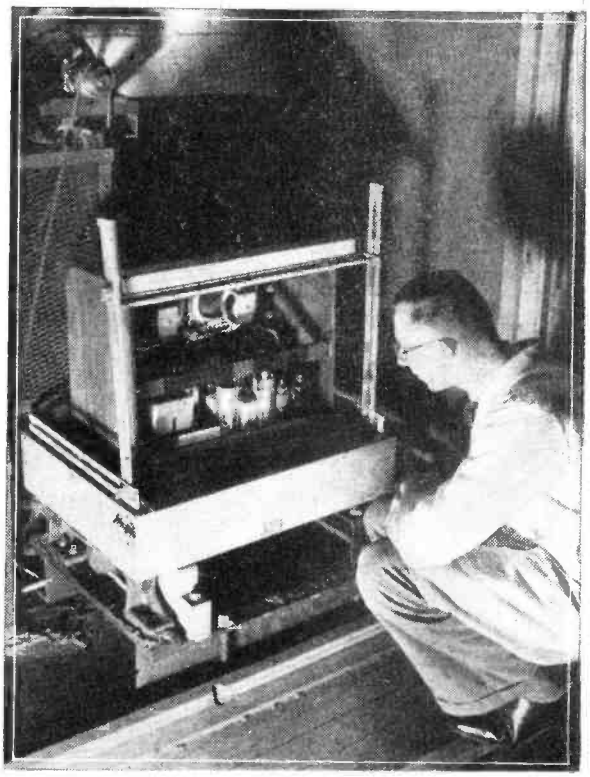
### Five Thousand Broadcasts

FIVE THOUSAND broadcasts!

This is the record which was achieved by Joseph Lewis, one of the B.B.C.'s most popular conductors, when he took charge of an orchestral concert which was broadcast on Saturday, September 16th. Mr. Lewis, who is well known to listeners, not only in the South and the Midlands, but also in the North, has been associated with the B.B.C. from 1923. Prior to that, he was assistant conductor of the City of Birmingham Orchestra under Sir Adrian Boult.

Few people who have seen Mr. Lewis at work can have realised that each movement of his hands while he is conducting costs him considerable pain, for he is a victim of rheumatism and this necessitates his using the lightest of batons.

Under the will of the late Sir Edward German, Mr. Lewis became the possessor of a gold-mounted baton which had been used by the famous composer. On account of his rheumatism, however, he has never been able to use this baton.



*Every G.E.C. receiver gets the shock of its life on this machine. When the set has come through a gruelling test successfully it is judged O.K. for service overseas.*



*Miss Frances Day, the famous actress, recently visited a camp "somewhere in Surrey" and entertained the troops. She received a great ovation, and is here seen joining in the general hilarity.*

### Golf Course Radio

IT is reported that wireless was used for the first time recently to keep spectators in touch with what was going on round a golf course when the Natal Golf Championship was played at Kloof.

Generally a crowd collects at the scoreboard and waits anxiously as score after score is registered: in future, spectators will know how players have fared to the halfway mark through a short-wave wireless transmitter which has been installed at the tenth tee.

NOW READY!

**MORE MILES PER GALLON!**

A new Handbook prepared by F. J. CAMM, explaining how motorists may reduce petrol consumption. The book also deals with petrol substitutes, such as paraffin, gas, etc.

**1/- or 1/2 by post, from GEO. NEWNES, Ltd., Tower House, Southampton St., Strand, W.C.2**

# The A.R.P. One

## A Simple Single-valve Receiver for Stand-by or Regular Use—Low in Cost and Simple to Operate

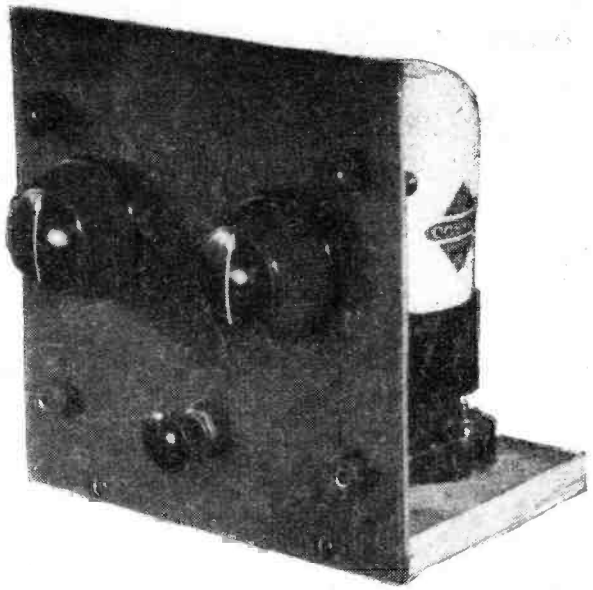


*Fig. 2.—Three-quarter front view of the set.*

LAST week complete constructional details were given of an efficient two-valve battery-operated receiver which was primarily designed for the reception of the Home Service transmissions. Its performance, under widely varying tests, was such that quite good loudspeaker results could be obtained when it was used in conjunction with an aerial having average efficiency, or, if local conditions rendered it impossible to use anything other than a short indoor aerial, most satisfactory headphone reception was assured.

Whilst this design will, no doubt, meet the requirements of many of our readers requiring an emergency set, it would appear that quite a number desire something even more simple, less expensive, and more economical than the Home Service Two; therefore, we have produced a simple single-valver, which may be built from odd parts which you may have on hand or which may be obtained quite cheaply, either from standard firms or from surplus stores. As will be seen from the accompanying illustrations and the picture on our cover this week, the set has been compressed into the smallest possible compass, the baseboard measuring only 5in. by 3in., and the panel 5in. square.

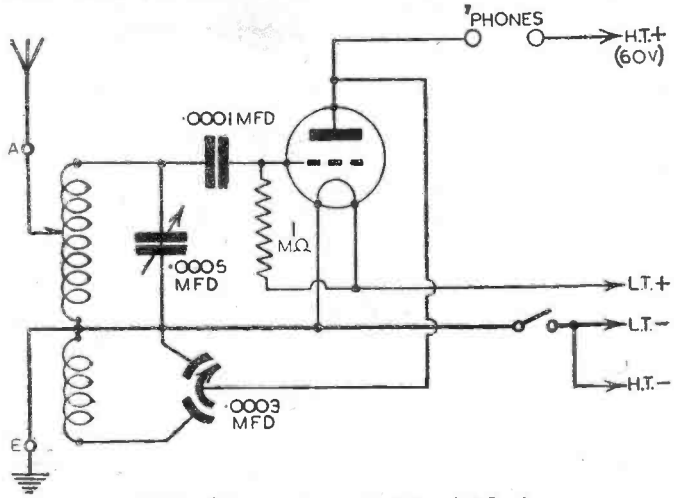



*Fig. 1.—Theoretical circuit of the A.R.P. One*

### Circuit Details

It may thus be placed in a small box and stored away in an odd corner of the dug-out or air-raid shelter so that special announcements may be followed during an air-raid or for the reproduction of any music which may be broadcast at the time. It may also be used as a stand-by receiver in the home, and will, with the necessary batteries, only take up a very small amount of space. The coil is designed for medium waves only, and may be home-made or obtained from Messrs. T. W. Thompson, by whom it is manufactured. It consists of a tapped grid coil with over-wound reaction winding, and provides adequate selectivity and sensitivity for the purpose for which it is used. The standard grid-leak and'condenser arrangement is employed, with a differential reaction condenser control. This condenser, together with the tuning condenser, is of the solid-dielectric type, and these are obtainable from Messrs. Polar, Bulgin, J.B. or similar firms. An on/off switch is placed centrally on the panel, and aerial and earth and 'phone connections are made by means of standard Clix plugs and sockets.

It will thus be seen that components are reduced to a minimum and, accordingly, the entire receiver may be constructed in a very short space of time. Operation is just as simple, and thus the receiver is also ideal for the beginner who wishes to make up a one-valve receiver for general use.

### Constructional Details

The baseboard is cut 5in. by 3in. from any ordinary stout wood or ply, a thickness of ⅜in. or ½in. being desirable to enable the front panel to be held firmly by screws driven into the edge of the baseboard. The panel, on the other hand, may be cut from the thinnest plywood, and is, as already mentioned, a square—5in. by 5in. The holes for condensers, switch and sockets are drilled as indicated in the panel layout diagram, and these parts may then be mounted and locked into position. The coil is attached to the baseboard by passing a screw through the cross-strip inserted at the lower end of the coil, and the valve-holder is then attached by its side. The fixed condenser is attached to the grid terminal of the valveholder, and the grid leak is joined across the grid and positive filament terminals. The remainder of the wiring may be seen from the wiring diagram, and the battery leads are, of course, cut from ordinary single flex, obtainable from the local stores. Four wander plugs are attached to the ends of the flex as indicated in the wiring diagram, and when wiring is complete the receiver is ready for test.

As already mentioned, the set will operate even with a simple indoor aerial of quite small dimensions, but obviously, the performance depends upon the locality and the strength of the signals which are available at the listening point. On the other hand, quite a large aerial may be used without any serious difficulty from the selectivity point of view being experienced.

### Operating Details

For the L.T. quite a small 2-volt accumulator may be used as the total consumption is only .1 of an amp. For the H.T. 60 volts is adequate and provides perfectly smooth reaction, so that a small 60 or 66 volt H.T. battery is suitable. The headphones should be of the high-resistance type—2,000 or 4,000 ohms, and should always be inserted into the sockets in the same relative position—keeping the "positive" tag of the 'phones (usually marked by a red thread running through the cotton covering or by some similar means) in the red or lower 'phone socket. Connect aerial and earth and pull out the switch. The receiver is then ready for tuning, and the best plan is to rotate the right-hand control slightly until a "breathing" sound is heard in the 'phones and then to turn the left-hand control until a station is heard. The right-hand control strengthens signals, but also increases selectivity so that until the station is exactly tuned in it may be found that signal strength appears to weaken as the right-hand control is rotated. A readjustment of the tuning control will, however, result in the desired increase in volume

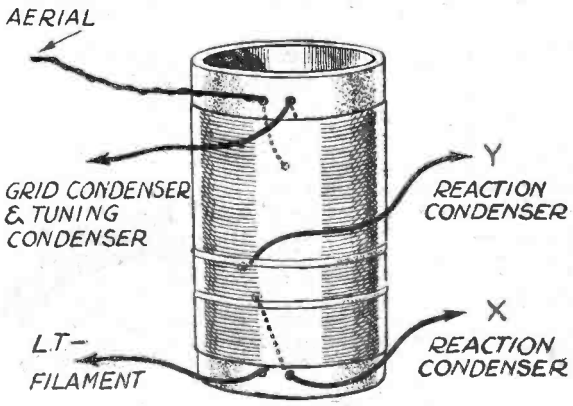



*Fig. 3.—Coil connection details for the A.R.P. receiver.*

(Continued on next page)

## THE A.R.P. ONE

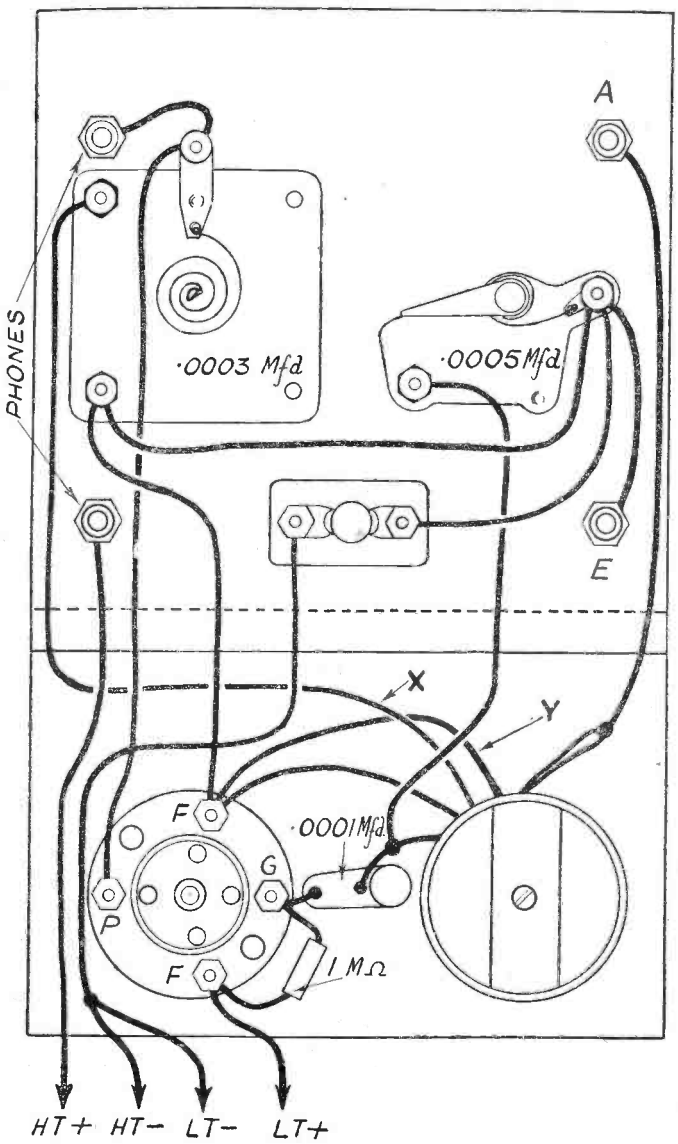
(*Continued from previous page*)

and at the same time an improvement in quality, as maximum quality is only obtained when the circuit is exactly tuned to the frequency of the signal being received. If the receiver is used in a position where signals are too loud, even with reaction at minimum, the best way of reducing the signal strenth is to lower the value of H.T. applied, going down to 15 volts if necessary. This will not have any deleterious effect on the valve or any other components, but if the low voltage is used very frequently that part of the H.T. battery will become discharged quicker than the rest of the battery, and then when an increase in voltage is required some difficulty may be experienced due to the increased resistance of the lower section of the battery. Beyond this, there are no special precautions to be observed, and the receiver may be used with the utmost confidence.

As already mentioned, the coil can be purchased ready wound but, for the benefit of those who would rather experience the thrill of making as much of the receiver as possible, we give below the essential details of its construction. The former is 1⅝in. in diameter and 2¼in. long, and should be made from a piece of ordinary postal cardboard tubing or, better still, a length of paxolin tubing if such is available. If cardboard is used, it is absolutely essential to see that it is perfectly dry; in fact, it is advisable to impregnate the tube after drying it in a slow oven for a few minutes. Ordinary shellac may be used for the impregnation.

