

Vol 5 no 116

# Present your Set with a NEW BLUE SPOT SPEAKER

If your set could speak it would be effusive in its thanks for the gift of a Blue Spot Speaker. A Blue Spot Speaker enables it to give you infinitely greater enjoyment of the wireless programmes. You will be amazed at the difference in the quality of

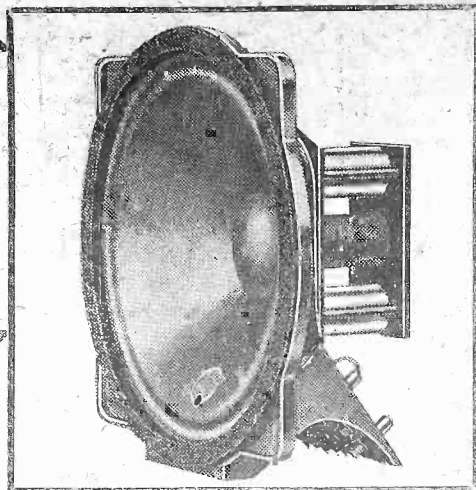
reproduction, the astonishing sensitiveness, the delightful flexibility. Get a Blue Spot Speaker now and enjoy your Christmas Radio. Christmas is a good time to instal extension speakers and have music throughout your home. Ask your dealer.



## BLUE SPOT PICK - UP

This model presents many attractive features. Tracking error is reduced to the minimum. The head lifts back for needle changing, eliminating risk of damage to records. Perfect reproduction of all frequencies without overloading. Screened leads. An earth connection provided. Special Volume Control giving silent and distortionless adjustment.

Price £1.7.6, or without Volume Control £1.1.6.



## BLUE SPOT "STAR" JUNIOR

This is an exceptionally fine speaker at a very attractive price. The "Star" Junior gives a greatly extended response and the reproduction is amazingly natural and vivid in every detail of speech, song or instrumental music.

**FEATURES.** New Magnet design. Die cast chassis. Transformer with 12 points matching to suit all usual output stages or for use as an extension speaker.

PRICE 35/-

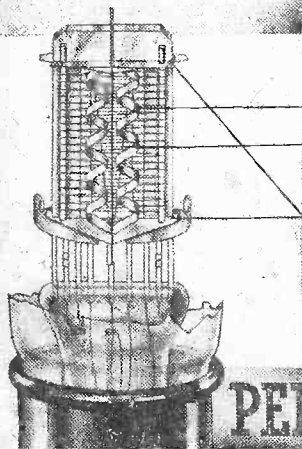
Cabinet model in oak and chromium 48/6.

Send to-day for interesting pamphlet (P.R.2), about Loudspeakers.

## THE BRITISH BLUE SPOT COMPANY LTD

BLUE SPOT HOUSE · 94/96 ROSOMAN STREET · ROSEBERY AVENUE · LONDON · E.C.1  
TELEPHONE: CLERKENWELL 3570. Distributors for Northern England, Scotland, and North Wales: H. C. RAWSON (Sheffield and London), Ltd., SHEFFIELD, 22, St. Mary's Parsonage, Manchester; 177, Westgate Rd., Newcastle-on-Tyne; 37, 38, 39, Clyde Place, Glasgow; 45, Springbank, Hull.

## Note this EDGE-ON ANODE



BATTERY  
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7/6

"Edge-on" anodes, minimising interelectrode capacity.

Uniquely sprung long life filament of unusually sturdy construction.

All parts completely interlocked, eliminating microphony.

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THE patent design of the anode of the 362 Battery SG2 provides exceptionally small interelectrode capacity owing to their "edge-on" construction. This valve has an unusually long straight portion to its characteristic, and can therefore be particularly recommended for a last S.G. stage.

**ALL 362 VALVES ARE GUARANTEED FOR 6 MONTHS. IF NOT STOCKED BY LOCAL DEALER SEND P.O. DIRECT TO US.**

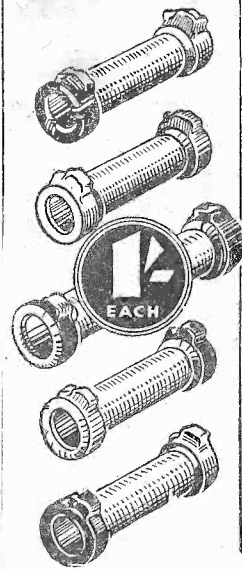
"362" PRICES: BATTERY VALVES—H, HL & L 3/6, Power 4/-. Super Power 4/6, SG & VS 7/6, Pentode Type 10/-. BA & BX 9/-.  
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# 362 VALVES

THE 362 RADIO VALVE CO. LTD  
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# 50 ohms TO 100,000



A DEFECTIVE Resistance can completely ruin the enjoyment of radio—and frequently does. Moreover, it is often difficult to trace the fault as none but the most expensive testing equipment can definitely locate it.

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# IT STANDS ALONE

**10, 20 or 30 m/A** AT EITHER 120 or 150 VOLTS. *no other unit has these 6 OUTPUTS*



## What this *NEW* "ATLAS" Mains Unit means TO EVERY BATTERY SET OWNER

### SPECIFICATION MODEL T.10/30

For A.C. mains. H.T. tapings 60/80 v. (min. and max.), 50/90 v. (min., med. and max.), 120 v. and 150 v. Tapped outputs 10, 20 or 30 m/A at 120 or 150 v. Trickle charger 2 v. at 0.5 amps. Westinghouse Rectifiers. Guaranteed 12 months. H.P. Terms 10/- deposit and 8 monthly payments of 8/6 each.

**OTHER MODELS** for D.C. and A.C. from 39/6 Cash or 10/- deposit.

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This wonderful new "ATLAS T.10/30" Mains Unit is quite unique. It has no less than 6 TAPPED OUTPUTS. This means that, with electricity in your house, any type of battery set, whether straight, superhet, "Class B" or "Q.P.P." can be made All-Mains operated in a few moments. It means that, no matter what set you may buy or make in future years, you can be sure of ample power and correctly matched voltages. And, most important of all, it means that you can cut your radio running expenses to less than 1/- per year—one-fiftieth of the cost of batteries—and keep your accumulator always fully charged.

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# A UNIVERSAL 3-VALVE SUPERHET SEE PAGE 443



EDITOR:  
Vol. V. No. 116 || F. J. CAMM || Dec. 8th, 1934.  
Technical Staff:  
W. J. Delaney,  
H. J. Barton Chapple, Wh. Sch., B.Sc. (Hons.), A.M.I.E.E.  
Frank Preston.

## ROUND *the* WORLD of WIRELESS

### Greetings!

**C**ORDIAL festive greetings to every reader. For the third year in succession we present to you our special Christmas Number. This issue does not represent the mixture as before with merely the icing on the title and holly borders round the pages. We have endeavoured to provide for every home constructor articles which will enable him to extract greater pleasure from his radio during the Christmas holidays. Custom has decreed that Christmas numbers should appear about three weeks before Christmas, and we have not broken the rule. After all, it is not such a far cry to December 25th, and our best wishes to all of our readers throughout the world go out with this issue.

### A Unique Christmas Gift

**S**PEAKING of Christmas reminds us that many readers have written asking us to repeat our tool kit offer. Unfortunately, only a few of these tool kits remain, and it is therefore not possible to offer them on the same terms as before. Those readers who missed the previous offer, and would like to possess one, may do so by sending a postal order for 3s. to PRACTICAL WIRELESS, Presentation Dept., George Newnes, Ltd., 14, Southampton Street, Strand, London, W.C.2. Orders will be dealt with in strict rotation until the stock is exhausted. All applicants whom it is impossible to supply will have their remittances returned. If, therefore, you are one of the unfortunate readers who did not acquire this remarkable pocket tool kit, you should send your remittance without delay. All kits will be dispatched before Christmas.

### Use the Index

**W**E continue to receive many queries which have either been answered in PRACTICAL WIRELESS before or have been the subject of special articles. May we invite the help of our readers by suggesting that they purchase the index which we issue every six months specially for their benefit? By consulting this they will probably find that the query they wish to ask has already been answered; they will therefore save

themselves time and trouble. These indexes cost 4d. each by post from The Publisher, George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

### Our "Wireless Constructors' Encyclopaedia"

**A**NOTHER reminder! Well over 100,000 copies of the popular "Wireless Constructors' Encyclopaedia" have already been dispatched. The book is in its third edition and makes an ideal Christmas present,

The Editor  
and Staff Join  
in Wishing  
Every Reader  
a Very  
Happy Christmas

either for a friend or for yourself. It costs 5s., or by post 5s. 6d. from George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

### Three-valve Superhets for All

**T**HIS week we give preliminary details of the Universal Three-valve Superhet. We have already described a battery version, an A.C. version, and a D.C. version. The Universal model introduced this week concludes the series of Three-valve Superhets, and we shall proceed to describe radio-gram models.

This receiver has proved to be the most popular of the long range of PRACTICAL WIRELESS receivers—deservedly so, bearing in mind its extreme selectivity, simplicity, and cheapness. As readers know, PRACTICAL WIRELESS was the first paper to describe a really practical three-valve superhet.

### Symphony Concert from Midland Regional

**E**GON PETRI is the pianist in the Midland Regional Symphony Concert by the City of Birmingham Orchestra on December 6th. The concerto is Rachmaninoff's D minor, and Schubert's Fifth Symphony will be given in the second part of the concert. Leslie Heward will conduct.

### Gracie Fields at Rochdale

**F**OR the third time in the last four years, Gracie Fields is returning to her home town, Rochdale; and from the local Hippodrome she will broadcast to Northern and Empire listeners on December 5th. As on her previous visits, the proceeds of all her performances, including her broadcasting fee, will go to local charities.

### Plays by Midland Authors

**O**N December 11 Midland Regional listeners will hear three plays which will be produced by Martyn Webster. Two of the plays are by Midland authors. Phyllis Bowman, wife of a Birmingham journalist, tries a futuristic experiment in a play depending entirely on effects, while Clive Ryland, author of three detective novels, has a clever dénouement to his play, "The Wager," which relates to a challenge made by a highwayman to a baronet whom he has robbed. The highwayman wagers that he will dine with the baronet and some of his swordsmen friends and escape unscathed. In the third play, entitled "O.K. Cameras," by A. Robert Jones and Peter M. Kenward, a murder in a film studio is the central incident. Michael North, Godfrey Baseley, John Lang, William Hughes, Hilda Birch and Nita Valeric are the principal players taking part in this triple bill.

# ROUND the WORLD of WIRELESS (Continued)

## Historical Trials Broadcast

THE fourth in the series of famous historical trials—the court-martial of the unfortunate Admiral John Byng, who was found guilty of cowardice and sentenced to be shot for failing to relieve the island of Minorca, after engaging indecisively with the French fleet in the vicinity, in the year 1756, will be broadcast in the Regional programme on December 6th and in the National programme on December 7th. Mr. Anthony Ellis, who has made the broadcasting version (and will be remembered by listeners as the author of the adaptation of Mr. E. C. Bentley's novel, "Trent's Last Case") is himself to play the part of Admiral Byng. Mr. Ellis, in the course of a long and varied career, has been connected with the theatre in the capacity of actor, theatrical critic, manager, and author. This broadcast reconstruction includes not only the court-martial, but also the preliminaries which led to it—that is to say, the piece begins with the departure of Byng on his ill-fated expedition, continues with the indecisive engagement with the French fleet, and proceeds finally to the court-martial and execution.

## Oundle School Choir

ON December 16th Regional listeners will hear a performance of part of Bach's B minor Mass by the boys of one of the great public schools of England, namely, Oundle. Two hundred and thirty boys will constitute the choir, thirty-five the orchestra, and three hundred and twenty will be in the chorus—a total of five hundred and eighty-five boys. In addition, Mr. Charles Woodhouse, leader of the B.B.C. Orchestra at the Promenade Concerts, will introduce a number of well-known players to augment the boys orchestra. Four guest singers—Elsie Suddaby, Astra Desmond, Arthur Cranmer, and Stuart Wilson, will also take part. Mr. Clement M. Spurling, Director of Music at Oundle for more than forty years, will be the conductor.

## Cardiff Musical Society's Concert

WHEN the first broadcast of the Cardiff Musical Society's concert is given on December 9th, a relay will be taken for West Regional and Empire listeners. The vocalist will be Mary Jarred (contralto). Warwick Braithwaite will conduct.

## Religious Broadcasts

DURING the Christmas season special religious broadcasts comprise carol services in the afternoon of December 24th from King's College, Cambridge, and in the evening from St. Mary's, Whitechapel. On Christmas morning a service will be relayed from St. George's Chapel, Windsor, conducted by the Dean of Windsor, Dr. Beilic. On December 30th a special evening service will be relayed from Canterbury Cathedral, with an address by the Archbishop of Canterbury. Arrangements are also being made for a New Year's Eve broadcast, probably from Winchester Cathedral.

## Coloured Entertainers

ON December 8th an act new to radio will be broadcast by Radcliff and Rogers, a gifted pair of coloured entertainers. They specialise in academic discussions and smart humorous conversations interspersed with excellent vocalism!

## INTERESTING and TOPICAL PARAGRAPHS

### Territorial's Smoking Concert

AN after-dinner smoking concert will be relayed from Deller's Café, Exeter, on December 10th, for West Regional listeners. The occasion is the annual dinner of the First Rifle Volunteers Old Comrades Association. This association was formed to keep green the memory of the first Volunteer Regiment formed in the

country in 1852. When the Territorial Act came into force in 1908, the 1st Rifle Volunteers' name was changed, and the Regiment became the present 4th Battalion Devon Regiment.

### Pantomime Rehearsal

ON December 12th a novel programme feature is a pantomime rehearsal—the first of two which are to be broadcast to the Midland Region. This takes the form of "Fifteen Minutes with Julian Wylie, rehearsing his Birmingham Theatre

## NEW FERRANTI RADIOGRAMS



A batch of Ferranti radiograms undergoing final inspection before packing and despatch.

## SOLVE THIS!

### PROBLEM No. 116.

Ferris made up a three-valve mains receiver which worked very satisfactorily. After some time he decided to improve matters by fitting an energised speaker, and appreciating that there would be a considerable voltage drop through the field he carried out the change in circuit and obtained a rectifying valve giving a much greater output. He previously used a 250-volt 60 mA. valve, and he purchased one of the 350-volt 120 mA. valves to enable the increased voltage to be obtained. When he tried out the scheme, however, he found that signals were not as good as previously. Why? Three books will be awarded for the first three correct solutions opened. Address your attempts to The Editor, PRACTICAL WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 116 and must be posted to reach this office not later than the first post on Monday, December 10th, 1934.

### Solution to Problem No. 115.

When Jackson modified his L.F. transformers he adjusted them to a frequency corresponding to a powerful French station, and thus, as his aerial tuning was not sufficiently selective, this station was fully amplified throughout the receiver and broke through at all settings of the tuning dial.

The following three readers successfully solved Problem No. 114 and books have accordingly been forwarded to them:

Mr. H. Furniss, 36, Northdown Rd., Romford, Essex.  
Mr. G. A. R. Bocking, 51, Sibley Grove, E.12.  
Mr. J. Tannahill, 202, Rowan St., Paisley, Scotland.

Royal pantomime." The other to be heard during the following week is of the rehearsal of Emile Littler's "Aladdin," to be presented at the Prince of Wales' Theatre, Birmingham. The stars in Julian Wylie's show are Dorothy Ward, Shaun Glenville, and Albert Burdon.

### School Sing-song

AN end-of-term sing-song from Tamton School will be broadcast to West Regional listeners on December 15th. The concert will be given in the Memorial Hall, which was recently reconditioned in memory of the late Headmaster, Dr. C. D. Whittaker, and one of the assistant masters, Mr. J. G. Loveday, who was connected with the school without a break for sixty-three years.

### "The Radio Follies"

A NEW concert party will make its first appearance at the Midland Regional microphone on December 14th. It is presented by Michael North and Richard Spencer, is called "The Radio Follies," and draws its artists from "The Radiotimists," "The Midland Mischief Makers," and "The Regional Revellers." Original sketches will be a feature of the entertainment.

Are You Making F. J. CAMM'S  
3-VALVE SUPERHET?

# Radio Throughout the House

A Clear Description of the Most Suitable Methods of Connecting Additional Loud-speakers to the Receiver without Impairing Quality of Reproduction

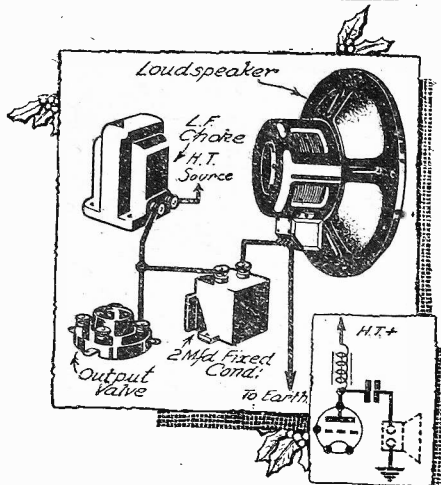


Fig. 1.—Showing how a speaker can be connected through a choke-capacity filter circuit.

## Choke-capacity Coupling

An alternative, and generally better, method of extending the speaker when the connecting wire requires to be more than, say, twenty feet long, is to feed the speaker on the choke-capacity principle, as shown in Fig. 1. Here, a low-frequency choke is connected between the speaker terminals, and a single wire is taken from that end of the choke which goes to the anode of the output valve through a 2-mfd. fixed condenser to one speaker terminal; the other speaker terminal is simply connected to earth. This earth connection might be made to any convenient point near the speaker, such as a gas or water pipe, or to a standard earth tube driven into the ground outside the window. It is not usually necessary that the speaker earth

At this time of the year more than at any other it is desirable that there should be provision for listening in any room of the house. When parties are in progress it is often wished to have the "wireless" first in the dining-room, then in the drawing-room, and so on. The problem, therefore, arises as to what is the best method of effecting the transference from one room to another, or of arranging that reception may be carried out in two or more rooms at the same time.

When the receiver is of the transportable type there is obviously little difficulty in moving it from one room to another, but this is not always convenient, especially when an external aerial is employed. In the case of an ordinary "fixed" set its removal would be very awkward, even if not impossible. Rather than attempt to move the receiver itself it is almost invariably better to fit extension loud-speakers, several, or any, of which can be operated from the same set. Where the speaker is a separate unit it is a perfectly simple matter to take it into another room by just increasing the length of the connecting wire. The new wire should, for preference, be of the twisted-flex variety, since if the two wires are parallel to each other, there is an appreciable capacity between them, and this tends to lower the "tone" of reproduction and make it sound rather "woofy."

## Makers of Popular Extension Loud-speakers

- AMPLION; BAKERS (SELHURST)
- RADIO; EPOCH; FERRANTI;
- GOODMANS; REPRODUCERS &
- AMPLIFIERS (R. & A.); ROLA;
- WHITELEY ELECTRICAL (W/B).

connection should be a good one, but if it has too high a resistance there will be a certain loss in volume.

The choke should be chosen according to the output valve in the set, and it will generally be found best to use one with tapings, so that the most suitable one can be found by trial. As to the feed condenser, this should have a rated working voltage equal to at least twice the high-tension voltage used for the set, and in the case of very high voltages two condensers might be used in series.

## Tone Compensation

An alternative to the choke-capacity feed, when the speaker leads are very long, and where the output valve is a pentode, is to use the ordinary twin wire and to modify the tone-compensator generally

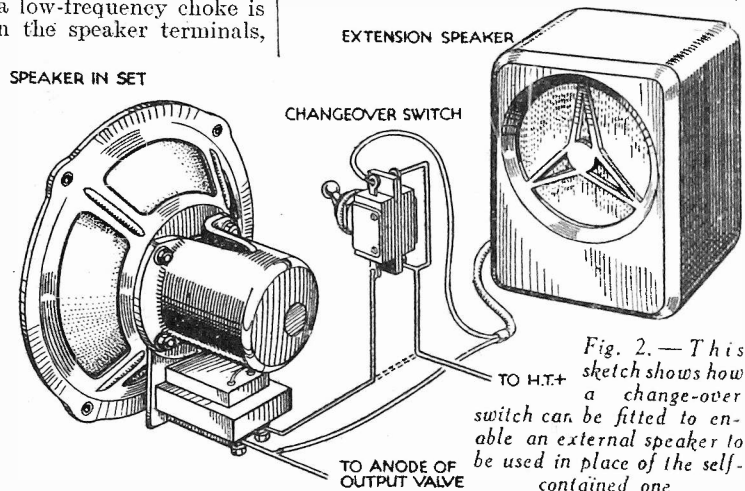


Fig. 2.—This sketch shows how a change-over switch can be fitted to enable an external speaker to be used in place of the self-contained one.

fitted in the pentode circuit. For example, if the resistance and condenser connected in series between the speaker terminals are of, say, 20,000 ohms and .02 mfd., the "tone" of the speaker can be maintained by increasing the resistance to about 50,000 ohms or by changing the condenser for one of about half the original capacity.

Where the speaker is built into the set (particularly in the case of a commercial set) a rather different method of connecting the extra speaker will probably have to be adopted. One method is to break the speaker lead which goes to high-tension positive and connect the two ends of the break to two terminals of a change-over switch of the Q.M.B. type, as shown in Fig. 2. The additional speaker is then connected to the third terminal on the switch and to that terminal on the speaker which is joined to the anode of the output valve. By this method, either of the two speakers can be switched on at will. There is, however, one important point which must be borne in mind when a pentode is used in the output stage: this is that the set must be switched off before changing from one speaker to the other. If this were not done the anode circuit would be broken for a fraction of a second whilst the change-over was being accomplished, with the result that a voltage surge would occur, and this might seriously damage the valve.

## Speaker Switching

This difficulty can be entirely overcome by using the arrangement shown in Fig. 3. In this case the primary winding of the transformer of the self-contained speaker is used as an output choke when the external speaker is in use. The extra speaker can be switched in or out of circuit

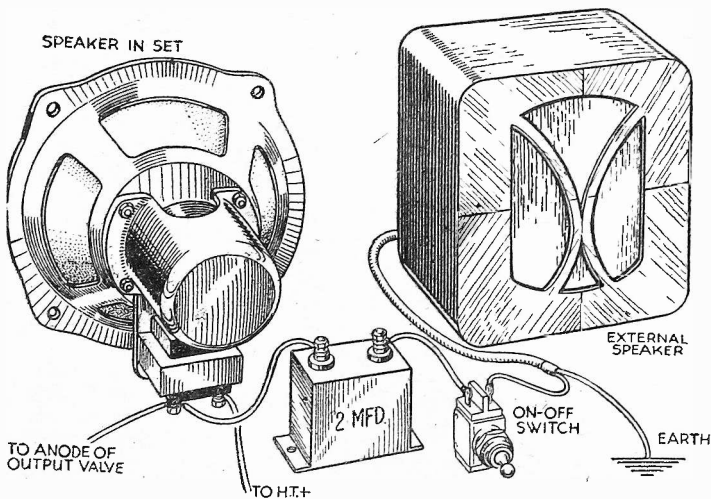


Fig. 3.—This diagram shows how an external speaker may be choke-capacity fed by using the self-contained speaker as an output choke. A switch is provided for disconnecting the external speaker when required.

