

**SUPERHET DIFFICULTIES**—See Page 39!

# Practical and Amateur Wireless

**3<sup>d</sup>**  
EVERY  
WEDNESDAY

Edited by F.J. CAMM

a GEORGE  
NEWNES  
Publication

Vol. 8. No. 197.  
June 27th, 1936.

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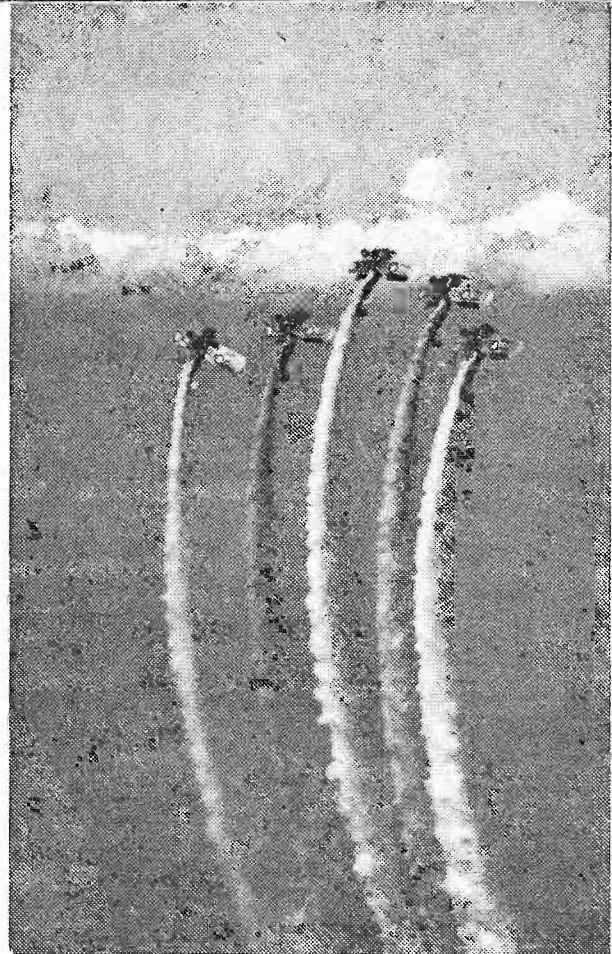
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# MAINS TRANSFORMER DESIGN

—SEE  
PAGE  
383



# Practical and Amateur Wireless

Edited by F. J. CAMM

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

VOL. VIII. No. 197. June 27th, 1936.

## ROUND *the* WORLD of WIRELESS

### Finger-tip Audition for Deaf Mute Children

A NEW instrument, called the *Telefactor*, has been invented for teaching deaf-mutes to speak; it consists of a vibrating diaphragm on which the pupil's finger-tips are placed. The apparatus includes specially sensitive headphones, and coupled to the amplifier are two microphones for the use of both child and instructor. The instrument may also be used for the electrical reproduction of gramophone records, and, by this means the pupil is familiarised with sounds.

### East Pittsburgh's New Aerial

KDKA, which claims to be the world's pioneer broadcasting station, will shortly erect a new aerial 750ft. in height; it is of a unique design, and the engineers claim that it will not only increase the range of the transmitter, but will do much towards curing any tendency to fading.

### British India Becomes Radio-minded

ALTHOUGH, at present, notwithstanding its vast population, British India can only boast of possessing 28,000 listeners, this figure already shows a 50 per cent. annual increase over the past three years. Everything is being done to popularise radio entertainments, and the installation of further stations, it is thought, will increase considerably the desire of the natives to acquire wireless receivers.

### Uruguay Aspires to a Fifty Kilowatt

FOLLOWING the example set by the United States of America and Mexico, Uruguay is now planning the construction of a high-power station to be installed in the immediate neighbourhood of Monte Video. The *Servicio Oficial de difusion radio electrica* is responsible for the development of the project. When completed the transmitter will work on 461.4 m. (650 kc/s) and should be heard in Europe, as are some of the most powerful stations in Buenos Aires (Argentine Republic).

### Poland May Acquire Another Relay

POLSKIE RADIO is said to be considering a further addition to its network by the installation of a 20-kilowatt relay transmitter at Lutsk in the province of Volhynia. This town is situated to the north-east of Lwow and is considered beyond the range of the latter's broadcasts.

### Do Radio Programmes Affect the Shoe Trade?

THIS question is one which has been interesting the boot and shoe industry in the United States. It has been computed that on radio star nights the large listening population is satisfied to stay at home, and, in consequence, proportionately less work is provided for the cobblers in repairs to footwear. The reason was actually put forward as being one of the staple causes for increased unemployment in this particular industry.

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### Is There To Be a Short-wave Plan?

IT is unofficially reported that following a recent conference a special commission appointed by the U.I.R. (Union Internationale de Radiodiffusion, Geneva) is now steadily working out a plan for the allotment of short-wave channels to recognised broadcasting stations. Such a scheme will not deal with Europe alone, but will comprise the short-wave transmitters throughout the world, and allot suitable frequencies in accordance with their geographical positions.

### More Entries for the Kilowatt Stakes

THE Czech broadcasting service proposes to build a 100-kilowatt transmitter, to be known eventually as Prague 2, on a suitable site between Melnik and Raudnitz, and an even more powerful station is to be erected near Brno; both are to be ready to operate by the end of 1937 or early 1938. Prague 2 will take over the Moravská-

Ostrava channel. At Uzhorod, in the Carpathian district, it is also planned to put up a 100-kilowatt station. The opening of relays at Carlsbad and Budweis are still under consideration.

### Soft Lights and Sweet Music

KHBC, at Hilo, and KGMB, in Honolulu, both popular broadcasting stations in the island of Hawaii, have been recently endowed with new studios; in view of the warm climate artists perform in a surrounding of palms and exotic flowers. The studios are built of sugar cane!

### A Musical Radio Alphabet

SO far, with the exception of Berlin, European studios have not used their initial letters as the notes of their interval signals. Canada, however, has adopted for two of its transmitters notes giving their respective call-signs, namely, CFAC, Calgary, and CFCF, Montreal.

### France Without Radio Papers

DURING the recent general strike, French listeners were deprived of their printed radio programmes, as both the printing and distribution staffs had joined the strikers. During this period the studios were compelled to broadcast, at odd intervals, the details of the items to which listeners were advised to tune in. Much of the time on the air was devoted to news bulletins.

### East Africa Adopts New Standard Time

ON January 1st, 1937, the clocks in Uganda, Kenya Colony, Tanganyika, and Zanzibar will be altered in their relationship to Greenwich Mean Time. At present, they are three hours ahead, but from that date they will be put back fifteen minutes. It should be noted that at this period of the year Nairobi (Kenya Colony) is only two hours ahead of B.S.T.

### New South African Radio Charter

THE Bill by which the Union of South Africa will create a Broadcasting Corporation on the lines of the B.B.C. has been passed by the Senate. It is considered that, with official backing, some considerable development in the network will take place in 1937.

# THE PICK of the PROGRAMMES

## Brass Quintet

**F**RANK BIFFO'S BRASS QUINTET, which broadcasts in the National programme on June 30th, consists of four brass (two trumpets and two trombones) and a piano. Nothing like it has ever been attempted before. Tired of hearing innumerable string quintets and octets Frank Biffo determined to present something entirely different. The instrumentation of four brass and a piano is quite original and consequently every number is specially orchestrated.

## The Royal Show at Bristol

**T**HE Royal Show, which comes to Bristol from June 30th to July 4th, will be discussed in the feature, "For Western Farmers in Particular," on June 25th. It is some twenty years since the Royal Show last visited Bristol, and no doubt those who saw the earlier Show will find many differences in the 1936 Show, which opens in Ashton Park, near Bristol, on June 30th. It is hoped that the President and the Honorary Show Directors will come to the microphone with A. W. Ling on June 25th, and that they will indicate what is to be seen at the Show.

## Light Music from Edinburgh

**F**OR an hour on June 26th, the Rutland Square and New Victoria Orchestra, directed by Norman Austin, will be broadcast from the New Victoria Cinema, Edinburgh. Items include Potpourri "Telefunken," arranged Morena; Valse Lente, "Roses and Butterflies," by de Micheli; Fantasia, "Faust," Gounod, arranged Pennati Malvezzi; Selection, "Songs from the Films," arranged Sigler; Rumba, "Marianna," by Marion Sunshine; Suite, "Three Dale Dances," by Arthur Wood; "Dance for a Children's Party," by Thiman; Medley, "Summer Hits of 1936," arranged Bentley; and Scottish Dances, "The Pibroch," arranged Maclean.

## Light Music from Bridlington

**F**LIONEL JOHNS and his Orchestra will broadcast a programme of light music from the Floral Pavilion, Bridlington, on June 30th, their programme including a selection from Ivor Novello's musical show, "Glamorous Night." Thomas Kay (xylophone) will be the soloist in "Zita," by Charrosin.

## Wolf Ferrari Opera

**O**N July 4th the short opera, "Susanna's Secret," by Wolf Ferrari, will be given by the B.B.C. Midland Orchestra, conducted by Leslie Heward, and two soloists—Harold Williams and Noel Eadie. Robin Whitworth, who has gone to Midland Regional for six months, chiefly to do feature programmes, is the producer. The plot, delightfully handled by the composer, concerns Susanna's secret habit of smoking, which leads her husband, when he gets a whiff of tobacco-laden air, to suspect a lover!

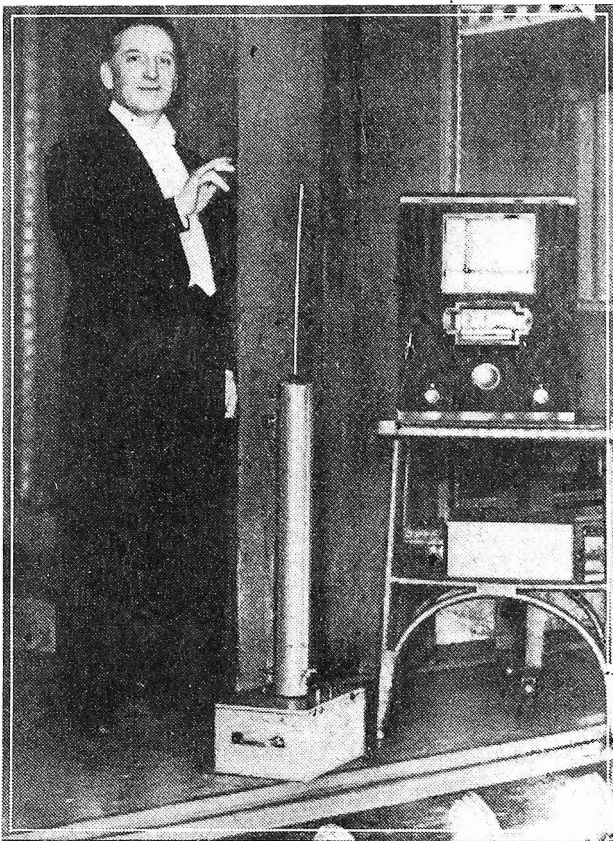
## Variety from Midland Regional

**P**ATRICIA ROSSBOROUGH, who has been on tour with Elsie and Doris Waters and Clapham and Dwyer, is to

### MAKE THESE DATES WITH YOUR RADIO

return to the Midland programme on July 1st with her "syncopated pianisms." The vocalist will be Jim Collier, of Birmingham, who spent some years in Canada

### THE MAGIC MUSICIAN



This illustration shows Mr. Andre Ledor who, with an ingenious oscillator operated by hand capacity, is able to produce music similar to that of the vibraphone. He is also able to make the radio set give realistic imitations of bird cries, cat calls, etc. The set used in conjunction with the apparatus is one of the latest Cossor receivers.

## SOLVE THIS!

### PROBLEM No. 197.

Newton was not satisfied with the reproduction obtained from his four-valve straight receiver and, therefore, as the volume of the required stations was more than ample for his requirements he decided to substitute a W 4 Westector for the reacting detector. He joined the positive end of the Westector to the junction of the coil and fixed vanes of the tuning condenser in the normal manner, and the negative end via a .25 mfd. fixed condenser to the P terminal of the existing L.F. transformer, with the H.T., G., and G.B. terminals of this component joined to H.T., grid of output valve, and G.B.—respectively. Why were results poor when the receiver was switched on? Three books will be awarded for the first three correct solutions opened. Post your entries to the Editor, to reach this office not later than the first post Monday, June 29th, 1936.

### Solution to Problem No. 196.

One of the ordinary 240-volt 60-watt lamps normally used for lighting purposes could have been connected in place of the burnt-out dropping resistance.

The following three readers successfully solved Problem No. 195: H. Giles, 9 Prince Albert Square, Earlswood, Surrey; E. Bailey-Wood, 11, Wenreig Road, Trealaw, Rhondda; J. McBean, 3, Farm Road, Crombie, near Dunfermline.

and the States, and broadcast regularly there. He is known as "The Singing Lumberjack."

## Recital by W. H. Squire

**O**N June 29th W. H. Squire, the cellist and composer, will give a recital, including three of his own works—a serenade, Meditation in C, and Larghetto in D. Mr. Squire was born at Ross-on-Wye, in Herefordshire.

## Military Band Concert

**T**HE R. A. Lister Military Band, conducted by S. T. Webber, will broadcast in the Western Regional programme on July 3rd, when Lorna Cantor (soprano) will be the vocalist. The R. A. Lister Military Band will be heard in many seaside places this summer, from Eastbourne in the South-east to Torquay in the South-west. Last year the band played for one week at Bognor, Weymouth, and Bournemouth, and this year they have been engaged for a fortnight at each of these three places. Lorna Cantor belongs to a Concert Party called "The Melody Five."

## Northern Concert Parties

**T**WO concert party shows will be included in the Northern programme on July 2nd. Broadcasting in the afternoon, the "Arcadian Follies," from the South Pier, Blackpool, will also contribute to the main Regional "pool" programme. Harry Korris, the well-known Manx comedian, will no doubt be remembered by listeners who heard this troupe last year. In the evening, the "Bouquets," presented by Murray Ashford, and broadcasting from the Spa Theatre, Scarborough, will be heard by North Regional listeners only. This concert party includes Gladly Sewell (comediienne), Laurel Mather (soprano), Jack Howard (baritone), and Murray Ashford himself (entertainer).

## The Silver Cord

**L**ISTENERS who remember Edna Best's magnificent performance in "A Bill of Divorcement" will welcome the news that she will shortly return to the microphone in a special adaptation of a famous London stage success. "The Silver Cord" was first presented at the St. Martin's Theatre in 1927, and enjoyed a run of nearly two hundred performances. It is by the well-known American dramatist, Sidney Howard, and the radio version has been prepared by Barbara Burnham. The play deals in a highly dramatic fashion with a problem that is at once frequent and tragic—the conflict of wills between a highly possessive mother and her children. Gladys Young, an experienced broadcaster, will have the part of her life as the mother, while Edna Best will take the rôle in which, in the stage version, Clare Eames made her name. Other members of a distinguished cast will include Ronald Simpson, Ann Todd, and Geoffrey Keen, the son of Malcolm Keen, who bids fair to carry on the great tradition of his family and his father. The play, which will be produced by Val Gielgud, will be broadcast from the National on June 29th, and from the Regional on July 3rd.

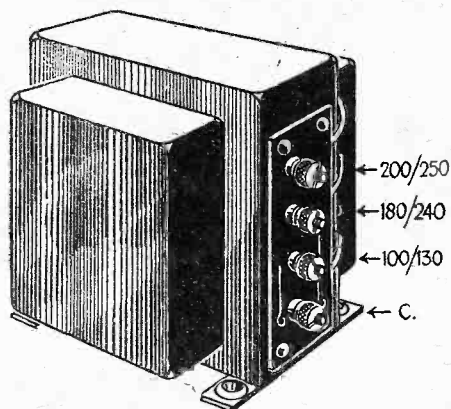
# Mains Transformer Design

Some of the Important Features in the Design of the Mains Transformer with Especial Reference to Commercial Components

**T**HERE are many experts who hold that the mains transformer is the most vital part of a mains-operated receiver; but even if this is not so, there is no doubt that the performance of the A.C. receiver depends upon the efficiency of the transformer which is used to supply the various voltages from the A.C. supply. Firstly, it is understood that one of the

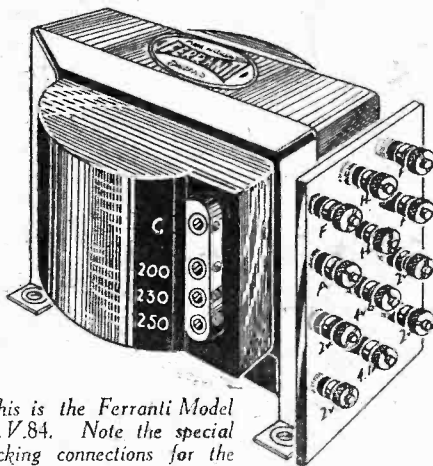
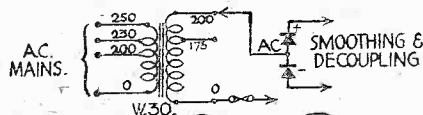
## The Principle of the Transformer

The principle upon which the transformer works is extremely simple, and merely consists of the transference of current from one winding to another by induction. If a coil of wire is placed near to another coil of wire, and an alternating current passed through one of the coils, a voltage may be measured across the ends of the other coil, and it so happens that the relationship between the voltage in one coil and that in the other is dependent upon the number of turns of wire in the two coils. Thus if a supply of 10 volts is applied to a coil consisting of 10 turns,



The Ferranti Model P 14.

great advantages of the A.C. supply (or of any alternating current, for that matter) is that it may be transformed to a higher or lower value, and this is a valuable feature which is denied to the user of a direct-current supply. One point must be emphasised, however, and that is that the wattage cannot be increased. In other words, if the voltage is stepped up, then the current will automatically be stepped down, and by stepping down the voltage the current may be increased.



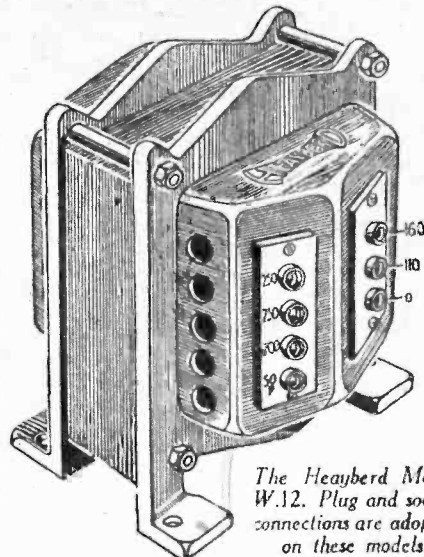
This is the Ferranti Model S.V.84. Note the special locking connections for the mains input leads.

and a coil consisting of 100 turns is placed close to it, 100 volts will be developed in the second coil.

In practice, the linkage between the two coils is increased by placing the coils over a core of iron in the usual manner, and this increases the inductance value of the coil and prevents certain forms of loss.

## Regulation Factor

There are, however, some other precautions to be taken when designing a transformer to carry heavy currents, one of the most important being the question of the total wattage to be carried. Firstly, the gauge of wire employed for each winding on the transformer must be selected so that the maximum current may be carried without an undue rise in temperature; and secondly, the primary winding must be designed with a full knowledge of the total loading of the various secondary windings. The correct selection of these gauges, in conjunction with the choice of the size of the core, will govern the output, and in a well-designed transformer there will not be a great deal of difference in the voltage when the current is varied over a fairly wide band. The better the transformer the less the variation, and this enables the various details of the wireless circuit to be more accurately worked out.

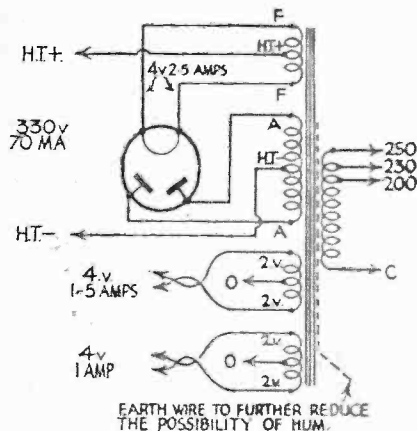


The Heayberd Model W.12. Plug and socket connections are adopted on these models.

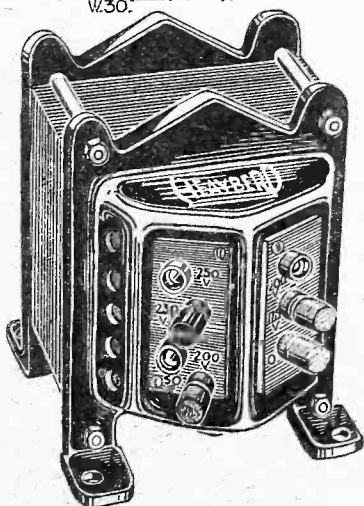
## Avoiding Hum

As the primary winding carries the alternating mains supply, there will be a similar alternation in each of the secondaries, and therefore the winding employed for the high-tension supply will have to be connected to a rectifier to convert it into a direct-current supply. This winding is very important, and in order to eliminate all possible risk of hum in the receiver there

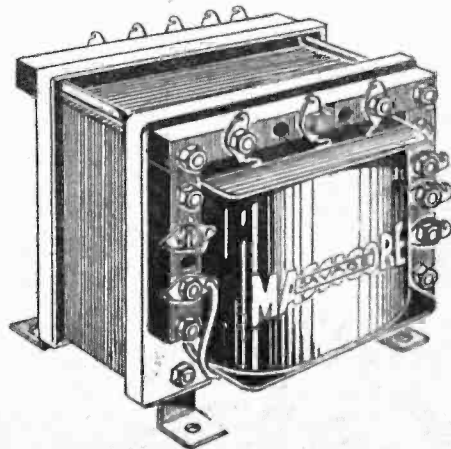
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Theoretical circuit diagram of the Ferranti S.V.84 transformer.