The actual winding is carried out with 22-gauge enamel wire, winding this with 70 turns close wound, that is, each turn lying close up to its neighbour. After 23 turns have been put on a tapping loop has to be made for the aerial, and this is accomplished by doubling a length of the wire and pushing it through a hole in the former. It must be kept taut whilst the rest of the coil is wound. After the winding has been finished a length of paper or Empire Tape ½in. wide should be wrapped round the lower end of the winding, its position being about ½in. from the lower end of the coil. On this insulator 20 turns of the 34 S.W.G. enamel wire are wound, and these must be in the same direction as the first winding. One way of anchoring the ends of this additional winding is by means of sealing-wax or Chatterton's Compound, whilst another way is to pierce holes through the former, between the turns of the first winding. In this case great care must be taken not to scrape off the insulation where the wires cross. The over-wound winding is for reaction, and the tapping on the main winding is the aerial connection, and the relative connecting points of these ends is shown in the diagram Fig. 3. The coil is mounted on the baseboard by means of a 1in. strip of wood screwed inside the lower end of the coil former. The ends should be rounded and screws passed through the coil former to attach the wood firmly.

### WIRING DIAGRAM OF THE A.R.P. ONE




**WORKSHOP CALCULATIONS TABLES AND FORMULÆ**
By F. J. CAMM
**3/6, by post 3/9 from**
*George Newnes, Ltd. (Book Dept.), Tower House, Southampton St., Strand, W.C.2.*

## Notes from the Test Bench

### Screens and Ganging

*SOME constructors who have attempted to build the 1940 "Air-Hawk" 9 have found difficulty in lining up the three bandspread condensers, having cut the holes in the screens out of true. It is obvious that with an assembly of this type, if the holes are the slightest degree out the spindles will not line up and, in spite of the flexible couplers, the drive will not turn the three condensers. The only satisfactory way of lining up the condensers, if the holes are drilled incorrectly, is to make small slots, or otherwise to enlarge the holes, and place a large disc or square of metal over the bush. Connect the couplers and condensers and operate the dial until all turn smoothly, and then tighten up the locking nuts, the washers or other metal pieces ensuring the condensers being locked firmly.*

### Awkward Wiring

*WHEN connecting some types of multi-switch unit difficulty is experienced in making connection to the various tags if the switch is mounted before wiring. The best way to avoid this difficulty is to attach lengths of wire to the switch unit before mounting, using bare wire and slipping lengths of insulated sleeving over the wires when they are finally attached to their respective positions. They may be bent or otherwise manipulated to run in the required direction and finally cut, straightened, the sleeving passed over, and then bent to make the desired run before soldering. This leads to a neat appearance and simplified work.*

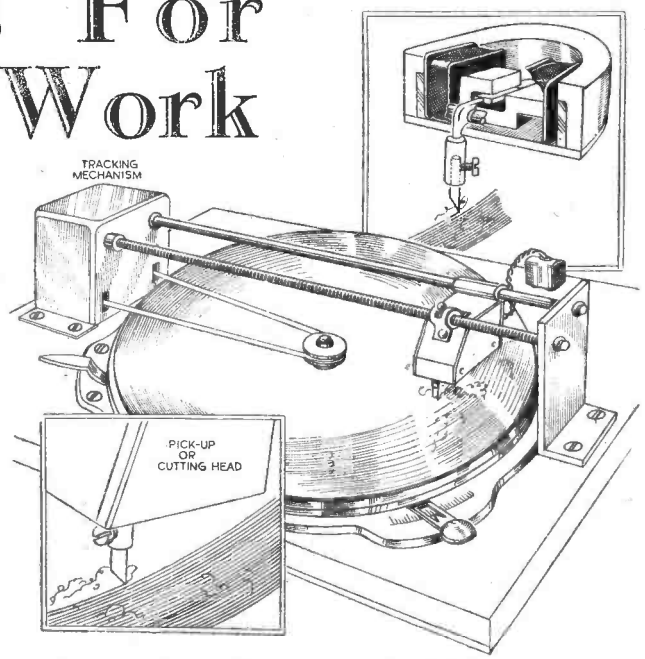
### A Dusting Point

*THE interior of a receiver accumulates a great deal of dust if not cleaned regularly, and dust can lead to leakage. Care should be taken when dusting the receiver, however, and if a small paint brush or similar article is used for the purpose, the precaution should be taken of wrapping the metal ferrule, which is generally fitted, with insulating tape. There is otherwise a risk of introducing a short-circuit via the ferrule, and even if the set is switched off, as, of course, it should be before dusting, the ferrule may come into contact with a terminal on a condenser which is heavily charged and may introduce trouble from that source.*

**PRACTICAL WIRELESS SERVICE MANUAL**
By F. J. CAMM.
From all Booksellers 5/- net, or by post 5/6 direct from the Publishers, George Newnes, Ltd. (Book Dept.), Tower House, Southampton St., Strand, London, W.C.2.

# Fresh Fields For Experimental Work

*With the Cancellation of Transmitting Licences Many Enthusiasts are Now at a Loss as to What Subject to Take Up to Replace Their Lost Hobby. The Writer of this Article, therefore, makes Several Useful Suggestions.* By L. O. SPARKS




*Home-recording provides a very interesting field for experiment.*

THERE must be many readers who are echoing the rather pathetic plea voiced by D. Gordon (N.W.9) in his letter which was published last week in the Open to Discussion columns. It is only necessary to quote but a few lines from his pen to express the feelings of many of the real enthusiasts, and the following words extracted from his letter sum up the new problem in a nutshell: ". . . I have lost my transmitter and find that listening alone is very uninteresting. I have plenty of gear and wonder if any other amateur transmitter has *discovered* any new field which may be explored without necessitating transmitting which is, of course, now illegal. . . ." Well, D. Gordon has the satisfaction of knowing that he is not alone with his problem. It is one of those little things which we have to accept as cheerfully as possible, and instead of bemoaning our loss, set-to to find some new hobby or useful work which will occupy the time previously taken by our interests in transmitting. To avoid any misunderstanding, I would mention that my rack is now but a skeleton; the units which used to fill the now empty spaces are enjoying—who knows—a well-earned rest in one of the P.M.G.'s stores.

With transmitting, like many other hobbies, one is apt to get so wrapped up in the subject that other spheres of activities are likely to be passed by or ignored, until one is suddenly made to realise the fact by those circumstances which suddenly jolt one back to earth.

When one is made to look round by such circumstances, it is surprising how many unexplored channels can be found, and if one is a genuine enthusiast, ample scope for fresh activities will soon be in evidence. It is the purpose, therefore, of this article to mention some of the most suitable subjects which, while being distinct from transmitting, are closely allied to the science in general and will help to improve and strengthen one's knowledge of the various spheres of radio.

## Electricity

Many constructors are inclined to gloss over some of the fundamental laws and theories of electricity and make too much use of compiled tables rather than work things out for themselves and thus get a thorough understanding of the whys and wherefores.

All stages of radio involve either direct or alternating current, or both together, and this one fact alone makes it essential for a certain amount of time to be spent on studying the characteristics of these forms of electricity and, if possible, verifying deductions or theories by as much practical experimental work as time and apparatus permit.

It is not possible in this article to mention every item which should be investigated, therefore the suggestions made below must suffice until more detailed advice can be given.

The best way to start would be to secure a good text-book on electricity and magnetism and work through it industriously. This does not mean dry as dust study. The whole subject can be made most interesting if the time available is split up into periods of reading, working out examples, practical experiments and the construction of such apparatus as that which comes within one's individual scope.

Keep a careful record of all work, as such not only comes in very handy for reference purposes but the very fact that the observations have to be written down helps to fix the details firmly in the mind of the student.

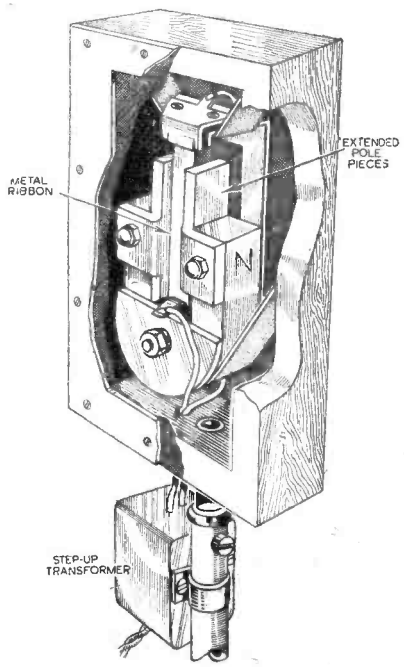
After electricity and magnetism, one can go on to high frequency currents, and in this section unlimited experiments can be carried out with apparatus which will be found on the shelves of most constructors' dens. The ordinary radio valve is another valuable source of interest which is so sadly neglected. Quite simple gear is all that is required to prove many theories related with this, including characteristics, detection, rectification and amplification.

Another item is coil and component design. Carry out comparative tests with different designs and make as many of the required parts as possible.

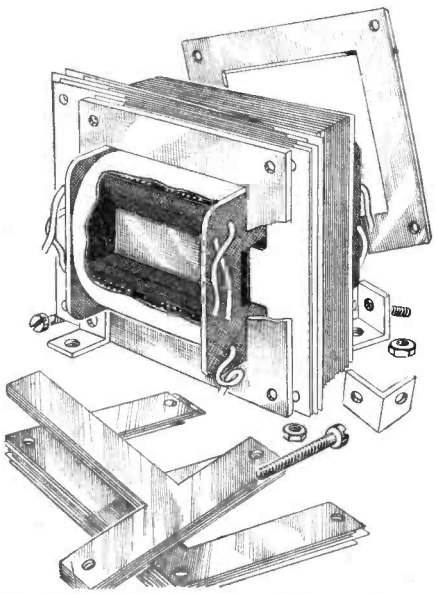
## Home Recording

A subject which can be most fascinating is home recording. This possesses the great advantage of creating considerable interest from the rest of the family and the majority of one's friends. Everybody always seems very keen to hear their own voice or talents as others hear them, and this, incidentally, once the equipment is working satisfactorily, can also be a source of income to help defray the cost of one's experiments. Quite good recording apparatus can be purchased

(*Continued on page 54*).




*Principal features of a home-made ribbon microphone are shown here.*



*Can the present-day transformer be improved upon? Here are the main features of its construction.*

## FRESH FIELDS FOR EXPERIMENTAL WORK

*(Continued from previous page.)*

for a reasonable figure, while the required L.F. amplifier should, of course, be constructed by the enthusiast and can form another line of interest.

The actual making of the tracking gear is usually beyond the facilities available to the average constructor, but this does not mean that those mechanically-minded should not have a shot at it.

Closely associated with the above activities is the microphone. A high-grade component of this type can cost quite a lot of money, but, here again, excellent opportunities are offered to the real constructor for serious experimental and constructional work connected with the design, response, sensitivity and assembly of one of the many forms of microphones, or, *perhaps*, the discovery of a new type.

### Mains Transformers

Judging by the number of letters received concerning the construction of mains transformers, it would appear that this item alone represents a very wide area for experimental work. Much can be done to determine the number of turns per volt for various size core areas. The gauge of wire required for given current requirements, the size stamping necessary for a certain wattage, and, above all, the efficiency of different designs. Such work as this, however, should not be undertaken by anyone unless they are familiar with handling mains voltages, as considerable care has to be taken to prevent the possibility of quite nasty shocks through carelessness or ignorance.

### Portable Receivers

Receivers of this type, and I am also including midgets, can form a distinct study on their own. Much time can be spent on evolving efficient designs when one gives due consideration to such things as sensitivity, stability, quality of reproduction, size, and lastly, but most essential, weight. Many constructors have never attempted to design or make a portable, and to those I would certainly recommend them as a sure means of passing many hours which will be filled with interest and anticipation. Midget components, whether purchased or home made, add considerably to the scope available as regards design, and mains or battery operation offers further possibilities for consideration and experimental work.

### Quality and Loudspeakers

These two items could form life-long studies. The quest for perfect reproduction or the perfect loudspeaker is never likely to cease, and a great deal can be done in these directions by all enthusiasts who are prepared to devote the time to the endless experiments offered by these subjects. Quality alone introduces so many factors; for example, L.F. couplings, response, tone correctors, attenuators, valve characteristics are but a few of the main items involved. With speakers, if one is prepared to experiment with different materials and designs for the cones, different baffles, flares or horns, then one can be assured of an endless variety of experimental problems.

### A.A. Holders

In spite of the vast number of fresh fields open to every amateur for exploration, there is one item which I would strongly advise those who recently held an A.A. licence not to overlook. I mean that item which is so essential to the securing of a full licence when those happy days come again, namely, twelve words per minute for Morse reception. There is not the slightest reason why additional time should not now be given to the perfecting of one's morse capabilities. With the dark evenings ahead, it is a good chance for two or more to get together and practise the code for all they are worth. Finally, whatever happens, stick to your hobby as long as your spare time will allow, for it is essential for all of us to have some mental relaxation during the critical times through which we are now passing.

# REDUCING THE INDUCTANCE OF RESISTANCE ELEMENTS

WHEN the resistance elements of a network are required to function over a wide range of frequencies, so as to include quite high frequencies, it often happens that steps must be taken to avoid as far as possible the introduction of reactance into the network arising from the self-inductance of the elements. Sometimes the problem can be solved simply by the use of resistances of the conductive layer type, but this method becomes unsuitable if a very high stability of magnitude is needed, as in an accurate attenuator. In such a piece of apparatus, also, the residual inductance of non-inductive windings, such as the bifilar and the Ayrton and Perry windings, may be too large for satisfactory operation. One method of surmounting the difficulty which results in a very satisfactory solution is to deliberately increase the self-capacity of the winding; if this is performed to the correct degree, the winding can be made to present a purely resistive impedance over an extremely wide range of frequencies—a winding of 1,000 ohms resistance and 5 microhenries inductance instead of presenting at 5 megacycles per second a reactive component of impedance of about 150 ohms, as it would do normally, may be made to present only a matter of a few ohms.

### Self-capacity Winding

To achieve the result of the above example it is necessary that the effective self-capacity of the winding should be adjusted to be about 5 micro-microfarads. In general it may be said that if L is the residual inductance and C the effective self-capacity it is necessary that C should be related to L and to R, the resistance of the winding, according to the formula: $L=CR^2$. L, C and R are shown represented n the equivalent network for the winding in the accompanying diagram. The principle underlying the method is quite simple and amounts, as is apparent, to the off-setting of the effect of inductance by the opposite effect of capacity.

There are, of course, a great many ways of arranging in practice for this balance to take place beyond the immediately obvious one of connecting a small condenser across the winding. If, as is often the case, the resistance is wound on a tube of insulating material the added capacity can be achieved by means of a copper tube, for example, pushed into the insulating tube; adjustment then consists of altering the distance to which the tube is inserted. Alternatively, thin metal foil can be stuck on the inner surface of the insulating tube and a certain amount can be scraped off until the right capacity is attained; or the foil can be placed on the outside. If the winding is on a card, the card can be split and a metal plate inserted. For small capacities the metallic element is best left floating, but to obtain greater capacities it is simplest to connect the element to the resistance at one end. In some cases it may be possible to obtain the whole additional capacity by locating the resistance close to a metallic surface, such as a screening surface.