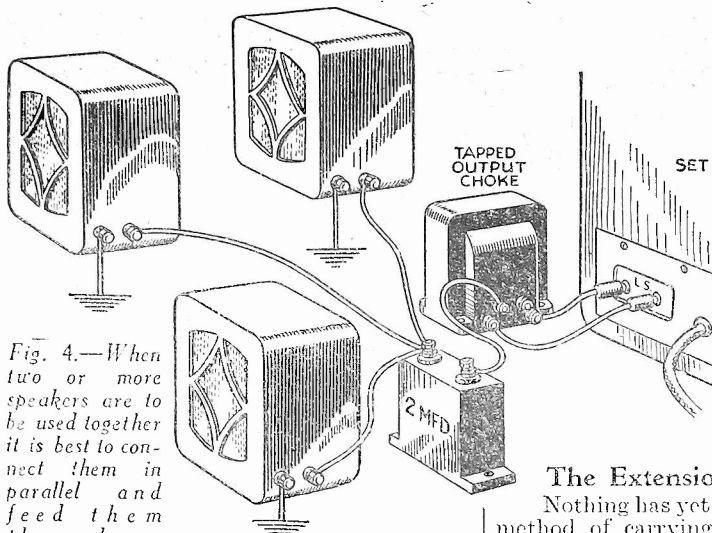


Fig. 4.—When two or more speakers are to be used together it is best to connect them in parallel and feed them through a tapped output choke and fixed condenser.

by means of an ordinary on-off switch connected in series with the feed condenser, as shown, but the built-in speaker must be disconnected by means of a switch connected in series with one lead from the transformer secondary to the speech coil. Of course, there is no reason why a single switch of the double-pole change-over type should not be used to carry out the two switching operations.

Should it be desired to have several speakers all working at the same time, it is best to connect the primary windings of their transformers in parallel, connecting them to the receiver through a tapped output choke and fixed condenser (see Fig. 4). The choke in this case must be chosen to match the output valve; that is, it should be of the "pentode" or "standard" type (having an inductance of approximately 50 or 30 henries respectively when carrying the full anode current of the last valve) according to the valve in use.

If the speakers are all of similar type, the only adjustment called for will be that of finding the most suitable tapping on the output choke; if they are different, it will be better also to experiment with different terminal connections. The latter process is considerably simplified if one of the special "extension" speakers is used which has a variety of tappings, each of which can be brought into circuit simply by rotating switch contacts, or by inserting the plugs provided into different sockets. Speakers of the kind referred to are the W.B. "Equilode," the R. & A. "Extensor," etc. Incidentally, it should be pointed out at this stage that the special speakers of the type referred to are always to be preferred for use as extensions, due to the facility with which optimum matching between the output valve and the speech coil can be obtained.

### Maintaining a Constant Load

When using a number of paralleled speakers, as shown in Fig. 4, and it is desired to switch one or more out of circuit, it is best to arrange to disconnect the secondary—not the primary—so that the matching is undisturbed. This can be done, of course, by including a switch between one of the leads from the secondary winding on the transformer and the speech coil. It is still better, however, to arrange the switch so that as the speech coil is disconnected a fixed resistance is brought into circuit; connections for this are shown

in Fig. 5. The fixed resistance must be approximately of the same value as the resistance of the speech coil—generally between about 5 and 10 ohms. A suitable resistance can easily be made by winding a short length of 36-gauge Eureka resistance wire on a strip of cardboard, bearing in mind that the resistance per foot of this wire is almost exactly 5 ohms.

### The Extension Leads

Nothing has yet been said of the actual method of carrying the speaker wires to various parts of the house, or of joining them to the speakers. The neatest and most convenient method is to take the wire round the picture moulding or skirting board, fastening it about every yard with an insulated staple; the only object of the insulation on the staple is to prevent the wire from being fractured, or the insulation from being scraped away. At each point where a speaker is to be used a two-point socket should be fixed to the wall, so that a corresponding plug can be inserted. It will almost invariably be found that the most convenient place for the socket is on the skirting board, although it might sometimes (when the wire is taken along the picture moulding) be attached to the side of a door frame. A cheap alternative to the special socket is an old two-coil holder, in this case using a coil mount for connection purposes.

There are a few important points to be observed in placing the extension leads, the chief of which is that the wires should not be run near and parallel to any electric-lighting or power leads; if this point is not watched there is every possibility of mains hum being introduced, whether the receiver is battery or mains operated. Another almost equally important point is that the speaker wires should not run close to the inside aerial or lead-in; if they do, a certain amount of instability might be caused.

Yet another point, when the speaker is simply to be moved from one room to another, is really one which has been referred to before; namely, that when the output valve is a pentode, the set should be switched off before transferring the speaker to another point, and also that the set should never be switched on whilst the speaker is disconnected.

### Parallel Capacity

It must be remembered that when a number of extension leads are provided, these being in parallel with each other, an appreciable capacity will be effectively placed in parallel with the loud-speaker. This capacity will necessarily have the effect of curtailing the high-note response, and it might be desirable to compensate for this in some way or other. The method in the case of a receiver in which a pentode

is employed has been mentioned before, but a different arrangement must be adopted when a triode is used in the output stage. The most effective system is to fit a tone-control transformer between the detector and L.F. stages, and adjust this to give emphasis to the treble. Alternatively a 2-henry choke and 25,000-ohm "graded" variable resistance should be connected in series between the primary terminals of the ordinary L.F. transformer (without altering the other connections, of course); by varying the setting of the resistance different degrees of high-note emphasis can be secured.

### Push-pull and Class B Output

The methods of adding extra speakers described above are applicable principally to receivers which employ a single power valve or a pentode in the output stage. When the output stage consists of two valves connected in push-pull, or of a class B or double pentode valve, the method of connection must be varied slightly.

In such cases it is nearly always necessary to take two leads to the speaker, these being joined to the two ends of the output choke, or the primary winding of the output transformer.

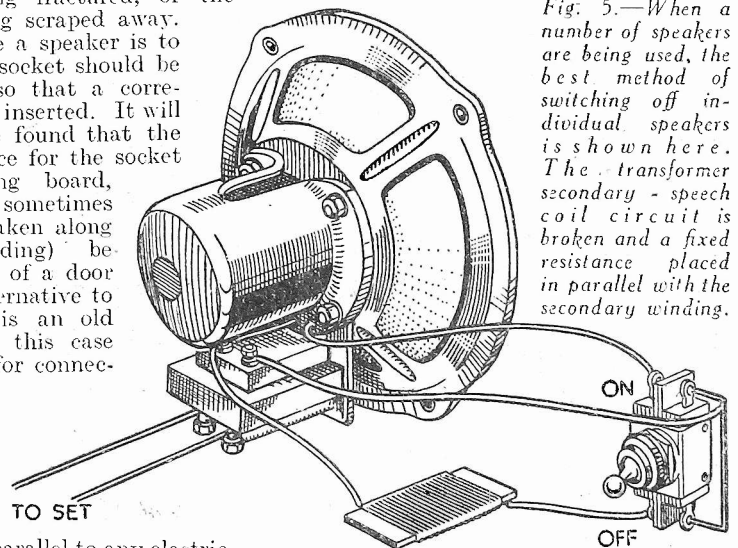


Fig. 5.—When a number of speakers are being used, the best method of switching off individual speakers is shown here. The transformer secondary—speech coil circuit is broken and a fixed resistance placed in parallel with the secondary winding.

As a safety measure, especially when the speaker is to be fed from a mains-driven receiver, it is a good plan to insert a fixed condenser of about 2 mfd. capacity in each of the extension leads. This method of connection will not upset the correct matching of the built-in speaker to the output stage provided that the additional unit is of the correct extension type and fitted with a switching device operating on tappings taken from the transformer windings.

Another method which can be employed when the new speaker has a transformer with a centre-tapped primary is to connect this in parallel with the speaker in the set. This arrangement is not very good, but is simple and in most cases will not affect the volume or quality of reproduction to any marked extent.

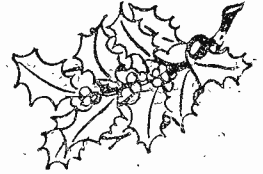
## 50 Tested Wireless Circuits

By F. J. CAMM

(Editor of "Practical Wireless")

Obtainable at all Bookstalls or by post  
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Southampton St., Strand, London, W.C.2.

2/6



# MICROPHONES FOR CHRISTMAS ENTERTAINMENT

Helpful Advice Concerning the Choice and Use of Microphones for Home Amusement and Entertainment  
By FRANK PRESTON

### The Purpose of the "Mike"

The final choice, therefore, rests very largely with the purpose for which the microphone is to be used, and the apparatus with which it is to be employed. When a good, powerful amplifier is available, and the microphone is intended to be used for making announcements in a hall, or for reproducing the voice of a crooner, it is desirable to buy a good instrument of the moving-coil or Reisz type; this may be expected to cost from three to six pounds. A few good microphones of the types referred to are the Amplion, Igranic, Parmeko, and Savage, and most of these are available in different types for stand or table mounting, whilst the Igranic can also be obtained in a pattern suitable for attachment to the lapel of the coat.

When the microphone is wanted only for home "broadcasting"—that is, for reproducing by the loud-speaker voices and music originating in another room—and moderately good quality is desired,

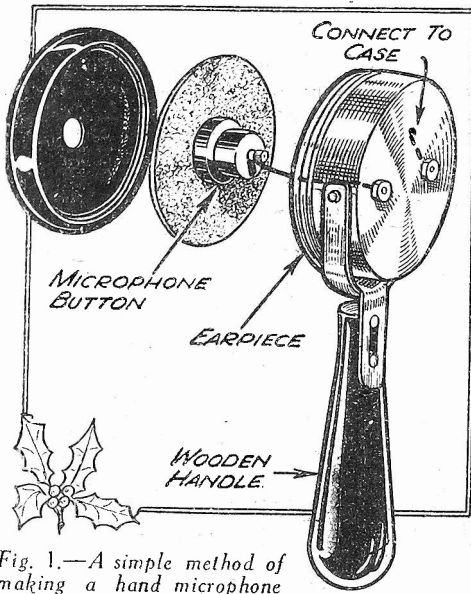


Fig. 1.—A simple method of making a hand microphone button from an old earpiece is shown above.

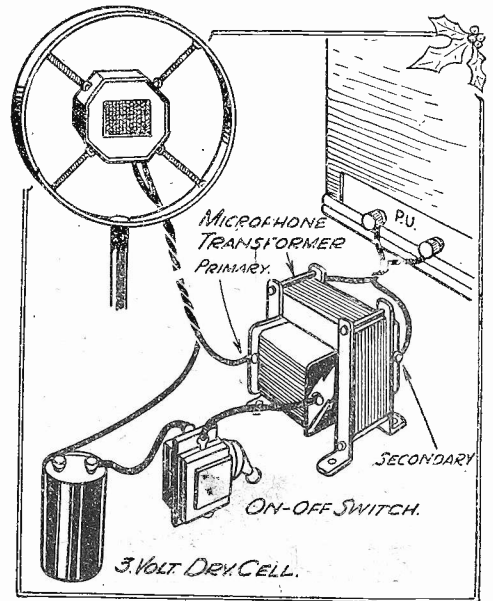


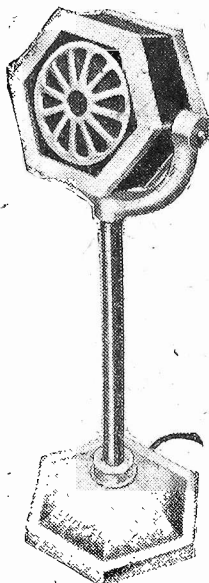
Fig. 2.—When a separate microphone transformer is used it should be connected as shown here.

**M**ICROPHONES are quickly becoming more popular as means of adding to the entertainment value of the wireless receiver, and there is now a wide range of suitable low-priced instruments available to the would-be user. This great variety is rather inclined to add to the difficulties of making a choice of one, especially since the prices vary from something like one shilling up to at least ten pounds. In the first place it is perfectly obvious that the low-priced microphone cannot be expected to give the same quality of reproduction as can the more expensive one. At the other end of the scale, however, it is well to bear in mind that, unless one is prepared to go to considerable pains to build or obtain a very high-class amplifier and speaker, the expensive microphone cannot be used to best advantage.

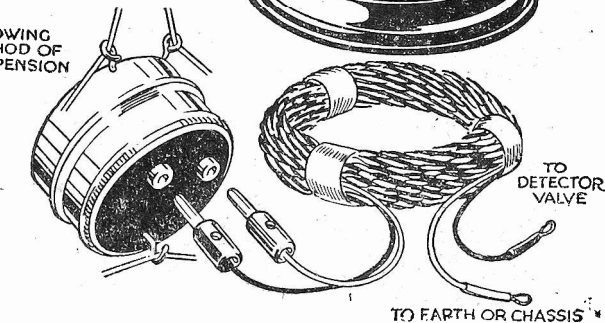
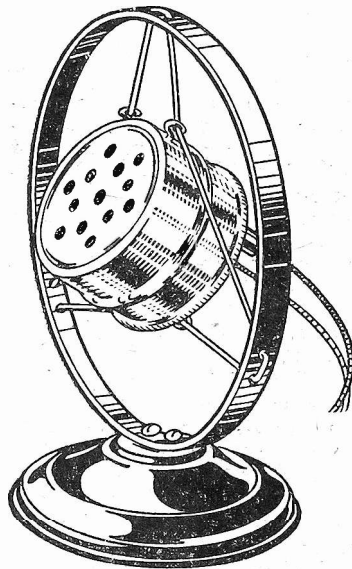
there are a number of excellent instruments which can be bought for about a guinea, and which contain the necessary transformer. One well-known example is the G.E.C. "Home Broadcaster," whilst another is the De-luxe model made by the Scientific Supply Stores. A wide variety of suitable instruments is also available from Electradix Radios, Economic Electric, Ltd., and Grafton Electric, Ltd.; a representative selection of medium-priced microphones is shown on this page.

### Home-made Microphones

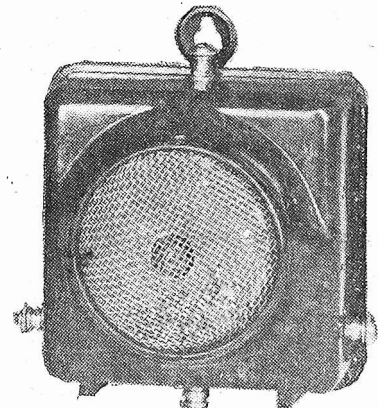
In many instances the constructor might prefer to assemble his own microphone, and this can be done extremely cheaply without any great sacrifice in efficiency. All the necessary parts, as well as full instructions, are obtainable from the two firms last



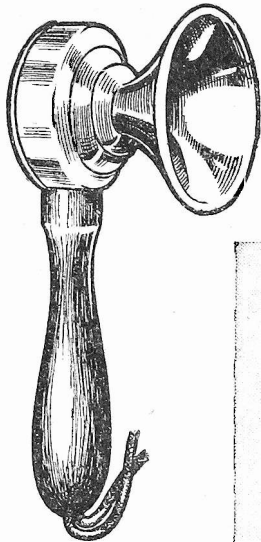
The Epoch microphone.



This is the "Scientific" de-luxe microphone, which is supplied with a length of flex and a special valve-holder connector.



The "Super" microphone made by Messrs. T. W. Thompson; it costs 8/6.



The R.C. and Wilson hand microphone. A special transformer can be obtained for use with it.

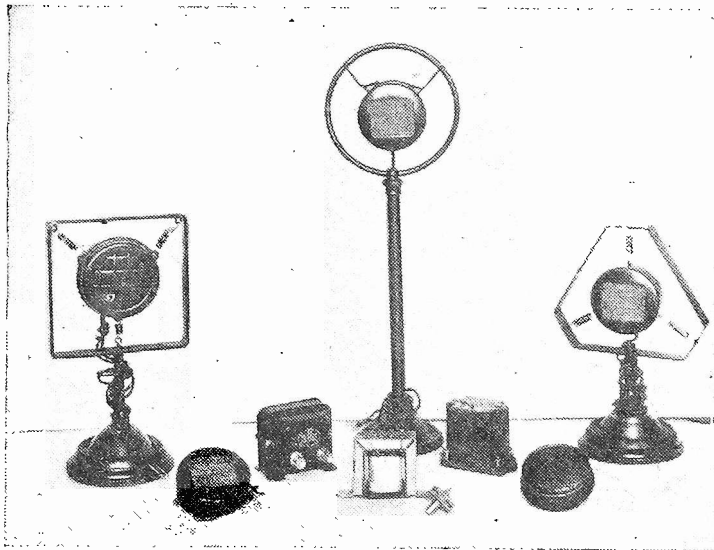
mentioned, and also from the Scientific Supply Stores. Another very inexpensive method of making a microphone is

should be obtained, or made according to the particulars given in Fig. 3. The core stampings shown may be those taken from an old L.F. transformer, or three dozen pairs of No. 5 stalloy stampings may be used.

It is nearly always desirable to fit a volume control in the microphone circuit, if this is not already attached to the microphone itself, and the control should take

for energising the microphone so as to overcome the resistance of the connecting wires. In this case, the simplest and most satisfactory method of volume control is by means of a 5-ohm variable resistance connected in series with the microphone and one of the connecting wires. By following this idea volume can be controlled by the user of the microphone as well as by a second person sitting near the set.

When there is an L.F. volume control fitted to the receiver it is, of course, unnecessary to employ an external one. It will be evident that a volume control which is connected in the high-frequency circuit of the receiver is quite useful for use in conjunction with the microphone, that mentioned above generally being connected between the secondary winding on the L.F.



A group of microphones of all types, by Electradix Radios.

by making use of a midget microphone button (which is a standard type of carbon-granule unit in miniature), mounting this on a diaphragm, as shown in Fig. 1.

The diaphragm might consist of a tin lid or, better, it might be the diaphragm from an old telephone earpiece. In the latter case it will be found convenient to remove the magnets, replace the diaphragm with microphone button attached, and connect a light flexible lead to one of the terminals, connecting the other to the casing—to which the microphone is connected by means of its second terminal and the metal diaphragm.

It was pointed out above that some microphones are supplied already fitted with the necessary input transformer, and in such cases it is generally only necessary to connect a small 3-volt dry battery to two terminals provided, and to connect the other two terminals to the pick-up terminals of the receiver. Where the latter terminals are not provided, the method of connection is exactly as described on another page in connection with a gramophone pick-up. If a switch is not fitted to the combined microphone and transformer it will be necessary to insert one in series with one battery lead so as to prevent current from being drawn from the battery when the unit is not in use; an ordinary on/off switch of either the push-pull or Q.M.B. type is suitable.

**The Input Transformer**

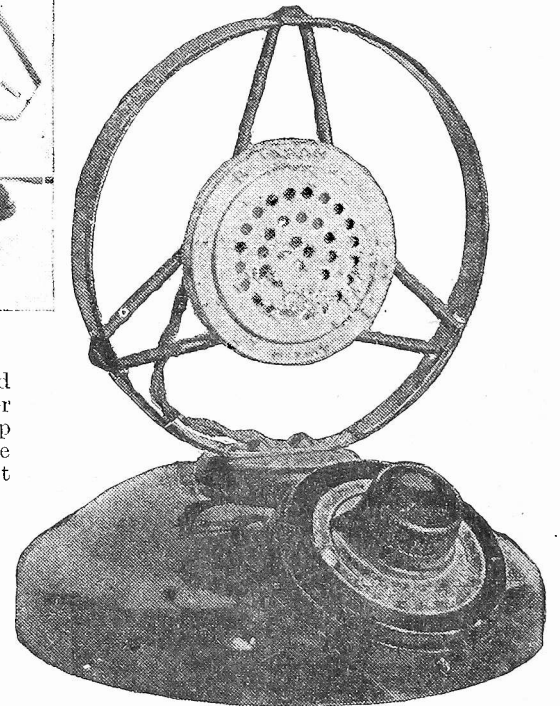
Where the microphone does not contain a transformer it is essential that this component should be obtained before the microphone can be used. The method of connecting the transformer is shown in Fig. 2, where it will be seen that the primary winding is wired in series with the microphone, battery, and an on/off switch, the secondary being connected directly to the pick-up terminals on the receiver. Nearly every manufacturer and supplier of microphones makes a special transformer for his own products, but in odd cases where this does not apply a step-up transformer having a ratio of between 1 : 50 and 1 : 100

the form of a potentiometer connected across the terminals of the transformer secondary, connection to the pick-up terminals being made from the centre terminal (slider) and one (it does not matter which) of the other two.

**Preventing Instability**

It will sometimes be found when using a microphone that a certain amount of low-frequency instability is experienced, or that reproduction is rather screechy or accompanied by a high-pitched whistle. When this is the case it might be overcome by reducing the voltage applied to the microphone down to about 1½ volts, or by using a volume-control potentiometer of lower resistance than that mentioned above. In some cases it might also be found advantageous to connect a fixed condenser of between .0005 mfd. and .005 mfd. in parallel with the secondary winding of the microphone transformer.

Another point which should be observed, especially when the microphone is being used some distance away from the receiver, is that the connecting leads should be screened. The screened twin wire used for set wiring is quite suitable, and the screening braid must be earth connected, or otherwise connected to one of the pick-up terminals (the correct one can easily be found by trial). When using a separate microphone and transformer it is generally better, where convenient, to mount the transformer as near to the set as possible, so that only the primary leads have to be extended; this will generally prevent L.F. oscillation. When this is done it might be necessary to use a rather higher voltage



The G.E.C. "Home Broadcaster" which is supplied complete with transformer, volume control, flex and battery.

transformer and the grid of the first L.F. valve.

Messrs. Pearl and Pearl have recently marketed a neat table model microphone with transformer in base at 9s. 6d.