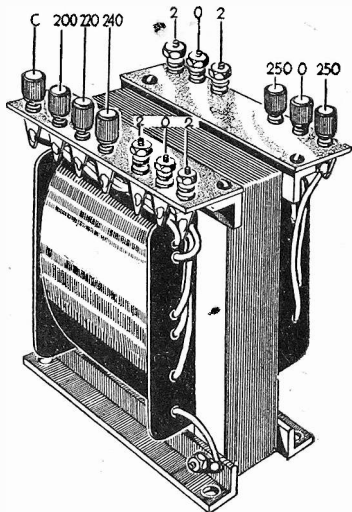
The Heayberd mains transformer W.30 and theoretical circuit diagram.



The W. Bryan Savage (Massicore) Standard Type transformer.

**MAINS TRANSFORMER DESIGN**  
(Continued from previous page)

are various schemes employed by different manufacturers. One very common arrangement is to place the low-tension, or heater, windings between the primary and the H.T. winding; whilst in other types of transformer a separate screen is interposed between the H.T. winding and the remainder of the component, and this screen is connected direct to earth. The usual arrangement of the windings on a standard mains transformer are well depicted in the theoretical circuit of the Ferranti SV84



A B.T.S. mains transformer of the unshrouded type.

transformer shown on the previous page. Here it will be seen that the primary winding is wound for a maximum input of 250 volts, and tapping points are provided so that it may be used on mains of a lower rating. In some makes of transformer there is also a tapping at the other end, so that intermediate voltages may be selected by a suitable combination of the two input leads. All the output windings are centre-tapped, the heaters to enable hum to be reduced and to facilitate the application of grid-bias resistors, and the H.T. winding for the purpose of employing a full-wave rectifying valve. The screening earth connection round the core is shown in this sketch.

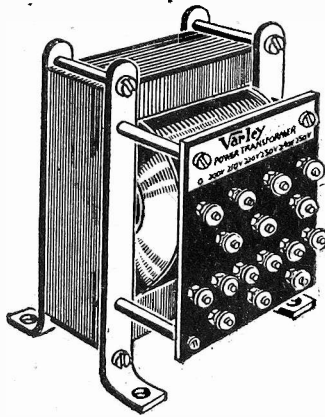
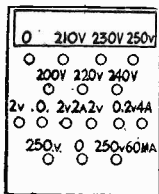
**Interaction**

As there is an A.C. supply present in the transformer, care has to be exercised to prevent this from interacting with other inductive components in the receiver, and in some cases this is carried out by mounting the transformer at some distance from such components, and also by arranging the transformer so that the windings are at right angles to any other coil. Alternatively, the entire transformer may be metallically shrouded with the shrouding earth connected. The question of ventilation should not be very important if the transformer has been carefully designed, as there should then be no undue voltage rise sufficient to warrant special care in this direction. Provided that the windings are not totally enclosed, or that the gauges of wire and method of winding have been carefully chosen, the component will not become hot. Any high degree of temperature rise generally indicates that the transformer is being over-run, due either to incorrect use or to a broken-down winding. In the Heyberd transformers the manufacturers employ a metal casing to protect the coil bobbins and the casing is provided with a number of holes to ensure a free flowing current of air during the whole time the transformer is in use, and

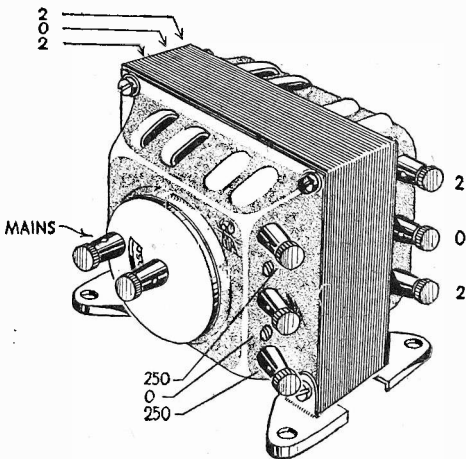
this effectively prevents serious damage due to temperature rise in the event of an overload. Normally the transformers do not run sufficiently hot to warrant this precaution, but it is a very good thought on the part of the makers. In the Savage Massicore transformer the windings are not enclosed, and the use of an extremely substantial core guards against the possibility of hot running. The Varley transformers, too, are built on these lines, and the windings should remain cool under all normal conditions.

**Methods of Connection**

With regard to the methods of making connection to the transformer windings, the makers seem to be divided. One of the main requirements is safety, and if there is the slightest possibility of a lead becoming detached from a connecting point there will be a risk of short circuits which may result in damage not only to the transformer but also to other components in the receiver. Thus, for this reason, one manufacturer will



The Varley Model EP 20, with diagram showing the arrangement of terminal board.



The Wearite Model T21A. In this model no mains sockets can be touched when the leads are connected, due to the rotating insulated disc.

provide soldering tags for connecting purposes, whilst on the Heyberd components a plug and socket connection is adopted, and the plugs are engraved with suitable markings to ensure the correct connection should they be removed at any time. Terminal connections are quite satisfactory provided they are correctly made, and ordinary flex should not be employed where the terminals are close together unless special precautions are taken. When ordinary flex is locked under a

terminal head there is a possibility of one or more of the strands of wire becoming loose and projecting from the terminal, and it may come into contact with a similar strand projecting from another terminal. Therefore, a soldering tag should be affixed to the ends of the wires, or the flex should be twisted between the fingers and the bared end dipped in solder or otherwise tinned to form a single solid connection, this may then be treated as a solid wire and bent into a loop which cannot come adrift.

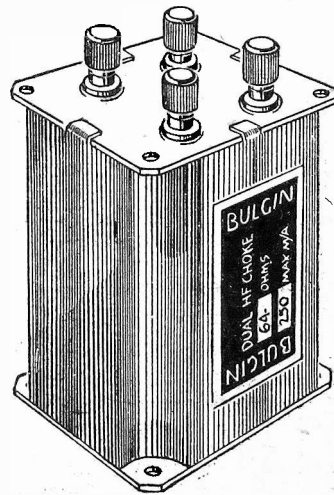
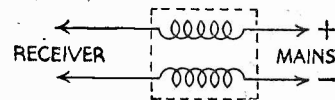
**H.T. Smoothing**

In connection with the smoothing of the H.T. supply, a high-inductance choke must be employed, and to avoid some forms of interference which are carried from the actual mains supplies, it is sometimes preferable to connect an H.F. choke in each mains lead. Such chokes must be specially designed and have thick wire so as to carry the high current. Furthermore, it is desirable that they should be screened and totally enclosed to avoid the risk of shocks. The Bulgin component shown on this page is designed on these lines, and consists of two chokes which should be connected as shown in the small inset diagram. It will be noted that the component is provided with a metal case for earthing purposes in order to comply with the standard regulations, and when ordinary home-made chokes are employed they should be similarly enclosed.

The problem of interference arising from the mains supply has been dealt with in previous articles, and the various forms of eliminating device may be joined between the mains leads to the transformer.

**Mains Supplies**

A final word of warning should be given concerning the connection of apparatus to the mains supply. When a receiver is designed for "universal" mains use, no transformer will be fitted. If a receiver designed for A.C. mains use, and fitted with a mains transformer, is connected to a D.C. mains supply, the primary of the mains transformer will be burnt out (unless fuses are fitted). The question of the frequency of the A.C. supply must also be borne in mind, and although it is possible to use a transformer designed for one frequency on mains of a different frequency, this course should not be adopted in view of the risk of hum and other difficulties.



The Bulgin Dual Mains H.F. Choke.

# LIGHTNING AND AERIALS

**A**ERIALS have always been considered an additional risk where lightning is concerned, but the possibility of the aerial or house being struck by lightning due to the aerial is, as statistics prove, very minute.

Lightning plays the most freakish tricks, and there is no knowing where it will strike, but there are one or two facts which should not be overlooked. It invariably takes the quickest and least troublesome path to earth, and usually strikes the highest point in its striking area.

Knowing these details, it is possible to provide some means whereby, shall we say, the lightning's requirements are fulfilled, and, at the same time, some reasonably secure protection for buildings and other earthed objects.

## What is Lightning?

It is not necessary to go into the theory of the cause of lightning, the various forms it takes or its characteristics, therefore, for our purpose a general statement will do.

Electricity is always present in the atmosphere; it is usually accepted that the earth is at negative potential, and that it is possible for clouds to become highly charged with an opposite polarity. When a certain difference in potential is reached between the clouds and earth, a discharge takes place, the magnitude of which depends on the state of the atmosphere, and the charge held by the cloud or clouds.

The discharge usually takes the form of what is commonly called "forked lightning," and, owing to the inconceivable amount of electrical energy it dissipates, it is capable of causing considerable damage to any object it may strike during the course of its travel earthwards.

It also happens, even when no storm is in the vicinity, that the atmosphere reaches a highly-charged state, and while the quantity of electricity may not be sufficient to cause a violent discharge, it is often sufficient to charge up metal bodies to a high potential which is capable of giving an unpleasant shock if taken to earth through one's body.

## Lightning Conductors

It is evident, therefore, that some form of protection is desirable, and it is usual to employ "lightning conductors." These consist of a stout metal low-resistance conductor, one end of which terminates in the earth, and the other end in a forked prong which projects above the building or object it has to protect. Good examples can always be seen on high buildings, churches, masts and factory chimney stacks.

Each conductor, or arrester, as they are sometimes called, protects a certain area, and it may be stated, approximately, that the effective area is equal to a circular space around it, the radius of which is roughly double the height of the conductor. Bearing these details in mind, it is obvious that if any protection is to be given to an aerial, much will depend on the actual length of the aerial, its height and the surrounding objects.

## Aerials and Arresters

We have seen that a discharge of lightning represents a terrific electrical power, and if any resistance is offered to its progress it is highly probable that the resisting body would be completely burnt. It is known that heavy metal objects, and

Details of a Simple but Efficient Lightning Arrester are Given in this Article. By L. ORMOND SPARKS

lightning conductors have been melted by a lightning discharge; therefore, it hardly seems feasible to think that the small gauge wire usually employed for aerials would stand much hope of remaining intact if struck, especially as it is invariably at right angles to the path of travel.

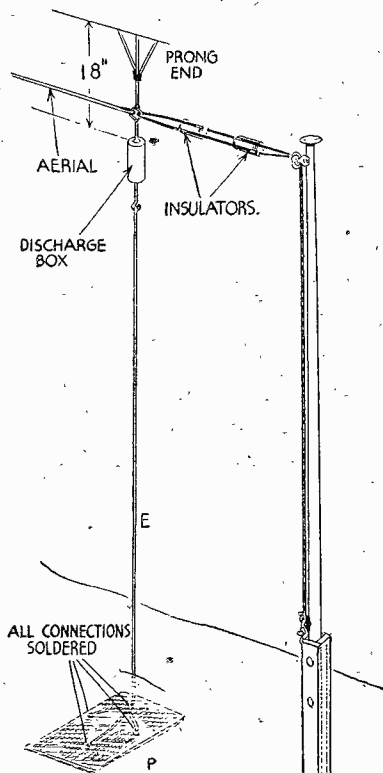


Fig. 1.—The mast end of an aerial fitted with the static arrester described in the text.

For this reason, alone, I do not think that an aerial is likely to conduct a destructive charge into or to a house, unless it happens to be in a very high and exposed part, and not surrounded by other earthed objects of a greater height.

In the case of ordinary atmospheric discharges, it is possible for the aerial to become highly charged, particularly if it is not earthed either through the set or by a switch, so some means of allowing the charge to escape harmlessly to earth should be provided.

All that is necessary is an efficient spark gap arrangement, the width of the gap being so adjusted that any excessive charge would jump or flash across the gap, one side of which is connected to the aerial, and the other side to earth. Various firms are producing suitable devices which can quite easily be fitted to any existing aerial arrangement.

If anyone has any doubt about these static charges, I would suggest that they watch the spark-gap when a storm is taking place, or summer lightning is in the vicinity. With my own aerial, which happens to be rather high and exposed, I have not only

seen quite large flashes, but I have also heard charges crackling off the free lead-in wire, and it was after one or two practical demonstrations of that kind that I decided to design some arrangement to keep the aerial free from such objectionable surprises.

## A Simple but Effective Static Arrester

Fig. 1 shows the result of my experiments, and the method of fastening it in the aerial circuit. It will be noted—and this is a very important point—that it is fitted at the highest end, and so arranged that the prongs actually project above the mast, if one is used.

The wire "E," which goes straight down to the earthing plate "P," should be reasonably large; I used 7/22 S.W.G. enamelled wire. The forked prong is provided for the same reason as those fitted to a proper lightning conductor.

Inside the tin case shown in Fig. 2 is housed a very efficient multi-point spark gap, and one side of this is connected to the prong section and the aerial, thus allowing either a heavy discharge to have a straight line to earth or, a static charge on the aerial to be attracted to earth.

(Continued on page 398)

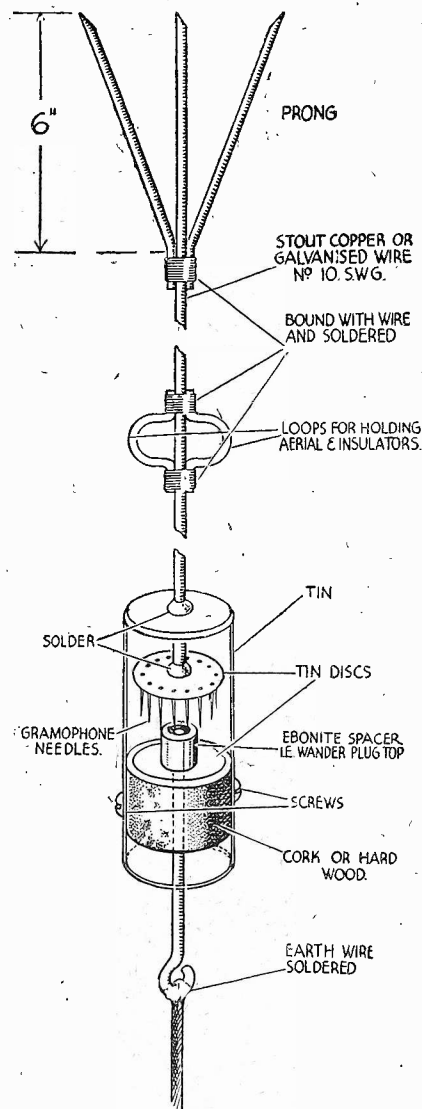


Fig. 2.—Details of construction of the arrester, showing how it is fitted to an aerial.

# Overhauling Moving-coil Loudspeakers

**A**LTHOUGH one of the most reliable pieces of apparatus included in those parts which go to make up a wireless receiver, the moving-coil loudspeaker is nevertheless a delicate instrument.

In the accompanying sketch is shown a section of a typical movement from which it will be seen that the moving-coil A is wound on a paper tube which is in turn cemented to the cone. The cone is central with BC, the pole faces of the permanent magnet F. The flexible supports D (a flexible disc fastened to the centre pole piece, and called the "spider") and E (a soft leather ring connecting the outer edge of the cone to the supporting framework, or sometimes even a corrugated continuation of the cone itself) allow, within limits, free movement of the coil and cone. When current passes through the coil in one direction, the interaction between it and the magnetic flux passing across the annular gap BC moves the coil one way. As the current is reversed, so also is the movement of the coil. In this way, audio-frequencies appearing in the coil as alternating current cause the coil to be moved first in one direction and then in the other, and the cone is thus driven to and fro to produce music or speech as the case may be. The magnetic flux produced by the magnet F passes through the upper pole piece B across the gap to C and then down to the centre pole-piece through the lower pole piece back to F. The energised moving-coil loudspeaker works on exactly the same principle with the difference that a large coil of many turns of wire, through which the D.C. current passes, is fitted round the centre pole-piece, thus forming an electro-magnet, which causes the magnetic flux in the gap.

## Mechanical Faults

Since, by virtue of the use of a matching transformer, no direct current can pass through the speech-coil, it follows that the faults most likely to develop in a moving-coil loudspeaker are mechanical, including the following:—

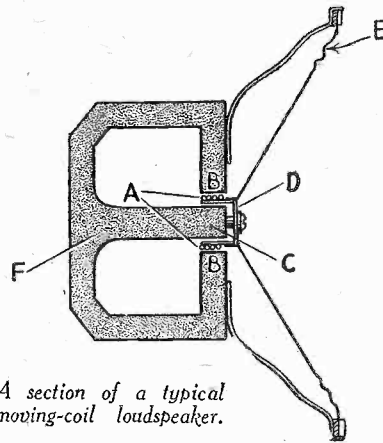
- (1) Dust particles in the air gap.
- (2) Warped speech-coil former, "spider" or cone.
- (3) Loose joints between speech-coil former and cone, cone and supporting framework, or "spider" and cone.

A very small clearance is generally given between the moving coil and the walls of

Faults which are Most Likely to Develop, and Their Remedies are Discussed in this Article  
By A. W. FLINT

the magnetic gap in which it works, so it follows that the introduction of but a small particle of dust, or a slight warping of the cone or coil former, will cause rubbing between the coil and the magnet walls, thus bringing about the most unpleasant distortion.

The first thing to do, therefore, is to remove the magnet from the cone and supporting framework. Usually by undoing two or three bolts, including the central bolt which fixes the "spider" to the centre pole-piece of the magnet. You will then be able to examine the speech-coil for wear-and-tear and warping, and to remove the



A section of a typical moving-coil loudspeaker.

dust collected round the centre pole-face. This cannot be done simply by blowing. A piece of insulating tape pushed in between the pole faces, and gently moved round the centre pole face will remove most of the dust and filings, but the procedure will have to be repeated two, or three times (using of course a fresh piece of tape each time). On the last occasion, a very light smearing of vaseline on the tape will be found to be beneficial. It must be borne in mind that this is quite a long job as the dust and filings have a very nasty habit of

clinging very tenaciously to the magnet. The object of using insulating tape, of course, is to have a material which will stick to the dust and thus pull it away from the magnet.

## Simple Repairs

You can now carefully clean the speech-coil and former carefully, and examine it. If it is found to be badly warped, the best thing is to send it to the makers for a new speech-coil to be fitted. A slight warp may, however, be removed, by carefully bending the former, but this is an intricate job, and should only be carried out with great care.

If the joint between the former and cone, or between "spider" and cone, is found to be loose, it should be stuck down firmly with the aid of a gum which is unaffected by the atmosphere. A good adhesive to use is a mixture of celluloid dissolved in amyl acetate. This makes a very strong cement, but it must be left for at least 24 hours to dry. It may also be used for patching up small tears in the cone itself.

Having satisfied yourself that all dust has been removed; that the cone is firmly attached everywhere, and that the speech-coil former is not warped, the speaker should now be reassembled. The operation of centring the speech-coil is a delicate procedure and, provided care is exercised, the following procedure should be adopted.

In almost every case, the centring of the coil is carried out by means of the flexible "spider," the centre of which is fixed to the magnet by means of a screw. To re-centre the coil, first slacken off this screw to allow freedom of movement of the coil, and then gently push three thin spacers (which may be narrow strips of thin visiting card or writing paper, depending on the clearance between the coil and the magnet) at equal distances from one another between the pole-piece and the coil. Tighten up the centre screw again, remove the spacers, and the coil will be found to be correctly centred.

If you have an old loudspeaker, there is no reason why, by carefully attending to the foregoing, it should not be made to do duty once again, even if only for an extension speaker. Even a speaker which you are now using for everyday use can be improved. And, when you have finished the job, enclose the speaker in a muslin bag, or your work will have been for nothing.

## "Out of Doors"

**T**HE eighth and final talk in the series "Out of Doors," by Henry Williamson, will be broadcast on June 29th in the Western Regional programme. It is not surprising that this series of talks has brought a large number of letters of appreciation from listeners in all parts of the country.

## Northern Command Tattoo

**R**AVENSWORTH CASTLE, scene of last year's Northern Command Tattoo, has again been lent to the military for this event. The Castle, which stands some three miles south of Newcastle-upon-Tyne, provides an impressive setting for the Tattoo, forming as it does one side of a

## PROGRAMME NOTES

vast natural amphitheatre, eminently suitable for the evolutions of troops. Excerpts from the "full dress rehearsal" on July 1st are to be broadcast, but it is not yet possible to state precisely which items will be taken. It is, however, fairly safe to say that listeners will hear the Massed Pipe and Massed Drums and Bugles Bands. The commentator, whose name is not yet available, will describe such items as the reconstruction of scenes from early Northumbrian history and the horse and motor-cycle display by the Royal Corps of Signals. Gaps will be filled by musical

interludes from the studios, supplied by Jos. Q. Atkinson and his Quintet.

## The Gwen Lewis Entertainers

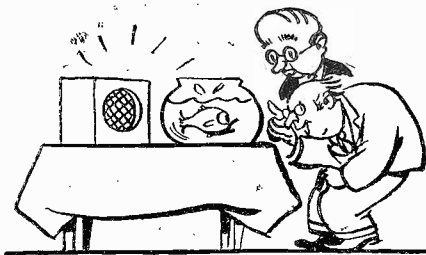
**L**ISTENERS may remember that last year the Gwen Lewis Entertainers broadcast from the Adelphi Gardens, Paignton. This Concert Party is returning to Paignton this summer, and will broadcast in the Western Programme on July 1st. The Party made their first appearance in 1926 at Broadstairs and proved a great success. They were engaged for two more consecutive years, and since then they have had seasons at many other seaside resorts. Gwen Lewis has taken part in Empire broadcasts to India, Australia and South Africa.