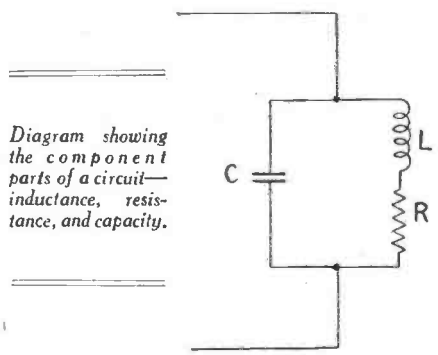



*Diagram showing the component parts of a circuit—inductance, resistance, and capacity.*

### Special Winding

Special measures may require to be adopted when the resistance of the winding is very small, for then, as the formula for the necessary capacity shows, this capacity tends to become rather large unless the residual inductance is made as small as possible in the first place. One arrangement that gives a very small inductance is where the resistance is wound as a figure-of-eight winding on a U-shaped metal former such as is provided by bending round a metal strip so as to give two thin metallic plates in close proximity to each other. The metal core has both the effect of reducing the inductance of the already highly non-inductive figure-of-eight winding and of increasing considerably the natural self-capacity of the winding. It must be pointed out that the value of L in the formula already given is, of course, the inductance of the winding in the presence of the metallic core. Other types of non-inductive winding can be used if preferred, retaining, of course, the principle of a metallic core. In contra-distinction to these precautions, necessary for very small resistance values, a perfectly straightforward type of winding may be used if the resistance is to be of high value.

A method of interest, but not one that lends itself to simple adjustment in practice, is to design the winding so that it possesses inherently a self-capacity of the required value without any further addition. A suitable form of winding is one in which the wire is wound in a coil of small diameter and in which this coil is then wound in the form of a larger coil on a former. By a not-too-easy calculation it is possible to relate the various dimensions so that the capacity and inductance of the winding neutralize one another.

# ON YOUR WAVELENGTH



By Thermion

### The R.S.G.B. to Carry On

I WAS glad to have a letter from Mr. J. Clarricoats, of the R.S.G.B., informing me that it is the Council's intention to carry on the work of the society during the war. They are retaining 53, Victoria Street, London, S. W.1, as a registered address, but the work of the society will be conducted from 16, Ashridge Gardens, Palmers Green, N.13 (telephone, Palmers Green 3255).

### Price Increases

THE increase in the price of commercial receivers has caused many old constructors to return to the ranks. I understand from our Blueprint Dept. that there has been an enormous demand for blueprints of some of our cheaper receivers. This is all to the good, especially when the component manufacturers confirm that there has been a run on components. I understand that it is the Editor's plan to publish a number of emergency receivers which can be built from parts which the constructor will have in hand. A further sign of the times is that our handbook entitled "Wireless Coils, Chokes and Transformers, and How to Make Them," and "Sixty Tested Wireless Circuits" have enjoyed a boomlet. People seem to be buying books and reading them now that there are few counter attractions in the evenings. This is the time to improve your knowledge and to make home study your evening entertainment.

The correspondence colleges inform me that they have had a sudden influx of students, which seems to indicate that others are thinking likewise.

This journal intends to carry on, and although I understand that it may not be possible, because of the paper shortage, to give quite the same number of pages, we shall do our very best to give the maximum possible. For the same reason it is now necessary for you to place a regular order for the delivery of this journal. If you rely upon purchasing your copy casually you may find that it has gone to another wise enough to reserve it.

A form which will save you trouble appears in this issue. Will you please fill it up and hand it to your newsagent? You will develop an even closer affection for your periodicals. It may not be possible shortly for newsagents to take journals for sale or return, so please do it now. And relating to this matter is the following letter from A. G. F., of Dormansland:

> I have just been reading your inspiring article in to-day's "P. W.," and I think that it's really rather fine; your summary of the uses of radio in warfare is really most efficient.
>
> I must congratulate the Editor on his decision to carry on with business as usual.
>
> At the moment I am building the Kestrel S.W. Four, and although it is not yet complete, I have a feeling that it is going to far outshine any other of my sets, and it is my fifth.
>
> I wholeheartedly agree with K. H., of Blackrock, when he says that many constructors have been won by receiving a home-constructed set. I am one of that variety, and I bless the day when I bought a three-valve set, mounted on a baseboard.
>
> I don't know what other readers, except those who have already expressed their excellent opinions, think about the new appearance and name of our journal but I must say that it is absolutely fine, and there's no getting away from it.
>
> Wishing PRACTICAL WIRELESS every success in these times of stress.

I like the spirit of this letter, which is typical of many which I have received from readers.

And, of course, "Torch" wishes to play his part too. This is what he has written:

Hail, ye many thousand readers,
Who find pleasure in my style,
Those who from my rambling rhyming
Now and then may get a smile;
Those who think that gentle "kidding"
Cannot rightly rank as "sin,"
And their fond indulgence granting
Welcome those who make them grin.

Mightier brains than mine are fighting
On the editorial staff,
Solving problems which perplex you,
Mine—to try and make you laugh.
Let the Editor, all-powerful
Radio wisdom still dispense,
And our "Thermion," guide and shepherd,
Gird at bunk and rank pretence.

Humbler far the task before me,
Whilst the Editor permits;
Happy if I make you giggle,
Cachinnate and "go in fits."
And for such as cannot like me
May some comfort still be found;
Grant me this and I'm contented—
*Laughter helps the hours "go round."*

### B.B.C. Plays and Features

IT is interesting to note that Val Gielgud, Director of Features and Drama, has now completed his plans for the last week of September and the first week of October. These show that his department is undertaking each week almost as many plays and features as in a month during normal times.

Mr. Gielgud's plans include a series of features which will be specially written for the microphone, and will deal with various aspects of life in this country under the changed conditions of war, as well as other topical subjects. The first of these programmes will be broadcast on September 30th under the title of "The Home Front—Children in Billets." It will be a recorded impression of children in evacuated areas. The second programme, which will be heard by listeners on October 3rd, is entitled "The Spirit of Poland," and is being written by Moray McLaren, Assistant Director of Features and Drama, who has travelled throughout that country.

When war was declared the first instalment of A. E. W. Mason's "The Four Feathers" had not been broadcast, although Peter Creswell had been working on the radio adaptation for some time. He will present the first of twelve weekly instalments on September 29th.

The schedule also includes a farcical comedy specially written for broadcasting by H. R. Jeans, entitled "Further Outlook Warmer"; a new amusing play called "The Son of the Sun," by A. L. Lloyd, based on an idea by Paul Morand; and two short plays, "Music at Dawn," by Julian Crane, and "The River Glideth," by Norman Edwards.

# A Simplified Automatic Frequency Control Circuit

## An Improved Arrangement in which the A.F.C. Potentials Are Applied Directly to the Control Grid of the Local Oscillator

QUITE a large number of this year's receivers employ "pull-in" tuning, or automatic frequency correction. In these receivers, which are of the superheterodyne type, the A.F.C. potentials are applied to the local oscillator circuit in such a way as to keep the receiver always exactly in tune. They have the disadvantage that additional components are required in order to effect a change in the local oscillator frequency. Thus, in some receivers an additional A.F.C. control valve is used which acts as a variable capacity or inductance; other receivers use iron-cored coils so arranged that a change in the permeability of the cores causes the local oscillator frequency to vary. The following is a description of an improved A.F.C. circuit designed by the Radio Corporation of America, in which no additional components are required.

Referring to the accompanying drawing, here is shown in a schematic manner the various networks of a superheterodyne receiver of the type employing an automatic frequency control circuit. Since such receiving systems are well known at the present time, it is not believed necessary to show the details of any network other than the local oscillator circuit.

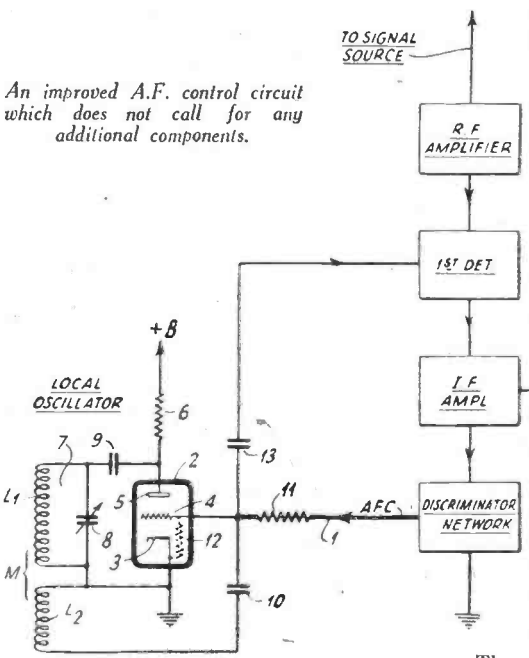
### "All-wave" System

In general, it may be stated that the present system will be of the broadcast type, or of the "all-wave" type, and will consist of the usual signal collector which feeds one or more stages of radio-frequency amplification. The first detector will be fed with amplified radio-frequency signals, and will feed its I.F. energy output to one or more I.F. amplifiers. The I.F. value may be chosen between 75 to 450 kc/s, and the I.F. energy is impressed upon a discriminator network. The audio voltage component of the discriminator output may be used for audio-frequency amplification and then reproduced. However, for the sake of simplicity, the I.F. energy is shown as being fed to a second detector which is independent of the discriminator network. The discriminator network may be of the type in which opposed rectifiers are tuned above and below the assigned I.F. value by the same predetermined frequency amount. In any event, the discriminator network will produce a direct current voltage whose polarity and magnitude depend respectively upon the sense and amount of frequency departure of the I.F. energy from the assigned I.F. value. In other words, as the receiving system is tuned to a desired signal frequency, the discriminator network will produce a direct current voltage whose polarity and magnitude will depend upon which side of the incoming carrier frequency the receiver is being tuned to.

### Local Oscillator

The A.F.C. voltage is applied to the control grid of the local oscillator valve by means of a lead 1. The local oscillator valve 2 includes a cathode 3, a control-grid 4, and plate 5. The plate is connected to a source of appropriate positive potential (not shown) through a voltage reduction-resistor 6, and the cathode 3 may be considered to be at a fixed potential, such as ground. The tank circuit 7 comprises the coil $L_1$ and the variable tuning condenser 8. The high alternating potential side of circuit 7 is connected to the plate 5 through a direct current blocking condenser 9, whereas the low potential side of the circuit 7 is established at ground potential. The control grid 4 is regeneratively coupled to the tank circuit 7 through a path which includes the direct current blocking condenser 10 and the feedback coil $L_2$.

The symbol M denotes the mutual conductance which provides reactive coupling between coils $L_1$ and $L_2$, it being pointed out that one end of coil $L_2$ is at ground potential. The A.F.C. lead 1 is connected to control grid 4 through a grid leak resistor 11, and the numeral 12 denotes the internal grid impedance (shown in dotted lines) of the oscillator tube 2. The local oscillations may be impressed upon the first detector through condenser 13. It will be understood that the variable condenser 8 will have its rotor plates adjusted simultaneously with the rotor plates of the tunable signal circuits of the receiving system. The frequency of the tank circuit 7 is maintained at a frequency different at all times with respect to the frequency of the signal circuits by a value which is equal to the assigned I.F. value. If, for example, when the receiving is employed in the broadcast band of 550 to 1,500 kc/s., the variable condenser 8 will adjust the tank circuit 7 through a frequency range which is generally higher than the signal frequency range; and differs therefrom at all settings of the tuning device by the assigned I.F. value.




*An improved A.F. control circuit which does not call for any additional components.*

### A.F.C. Circuit

The A.F.C. circuit functions to provide a frequency adjustment of tank circuit 7 over a small range on either side of predetermined station settings of the variable condenser 8. As explained previously when the variable condenser 8, and the variable condensers of the signal circuits, is adjusted to a setting such that the I.F. energy is close in frequency to the assigned I.F. value, the discriminator network will produce A.F.C. voltage, which will vary the bias of control grid 4 sufficiently to produce a frequency adjustment of tank circuit 7, which is independent of the frequency adjusting action of condenser 8, so as to maintain the energy at the assigned I.F. value. In the present case this is accomplished by proper choice of the constants of M and $L_2$. That is to say, the mutual inductance between the tank circuit and the feed-back coil $L_2$, and the self-inductance of coil $L_2$, are chosen so as to provide a reactive effect in tank circuit 7 and which can be varied in magnitude upon variation of the gain of valve 2. This reactive effect is equivalent to a parallel negative inductance. In other words, the frequency correction of the oscillator tank circuit is secured without adding any auxiliary circuit elements for the function. It will be appreciated that such a simplified A.F.C. circuit is of advantage, particularly in the case of receivers of the compact type such as are used in automobiles and aeroplanes.

### Tank Voltage

The nature of the electrical reactions which give rise to the production of the simulated reactive effect across the tank circuit 7 may be explained as follows: If the reactive magnitude of feedback coil $L_2$ is made large compared to the magnitude of the internal grid impedance 12, then it can be demonstrated that the voltage of the grid 4 will depend upon the product of the alternating voltage across tank circuit 7, the ratio of the magnitude of M to $L_1$, and the ratio of the magnitude of impedance 12 to the reactive value of feedback coil $L_2$. In effect this relationship means that there exists a quadrature component in the expression defining the value of the voltage of grid 4. Variation of the bias of grid 4 will then cause a frequency variation of tank circuit 7 by virtue of a variation of the reactive effect produced.

Voltage across tank circuit causes lagging current in coil $L_1$. Polarity of M must be such as to make circuit oscillate, so that

(Continued on page 64)

# A Dual-Action Morse Key

## Constructional Details of a Simple Key for the Experimenter

WHEN co-operating with a friend in practising the Morse code, the writer suggested that there may be some advantage in combining the movements of a straight key and a "Buggy," the idea being that the discernibility of messages at various speeds could be checked in the immediate duplication by the one key.

A very simple hook-up key was used to see whether or not such a key would be worth designing and constructing as a permanent job, and some interesting notes were made. Finally, from various rough sketches the key illustrated was decided upon and built, and has since proved its utility in many ways.

### Constructional Details

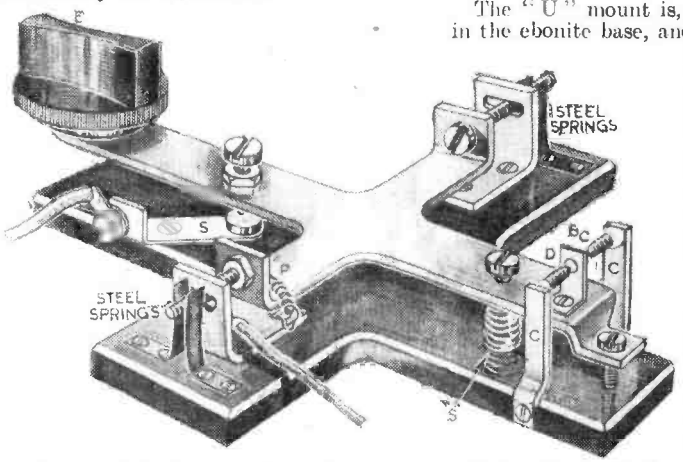
The rocker arm was fashioned from an odd piece of 14 gauge aluminium, this being more convenient to "work" than brass. To obtain the combined key actions without over elaboration in the design, it was found that by a simple spring-governed slot movement as depicted, sufficient rocker and side action could be had whilst not interfering perceptibly with the free use of the key either way.