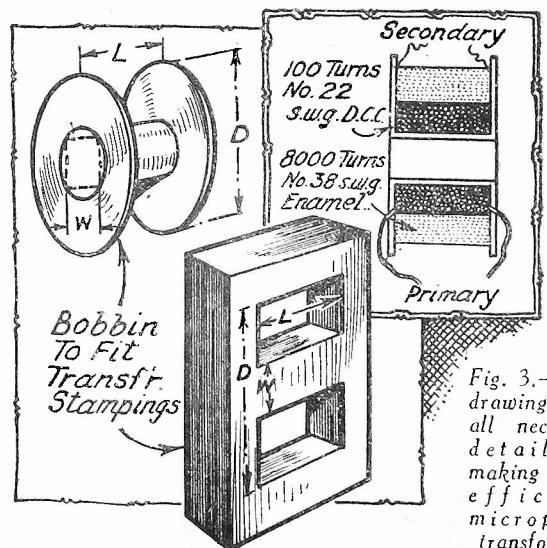
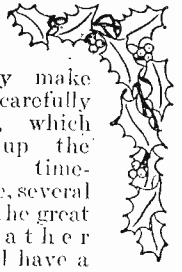
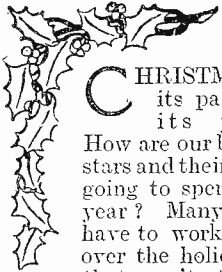


Fig. 3.—This drawing gives all necessary details for making an efficient microphone transformer.





# CHRISTMAS WITH THE RADIO STARS

An Article Which is Chiefly Concerned with the Children of Some Well-known Radio Artists, and What They Will Receive as Christmas Gifts

**C**HRISTMAS, with its parties and its presents!

How are our broadcast stars and their children going to spend it this year? Many of them have to work hard all over the holidays, but that won't stop them snatching a few jolly hours with their youngsters. Their home hours are even more precious to them than they are to us, for they are so much in the public eye—or ear—that their moments with their children are very few.

Alice Moxon and Stuart Robertson are going down to South Wales to sing in Pontypridd at Christmas time, so Elizabeth, their enchanting four-year-old, will have to have her celebrations with them a little earlier, but there will be junketings enough at home with her grandparents and relations, even with mummy and daddy away.

something for the dolls' house will appeal to Elizabeth most.

### "The Assassins"

Denis O'Neil's two children, Peter and Micky, have varied tastes. Peter, who at the age of seven is Denis in miniature, is absorbed in anything mechanical. He pines to be a liftman when he grows up, or else a tram-driver, as he is extremely fond of pressing buttons and pulling switches. He is very musical, too, so perhaps he will start a new fashion and become the first singing liftman! He has set his heart on having a tricycle for Christmas, but it must have a free wheel, so that he can go downhill in peace and not have to keep pedalling. He is very firm indeed on this point. Maureen—Micky to her family—is a sweet little girl, as much like her mother as Peter is like his father. Micky is passionately fond of animals and is saving very seriously — in halfpennies — to buy a puppy! She can't quite decide which she wants most, a puppy or a fairy cycle. Mr. and Mrs. O'Neil are going to see what they can do this year to fit out their offspring. "The Assassins," as they call

requests they make on their carefully written lists, which they send up the chimney in time-honoured style, several weeks before the great event. Father Christmas will have a hard time this year bringing a tricycle and a fairy cycle down the chimney!

Reginald Purdell's son John, aged 21, is already very keen on trains, and Reggie and his wife are planning to augment his rolling stock for Christmas. John is a very happy youngster, although, as his mother admits, he is also "a perfect divvle." He has a large amount of toys, as he possesses some very indulgent godparents, and already seems to have every imaginable kind of plaything. But John can never have enough trains; engines, trucks, and carriages, with signalmen, stationmasters and platforms to set beside the track. There is no end to the variations on the railway theme, and a model station or something of that kind is almost certainly coming to young John Purdell for his Christmas present this year.

### The Young Hulberts

Jill and Jaqueline Hulbert, children of Enid and Claude Hulbert, or Enid Trevor, as we all call her, know just what to expect each Christmas. The procedure never varies. On Christmas afternoon there is always a big party, to which the Jack Hulberts and their daughter Pamela are invited. They have a large Christmas tree with all the usual decorations and presents on it, and have a really jolly party, with crackers, caps, and everything handsome about it, to which all their little friends are invited, too. (Claude is then persuaded

*(Continued on page 457)*



Jack and Claude Hulbert at the microphone.

Elizabeth, who is very fair and blue-eyed, is extraordinarily like her famous auntie, Anna Neagle, and let's hope she'll be as successful in life when she grows up. The young lady longs for a bicycle, but probably won't get one this year, as she's still a little young for such contrivances. Alice thinks she'll probably give her something for her dolls' house, or add another doll to her already very large family. Elizabeth is intensely fond of dolls and all that pertains to them, and is blissfully happy arranging and re-arranging her dolls' house, sweeping the carpets, giving the inmates a bath and washing up the china from their dinner tables. She's a very domesticated little person at present, though this useful phase may not last! Still, Alice and Stuart think

them, with complete methods of conveyance. Micky also wants a new bed for her dolls' house. Micky and Peter never have their presents till after breakfast. First thing in the morning they unpack their stockings, which Father Christmas has wedged incredibly full, then, breakfast over, the fun starts. It is really extraordinary, think the small O'Neils, how clever Father Christmas is, for he always seems to bring them exactly what they want, evidently taking most particular notice of the

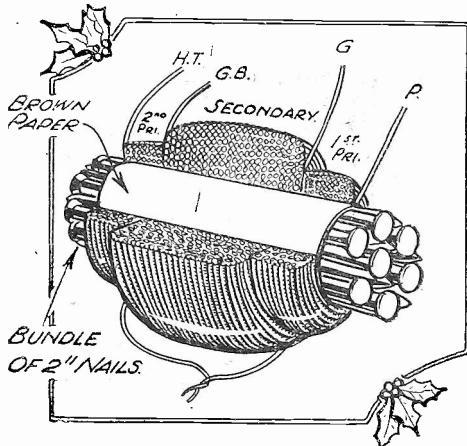


Reginald Foort at the organ of the Plaza Theatre.

AMUSE YOURSELF AND

# 30 MINUTE—

## SOME NOVEL RECEIVERS MADE FROM ODD MATERIALS AT A FEW MINUTES' NOTICE



A bundle of nails and some wire will make a good L.F. transformer.

WE have recently given details of a three-valve superhet which cost only £5. In this week's issue will also be found details of a three-valver which costs round about £2. Just to show that it can be done, however, here are details which will enable you to make a three-valver for 2s., or thereabouts. It is the components which cost the money when making up a wireless set, so why not make your own and save the money? Fixed condensers cost at least 6d., but what is wrong with a dozen turns of wire wound round a pencil, with a further layer on top separated by a thin strip of paper? A volume-control potentiometer costs at least 3s. 6d., but split a pencil down the centre, bind the ends with thin wire, screw a strip of brass on a piece of wood so that it rubs on the lead inside the pencil, and there you have a good potentiometer. These suggestions are, of course, Christmassy, and I am not suggesting that they are by any means as good as the commercial article, but with the festive season at hand many readers will no doubt like to build up one of the sets described here just to show friends that it is not necessary to spend pounds in order to hear the local station. In fact, by using a little care, some very good results may be obtained with some of the sets.

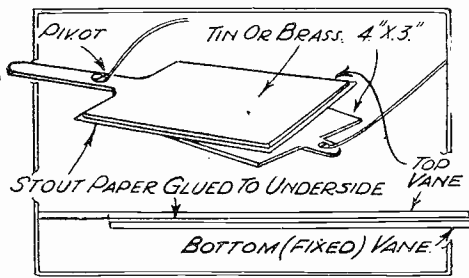
### The Coil

For these "junk" sets an expensive coil is out of place, so wind your own this way. Take a bottle, glass or other similar article which might be found in the house at Christmas and get hold of some covered wire. It doesn't matter whether it is 22, 26 or only just 21, so long as it is fairly stout and covered. The bottle or other device should be about 3in. in diameter. Take the bottle in the left hand and grip at the same time the end of the wire. Now wind thirty-five turns of wire round and round the bottle or glass, one turn over the other anyhow, so as to form a hank. When the thirty-fifth turn is completed, break the wire and twist the broken ends together. It would be possible to make a loop here instead of breaking the wire, but as it will have to be bared subsequently, we may as well break the wire and join it up again! Now wind a further fifteen turns, in the same direction and over the other turns. Break off the wire, slide the hank off the bottle (unless you chose a bottle with a taper, when you had better start again) and tie the hank in two or three places with cotton. Just

to be technical, we will call the beginning of the hank the high-potential end, the finish the low-potential end, and the tapping point the aerial tap. Or, if you prefer it, 1, 2, and 3 respectively. If you think your enthusiasm will lead you to one of the valve sets, wind a further coil round the bottle before it goes back. This second coil will have thirty turns only.

### Fixed Condensers

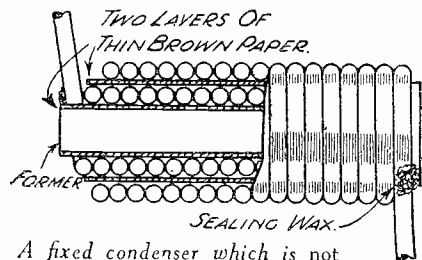
For these (you only want one for any of the sets described, but you may like to make up some extras for the children's stockings), borrow a pencil. Wrap a strip of stout brown paper round it, say 1½in. wide. Wrap it round two or three times and well Seccotine it. When dry this will slide off the pencil (unless it gets stuck) and over it you must wind an even layer of wire. Again the gauge does not matter. To keep the wire in place, drop some sealing-wax on it. Let the layer be about 1½in. long and cut the wire (or break it if the scissors are in use) and stick the end down. It's not wanted. Wrap one layer of good paper over this coil, and on top of this wind a second even layer of wire. Be careful, however, to start at the other end this time, and fix the ends with sealing-wax again. If you care to buy a capacity bridge you will probably find that this condenser has a capacity of roughly .0005 mfd., but it doesn't matter for our purpose.



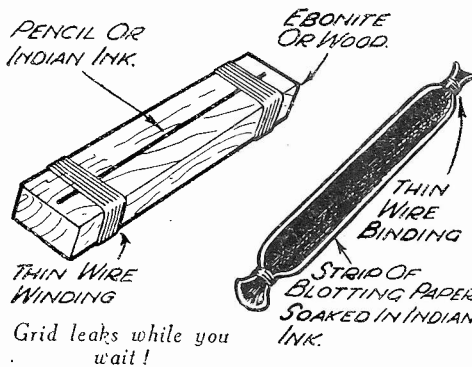
A variable condenser made from sheets of brass or tin.

### A Variable Condenser

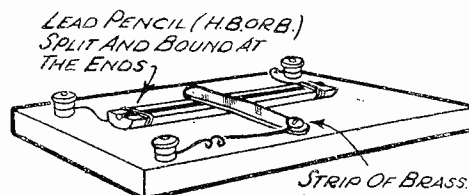
Unfortunately, we shall have to tune our coil so as to prevent the chamber music from spoiling Henry Hall's efforts, but we need not go to the stores for an S.L.F. with slow-motion dial. When the sardines have all gone, cut up the tin, or, if you prefer it, get an old piece of brass. Cut out two pieces as shown in the artist's sketch, and on the piece with the tail stick a sheet of notepaper. This is not for a station log, but simply to prevent the two plates from short-circuiting. They may be mounted on a piece of wood, or screwed straight to the baseboard. The handle will enable the value to be adjusted, so don't screw it down too firmly.



A fixed condenser which is not non-inductive



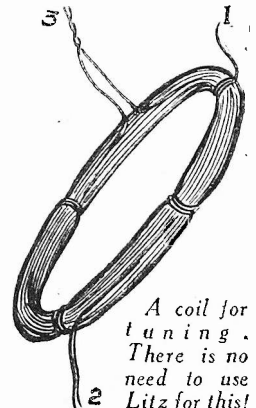
Grid leaks while you wait!



A lead pencil and a strip of brass to act as a potentiometer.

### Grid Leaks

To enable the grid to leak, dip a piece of blotting-paper in some Indian ink; or, if you haven't got any such ink, get a piece of paper and borrow the blacklead from the kitchen—the stuff which is used to clean the grate is indicated—and rub some of this on the paper, say a quarter of an inch strip by 1½in. long. If the blacklead is missing, get an ordinary piece of firewood or ebonite and rub some pencil on one surface. To obtain good connection with any of the above grid leaks bind the ends with bare wire. Again the efforts of the artist should make the scheme quite clear.



# YOUR FRIENDS WITH THESE JUNK SETS!

## THEY WORK REALLY WELL!

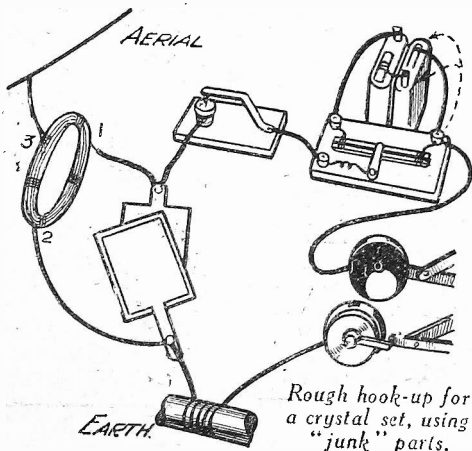
By W. J. DELANEY

### An L.F. Transformer

For the two- or three-valver we must have an L.F. transformer, but this won't cause any difficulty if there is any wire left. Take some of the nails out of the case, auntie sent the whisky in, or if it hasn't arrived yet buy twopennyworth from the ironmonger's (nails, not whisky). Two-inch nails will do, about a dozen or thirteen, say. Place them alternately—that is, half with the heads one way and half the other way round. This will enable them to lie parallel without being thicker at one end than the other. Get some more cotton and tie them together, and wrap a layer or two of thin paper round them. Now hold the bundle in the hand with only about one-third sticking out in the open, and over this wind fifty turns of wire. Pile it up anyhow, and if you are holding it right you will get a neat section having a more or less flat end. Borrow the sealing-wax again and make the end firm. Now very carefully release your hold of the bundle and slide it out of your hand until you are only holding one-third. Between your hand and the end of the first heap of wire wind 299 or 300 turns of wire. Be careful not to knock the first heap off while you are doing this, and if your arm does not ache too much you can finish the transformer by winding a further fifty turns on the remaining length of core (that is, the bundle of nails). Once again the artist has stepped in to help you by making a sketch of the transformer. Note that the inner ends of the two outside heaps of wire are joined together and so form a split primary. I will not worry you with inductance figures and response curves, but they are good!

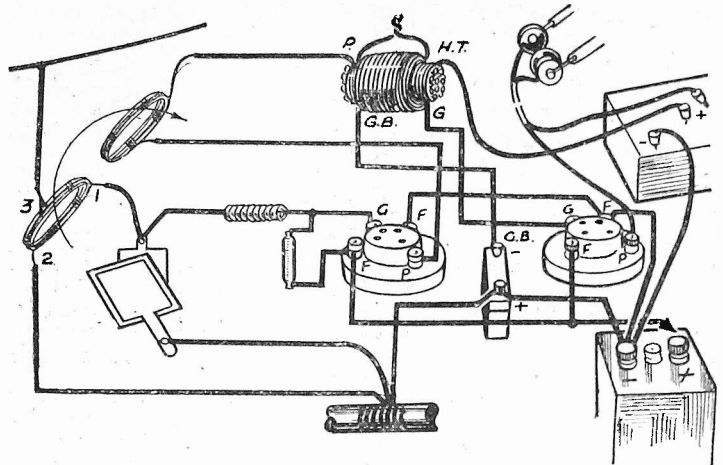
### Some Receivers

The circuits of several sets are given and you should not find it difficult to build

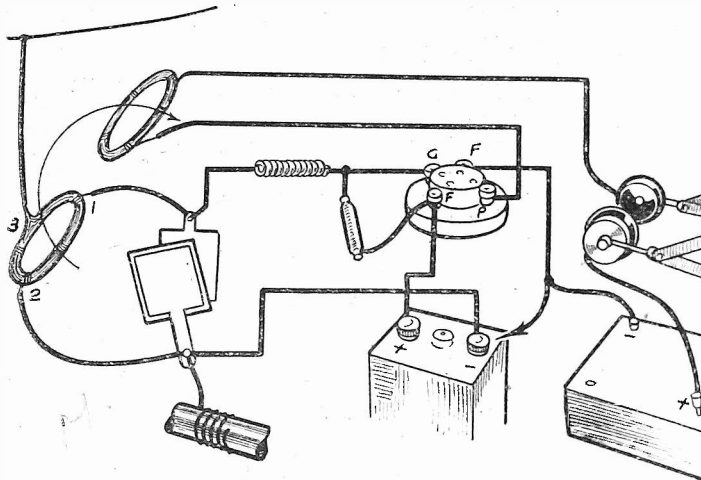


these up, using the parts you have so ably constructed. The circuits are in pictorial form, showing at the same time the layout to be followed.

For reaction you must push the small coil near the aerial coil, and if you must get Honolulu, then tie the coil on a bit of wood so that you can



Two valves and some junk parts—a hot two-valver.



A one-valver which will probably rope in dozens of foreigners.

get the critical adjustment which is so necessary when "reaching out." If you are going to be content with the local, or

just want a set to mount in a cigar box or to take to bed with you, try the crystal set with a piece of carborundum crystal wedged into a thimble and a piece of steel pressing tightly on it. The piece of steel may be a razor-blade, and you can dispense with the thimble if you like. The pressure wants to be fairly firm, and two pocket-lamp batteries in series across the potentiometer will enable the crystal to do its stuff really well. You may get some foreigners on this set—it all depends how near they are. If you don't want permanency you can use two of the ordinary types of crystal, pressing together in a small bakelite tube such as contains lip-stick or other commodity. The phones should be sensitive in order to make the most of the weak signals which are obtained on a crystal receiver. To conclude, all these ideas are thoroughly practicable, and you will be agreeably surprised at the performance which the sets will put up—even at Christmas.

THE close of 1934 has seen marked progress in home construction. Perhaps the most noteworthy development has been the eradication of the disparity between the price of the commercial as against the home-constructed receiver. PRACTICAL WIRELESS takes pride in the fact that it has taken the lead on the question of price, and has been largely responsible for a reduction in the prices of components.

The co-operation of manufacturers on this important point has been truly remarkable, and we place on record our appreciation of their good-will.

It is extremely likely that early in 1935 television will arrive and, as with radio-telephony, the home constructor will be in the fortunate position of being able to build vision receivers years before they are available to the same extent as commercial wireless receivers. The home constructor will also play an important part in the perfection of this newest of sciences. Nineteen-thirty-four, too, has seen for the first time the production of a really satisfactory three-valve superhet. for home constructors—here again PRACTICAL WIRELESS took the lead. It is generally agreed by manufacturers and designers that this journal has done a vast amount of work in bringing home construction to its high level of efficiency. The year 1935 will witness phenomenal developments in radio, and we assure our readers that we shall, as in the past, take the lead in acquainting them with latest technical developments.

In conveying to our readers all over the world festive greetings, we desire, in conclusion, to set on record our appreciation of their loyalty which has made this possible.—The Editor.

A  
**Christmas Message**  
from the Editor

8-11, South-ampton Street,  
Strand,  
London,  
W.C.2.



# Home Broadcasting

How to Fit Up the Receiver and Accessories so as to Get the Best Results from Your Own Play.

A suitable ten-minute play is given on page 425

ELSEWHERE in this issue you will find the full script and details for a novel play which you can arrange at home, and which will no doubt be found an admirable change from the ordinary broadcast programmes. Naturally, in order to carry out this play, it is essential to fit a microphone, or more than one, to your receiver, and the methods of carrying out this part of the work are described in another part of this issue. In order to obtain a real atmosphere you will need a microphone for the artists, a similar instrument for the producer or "effects engineer," and a gramophone with pick-up for the prologue or intermission. The reproduction must take place before your audience in another room, and consequently you will need one or more loud-speakers. To obtain the most realistic effect it would be preferable to seat the audience in a darkened room, but this is not always desirable, and therefore one of the following schemes should be adopted.

### Screening the Speaker

If you intend to use only one speaker, stand this in the centre of one wall of the room, and in front of it stand two small tables upon which are stood either sprays of autumn leaves or small ferns or palms. Arrange these tastefully so as to mask completely the speaker, and, provided no other furniture is very close, the effect will be both entertaining and aesthetic. If you are an idealist, you will use two speakers, separated by a distance of about four feet or so, each screened in the above manner, and will illot

to each speaker a position corresponding to the R.H. and L.H. of your stage. With a suitable switch as shown later on, you will use the appropriate speaker corresponding to the position of your actors, and thus obtain a stereophonic effect which will greatly heighten the illusion of the play. If a suitable electric-lighting point is conveniently situated use a 30 or 40 watt bulb for each palm, resting on the soil or near the top of the pot, and screened from the direct view of the audience by suitably-shaped coloured paper. Put out the main light of the room, and

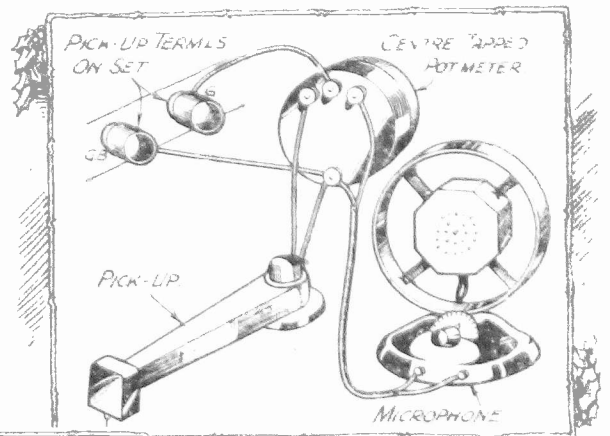


Fig. 4.—A centre-tapped potentiometer (or fader) will enable the volume from mike (or pick up) to be smoothly mixed or controlled.

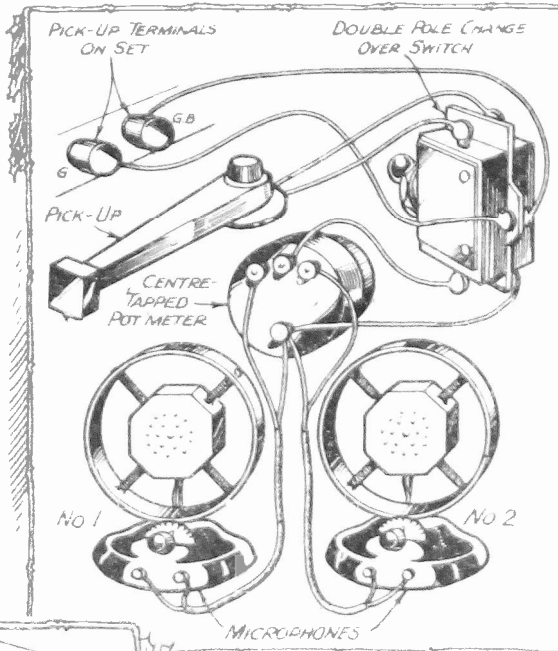


Fig. 3.—If two mikes are to be used, the fader will control both as shown here.

you will have a "stage" controlled only by the light, atmospheric.