# On Your Wavelength

## Crooning Goldfish

THIS is not a new form of oath to replace 'ods fish, or 'ods bodikins! By my halidom I up and smite thee hip and thigh. I am referring to a recent news paragraph that a man has proved that while goldfish are dumb they can hear, and he claims to have taught them to listen to the radio. That must account for the sad wagging of the dorsal fin of the small vertebrata which swims about the bowl in Thermion Villa. It must have been listening to a crooner, and I must watch its antics the next time one of these queer creatures is broadcasting from the radio. I have often noticed that its gills distend with some sort of rhythmic periodicity and I must observe whether it is keeping time with the crooner or uttering a silent prayer in dumb fashion. The correspondent referred to is certain that goldfish hear owing to the various habits they have of responding to varying broadcasts. I understand that the sight of the poor fish gnashing



Teaching a goldfish to croon.

its tail in fury on hearing crooners and "the foundations" brings tears to the eyes of the fish.

## Lessons by Television

READING my weekly newspaper the other day and the sensational blurb about television, I learned that among the first things to be televised will be complete courses of lessons in flying, riding a horse, and swimming.

Therefore next winter you may picture me anxiously grasping an umbrella as a joystick and with feet on the hearth simulating the movements of a pilot, and enjoying all of the delights of flying with none of the risks. Of course, I do not take these blurbs seriously. I am sure the B.B.C.

## By Jhermion

has found out its mistake in using the radio chiefly for uplift and that it will not make the mistake of using the television programmes for educational purposes only. Will the children's hour consist of a blackboard lesson in the multiplication table and the alphabet—"a for horses, b for mutton, c for a holiday, j for oranges, l for leather, i for Novello, and so on? The television programmes I hope will be used for Cabaret, the presentation of sweet and dainty dancing girls, singers, conjuring, and acrobats. We already have two pretty television hostesses whom I have met, and if that is an augury of the good things to come it will not be difficult to sell television receivers at £50 a time.

## Running Commentaries

NOW that the sports season is in full swing we shall have the usual spate of staccato commentaries. They are called running commentaries, but they usually consist of long recitatives, staccato interjections, and asides which give you anything but a mental picture of the event. There will be five in one afternoon very shortly. There are commentators and commentators. Some years ago I heard the Reverend B. W. Davics, the well-known motor-cycling journalist, broadcast a commentary of the Tourist Trophy Motor-cycle Races; vastly different from some of the commentaries I have heard. I think the trouble arises from the fact that the B.B.C. is so anxious to put up a good show that it selects as commentator a man who is known to be an authority on his subject rather than an enthusiast, and more often than not they get "mike" fright and tongue-tied, while others have seen so much of the sport that they sound like it. The sort of commentary to which I object is of the "er-er-er" variety, with too many withdrawn interjections—"He's scored a goal—no, he hasn't!" Many of the commentaries are inconsequential and purely waste of time—listening time.

## Sleepy Music

IT is suggested that the B.B.C. should broadcast dreamy slumber music, so that Orpheus may coax us to sleep. You remember, probably, the words in Rathbone's Pastoral Medley:

"We welcome thee, we welcome thee,

Welcome thee, O sleep.

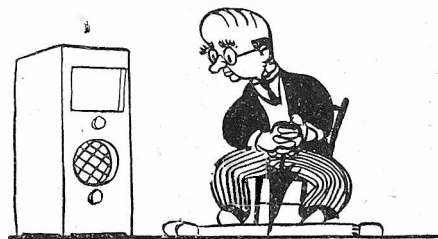
Come! Claim us for thine own."

I will omit the obvious comments, but a lot of the music sends me to sleep already, and I am not of a somnolent turn of mind.

There are a number of pieces of music which would be suitable for the purpose, Rock-a-bye Baby, for example; perhaps between the items we could have music to wake us up!

## Contentious Subject

ALTHOUGH it is undoubtedly a dangerous subject to broach, it is perhaps arguable that two of the

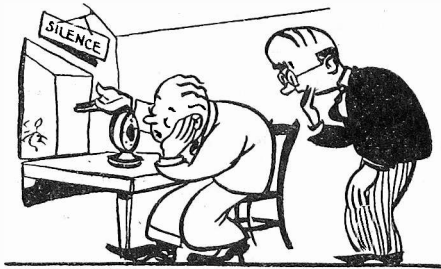


Learning to fly by television.

ten(?) most popular voices since the birth of the B.B.C. are those of Olive Groves, and Les Allen. Both these artists have been booked for Sunday afternoon programmes in the near future. Olive Groves has been heard in the Horlick's Tea-Time Hour from Normandie and Luxembourg on June 20th, and Les Allen and his Canadian Bachelors open from the same stations in this programme (with Debroy Somers' Band) on June 27th. It is not unintriguing to note that the Bachelors are not only genuine bachelors, but are also under contract to remain so! The Three Herons, equally genuine sisters, are also under contract for this programme, which is always from 4.0 p.m. to 5.0 p.m.

### Inferiority Complex

A READER whose handwriting I can scarcely read and whose address I take it is Crazy Island, Port Swittenham, of the Federated Malay States, thinks I suffer from an inferiority complex because I don't like Dickens and crooners. This reader's name is one of those which to pronounce causes your false teeth to fly out and bite someone. It looks from his handwriting to be a guttural semi-German, Irish-Scottish name, so I must make allowances for the fact that he is annoyed that I should dare to criticise Robert Burrrrrrrrns. This reader, I doubt not, prefers shrimps to my salad, and the tinnabulations of the natives twanging their guitars on the sylvan shores of Crazy Island to the intelligent music which is my wont. In any case he has just wasted a 1½d. stamp in



Bored commentators.

writing to me, for with due contumely, without punctilio or ceremony, I scattered the pieces incontinently into the wastepaper basket.

### What the Schools Like

I SEE that statistical experts at Broadcasting House have been finding out which of the educational broadcasts are the most popular with the Schools, and the following is the result of their research.

Travel Talks lead the field in order of popularity with 2,120 schools listening to them. These broadcasts are given by speakers chosen for their intimate knowledge of the country they describe and certainly carry out the aim of Schools Broadcasting in helping the teacher to do what he himself is unable to do. By their aid he is, in effect, enabled to say to his class, "Before we begin our lesson on Finland, here is Mr. So-and-so, who has lived in the country for years, to give us his intimate impressions."

Nature Study Talks, designed for listeners in rural schools, and British History take second place with 1,792 listening schools. Anyone who has listened to one of Miss Rhoda Power's fascinating British History narratives, either at school or at home, can easily



## Notes from the Dial Bench

### Dial Lamps

THERE seems to be a craze for dial lamps at the moment, but constructors do not seem to realise that these are an expensive addition to a battery set. Ordinary flash-lamp bulbs are commonly used, and as most of these have a rating of approximately .25 amp. at 3 volts, the consumption of two of them will be as much as, and in most cases greater than, the total filament consumption of the receiver valves. In the interests of economy only one dial lamp should be fitted to battery receivers, and if the receiver is used for lengthy periods it is advisable to fit an on-off switch in series with the lamp circuit so that the latter can be switched off after the required station has been located.

In mains receivers the consumption of the dial lamp is small compared with that of the valve heaters and therefore a switch is not necessary; two, or even more, lamps can be fitted without materially affecting the total running cost.

### A.C.-D.C. Receiver Lamps

IN A.C. receivers the dial lamps are invariably connected across the heater circuit, the two leads being generally connected to the two heater sockets of one of the valve-holders. In receivers of the A.C./D.C. type, however, there are three methods of wiring the lamps. In some cases they are wired in series with the heater circuit, thereby acting as a pilot light—if one of the valves burns out, the dial light goes out. This method of connection has one disadvantage, however, as the receiver will not function if the dial lamp burns out, and therefore if a spare is not readily available an important programme may be missed. The second method of connection is across a section of the mains dropping resistance—some dropping resistances are specially wound for this purpose. The third method is the connection of a 10- or 15-watt lamp across the mains input leads. This is the method that gives the least trouble, as connection is made outside the receiver, and therefore the lamp is not dependent on the receiver.

### Faulty Volume-Control

VOLUME-CONTROL potentiometers have a habit of going wrong at the most inopportune moments—perhaps when an important programme is being received. This is especially so in battery receivers when a high resistance potentiometer is used for controlling the bias voltage of the S.G. valve. When this fault occurs and a new control is not readily available, volume can be controlled temporarily by removing the G.B.—lead and the lead connected to the centre terminal or tag of the potentiometer. These two leads should then be joined together and the G.B.—plug inserted into the required socket of the G.B. battery. The correct socket is found by experiment, of course, and the plug has to be moved to suit the particular station being received.

understand the reasons for their popularity. They are history without tears; little scenes from the past enacted before the microphone by experienced radio players. When Kings and commoners of old England can thus speak in our class rooms it is easy to see that the teacher has an endless fund of reality upon which to draw in order to vitalise his lessons.

Regional Geography, Discovering England, Friday Talks, Senior Music and Tracing History Backwards follow in order of popularity with the schools.

Out of the twenty broadcast courses available, ten are listened to by well over a thousand schools, and the numbers in every case show at least a hundred per cent. increase since the last census was taken a year ago. The number of schools listening to the Friday Talks and Stories has increased by six hundred per cent., while a four hundred per cent. increase is shown for Discovering England, a course designed to encourage listeners in rural schools to learn about their districts and compare them with others. The Friday Talks are planned to give children something rather out of the ordinary for the last day of the week, and are given by a variety of interesting people. Recent talks have been given by an engine driver, a life-boat man, a deep-sea diver and a famous air pilot.

The figures show that every day more and more teachers are deciding



Lullaby hour.

to enlist the aid of broadcasting experts in their class-rooms and are using the broadcasts with care and intelligence to illuminate their ordinary lessons. It is expected that when the next census is taken this autumn, another substantial increase will be shown.

In addition to the schools, it is known that a large number of adults regularly follow the broadcasts. Parents in particular have been requesting the pamphlets which are issued in connection with the courses so that they may follow the same broadcasts as their children, and discuss them in the evenings.

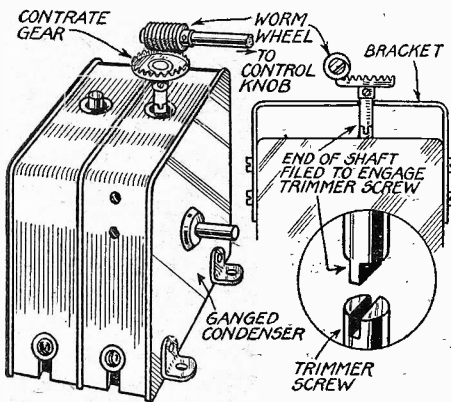
A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Panel Control of Condenser Trimmers
HERE is a method of controlling any trimmer of a ganged condenser from the panel should frequent adjustment be necessary. The knob drives a worm wheel,



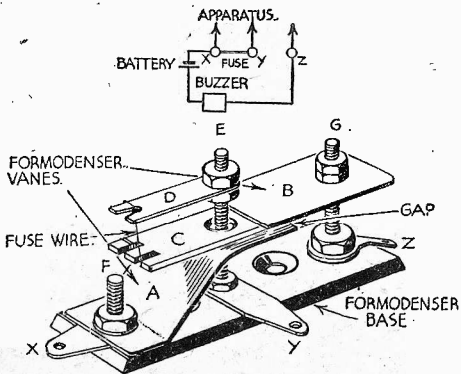
A novel method of controlling trimmers.

which engages a contrate gear, as shown in the sketch, thus turning the trimmer screw through the shaft. The end of this shaft is ground or filed, as indicated, and the shaft itself is centred by a bracket bolted to the cover of the condenser. Bevel gearing may be employed, but it does not give such a smooth drive.—A. M. WILDING (Wallasey).

An Alarm Fuse Holder

THE accompanying illustration shows clearly the assembly of this useful contribution to the test bench. The only materials needed are the base, a couple of vanes of an old Formodensor, and two nuts and bolts, together with three soldering tags.

Firstly, the base should be drilled to take the bolts, and two holes as shown (counter-sunk), for fixing the device to the panel, or other suitable position. Next affix bolts F, E, and G, then screw the unit down. Place the springy contact vane A (which, by the way, has already the brass strip C riveted to the end) into position, after having drilled a large clearance hole to take the bolt E,



An effective alarm fuse holder.

THAT DODGE OF YOURS!

Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account by sending it in to us addressed to the Editor, "PRACTICAL AND AMATEUR WIRELESS," George Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every notion sent in must be original. Mark envelopes "Radio Wrinkles." Do NOT enclose Queries with your Wrinkle.

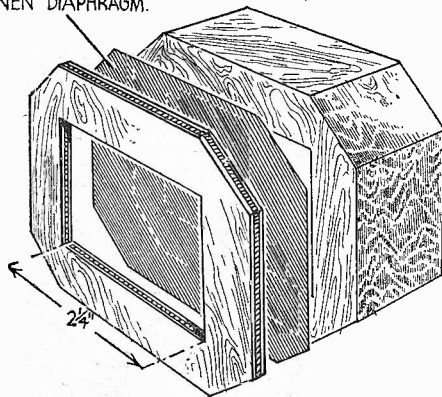
and cut two slots as shown. Now take another vane B, and, using two locking nuts, fix it to bolt G.

The contact D was made with a piece of contact spring from an old telephone switch, a slot being cut at the end to engage the fuse wire easily. When fixing the fuse wire see that there is sufficient gap between vane B, or contact, and the end of brass strip C. The operation of this gadget is quite snappy.—W. R. HOBBS (Ilford).

An Improved Carbon-type Microphone

THE microphone shown in the accompanying sketches is an improvement upon the ordinary carbon type of mike which I have seen illustrated at different

BLUE TRANSPARENT LINEN DIAPHRAGM.

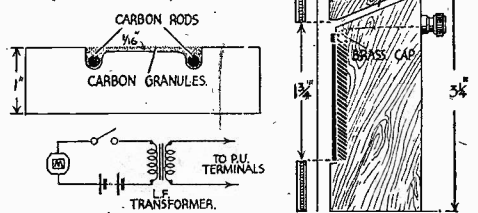


An improved carbon-type microphone.

times in PRACTICAL AND AMATEUR WIRELESS. I found, when constructing these mikes, that the greatest difficulty was to get in the right amount of granules, so I devised a way of placing them in through a hole made in the back of the mike, as indicated. The blue transparent linen paper and wooden cover should first be secured to the block, the paper being pulled taut. The granules could then be fed through the hole by means of a paper funnel. During the filling process a finger was placed over the hole from time to time and the mike shaken from side to side, and more granules added, until the mike was full. By this process, the granules were not compressed as they would be by filling in the ordinary way. The hole is afterwards sealed with

a stick of wood or sealing wax. I found that the circuit illustrated was the best for simplicity and that the voltage should be increased as the mike is taken further from the set. A switch should be

Circuit diagram and details of construction of an improved microphone.

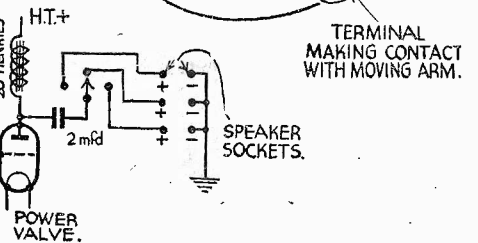
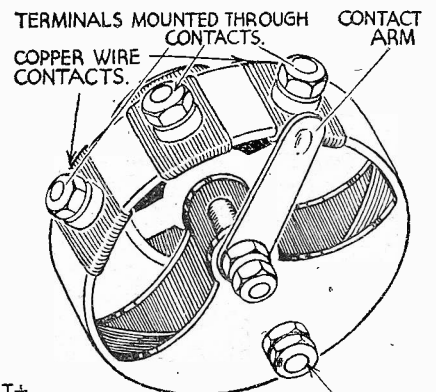


incorporated to prevent waste of current when the mike is not in use.—H. J. DENT (Devonport).

A Loudspeaker Switching Device

THIS simple switching arrangement is for selecting one or two loudspeakers at a time by turning a knob at the back of the receiver.

Take an old rheostat and strip off all resistance wire; then wind a portion of the former with copper wire for about 1/2 in., and mount a terminal as illustrated. Leave a space a little less than the width of the



A simple loudspeaker switching device.

rotating arm, and continue winding as above, until you have the number of contacts required, one for each speaker. Connect the switch as shown in the theoretical circuit, and mount it on the back of the set, together with sockets for extension speakers. Two speakers can be operated at one time if the switch is set with the rotating arm bridging two contacts.—J. WALKER (Perth, Scotland).

# Practical Television

June 27th, 1936. Vol. 3. No. 8.

## A Special Use

**T**HE other week we suggested in these notes that those people afflicted with a loss of speech will find television of great value if they use the lip language. This has now been substantiated in Germany by two deaf and dumb people who employed the television telephone service established between Berlin and Leipzig. A girl and her fiancé at each end of the line were able to "converse" with one another for the scheduled three-minute period and make arrangements to meet at a mutually convenient place. Ordinary radio has given no pleasure to the deaf and dumb, but television is destined to give them a new outlook and bring great joy by this new form of entertainment in the home.

## The Alexandra Palace Mast

After weeks of careful work the tall steel lattice mast set on the summit of one of the partially demolished towers of the Alexandra Palace has been finished by the constructional engineers who secured the contract for this difficult task. The mast itself is just over 200 ft. high and weighs approximately 30 tons. The foundations are set deep in concrete and many thousand rivets have been used by the workmen perched on platforms and scaffolding employed in the erection. Since the height of the tower is 80 ft. above the ground and the ground itself 300 ft. above sea level, this makes the tower top 600 ft. above sea level, that is, 100 ft. lower than the top of the South Tower at the Crystal Palace. Full allowance for the strongest wind pressure has been made, while from the summit will glow a red light as a warning to aircraft in the neighbourhood. The mast is a landmark for miles around and will be made even more conspicuous at its tapered top when the two sets of aerial units, one for vision and one for sound, are positioned one above the other like spokes holding a ribbed drum. This double aerial with a separate feeder for each, linking the sound and vision ultra-short-wave radio transmitters, is the next task to be tackled, so there is still a chance that experimental signals will be "on the air" just prior to the Radio Exhibition at Olympia. July 1st was the latest date furnished for this to happen but it hardly seems likely that the work will be complete in time to keep to the anticipated schedule.

## More Television Fears

A little while ago the cinema industry was voicing its fears as to the effect that a high-definition television service would have on its present prosperity. It is significant that this has now died down as a result, no doubt, of a more sobered outlook on the whole situation. The cry has now been taken up in another direction, however, for at the recent British Music Industries convention fears were expressed as to the competition that will come to the music trade when television is established on proper service lines. A delegate referred to the new possibility as a bogey, but as in every other case the fears will prove to be without foundation. The exercise of sight

and hearing which television makes possible will, if the programmes are handled properly, add to the public appreciation of music just the same as the seat at a concert is always to be preferred to the blind listening offered by radio in the home.

## The Church and Television

A few weeks ago a Church ecclesiastic drew attention to the improvement that would be effected in broadcast religious services when the ceremony could be televised as well as heard. The whole atmosphere would be more in keeping with the service, as those participating by the aid of television would be able to concentrate wholly on the broadcast instead of

being tempted to regard it as a background of sound while other activities were being indulged in. Now it is stated in the Press that the Pope has expressed his desire to learn more concerning the possibilities of television. In keeping with modern progress a short-wave broadcasting station has been in use at the Vatican for years, and the idea of being able to appear on the screen to a proportion of his listeners is said to appeal very forcibly to the progressive mind of the head of the Catholic Church.

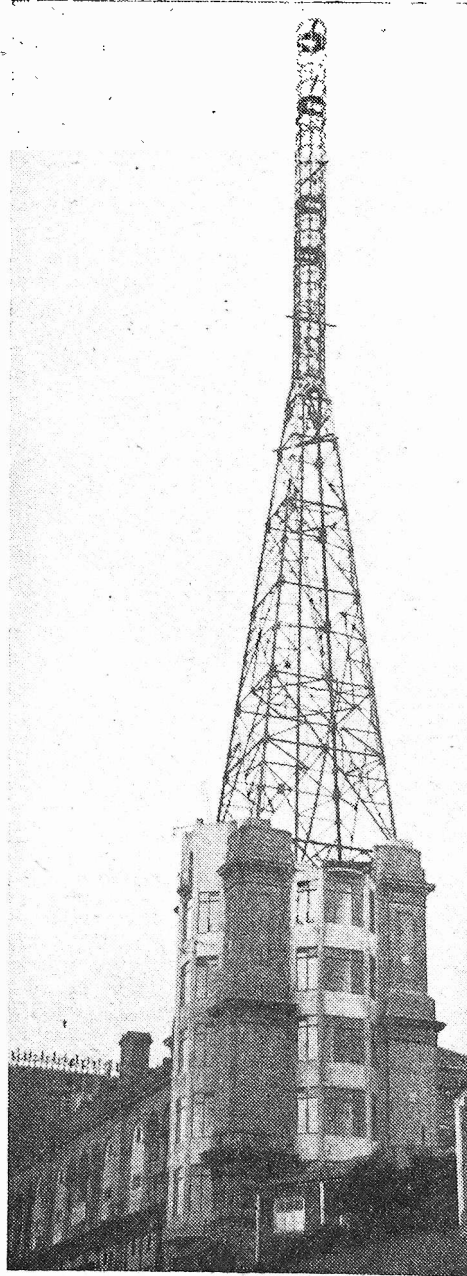
## Television Demonstration Room

It was stated originally that the B.B.C. intended installing public television demonstration rooms in certain parts of London, but this project has now been abandoned. In place of this encouragement is to be given to private enterprise, and several West End stores and other public places, including possibly London railway termini, are making investigations with a view to setting up receivers so that anyone interested can witness the programmes as televised pictures, free of charge. The B.B.C. are rendering assistance in this connection, giving advice as to the best method to be adopted for staging the shows, the audience being limited to about forty to fifty people so that comfortable vision for all will be assured. The idea is one which should find favour and resembles the scheme adopted in both Paris and Berlin, except that in those cities the receiving stations were sponsored by official government bodies. In the same connection it is stated that the chairman of an American film corporation is in this country for the purpose of planning theatres in which both television demonstrations and films could be shown, and so appeal to a larger public. If sponsored programmes are accepted by the B.B.C. to meet the heavy drain on the sum allotted for the television equipment, then it should be possible to arrange some very striking link-ups between those National advertisers who support the scheme and any of the large stores who are exhibiting television receivers to their customers.