Two slotted brass bearing brackets were made up and, from a watch maker, four strong steel springs were obtained, already drilled, for a few coppers. Two 1in. 4BA screws sufficed for the bearings, a $\frac{1}{16}$in. play being allowed either side in the normal position.

All the parts were then fitted to an ebonite base which, when cut and bevelled at the edges as depicted, provided a steady and attractive method of mounting.

### Contact Assemblies

The front contact assembly constitutes simply a 2BA rd. hd. brass screw, the head being filed to a comparatively thin cheese head, after fitment, whilst the tension spring "Ts" was obtained from a cheap key of early pattern which was far too clumsy for serious use.




*A pictorial sketch of the dual-action morse key, showing the details of construction.*

A strip of heavy gauge brass bent into "U" shape and drilled for fitment to the sides of the ebonite base, provided suitable mount for the "Buggy" key contacts "C," the contacts comprising two 4BA csk. screws with their ends filed to a point. These screws are then soldered to the ends of the contact strips, as shown.

The rocker contact was in this instance obtained from a contact nest taken from an old telephone-type key, thus furnishing a clean platinum contact disc "D." A pig-tail connection is made between the rocker and one slot bracket, one connection being taken from this bracket by soldering the lead to the head of the fixing screw.

The "U" mount is, of course, recessed in the ebonite base, and a wire is soldered to the centre and passed along a groove made in the base, to the contact "S," external connection being made to this contact by the original fitment and solder tag.

For the knob a 1½in. diameter ebonite knob was improved upon by the shaping of a strip of ebonite, "E," which was then mounted by means of two 6BA screws fitted into tapped holes in this strip, and hidden from sight by locating them underneath the knob overlap.

To complete the job, a piece of green baize was cut to the cross design, and stuck to the key base with adhesive, or as an alternative a sheet of thin rubber may be used to prevent movement of the key or marking of any polished surface.

# AVOIDING CABINET RESONANCE

## Details of Some Experiments and a Simple Anti-boom Device

THE difficulties underlying the use of a loudspeaker with a powerful receiver fitted into a small cabinet are rather difficult to overcome, although several suggestions have been made from time to time. In my case the wireless equipment delivers an output of 6 watts, fed into a dual loudspeaker, and the entire equipment is housed in a radiogram cabinet (home-made) measuring approximately 3ft. by 2ft. 6in. by 18in. deep. The receiver and amplifier is mounted on a shelf in the upper portion and to maintain as large a baffle area as possible the shelf is a skeleton affair and does not reach farther back than about half-way. The receiver projects over this. The speaker is mounted on a sloping baffle in the lower half and when operating at full throttle there was an annoying resonance. This was eventually traced to the wooden sides—the front being $\frac{5}{8}$in. thick and of nine-ply, but the sides were only $\frac{3}{8}$in. thick and of three ply. The laminations of the sides were causing the trouble.

The first experiment to overcome the trouble was carried out in the scheme adopted in some organs—namely, altering the resonance, and this was accomplished in the most simple manner by screwing odd pieces of wood at varying angles on the inside of the cabinet. It modified the resonance point, but it could still be noticed and took the form of providing vocalists with leather lungs. At least this is the most effective way of explaining the fault. Orchestral and solo items seemed quite good, but when a tenor, for instance, was received at the same volume it seemed to impart a peculiar quality to the voice which was described by a visitor, very aptly, I think, as "leather lungs."

### Fabric Baffles

Bearing in mind the patented device employed in the B.B.C. speakers, some experiments were next tried on these lines, and although the effect was modified and improved to a marked degree, I found a greater trouble present with the material which I used for packing the corners of the cabinet. This was obtained from a furnishing stores and was the material used for stuffing chairs, etc. It had not been in the cabinet for more than a month when I was told that the moth had taken possession. A search was made, and it was indeed found that the material was moth infested, and it was accordingly rooted out and burnt.

The next point to consider was how to employ a similar scheme but which would be moth-proof, and the scent of camphor or naphthalene balls was not desired. Various schemes were tried and rejected until finally a very simple arrangement was discovered, which cost absolutely nothing to install, is definitely moth and other insect-proof, and which has removed all signs of coloration and enables the maximum output from the equipment to be obtained without any form of apparent resonance or distortion. The scheme is simple to make up and the only material required (apart from some odd pieces of wood) is a quantity of old newspapers.

In my cabinet the size of the bottom shelf is practically the same as one half of a sheet of my daily newspaper, and thus, by folding the paper in half it just covers the shelf. On the sides a similar measurement holds for a fair distance up the cabinet (roughly just above the shelf) and so the folded paper may be placed on end against each side. The papers were saved from some weeks and the bottom of the cabinet was covered by a thickness of about one inch with the folded papers and a strip of thick wood placed diagonally across them and screws passed through the strip, through the papers and into the cabinet. On the sides the same arrangement and thickness was adopted, but the strips were placed across the top and bottom so as to hold the papers in position—the centre portion being left free.—D. J.

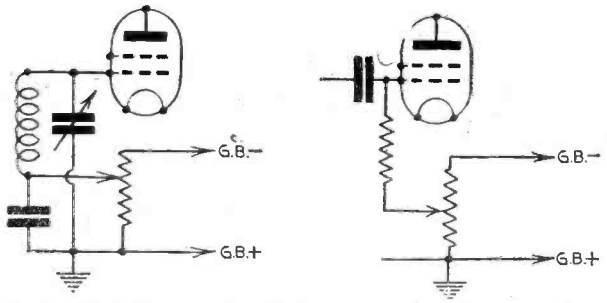



*Fig. 1.—Controlling gain in a battery receiver may be accomplished by either of the methods above.*

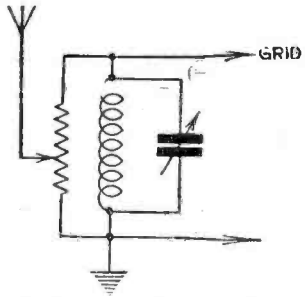



*Fig 3.—Controlling input by a resistance across the aerial circuit.*

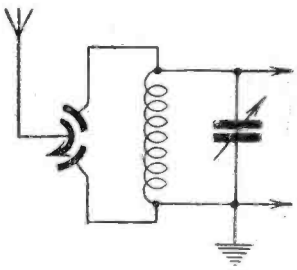


*Fig. 4—Here the input is controlled by a differential condenser.*

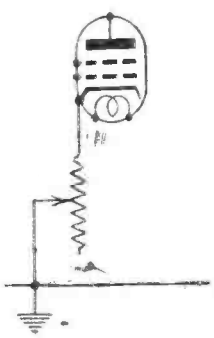
# THE MANUAL CONTROL OF VOLUME

## An Explanation of the Usual Forms of Volume Control as Used in Modern Receivers - - - By W. J. DELANEY

IT is necessary in a modern receiver to control volume, the reason being that apart from a desire to restrict the output to comfortable proportions, it is also necessary to avoid overloading of one or more valves in the circuit. Most modern receivers now employ what is known as automatic volume control, whereby the signal itself applies some form of bias to the early valves in the receiver and thereby keeps the output to the L.F. stages down to a given maximum. In addition to this form of control, however, there is also a control known as the manual volume control, and primarily its purpose is to enable the listener to keep the volume down to a comfortable level. If, however, it is left in the maximum position distortion will be noted when a local station is tuned in, unless the receiver is of specialised design where the A.V.C. circuit has been so designed that the maximum output of the detector or second detector is such that the output valve cannot be overloaded. The normal manual methods of volume control are applied either to the H.F. or L.F. circuits, the latter being most common. In order to appreciate the function of the forms of control, let us examine their application and the reasons for the different methods.

### Early Control

When a receiver is installed close to a high-powered broadcasting station there is a large signal voltage present in the aerial circuit, and the more efficient the aerial circuit, the greater the voltage which will be present between aerial and earth. Now the first valve in a receiver may be an H.F. amplifying valve or a detector valve. In the latter case it may be taken as a general rule that the more powerful the signal the better, and where a diode is employed it is essential to make quite certain that a really strong signal is applied to avoid distortion. In the case of an H.F. amplifying valve, however, we may experience difficulties if a powerful signal is present and we endeavour to tune to another station. Without going into the actual effect we may simply consider the effect as an over-amplification of weak signals which are present as a background to a fairly strong signal which does not receive the same amplification owing to a saturation effect on the valve. Thus, in such a case we must introduce the control over volume in the first stage, and provided the H.F. valve is employed we can adopt either method No. 1 or No. 2. In the latter case, of course, we must employ a variable-mu valve and restrict the amplification of the valve by varying the grid-bias. For the benefit of newcomers the essential parts of such a circuit are shown for battery receivers in Fig. 1 and for mains receivers in Fig. 2.



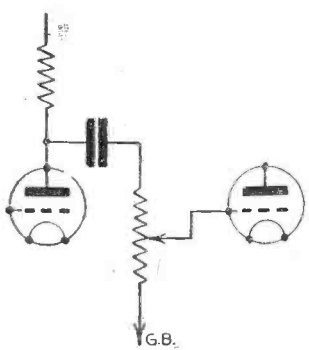



*Fig. 2 (left)—Controlling a valve of the indirectly-heated type.*
*Fig. 5 (above)—L.F. signals are controlled in an R.C. stage as shown here.*

### Aerial Circuit Control

If, however, we wish to use an ordinary valve in this stage and consequently desire to employ control method No. 1 we must provide some means of tapping off only part of the total signal. There are two methods of doing this in this part of the receiver—one by using a resistance across the circuit and the second by using a special balanced condenser method. The latter may be simplified by employing an ordinary differential reaction condenser, and again the essentials only are shown in Figs. 2 and 4. In Fig. 3 the total signal is produced across the ends of the resistance as well as across the tuning coil, and an arm on the resistance is adjustable so that part is short-circuited. This scheme is not much used owing to variation in tuning, and is generally incorporated with the bias potentiometer which is employed for a variable-mu valve to obtain the advantages of both schemes.

In Fig. 4 a somewhat different effect is obtained, as the transference of the unwanted signal voltages is carried out through the capacity existing between the vanes of the condenser, and not direct through the medium of actual contact as in Fig. 3. In this case also, a limiting effect is introduced as it will be seen that the signals in the position of minimum volume pass to earth through the condenser instead of going through the coil.

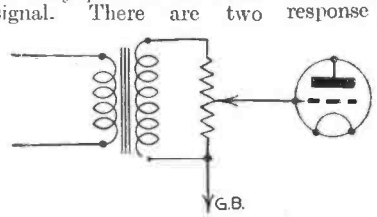
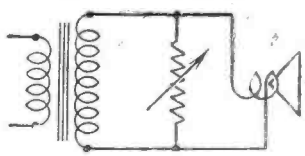



*Fig. 6 (above)—A transformer is controlled as shown here, whilst on the right (Fig. 7) is a simple means of controlling speaker volume.*

### L.F. Controls

On the L.F. side of the receiver a potentiometer is the only practical device, and it may be used alone or in conjunction with a transformer. In the first case it will form the grid-leak of an ordinary resistance-capacity coupled stage, and in the second case it will be joined across the secondary of the transformer. (It could be placed on the primary side of the transformer, but this is not desirable owing to noises introduced due to the fact that current is flowing through it and its effect is also generally erratic.) Figs. 5 and 6 show the two methods in essentials and it will be seen that in the first case the total signal will be developed only across the control, whilst in the second the transformer winding is also included. Thus in this case the actual response curve of the transformer will be modified, and it is necessary to choose the value of the resistance with a full knowledge of its effect on the inductance of the secondary winding, and

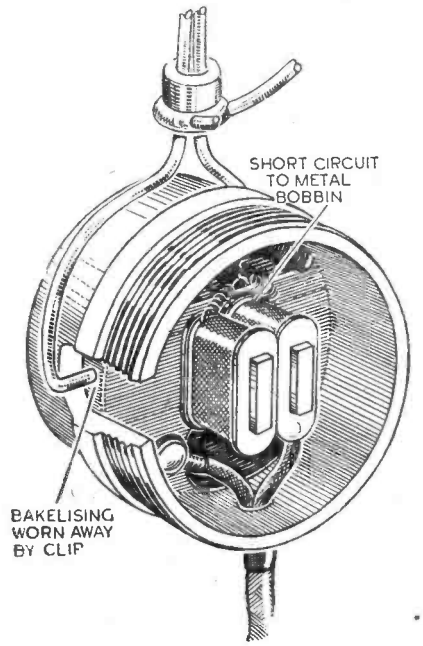
(Continued on page 66)



# Practical Hints

## Tracing a Short in Headphones

A NUMBER of the earlier patterns of headphones employed metal earpiece fitments to the head-band, this metal hinging in the majority of instances comprising simply a heavy-gauge wire fashioned in such a way as to cleat into the earpiece moulding, which often constituted bakelite or ebonite. A friend using such a pair of headphones recently complained of receiving a severe electric shock when handling the 'phones whilst touching the metal




*How an unusual short occurred in a pair of headphones.*

chassis or a metal toggle switch, and was puzzled as to the cause owing to the apparent completeness of the insulation afforded by the bakelite moulding.

An investigation brought to light the rather interesting reason. The poles of the earpiece in question were fitted in quite the conventional manner, but the magnet was moulded in the bakelite case, the leads being taken to rivets which on test proved to be effectively insulated in the moulding, so this possible point for a breakdown could be ruled out.

The hinging portions of the wire clip must contact in some way with the H.T. feed, and therefore it was to be assumed that the leakage would be found in one or both of the coils.

This proved to be so, the series connection of the two coils being so tightly pressed against a flimsy strip of insulating paper next to the metal bobbin adjacent to the magnet that break-through ultimately occurred. This, however, did not explain how the clip became "live," until examination showed that the tips of the hinging portions had gradually worn the bakelite down, until contacting directly with the magnet which was now at positive potential

### *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.**

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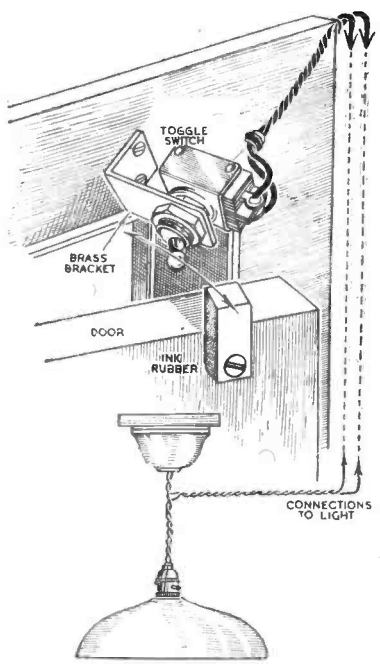
**All hints must be accompanied by the coupon cut from page 63.**

in respect of the chassis.—H. GARFORD (Birmingham).