### Connecting the Mikes

It will be assumed that the receiver with which the apparatus is to be employed has pick-up terminals. Suitable bins should be applied to these (as tested with gramophone records) to obtain quality reproduction in the distant room. For a single microphone, with change-over for pick-up, you will require only a simple double-

pole change-over switch, wired as shown in Fig. 2. It is assumed, of course, that the microphone incorporates its necessary input transformer, but if not, one will have to be provided. It is also assumed that the terminals marked P.U. on the receiver are connected to a volume-control potentiometer, as otherwise there will be no method of regulating the volume. This scheme is, of course, the very simplest which can be adopted.

If two microphones are to be used, either to prevent the players from having to be too close together, or to enable sound effects, etc., to be introduced, a fader will be essential. This is, in effect, a centre-tapped potentiometer, and it will be seen from Fig. 3 that one make is joined across each half of the fader, and this is joined to one pair of contacts on the D.P.D.E. switch. The fader will enable not only the strength of the reproduction to be regulated, but will enable the output from one to be very gradually reduced and that from the other gradually introduced. This is carried out by slowly rotating the control knob. For a rapid change at full strength the arm is simply turned rapidly from one end to the other. The pick up should have its own volume control so that this may be controlled if necessary.

### A Fader and a Simple Circuit

The fader may be used to control a single mike and the pick-up by joining it as shown in Fig. 4. With this arrangement, an announcement may be made into the microphone, and the record started at the same time. As soon as the announcement is completed, the arm of the fader is slowly turned, and as soon as it passes the centre point the gramophone record music will

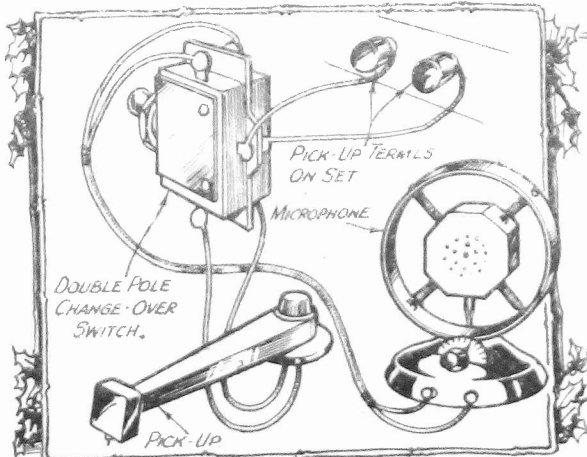


Fig. 2.—A simple method of changing over from mike to pick-up by means of a double-pole change-over switch.

gradually be heard through the loud-speaker, increasing in strength as the arm approaches the opposite end of the fader. If necessary, a combination of these two circuits could be employed, or a switch could be placed at the points marked "mike" or "pick-up," so that further microphones or pick-ups could be introduced.

**The Prompter's Box**

Obviously it is essential for the producer to arrange matters so that the correct degree

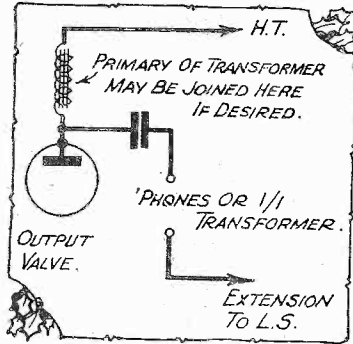


Fig. 6.—For hearing and controlling the output a pair of phones may be joined in this manner.

of volume regulation is carried out on the various reproducing media, and therefore he must be able to hear the actual signals and not the original sounds. It is not worth while arranging a sound-proof box, but a pair of 'phones will enable the idea to be admirably carried out. Very much depends upon the circuit as to the actual position of the 'phones, but in most battery-operated receivers, provided two or more two L.F. stages are employed, the 'phones should be joined between anode and earth in the stage immediately following the input stage. Simply connect one terminal of the 'phones to earth and the other through a condenser to the anode or anode-coupling component. With mains apparatus this is not advisable, as there would be risk of a serious shock. Use, in this case, a 1/1 transformer so as to isolate the 'phones.

Obviously, an output filter circuit will be required so as to enable the speaker or speakers to be run into the required room, and therefore an output transformer may

be wired in this circuit using the 1/1 ratio simply for isolating the 'phones. The primary of the transformer may be used instead of the filter choke. Some care may be necessary with some receivers to avoid distortion due to the incorrectness of the load on the output valve, but for the home broadcast this point will not occasion any difficulty, as it will not be the desire of the producer to obtain 100 per cent. quality, and therefore the arrangements given will

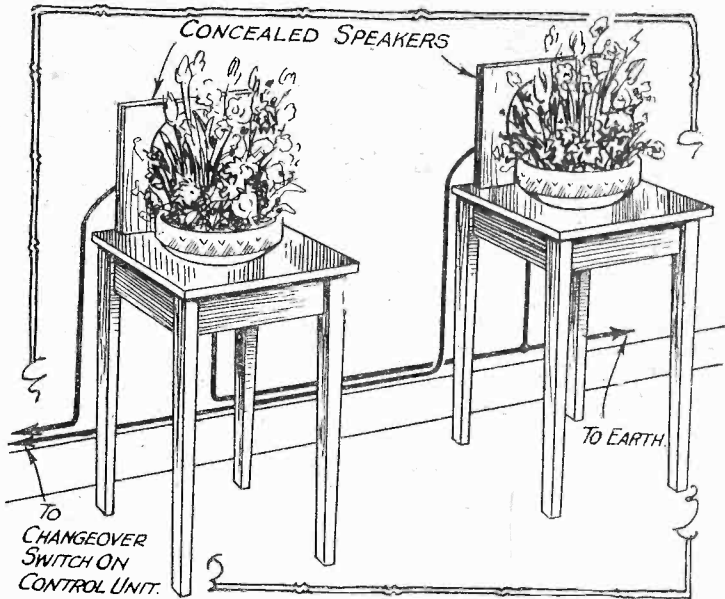


Fig. 1.—To obtain realism, two masked speakers arranged in this manner will prove highly useful.

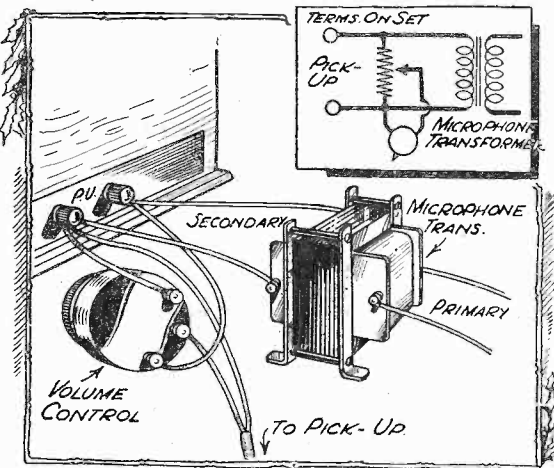


Fig. 5.—Blending or mixing the output from two sources—in this case, microphone and pick-up.

be highly suitable for the home broadcast.

The fader and change-over switch may be mounted in a small cabinet with a suitably sloped front, and the score may be placed upon this. The producer can then follow

the actors and introduce the various noises as the "effects engineer" makes them, and with the 'phones on there will be no fear of any wrong balance in the various parts. Fig. 5 shows how to wire the 'phones or output transformer in the output circuit (although it will be appreciated that the signals will be very loud with this arrangement), and Fig. 7 shows a suggested arrangement for the various parts to enable the producer to have the maximum control.

**Superimposing**

If you are going to relay the play which is given elsewhere in this issue you will

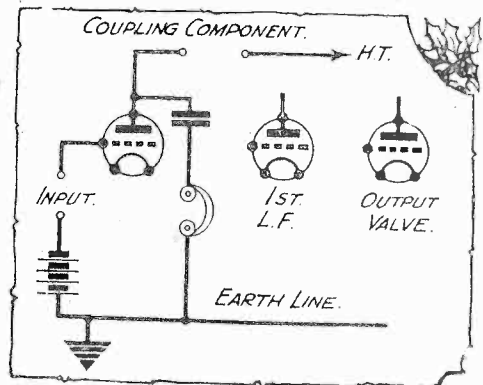


Fig. 7.—A method of monitoring which produces weaker signals, but is simpler to arrange.

want to superimpose the speech upon the music from a gramophone record, and although this is possible with some of the devices already mentioned (by substituting pick-up for microphone) an alternative scheme is available and is shown in Fig. 5. It will be seen here that a potentiometer is joined across the pick-up terminals, in addition to the microphone or microphone transformer, and the pick-up is joined to the arm and the G.B. side of the pick-up circuit. Thus, movement of the arm of the control will control the degree of volume from the pick-up, whilst affecting only very slightly that from the microphone. In fact, if the transformer is well designed, no variation at all will be obtained with this circuit, and thus the music may be slowly and quietly faded in, whilst speech is given continuously and will thus be heard above the music.

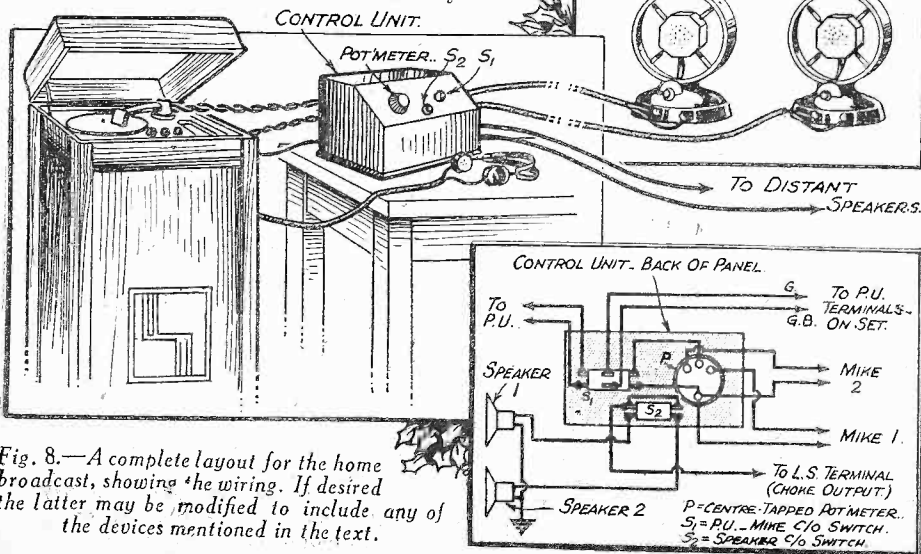


Fig. 8.—A complete layout for the home broadcast, showing the wiring. If desired the latter may be modified to include any of the devices mentioned in the text.

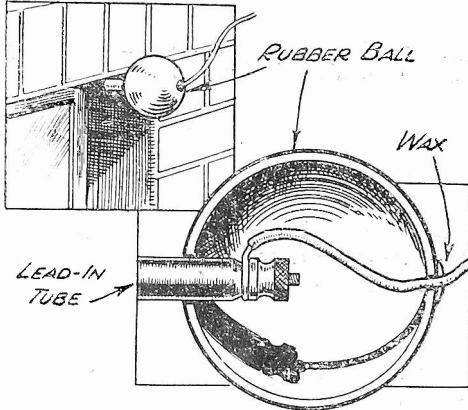


# READERS' WRINKLES

THE HALF-GUINEA PAGE

## Weatherproof Lead-in Connection

THE simple dodge shown in the accompanying sketch is a method whereby the aerial connection to the lead-in tube may be effectively screened from damp

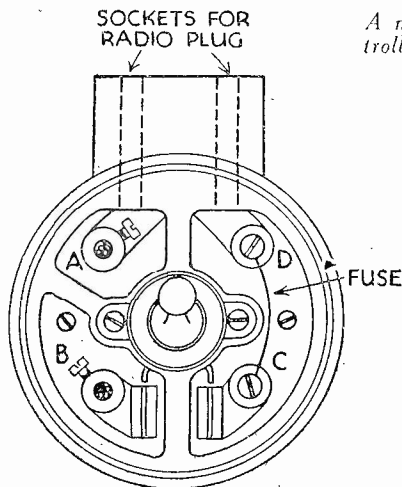


A weatherproof lead-in connection.

weather. A rubber ball has two holes pierced opposite to each other, and the diameter of one hole is rather less than that of the lead-in wire. The other hole is rather less than the diameter of the lead-in tube. The lead-in wire is threaded through these two holes, going through the smaller one first. After connection has been made to the terminal on the lead-in tube, the rubber ball is pushed on to the tube. The connection is then inside the ball. A touch of sealing wax or Chatterton's Compound on the ball where the wire enters will ensure certain protection. — CHARLES GREAVES (Birtley).

## Safety Fuse for a Mains-driven Set

MANY mains receivers are worked from a switch plug that has been connected to a lighting or heating circuit, the fuses of which are too large to safeguard the receiver in the event of a fault.



A safety fuse for a mains-driven set.

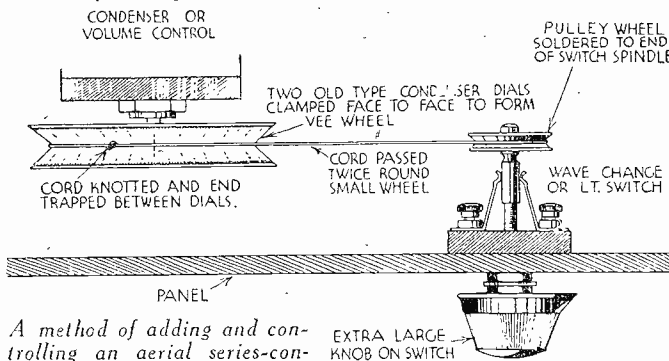
## THAT DODGE OF YOURS!

Every Reader of "PRACTICAL WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best 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 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.

Here is a simple way of inserting a fuse which governs the radio set only. Referring to sketch, A is the negative terminal which goes straight to the set, and B is the positive terminal. When the switch is on, the current flows from B across the switch contacts to C, from which it goes across a metal bridge to D, and then to the set. If the metal bar or bridge be removed from between C and D, and a length of very fine fuse wire be connected across these terminals, the wire will "blow" in the event of a fault, and so safeguard the set. When the switch is off, the terminals C and D are not alive. — F. J. KIRBY (Chard).

## Adding an Aerial Series-condenser

WISHING to add an aerials series-condenser, so as not to upset the symmetrical arrangement, and without having to add any further controls to the

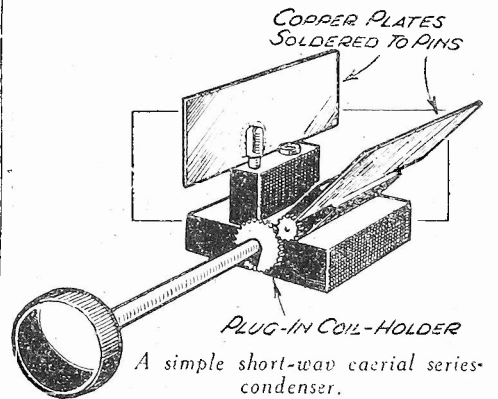


A method of adding and controlling an aerial series-condenser.

panel, I hit upon the idea shown in the accompanying illustration. It is only necessary for the switch spindle to have a fairly sound metal bush to work in, and most switches of this type are already provided with one. By fastening the cord, as shown, and passing it twice round a small pulley wheel, it is not necessary to keep it very tight. If the condenser or volume control spindle has to turn through more than 90 deg. it is necessary to pass the cord twice round the large wheel as well. The small pulley wheel should be neatly soldered to the end of the switch spindle, and care should be taken to see that the pulley is in alignment with the V-groove of the larger pulley. The illustration makes the arrangement quite clear. — A. E. H. SCUDAMORE (Nottingham).

## A Short-wave Aerial Series-Condenser

AN efficient short-wave aerial series-condenser may be made with an old coil-holder of the type where both aerial and reaction coils are plugged into sockets; the latter coil moving backwards



A simple short-wave aerial series-condenser.

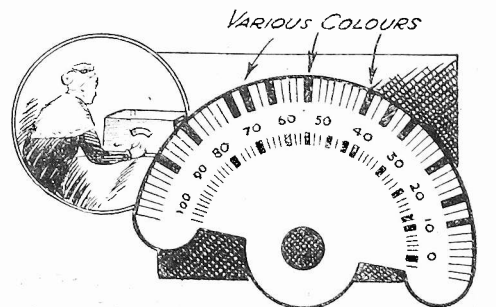
and forwards with the aid of a cogged spindle.

Small copper plates, 2in. by 1in. approximately, are soldered parallel and opposite to each other on to both fixed and moving pins of the holder. Rotation of the spindle causes the distance, and hence the capacity, to vary between the two plates. Tissue paper may be gummed to the inside of one of the plates to prevent them shorting when at the maximum capacity position.

The extension spindle makes this low-capacity condenser particularly adaptable for short-wave work. — J. DUNN (Earls Court).

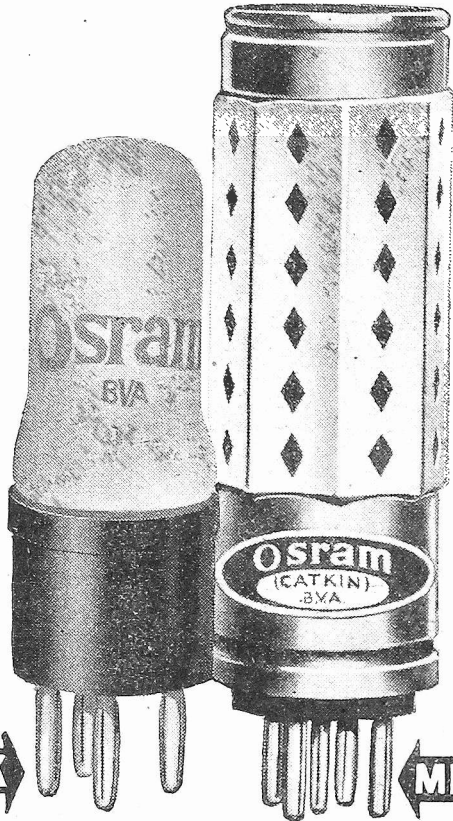
## Colour Tuning

HERE is a simple and novel idea which I have adopted to facilitate the tuning of my set. At every station setting of my disc drive I filled in the space of one degree with coloured oil paint. For instance, the National setting can be done in green, the Regional in red, the Midland in blue, and so on. The medium-wave stations can be marked at the top of the dial in one colour, while the long-wave stations can be marked at the bottom in another colour. — C. GANTZER (Billericay).



A novel colour tuning device.

# Give Your Set a Tonic!



**A poor DETECTOR VALVE is a Brake on the performance of your Set**

The majority of broadcast receivers prior to 1933 used a Triode Detector. This valve may be said to be the 'key' stage in the set as upon its proper functioning depends the sensitivity, selectivity, quality of reproduction and general absence of background noise so essential to the correct working of a set.

**QUALITY of REPRODUCTION and ABSENCE of BACKGROUND NOISE.**

Absence of clarity in the reproduction or the presence of background noises can be removed by fitting a new Detector Valve. Long experience and attention to fine detail in the design of OSRAM Detector Valves has led to many improvements in mica bonding of the electrodes and special treatment to prevent parasitic noises.

Do not put up with inferior reception when your set can be so much improved by fitting a new OSRAM Detector Valve. There is a type for every class of broadcast receiver.

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For 2-volt Battery Sets.

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**H210**..... 5/6  
For OSRAM "MUSIC MAGNET" FOUR and OSRAM "FOUR" Sets.

**MH4 (CATKIN) or MH4**... 13/6  
For A.C. Mains Sets.

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For 0.25 amp. D.C. Mains Sets.

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**A TONIC TO ANY SET**

**Mr. F. J. CAMM***Specifies***ROLA**

MODEL

**F5B-PM288**

(6in. Overall Diameter)

PRICE 25/-

**EXCLUSIVELY**

in his new  
**HALL MARK III  
RECEIVER**

The above ROLA Speaker embodies every up-to-the-minute improvement in magnet design. This is emphasised by the fact that in the white heat of competition ROLA is used by the large majority of British Radio manufacturers.

**NOTE**

The output transformer fitted to the above ROLA Speaker is EXACTLY MATCHED TO THE OUTPUT VALVE OF THE RECEIVER, and THE WHOLE OF THE OUTPUT TRANSFORMER IS USED. Should any attempt be made to use a speaker with a large number of tapings in conjunction with the Hivac PP220 Output Valve used in this receiver only a small portion of the transformer will be used with consequent loss of quality.

*IMMEDIATE DELIVERIES AVAILABLE***● EXTENSION SPEAKERS**

Rola have published a chart showing the Extension Speaker you should use with all factory-made receivers. Rola supply speakers to the large majority of British Radio Manufacturers. It is essential that the speech coil impedance of the Extension Speaker exactly matches that of the speaker in the set. You will see, therefore, why YOUR EXTENSION SPEAKER MUST BE A ROLA.