## Television Abroad

The tenfold increase in aerial power which has been effected with the Parisian equipment situated at the base of the Eiffel Tower has made an enormous difference to the French experimental ultra-short-wave television service. Good signal diffusion is claimed for an area having a radius of about 35 to 40 miles from the centre of Paris. This is being hailed by France as sufficient to put them in the lead as far as world development of television is concerned, and although one of the last in the field they are quite rightly priding themselves on their achievement in the face of competition from other nations. While the comments concerning the radiation of the signal are favourable, however, little seems to have been said of late regarding the quality of the pictures which are still being maintained at a definition of 180 lines and reproduced at 25 pictures per second, the scanning being of the successive type.

In Japan the study of television has been going on for a period of years and several demonstrations were staged on low definition standards. It is now learned that the various interests, each working on different systems, are to be amalgamated under the Nippon Broadcasting Associations, and a sum of money has been allotted to expedite this pooling of technical resources. If success is achieved, steps will be taken to televise important outdoor events during the course of next year.



The television mast at the Alexandra Palace from which the television programmes will be transmitted.

# Superhet Difficulties

A Few Simple Hints for Those Who Have Built Their First Superhet Receiver and Find that Results are not up to Expectations - - - By FRANK PRESTON

**C**ONSTRUCTORS, as a whole, are becoming far more familiar with the superheterodyne, but in many cases they are still inclined to feel rather "at sea" when the receiver fails to function properly after construction. This presents a far greater difficulty than that which arises when a fault develops in a set which had previously operated correctly, because then it is more a matter of searching for a defective component or loose connection than of looking for a fundamental fault. Besides, the general tests which have to be applied are similar to those obtaining when a normal "straight" set is concerned.

## Gang-condenser Connections

The tuning circuit is the part which probably causes more difficulty than any other; this is to be expected in view of the fact that it is this which differs most from the corresponding part of the older types of receiving set. Sometimes it is found, for instance, that nothing but the local stations can be heard, the signals from these being much weaker than they should be, and the dial reading being entirely different from what would be anticipated. Such a fault generally points to the fact that the gang condenser has been wrongly connected, the oscillator portion being joined to one of the signal-frequency coils instead of to the oscillator coil. This mistake can easily be made because there is no standard position for the oscillator section (which has quite a different capacity and a different "law" from the others), and it is sometimes placed at the end nearest to the operating spindle, and sometimes at the other end. Very often the condenser is marked in some way, but this is not universal.

## The Oscillator

Should there be any doubt concerning which is the oscillator section it is easy to check up by removing the screening cover and examining the vanes. In most cases the moving vanes are of different shape, whilst the fixed vanes are cut away more in

due to using a condenser designed for an intermediate frequency of one figure, with coils designed to work at a different I.F. This is a trap which is very easily fallen into by those who build from "junk" parts picked up at a cheap store! Yet another similar trouble is due to using I.F. transformers of the wrong frequency calibration; in this case the dial readings will be approximately correct, but all signals will be very weak—if received at all.

When tuning is not perfectly sharp—as it

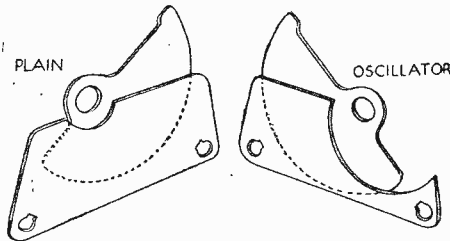


Fig. 1.—The general shape of the vanes in a plain and oscillator section of a superhet-type gang condenser.

should be with a superhet—it is generally indicated that the trimmers on the intermediate-frequency transformers have not been correctly adjusted, although attention

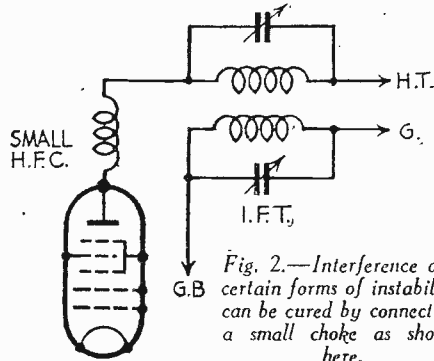


Fig. 2.—Interference and certain forms of instability can be cured by connecting a small choke as shown here.

should also be directed to the trimmers on the gang condenser. But the latter rarely cause flat tuning; they are more likely to reduce signal strength, because the tuning nearly always "follows" the tuning of the oscillator condenser.

## Interference

When long-wave interference is in evidence, however, the setting of the gang-condenser trimmers should be checked, whilst it should also be seen that the I.F. transformers and their connecting leads are properly screened, especially if any of the connecting wires are more than a few inches long. Another possible reason for this interference, or for so-called second channel interference, is due to signals leaking across the capacity between the electrodes of the frequency-changing valve. The amount of leakage is nearly always of very small proportions, but it might be sufficient to allow signals from the local stations to pass. And when this does occur whistles will be heard at various parts of the tuning scale, which cannot be eliminated properly by altering the settings of the I.F. transformer trimmers.

One simple modification which is often successful in removing the trouble consists of inserting an H.F. choke of low inductance between the anode of the frequency changer and the anode terminal of the first I.F. transformer, as shown in Fig. 2. A small, inexpensive and unscreened "reaction" choke can often be used, but the inductance of a better-class component is so high that it will probably silence the set, or otherwise cut down signal strength. A choke can be made by winding about 200 turns of 36-gauge enamelled wire on a bobbin of 3/4 in. internal diameter. It is not essential to split up the winding, because the small self-capacity which results from pile-winding is not sufficient to have any serious effect. The bobbin can be made by screwing two cardboard end-checks 1 in. in diameter to the ends of a wooden rod about 1 in. long, as shown in Fig. 3. The rod and checks should be given a couple of coats of shellac or cellulose varnish, and connections can be made by soldering short lengths of flex to the ends of the winding.

## Instability

The same cure is often satisfactory in the case of instability or persistent oscillation, which renders reproduction poor and causes the set to "howl" at each side of the tuning point of a signal. Another reason for this instability is too close a coupling between the primary and secondary windings of the I.F. transformers. When the positions of the windings are variable it is an easy matter to effect a remedy by moving them farther apart. When they are fixed, a similar result can be obtained by connecting a fixed resistance of between 200 and 1,000 ohms between the ends of the primary winding of one or both of the transformers. In most cases it will be sufficient to join a 500-ohm resistance in parallel with the primary of the first I.F., as shown in Fig. 4.

## For Medium Waves

It is very often found that the instability is experienced on long waves only, or when receiving one or two powerful transmissions. When this is the case it is a good plan to connect an on-off switch in series with the resistance, as in Fig. 4, because the resistance does actually reduce the sensitivity of the receiver to a certain extent, and thus impairs the reception of weaker signals. Leads to the switch should be short and screened.

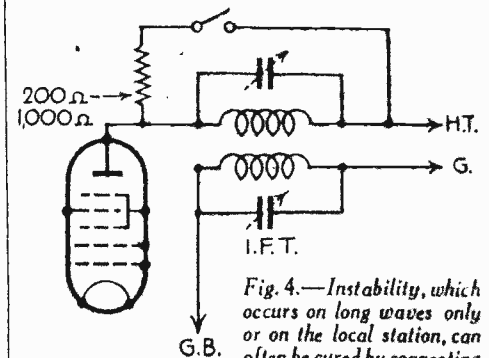


Fig. 4.—Instability, which occurs on long waves only or on the local station, can often be cured by connecting a resistance as shown here.

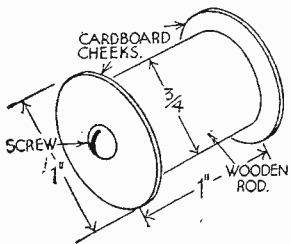


Fig. 3.—Details of the spool for the special choke indicated in Fig. 2.

the centre where the spindle passes them. When the condenser is of the three-gang type it is easy to find one section which is different from the other two, but this is not possible when using a two-gang component. Fig. 1, however, shows the general shapes of the vanes in both sections, and this should clear the difficulty.

## Incorrect Intermediate Frequency

Another trouble which is experienced by those who do not follow any published design, or who do not employ the specified components, is similar to that just described, but normally less severe. This is

IN the hands of hundreds of amateurs the simple short-wave receiver employing a detector stage followed by one or two L.F. stages gives most remarkable results, picking up stations from the other side of the world very often at sufficient volume to operate the loudspeaker. There are conditions of freak reception, of course, but it is really surprising what can be done with this type of receiver when connected to a suitable aerial and earth system, and verification of the above statements may be obtained from the various letters which we have published from time to time on our Practical Letters page.

In spite of this remarkable performance, however, it is often found that reaction effects are rather erratic. Or, on the other hand, it may be found that at certain wavelengths the receiver seems to become lifeless and no signals of any kind can be picked up. Whilst this is often due to the particular characteristics of the aerial-earth system, it is, unfortunately, experienced in the

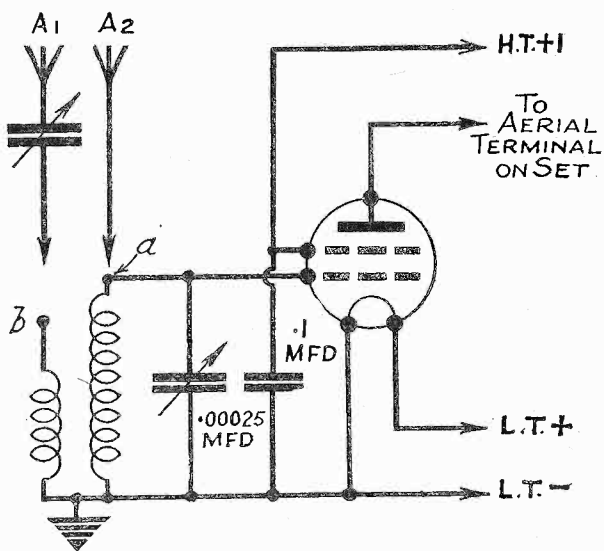


Fig. 1.—Theoretical circuit employed in the short-wave H.F. unit.

majority of receivers on various occasions, but not consistently. Furthermore, it is often found that there are many stations which are just not loud enough for comfortable reception, and the desire is felt for some additional amplification. This cannot be carried out on the L.F. side owing to the increased amplification of background noises, and the limiting factor in short-wave reception is found generally to be the noise-to-signal ratio.

**H.F. Amplification**

It has often been stated that high-frequency amplification is ineffective on the short waves, but this is only a partial truth. At certain wavelengths (chiefly below 10 metres) and with certain types of circuit there is, indeed, very little to be said for H.F. amplification. It may even be found that the fitting of an H.F. stage will result in a reduction of the general sensitivity, or in complete instability. With care, however, it is definitely possible to build an H.F. stage in such a manner that a good measure of amplification may be obtained, but what is more important, the effect of such a stage is to level up the reaction control which, in itself, enables more to be obtained with the receiver, and the circuit becomes practically independent of the aerial. It will not, however, be found worth while using this type of circuit below 10 metres without very special precautions.

# THE PERFECT H.F. AM

**The Best Circuit**

There are two main types of short-wave H.F. amplifier, that in which an aperiodic aerial circuit is employed, and that in which a complete tuned circuit is provided. In the former case one can employ either an H.F. choke or a resistance between aerial and earth, but this arrangement is of very little use when the receiver is required for use on wavelengths above 50 metres. Consequently, if we are to make the receiver very efficient we must design it so that it may be used on practically any wavelength, and as the majority of experimenters employ a specially-constructed ultra-short-wave receiver for wavelengths below 10 metres, it is worth while to build the H.F. amplifier with a tuned circuit.

The amplifier now to be described has been designed and tested in conjunction with the popular Perfect Short-Wave Three receiver which was described in our issue dated February 8th last, but any similar type of receiver may be employed in conjunction with this amplifier, provided that a six-pin H.F. transformer is employed for coupling between the H.F. and detector stages. The circuit of the H.F. section is given in Fig. 1, and it will be seen to be exceedingly straightforward. For tuning purposes a standard 4-pin short-wave coil is employed, and the aerial may be joined direct to the primary or secondary coil, or may be connected through an air-dielectric pre-set condenser, and this provides variations to allow of different circumstances, although, in certain conditions, it may possibly be found that the condenser is not necessary. However, an experimental rig up will soon enable this fact to be ascertained. A similar variable condenser to that employed in the Perfect is used for tuning and it should be mounted in a similar manner and the terminals must be insulated from the metallised chassis.

**Important Details**

Some important details must now be

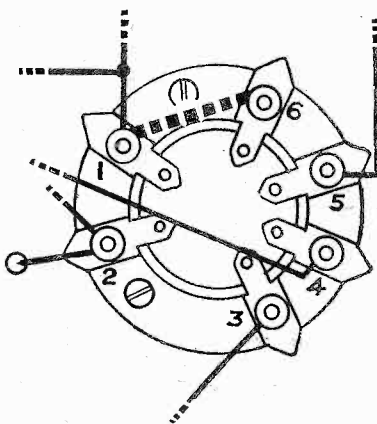


Fig. 2.—The lead shown by the dotted line above must be removed from the coil-holder in the Perfect Three.

Complete Constructional Details of Designed Primarily for Use with the Used with Practically Any Simple Provided with H.F. Amplification.

mentioned in connection with the use of this unit. Firstly, the 6-pin coil which is employed in the aerial circuit of the Perfect (or similar) receiver must now be used as an H.F. transformer, in which arrangement the coil which was originally included in the aerial circuit must now be included in the anode circuit of the H.F. valve. Consequently, one wire must be removed from the six-pin coil base in the Perfect. This is shown in broken lines in Fig. 2. The coil-holder diagram which is shown in this illustration is taken from the article on page 132 of our issue dated April 18th last in which instructions were given for modifying the connections to this coil in order to bring it into line with all modern six-pin coils, and therefore if you are using a Perfect or similar receiver wired on the older arrangement the connections should

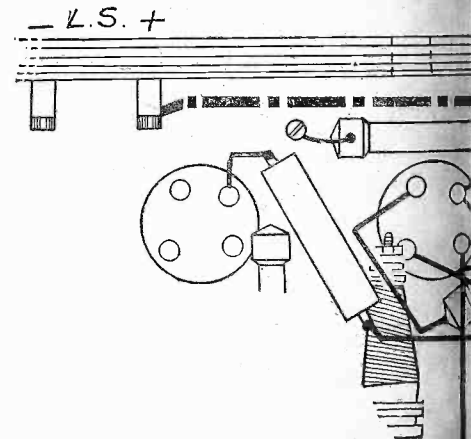


Fig. 3.—The additional lead shown above must be removed from the Perfect to complete the circuit to the H.F. unit.

be brought into line with the present arrangement. Terminal No. 6 on this holder has now to be connected to H.T. positive and it may be connected direct to the positive L.S. terminal, as shown in the chain line in Fig. 3. No other wiring alterations are required and it now only remains to describe the construction of the unit and the method of connecting to the original receiver.

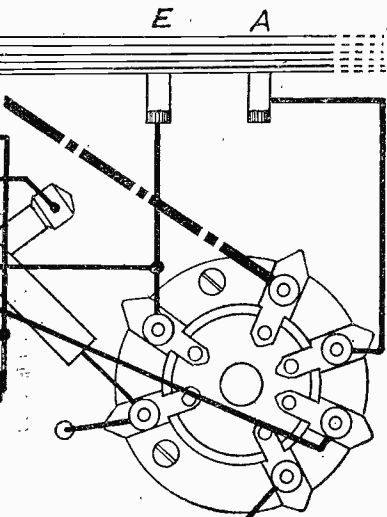
**Construction**

The coil- and valve-holders may be mounted on a small-wooden chassis with metallised surface, or on an ordinary wooden chassis with a metal surface. The

# SHORT-WAVE AMPLIFIER

Special Short-wave H.F. Stage  
 Perfect Three, but Which May be  
 Short-wave Receiver Not Already  
 By W. J. DELANEY.

ing is shown in Fig. 4. The chassis  
 own is of the same width as the Perfect  
 chassis (6½ in.) and the H.F. unit should  
 preferably be placed immediately alongside  
 Perfect chassis, with a vertical metal  
 screen, 8½ in. high, attached to the side  
 of the chassis to screen completely the H.F. stage.  
 This screen is most important, and without  
 it nothing but instability may result. The  
 height of the screen is the same as the  
 height employed for the Perfect, and thus  
 the two chassis may be accommodated in a  
 single cabinet. Where an existing cabinet  
 is now being employed and will not  
 accommodate the additional unit, the  
 connections must be brought out in a flexible  
 lead for accommodation on the present  
 receiver, but the lengthy leads so introduced  
 probably result in losses, and it will be  
 desirable to endeavour to accommodate



unit close up to the original chassis.  
 If a separate cabinet is employed the  
 left-hand side of it should be lined with  
 foil connected to earth.

### Terminal Connections

The filament terminals on the valve-holder  
 of the H.F. unit have to be joined to the  
 filament terminals in the detector stage  
 the simplest way of doing this is to fit  
 a four-pin adapter to the detector valve-  
 holder into which the detector valve is  
 inserted. It will be found then that the  
 filament terminal on the H.F. valve (which is,  
 of course, the screening grid) may be  
 connected to the H.T.+1 lead in the

Perfect, or in other words may be  
 joined to a tapping on the H.T. bat-  
 tery between 60 and 100 volts, the  
 most useful voltage being found on test.

### Using the Unit

In order to use the unit the aerial lead  
 must be removed from the present set and  
 transferred to the aerial terminal on the  
 H.F. unit. The earth lead will auto-  
 matically be completed via the H.T.—  
 lead from the present set. The aerial  
 should be connected to terminal A2, and  
 the lead joined direct to the grid coil.  
 Tuning on the H.F. unit will be com-  
 paratively flat, so that tuning should be  
 carried out with two hands, keeping the  
 two tuning dials as nearly as possible in  
 step. As soon as a station is heard the  
 detector (or present) tuning condenser  
 should be adjusted for maximum response,  
 and the H.F. tuning condenser turned  
 slowly through one or two degrees on either  
 side. It will be found in this way that the  
 two circuits will be kept in tune and no  
 difficulty whatsoever should be experienced  
 in locating stations, in spite of the additional  
 tuned circuit. In the unlikely event of  
 greater selectivity being required, the  
 aerial coil on the four-pin coil may be  
 included in circuit by transferring the  
 lead to the appropriate terminal, or the  
 series aerial condenser may be included  
 in the circuit.

When a station has been found, try the  
 effect of modifying the H.T. applied to the  
 H.T.+1 lead, and this will enable you to  
 locate the most satisfactory working voltage  
 for the receiver, and when once adjusted  
 no further alteration should be required  
 unless the H.F. valve is replaced, or when  
 the H.T. battery becomes partially dis-  
 charged. It should, of course, be replaced  
 when such a modification becomes necessary,  
 in view of the possibility of instability.

### Incorporating the Unit

If the receiver is to be used permanently  
 with the unit as a single self-contained  
 piece of apparatus, the lead from the anode  
 of the H.F. valve may be shortened and  
 connected direct to the appropriate termi-  
 nal on the second coil-holder. No  
 screening should be found necessary, but  
 the lead should not be passed through the  
 vertical metal screen if it is found that  
 serious loss is not introduced by taking the  
 lead round the rear of the chassis. The  
 combination was tried out with the lead  
 taken in this manner and also with a short

### List of Components

- One .00025 mfd. Popular Log Tuning  
 Condenser, Type 1040 (Jackson Bros.).
- One Dual-ratio Slow-motion Drive, Type  
 2092 (Jackson Bros.).
- One 4-pin chassis-type valve-holder, Type  
 U.H./4 (B.T.S.).
- One 4-pin coil-holder, Type 4 C.H. (B.T.S.).
- One 4-pin Short Wave Coil, Type E. No. 2  
 (B.T.S.).
- One .1 mfd. tubular condenser, Type 300  
 (T.C.C.).
- One Metaplex Chassis, 5½ by 6½ with 2½ in.  
 runners (Peto-Scott).
- One Sheet aluminium 8½ by 6½ in. (Peto-  
 Scott).
- Two Type R Terminals, A1 and A2 (Belling-  
 Lee).
- One Pre-set condenser, Type U.T.C. (B.T.S.).
- Flex, connecting wire, screws, etc.

rigid wire (screened) led through the screen  
 and taken to the terminal on the H.F.  
 transformer. The latter arrangement gave  
 a definite loss on certain stations, and on  
 the lowest wavelengths it was found that  
 certain stations which could be just heard  
 with the longer lead could not be obtained  
 at all with the lead taken through the  
 screen, in spite of the fact that nearly  
 six inches of lead were removed in so  
 doing.