## An Automatic Light Switch

I RECENTLY fitted the device illustrated to a local shopkeeper's door. It switches the light off immediately the door begins to open, and switches it on immediately it closes. The one fitted works extremely well.

The switch is a Bulgin toggle mains on/off type, and it is secured by a brass bracket, drilled with a hole large enough to take the switch bushing. The switch dolly is operated by a piece of ordinary ink rubber, tapered for flexibility and secured to the door by a screw and large washer. I mounted the switch slantwise so that the



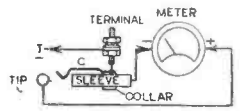

*A handy dodge for operating a light switch by the the opening and closing of a door.*

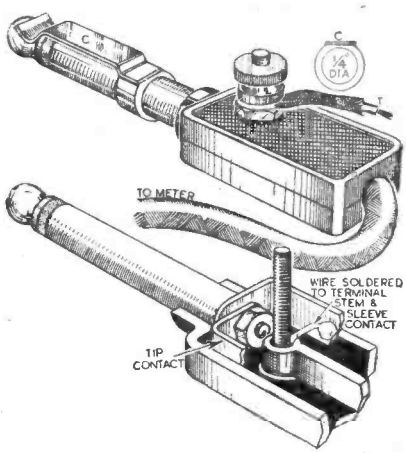
rubber could be adjusted for wear. The switch is wired in series with the lamp-holder.—S. WIGGETT (Beccles).

## A Triple-purpose Plug Modification

BY the simple adaption illustrated in the accompanying sketches I can now keep a millianmeter or voltmeter permanently and safely connected, ready for either receiver measurements by ordinary jack use, or for "tip" testing.

For ordinary jack purposes, the shorting strip "C," which comprises a springy brass strip soldered to a "flatted" ¼in. bore brass bush, is removed, whilst for the test prod method of use "C" is moved along




*A simple method of adapting a plug for various purposes.*

the plug sleeve, disengaging with the plug tip.

The other connection is made by means of either another test prod or a crocodile clip lead taken from a plug terminal "T," which is fitted in place of the usual moulding fixing screw.

When not in use, the shorting strip "C" is moved along to engage with the tip of the plug, thus protecting the meter by short circuit. The inset diagram shows the method of wiring, and it will be noticed that the tip is conventionally positive, the terminal being in this case negative.

When soldering the connection from the terminal stem to the sleeve contact, care is necessary to avoid excess solder, so that the other part of the plug case or moulding will neatly clamp down; for this purpose, a reasonably light gauge of tinned copper wire should be used, and where possible a notch can be made in the moulding bush to recess the terminal solder connection, this also serving to cleat the terminal stem.—T. C. HENSON (Wanstead).

**READ "THE CYCLIST"**
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# EMERGENCY RECEIVER INSTALLATION

## Some Simple Methods of Providing Radio Reception in the Refuge Room or Garden Air-raid Shelter. Details are Given for Installing an Extension Speaker or an Extra Receiver — By FRANK PRESTON

DESPITE the various criticisms of the indifferent entertainment programmes put out by the B.B.C., there is no doubt that the frequent news service has been greatly appreciated. It was most appreciated, perhaps, during the few days immediately before and after our entry into the war, but its obvious value in an emergency, such as the appearance of enemy aeroplanes over this country, cannot be over-estimated. Valuable information can be broadcast and while shelter is being taken frayed nerves can be steadied by a continuous broadcast of light entertainment.

All this leads to the desirability of having radio available in the refuge room or air-raid shelter. Probably many readers have already made a simple receiver especially for this purpose and installed it in the appropriate place. Others perhaps have a portable ready for use, and some will build the neat little single-valver described on other pages of this issue.

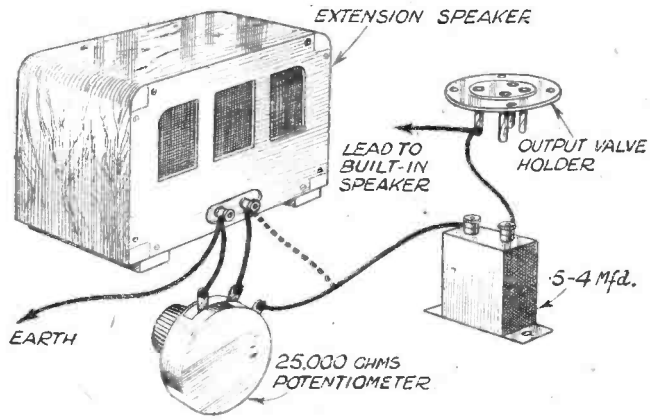



*Fig. 1.—Simple connections for an extension speaker with remote volume control. This can be omitted by using the connection shown by a broken line.*

### Alternatives

Those who have not yet given the matter full consideration would be advised to do so now, because there might not be any time to make suitable provisions after the sirens have given out their wailing note. Probably the first question to be settled is whether an entirely separate receiver will be installed permanently in the shelter or gas-proofed refuge room or whether an extension speaker will be run there from the normal domestic receiver.

Either arrangement can be made fully satisfactory, although if the home receiver is mains operated there is a chance (but it is not likely, we are informed) that it will be inoperative in some instances due to the disconnection of the supply. Thus, those who are anxious to be doubly sure will prefer to have a separate battery receiver. An ultra-simple one with 'phones only has much to recommend it, but on the other hand the broadcast can be followed by only one of those who are sheltering unless extra pairs of 'phones are made available.

In my opinion there is much to be said in favour of using an extension speaker —preferably as well as a small "stand-by" receiver for operation from tiny batteries. Only one station is required, so there is no advantage in being able to tune the set, and since first-class reproduction is not necessary on speech (besides which it cannot be obtained from the present emergency B.B.C. transmitters) tone control is totally unnecessary. Extra batteries are not required for the additional listening point, which is a convenience, and there will be more than sufficient volume for all occupants of the shelter to follow the transmissions with ease.

### Extension-speaker Connections

The usual precautions which have to be taken when arranging extension speakers, if a certain amount of distortion is not to occur, can be ignored; it is necessary, therefore, only to run a lead to the extra speaker and to fit a very simple form of volume control to it. A twin-wire extension need not be used, for a simple choke-capacity output filter arrangement can easily be used. All that is required is to connect a fixed condenser of between .5 and 4 mfd. capacity to the anode terminal of the output valve and to run a lead from the second terminal of the condenser to one side of the speaker; the second speaker terminal is taken to any covenient earth connection. In the case of an "Anderson" shelter, the corrugated-iron frame will provide an excellent earth return. The volume control can take the form of a 25,000-ohm potentiometer connected as shown in Fig. 1, although if desired the control can be omitted by using the modified connection shown by a broken line.

### Protection from Damp

When using this method of connecting the extra speaker, the speaker already fitted in the set—or rather, the output transformer which forms part of it—is used as the output coupling choke. If a separate speaker is already used in conjunction with the set and it is wished to employ this as the extension unit, an L.F. choke should be joined between the speaker terminals on the set. It is, however, better in every respect to have one speaker more or less permanently installed in the shelter. There is one minor difficulty in connection with this matter if the shelter or refuge room should be damp; dampness might cause damage to the speaker. This can be prevented fairly satisfactorily by covering the whole speaker with an oiled-silk, or even a grease-proof paper bag. It is also a good plan to run the speaker for a few minutes every few days.

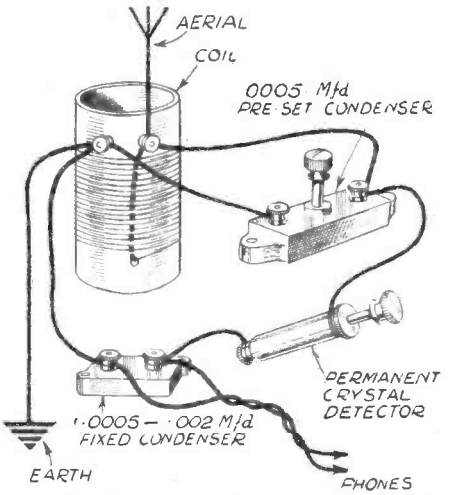



*Fig. 2.—How a crystal receiver can easily be made. The coil can be of any type and only the medium-wave winding is used. If home made, use a 2-in. diameter former and wind on 50 turns of 24-gauge enamelled wire.*

### Remote Control

There may be some who wish to be able to switch the remote receiver on and off from the shelter, and this brings in a few small difficulties, especially if the shelter is in the garden and some distance from the receiver. Probably the best method is to use a remote-control relay such as the Bulgin Universal Distant-Control Relay, or the W.B. "Long Arm." This is certainly a refinement, but it might be inconvenient to run a number of wires between the set and the speaker point when these must be out of doors. And when a potentiometer volume control is employed, as previously mentioned, this will serve to switch the speaker out of circuit whilst leaving the set on. There will be no harm in this, although it might result in the batteries running down prematurely and thus rendering the set inoperative. Either of the special controls mentioned is easy to install, and full details are supplied by the makers.

### Weatherproof Leads

When running either speaker or control wires from the house into the garden special precautions must be taken to see that they are weatherproof. Excellent cable for the job is "black glossy," as used

(*Continued on opposite page.*)

## EMERGENCY RECEIVER INSTALLATION.

(*Continued from previous page*)

for wiring the electrical system of cars. It can quite well be run along the top of the fence by supporting it in insulated hooks or even by ordinary electrical staples. Some of the insulated aerial wires are weatherproof for a long time even when laid in the ground, and could therefore be run along a shallow furrow, which may afterwards be covered in. Those who have made the shelter for use as a summer house as well as for emergency purposes, will often prefer to have a more permanent arrangement, in which case it would be worth while to run the lead or leads through lengths of conduit tubing, or to use lead-covered house-wiring cable for the extension leads. These will make the leads waterproof, so that they may be buried in the ground.

### Aerial and Earth

When installing a separate receiver in the shelter aerial and earth connections will be desirable unless the receiver is a fairly sensitive one; even a sensitive portable cannot be expected to function very efficiently in a steel shelter, which provides an excellent screen! In most instances a perfectly satisfactory aerial can be provided by running a length of insulated aerial wire along the top of a fence, whilst the earth connection can be made to the frame of the shelter or to an earth tube pushed into the ground inside or just outside the building. It will very often be found that sufficiently good reception can be obtained by using only an earth lead and connecting this to the *aerial* terminal. This is usually better than omitting the aerial lead and joining the earth lead to its normal terminal.

### A Simple Crystal Set

If a moderate aerial-earth arrangement can be provided a crystal set will operate 'phones in many parts of the country, and a simple stand-by set of this type can easily be made. All that is required is an old coil, a crystal detector, a small fixed condenser, and a pre-set condenser, these being joined together as shown in Fig. 2. Once the set has been tuned, the pre-set can be locked so that the tuning cannot be upset and the receiver is always ready for use. A permanent type of detector is desirable since it might not be easy to make delicate adjustments to a cat's whisker. Sharp tuning is not required, because only one station is wanted and interference from other transmitters is very unlikely.

It is a good plan to make arrangements on one of the lines mentioned now—it might be too late to do the job thoroughly if the matter is deferred.

# RADIO CLUBS & SOCIETIES

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

**EDGWARE SHORT-WAVE SOCIETY**

**Headquarters :** Constitutional Club, Edgware.

**Secretary :** F. Bell, 118, Colin Crescent, Hendon, N.W.9.

MEETINGS in future are being held at G3HT, Gainsborough Gardens, Edgware, on Wednesdays. At our first meeting the members welcomed OK1VU, who is helping in his country's cause.

The club is adopting G4KD QSL card for members.

Morse classes are now going strong at the secretary's house, on Sundays, at 11 a.m.

**KILMARNOCK AND DISTRICT SHORT-WAVE SOCIETY**

**Headquarters :** Wardneuk Receiving Station, Kilmarnock.

**Secretary :** K. Law, 2, Parkerston Terrace, Dunlop, Kilmarnock.

OWING to the present situation, and the calling-up of some of our members, the society has closed down for the present.

## TROPHY PRICE INCREASES

MESSRS. PETO-SCOTT announce that owing to increasing labour, material and manufacturing costs it has been necessary to increase all list prices for Trophy communication type and short-wave receivers by 10 per cent. This applies to all orders invoiced on and after September 11th, and the new list prices are as follow:

Trophy 8, £13 17s. 3d.
Trophy 6, £10 19s. 6d.
A.C. Trophy 3, £6 18s. 9d.
Battery Trophy 3, £6 6s. 6d.
Preselector, £7 8s. 6d.

Additional cost of coils for the Trophy 3 for complete coverage of 6.2 to 550 metres, 18s. 6d.

It may be necessary to make further increases in prices at a later date.

# BOOKS RECEIVED

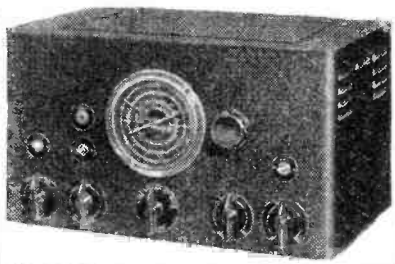
**THE RESTLESS EARTH.** By R. Gheyselinck. Published by The Scientific Book Club. 286 pages. Price 2s. 6d. to members.

WHEN we glance towards the skies and ponder over the secret world of the stars, or when we probe into the secrets of nature—the wide realm of animals and plants—we are apt to forget the significance of the earth, that giant globe on which we live and have our being. In this interesting book the author has described in non-technical language the agitated movement going on in the body of the earth, changing it again and again. All these changes are dependent on the rhythm of geological events which are subject to certain laws, and these are clearly explained in this book. There are seven chapters, covering such subjects as The Enigmatic Beginning; The Face of the Earth; Petrified Life; The Great Rhythm; Mountains Grow; The Unsteady Crust; and Wegener's Theory of Continents Drift. The book is illustrated with eight half-tones.

**A FIRST COURSE IN MATHEMATICS.** By P. J. Haler, M.I.Mech.E., and A. H. Stewart, B.Sc. Published by University Tutorial Press, Ltd. 294 pages. Price 3s.

THIS handbook, which comprises a practical course on the rudiments of mathematics, is intended for the use of students preparing for a course of technical study. An important feature of the book is that the authors have endeavoured to pervade the contents with the atmosphere of the workshop. The necessary reference which the student must make to the drawings accompanying many of the problems forms a good introduction to the art of "reading" machine-drawings and plans. The book, which is a third edition, includes added chapters on Logarithms and Trigonometry.