With most receivers FR6-PMM (without transformer) is suitable ... **32/-**  
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Broadsheet) is suitable ... **39/6**Also obtainable in magnificent burr walnut cabinet, Model No. 1 ... **70/-****ROLA***the World's Finest Reproducers*

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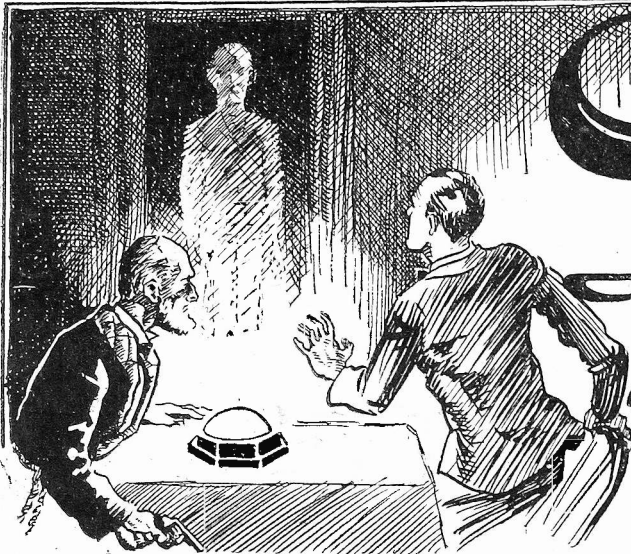
# A lasting Gift

to any enthusiast constructing an A.C. Mains Set or Eliminator is a Westinghouse Metal Rectifier. They will appreciate it for its constant and undeteriorating output and above all its freedom from breakdown



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# A Ten-minute Thriller Séance

A Radio Play Specially Written for  
Home Broadcast Entertainment  
by ARTHUR ASHDOWN

*Fade in gramophone playing "False Triste" for about thirty seconds. Fade out music slightly whilst Announcer speaks.*

**Announcer:** And now, Ladies and Gentlemen, might we ask you to turn out the lights while we present a radio thriller entitled:—  
"SÉANCE"

The characters are:—

Jacob Wheilmann  
Joseph Sinclair  
Robert Dickson

*The action of the play takes place late at night at Wheilmann's flat in London. Ladies and Gentlemen—"SÉANCE."*

*Fade in music to full strength for a few seconds and then fade out completely.*

*A clock strikes eleven. The telephone rings.*

**SIN.:** Hello, hello! Yes, yes, this is Mr. Wheilmann's apartment. Who? Oh, yes, Mr. Dickson, just hold the line, please—Mr. Wheilmann will speak.

**WHEEL.:** Hello, hello, yes—yes—what? You cannot come to-night? Oh, really? But I have everything ready—no, another night will not do, you will come to-night. . . . What do I mean? . . . Oh, really, Dickson, I think we understand, don't we? . . . Where are you speaking from? . . . Oh, the club! . . . Very well, you will be here in a few minutes. That is better, my friend! . . . Good-bye.

**SIN.:** Was he trying to cry off?  
**WHEEL.:** Yes, he had suddenly remembered another important engagement.

**SIN.:** Not as important as ours, surely?  
**WHEEL.:** No, I think not! But so like our dear Dickson—always wriggling—like a worm.

**SIN.:** Like a snake!  
**WHEEL.:** Really, Sinclair, you are very harsh!

**SIN.:** Harsh! Harsh! I like that! Do you think I've forgotten those days of hell in that blazing desert when he left us for dead—do you think I've forgotten?

**WHEEL.:** No, my dear Sinclair, you have not forgotten—and I—I have not forgotten! Ten years we have remembered and waited—for to-night! For ten years, and now—to-night!

**SIN.:** Revenge is sweet!

**WHEEL.:** Yes, Sin-

clair, revenge is sweet! (He laughs.) Last night at the Club I played him again at poker, and won. He had to give me an I.O.U. That means the well is dry! The value of the diamonds which he took that night ten years ago was about five thousand pounds. We have got some of it back—and now, Sinclair, we want the—er—interest!

**SIN.:** Yes—the interest.

**WHEEL.:** How I've laughed to myself night after night as I've played him.

**SIN.:** He has never suspected you at all?

**WHEEL.:** No, Sinclair, ten years alter a man a lot, and a few days in a scorching desert also help to change him.

**SIN.:** He's never seen the tattoo-mark on your arm?

**WHEEL.:** No, but I will show it to him to-night before—before he—er—goes.

(A buzzer sounds twice.)

**W.S.:** That will be our friend.

**WHEEL.:** Everything is quite ready?

**SIN.:** Quite!

**WHEEL.:** You are sure that it is only a blank cartridge in the revolver? No trace of a bullet must be found!

**SIN.:** No trace will be found!

**WHEEL.:** Good! You had better go then and get ready for the—er—séance. I will show him in.

**SIN.:** All right!  
(The buzzer sounds again.)

**SIN.:** He seems impatient!

**WHEEL.:** He hasn't been used to waiting like we have. Hurry, Sinclair, I'm going to let him in.

(A door shuts, and then a slight pause.)

**WHEEL. (speaking from a distance):** Good evening, Dickson!

**DICK. (gruffly):** Evening!

**WHEEL.:** Let me take your things. Dear, dear, they're quite wet!

**DICK.:** Yes, it's a hell of a night to drag anybody out.

**WHEEL.:** Yes, yes—I am sorry—but I have made all the arrangements, and it will be a good night for the spirits—to-night!

**DICK. (absently):** Eh? Oh, yes, yes, rather! Er—by the way, you don't mind if I help myself, er—these spirits are more in my line.

**WHEEL.:** Yes, help yourself by all means.

**DICK.:** What about you?

(Clink of glasses, sounds of whisky pouring, etc.)

**WHEEL.:** No, thank you. Perhaps I will drink—er—later, after I have proved to you that Spiritualism is possible.

**DICK.:** Well, here's to the—er—séance!  
(A slight pause as he drinks.) Ah, that's better! You know, Wheilmann, you've got a devil of a job on to convince me. I wouldn't have come along to-night only—

**WHEEL.:** Only?

**DICK.:** I say, Wheilmann, it's about that I.O.U. I gave you.

**WHEEL.:** Yes?

**DICK.:** I say—I say, can you wait a while for the money? I'm absolutely skinned—right out.

**WHEEL.:** We will talk about that later. Who knows—perhaps we might forget about it altogether.

**DICK.:** Wheilmann—you really mean—?

**WHEEL.:** We will see! We will see! Let us get on, it is getting late.

**DICK.:** Right! I'll just have another spot and then I'll see two ghosts for you.

(Clinking of glass, etc.)

**WHEEL.:** Maybe you will!

**DICK.:** Well, whatever you show me won't disturb my sleep.

**WHEEL.:** You sleep well?

**DICK.:** Like a log!

**WHEEL.:** That is good, it shows a clear conscience!

**DICK.:** However, don't make the first performance too frightening, old boy, remember, I've a weak heart.

**WHEEL.:** Yes, I know.

**DICK. (puzzled):** You know?

**WHEEL.:** But no! How stupid of me. I often mix you with another friend of mine. He had a weak heart. I knew him some time ago—in Africa.

**DICK.:** Africa? You've been in Africa?

**WHEEL.:** Why, yes! And you?

**DICK.:** Oh—er—yes—er—er—some time ago! Er—er—let's get on with the show.

**WHEEL.:** All right! Will you pull up your chair to the table, please? Thank you! Now I will explain. It is essential that you concentrate. I will play some music on the gramophone, and switch out all the lights, except the green bowl on the table between us. Then I will draw back the curtains from across that doorway, for it is there, in the next room, that the forms will materialize. Are you ready?

**DICK.:** Yes, fire away!

**WHEEL.:** Very well, the lights. (A click is



heard.) Now the music (after a slight pause "Valse Triste" is heard on the gramophone). Now the curtains. (A pause.) And now I will sit here opposite you. Please put your hands on the table so! Thank you! And now quiet, please.

(A pause during which only the soft music is heard.)

DICK. (excitedly): Look, Wheilermann, look—there's something there.

WHEEL.: Quiet, man—quiet!

(Another pause.)

DICK.: It's—it's getting more distinct. Oh, my God! My God!

WHEEL.: Quiet man, can't you—it may speak to us.

DICK.: It's a man—it's a man!

WHEEL.: Quiet, can't you! Look, he is trying to speak to us.

THE SPIRIT: I come to you from many miles away—. I come to one man here to-night—to you, Robert Dickson.

DICK.: No—no, no—not me!

THE SPIRIT: I come to you from the burning wastes of Africa—where I died—where I was killed by you, Robert Dickson.

DICK. (hysterically): No, no—it's a lie! Wheilermann, it's a lie!

WHEEL.: No, it is the truth! And my name is not Wheilermann—look—look at my arm!

DICK.: My God! Vanderberg!

WHEEL.: Yes, your old friend Vanderberg whom you left for dead also. But wait, our friend has more to say yet.

THE SPIRIT: Ten years ago I died—I see it all again now. A camp pitched in the desert—a moonlight night—a figure emerges from the tent—two other figures rush out to stop the thief—and then he fires—to kill!—The shot! I hear it now—. (A revolver shot is heard, followed by a dull thud.)

SIN.: (after a pause): Is he dead?

WHEEL.: No, he is sleeping like a log!

SIN.: Like a dog!

WHEEL.: Shut off the gramophone. We are not quite finished yet. (The music stops.) (Wheilermann speaking into telephone.)

Hello, hello—give me Ritz 8638. (A pause.)

Hello, hello—can I speak to Doctor Jarvis, please—oh, is that you, Jarvis! Wheilermann speaking! You might come round to my flat, will you? Dickson is here—yes, Dickson from the Club. He seems to have collapsed—I'm afraid you'll be too late—what's that?—yes, heart failure!!!

(Fade in finale of "Valse Triste".)

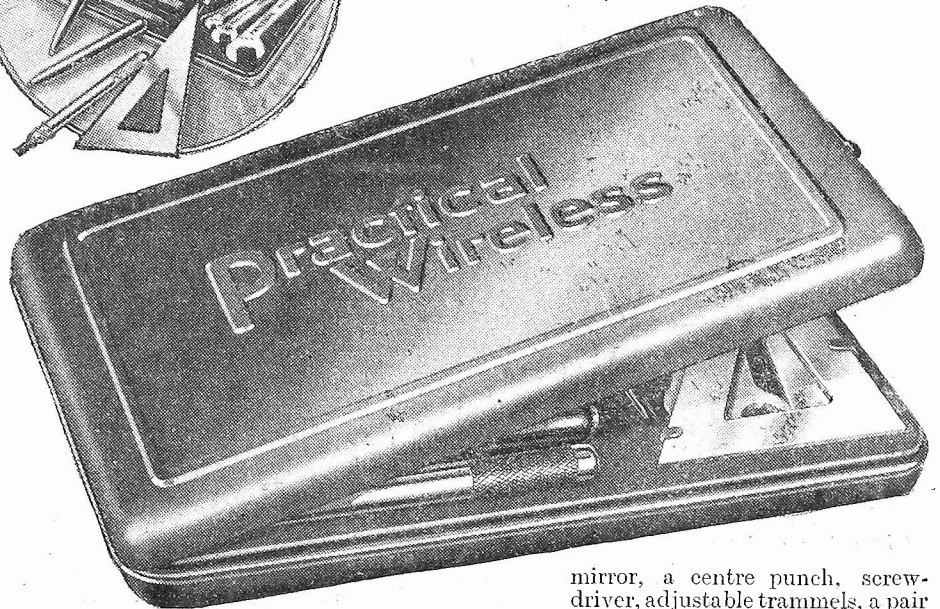
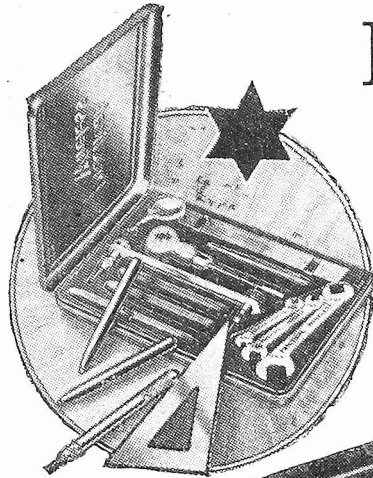
**NOTES ON PRODUCTION**

In presenting a radio play it is, of course, essential that each character should be readily distinguished by his voice, and it is therefore advisable that some pre-arranged inflections should typify each voice heard. "Wheilermann," for instance, could play his part in a guttural voice, whilst "Sinclair" could speak rather deliberately.

It is, of course, possible to read straight from the book in front of the microphone. But it is recommended that a thorough knowledge of the script is obtained beforehand, as this will enable the actors to give a more coherent reading of the play.

Careful experiments should be carried out by the actors, under the directions of the Producer, with a view to deciding how near to the microphone to speak, and at what strength.

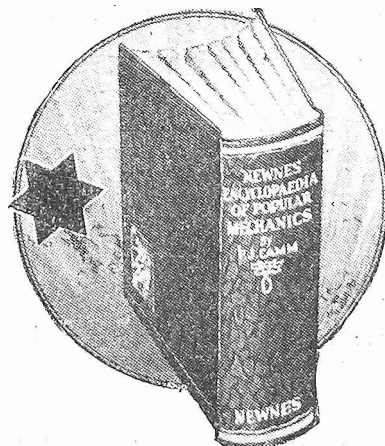
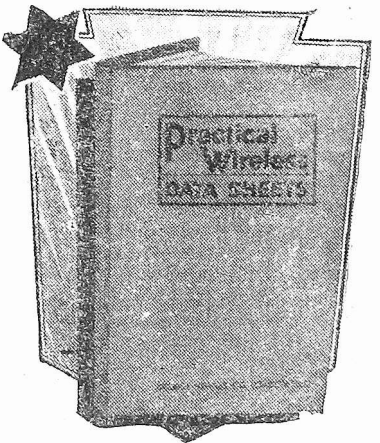
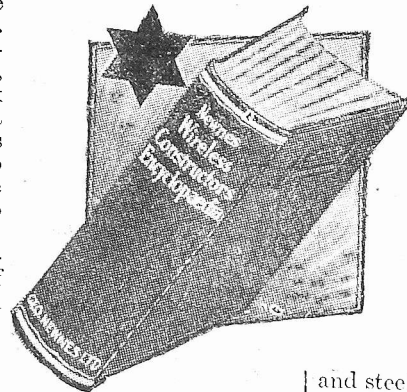
The Producer, after a preliminary read through with the Cast, should then hear the play in another room via a loud-speaker, and make notes of any faults which he may detect. In this way he will be able to judge the play as it will be presented to the Audience.



mirror, a centre punch, screw-driver, adjustable trammels, a pair

WE have been inundated with requests from readers asking us to repeat our Gift Tool Offer, as many of them failed to qualify when the offer appeared. As only a few of these tool kits remain, it is not possible for us to do this. We are prepared, however, while the stock lasts (only a small supply is available), to supply these tool kits to readers for 3s. Each kit contains a set of spanners, an accurate 4in. Chesterman steel rule, a

of ebonite test prods, scriber with chucks,



and steel set square. The cases are of metal finished in black cellulose. As soon as the present stock is exhausted, applications will be returned to the senders. Address your inquiries to PRACTICAL WIRELESS, Presentation Dept., Geo. Newnes, Ltd., 14, Southampton Street, Strand, London, W.C.2.

Other illustrations on this page show our free gift Data Sheets, which in their strong loose binder provide a handy workshop companion in easily consultable form of all the facts and figures relating to wireless receivers. A few copies of this remain, and can be supplied for 3s. 6d., by post 3s. 10d. Other useful Christmas presents are the "Wireless Constructors Encyclopedia," 5s. (by post, 5s. 6d.), and the "Encyclopedia of Popular Mechanics," 5s. (by post 5s. 6d.), from George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

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# Rapid Fault Finding

A Description of a Number of Temporary Repairs which can Quickly be

**W**HETHER home-made or ready-made, the modern receiver is not likely to cause trouble by "breaking down" or otherwise developing a fault,

but it is, nevertheless, well to be prepared in case of possible trouble. This is particularly true at Christmas time, when the set will probably be used more than at any other period of the year, especially when parties are being given and friends entertained. When anything does go wrong it is a great convenience to be able to locate the fault at once and then to carry out either a temporary or permanent repair without having to miss an item which is particularly wanted.

Any fault which occurs suddenly is almost sure to be due to some minor defect, and before wasting unnecessary time dismantling the receiver and blaming every conceivable component it is well to see that the aerial lead-in is properly connected, that the earth lead has not come adrift, and that the fuse (where fitted) has not chosen the opportunity for "blowing," although it might have behaved perfectly for several months past.

## Look to the Aerial and Earth First

A rapid inspection will show whether or not the aerial lead-in wire has broken away from the horizontal span, but a break inside a length of insulated wire which is passed through a hole in the window frame, or led round the wall of the room, is not so noticeable. Thus, if the aerial is in any way suspected, it is well to cut the lead-in at some convenient point outside the house, carefully scrape the wire clean and bright, and then connect a new length of well-insulated wire that can be taken straight to the set. In the unlikely event of the aerial having been broken down by a storm it is well to remember that an improvised aerial can usually be brought into fairly satisfactory service. A length of

## Carried Out in the Case of a Fault Suddenly Developing in the Receiver

insulated wire run round the picture moulding, along the top of a garden fence (Fig. 1) or thrown out of the window of an upstairs room will always give sufficiently good reception of the local station at least.

Even when one of these rather rough and ready arrangements cannot be adopted there is no need for despair, for quite good results can nearly always be obtained by transferring the earth lead from its normal terminal to the aerial terminal. Another—by no means new—method is to connect a

When a fuse of the flashlamp type is fitted the foil may be connected between the terminals of the holder, this also being shown in Fig. 2, although in this case it is probable that an ordinary flashlamp bulb would be available, and this could be used until a correct fuse was obtained.

## When the Batteries Fail

In the case of a battery-operated receiver there is always a danger of the batteries running down at a critical time. This should not occur if care has been taken to replace the H.T. and have the accumulator charged regularly, and it is worth while to check up all the batteries before Christmas, attending to any whose voltages have dropped. A run-down accumulator is nearly always indicated when signals fade away fairly rapidly while the set is in use; a check can be made by switching off the set for a short time and then switching on again. Should signal strength return to normal when the set is switched on a second time, and again fade out there need be no doubt that the low-tension supply is definitely inadequate. Receivers having up to three valves can be used fairly satisfactorily for a few hours by employing a 1½-volt dry cell of the kind used for operating electric bells and the like. When this is done, however, it will be found that

signal strength is much below normal, whilst there might be distinct signs of distortion. An improvement can, however, be effected by reducing the grid-bias voltage applied to the low-frequency valve(s). Better still, a pair of dry cells can be connected in series and the voltage

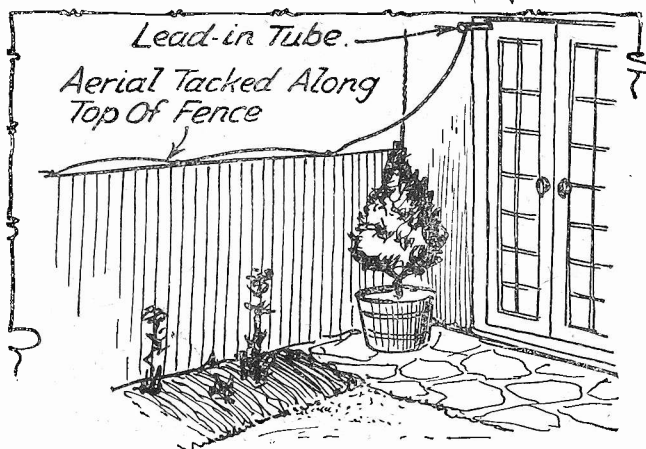


Fig. 1.—When the aerial collapses the wire may be temporarily fixed along the top of a wooden fence.

length of wire to the spring mattress of a bed.

A broken earth connection is generally evidenced by the fact that tuning is unduly critical, whilst the set is generally more prone to oscillate, and so to distort. A test for the earth connection is to touch the earth terminal with the tip of a moistened finger; if this affects reception one may be sure that the earth lead is defective. It will not generally be a difficult matter to trace a break in the wire and, if necessary, to fit a completely new earth by means of a length of wire attached to a chemical-earthing device, such as the Graham Farish "Filt," or even to a short length of metal piping driven into the ground outside the house.

## Don't Forget the Fuse

A "blown" fuse will be suggested by the fact that the set is quite "dead," there being no sound of any kind from the speaker. If a replacement is not available, makeshift can be made by using a narrow strip of tinfoil taken from a cigarette or chocolate box. The strip of foil should be laid over the fuse, as shown in Fig. 2, when the latter should be inserted into its holder and the foil cut away at one point so as to leave the smallest possible amount without the foil actually being cut in two. The reason for cutting away the foil as shown is that, if this were not done the current-carrying capacity would probably be sufficiently high to cause damage to the valve filaments, assuming that a really serious fault had developed in the set.

TIN FOIL CUT TO SHAPE AS SHOWN, IN PARALLEL WITH DEFECTIVE FUSE

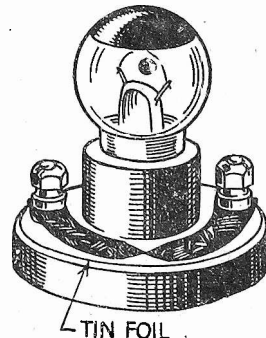
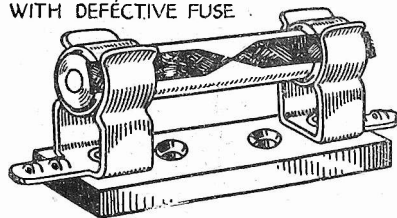


Fig. 2.—Showing how strips of tinfoil can be used as replacements for a "blown" fuse.

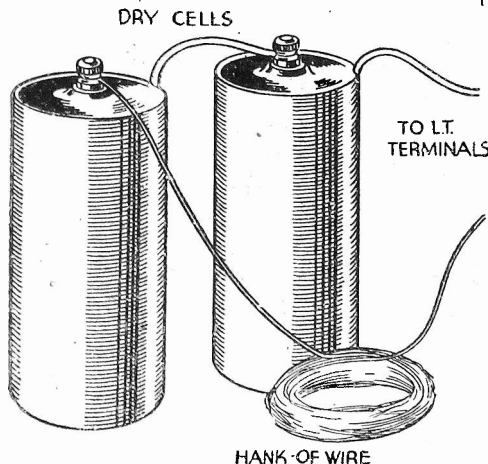
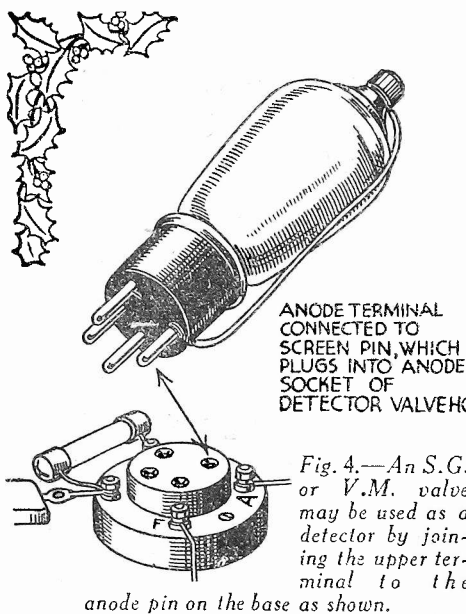


Fig. 3.—Two dry cells may be used for the L.T. supply by connecting a hank of wire in series so as to drop the excess 1 volt.



reduced by connecting an odd length of wire between one terminal and the set, as in Fig. 3. The length of wire required will depend upon the current consumption of the set, but assuming this to be .4 ampere (an average figure for a three-valver with H.F.-det. and power valves) approximately 24yds. of 26-gauge wire will be suitable. An old dual-range coil can often be used in place of the wire to provide the necessary resistance.