The earth return lead for the vertical  
 screen is completed through the metallised  
 surface of the chassis, but to ensure maxi-  
 mum screening effects, a lead may be  
 taken through the side runner of the  
 chassis and bolted to the screen, and then  
 connected direct to the earth terminal.  
 A short bare wire may also be attached to  
 one of the H.F. coil terminals which are  
 now shown joined together, and this wire  
 may be turned under the coil-holder and  
 held in contact with the metallised surface  
 of the chassis by means of the normal  
 holding-down screw.

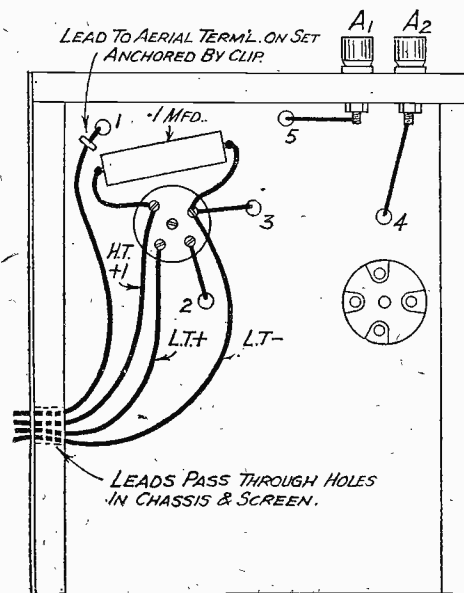
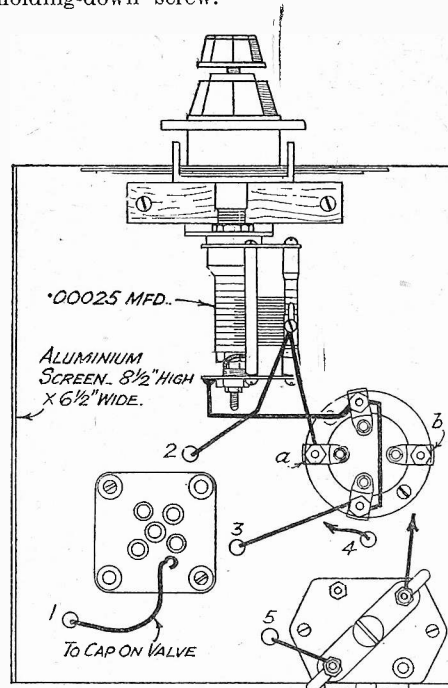


Fig. 4.—Wiring diagrams of the H.F. unit.

FROM time to time it is a good policy to spend an hour or so in searching through a small section of the wave-band, although it is true that with a view to a large catch one is tempted to try out the entire condenser dial at one sitting. The fact remains that a thoroughly patient search over a few degrees in a busy portion of the short-wave band will bring invariably good results. At this period of the year broadcasts on the higher frequencies are heard until the later evening hours, but, without doubt, after midnight, and until day breaks on this side, a search over 49.50 metres should supply many entries in your log. Work up slowly from such a convenient landmark as the condenser setting of Skamlebaek (Denmark), on 49.5 m. (6,060 kc/s), a transmission which can be tuned in on almost any evening.

### Philadelphia

On the same reading from B.S.T. 01.00 you should hear without difficulty W3XAU, Philadelphia, which is on the air until 04.00, or W3XAL, Cincinnati, working somewhat later. A fraction above, although the wavelength is somewhat variable, we find HJ4ABD, Medellin (Colombia), *La Voz de Abura*, and again, slightly higher on 49.55 m. (6,055 kc/s), it may be worth while to try for XEUW, Vera Cruz (Mexico), which relays XEU, in that city. The interval signal is a bugle call followed by chimes. If you should succeed in picking up the broadcast you may secure a "veri" by writing to the Radiodifusora Comercial XEU, Avenida Independencia, 98, Vera Cruz (Mexico).

### Bogota

There then follows another Colombian, namely, HJ3ABD, Bogota, last reported on 49.59 m. (6,050 kc/s), which calls itself *Colombia Broadcasting*, and must not be confused with HI9B, Santiago de Los Caballeros (Dominican Republic), opened as recently as last January, and since logged on many occasions, but which styles itself *Broadcasting Columbus* for some reason or other. It is on the air nightly, and has already been heard as early as 22.30. When last picked up it was a fraction of a degree below GSA, Daventry.

On 49.67 m. (6,040 kc/s) there are two separate stations to be logged, and this is often possible in view of the fact their programme times do not clash throughout the night. WIXAL, Boston (Mass.), works on Sundays from B.S.T. 22.00 until midnight; on Mondays, Tuesdays, and Thursdays, from midnight to 02.00. On the other hand, W4XB, relaying WIOD, Miami Beach (Fla.), operates from 18.00-20.30—an unfavourable hour for us—and again from 23.30-06.00. Moving slightly

## Leaves from a Short-wave Log

higher up the scale a search should be made for HP5B, Panama City (49.74 m.—6,030 kc/s), of which the daily schedule is B.S.T. 18.00-19.00 and 02.00-04.30, but a slight deviation may give you a much more powerful broadcast from PRA8, Pernambuco (Brazil), on 6,028 kc/s, with a continuous programme from B.S.T. 21.00-01.30; its signals are usually very loud and on most nights the capture would be termed by the Yanks "a sure bet." Interval signal: Gongs (Notes: E, G, G, A, G repeated). Bear in mind that the language used is Portuguese and not Spanish. In passing, make a note also that on 49.8 m. (6,023 kc/s) you might hear, at some time or other, with luck, a transmission from s.s. *Kanimbla*,

Santa Marta (Colombia) is now working on 49.79 m. (6,025 kc/s), and can be identified by its four gong strokes before each announcement in Spanish. It will be discovered immediately below DJC, Zeesen, of which, on most nights, it is quite clear. Care should be taken not to mistake the 7th harmonic of Radio Strasbourg (49.89 m.—6,013 kc/s) for the German station, especially as at the moment of tuning-in you might chance to hear the alternate German announcement. The deep booming note of the gong, however, should set you right.

### Colombia and Cuba

HJ3ABG, Bogota (Colombia), which comes almost on top of this transmission (49.9 m.—6,012 kc/s) gives us as a clue three chimes something like those used by the N.B.C. short-wavers. On 49.92 m. (6,010 kc/s) at the moment there are two broadcasters, namely, COCO, Havana (Cuba), and YNLF, Managua (Nicaragua), which has recently adopted this channel. It would be



Short-wave enthusiasts carrying their apparatus to the wireless station on Mount Snowdon.

an Australian liner, and one of the first to be equipped with a mobile broadcasting station. The call-letters are VK9MI for radio programmes, but for ship traffic it is registered as VLFS. The station is operated by Amalgamated Wireless (Australasia) Ltd., of Sydney, Melbourne, etc., and possesses a lady announcer. An alternative channel used is 25.619 m. (11,712 kc/s). HJ1ABJ,

well to remember that on 49.96 m. (6,005 kc/s) you will no longer pick up the calls VE9DR or VE9DN; the stations appear to have been replaced by CFCX, also at Drummondville (Quebec), which is now relaying nightly the Canadian Radio Commission programmes from CFCF, Montreal. The time to try for this newcomer is between B.S.T. 23.00 and 05.00.

### Gloucester Hospitals Pageant

ON July 2nd, in the Midland Regional programme, David Grettton will describe the Gloucester Hospitals Pageant, in which over five hundred performers are taking part. There are five episodes, and a final procession representing "Gloucester down the Ages." The two episodes which listeners will hear are the celebration of the grant of a Fair to Gloucester to be held on the Feast of St. John the Baptist, beginning in 1356; and the visit of Henry VIII and Anne Boleyn to the city in 1535, when they were welcomed by the civic dignitaries and the Guilds. A later episode presents the relief of Gloucester by the trained bands of London, commanded by the Earl of Essex,

## ITEMS OF INTEREST

in 1643. The Pageant is being held in Gloucester Park.

### Where the Anthem Does Not End Programme

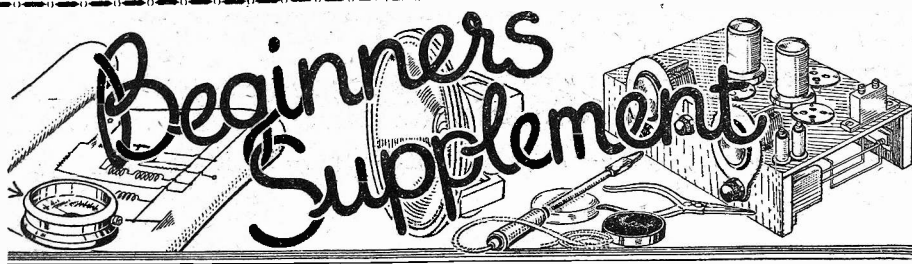
AS the Budapest (Hungary) radio entertainments are calculated to interest foreign listeners, the studio director has decided that the news bulletin in Magyar should be given, not as a final item, but as a special feature at the end of the day's transmissions. In consequence, the last official news broadcast is heard

after the announcers have bid the unseen audience good night, and follows the playing of the Hungarian National Anthem.

### When Portugal Settles Down

THE scheme passed by the Ministry of Communications for the reorganisation of broadcasting in Portugal has been shelved owing to political differences, but it is anticipated that, for the welfare of the country, some move in the development of the plan will be shortly made. It is reported that the first step to be taken will be the increase in power to 100 kilowatts of the Lisbon National transmitter, to be followed, at short interval, by stations of the 20-kilowatt type in North and South Portugal.





**QUEER RECEIVER FAULTS**

Even Mysterious Faults Can be Traced to Quite Simple Causes if Systematic Testing is Adopted. By H. J. BARTON CHAPPLE, B.Sc.

ONE point which the radio amateur must recognise is that all receiver faults, no matter how mysterious they may seem, must have a definite cause, and that that cause can always be found and remedied provided the business of testing is tackled in the right way. Another important point to bear in mind is that no step in the systematic testing of a set should be omitted just because you are certain in your own mind that "it cannot be that."

**In the H.F. Stage**

A fault in the H.F. stage of a receiver was vividly brought home recently when a well-made amateur "straight three" was reported to give good reproduction on gramophone, but nothing on radio. Obviously the H.F. valve or the tuned circuits were at fault, and the valve proving in good condition, there only remained the tuned input circuit and the detector tuned grid circuit, with the associated components and wiring. Component after component was submitted to test and passed satisfactorily—grid leak, grid condenser, bias resistance, H.F. chokes, until only the coils and gang condenser remained. The anxious owner was confident that there was no need to test these. They were, he said, one of the best makes and quite new. Although the coils proved to be faultless, the condenser showed a short to earth in one section, due to the fact that the slip of mica forming the insulation of one of the trimmers had become displaced and permitted the moving section of the trimmer to short. After being gently coaxed back into position, the receiver behaved itself in the manner originally expected.

In another case a three-valve set was inoperative on radio, and everything had been thoroughly tested, including the H.F. valve, for which a substitute known to be in excellent condition was found. This valve had been suspected because the anode current of the complete set was high, but became normal when the H.F. valve was removed, although the valve by itself, tested separately, took the rated current. Finally, the fault was run to earth—a tiny ragged end of metal in the screening hood over the anode connection was making contact with the anode terminal, and only needed the touch of a pen-knife to clear the trouble.

**Hum**

Hum is undoubtedly one of the most annoying faults, because it usually occurs in a receiver which is otherwise in good working order. It can be due to so many things, and in most cases one can only try out methods of eliminating it which involve fairly big changes in the wiring or layout. Sometimes, however, the cause is easily discernible and found to be—just false economy. In two cases

quite recently the circumstances were very similar. With the first—a home-built mains set—the only power transformer available was one having two low-tension secondary windings—one for the rectifier, and the other for the receiving valves, while in the second case the set builder had used an old type transformer with a high-tension winding only, in conjunction with a metal rectifier and an equally old filament transformer for heating all the valves. As the directly-heated output valve needed about 25 volts bias, it meant raising the cathode potential of all the other valves by this amount above the heater potential—not a very desirable proceeding at the best—and made it possible for all sorts of pick-up in the cathode leads. In the first instance the owner was persuaded to substitute a metal rectifier for his valve rectifier, and to use the 4-volt winding thus released to heat the early stage valves, using a hum balancer as close to the valves as possible; and in the second case the owner consented to buy a new transformer with its due proportion of low-frequency windings, and to adopt the same procedure with respect to balancing potentiometers, after which no further trouble occurred.

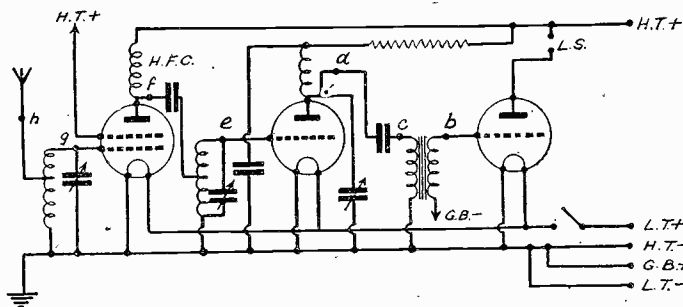
There was, however, a rather amusing case in which the listener complained of considerable hum in the speaker of his home-built set, but none when operating an extension speaker in another room. On visiting this installation the extension

reduced the trouble, but the transformer was of a type in which it was impossible to gain access to the clamping bolts. Short of replacing the transformer, therefore, nothing could be done except to place the receiver in a substantial case which had the effect of deadening the sound to some extent.

**Curing Instability**

Instability of one sort or another is sometimes hard to track down, but when all decoupling arrangements have been checked it is as well to examine all the connections which should normally go to earth, or the chassis. Of the little breakdowns which have been found to cause instability the list contains such items as a badly soldered connection to the sheathing of a screened lead, and a dry joint at a soldered connection to the chassis. A rather unusual fault which had the same effect—the introduction of instability—was in a battery set where it was found that the wire which should have made connection between the metallising and one of the filament pins had broken loose inside the cap. Matters were put right by winding a piece of tinned copper wire round the neck of the valve to make good contact with the metallising and connecting this externally to the correct side of the filament circuit.

What could be more annoying than a receiver which works perfectly in one house, but gives nothing but trouble in another? A case in point was a universal set where the owner complained that the hum was unreasonably loud. The set was collected and tested in the shop, some miles away, and little fault could be found with it—the customer admitted as much when he called for it. But the next day the same complaint was made, and, indeed, the hum was acknowledged by the service engineer to be above normal, and back to the shop it went again, and again it worked with scarcely a trace of hum. Then someone remembered that the customer's house was in a new part of the district and served from A.C. mains, whereas the shop, in the old part of



In a standard type of 3-valve circuit, such as is shown here, the various parts of the circuit may be checked by touching the lettered points, when a "plop" should be heard.

speaker in the sitting-room was first examined, and was found to be a good-class energised moving-coil instrument, giving the programme with only the very faintest trace of hum—certainly not enough to be noticeable a few feet from the instrument. A move was then made to the study where the set was located with another speaker mounted on a baffle quite near it. Sure enough a very pronounced hum emanated from the corner where the equipment was set up, but it did not take long to discover that the hum did not come from the speaker at all but was entirely due to mechanical vibration of the laminations of the power transformer and smoothing choke! It was found possible to tighten up the clamping plates of the choke which somewhat

the town, was on D.C. This gave a clue, since the rectifier valve, which performs its true function when the set is operated on A.C., acts merely as a low resistance on D.C. mains, and this valve, also, has a very large difference of potential between its heater and cathode. Careful test revealed that the insulation between heater and cathode was sub-normal, and replacement left the set in quite a satisfactory condition.

**Quality**

Many of the faults which come to the notice of the radio engineer are not faults at all, but merely queer complaints, usually due to complete misunderstanding of fundamental facts on the part of the

(Continued overleaf)

# THE VIDOR S.W. CONVERTER

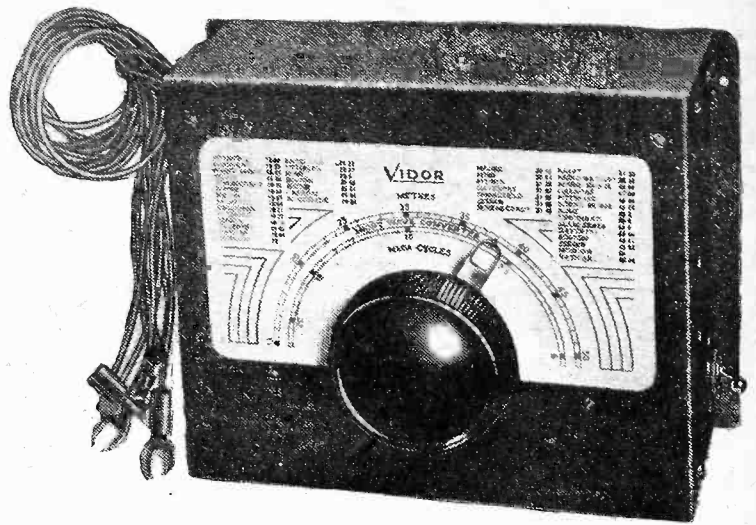
**M**ESSRS. VIDOR, LTD., have just released an interesting short-wave converter which will be found of great utility to all those who are anxious to indulge in short-wave listening, but who are not anxious to build a special short-wave receiver. The converter, as most amateurs are by now aware, enables any standard broadcast receiver employing H.F. amplification to be converted into a superhet merely by placing the unit in the aerial feed to the receiver, when the H.F. amplifiers in the broadcast receiver become intermediate-frequency amplifiers on the short-waves, and tuning is then carried out only on the converter unit. In the Vidor Unit which is shown on the right, a heptode frequency-changer is employed, and the coil which is fitted covers from 13 to 50 metres by means of a single condenser which is provided with a fast and slow-motion dial. To avoid difficulties in connection a special change-over switch is provided, and the aerial is automatically changed over when it is desired to listen to the broadcast wavebands.

## Battery Supplies

The arrangement adopted in the receiver

enables the necessary L.T. and H.T. voltages to be obtained automatically from the broadcast receiver and thus reduces the difficulties of using the unit to the very minimum. If it is desired to use the unit with a broadcast receiver of the mains-operated type, a separate battery supply may be used with the converter without difficulty. The unit may be employed with a superheterodyne receiver, provided that no special whistle-interference eliminating devices are connected in the aerial circuit, and this fact should be ascertained before endeavouring to use it with this type of receiver.

The special patented double-motion knob enables tuning to be carried out in the simplest manner, as the control is used



General view of the Vidor S.W. Converter, showing the large tuning scale.

to provide an approximate setting, and then a band of approximately three metres is covered by the knob in the slow-motion position. The scale, which covers the entire front of the cabinet, is calibrated in megacycles and metres.

The cabinet is all-metal and measures only 7in. by 5½in., and can be placed in any convenient position close to the broadcast receiver and left permanently connected. The price is 47s. 6d. complete.

## BEGINNERS SUPPLEMENT

(Continued from previous page)

listener. For example, a listener who had recently bought a very expensive moving-coil speaker—of a make renowned for its excellent frequency response over a wide range—complained bitterly that the reproduction from his set was no better than when he was using a much cheaper instrument. When asked for more precise information concerning his complaint he explained that the performance was still sadly deficient in the upper or treble register. Further inquiries elicited the information that he was using a superhet receiver of the most selective type, quite incapable of giving any noticeable output at audio frequencies above about 4,500 cycles. It was a long time before the listener could be convinced that a speaker, however good, cannot reproduce frequencies which do not exist in the power fed to it from the set. The reverse case, in which a "quality" receiver is worked in conjunction with a speaker having a very limited frequency response does not occur quite so often. It would appear that listeners sufficiently interested in good reproduction to make a special quality receiver are equally willing to employ a quality speaker as well.

Under modern reception conditions a radio receiver is something of an instrument of precision, and if a published circuit or one's own design calculations indicate that a resistance of 20,000 ohms should be used, it is no good using 30,000 or 15,000 because this size happens to be handy. And to obtain good efficiency it is better to invest in some modern non-inductive fixed condensers instead of making do with the oddments lying at the bottom of the junk box.

Writing of resistances is a reminder that instances have been known where resistors have differed considerably from that indicated by their colour code mark-

ings. To avoid trouble due to this, or to the use of any other component of doubtful value or quality, the constructor should, where possible, make a practice of testing every component before it is incorporated in the set. Continuity, insulation, and resistance can be measured or tested by the simplest means—a battery and milliammeter/voltmeter outfit of inexpensive make are all that is required, and the few minutes spent in such tests may well save hours of labour in locating abstruse faults, the isolation of which may mean practically rebuilding the set.

## THE EFFICIENCY OF COILS

(Concluded from page 367, June 20th issue.)

Such a wire not only presents a much larger surface area than a solid wire of equal cross sectional area, but the separately insulated strands reduce the losses from eddy-currents in the windings. The next best alternative to "Litz" wire is solid copper of heavy gauge. The lower the wavelength on which the coil is to be used, the greater the need of a design giving low values of H.F. resistance. Thus, while a fairly small gauge solid wire is reasonably satisfactory for the long-wave band, "Litz," or a large gauge copper wire should be employed for the medium-wave winding, while for short-wave coils heavier gauges still must be used, and for ultra-short-wave working the coils are frequently made of copper tube instead of solid wire.