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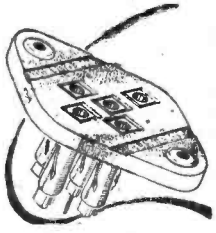
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LISTENING ON THE SHORT WAVES



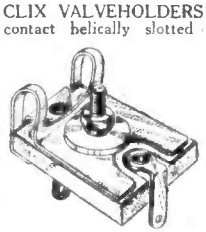
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**or 3-VALVE CHASSIS ONLY.** Amazing all-wave S.G.3 chassis offer, fully tested and complete with valves. Wave-range 14-2,100 metres. Station and colour coded scale. Screened coils. Ready for attachment to speaker and batteries. **Bargain 69/6.** Carriage Paid. **Worth 87/6.**

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# SCHOOL BROADCASTING IN WAR TIME

THE service which School Broadcasting might render in war time was discussed by the Central Council for School Broadcasting during the summer of this year. The details of an adjusted programme have since been worked out by officials of the B.B.C and of the Council in consultation. Their educational aim is approved by the Chairman of the Central Council, and the B.B.C., subject to contingencies, has decided to allot generous time for broadcasts to schools out of its single programme.

The first stage was in the early days of evacuation; an emergency programme, previously prepared, began on September 6th. Almost all the schools that were then open were acting as social centres, and making no attempt at formal teaching, while many children were in the care of hosts who sometimes found it difficult to know what to do with them. School Broadcasting of the ordinary kind was suspended. A programme was therefore designed to meet the occasion and, with modifications, was continued until September 22nd. It has been simpler, and has contained more entertainment than normally. A feature has been the special talks aimed at helping town children who have been transferred to the countryside to understand and respect their environment.

## Teachers' Schemes

A question that called for early solution was whether the B.B.C. should continue on these emergency lines, or revert to something which corresponded more nearly to the teachers' schemes of work. It was decided that a new stage should begin, as from September 25th, when normal School Broadcasting was due to begin.

Another matter that had to be decided was whether the broadcasts should approximate to School Broadcasting as generally known, so far as circumstances permitted, or should something new be attempted in the way of direct teaching. It may be thought desirable in the future that one or more direct teaching courses shall be designed: if so, it will be for the teaching profession to say how and when. For the moment it seems to be the task of the B.B.C. to resume School Broadcasting on its own lines as soon as possible, as a supplement to the teachers' work, with such modifications as may be imposed by circumstances, which at present are not all unfavourable for broadcasting. Schools are turning to the wireless, not only to help solve problems of organisation in the reception areas where double shifts are necessary, but everywhere to maintain a link with the outside world for children either transplanted from their homes, or too excited to attend easily to their ordinary lessons.

Modifications will be necessary. In the first place, it will not be possible to make pamphlets available. Many authorities have had perforce to cancel their orders and even if other orders were filled, it would not be possible to assume in a broadcast that pamphlets would be generally available, so the stocks are being held against a better day: scripts will be prepared in such a way as to be self-contained, and, generally, periods of fifteen minutes instead of twenty minutes will be devoted to each subject, since the strain of continuous listening is greater. Again, studio facilities are at present limited, and the number of dramatic programmes must therefore be reduced for a time, though their special value in present conditions is fully realised. It must also be remembered that there is now only one programme for the nation, out of which schools still get about the same amount of time as when there were alternatives.

## Adult Listening

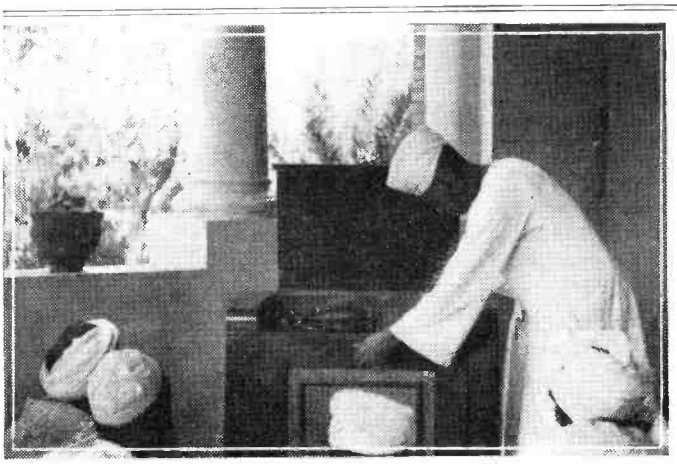
It is well known that in normal times many adults, parents in particular, listen to School Broadcasts, and it is hoped that more will do so to-day, sharing the children's interests and finding in School Broadcasting good programme value. Within these limitations the emergency programme now announced will keep as close to normal School Broadcasting as possible.

Schools which are not yet working under normal conditions will, however, find that each broadcast is complete in itself and self explanatory and can therefore be used when the usual classroom facilities are not available.

## Normal Programmes

Programmes for schools as from September 25th contain all the main elements of the normal programmes except Modern Languages, which would have the smallest appeal numerically both to the schools and to the general public. The lessons to be learnt from the countryside must continue to have a special place in any scheme of work carried on under conditions of evacuation.

Announcements concerning the programmes will be broadcast each day at 11.0 a.m. and 2.0 p.m.



*Overseas listeners showing interest in one of the latest G.E.C. radiograms.*

# 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).

## Station MTCY—Hsinking

SIR,—May I point out a slight misprint in the September 9th issue which might prove misleading to readers. "The Voice of Manchukuo," Hsinking, given as NTCY, should be *M*TCY, the prefix "N" having been allotted, of course, to the Canal Zone only.

MTCY appreciate useful reports on their special European transmissions, and now their schedule extends from 22.00 until 22.50 B.S.T. on 11,775 kc/s.

Colombian calls are again about to be shuffled: HJ3CAD, 4,845 kc/s to HJCD; HJ3CAH, 4,900 kc/s to HJCH; HJ3CAF, 4,855 kc/s to HJCF.

In the past seven years HJCF has been HKF, HJ3ABF, then HJ3CAF, and now HJCF.—PETER G. JACKSON (Ramsgate).

## "Spares Box" and Crystal Sets!

SIR,—Your intention to continue publication is as welcome as it is courageous and will, I hope, receive the support it deserves.

May I suggest that with the probable shortage of components and with increased prices—now is a good time to develop the "spares box" type of set. We want sets now that are economical in current and that give first-class reception on the wave-bands now in use.

One other suggestion. Crystal sets are very useful just now. Most published designs require a specially wound coil. Will you give us one using a "spares" coil so that it can be easily and quickly made up?

Wishing you success in these difficult days.—H. EDGAR PARKER (Bitterne).

## Exchanging S.W.L. Cards

SIR,—I would like to inform readers of PRACTICAL WIRELESS that S.W.L. cards may be obtained from V. Mandelstamm, 738, South Park Avenue, Saginaw, Michigan, U.S.A., and also from H. R. Brown, 9,410, Second Avenue, Silver Spring, Maryland, U.S.A., by sending their cards.—A. V. OGLESBY (York).

SIR,—I would be very glad indeed to exchange my Q.S.L. card with any S.W.L., A.A., or full ticket ham, in any part of the world. All cards will be acknowledged by return of post.

I also thank you for my B.L.D.L.C. certificate which is very attractive indeed.—L. HUDSON, 12, Devon Terrace, Pontefract Lane, Leeds, 9, Yorks.

## A Four-valve A.C. Short-waver!

SIR,—Being a regular reader of your excellent paper, may I suggest the publication of a 4-valve A.C. short-wave receiver in PRACTICAL WIRELESS? The receiver should have electrical band-spread tuning and plug-in coils. I built your converter-adaptor a while ago, and was very satisfied with its performance.

The new PRACTICAL WIRELESS is super and I wish it success.—J. PARKIN (Hull).

## Correspondent Wanted

SIR,—May I add my appreciation of the new PRACTICAL WIRELESS, but I would like to see more short-wave receivers described.

I believe a "Spares-box" receiver was published some time ago, and I shall be glad if you will inform me in what issue it appeared.

I would like to correspond with a S.W.L. in U.S.A.—R. EAST, 44, Devon Avenue, Whitton, Middlesex.

*[An article on the construction of our "Spares-box Three" appeared in the issue for February 4th, 1939.—ED.]*

## A Twin Aerial

SIR,—The following dodge may be of interest to other listeners of the B.B.C. Home Service broadcasts.

Severe "blasting" has been spoiling my reception of the North Regional transmitter, and in the hope of stopping this, I have rigged up two aerials. One is fitted to the roof of the house, and the other is about half-way down the length of the garden. Total length of both aerials is about 50ft.

My receiver is fitted with two aerial plugs for use with a dipole aerial, but hitherto I have used only one of them.

The twin aerial idea works perfectly. Signals have been quite steady ever since I've tried this arrangement, and the blasting has disappeared.—L. HALL (Bristol).

# Prize Problems

## PROBLEM No. 367

MARTIN'S three-valver suffered from "motor-boating" and he therefore decided to fit a decoupling circuit in the first L.F. stage. He found a resistance and some condensers in his spares box and fitted the necessary resistance and condenser in the appropriate manner. It did not cure the trouble. He tried various values of condenser from his collection, but these did not have any effect on the trouble. What was the most likely reason for this? 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. 367 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, October 2nd, 1939.

## Solution to Problem No. 366

When Jackson mounted the valveholders he omitted to make certain the valve legs cleared the chassis edge. The grid leg of the L.F. valveholder was in contact with the chassis and accordingly signals were short-circuited at that point.

The following three readers successfully solved Problem No. 365, and books have accordingly been forwarded to them: S. G. Bennet, 6, Church Road, Waterloo, Liverpool 22; A. E. Parks, 23, Ockendon Road, Canonbury, N.1; W. Clouting, Boyton, nr. Woodbridge, Suffolk.


**THE WAR** At a time like this we are only advertising immediately useful items. Previous adverts. detailed a wide range of goods. Where stock is limited preference is now given to National Service users.

**ELECTRIC SUPPLY.** An Independent Emergency or Stand-by set may be of great value to you. Can be transported on any car that can carry 3 cwt. All these sets that we are offering are in first-class order and straight from reserve Govt. Stores, kept unused as stand-by. Being a pre-crisis release they are an opportunity for a low price purchase that might not otherwise have occurred and certainly cannot be repeated. The Half Kilowatt Set is worth £50, but our price is **only £16**, and with engine and dynamo carry the full Electradix guarantee.

**A.R.P. PETROL ELECTRIC GENERATING SETS** for Lighting and Charging. Half h.p. DIRECT COUPLED 150 watts D.C., 1,300 r.p.m., 2-stroke water-cooled 1-cyl. Engine, magneto ignition. On bedplate with 30 volts 5 amps. Dynamo, £12.



90 larger size ½ kW. S.T. Petrol Electric Sets, 500 watts, 2-stroke water-cooled 1 h.p. 1 cyl. engine on bedplate direct coupled to 50/70 volts 10 amps. D.C. Dynamo, magneto ignition, fuel and oil tank, £16.

**STORAGE.** You may have charging facilities and want to install high capacity steel accumulators which will hold their charge almost indefinitely.

**A.R.P. EDISON HIGH CAPACITY STEEL CELLS** at half price for stand-by lighting. 120 A.H. to 300 A.H. at 20/- to 25/-. Makers' Price is £5. Ask for leaflet.

**FULL PARTICULARS** gladly given as far as we are able to A.R.P. ENQUIRIES.

**YOU MUST KEEP YOUR BATTERY PREPARED!!! Battery Charging on A.C. Mains.** The **A.C. NIFNDAY** will keep your battery fit without attention. **Model N/A6.** 100/250 volts A.C. and D.C. 6/8 volts ½ amp., 15/-. **Model N/B6.** 100/250 volts to D.C. 6/8 volts 1 amp., 25/-. **Model N/C6.** 100/250 volts to D.C., 6/8 volts 2 amps., 35/-. **Model N/D12.** 100/250 volts to 12 volts 1 amp., 32/-. Ditto, 12 volts 2 amps., with 6-volt tap, 55/-. 5 amp., £4/10/-.

**Foggy Dugouts** or ill-ventilated shelters must be kept fresh.

**A.R.P. SHELTER.** Ventilation and Air Conditioning. Compact unit, drive off A.C. or D.C. mains, 80 watts; 9in. Blower, 20 cub. ft. fresh air per min. 25/- is a bargain price.

**WET WEATHER ELECTRIC PUMPS.** for A.C. or D.C. 12 v. to 230 v. Centrifugal all-bronze pump, throws 120 gals. per hour, 70/6. Type R pumps for draining shelters, dug-outs, etc., £5/15/-.

**RADIO SIGNAL PHONES.** Complete sets with 5 line or 20 line exchanges. Portable army wardens phones, etc. State wants.



**POCKET HEADPHONES.** W.D. all leather headband strap and cords, 2/6 pair. Wireless type, with aluminium headbands, 2/9. 4,000 ohms, 4/6. **LISTENING MIKES** steel-clad Electradix indestructible; are ears outside your dug-out.

**CABLE.** Lightweight twin field cable, unbreakable Army steel reinforced, 55/- mile. Heavier types 65/- and 70/-.

**FIRE CONTROL SIGNALS.** Emergency day Lucas and Aldis Hooded Army Signal Lamps, telescopic sights, hand or tripod. For Fire Brigades and Police, 60/-.

**AIR RAID SIGNAL BELLS—FIRE ALARM BELLS.** Waterproof mains, Battery or Hand magneto Buzzers; Morse Practice Sets, Morse Keys, Recorder gear, as previous adverts.

5/- **EMERGENCY PARCELS** of useful stand-by electrical and radio repair material and apparatus, 10lbs. for 5/-. Post Free.



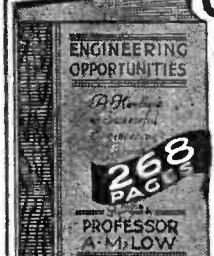
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PRACTICAL WIRELESS, 30/9/39

# How Many Milliwatts?

## A Discussion on the Advantages of High Undistorted Outputs, and Some Simple Facts Concerning a Very Debatable Subject

IT is often a difficult matter to decide upon the most suitable type of output stage due to the fact that the actual amount of power which is required to feed the loudspeaker is not easy to determine. It is all very well to say that perfect reproduction cannot be obtained unless the output is at least 5 watts, but there are thousands of experienced wireless-set users who would not tolerate a speaker working with such an input—at least, when that speaker was placed in the drawing-room. Besides, there are many who prefer what they call "pleasing" reproduction to absolutely "natural" reproduction.

When it is remembered that the average battery-operated three-valve receiver with triode output valve has a maximum undistorted output of about 150 milliwatts, and that the corresponding figure for a four-valve A.C. superheterodyne is from 2,000 to 3,000 (yes, two thousand to three thousand) milliwatts, the question seems more complicated than ever. You know that a three-valve battery set used with a modern moving-coil loudspeaker provides quite enough volume for comfortable listening in an averaged-sized room, and you also know that you are by no means deafened by the more powerful receiver.