The high-tension supply presents a rather different problem, but a run-down H.T. battery is usually indicated by the fact that signals gradually fade away while the set is in use, probably taking two hours or more to disappear completely. A run-down H.T. battery can be rejuvenated temporarily by placing it in a warm place for an hour or so; it might be put in front of the fire, or even in a warm oven, but care should be taken that the pitch is not melted due to overheating.

**If a Valve "Gives Out"**

When it has been concluded that all the extraneous accessories are in order the set itself must be attended to. Perhaps the most likely source of trouble here is a damaged valve, but this need not, in most cases, preclude the use of the set. The first difficulty is to decide if a valve really is at fault, and if so, which it is. If there is a click in the speaker when the set is switched on, or if there is a "breathing" sound after switching on, the output valve can be considered as being O.K. If the set seems completely "lifeless" it is more than likely that the output valve is at fault. It might be replaced by any spare valve which happens to be to hand, provided that the grid-bias is adjusted to suit the substitute. On the other hand, it might be possible to carry out a general "re-shuffle," placing the detector valve in the power or pentode valveholder, using the H.F. valve for detection, and eliminating the H.F. stage in the manner to be described later.

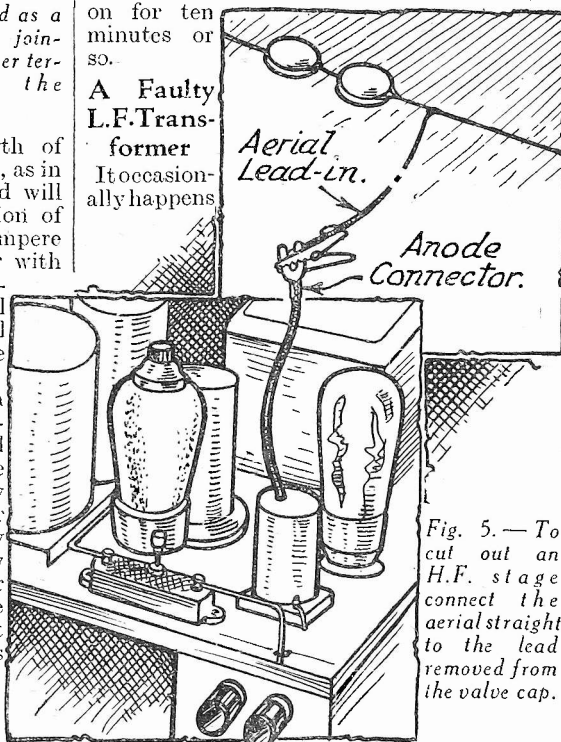
Although it is not always appreciated, an S.G. or variable-mu valve can be used as a fairly efficient detector without altering a single connection in the set, and by joining the anode terminal to the screening-grid pin, as shown in Fig. 4.

**Cutting Out the H.F. Stage**

In order to cut out the high-frequency stage (which is not normally required for local-station reception) the aerial lead should be transferred from the aerial terminal to the anode-terminal connector for the H.F. valve, as in Fig. 5. This same method can, of course, be employed when the H.F. valve has developed a fault, as would generally be indicated if radio signals could not be received, although the set behaved normally when a gramophone pick-up or microphone was in use.

It is not always a very easy matter to distinguish a faulty valve in the case of a battery receiver, except by applying systematic tests, such as those suggested above. Where a mains receiver is concerned, however, a faulty valve can generally be traced by the fact that it is cold after the receiver has been switched on for ten minutes or so.

**A Faulty L.F. Transformer**  
It occasionally happens



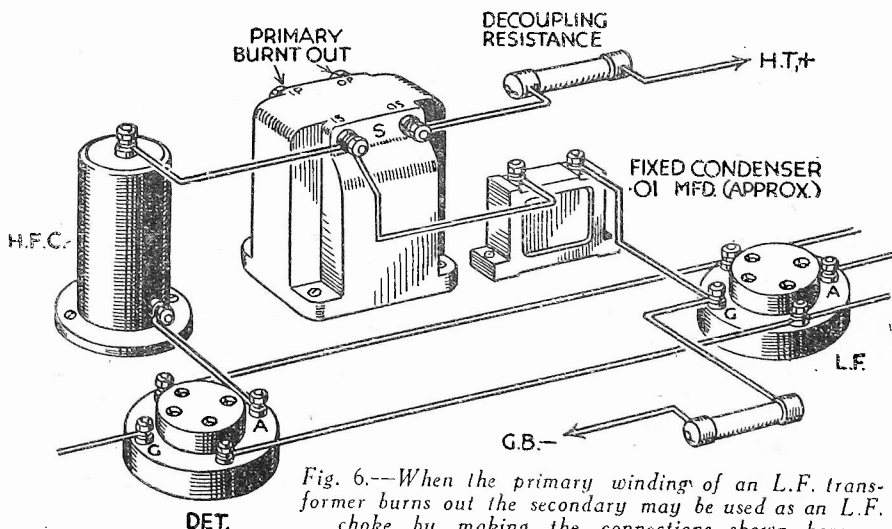
that a low frequency transformer burns out—causing a cessation of signals—or develops a partial open-circuit, resulting in crackling sounds being heard in the speaker. If a transformer is suspected the wire going to one terminal should be disconnected and re-connected while the

set is switched, taking care that the wire is well insulated from the hand in the case of a mains set. If there is not a distinct "click" as the connection is made and broken the transformer is probably at fault. Where crackling is experienced the transformer-primary terminals should be shorted with a length of wire; if this stops the crackling it is safe to assume that the component is the cause of the trouble.

A rapid method of temporarily getting the set into correct operation again is by using the secondary winding of the transformer as a low-frequency choke, and feeding the following valve through any convenient fixed condenser having a capacity not lower than .001 mfd., as shown in Fig. 6. It will be seen that a grid leak (preferably .25 mA) is connected between the grid and the G.B. negative lead, which previously went to the G.B. terminal on the transformer.

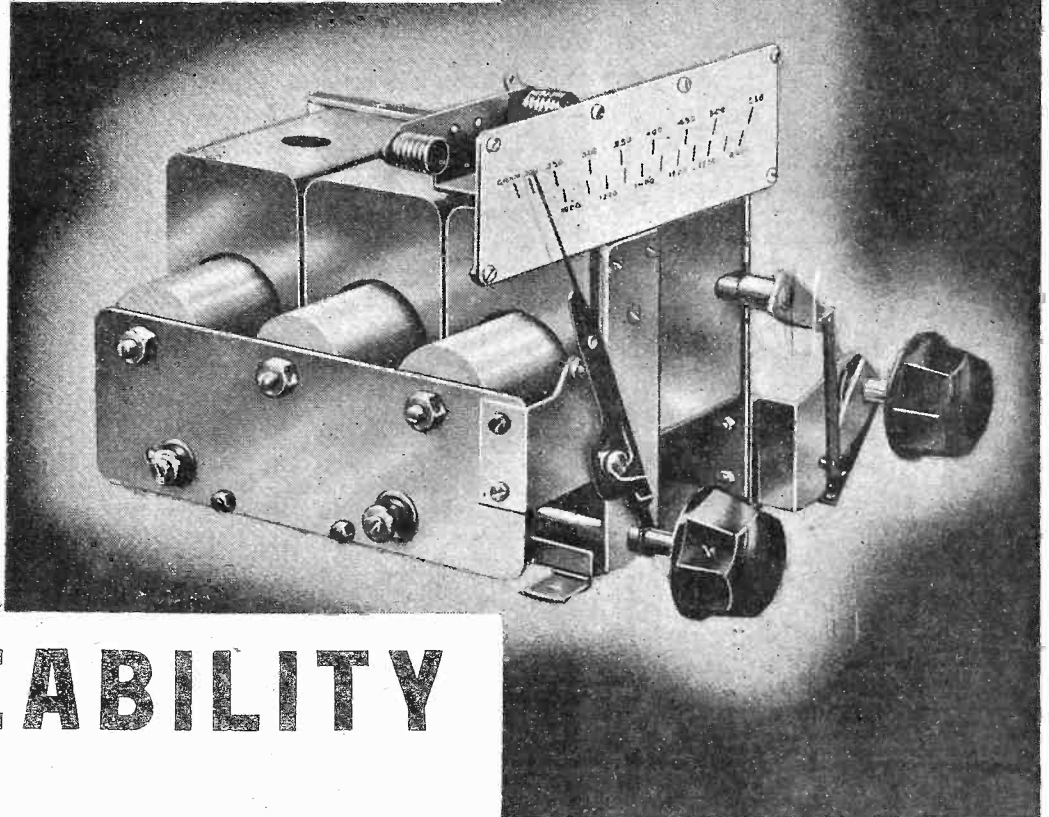
There is another troublesome fault which, although occurring very rarely when modern valves are in use, is still by no means unknown. Reference is made to microphony, which is evidenced by a continuous "hum," "groan," or even a whistle, from the speaker. The trouble is caused by the sound vibrations from the loud-speaker striking the glass bulb of a valve (generally the detector) and causing it to vibrate. This vibration is, in turn, transferred to the electrodes which also vibrate and so produce a note in the speaker. The sound generally starts as a rather low note, but it rapidly builds up until it completely spoils reproduction. When this trouble is experienced the detector valve should be gripped in the hand; if this tends to reduce or modify the noise it can be taken for granted that the detector valve is microphonic. The proper course—if the valve is fairly new—is to return it to the makers for examination, but if it is old a remedy can nearly always be effected by wrapping a piece of soft felt round the valve or, better still, by mounting the valve-holder on a strip of soft, spongy rubber.

If it appears that the detector valve is not at fault it is best to test the others in a similar manner to that described above, applying the same remedy if found faulty. An L.F. valve is more likely to be the cause of trouble than an H.F. amplifier, but any one of them might be at the root of the trouble.



# PERMEABILITY TUNER

3-Gang (BP100)	- - - - -	£3.2.6.
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# PERMEABILITY TUNING - - - - -

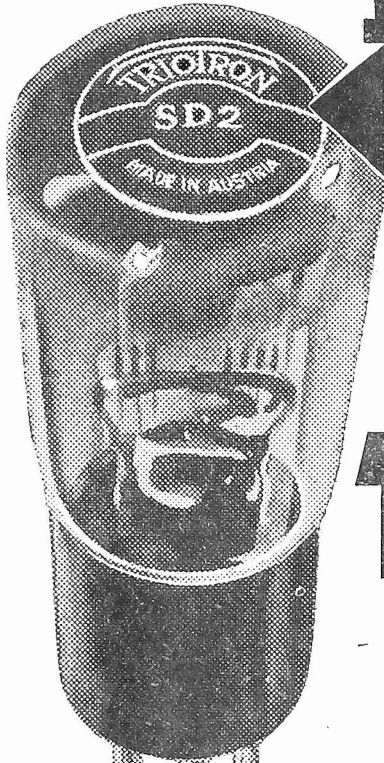
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## 3/6

# TRIOIRON VALVES

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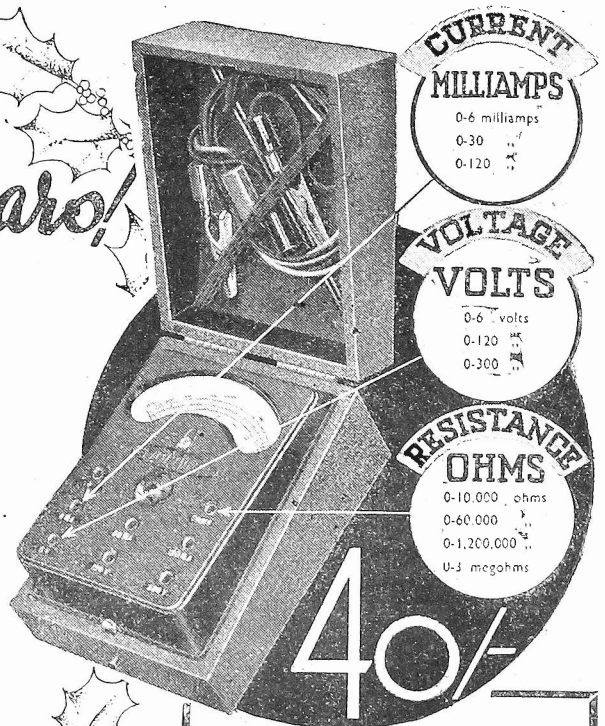
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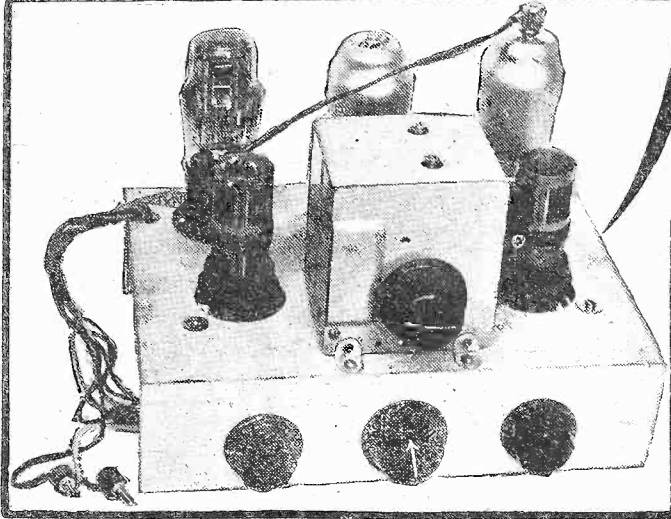
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# Constructing the

# Hall-Mark 3



The Latest Design in Our New Series of High-class, Low-priced Receivers. By an Ingenious Arrangement of High-class Components the Hall-mark of Performance is Obtained. The Specification, too, is Hall-marked

THE dictionary gives the meaning of hall-mark as "a stamp to attest as to a standard," and the hall-mark which we know so well is affixed to gold and silver. It connotes a high standard, and we think no more fitting name could be chosen for our latest three-valver than the Hall-mark Three. We do not intend that this shall take the place of the Superhet Three, nor by any means compete with it. It is intended to fill an entirely different need, and to further our campaign for cheaper radio. Apart from its simplicity, its cost is one of its prime features. As may be gathered from a perusal of the advertisements in this issue, the complete receiver (Kit A) costs something in the region of 45s., and this trifling cost brings it within the means of every listener. Cost is one of the principal considerations of every receiver, but it must always be borne in mind that cost must be considered as a collateral part of performance. It is possible to build a three-valve set for a few shillings, but obviously it cannot be expected to produce the results which would be obtained with a similar circuit constructed from parts bearing well-known trade-marks. In the Hall-mark Three, however, we have aimed at producing a low-price receiver incorporating high-class components which will give results that greatly exceed those obtained by receivers costing several pounds. How this has been accomplished will be shown later on. We must point out, before going into details of the receiver, that it has been designed at the express wish of thousands of our readers who want a small, but powerful and selective receiver, capable of giving a really good account of itself, but costing no more than £2 or so.

### The Design

The accompanying photographs, and the blue print which is given free with this number, will reveal that the design follows certain new lines. The two coils which are employed are not of the screened variety, but are built up on simple lines, although the method which has been adopted in the windings renders them extremely efficient. However, to deal with the circuit in detail, as this is the simplest method of enabling even the beginner to understand the complete apparatus. Three valves are

employed in the well-tried combination, S.G., detector, and output stage. The H.F. valve is not of the variable- $\mu$  type, and this enables cost to be reduced quite considerably. Firstly, there is the expense of a volume control potentiometer; secondly, the associated voltage-dropping resistances



AN IDEAL  
XMAS PRESENT—FOR  
A FRIEND OR YOURSELF!

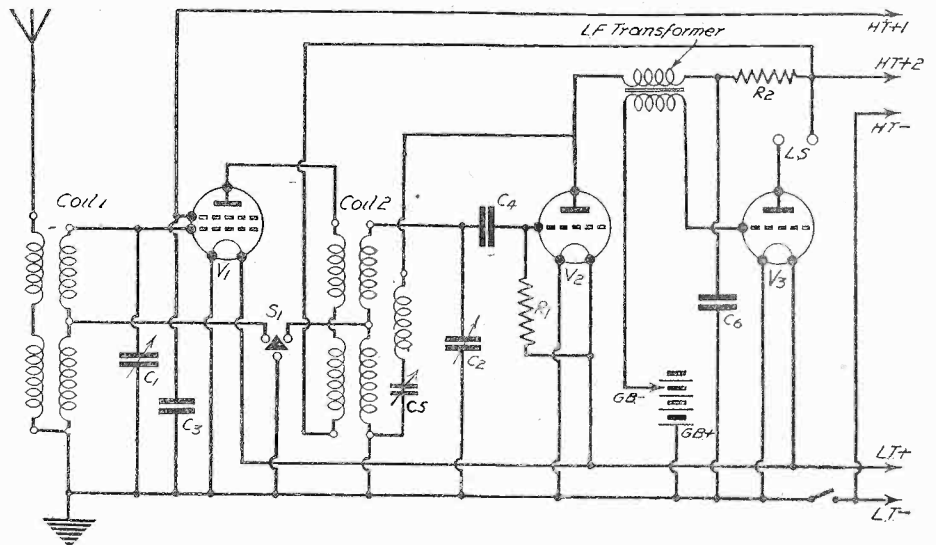
require more careful choosing, and generally more decoupling is required, so that further expense is saved.

The aerial circuit is of the H.F. transformer type, giving high selectivity with good signal strength, and the coil which is used to couple the H.F. to the detector valve is of similar type, thus avoiding the expense of an H.F. choke and coupling condenser. Coupling between the detector and output valves is by means of a directly-

fed L.F. transformer, and it will also be seen that expense has been saved in this stage by dispensing with the customary H.F. choke used for reaction. The primary of the particular L.F. transformer which has been employed provides ample choking effect, and smooth reaction is obtainable throughout the tuning range. Decoupling has been incorporated in this stage, and the necessary condenser is of the tubular type, which is very much cheaper than the usual type of condenser, and it is connected direct to the appropriate points by means of the wire ends.

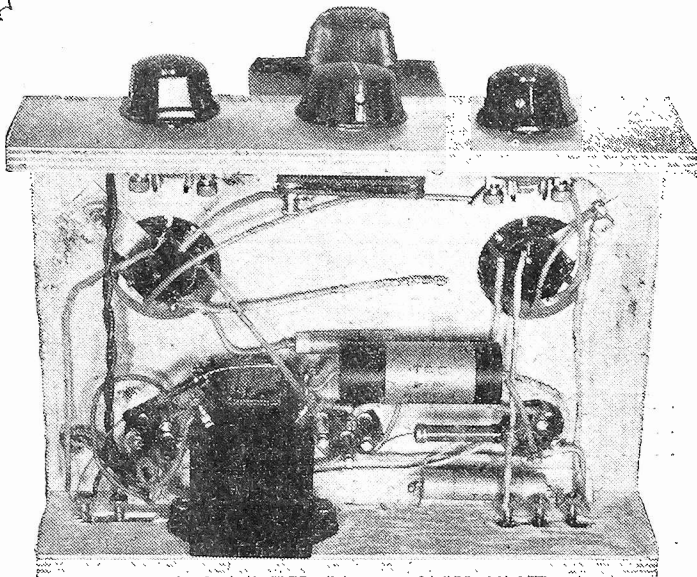
### The Controls

Although there are four controls on the panel front, there are only two which are of prime importance, namely, the main tuning control (upper centre) and the reaction control immediately below it. The remaining two knobs control the wave-change and the filament switching, and are therefore only subsidiary. With regard to the main tuning control, this operates on the two-gang condenser, and it will be seen from the illustrations that a small ordinary disc knob has been used



Theoretical circuit of the Hall-mark Three.

# THE HALL-MARK THREE I DESIGNED TO GIVE FROM MINIMUM EX GRADE COMPO



Underside of this interesting receiver.

for the experimental receiver, and this knob is specified in the list of parts. Messrs. Polar supply the disc control for this purpose, and it will be seen in the advertisement pages, priced at 1s. For those who prefer to have something more elaborate, a slow-motion drive may be obtained, although in that case it is essential to specify when ordering that the "degree" dial is required, as otherwise you will obtain a dial calibrated in wavelengths or frequencies, and this will not hold for the particular coils which are used.

A Rola loud-speaker has been specified and this efficient unit enables advantage to be taken of the quality of reproduction. This loud-speaker, in conjunction with the particular output valve which has been specified, will enable really high-class reproduction to be obtained, and there will be no suggestion, when the receiver is working, that it cost such a small sum.

### The Construction

With such a limited number of components, construction is naturally greatly simplified, and it reduces itself to the mounting of the ganged condensers, the coils, and the valveholders, and the connecting of the separate contacts, in some cases by means of ordinary wire, and in others by means of the wire ends of resistances or condensers. The first task is to mark out the chassis, taking your measurements from the blue print. Alternatively, the latter may be laid over the chassis and a tracing made direct on to the chassis surface. To accommodate the valveholders you need a 1 1/4 in. bit, and for each of the coils you must cut a 1 1/2 in. hole. On the rear of the chassis you will have to drill

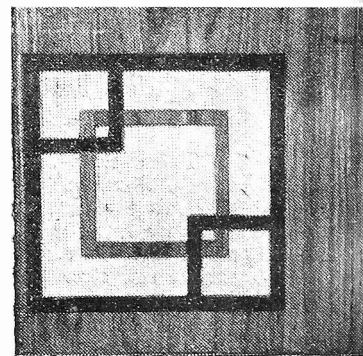
small holes to accommodate the socket strips, and on the front of the chassis clearance holes for the three controls. Alternatively, you can purchase the chassis, already drilled, direct from Messrs. Peto-

prevent them from being damaged. Complete the wiring, and the receiver is ready for a test.

### Testing Out

In view of the remarkable results obtainable and the simplicity of the circuit, it is essential to use a really worth-while

## 45 STATIONS



Scott. Assemble the valveholders, the socket strips, the two switches, and the reaction condenser, and carry out as much of the wiring as possible with these parts only in position. The advantage of this method of construction is to be found in the ease with which the chassis may be handled and turned about. If you mount the coils and the ganged condenser, not only is the complete chassis more weighty, but you have to exercise some care to avoid damage to the coils.