## Classification

Probably the most efficient type of coil yet produced, from the point of view of low losses from self-capacity and H.F. resistance, is the Litz-wound solenoid with good spacing on a ribbed former about 3ins. in diameter, such as was used largely in receivers of a few years ago. The

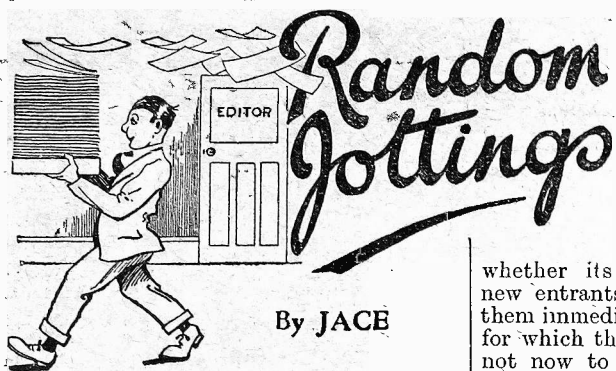
only reason why it is not so frequently seen to-day is that its external field is large, and in order to preserve the stability of the circuit, and at the same time reap the benefit of its efficiency, the necessary screening arrangements are unwieldy in size.

Next on the list in general order of overall efficiency are the iron-cored tuning coils, particularly when wound with Litz wire for the medium-wave section. The main advantage is that the iron core permits the required inductance to be obtained with much smaller overall dimensions, allowing, among other things, the use of very compactly-dimensioned screens without introducing undue losses. Smaller air-cored Litz-wound coils come next on the list, followed by the various designs of coils on ribbed formers and employing solid wires.

## Choice of Coils

Finally, a few words concerning the relative suitability of the various types of coils in different kinds of sets should be helpful. In the case of a multi-stage set having three tuned circuits, although iron-cored coils would normally be recommended, sufficient selectivity for reasonable requirements should be obtained with ordinary air-cored coils. For a simple set with two tuned circuits, if reasonable selectivity is wanted, either good Litz coils or iron-cored must be used. But should the selectivity requirements be less stringent, as, for example, in the local-station quality set, a much less expensive arrangement could be used with impunity.

Excellent results can be obtained for local station reception only when using a pair of medium-wave coils of the solenoid pattern wound on fairly large paxolin formers.



By JACE

### Police Radio

IT is stated that a new high-power radio station is shortly to be erected in Lancashire to supersede the present Liverpool police radio transmitter at Old Swan, where for the last four years several successful experiments have been carried out.

The entire transmitting plant as well as the new bicycle receiving sets have been developed by Sergeant Menzies, who in private life is a keen radio amateur and owner of Station G5MQ.

Within a twenty-mile radius of Liverpool there are twenty police stations equipped with receivers and numerous motor-cars, motor-cycle combinations and cycles fitted with radio receivers which hear every word spoken into the microphone at the headquarters station.

It is possible to block every exit from the city within a few minutes of broadcasting instructions by radio.

On the bicycles a small two-valve set is carried in a leather case slung from the framework. Despite the small size of these sets they provide good reception up to distances of twenty miles from headquarters, and with Morse the range is extended to thirty miles.

### Scophony Limited

RESOLUTIONS authorising the conversion of Scophony Limited, the Television Company, from a private into a public Company, and the increase of the capital from £140,000 to a nominal capital of £300,000, consisting of 1,200,000 5s. shares, were carried unanimously at a shareholders' meeting of Scophony Limited, held on Thursday, June 4th, and presided over by Sir Maurice Bonham-Carter, the Company's Chairman.

Scophony Limited is developing the Scophony System of television, based on optico-mechanical principles, and its position is unique, in that its receiving apparatus is capable of giving projected pictures of a size suitable not only for home entertainment, but also for large cinema theatres. In recent months the Company has been actively engaged on the development of apparatus for reception of television broadcasts from the B.B.C. Alexandra Palace television station, which should commence its regular transmissions some time this autumn. Some of the Company's inventions deal with methods for transmitting vision over telephone lines.

The Company has an exceptionally strong patent position: it holds about 117 granted patents all over the world, while 105 more are still pending.

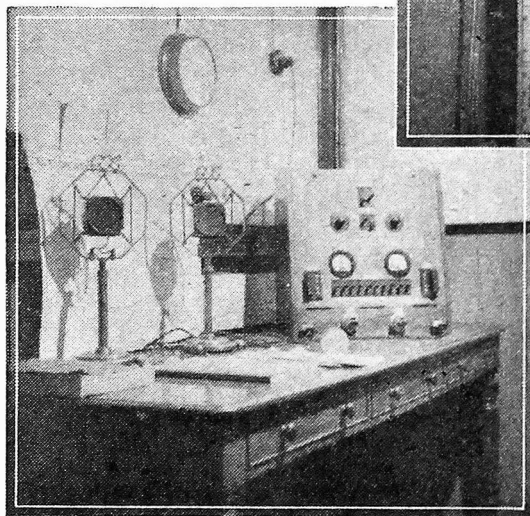
The Chairman, Sir Maurice Bonham-Carter, is a director of O. T. Falk & Co., Investment Bankers. Messrs. E. K. Cole, Limited, the well-known radio manufacturers, are substantial shareholders in Scophony Ltd., and the Chairman of E. K. Cole, Mr. W. S. Verrells, is Deputy Chairman of Scophony Limited. The Managing

Director is Mr. S. Sagall, founder of the original Scophony Limited some six years ago. Mr. Arthur Levey, film industrialist, is a prominent shareholder.

### Proposed School for B.B.C. Staff Training

THE B.B.C. has lately been considering whether its present system of training new entrants to its service by attaching them immediately to the particular branch for which they have been recruited ought not now to be modified in view of the growing range and specialisation of B.B.C. work. It has at the same time explored the best means of keeping its existing headquarters and regional staff in up-to-date touch with the latest developments in their work, and of employing to the best advantage a small reserve of staff for emergency and holiday requirements. The problem has lately been made more acute by a growing number of requests from overseas broadcasting authorities for the help of men trained in the B.B.C. service.

Among the methods suggested for this purpose has been the establishment of a special school through which new entrants should pass on admission, and to which existing members of the staff could from time to time be attached for refresher and similar purposes. The scheme in question, which has not yet passed beyond the stage of discussion, or been worked out in any complete detail, contemplates a training



which would vary according to individual needs from a few weeks to several months for some twenty members at a time of newly recruited and existing staff combined, including announcers, studio assistants and general programme and executive staff. It would provide a practical survey of a wide range of the B.B.C.'s activities, by such means as lectures on programme building, attendance at rehearsals, and visits to different centres. It would introduce also a certain amount of experimental work, designed to bring out any special aptitudes for broadcasting purposes which those attending the school might possess, and perhaps to assist towards the solution of particular problems of technique.

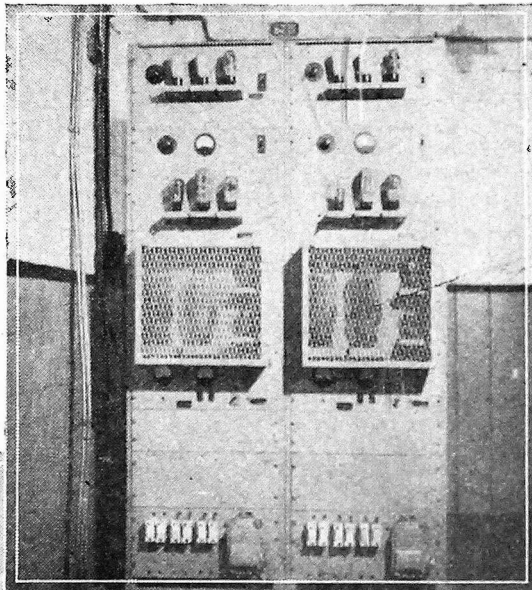
The adoption of this proposal would not affect in any way B.B.C. methods of staff

recruitment. In this matter the policy of the B.B.C. is to select, without favour, from the widest possible field of applicants, in the great majority of cases after public advertisement, the best men or women available for its vacancies.

### A Choral Society Centenary

THE Centenary of Stratford-upon-Avon Choral Society is to be celebrated on June 28th by a special concert in the Shakespeare Memorial Theatre. Warwick Musical Society is co-operating, so that altogether there will be a chorus of about 120 voices. The City of Birmingham Orchestra has been engaged. Leslie Heward and John Brough, of Stratford, will conduct. The second part of the concert will be broadcast; this consists of Schubert's "Rosamunde" overture and Elgar's "The Music Makers," with Mary Jarred as the contralto soloist.

### AMPLIFIER AT EUSTON STATION



These illustrations show part of the public call system installed at Euston Station by the General Electric Coy., Ltd. Above, the main amplifier equipment, and on the left, the microphones and switching controls in the announcing box.

### Ronald Frankau as Composer

IT is interesting to learn that Ronald Frankau, whose quick-shot repartee in "Murgatroyd and Winterbottom," and whose soulful ditties in variety programmes are so well known, has burst forth as the composer-author of a complete musical show to be broadcast in July. At present Ronald is trying to be original in melodies, but, despite longer cigarette holders, is finding it a most difficult problem. Details of this tremendous musical occasion are yet with the comedian himself.

### Concert from Cheltenham

FOUR solos by Marie Hall, the famous violinist; two groups of songs by Percy Underwood, the Gloucester baritone; and two groups of the late Sir Hubert Parry's Schulbrede Tunes, by Herbert Sumson, who is organist and Master of the Choristers at Gloucester Cathedral, make up an attractive programme for the concert from Cheltenham Town Hall on July 3rd. This broadcast will be given in the Midland Regional programme.

(Continued overleaf)

## RANDOM JOTTINGS

(Continued from previous page)

## Will all Radio Stations Possess an Aquarium?

AS it is highly important that the water used for the cooling of valves in broadcasting transmitters should be perfectly clean and free from any vegetable growth and other impurities, at some stations the tanks containing the necessary supplies have been provided with goldfish, which assist in keeping the supply free of moss and weeds which, on occasion, have been traced as the causes of a "technical hitch."

## Hastings and St. Leonards Model Yacht Club

THE Hospitals Carnival Week held annually at this popular seaside resort has grown to proportions of national interest. We are therefore interested to learn that the Hastings Model Yacht Club have decided to hold a very ambitious "Exhibition of Models" in connection with the Carnival which takes place this year from Saturday, August 29th, to Saturday, September 5th. Various companies have given their assurance of collaboration, notably Cunard White Star, P. and O., Southern Railway, Imperial Airways, etc., besides numerous local firms.

Further offers of exhibits are invited, as there remain several stand vacancies, and will be welcomed from industries, manufacturers, and similar undertakings, club and association secretaries, etc. No charge for stands will be made, and all proceeds and benefits (other than publicity) will accrue to the Hastings Hospitals. Offers should be addressed to: Captain E. K. Cormody, General Secretary, Hastings and St. Leonards Voluntary Hospitals Carnival Association, 27A, White Rock, Hastings, from whom further particulars may be obtained.

It should be pointed out that there will be Watercraft, Locomotive, Aircraft, General Interest, and Juvenile Sections of the Exhibition.

## LIGHTNING AND AERIALS

(Continued from page 385)

Through its design and efficiency, a lightning arrester of this kind is really worthy of its name, as it does offer a practical solution to the problem of protecting the aerial and mast, while it also greatly reduces static interference.

As mentioned before, it is fitted at the highest end of the aerial, therefore, it is in a far better position to carry out its work than one, say, fitted at set level and in or near the house. By virtue of its height its effective area is greatly increased, and as it is well protected against atmospheric conditions, it can be fitted and forgotten.

The constructional details are clearly shown in the diagrams, and there is only one point which needs any particular care, that is, soldering the gramophone needles to the tin disc. The tin need not be very stout, and it will be found quite easy to assemble this part if the disc is placed over a cork or a piece of soft wood, and the needles driven through the tin until their flat ends are just projecting above the disc. The centre wire and the needles can then be soldered in position, and when the metal has cooled down, the cork or wood removed.

The ebonite spacer is provided to keep the earth disc one-sixteenth of an inch from the pointed ends of the needles, so this must be adjusted with reasonable care, otherwise too large a gap will be provided, or there will be a possibility of the points and the earth disc shorting.

## 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.

**R. F. H. (Alton).** A short line was inadvertently left in the diagram by the draughtsman, and the cathodes should not, of course, be joined to the heaters. The statement regarding suitable universal valves is quite correct, as in this particular circuit the anode current and H.F. and screen voltages were also considered.

**J. McC. (Sheffield).** It is very difficult to suggest the trouble as the set is home-designed, but it would appear that the design is faulty, and a circuit would be necessary in order to locate the possible trouble. Obviously, a good meter would be of assistance in order to find whether the voltages applied are correct.

**F. P. R. (Exmouth).** We cannot give you the value of the resistance and suggest you communicate with the makers of the instrument. There may be some internal resistance which can be removed or otherwise modified to convert the instrument, although by bearing in mind that to read the current you multiply the scale and must by-pass the greater portion of the current you can calculate the resistance required for that purpose.

**J. C. V. (Montrose).** Vibration can cause the trouble, but if it is consistent, and is always cured by the on and off switching, we suspect a by-pass condenser which fails to function. This is probably of the electrolytic type and the condenser fails to act as such until a heavy surge is created by the on and off switching.

**D. A. H. (E. Croydon).** We do not recommend a frame aerial for the set mentioned.

**L. R. K. (Margate).** For full details concerning the QSL cards, etc., write to the Radio Society of Great Britain, 53, Queen Victoria Street, S.W.1.

**R. T. (Brockley).** The best position for a volume control in the circuit in question would be across the secondary of the L.F. transformer. A value of 500,000 ohms or more should be used, and the two terminals are joined to the two secondary terminals, leaving the present G.B. lead attached. The resistance R3 is disconnected from the secondary and is joined to the arm of the potentiometer.

**W. H. (Alnmouth).** The machines may be obtained from the Automatic Coil Winder and Electrical Equipment Co., Ltd., Winder House, Douglas Street, London, S.W.1.

**J. T. L. (Bombay).** The chokes may be wound with 20 or 22 gauge D.C.C. wire on a 2in. former. A hundred or 150 turns will be found suitable, but a high degree of insulation must be maintained.

**A. S. (Market Drayton).** If it is essential to change the entire coil, you could only do this by means of a five-pole change over switch, such as the new B.T.S. multi-pole switch referred to in our pages recently.

**D. S. (Godalming).** If you cannot answer the point raised in your query you would be unable to obtain a transmitting licence, and should therefore study the subject before making application.

**C. D. (Belfast).** The cost would be about 10s. or 12s. See the article in our issue dated February 8th last.

**J. H. C. R. (Tottenham).** We do not think it would prove practicable to try and make one eliminator to serve all purposes. Try and build each one for each receiver.

**L. K. (Bolton).** The Elf Portable which was recently described should prove ideal for your needs.

**R. D. S. S. (Enfield).** We cannot give the information concerning the transmitter. If you cannot solve the queries raised you cannot hope to obtain a licence for transmitting. We would also point out that a condenser is not rated by its resistance but by its capacity.

**E. R. (S.E.5).** We regret that all the issues in question are now out of print.

**S. B. (Stony Stratford).** We do not recommend the unconventional method of using the Class B valve. It would be preferable to remove this and use a super-power valve in its place, with a low ratio transformer to feed it.

**C. E. (S.E.1).** We cannot give you the resistance values without knowing the resistance of the meter. If you do not know this value, write to the makers for full details, and this course will probably be essential in view of the fact that the meter has been dismantled.

**C. F. D. (Hatch End).** The only component necessary is a 2 mfd. condenser. A length of single bell wire will be required, and the arrangement is as follows: One terminal on the condenser should be joined to the anode terminal of the output valve (or loud-speaker negative). The length of wire is then attached to the remaining terminal on the condenser and taken into the garden to the desired point. The end is then attached to one terminal of the loud-speaker, and the other terminal of the speaker is provided with a short piece of wire attached to a short metal spike, which should be driven into the ground to complete the circuit.

**B. B. (Romford).** The wire used for the coil is 28 gauge enamelled. All turns are wound evenly side by side.

**R. H. R. H. (Glenageary).** The circuit is not suitable for use with battery valves, and the standard high-voltage mains valves should be employed throughout. We cannot check the resistance valves as we have no data concerning the total H.T. current of all of your valves. The condensers should preferably be of the electrolytic type.

## 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.

## SLADE RADIO SOCIETY

ON Thursday, June 11th, we had a demonstration of the Magnavox Duode speaker, kindly loaned us by the Benjamin Electric Co. The speaker was coupled to a quality amplifier, and put up a really amazing performance. Standard frequency records and others were played, also radio. For comparison, a very good quality set driving a Celestion speaker was demonstrated under identical conditions; the voting at the end, however, showed the majority in favour of the Magnavox speaker.—Hon. Secretary, Chas. Game, 40, West Drive, Heathfield Park, Hlands-worth.

## CATALOGUES RECEIVED

## BULGIN RADIO PRODUCTS

THE house of Bulgin started making high-class radio components fifteen years ago, and to-day the name Bulgin is a household word amongst wireless constructors all over the world. Every component or unit is thoroughly tested before leaving the Bulgin factory, which is equipped with modern machine tools, presses and coil-winding machines. In a very comprehensive catalogue we have received from this firm every component the constructor is likely to require is listed. Several types of semi-rotary and toggle mains switches, low-voltage switches, and volume controls are shown, together with a compact thermal delay switch. Aerial equipment, variable resistances, non-inductive resistances, power resistances of all values, H.F. and L.F. chokes, L.F. couplings and filters, mains interference suppressors are also listed. Among the other components included are a range of the well-known skeletonised tuning coils, valve-holders and adaptors, valve testers and measuring instruments, mains connectors and fuse-holders, jacks and plugs, and signal lamps and panel lights. There is also a special section dealing with short-wave and television components. At the back of the catalogue is a useful technical manual describing the advantages of using Bulgin components, together with some of the principles underlying their working. The catalogue is priced at threepence.

## BRUNSWICK RECEIVERS AND RADIOGRAMS

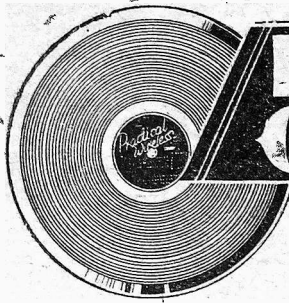
WE have received from Brunswick, Ltd., two folders giving particulars of their All-wave "Panatrop" Radiogram, and medium-long wave receiver and radiogram. The "Panatrop" is an eight-valve superhet all-electric radiogram giving an undistorted output of 7 watts. A high-frequency stage is employed on all wave-lengths, and inter-station noise suppression ensures quiet tuning. The tuning controls comprise the Brunswick Master Tuner, incorporating a central four-way—short, medium, long and gramo. switch—having on either side one control, mains on/off, and volume and tone control, with small new knobs of very neat appearance. The three wavebands covered are 16 to 49, 175 to 550, and 1,000 to 2,000 metres. The medium-long wave model is a seven-valve console type receiver, the wave range covering 185 to 550 and 1,000 to 2,000 metres. Technical refinements include distortionless automatic volume control, and inter-station noise suppression. Gramophone pick-up and external speaker sockets are provided. This chassis is also fitted in two radiogram models, one incorporating a high torque single record player electric motor unit, and the other a new record changer unit which takes up to eight records of any size. All these models are obtainable by hire-purchase terms, if desired.

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# IMPRESSIONS ON THE WAX

By  
T. Onearm

## "Listen to Liszt"

**A**LBERT SANDLER and his Orchestra make their second 1s. 6d. record for the Columbia Company this month—Columbia FB 1386. "Listen to Liszt" is the title, and it contains excerpts from the "Hungarian Fantasia" and the "Hungarian Rhapsody" No. 2.

Rawicz and Landauer, the Viennese piano duettists, who recently played before the King, have recorded this month an "Austria-Hungary Piano Selection" on Columbia FB 1389. It is an extremely fine recording.

## A New Tenor

**P**ERCY MANCHESTER, who has appeared on the stage and on the air, makes his first record this month for Columbia on Columbia DB 1642. He sings "Dear England" and "Ballads by Request," the latter being a medley of "Vienna, City of My Dreams."

Sidney Torch, on the organ of the Regal Cinema, Edmonton, London, plays the season's big hit, "Alone," the vocal of which is sung by Carolyn Marsh, who also sings in the companion number "Goody-Goody." The record is Columbia FB 1383.

## "Queen Mary" Signature Tune

**T**O Henry Hall was extended the honour of conducting the principal band of the giant liner, the *Queen Mary*, on her maiden voyage across the Atlantic and back. He has also written the official signature tune to be used in all broadcasts from the ship, and with the B.B.C. Dance Orchestra has recorded it on Columbia FB 1049. Its title is "Somewhere at Sea" and is backed by "The Glory of Love."

This latter tune is also sung by Hildegard on Columbia FB 1401, coupled with Ray Noble's latest song "The Touch of Your Lips."

Turner Layton follows his many successful records with a "Follow the Fleet" medley on Columbia FB 1402. "A Little Rendezvous in Honolulu" and "Hypnotized," also by Turner Layton, appear in the same list on Columbia FB 1403.

## An Innovation

**A** NEW style of guitar playing, in which the tone is amplified through a pick-up attached to the player's instrument, is demonstrated by Lew Fillis on Columbia FB 1391. The two titles which Fillis plays—"Dipsomania" and "Mood Ruby"—are rendered on the new Spanish "electric" guitars. This record is a personal triumph for Columbia recording engineers, for they were armed with the knowledge that the Americans have tried to reproduce the "electric" guitar and failed.