### Power Output and Volume

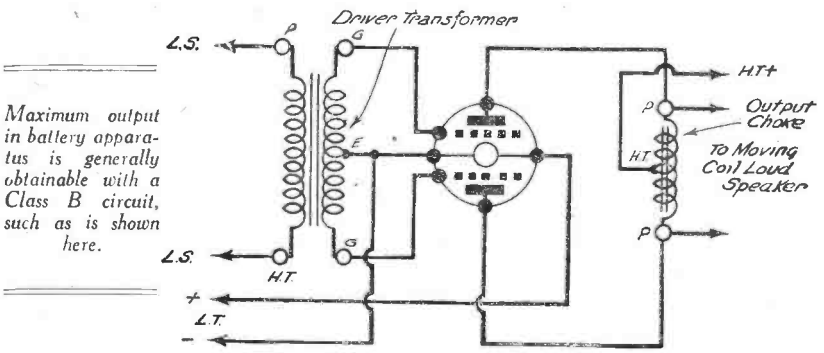
If you were to listen to the two sets on following evenings you might form the impression that one was twice as loud as the other, but you would certainly not imagine that the output of one was something like twenty times as great as that of the other. Where, then, is the catch? Well, in the first place the audible sound is not in proportion to the output expressed in milliwatts—far from it. In the second place, the reproduction provided by the battery set is probably far from perfect, whilst that from the mains set is appreciably better; and good reproduction never sounds as loud as distorted reproduction—if the latter can rightly be called reproduction! An example of this was thrust upon me the other day when I was trying out a 6-watt amplifier. A friend popped in to see me and listened to the small auditorium speaker for some time before remarking that the quality was excellent. I replied to the effect that it ought to be, since the cost of parts for the amplifier was over ten pounds, and that the output valve alone cost 25s. He was amazed and said that he couldn't understand why I should go to all that expense for such a modest output. It was my turn to be surprised, for I hardly look upon 6 watts as being modest, and I knew the amplifier was working efficiently. On inquiring exactly what my friend was driving at, he explained that he had a three-valve battery-set which cost him about £7 a few years ago, and that he got "rather less volume" than the amplifier was giving.

After enquiring for full details of his receiver, I found that he was using a small-power output valve rated to give a maximum of 170 milliwatts output. I could not convince him that the output from my amplifier was fully thirty-five times as great as that from his set, and when I suggested—I only *suggested*—distortion, he was most indignant.

### Volume and Distortion

There is another kind of person who firmly maintains that an output of more than the 200 milliwatts given by the average battery set with pentode must of necessity deafen the listener. This type of person will not allow himself to believe that the volume of sound which reaches his ears when he is in the auditorium of a concert-hall listening to an orchestra, or when he is standing near the bandstand on the promenade at Folkesbourne, is at least equivalent to that he gets from a speaker fed from 5,000 milliwatts and working in his own drawing-room. Instead, because his own speaker becomes "uncomfortably loud" when the volume-control is turned full on, he thinks that the speaker is overloaded, and that his aural discomfort is actually due to the reproduction being too loud. Nothing of the sort; the trouble is merely that one or more of the valves is being overloaded, causing distortion and harshness which offends the ears.

*Maximum output in battery apparatus is generally obtainable with a Class B circuit, such as is shown here.*




### Maximum or Average Output?

But this is not all. Because a receiver is capable of providing a maximum undistorted output of, say, 5 watts, it does not mean that this power is actually being applied to the speaker whenever the volume-control is turned to its maximum setting. In fact, the speaker will, in all probability receive 5 watts only once in several hours, and during the rest of the time the *average* output may be no more than 150 milliwatts. The truth of the matter is that for the speaker to do full justice to all kinds of music the maximum volume of sound from the speaker must be several hundred times as great as the minimum: and for that minimum to be comfortably audible the available maximum must be very nearly 2 watts when the speaker is used in a drawing-room of average size. Many competent acoustic engineers are quite emphatic in stating that the lowest maximum undistorted output necessary for "natural" reproduction is 5 watts—some give figures higher than this.

### Making a Decision

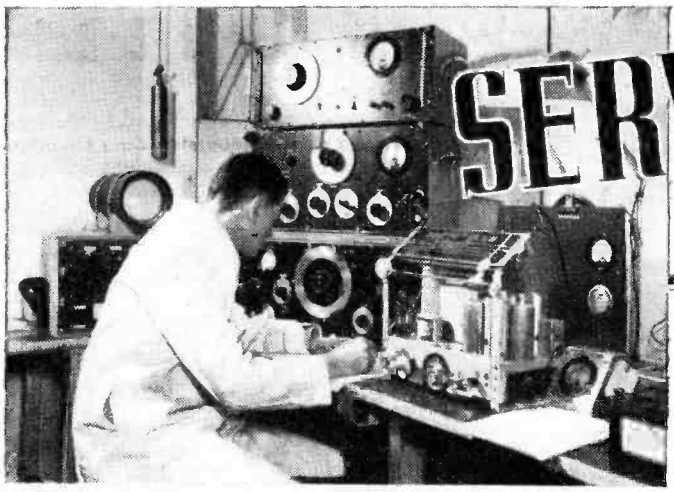
And while there is so much disagreement between technicians, the normal listener cannot help but be in a quandary. The best course he can take, therefore, in an attempt to solve the problem to his own satisfaction is to go to the showrooms of a large dealer and listen to as many *good* receivers as possible, of different output ratings, and to decide what output best suits his own requirements. He can then proceed to build his amplifier, or design the output stage of his receiver, accordingly. This is, of course, assuming that he can afford to build an instrument capable of providing the output desired, and also assuming that a mains supply is available. If he is limited to batteries, he must be content with about 1½ watts, and if funds are limited he must be satisfied with an output which most nearly approaches that preferred. Whatever the requirements there is a PRACTICAL WIRELESS receiver to satisfy them. Incidentally, the highest output from any of these receivers is given by the "Universal Hall-Mark Four" which has an undistorted output of 6 watts, and can be built extremely cheaply.

### Frequency Control Circuit

(*Continued from page 56*)

induced voltage in $L_2$ is 180° out of phase with tank voltage. This voltage flows through $L_2$ and the internal grid resistance of tube 2. If the reactance of $L_2$ be made high compared with the internal grid resistance, current therein will lag induced voltage substantially 90°, i.e., it will lead the tank voltage by approximately 90°. This quadrature voltage applied to the grid 4 causes equivalent quadrature current flow in the plate circuit, i.e., the tank circuit. Making grid 4 positive increases mutual conductance of tube 2, which decreases the negative equivalent inductance across tank circuit and which in turn causes an increase in the oscillation frequency of the tank circuit. No added elements over ordinary oscillator circuit are needed, but the proportion of reactance of $L_2$ and internal grid resistance must be such that reactance predominates in order to obtain frequency correction effect.

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# SERVICING —New Series

## How to Test Valves with Simple Apparatus and with Special Valve Testers

ONE of the first steps when a receiver is sent in for testing is to adopt a systematic method of examination and record entry in a special book kept for the purpose. The receiver should be examined to make certain that all valves are in position and the book entry should take into account any loose parts or leads which may be noted in this connection. Special

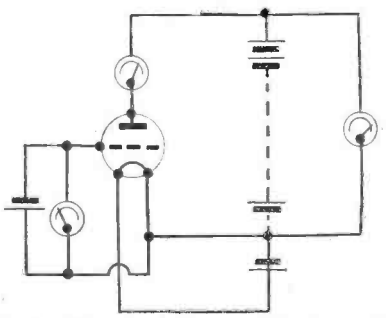


*Fig. 1.—Theoretical diagram of the basic valve tester. Practical diagram appears on page 66.*

numbered labels would be an advantage where there is much work, and there is a likelihood of two or more sets of the same make and type being received, and these will enable the set to be quickly picked out, instead of looking for any special chassis number which the makers may have provided. The preliminary entries and records will do much to facilitate tracing the set and also be of assistance should the receiver have to be returned at a later date for further servicing.

After this the actual work of testing may be tackled, and the first step will be to make quite certain that the valves are in order. It is obvious that defective valves will result in a receiver giving a poor performance, or in preventing signals from being received, therefore the valves should be checked first. A valve operates by virtue of an emission from the filament or cathode and, therefore, after a long period of use the emission may fall off. This will result in inefficiency. At the same time, the emission from the filament or cathode is attracted to an anode and passes through one or more grids. These perform definite functions according to the type of valve, and the performance depends upon the position of these grids apart from potentials which may be applied to them. Therefore, apart from the necessity of ascertaining that the emission is in order, it is also necessary to make certain that the positions of the various electrodes are such that there are no short-circuits between them.

### Mutual Conductance

The most effective method of testing the condition of a valve is by means of its mutual conductance. This is sometimes known as the "goodness" of the valve. In some cases, especially in American practice, this is also known as control grid—plate transconductance, or simply transconductance, the abbreviation for which is $g_m$. This factor combines in one term the amplification factor and the plate resistance, and it is the quotient of the first by the second. It may be more strictly defined as the ratio of a small change in plate current to the small change in the control-grid voltage producing it. As an example, if a grid voltage change of 0.5 volt causes a plate current change of 1 mA, then the transconductance is .001 (amps) divided by .5. The unit of conductance is the mho, which is the spelling of "ohm" backwards. For normal purposes a millionth of a mho is the standard, and this is a micromho. The mutual conductance is also expressed in terms of mA/volt.

The simplest valve tester will, therefore, consist of a valveholder mounted on a baseboard provided with terminals so that L.T., H.T. and G.B. may be applied. Meters will have to be used to ascertain the exact voltages applied and the anode current which is flowing, and this is shown in Fig. 1. The meter in the L.T. circuit may, of course, be dispensed with provided that it is reasonably certain that the L.T. supply is more or less correct. Similarly, the H.T. voltmeter may be omitted if a reliable H.T. source is used, such as a new tapped H.T. battery or mains unit delivering the necessary output. Valves are rated with a given H.T. voltage, and this should be selected when a valve is being tested. Thus, the only essential meters are for measuring the change in the grid-bias supply and for the change in anode current. A single dual-purpose meter could be used, of course, with plugs and jacks or switches to make the necessary change in position in the circuit, and this is one of the methods adopted in certain commercial apparatus. Another method which is often employed is to use only the anode current meter, and to select H.T., L.T. and G.B. voltages from a mains supply unit by means of a switch. The mains are reasonably constant, and the ratio of the voltages required in relation to the mains supply are such that the slight changes in main voltage make very little difference to the secondary voltages, and

(*Continued on next page*)

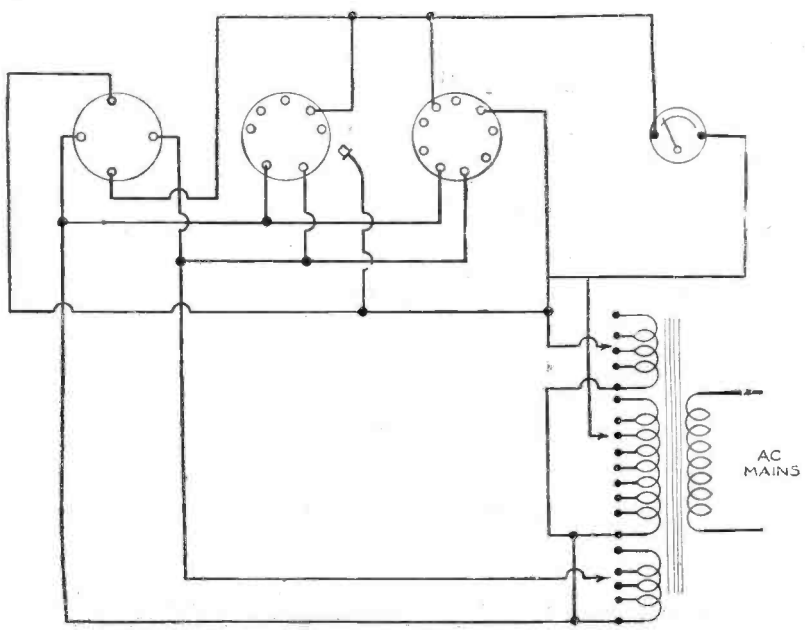



*Fig. 2.—Basis of the modern commercial all-valve tester.*

## SERVICING

(*Continued from previous page*)

the accuracy is high enough for valve test purposes.

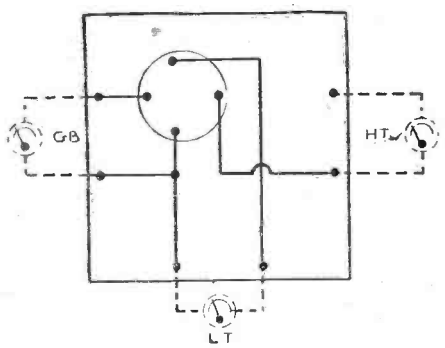



*Fig. 3.—Practical arrangement of the circuit shown in Fig. 1.*

### All-purpose Meter

The general design of a good valve tester may therefore be summed up as a small mains supply unit with selector switches for various voltages, and a large-scale milliammeter connected permanently in the anode circuit. In commercial models a series of valveholders for all types of valves are wired in parallel on the lines indicated in Fig. 2. This is more or less an outline of the idea, without all the refinements which can be introduced. A further feature of the commercial tester is the marking of the milliammeter dial in three coloured sections, generally marked "Good," "Indifferent" and "Replace." This enables your customer to see the condition of a valve and he does not have to be bothered with figures which may or may not mean anything to him.

## THE MANUAL CONTROL OF VOLUME

(*Continued from page 58*)

the maker's instructions must be followed. The moving arm again is used to select the desired proportion of the signal voltage.

### Speaker Control

There is one position left at which control can be exercised, and that is the loudspeaker. Obviously, from what has been said, this control cannot prevent overloading of valves or components in the receiver and is, therefore, only of use where the speaker is being used as a remote listening point and an item is received which is not desired. In this case the signal will be bypassed, which is a reversal of the method No. 2, and it may be accomplished by a potentiometer device across the secondary of the speaker transformer, or by a resistance of such a value that the speech coil is gradually short-circuited. In general, it will be preferable to ignore control methods on the primary of the speaker transformer for the same reason as in the case of the L.F. transformer.

In all cases where the signal voltages are present across the control, it is obvious that the change from one point to another must be carried out very gradually or noises will be introduced, or other troubles will be present, due to the sudden jumps from one point to another, and thus the selection of a component for volume control purposes requires some care, and only the best should be obtained.

# The Radio Society of Great Britain

THE following letter has been received from the Radio Society of Great Britain:

I am directed by the Council to inform you that after the most careful consideration of all circumstances, they have unanimously resolved that the work of the Society shall continue for as long as possible. In making this decision the Council expressed the view that it is essential for the future of Amateur Radio in Great Britain that a strong and virile organisation must remain in being.

The need for representation will eventually arise when matters concerning experimental licences come up for discussion. The Society cannot allow itself to become an organisation in name only—it *must* continue to be, in truth, the National Society, representing the Radio Amateurs of Great Britain.