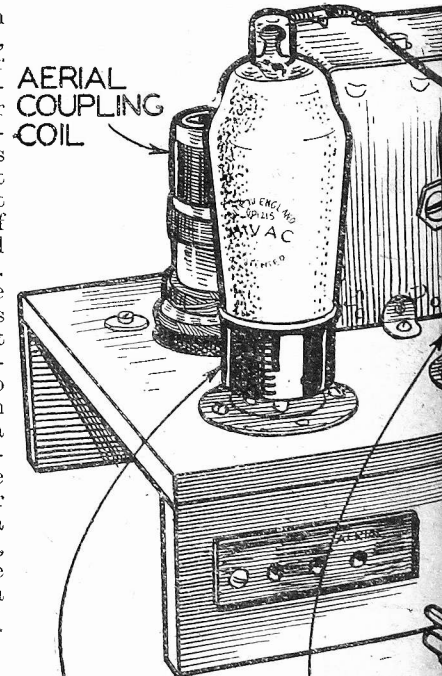
### Wiring

The wiring can be carried out in any manner to suit individual preference, although it is always advisable to mark out a wire, as it is placed in position, on either the blue print or the theoretical circuit diagram. In this way no wire will be omitted and no wrong connection should be made. Some constructors prefer to work through the receiver in strict sequence, starting at the aerial and so placing each part of the circuit in place until arriving at the loud-speaker terminals. Whilst this may be an interesting manner of wiring the receiver, it is not to be advocated, on account of the fact that all accessories must be placed in position, and when a fairly comprehensive receiver is being constructed the chassis is cumbersome and difficult to handle. However, proceed as you desire with the wiring, and when you have affixed all those which are possible, add the L.F. transformer and complete the wiring to this. Now place the coil clips beneath the chassis and lock them in position, resting the chassis on its end whilst so doing. Attach the gang condenser, and the chassis may then be inverted, as the condenser is higher than the coils and will

aerial and earth system. The former should be about 60ft. in length, and attention should be paid to the insulation. Remember that you cannot amplify signals which you do not receive, and the weak impulses which arrive on your aerial must pass through the first tuning coil if anything at all is to be made of them. These high-frequency currents take the shortest and easiest path to earth, and poor insulation or dirty insulators will result in a great loss of signal strength. These points are not so important to the man with a multi-valve receiver or a superhet, where there is a

### TWO GANG TUNING CONDENSER

AERIAL COUPLING COIL

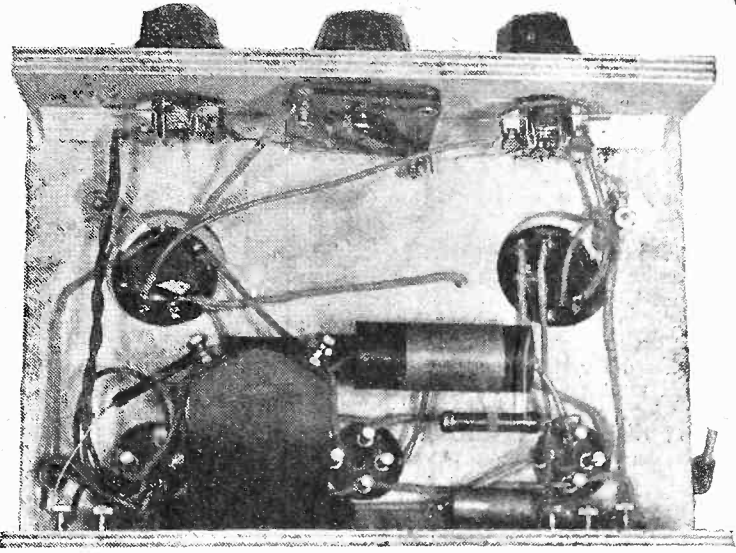


S.G. VALVE DETECTOR

# A MODERN CIRCUIT—

# A HIGH-CLASS RECEIVER

## MAXIMUM RESULTS AT A MODERATE PRICE. ONLY HIGH QUALITY COMPONENTS ARE USED



Another underside view of the Hall-mark Three.

great deal of H.F. amplification, but with the simpler types of receiver attention and a little more money spent on the aerial and earth will well repay the listener in increased signal strength and more stations. When the aerial and earth are connected plug in

reaction if possible. Should no station be heard, use may be made of the reaction control in order that some kind of

**45 SHILLINGS**

the H.T. leads to the H.T. battery, inserting H.T.+1 into the 60-volt socket and the H.T.+2 plug into the 120-volt socket. It might be found desirable at a later stage to vary the voltage at H.T.—1, but for the preliminary tests 60 volts will be found quite satisfactory. The G.B. plug should be inserted into the 6-volt socket, and the positive plug into the socket so marked on the battery. Now

switch the receiver on with the right-hand switch, set the reaction control to zero and slowly turn the tuning control. The local should be heard at some point, and it should be tuned in to its maximum, without

signal may be obtained for trimming purposes. Now with a pointed slip of wood or some other non-metallic screw-driver adjust the trimmers on top of the ganged condenser, slowly swinging the main tuning knob whilst so doing in order to keep the signal at the correct point. A little time should be spent in carrying out this adjustment accurately, and it may then be ignored. It should now be possible to turn the tuning knob throughout the entire tuning range and find many stations without the use of the reaction control. To build up signal strength the latter should be used, but in the interests of quality, keep the reaction always at a minimum. The change to long waves is carried out by rotating the left-hand switch, and a number of long-wave stations should be heard, Droitwich occupying only a small space on the dial and enabling Radio-Paris to be heard quite clearly without overlap. When the receiver is functioning correctly, experiments may be carried out with the H.T.—1 plug in order to find the most suitable tapping point for your particular valve and aerial system, but when once this has been found it may be ignored until the battery has run out.

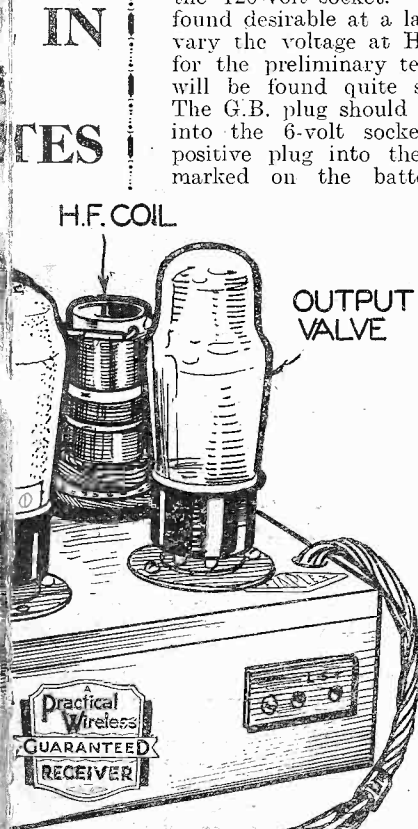
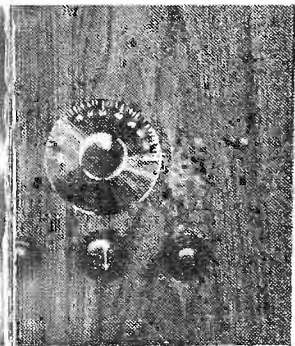
Since the receiver was originally designed, certain ideas have been tried out in order to still further improve it from the point of view of construction and operation. So far as the latter point was concerned, it has been found definitely impossible to improve performance, or in any manner to simplify the operation, without introducing more expensive items or in other ways to defeat the object. So far as construction is concerned, however, a very simple idea has been adopted which will incur no additional expense, but which will prove of great advantage to the constructor, especially

the beginner. In the design as originally constructed the coils were fitted with small soldering tags, to which the ends of the coil windings were soldered. Thus to connect these in circuit soldering has to be adopted, and as there are eleven connections to be made to the coils, the wiring of the receiver could not be executed in a very rapid manner. Furthermore, there was always the risk that the inexperienced amateur might unduly prolong the soldering process, during which the coil ends might become detached from their tags and thus cause trouble. We therefore devised the simple scheme of providing the coils with coloured leads of sufficient length easily to reach the various connecting points, and thus at the same time simplify construction.

### The Coloured Leads

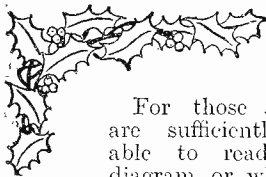
When the coils are purchased, therefore, they will be found to have lengths of coloured wire, approximately 9in. long, attached to all points, with the exception of one. The latter is the connection on top of the H.F. transformer to which the anode of the S.G. valve is joined. The other ends of the coils will have to be joined so that the colours are connected as follows:—

- Coil No. 1 (Aerial Coil)  
Aerial lead—Pale blue.  
Earth lead—Black.  
Wave-change switch—Yellow.  
Grid and tuning condenser—Two white leads.
- Coil No. 2 (H.F. Transformer)  
Grid and tuning condenser—Two white leads.  
Detector anode—Dark blue.  
H.T. plus—Red.



# AT A MODEST PRICE





Reaction condenser—Green.  
Wave-change switch—Yellow.

For those constructors who are sufficiently expert to be able to read the theoretical diagram, or who prefer to make their own connections, there is, of course, no objection to removing the coloured leads and proceeding exactly according to blueprint; but time will be saved, and greater certainty of sound connection obtained, if the coils are connected direct by means of their coloured leads.

### Receiver Design

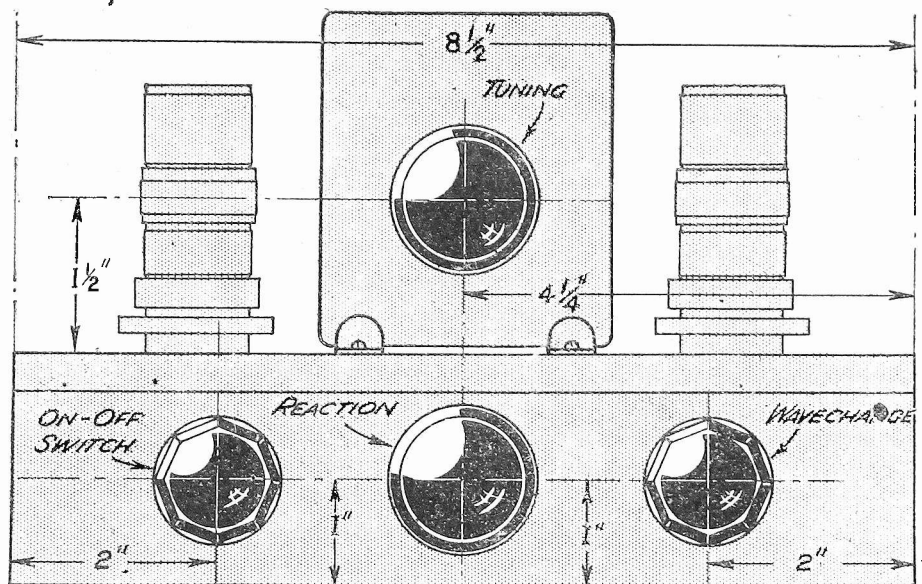
It is interesting to compare this receiver with other models which have been published by us from time to time, and the general overall dimensions will be one of the first points which will strike the eye of the older experimenter. This is in no small measure due to the neatness of the particular gang condenser which is specified and this represents a marked advance on the designs of even last year. A single tuning condenser would have occupied at least as much room a year ago, and yet to-day two sections, each of .0005 mfd., have been accommodated in an all-metal casing, complete with a dust cover and trimming condensers, with overall dimensions of approximately the same size. The three-gang condenser is very little larger, and these modifications in component design naturally extend their advantages to the general receiver.

### The Coils

The tuning coils of a year ago, except those enclosed in screening cans, also took up considerably more space than those employed in the Hall-Mark Three, whilst the fixed condensers were invariably enclosed in moulded bakelite cases, one of which would occupy more room than all the condensers employed in this receiver. Thus, there is a definite reflection in this receiver of the modern trend of design, and no doubt by next year we shall see even more important advances which will result in further modifications of design. It is true that in America some "Midget" all-mains receivers are produced commercially, but in general the components employed in these receivers are specially designed for the purpose and thus have been constructed with a certain restriction on performance, efficiency being a secondary consideration so long as compactness took the lead. The results are certainly very good, but they cannot be compared to those obtained when standard parts are used in a similar circuit design.

In the case of the components on the English market, however, efficiency is all the time the keynote, and no "stunt"

**IF YOU ALREADY OWN A SATISFACTORY RECEIVER—MAKE THE HALL-MARK THREE AS A STAND-BY.**



Drill your cabinet from the dimensions given here.

parts are produced by firms of repute. Consequently, the combination of those parts enables a high standard of performance to be obtained, and the user has the full assurance that nothing has been sacrificed.

### Smaller Valves

The valves are, of course, still rather on the large side, and we can see no reason why

Three but giving infinitely more powerful results, would be possible.

Perhaps valve manufacturers will take the hint, and if such a change in design is not possible, we should be greatly interested to know the reason. In the meantime, let the Hall-Mark Three take its place as a milestone in the development of neater, cheaper, and better radio design.

## ODDS AND ENDS

### The Beaconsfield B.B.C.!

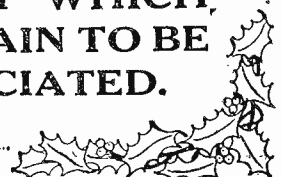
BROADCASTING talent is taking a business holiday from Portland Place, and is "In Town To-night" all hours of the day at the British Lion studios at Beaconsfield.

"In Town To-night" is the title of the radio musical comedy in which a galaxy of radio, stage, and screen stars are appearing. There is Stanley Holloway, who tells the famous tragedy of Albert and the lion, Dave Apollon and his Serenaders with Nora Williams, the well-known Blues singer, Jack Barty, Tessa Deane, Howard Jacobs's Band, Leslie Saroni, Olive Groves, the Carson Sisters, Billy Merrin and his Commanders, The Three Radio Rogues, and many others who are known to listeners in all over the country.

Another notable feature of this production is the inclusion of the Band of His Majesty's Coldstream Guards, whose martial music will form a contrast to the dance bands in the film.

"In Town Tonight" is being directed by Herbert Smith, who was responsible for the highly popular radio revue, "On the Air."

**THE HALL-MARK THREE MAKES AN IDEAL XMAS PRESENT WHICH IS CERTAIN TO BE APPRECIATED.**



**FOLLOW OUR DESIGNS AND ACHIEVE BEST RESULTS!**

the amount of glass could not be restricted in the majority of types. A general reduction in the overall height, as well as a modification of the bases, would enable even more compact receivers to be constructed, and if only this could be obtained with a reduction in price, wireless interest would be greatly stimulated, and the employment of multi-valve receivers, taking up no more space than the Hall-Mark

### LIST OF COMPONENTS FOR THE HALL-MARK THREE.

Two Hall-Mark Coils—B.T.S.  
Two-gang Condenser—Polar "Midget."  
One Polar Hall-Mark Dial.  
Reaction Condenser .0003—Graham Farish.  
3-point Wave Switch—Graham Farish.  
2-point On/off Switch—Graham Farish.  
L.F. Transformer 5/1—Varley Niclet.  
Tubular Condensers—.5 mfd. (type 250), .1 mfd. (type 250), .0003 mfd. (type 300)—T.C.C.  
Resistances, 2 meg. (type G1), 30,000 (type G.5)—Ferranti.  
Valveholders, 3 four-pin—Clix.  
Terminal Strips, A-E, L.S.—Clix.  
Plugs, H.T.1, H.T.2, H.T.—, G.B.+ , G.B.—  
—Belling-Lee.  
Spades, LT+, L.T.——Belling Lee.  
Battery Leads—Belling-Lee.  
Metaplex Chassis, 8 1/2 in. x 6 1/2 in. 2 runners, 8 1/2 in. x 2 in.—Peto-Scott.  
Valves, VP215 (4 pin), D210, PP220—Hivac.  
Batteries, H.T. 120 volts, G.B. 9 volts—Exide.  
Speaker, Rola, F5B.P.M. 288.





EST. 1919

# PETO-SCOTT

## PILOT AUTHOR KIT EXACT TO SPECIFICATION

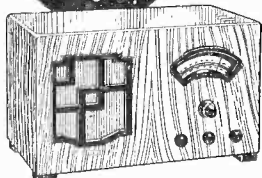


EST. 1919

SEND US YOUR ENQUIRIES FOR ALL YOU NEED IN RADIO

Miscellaneous Components, Parts, Kits, Finished Receivers or Accessories for Cash or C.O.D. or H.P. on our own system of Easy Payments. Send us a list of your wants. We will quote you by return. C.O.D. orders value over 10/- sent carriage and post charges paid (GREAT BRITAIN ONLY). Hire Purchase Terms are NOT available to Irish and Overseas Customers.

**5/- down** 1935 Guaranteed **RADIO** PETO-SCOTT BATTERY S.G. 3



Direct from Factory to you... saves middleman's profits. Gives a wide choice of foreign stations with amazing perfection of tone and volume.

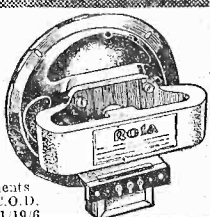
Built with all the latest 1935 improved components including Peto-Scott 1935 Moving-Coil Speaker, SCREENED COILS; high efficiency S.G. Detector and super power output valves. Low D.T. consumption. Full-Vision scale. Modern Walnut Cabinet. British valves of guaranteed life. Ready to play. Complete with Oldham Accumulator and H.T. Batteries. Cash or C.O.D. Carriage Paid £6 6s., or 5/- down and 18 monthly payments of 7/9.

STRAIGHT 3 v. Model £4/19/6. Cash, Carriage Paid, or small deposit and balance 6/- monthly.

Send for Art Folder of Peto-Scott 1935 Guaranteed Radio de Luxe—models from 2/6 weekly.

**ROLA FR5** PERMANENT MAGNET S.G. SPEAKER

With Universal Tapped Transformer. Send only 2/6, balance in 10 monthly payments of 3/-. Cash or C.O.D. Carriage Paid £1/9/6

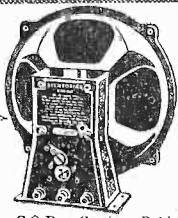


**2/6 DOWN**

Model FR6. Send only 2/6, balance in 10 monthly payments of 4/3. Cash or C.O.D. Carriage Paid £1/19/6

**W. STENTORIAN SENIOR**

TYPE PMS1. For Power, Penetration and Class "B". Send only 2/6, balance in 11 monthly payments of 4/-. Cash or C.O.D. Carriage Paid, £2/2/0.

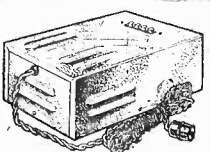


**2/6 DOWN**

W.B. Stentorian Standard Model. Cash or C.O.D. Carriage Paid, £1/12/6, or 2/6 deposit and 11 monthly payments of 3/-. W.B. Stentorian Baby Model. Cash or C.O.D. Carriage Paid, £1/2/6, or 2/6 deposit and 9 monthly payments of 2/6.

**Peto-Scott Guaranteed H.T. ELIMINATORS**

For A.C. Mains, 200, 250 volts, 3 Tappings: S.C. 60%, Detector 50%, Power 120-150%. Output 25 m.a. Incorporates Westinghouse rectifier. Send only 2/6, balance in 9 monthly payments of 4/-. Cash or C.O.D. Carriage Paid, £1/15s. 0d.



**2/6 DOWN**

D.O. Model for D.C. Mains only. Similar specification, but without rectifier. Cash or C.O.D. Carriage Paid, 17/6 or 2/6 deposit and 7 monthly payments of 2/6.

### F. J. GAMM'S HALLMARK 3

MR. F. J. GAMM'S GUARANTEE applies only to kits built exactly to his specification. Moral—buy a Guaranteed PILOT AUTHOR KIT.

**KIT "A" CASH or C.O.D. Carr. Paid 45/-**

THESE ARE THE PARTS USED BY MR. F. J. GAMM AND CONTAINED IN THE PILOT AUTHOR KIT "A"

- 1 Peto-Scott Metaplex chassis 8 3/4 in. by 6 1/2 in. with 2 in. runners ready drilled for valveholders and strips .. 2 9
- 2 B.T.S. Hallmark Three coils, with coloured leads .. 7 6
- 1 Polar Midget 2-gang cond., and dial knob .. 12 0
- 1 Graham Farish reaction cond., .0003 mfd. .. 2 0
- 1 Graham Farish 3-point wave switch .. 1 0
- 1 Graham Farish 2-point on/off switch .. 10
- 1 Varley Nicolet L.P. Transformer 5:1 ratio .. 7 6
- 3 T.C.C. tubular conds. .5, .1, .0003 mfd. .. 4 4
- 2 Ferranti resistances 2 meg. type G.1. (1), 30,000 type G.5 (1) .. 1 6
- 3 Clix valveholders, 4-pin with terminals .. 2 0
- 2 Clix socket strips, A1, A2, E and LS+, LT— .. 1 3
- 1 B.T.S. 5-way battery lead, HT—, HT+1, HT+2, LT+, LT— .. 2 0
- 2 Belling Lee plugs, GB+, GB— .. 3
- Wire, screws, flex, Dial Indicator .. 2 0

Kit "A" Cash or C.O.D. Carriage Paid £2 5 0

OR YOURS FOR

and 11 monthly payments of 4/-  
**KIT "A." Author's Kit of first specified parts less valves, cabinet, and speaker.**

**5/- DOWN**

**KIT "B"** As Kit "A" but including set of 3 Specified Valves, less Cabinet and Speaker. Cash or C.O.D. Carriage Paid £3/5/9, or 12 monthly payments of 6/-.

**KIT "C"** As for Kit "A" but including Valves and Peto-Scott Walnut Console Cabinet, less speaker. Cash or C.O.D. Carriage Paid, £4/0/9, or Deposit 7/8 and 11 monthly payments of 7/3.

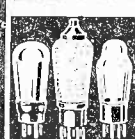
If Rola FR5/P.M./288 Moving-Coil Speaker required with any of the above Kits, add £1/5/0 to Cash or C.O.D. price, or 2/3 to deposit and each monthly payment.

**CHASSIS AS SPECIFIED BY MR. F. J. GAMM**  
Metaplex Chassis, 8 3/4 in. by 6 1/2 in. with 2 in. runners, Ready drilled for valve-holders and strips. **2/9 extra.**

### SPECIAL C.O.D. PARCEL

Comprising Peto-Scott Ready-Drilled Metaplex Chassis, 8 3/4 in. x 6 1/2 in. x 2 in., 2 B.T.S. coils complete with coloured leads, and Polar Midget 2 gang condenser with dial knob. **£1.2.3** Cash or C.O.D. Carriage Paid.