## Humour

**A** MILLION TEARS," composed by Bud Flanagan, is incorporated in Flanagan and Allen's new sketch, "Ye B.B.C.," on Columbia FB 1407. Allen is

a B.B.C. announcer, and asks you to imagine a broadcast of "In Town Tonight" as it would have sounded three hundred years ago.

A new humorist to the Columbia Company appears this month on Columbia DB 1646. Arthur Marshall is his name, and he gives realistic schoolgirl impersonations in "A School Girl's Story" and "The Headmistress."

Norman Long's latest is "That Little Back Garden of Mine" and "Aren't we All," on Columbia FB 1398.

Other interesting records are Billy Mayerl's "Six Miniatures" on Columbia FB 1397, Debroy Somers' Band in Welsh and Irish Medleys on Columbia FB 1396, and marimba and xylophone solos by Rudy Starita on Columbia FB 1395.

## Regal Zonophone

**M**UNN and Felton's Works Band, world's champion band in 1935 and holders of the 1,000 guineas Crystal Palace Trophy, conducted by W. Halliwell, have recorded the famous "William Tell" Overture on Regal-Zono MR 2088.

Gracie Fields, the popular Lancashire star, has recorded two old favourites in "Love in Bloom" and "Singing in the Bathtub" on Regal-Zono MR 2086. She also sings "Lancashire Blues" coupled with "Our Avenue" on Regal-Zono MR 2087.

## "Welcome Vienna" Selection

**T**HE Coventry Hippodrome Orchestra, conducted by Charles Shadwell, have made a "Welcome Vienna" selection, introducing "Blue Danube," "Live, Love and Laugh," "Ungeduld," "In Grinzing Time," "Vienna, City of my Dreams" and "Fliegermarsch," coupled with "Irving Berlin Waltz Medley," introducing "All Alone," "Always," and "What'll I Do," all of which are old favourites. The number of this record is Regal-Zono MR 2089.

George Formby makes his first medley record this month on Regal-Zono MR 2083. He introduces "Sitting on the Ice," "Chinese Laundry Blues," etc.

## A FINE BOOK FOR THE BEGINNER!

AND A USEFUL PRESENT

# EVERYMAN'S WIRELESS BOOK

(2nd Edition)

By

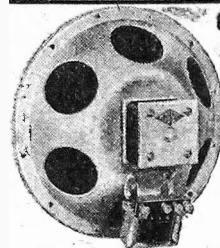
F. J. CAMM

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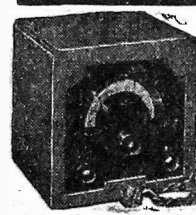


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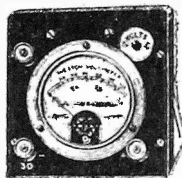
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Small types, Blue Flyer, 50/-; Patent, 45/-; H. M. Victor, 35/-.

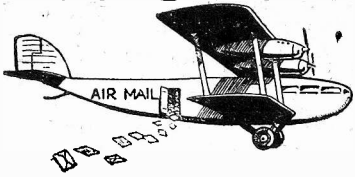
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# LETTERS FROM READERS

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



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

## HJ1ABD (Cartagena): A Correction

SIR,—I wish to point out that the "Short Wave Log" section of your issue dated June 13th, contains two errors. Firstly, your correspondent states that the Colombian station operating on 31.25 m., or 9,600 kc/s, is not HJ1ABP, but HJ1ABD. This station was first logged here on March 7th and the call was then given clearly in English as "Radio Cartagena, station HJ1ABP of the Cartagena Broadcasting Co.," and the address Apartado 37, not 252, which is the address of HJ1ABD "Ondas de la Heroica." These stations have both verified reception by QSL card. The second inaccuracy concerns TIRCC, whose address is Apartado 1064, and not 40 as given in the article.

Perhaps readers may be interested in the following list of recently verified reception: HIX, HIG, H11S (20 watts on 46.72 m.), H15N, H1L, H14D, H11J, HJ1ABB, HJ1ABE, HJ4ABB, HJ3ABH, HJ5ABC, HJ4ABC, HJ4ABE, HJ4ABA, HJ3ABD, HJ1ABG, HJ2ABD, CX1AA, NY2AE, LU1EX, PY2ET, PY2BA, YV12RM, YV10RSC, CO2KY, HCK, HCJB, HC2RL, TGX, HIZ, YV8RB, ZBW, EA8AB, TIGPH, HH2S and W7APD.

Recent unverified catches include: HH5PA, OA4AA, HJ3ABX, YV9RC, VP3BG, H18Q, H1T, H1H, H13C, H11W, H11C, HC1RF, YNVA, HP5J and HP5F.

I shall be pleased to correspond with anyone interested or to show anyone in the neighbourhood my verifications, den, or humble 0-v-2 receiver. Furthermore, I shall be pleased to send a specimen copy of our publication to readers enclosing two penny stamps to cover postage.—F. A. BEANE (British Short-Wave League, Ridgewell, Essex).

## A Reader's Thanks

SIR,—I should like to thank you for the book, "50 Tested Wireless Circuits"—received for my solution to Problem No. 193, which came as a pleasant surprise. I have already found much pleasure in studying the mains sets contained therein.

Permit me to say that I read your paper regularly, and am particularly interested in developments in mains sets—at the present time in obtaining real quality, and recently there has been much helpful advice in your paper. Articles dealing with the application of Ohms Law also appeal to me, and fault-finding articles I find interesting.—W. H. LAW (Grove Park).

## S.W. Logs: A Suggestion

SIR,—May I put the following suggestion before readers of PRACTICAL AND AMATEUR WIRELESS who are interested in short-wave listening and experimenting, and who send in "logs" of broadcasting S.W. stations which they have received. Most of these logs include a number of more powerful stations, such as W3XAL (17,780 kc/s), W1XAL (11,790 kc/s), DJD (11,770 kc/s), PMN (10,260 kc/s), VK2ME (9,590 kc/s), and W2XAF (9,530 kc/s).

I suggest that when listeners send in their logs which will include some of these "key" stations they should state the following: type of receiver, headphones or loud-speaker, type of aerial, date, and time of reception, and signal strength. From this data other listeners could check their own logs and compare them, and if any difference in strength of a certain station was observed the experimenter could tax himself by trying to find a suitable solution for such a state of affairs. In this way, I believe, some useful data could be compiled which would be of some use to experimenters.—A. W. BIRT (Kings Langley).

## DX Reception

SIR,—Please find enclosed list of amateur stations heard during period January-June. All the Americans were 7 mc. C.W. The log is representative of all countries heard, from some 1,680 logged. Have any of your readers noticed that DX signals on 14 mc. are rarely below R4, while really weak ones are usually "locals." I think my log proves the value of learning Morse. My receiver is a 1-v-1 s.g.-s.g.-pen. (tuned H.F.) with a 66ft. loft aerial (closed circuit).—E. J. NAPIER (Hayes End).

[Pressure on our space prevents the publication of your interesting log.—Ed.]

CUT THIS OUT EACH WEEK.

## Do you know

—THAT short-wave coils may be obtained with pins spaced so that they may be plugged into ordinary 4 or 7-pin valve-holders.

—THAT care must be taken when using a moving-iron speaker at an extension point.

—THAT an extension speaker of low impedance may be used under certain circumstances, but care should be taken that a high current is not passed through it.

—THAT when sufficient H.F. amplification is available a capacity aerial may be included close to the receiver in place of the more orthodox arrangement.

—THAT the only precaution when using the above arrangement is to avoid any induced hum from A.C. mains leads.

—THAT when using a meter to measure anode current it is often worth while (and sometimes essential) to include a large capacity fixed condenser in parallel.

—THAT in a powerful mains receiver it is sometimes worth while to fit a separate H.T. section to the amplifier portion to avoid hum and instability.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.

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

## A Scottish Reader's Log

SIR,—Please allow me to thank you for your excellent paper, PRACTICAL AND AMATEUR WIRELESS, of which I have been a reader since No. 1. I am very interested in the various logs which are published from time to time, but I have still to see one from my district. I enclose extracts from my log compiled in the last twelve months. My receiver is an 0-v-1, which was published in the short-wave section of PRACTICAL AND AMATEUR WIRELESS dated June 15th, 1935.

The individual stations are too numerous to mention separately, so I will give prefixes only. Amateur stations, ON, PA, HI, HB, LY1, VP6, CO6-7, F3-8, W1.2,3,4,5,8,9, FA8, VE2-3, SP1, EA2-5, G1, G2-5-6, PY2, IA2, YM4, CT1, K4, OZ7, VO, NY2, LX1 and CX1. Broadcast or commercial stations: VK2ME, HAS3, CTIGO W3XAL (16 metres), SUZ, DJE, DZH RW59, VP3MR, FYA and JVP. I have QSLs from all the above and hope to receive verifications from the following: HP1A CO8YB, PK4AU, SU1RO, SU1CH, LU6AQ, YV4AC, I1KG, FT4AH, HC1RF, EA8AT, TI2AV, CE1BC, VP3BG, HH5PA, SVINK, OE1FH, VE9AL, LU8AB, TI2RC, VP4TH, HP5J, LZA, PRF5, PMN, ETB, VQ7LO, HJ1ABP, JVM, JVH and URAB, an American Eclipse expedition to Soviet Russia about twenty-six miles over the border in Asia. Wishing PRACTICAL AND AMATEUR WIRELESS every success.—T. ALLAN (Newburgh, Fife).

## S.W. Correspondent Wanted

SIR,—I have read the reports on short-wave stations published in your fine paper with interest, but as I have not seen any from this district, I am enclosing my log of stations heard here during the past month. Listening was done mostly at week-ends.

I should be very pleased to get in touch with any short-wave amateur in this district and would like to know if there is a short-wave club in the locality. My receiver is an 0-v-2 used with a 65ft inverted L antenna. I am interested mostly in amateur DX work.—L. BROOMHEAD (837, Half Hall, Stocksbridge, Sheffield).

[We were interested in your log, but owing to its length we regret we are unable to publish it.—Ed.]

## From the U.S.A.

SIR,—Perhaps it may interest other readers how other parts of the world listen-in. I have just been studying a circuit diagram of one of America's crack sets.

The circuit consists of over twenty valves. They are 1st R.F., then converter valve, four stages of I.F., 2nd det., 1st A.F., 2nd A.F. (consisting of two valves in push-pull), also including one osc., two beat osc., R.F.-A.V.C., noise-suppressor valve; this is then coupled to a 35-watt amplifier consisting of two valves connected to the mains transformer for erectifying, then to the output stage of four valves. For interest of readers, the output appears to me like four triodes in push-pull. This output is delivered to three moving-coil speakers, giving a high fidelity reproduction.

Perhaps some reader can beat this, but it comes from America.—JOHN W. LEECH (Llandudno).

## S.W. Club Wanted

SIR,—I am interested in short-wave reception and shall be very pleased to get in touch with any short-wave club in my district.—J. OGG, 18, Norham Road, Oxford.

# Facts and Figures

## COMPONENTS TESTED IN OUR NEW LABORATORY

### New Ferranti Electrolytic Condensers

A NEW range of high-grade electrolytic condensers has just been made available by Messrs. Ferranti, and these range from 1 to 50 mfd. and include four two-unit types, consisting of an 8 plus 16 mfd. or 8 plus 8 mfd. unit. These condensers are all of the dry electrolytic type, and are available in the carton or tubular form. The ratings of these models range from 6 to 500 volts, and prices extend from 1s. 9d. to 7s. As usual with these types of condenser they are intended for use only in D.C. circuits or in circuits where there is D.C. with a certain degree of A.C. ripple, such as in a mains rectifier circuit. The sum voltage of the D.C. and peak ripple must not exceed the ratings given for the various types. The condensers are non-polarized, and to prevent reversal the leads which are provided on the carton type are coloured black for negative and red for positive. The tubular models are fitted with soldering tags and these are shorter than the depth of the sealing compound to avoid the possibility of contact with the electrolyte. Further details may be obtained by writing for the Ferranti leaflet R102/CE.

### Goltone Mains Bell

WITH A.C. mains facilities it is not worth while operating a door-bell from a dry battery. The only difficulty which attends the use of the mains, however, is in transforming the voltage to the low value required for the ordinary type of bell, and this means that the primary of such a transformer must be in circuit with the mains supply the whole time, unless the bell-push is fitted in the primary circuit—a very unsafe procedure. Special high-voltage mains windings may be fitted to bells, but the operation of the make-and-break which causes the hammer to strike the bell will result in a radiated interference which will affect wireless receivers over a considerable distance. In certain districts the authorities insist that such a bell must be fitted with an interference eliminator or not be employed. The new A.C. bell introduced by Messrs. Ward and Goldstone is entirely non-radiating, will operate on any mains supply from 200 to 250 volts at frequencies from 40 to 100 c.p.s. It requires no separate transformer, the necessary transformation of voltage being carried out inside the bell, in an efficient manner. There are no make and break contacts to create interference with radio outfits, and the absence of sparking contacts renders the bell proof against wear and breakdown. There are also no contacts to be replaced or cleaned periodically. The ordinary low-voltage push button indicator and wiring may be employed and thus installation costs are low, and to conform with regulations, the entire assembly is housed in a metal box provided with a separate earthing terminal. The price is 6s. 3d.

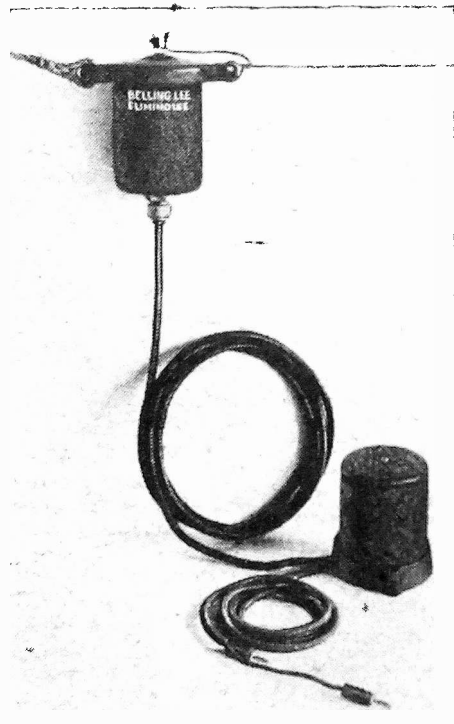
### Brush Crystal Headphones

THE Brush Development Co. has just announced the introduction of two new models of Brush crystal headphones to supplement the Brush Type A 2-phone model that has already won such wide

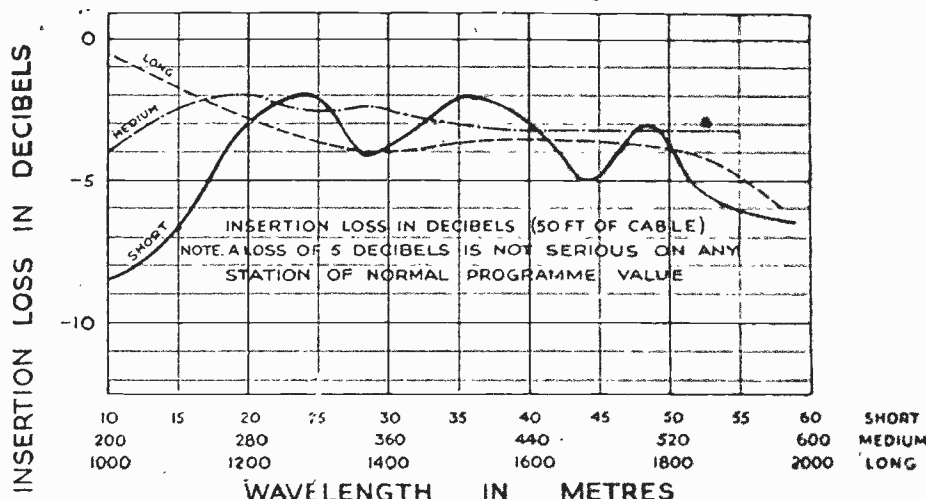
popularity. First of these two new developments is a single 'phone instrument with head band and soft rubber pad which holds the 'phone securely in place against the ear of the user. It is ideally suited for use in installations where the preference is for a single 'phone, rather than the double 'phone model.

The second of the new models is also a single 'phone instrument, but with the 'phone mounted on a 12in. lorgnette handle. A 5in. extension (to 17in.) is provided, and enables the user to hold the instrument against the ear from any of several convenient and comfortable positions. Brush lorgnette handle headphones have already been used with outstanding success in connection with public address installations in churches, etc.

Both the single 'phone headset and



The Belling-Lee Eliminoise Aerial Kit (which was reviewed in our issue dated June 13th last). And (below) the curves issued by the makers.



lorgnette handle headphone are of typical Brush design and are representative of the company's traditionally high electrical manufacturing standards. They are extremely sensitive—can handle excessive volume without overloading—have no magnets to cause the diaphragm to chatter in the user's ear. They are of rugged construction and light in weight. More complete details, including descriptive literature, circuit diagrams, complete installation data and prices can be secured from Messrs. R. A. Rothemel, Rothemel House, Canterbury Road, High Road, Kilburn, N.W.6.

### B.T.S. Microphone Transformer

IN our issue dated May 30th last we reviewed the new B.T.S. transformer, and we have now received a neat transformer designed for use with this. The component is exceptionally small, and is wound to provide a total primary to secondary ratio of 70 to 1. The primary is centre-tapped so that it may be used in a push-pull arrangement if desired, or one section only of the primary may be employed to provide a ratio of 35 to 1. Each half of the primary will carry 25 mA safely and thus a total primary current of 50 mA may be carried. This figure may, of course, be exceeded when a push-pull circuit is used owing to the cancellation of the D.C. magnetising current. The D.C. resistance of the primary is 10 ohms, and in view of the size of the component no terminals are fitted. Identification of the ends of the winding is carried out by means of coloured leading-in wires, and the inner (or beginning) of the primary is red with the outer green. The tap is coloured yellow. The secondary leads are found on the other side of the transformer and are yellow and blue. The price of this component is 5s.

### Three New Mazda Valves

THE 2-volt battery user will be interested in three new valves just introduced by Messrs. Edison Swan Electric Co. These are the VP210, a variable-mu H.F. pentode having similar characteristics to the VP215, but with a much reduced anode-to-grid capacity. This is now .004 mfd. and the microphony has been greatly reduced. A 7-pin base is fitted. The SP210 is another new valve, rated at .1 amp with 150 maximum anode and screen volts. This valve is also designed to give freedom from microphonic disturbance and has a low anode-to-grid capacity. The remaining valve is an output pentode, type Pen231. This is rated at .3 amps, with 150 volts maximum anode and screen H.T. The normal anode current, with 2.5 volts C.B. is 5 mA, and the screen current is 1 mA. The output is given as 370 mW.