### "The T. and R. Bulletin"

It is the Council's intention to continue the monthly publication of the Society's journal in a reduced form. Each issue will contain technical articles and topical information. Later it is hoped to include news from members serving in H.M. Forces, which will enable them to keep in touch with one another.

The decision to continue publication of *The T. and R. Bulletin* was made after advice had been received that several prominent advertisers had promised their continued support. The Council believes that this demonstration of goodwill on the part of the radio trade will be welcomed by every member.

The September issue will, it is hoped, be published towards the end of the current month.

### QSL Service

Cards for home members will continue to be distributed at reasonably frequent intervals, providing stamped addressed envelopes are in file. Cards for overseas amateurs will be forwarded as circumstances permit. As from October 1st, 1939, the R.S.G.B. QSL Bureau will be operated by Mr. A. O. Milne, 29, Kechill Gardens, Hayes. Bromley, Kent, to which address all cards should be sent.

### Experimental Section

Although the activities of the section must necessarily be curtailed the Council anticipates that arrangements will be made for certain of the groups to function. Further information in this connection will be published in the October issue of *The T. and R. Bulletin*.

### Local Activities

The Council expresses the wish that local activities shall continue as far as circumstances permit. Brief reports of meetings should be forwarded to headquarters by T.R.s or local organisers.

District meetings will, it is anticipated, cease, but it is hoped that district representatives will continue to keep in touch both with headquarters and their local groups.

### Headquarters

The registered address of the Society will continue to be 53, Victoria Street, London, S.W.1, but the business of the Society will be carried on from 16, Ashridge Gardens, London, N.13, the private address of the Secretary-Editor (Telephone: Palmers Green 3255). All correspondence should, as hitherto, be sent to 53, Victoria Street, but members should not call at that address.

With reduced headquarters staff it is essential that correspondence be reduced to an absolute minimum.

### Subscriptions

The Council has decided that as from September 1st, 1939, the Home Corporate Membership subscription shall be 15s. per annum, except in the case of members serving with H.M. Forces, who will pay a subscription of 10s. per annum. Overseas and Associate subscriptions will remain unaltered.

The Council asks that all members shall forward subscriptions as promptly as possible when they become due, in order to avoid additional clerical work falling upon the reduced headquarters staff. Members will appreciate that the payment of their subscriptions is essential to enable us to carry on.

Applications from new members will be accepted at the new war-time subscription rates.

### Convention

It is with much regret that the Council has to inform the membership that all arrangements for the 1939 Convention have been cancelled. They wish to record their thanks to all who replied to the circular, and particularly to those who had promised to loan apparatus.

### Changes of Address

It is essential that changes of address shall be communicated to headquarters as promptly as possible, in order to prevent delays occurring in the delivery of *The T. and R. Bulletin* and other notices.

J. CLARRICOATS, Secretary-Editor.

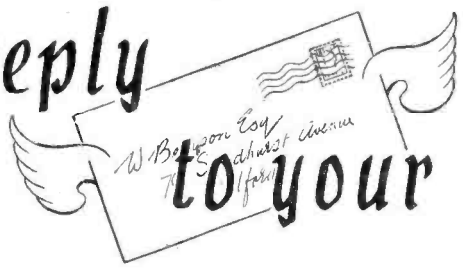
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# In reply to your letter



## Aerial and Interference

**"I live in a flat where I am unable to obtain access to the roof. There is very bad interference, and I have been unable to cut this out. Is there nothing I can do to cut out this trouble, as signals are completely ruined at the moment?"—G. L. (W.4.).**

THE trouble must come from some interior electrical machinery or similar apparatus and therefore the only satisfactory solution is to erect an aerial well clear of the area of interference and use a screened lead-in cable. As you cannot do this, all we can suggest is to fit mains suppressors (if the set is a mains model), enclose the set in a metal box or line the cabinet with foil earthed, and then try the smallest possible indoor aerial. This should be placed in various parts of your flat until you find a position and direction which gives minimum interference.

## Transformer Ratio

**"I have seen in a local radio store a transformer with a ratio of 10 to 1. It seems to me that this is much too high for satisfactory use, and I wonder if it has been designed for some special purpose. Could you tell me whether it is a standard L.F. component and how it could be used?"—H. H. (Leeds).**

THERE was a component of the type mentioned on the market at one time, and it is, of course, very useful in making a simple one-stage amplifier for use with a crystal or single valve set. It provides a big gain and in the interests of economy it is well worth considering. Obviously, however, the number of L.F. stages will have to be kept to a minimum in order to avoid overloading difficulties.

## Speaker Transformer

**"I have just obtained cheaply a small moving-coil loudspeaker, which has apparently been removed from a commercial receiver. There are two flexible leads stuck to the cone and these are 'in the air.' It appears that a transformer has been taken off, as there are fixing holes and bolts projecting. Is it safe to assume that this is a low-resistance speaker and that I must use a transformer with it?"—F. T. E. (Co. Sligo).**

IT should be possible to see the winding on the cone, and if this is not made from very thin wire then it is a low-resistance speech coil and a transformer will have to be used to couple it to the output stage. As you will not know the impedance of the coil winding, you should obtain a multi-ratio speaker transformer and then adjust the output tappings to obtain the maximum volume and quality, when you will know that the load is approximately correct.

## H.F. Choke

**"In building a simple one-valve set I have been told that I can ignore the H.F. choke. My informant says that the headphones themselves will provide all the choking effect that is necessary, and I should be glad if you would inform me whether or not this is so."—L. S. E. (Eastchurch).**

IN a normal medium or medium-long-wave broadcast receiver this is quite true. You may find, however, that a fixed condenser across the 'phones would be desirable if the choke is omitted. You will see, in this issue, that we have omitted the choke in our A.R.P. One, and reaction is perfectly controllable in spite of this. In a short-wave set, however, the inductance value of the 'phone windings will probably prevent the reaction circuit from functioning properly, and a good short-wave choke should be included in such a set.

### 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.**

## Multi-contact Switches

**"I should like to try out your Kestrel short-wave set, but I already have a rotary multi-contact switch of American manufacture. This has the same number of contacts as your specified component and I should like to know whether it will be safe to use this. I know you do not specify alternatives, but at the moment cash is short and I should like to use this item."—B. S. R. (N.15).**

THE rotary type of flat disc switch is available in various different patterns, and although it may have the same number of contacts, it may not be of the same type. The switch used in the Kestrel is a three-pole four-way component, and you will have to examine your switch to make certain that it is a similar type.

## Colour Code

**"I have just got an American set and I note that the speaker plug, which is a five-point affair, is provided with coloured leads. I assume this follows some standard colour code, and as I wish to try alternative speakers of a larger design, I should be glad if you could tell me which is the field winding, etc."—L. W. Q. (Norwich).**

THE only code we can trace which used in speakers is apparently not a standard one. In this, the field winding is black and yellow, the black being the inside of the winding. The primary is presumably centre-tapped, as you say there are five leads, and in that case red is the centre tap, green the outside primary and brown the inside primary.

## Using Headphones

**"I recently bought an all-wave superhet, and find that on the short waves many of the stations are hardly of entertainment value on the speaker. I can just hear them by putting my ear close to the speaker and I wonder if it would be feasible to use headphones connected to the extension speaker sockets. The set is operated from A.C. mains and I wonder if this would render the phones dangerous to use. I should be glad of advice concerning this point."—D.T. (Shrewsbury).**

IT is quite in order to use headphones for the purpose mentioned, and, in fact, the use of 'phones is becoming increasingly popular with all-wave sets on account of the much greater enjoyment which can be obtained on the short waves. There are other advantages in the use of 'phones for tuning, etc. You must first ascertain whether the extension speaker sockets are designed for a low or a high impedance, and then obtain a low or high-resistance pair of 'phones. Alternatively, you can use standard high-resistance 'phones, but volume will be reduced unless the output is for high resistance. A step-up transformer may, of course, be used to feed high-resistance 'phones from a low-resistance output and vice versa.

## 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. L. (Warrington).** We do not know of any school in the locality, and can only advise one of the Correspondence Colleges.

**R. J. (Didcot).** We cannot recommend individual makes, but do not think you will have any difficulty in obtaining the particular model mentioned.

**J. H. (Bathgate).** We have no details of the Goltone coil, but the Telsen coil will be found in our issue dated June 13th, 1938.

**J. H. W. (Nr. Bolton).** We are unable to identify the coil from your description.

**A. C. P. (W.2.).** You cannot build the transmitter now, as all licences have been withdrawn.

**No Name (Highfield).** Blueprints are 1s. each, but we have not produced one for the set in question. Messrs. Peto-Scott can supply a complete kit.

**K. B. A. (Taunton).** The blueprint list is published whenever possible.

**F. C. (Wellington).** Write direct to Messrs. Mullard at Century House, Shaftesbury Avenue, London, W.C.

**R. M. (N.6).** We have no details of the coil in question.

**N. T. (Deepdale).** Write to the makers of the set for their recommendation regarding a suitable unit.

**R. W. (S.E.16).** It is possible to make up a frequency filter, but we cannot give details without full data of the various speakers.

**D. A. C. (Worthing).** Values cannot be given without current values at the various tappings.

**Tynebilt Radio (Newcastle-on-Tyne).** We regret that details of the coil in question are not now available.

**D. B. (Ashchurch).** The coil may be obtained from T. H. Thompson, of 176, Greenwich High Road, S.E.10.

**The coupon on page 63 must be attached to every query.**

# Practical Wireless
# BLUEPRINT SERVICE

These Blueprints are drawn full size.

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

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

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

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

| PRACTICAL WIRELESS | *Date of Issue.* | *No. of Blueprint.* |
|---|---|---|
| **CRYSTAL SETS.** | | |
| **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: Blueprints, 1s. each.** | | |
| Four-range Super Mag Two (D, Pen) | — | PW36B |
| The Signet Two (D & LF) | 24.9.38 | PW76 |
| **Three-valve: Blueprints, 1s. each.** | | |
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| 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) | 12.6.37 | PW41 |
| Hall-Mark Cadet (D, LF, Pen (RC)) | 16.3.35 | PW48 |
| F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three) | 13.4.35 | PW49 |
| Genet Midget (D, 2 LF (Trans)) | *June* '35 | PM1 |
| Cameo Midget Three (D, 2 LF (Trans)) | — | 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 |
| All-Wave "Corona" 4 (HF, Pen D, LF, Pow) | 9.10.37 | PW79 |
| "Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B) | 12.2.38 | PW83 |
| The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC)) | 3.9.38 | PW90 |
| **Mains Operated.** | | |
| **Two-valve: Blueprints, 1s. each.** | | |
| A.C. Twin (D (Pen), Pen) | — | PW18 |
| A.C.-D.C. Two (SG, Pow) | — | PW31 |
| Selectone A.C. Radiogram Two (D, Pow) | — | PW19 |
| **Three-valve: Blueprints, 1s. each.** | | |
| Double-Diode-Triode Three (HF Pen, DDT, Pen) | — | PW23 |
| D.C. Ace (SG, D, Pen) | — | PW25 |
| A.C. Three (SG, D, Pen) | — | PW29 |
| A.C. Leader (HF Pen, D, Pow) | 7.1.39 | PW35C |
| D.C. Premier (HF Pen, D, Pen) | — | PW35B |
| Ubique (HF Pen, D (Pen), Pen) | 28.7.34 | PW36A |
| Armada Mains Three (HF Pen, D, Pen) | — | PW38 |
| F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) | 11.5.35 | PW50 |
| "All-Wave" A.C. Three (D, 2 LF (R.C.)) | — | PW54 |
| A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen) | — | PW56 |
| Mains Record All-Wave 3 (HF Pen, D, Pen) | — | PW70 |
| All-World Ace (HF Pen, D, Pen) | 28.8.37 | PW80 |
| **Four-valve: Blueprints, 1s. each.** | | |
| A.C. Fury Four (SG, SG, D, Pen) | — | PW20 |
| A.C. Fury Four Super (SG, SG, D, Pen) | — | PW34D |
| A.C. Hall-Mark (HF, Pen, D, Push-Pull) | 24.7.37 | PW45 |
| Universal Hall-Mark (HF Pen, D, Push-Pull) | 9.2.35 | PW47 |
| A.C. All-Wave Corona Four | 6.11.37 | PW81 |
| **SUPERHETS.** | | |
| **Battery Sets: Blueprints, 1s. each.** | | |
| £5 Superhet (Three-valve) | 5.6.37 | PW40 |
| F. J. Camm's 2-valve Superhet | — | PW52 |
| F. J. Camm's "Vitesse" All-Waver (5-valver) | 27.2.37 | PW75 |
| **Mains Sets: Blueprints, 1s. each.** | | |
| A.C. £5 Superhet (Three-valve) | — | PW43 |
| D.C. £5 Superhet (Three-valve) | 1.12.34 | PW42 |
| Universal £5 Superhet (Three-valve) | — | PW44 |
| F. J. Camm's A.C. £4 Superhet 4 | 31.7.37 | 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.** | | |
| **One-valve: Blueprint, 1s.** | | |
| Simple S.W. One-valver | 9.4.38 | PW88 |
| **Two-valve: Blueprints, 1s. each.** | | |
| Midget Short-wave Two (D, Pen) | — | PW38A |
| The "Fleet" Short-wave Two (D (HF Pen), Pen) | 27.8.38 | PW91 |
| **Three-valve: Blueprints, 1s. each.** | | |
| Experimenter's Short-wave Three (SG, D, Pow) | 30.7.38 | PW30A |
| The Prefect 3 (D, 2 LF (RC and Trans)) | 7.8.37 | PW63 |
| The Band-Spread S.W. Three (HF Pen, D (Pen), Pen) | 1.10.38 | PW68 |
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| **Three-valve: Blueprints, 1s. each.** | | |
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| Parvo Flyweight Midget Portable (SG, D, Pen) | 3.6.39 | PW77 |
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| 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.** | | |
| Class B Three (D, Trans, Class B) | — | AW386 |
| £5 5s. S.G.3 (SG, D, Trans) | 2.12.33 | 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) | *Mar.* '35 | WM384 |
| The Auto Straight Four (HF Pen, HF Pen, DDT, Pen) | *Apr.* '36 | WM404 |
| **Five-valve: Blueprints, 1s. 6d. each.** | | |
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| **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) | — | WM304 |
| **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, R.C. 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-valver Short-waver (SG, D, LF, P) | 22.7.39 | WM383 |
| **Superhet: Blueprint, 1s. 6d.** | | |
| Simplified Short-waver Super | *Nov.* '35 | WM397 |
| **Mains Operated.** | | |
| **Two-valve: Blueprints, 1s. each.** | | |
| Two-valve Mains Short-waver (D, Pen) A.C. | — | 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) | *Aug.* '35 | WM391 |
| **MISCELLANEOUS.** | | |
| S.W. One-valve Convertor (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.) | *Jan.* 5, '35 | AW462 |
| Short-wave Adapter (1/-) | — | AW456 |
| Superhet Converter (1/-) | — | AW457 |
| B.J.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 |