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PRACTICAL WIRELESS STRAIGHT SETS. Battery Operated.		
One-valve : Blueprints, 1s. each.	Date of Issue.	No. of Blueprint
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<b>Two-valve : Blueprints, 1s. each.</b>		
Four-range Super Mag Two (D, Pen) ..	11.8.34	PW36B
<b>Three-valve : Blueprints, 1s. each.</b>		
Selectone Battery Three (D, 2 LF (trans.)) ..	—	PW10
Sixty-Shilling Three (D, 2 LF (R.C. & trans.)) ..	2.12.33	PW34A
Leader Three (SG, D, Pow.) ..	—	PW35
Summit Three (HF Pen, D, Pen) ..	18.8.34	PW37
All-Pentode Three (HF Pen, D (pen.), Pen) ..	22.9.34	PW39
Hall-Mark Three (SG, D, Pow.) ..	—	PW41
Hall-Mark Cadet (D, LF Pen (R.C.)) ..	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (pen), Pen) (All-Wave Three) ..	18.4.35	PW49
Genet Midget (D, 2 LF (trans.)) ..	June '35	PM2
Cameo Midget Three (D, 2 LF (trans.)) ..	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) ..	17.8.35	PW53
Battery All-Wave Three (D, 2 LF (R.C.)) ..	31.8.35	PW55
The Monitor (HF Pen, D, Pen) ..	8.2.36	PW61
The Tutor Three (HF Pen, D, Pen) ..	21.8.36	PW62
The Centur Three (SG, D, P) ..	—	PW64
<b>Four-valve : Blueprints, 1s. each.</b>		
Fury Four (2 SG, D, Pen) ..	—	PW11
Beta Universal Four (SG, D, LF, Cl. B) ..	15.4.33	PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B) ..	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen) ..	—	PW34C
Battery Hall-Mark 4 (HF Pen, D, Push-Pull) ..	—	PW46
F. J. Camm's Superformer (SG, SG, D, Pen.) ..	12.10.35	PW57
<b>Mains Operated.</b>		
<b>Two-valve : Blueprints, 1s. each.</b>		
A.C. Twin (D (pen), Pen) ..	—	PW18
A.C. D.C. Two (SG, Power) ..	7.10.33	PW31
Selectone A.C. Radiogram Two (D, Pow.) ..	—	PW19
<b>Three-valve : Blueprints, 1s. each.</b>		
Double-Diode-Triode Three (HF Pen, D, D.T., Pen) ..	10.6.33	PW23
D.C. Ace (SG, D, Pen) ..	15.7.33	PW25
A.C. Three (SG, D, Pen) ..	—	PW29
A.C. Leader (HF Pen, D, Power) ..	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen) ..	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen) ..	28.7.34	PW36A
Arnada Mains Three (HF Pen, D, Pen) ..	18.8.34	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D Pen) ..	11.5.35	PW50
"Allwave" A.C. Three (D, 2LF (R.C.)) ..	17.3.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen) ..	31.8.35	PW56
<b>Four-valve : Blueprints, 1s. each.</b>		
A.C. Fury Four (SG, SG, D, Pen) ..	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen) ..	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull) ..	—	PW45
Universal Hall-Mark (HF Pen, D, Push-Pull) ..	9.2.35	PW47
<b>SUPERHETS.</b>		
<b>Battery Sets : Blueprints, 1s. each.</b>		
£5 Superhet (Three valve) ..	—	PW40
F. J. Camm's 2-valve Superhet (two-valve) ..	13.7.35	PW52
F. J. Camm's £4 Superhet ..	—	PW58
<b>Mains Sets : Blueprints, 1s. each.</b>		
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 ..	—	PW59
F. J. Camm's Universal £4 Superhet 4 ..	11.1.36	PW60
<b>SHORT-WAVE SETS.</b>		
<b>Two-valve : Blueprints, 1s. each.</b>		
Midget Short-Wave Two (D, Pen) ..	15.9.34	PW38A
<b>Three-valve : Blueprints, 1s. each.</b>		
Experimenter's Short-wave Three (SG, D, Power) ..	—	PW30A
The Prefect 3 (D, 2 LF, RC and Trans.) ..	8.2.36	PW63

PORTABLES.		
<b>Three-valve : Blueprints, 1s. each.</b>		
F. J. Camm's ELF Three-valve Portable, (HF Pen, D, Pen) ..	16.5.36	PW65
<b>Four-valve : Blueprints, 1s. each.</b>		
Featherweight Portable Four (SG, D., L.F., Cl. B) ..	—	PW12
<b>MISCELLANEOUS.</b>		
S. W. Converter-Adapter (1 valve) ..	—	PW48A
<b>AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.</b>		
<b>Blueprints, 6d. each.</b>		
Four-station Crystal Set ..	—	AW427
1934 Crystal Set ..	—	AW444
150-mile Crystal Set ..	—	AW450
<b>STRAIGHT SETS. Battery Operated.</b>		
<b>One-valve : Blueprints, 1s. each.</b>		
B.B.C. Special One-valver ..	—	AW387
Twenty-station Loud-speaker One-valver (Class B) ..	—	AW449
<b>Two-valve : Blueprints, 1s. each.</b>		
Melody Ranger Two (D, Trans.) ..	—	AW388
Full-volume Two (SG., Det., Pen) ..	—	AW392
Iron-core Two (D, Trans.) ..	—	AW395
Iron-core Two (D, Q.P.P.) ..	5.8.33	AW396
B.B.C. National Two with Lucerne Coil (D, Trans.) ..	—	AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans.) ..	—	AW338A
Lucerne Minor (D, Pen) ..	—	AW426
<b>Three-valve : Blueprints, 1s. each.</b>		
Class-B Three (D, Trans, Class B) ..	22.4.33	AW386
New Britain's Favourite Three (D, Trans, Class B) ..	15.7.33	AW394
Home-Built Coil Three (SG, D, Trans) ..	—	AW404
Fan and Family Three (D, Trans, Class B) ..	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans) ..	2.12.33	AW412
1934 Ether Searcher : Baseboard Model (SG, D, Pen) ..	20.1.34	AW417
1934 Ether Searcher : Chassis Model (SG, D, Pen) ..	—	AW419
Lucerne Ranger (SG, D, Trans.) ..	—	AW422
Cosser Melody Maker with Lucerne Coils ..	—	AW423
P. W.H. Mascot with Lucerne Coils (D, RC, Trans) ..	—	AW337A
Mullard Master Three with Lucerne Coils ..	—	AW424
£5 5s. Three : De Luxe Version (SG, D, Trans) ..	10.5.34	AW435
Lucerne Straight Three (D, RC, Trans) ..	—	AW437
All Britain Three (HF Pen, D, Pen) ..	—	AW448
"Wireless League" Three (HF Pen, D, Pen) ..	3.11.34	AW451
Transportable Three (SG, D, Pen) ..	—	WM271
£6 6s. Radiogram (D, RC, Trans) ..	—	WM318
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
Iron-core Band-pass Three (SG, D, QP21) ..	June '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen) ..	—	WM371
Graduating to a Low-frequency Stage (D, 2LF) ..	—	WM378
P.T.P. Three (Pen, D, Pen) ..	June '35	WM389
Certainty Three (SG, D, Pen) ..	Sept. '35	WM393
Miniature Three (SG, D, Trans) ..	Oct. '35	WM396
All-wave Winning Three (SG, D, Pen) ..	Dec. '35	WM400
<b>Four-valve : Blueprints, 1s. 6d. each.</b>		
65/- Four (SG, D, RC, Trans) ..	—	AW370
"A.W." Ideal four (2SG, D, Pen) ..	16.9.33	AW402
2 H.F. Four (2SG, D, Pen) ..	—	AW421
Crusaders' A.V.C. 4 (2HF, D, QP21) ..	18.8.34	AW445
(Pentode and Class-B Outputs for above : blueprints 6d. each) ..	25.8.34	AW445A
Self-contained Four (SG, D, LF, Class B) ..	Aug. '33	WM331
Lucerne Straight Four (SG, D, LF, Trans) ..	—	WM350
£5 5s. Battery Four (HF, D, 2LF) ..	Feb. '35	WM381
The H.K. Four ..	Mar. '35	WM384
<b>Five-valve : Blueprints, 1s. 6d. each.</b>		
Super-quality Five (2HF, D, RC, Trans) ..	May '33	WM320
New Class-B Five (2SG, D, LF, Class B) ..	Nov. '33	WM340
Class-B Quadrydyne (2SG, D, LF, Class B) ..	Dec. '33	WM344
1935 Super Five (Battery Superhet) ..	—	WM370

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

Mains Operated.		
<b>Two-valve : Blueprints, 1s. each.</b>		
Consoelectric Two (D, Pen) A.C. ..	23.9.33	AW403
Economy A.C. Two (D, Trans) A.C. ..	—	WM286
Unicorn A.C./D.C. Two (D, Pen) ..	Sept. '35	WM394
<b>Three-valve : Blueprints, 1s. each.</b>		
Home-lover's New All-electric Three (SG, D, Trans) A.C. ..	—	AW383
S.G. Three (SG, D, Pen) A.C. ..	—	AW390
A.C. Triodyne (SG, D, Pen) A.C. ..	19.8.33	AW399
A.C. Pentaquester (HF, Pen, D, Pen) A.C. ..	23.6.34	AW430
Mantovani A.C. Three (HF, Pen, D, Pen) A.C. ..	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen) ..	Jan. '36	WM401
<b>Four-valve : Blueprints, 1s. 6d. each.</b>		
All Metal Four (2 SG, D, Pen) ..	July '33	WM329
Harris Jubilee Radiogram ..	May '35	WM386
<b>SUPERHETS.</b>		
<b>Battery Sets : Blueprints, 1s. 6d. each.</b>		
Modern Super Senior ..	—	WM375
Varsity Four ..	Oct. '35	WM395
<b>Mains Sets : Blueprints, 1s. 6d. each.</b>		
1934 A.C. Century Super A.C. ..	10.3.34	AW425
Heptode Super Three A.C. ..	May '34	WM359
"W.M." Radiogram Super A.C. ..	—	WM366
1935 A.C. Stenode ..	Apr. '35	WM385
<b>PORTABLES.</b>		
<b>Four-valve : Blueprints, 1s. 6d. each.</b>		
Midget Class-B Portable (SG, D, LF, Class B) ..	20.5.33	AW389
Holiday Portable (SG, D, LF, Class B) ..	1.7.33	AW393
Family Portable (HF, D, RC, Trans) ..	22.9.34	AW447
Two H.F. Portable (2 SG, D, QP21) ..	June '34	WM363
Tyers Portable (SG, D, 2 Trans) ..	Aug. '34	WM367
<b>SHORT-WAVERS—Battery Operated.</b>		
<b>One-valve : Blueprints, 1s. each.</b>		
S.W. One-valve converter (price 6d.) ..	—	AW329
S.W. One-valve for America ..	—	AW429
Roma Short-waver ..	—	AW452
<b>Two-valve : Blueprints, 1s. each.</b>		
Ultra-short Battery Two (SG det, Pen) ..	Feb. '36	WM402
Home-made Coil Two (D, Pen) ..	—	AW440
<b>Three-valve : Blueprints, 1s. each.</b>		
World-ranger Short-wave 3 (D, RC, Trans) ..	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen) ..	30.6.34	AW438
Experimenter's Short-waver ..	Jan. 19, '35	AW463
The Carrier Short-waver ..	July '35	WM390
<b>Four-valve : Blueprints, 1s. 6d. each.</b>		
A.W. Short-wave World Beater (HF, Pen, D, RC, Trans) ..	—	AW436
Empire Short-waver (SG, D, RC, Trans) ..	—	WM313
Standard Four-valve Short-waver ..	Mar. '35	WM383
<b>Superhet : Blueprint, 1s. 6d.</b>		
Simplified Short-wave Super ..	Nov. '35	WM397
<b>Mains Operated.</b>		
<b>Two-valve : Blueprints, 1s. each.</b>		
Two-valve Mains Short-waver (D, Pen) A.C. ..	—	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C. ..	Aug. '34	WM368
"W.M." Long-wave Converter ..	—	WM380
<b>Three-valve : Blueprint, 1s.</b>		
Emigrator (SG, D, Pen) A.C. ..	—	WM352
<b>Four-valve : Blueprint, 1s. 6d.</b>		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) ..	Aug. '35	WM391
<b>MISCELLANEOUS.</b>		
<b>Enthusiast's Power Amplifier (1/6)</b> ..		
Listener's 5-watt A.C. Amplifier (1/6) ..	Sept. '35	WM337
Radio Unit (2v.) for WM392 (1s.) ..	Nov. '35	WM398
Harris Electrogram (battery amplifier) ..	Dec. '35	WM399
De-Luxe Concert A.C. Electrogram ..	Mar. '36	WM403
New style Short-wave Adapter (1s.) ..	June '35	WM383
Trickle Charger (6d.) ..	Jan. 5, '35	AW462
Short-wave Adapter ..	Dec. 1, '34	AW455
Superhet Converter ..	Dec. 1, '34	AW457



# QUERIES and ENQUIRIES



## Speaker Protection

"I am using perforated zinc covered with gauze for the back of my radiogram. Would this cause any damage to amplifier or cause any demagnetising of the speaker, which is of a heavy permanent magnet type?"—W. R. (Euston).

AS zinc is non-ferrous it cannot have any effect whatsoever on your loud-speaker. From this point of view, therefore, the use of the zinc is quite in order. There is, however, the possibility that the use of the large expanse of metal may have some adverse effect on the tuning circuits in your radio section, and unless special care is taken the coils, chokes, etc., may be affected. You could use the sheet of zinc as a capacity aerial or capacity earth under some conditions, but otherwise we suggest that you take steps to ensure that it is not having any effect on the tuning and other inductive components.

## Charging an Accumulator

"Could you inform me how to join up an accumulator with my eliminator feeding a two-valve battery set, so that the accumulator could be charged from the mains? The eliminator is Type A, with valve outside, and has four plug terminals, H.T.—, H.T. +1, 2, 3."—R. S. (W. Kensington).

YOUR eliminator is presumably designed only for the supply of high tension. As such the maximum current output will be about 25 to 30 mA, at 120 or 150 volts. Your receiver is a two-valver and presumably employs a detector and power or I.F. valve. The filament rating of these will be at the least .1 amp. each, and there is a possibility that the output valve consumes even more. Therefore, for each hour your set is in use you are taking from your accumulator at least .2 amps., or, in other words, 200 mA. Assuming that your H.T. eliminator delivers 30 mA at maximum, this means that it would take at least six hours to replace the drain for one hour's listening. This is therefore impracticable. A more important point is, however, that the internal resistance of the H.T. eliminator is no doubt such that if the accumulator were connected to it under certain conditions, some damage might arise, and we do not advise you to attempt this form of charging. You can obtain a special metal rectifier for charging purposes which will deliver .5 amps., and a transformer to connect between this and the

mains, and the components are quite cheap. Messrs. Heayberd can supply a rectifier for 11s. and a transformer for 17s. 6d.

## Coil Connections

"I have a three-valve set and the wires of some parts have been disconnected. Perhaps you could tell me which wires to connect to the coil which has six points marked A, E, G, RE, RA, S? I believe the point S goes to one side of the wave-change switch, but what wire is connected to the other side?"—G. J. S. (Southville, Bristol).

WHILST coil connections are not standardised it would appear, from the references on your coil, that the following connections should be made. Terminal A should be joined to the aerial terminal, and terminal E to the earth terminal. The tuning condenser should be joined across these two points. The lead from the anode of the detector valve should be joined to terminal RA, and terminal RE should be joined to one side of the reaction condenser, the other side of which should be joined to earth. The wave-change switch should presumably be of the two-point or on-off type, one contact being joined to point S and the other contact to earth, or terminal E.

### 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 querrists.

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

If a postal reply is desired, a stamped addressed envelope must be enclosed. Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

## Short-wave A.C. Adapter

"I should like to construct a short-wave adapter for use with my A.C. mains two-valve receiver (det. and pen.). Will you kindly inform me where I can obtain a blueprint and details for same?"—F. B. (Aylesbury).

THE combined Adapter-Converter, which is described on Blueprint P.W. 48A, should meet your requirements. This unit is designed for use as converter or

adapter without alteration, and may also be used with battery or mains supplies. Unfortunately, the issue in which the unit was described is now out of print, but if you have any back numbers you will find details in our issue dated February 23rd, 1935.

## Century Super

"I have a Portable Century Super set which I wish to re-wire, and I should be very much obliged if you would be good enough to forward to me full constructional details as published in 'Amateur Wireless,' No. 473."—E. P. S. (Chelmsford).

WE could not, of course, give you full constructional details in the form of a letter, as these details occupied several pages in the journal in question. Unfortunately, however, the issue is now out of print and we cannot forward you a back number. No blueprint is now available, and we can, therefore, only suggest that you consider the construction of a more modern receiver utilising the pentagrid frequency-changer in place of the arrangement employed in your old receiver.

## H.T. Batteries

"I am building a three-valve battery set employing H.F. pentode, detector, and output pentode. Will an ordinary 120-volt dry battery produce good results, or is one of the super-power dry batteries necessary? I also have an old speaker—not moving-coil. Will this be in order until I buy a better one. I intend to get the W.B. Stentorian Senior or Junior. Which do you recommend for best results with my set?"—A. B. (Willington).

THE capacity of the H.T. battery will not affect the reproduction whilst the battery is new. Therefore, from the point of view of results, it does not matter what type of battery you buy. The question of capacity does, however, arise when considering the total current taken by the receiver. If this is in excess of that for which the battery is designed, it will quickly become discharged and, in addition to distortion, there will be a possibility of various forms of instability occurring. You do not state the type of pentode so that we cannot make a definite recommendation, but we think you will find that it always pays to buy the larger type of battery, as it provides more reliable results over a long period. If, however, the current taken by a receiver is extremely small, it would not be worth while obtaining one of the super types of battery in view of the possibility of this deteriorating due to climatic change rather than use, and thus it might break down before full use had been made of it. We suggest the Senior Stentorian, and this may then be retained in the event of your modifying the receiver.

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

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We suggest that Constructors seize the opportunity of trying out the famous **OSTAR-GANZ UNIVERSAL HIGH VOLTAGE VALVES**, which are rapidly conquering the market. The advantages of using these valves will be proved soon after you accept our part exchange offer, which we are backing with a six-months' guarantee, compared with the usual guarantee of three months.

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Chassis	Table Model	Radiogram
FOUR VALVE SUPERHET		
113 gns.	15 gns.	21 gns.
SUPERHET FIVE		
131 gns.	17 gns.	22 gns.
SUPERHET SIX		
141 gns.	19 gns.	25 gns.
SUPERHET SEVEN		
21 gns.	25 gns.	20 gns.
SUPERHET TEN		
30 gns.	35 gns.	42 gns.

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TEL.: HOLBORN 4631.

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**47/6** LISSEN SCREEN GRID, DETECTOR, PEN-TODE, SET. Handsome Ebony finish cabinet, Chromium fittings, Moving Coil Speaker. Complete with Valves, BRAND NEW.

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**5/6** TRIAD VALVES. 01-A, 24A, 27, 30, 31, 32, 33, 35, 37, 38, 39, 41, 42, 43, 45, 46, 47, 53, 55, 56, 57, 58, 59, 71A, 75, 78, 80, 6A6, 1C6, 6F7, 2A3, 5Z3, 12A7, 6A6, 6A7, 6D6, 12Z3, 25Z5.

**3/6** SPECIAL OFFER AMERICAN VALVES, type 12Z3, 5Z3, 25Z5, 6B7, 6A7, 6FY, 45.

**3/6** LISSEN 2 VOLT CLASS B VALVES. Type BB.220 A. Brand new, boxed.

**2/11** LISSEN INTERMEDIATE FREQUENCY TRANSFORMERS, 126 kc/s. Brand new, boxed. List price, 8/6.

#### BRYCE MAINS TRANSFORMERS.

**8/6** 250-0-250, 80 m.a. 2-0-2 volts, 2.5 amps, 2-0-2 volts, 4 amps. Shrouded.

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**17/6** 500-0-500 volts, 150 m.a., 2-0-2 volts, 2.5 amps., 2-0-2 volts, 6 amps., 2-0-2 volts, 2 amps., 2-0-2 volts, 2 amps. Shrouded.

**8/6** H.T.8 TRANSFORMERS. 250 volts, 60 m.a., 2-0-2 volts, 4 amps.

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ALL THE ABOVE TRANSFORMERS ARE OF FIRST CLASS MANUFACTURE, BRAND NEW AND CARRY MAKERS' GUARANTEE

**2/6** 8 mfd. and 4 mfd. DRY ELECTROLYTIC CONDENSERS. By well-known manufacturer. 450 volt working, 500 volt peak. Brand new.

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**2/-** G.E.C. 110 kc/s INTERMEDIATE FREQUENCY COILS. Complete with two trimmers.

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**8/6** 110 kc/s SUPERHET KIT. Comprising 3 gang S/H Condenser; 2 Band-pass Coils, Screened Oscillator; 2 I.F. Transformers. Fully Screened.

**2/11** LISSEN IRON CORED AERIAL COILS with Reaction.

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Available shortly, one, two and three-valve Short Wave Kits, Battery and A.C./D.C. types. At competitive prices. Apply for details.

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

**COIL FORMERS,** in finest plastic materials. 1 1/2 in. low-loss ribbed 4- or 6-pin, 1/- each.

**CONDENSERS,** super ceramic S.L.F. .00016, .0001, 2/9 each; double-spaced .000015, .000025, .00005, 3/- each. All brass with integral slow-motion .00015 tuning, 3/9; .00015 reaction, 2/9.

**SHORT-WAVE KIT** for 1 valve receiver or adaptor, complete with chassis, 3 coils 14-150 metres, condensers, circuit, and all parts, 12/6. **VALVE GIVEN FREE.**

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**BAND-PASS KIT,** 14/6 the lot. Lissen 3-gang coil unit. Utility 3-gang condenser and disc drive, 4 valve-holders, chassis and blueprint.

**SPEAKERS,** K.B. 8" P.M.s, 9/6, Goodman 7" P.M.s, 9/6, Rola 7" P.M.s, 10/-.

**MAINS TRANSFORMERS.** Premier wire-end type with screened primaries.

H.T.8 & 9 or H.T.10 with 4v. 4a C.T. and 4v. 1a C.T., 8/6.

250-250v. 60 ma., 4v. 1a., 4v. 2a. and 4v. 4a., all C.T., 8/6.

350-350v. 120 ma., 4v. 1a., 4v. 2a. and 4v. 4a., all C.T., 10/6.

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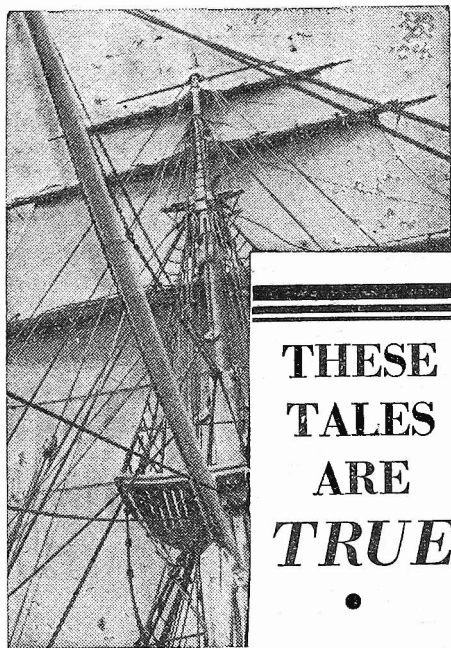
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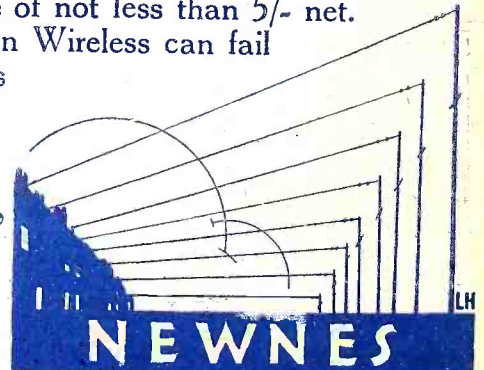
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