### HALLMARK VALVE KIT



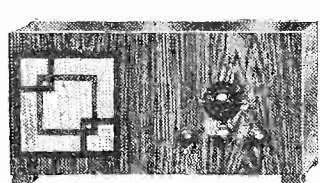
Set of 3 Hivac valves (VP215; D210; P220) solely specified for Our F. J. Gamm's Hallmark 3. Cash or C.O.D. Carriage Paid, £1/0/9 or 2/6 deposit and 4 monthly payments of 5/-.

**2/6 DOWN**

ANY ITEM SUPPLIED SEPARATELY—ORDERS OVER 10/- SENT C.O.D. CARRIAGE AND POST CHARGES PAID.

### EXCLUSIVELY SPECIFIED PETO-SCOTT Walnut HALLMARK 3 CONSOLETTA

Exclusively specified by Mr. F. J. Gamm for the Hallmark 3, this attractive cabinet is built by master craftsmen from carefully selected woods and is the only cabinet specially designed to house this set.



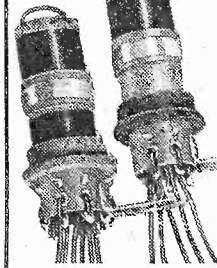
**READY POLISHED.** Peto-Scott Hall-Mark 3 Console Cabinet. Cash or C.O.D. Carriage and part packing 2/6 extra. **15/-**

**FOR HOME POLISHING.** Peto-Scott Hall-Mark 3 Console Cabinet in the white, ready assembled, sanded and ready for polishing. Cash or C.O.D. Carriage and part packing 2/6 extra. **10/6**

### FINISHED INSTRUMENT

Built exact to Author's Specification. Aerial tested on actual broadcasting. Complete with Valves, Peto-Scott Console Cabinet and the new ROLA FR5/P.M./288 Speaker. Cash or C.O.D. Carriage Paid, £8.6.0, & 11 monthly payments of 11/3.

### B.T.S. HALLMARK 3 COILS



Specified and used by Mr. F. J. Gamm for the Hall-Mark 3.

No other coils will so certainly guarantee exact duplication of Mr. F. J. Gamm's results. . . . There are no substitutes.

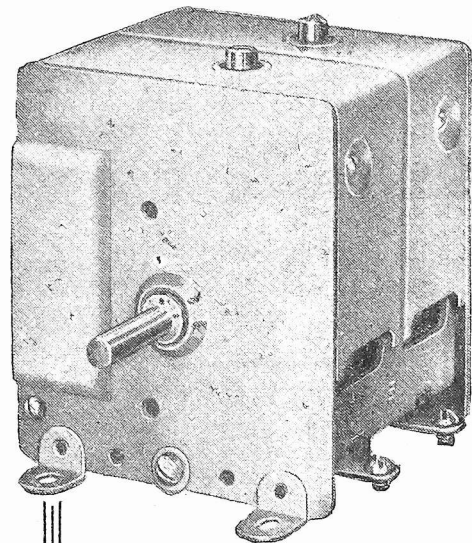
With coloured Leads for easy Identification. **THE PAIR 7/6** Postage 9d. extra

PETO-SCOTT CO., LTD., 77, CITY ROAD, LONDON, E.C.1 Telephone: Clerkenwell 9405/7, West End Showrooms: 32 High Holborn, London, W.C.1. Telephone: Holborn 3245.

Dear Sirs,—Please send me CASH/C.O.D./H.P. ....  
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for which I enclose £.....  
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# The "HALLMARK THREE"



specifies the

## POLAR

### MIDGET TWO-GANG CONDENSER

Steel frame and cover. Ball-bearing shaft. Small overall dimensions. Trimmers operated from top. Matched within 1/2 per cent or .1 mmfd. whichever is the greater.

2 x .0005 ... .. **11/-**

Knob dial in degrees 1/- extra

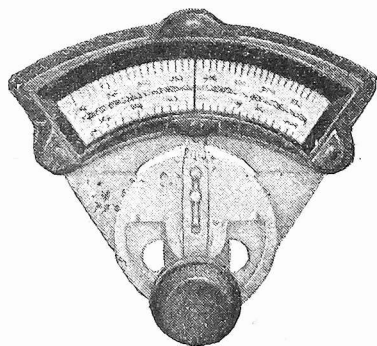
Three-Gang ... .. **16/6**

Three-Gang Superhet for 110 and 465 Kc. I.F. **16/6**

suitable

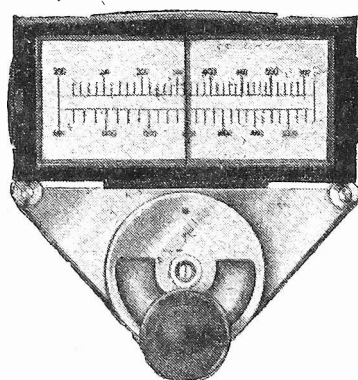
## POLAR DRIVES

**SPECIAL NOTE:** It is necessary when ordering your drive for the "Hallmark Three" to state that it is to be fitted with degree scale.



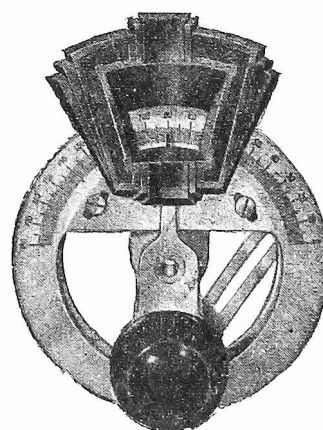
### POLAR ARCuate DRIVE

Slow-motion drive. Bevelled scale. Moulded Escutcheon. **5/9**  
Lampholders ... ..



### POLAR V.P. HORIZONTAL DRIVE

Slow-motion drive with vertical moving pointer. Moulded Escutcheon. **6/6**  
Lampholders ... ..



### POLAR PANEL MOUNTING DRIVE

Slow-motion drive. Bevelled scale. Moulded Escutcheon. **5/-**  
Lampholders ... ..

### POLAR TUNING GRAPHS

are now available at 3d. each post free. Send to-day and ask for new Polar Catalogue.

**WINGROVE & ROGERS, LTD.,**  
188-189, STRAND, LONDON, W.C.2.

'Phone: Temple Bar 2244/5/6.

Polar Works - - Old Swan, Liverpool.

### OTHER POLAR DRIVES

for use with the "Midget" gang condenser, etc., are:—

Polar Vertical C.K. ... .. **6/6**

Polar Semi-Circular ... .. **5/9**

Christmas Greetings to our Friends, present & future, at Home & Overseas

# Build it with a "GOLD-MINE" Guaranteed KIT

50% SAVING - 100% RESULTS

## HALL-MARK 3 (24/6)

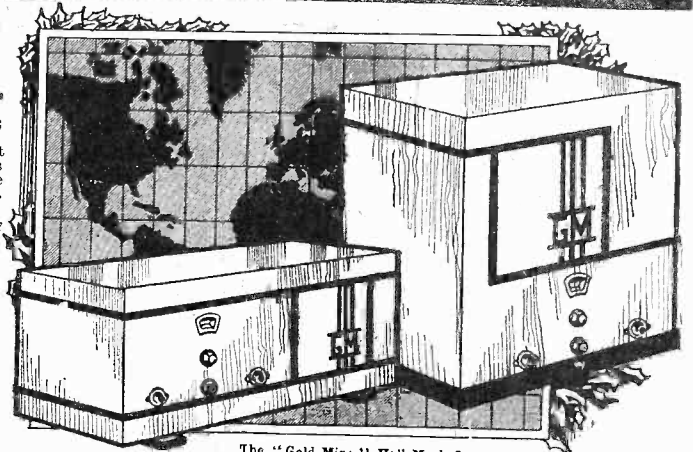
**"GOLD MINE" RADIO**  
 SYMBOL OF SECURITY SERVICE & VALUE, INTRODUCED IN 1932 TO FULFIL A LONG FELT WANT & NOW STANDING THE TEST OF TIME!

50/- DE LUXE KITS FOR 24/6

**AMAZING WHOLESALE OFFER DIRECT TO THE PUBLIC**

Every Kit is made up of superb quality components throughout, and of author's exact specified values. ADDITIONALLY TO AUTHOR'S SPECIFICATION, every Kit includes high-grade slow-motion tuning drive and illuminated scale with escutcheon, also de-luxe word-indicating switches are included. See illustrations and detailed specification. It speaks for itself.

**EVERY KIT CARRIES A 100% RESULTS GUARANTEE**—a definite guarantee that if these results are not obtained, we will service the set free of charge or refund your money in full.



The "Gold-Mine" Hall-Mark 3.

**BUY YOUR KIT DIRECT** RETAIL PRICES OUR PRICES

Any part supplied separately

**COMPLETE PRICE LIST**

No.	Component.	Make.	s.	d.	s.	d.
1	Pair "Hall-mark Three" Coils	"Pr. W."	5	9	4	10
1	2-gang "Midget" Condenser, with escutcheon and illuminated disc drive	Wavemaster	12	6	8	10
1	.0003 mfd. reaction condenser	Wavemaster	2	6	1	6
1	3-point wave-change switch	Gripso	2	9		8
1	2-point on off switch (Both above switches with rotary disc showing on/off or long, short, through miniature escutcheon plates.)	Gripso	2	3		6
1	5/1 L.F. Transformer	Magnacore	10	6	2	2
1	.5 mfd. fixed condenser	Wego	1	9		3
1	1 mfd. fixed condenser	Wego	1	6		7
1	.0003 mfd. fixed condenser	T.C.C.		9		4
1	2 megohm resistance, 1 watt	Franklin	1	0		4
1	30,000 ohm resistance, 1 watt	Franklin	1	0		4
3	4-pin valveholders	Pye	3	0		9
1	Chassis, 8 1/2 in. by 6 1/2 in., with 2 terminal strips: A-E, L-S	"Goldplex"	1	10	1	10
5	Wander plugs: H.T.1, H.T.2, H.T.3, G.B.-1, G.B.-2	"Truscrow"		7		3
2	Spade terminals	"Truscrow"		3		2
1	Battery cord, connecting wire, and sundries	Glazite, etc.	2	0		9
KIT A, complete as above			50	11	24	6
1	Valve V.P.215 (4-pin)	Hivac	10	6	10	6
1	Valve D.310	Hivac	3	9	3	9
1	Valve P.220	Hivac	5	6	5	6
1	or					
1	Var. Mu. H.F. Pentode Detector	Clarion	13	0	8	0
1	Power	Clarion	5	6	2	9
1	Cabinet, for set and speaker	Clarion	6	6	3	6
1	Cabinet, horizontal type as illustrated	Oak	15	6	8	6
1	Cabinet, vertical type as illustrated	Walnut	27	6	18	6
1	Rola Speaker P.M.	Walnut	27	6	18	6
1		Rola	35	0	22	6

**THIS WEEK'S SPECIALS:**

These bargains represent very limited stocks and are therefore not listed in the new "RADIO GOLD-MINE." The value is unprecedented, and cannot be repeated.

	Retail Value.	Our Price.
5-valve superhet chassis, complete Mullard Valves. Full A.V.C.	11 gns.	£ s. d. 6 12 6
6-valve superhet chassis, as above	13 gns.	7 10 6
7-valve superhet chassis, as above. Also Interstation Noise suppression	15 gns.	8 15 0
Above chassis, all new 1935 models ex famous manufacturer. All boxed new, and guaranteed perfect.		
25 m.a. H.T. Eliminators.		
4 tappings, 150v.	35 0	1 0 0
D.C. Ditto	18 6	0 10 0
Ormond P.M. Speakers	27 6	0 14 6
Rola Speakers		
Mains Energised:		
2,300 ohms	35 0	0 19 6
6,000 ohms	35 0	0 19 6

**KIT A** All components and sundries, as listed opposite in sealed carton, with free copy of Pr. W. (value 50s. 11d.) Price **24/6**

**KIT B** As Kit A, with the addition of set of Clarion fully guaranteed valves. (Value 75s. 11d.) Price **38/9**

**KIT C** As Kit B, with the addition of Rola Permanent Magnet M.C. speaker, and oak console cabinet (either cabinet as illustrated, 10s. extra.) Price **69/9**

**KIT D** As Kit C, together with set of high-grade British batteries (120v. H.T., 2v. L.T., 9v. G.B.) Price **79/10**

**AT A SAVING of 40-50%**

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# SPECIAL VOLTAGE STABILISING

An Explanation of a Novel System of Stabilising the Output Voltage from an Eliminator by Means of a Pentode

**A**LTHOUGH under most radio conditions employing high-tension eliminators, fed from A.C. mains, the usual smoothing arrangements of chokes and condensers are sufficient to provide a reasonably ripple-free source of voltage and current, there are special occasions where a very constant voltage is required. Various schemes have been suggested to meet these cases, and the basic principle involved is the operation of a conventional full or half-wave rectifier fed from the mains, and the subsequent elimination of any voltage variations from this choke and condenser smoothed output by making the fluctuations bias the grids of a thermionic valve in such a manner that the resultant anode current is constant.

Of course, dry batteries could be used for supplying steady voltages, but these deteriorate with time, and although in the circuit shown in the accompanying diagram a battery is shown, its position is such that there is minimum deterioration and maximum steadiness, as there is no current drawn from it. In point of fact the length of service is equivalent to the battery's shelf life. With this pentode-stabiliser circuit the total current fed from the output is naturally limited by the anode current of the valve itself, and its most important applications are to meet conditions of extreme voltage steadiness up to as much as 1,500 volts where the current fed to any apparatus is quite small.

## The Scheme Explained

In the circuit diagram a straightforward half-wave valve rectifier circuit is shown (this can be replaced with a full-wave rectifier, if desired), the normal output from which is given across the points A

and B. The stabilising pentode is of the directly-heated filament type, such as a Cossor PT41, Osram PT4, or Mullard PM24M, the secondary transformer winding feeding the filament being centre-tapped.

A double-tapped potentiometer, made up from three distinct resistances,  $R_1$ ,  $R_2$  and  $R_3$ , applies the appropriate potentials to the valve electrodes; two other resistances—namely,  $R_4$  and  $R_5$ , completing the circuit, so that at the points C and D

factorily when the different variables provided by the five resistances bear certain relationships one to the other. These conditions can be analysed mathematically, but the expressions are far too complicated to give here. The American engineer who developed this scheme, however, has provided very full details of the circuit constants for a stabiliser having output voltages varying between 85 and 1,400 volts.

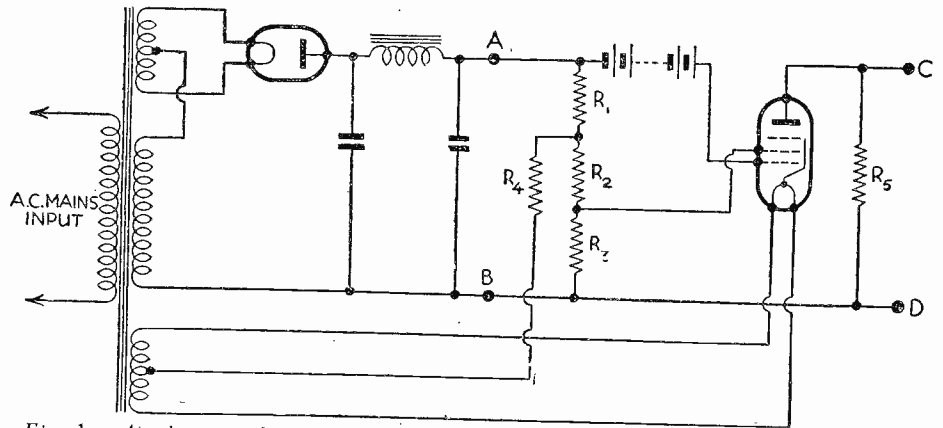


Fig. 1. A schematic diagram of a suitable voltage stabilising arrangement using a pentode valve

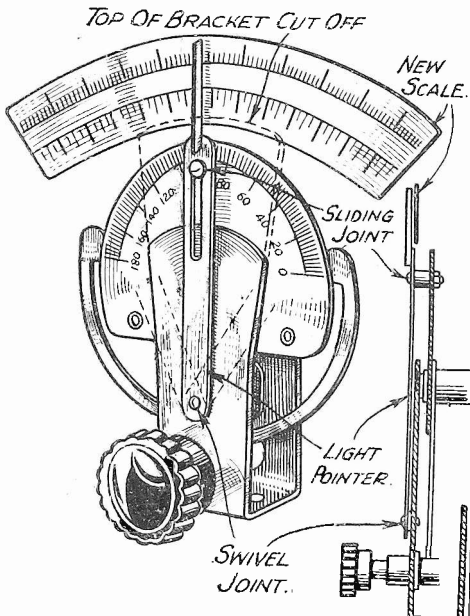
is given the stabilised voltage required. For absolute stability the rate of change of pentode current with reference to the voltage input from the mains (the mains variations being responsible for the voltage fluctuations it is desired to suppress as far as possible) must be zero.

The dry battery shown should give a voltage of from 45 to 50 volts, and, of course, the complete circuit is only working satis-

As a typical example the following details will give some idea of the quantities.  $R_1=3,000$  ohms;  $R_2=15,000$  ohms;  $R_3=175,000$  ohms;  $R_4$  is zero; while  $R_5=11,000$  ohms. When these measurements were taken the ordinary smoothed voltage across points A and B was 770 volts, and that across the points C and D was 135 volts, the current delivered under these conditions being just over 12 milliamps.

## OLD-TYPE DISC DRIVE CONVERSION

**T**HE accompanying sketch shows one of the older type of disc drives converted to a moving pointer dial. The top of the front of the chassis of the disc



Showing the suggested improvement to an old-type disc drive.

drive is cut off to within  $\frac{1}{8}$  in. of the condenser spindle, and a  $\frac{3}{8}$  in. hole is pierced in the celluloid scale of the drive. The pointer can be made with a piece of tin, as light as possible, and a wire can be soldered on as a pointer, if preferred. The pointer is mounted by removing the small guiding bolt just above the disc drive spindle and substituting a  $\frac{1}{2}$  in. by  $\frac{1}{8}$  in. bolt and nut, with a  $\frac{1}{8}$  in. spacer between. A small nut will do for a spacer, and another  $\frac{3}{8}$  in. by  $\frac{1}{8}$  in. bolt through the slot in pointer to the scale, with a  $\frac{3}{8}$  in. spacer between. For the new scale I used a piece of thin white celluloid and marked it with Indian ink, using the top half of the scale for the short waves and the lower half for the longer waves.—JOHN G. HOUGHTON (Liverpool).

## UNCONSCIOUS IMAGE OBSERVATION

**W**HEN watching any form of television image there are one or two matters which each individual observer quite unconsciously solves for himself. This is in relation to what has come to be known as television definition, and is a personal factor which must inevitably be associated with any true judging of the standard of performance of any particular system.

The first item is the actual position taken up by anyone looking at television images reproduced in a receiver. The

distance from the screen, and the angle at which observations are made are settled by the individual, so that he is quite satisfied with regard to the effects and the amount of real information it is actually desired to obtain from the images being shown. Personal habit and the experience gained from daily routine bring about a tempering of the demands created by an ideal reproduction.

This is borne out by a walk through any art gallery, when it will be noticed that we quite unconsciously step back to admire a painting so that any coarseness brought about by the artist's brush strokes becomes unnoticeable to the eye, the organ in question registering the illusion or effect which the painter wished to convey.

Another item which is purely a question of personal opinion with regard to television image observation concerns whether the standard of definition is to be the ability of the images themselves to tell any story which may be associated with the items being radiated from the studio or, alternatively, whether opinion is to be expressed on the basis of the ability of the observer's eye to see the elements of the image detail and the structure. The scientific mind will obviously take as the view point the latter and more rigorous examination, but if we are being entertained, then the ability to tell the story without the mechanics of the process being too prominent will undoubtedly be the fairest way of treating the whole problem.





THE EASY ROAD TO RADIO.

# THE BEGINNER'S SUPPLEMENT

## ELECTRICAL CELLS

A Simple Explanation of the Battery—How it is Constructed, and How it Works

### The Simple Cell

If strips of two metals are put into water, containing, for example, salt or a little sulphuric acid such as is used in accumulators, then, provided they do not touch each other, they rapidly acquire a potential difference. If we take the metals copper and zinc, in a weak acid solution this "potential difference" is of the order of one volt, and is not affected by the dimensions of the plate.

Some interesting experiments can be made to show the properties of such a simple cell, and the apparatus can be found at home.

1. Put a strip of commercial zinc in dilute battery sulphuric acid; it will dissolve slowly, giving off bubbles all the time.

2. For this experiment a little mercury is needed. Take the zinc out of the acid, and put a little mercury on each side of it; then try to rub it off again; you cannot, because the mercury has amalgamated with the zinc. If this amalgamated zinc is put back into the acid, it no longer dissolves and gives off bubbles.

3. Now put a strip of copper in the acid with the zinc. Make the copper and zinc touch outside the acid, but not inside. Bubbles immediately appear from both zinc and copper, but on inspection you will see that some very small bubbles are clinging to the surface of the copper.

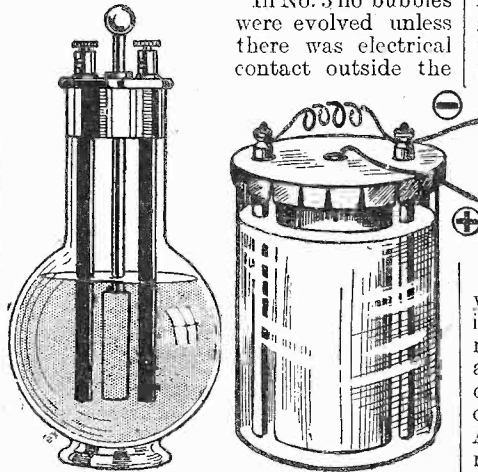
4. Take the copper out and rub it. Connect the copper to the zinc by copper wires through a low-resistance "galvanometer" (this is only something to give an idea of the amount of current in a circuit, like an ammeter, but more sensitive). Put the copper back in the acid, and observe the deflection of the galvanometer. The deflection can be taken as a rough measure of the current, and after some time will be seen to decrease. When it has decreased, take the copper out, rub the bubbles off, and put it back. The current should return to its former value.

5. Now put some crystals of potassium dichromate into the acid. (If you have none of this, use Condy's fluid; this is mainly sodium dichromate, which is cheaper but just as useful as the potassium salt). If the galvanometer deflection is down, it will then jump up and stay up. This shows why the dichromate cell is very good for keeping a voltage of two volts (just over, in fact). In the

dichromate cell, carbon (from old dry cells) is used instead of copper.

These few experiments give the whole theory necessary to understanding the running of "primary cells." They are best explained as follows:—

In No. 3 no bubbles were evolved unless there was electrical contact outside the



A dichromate cell and another battery of the type mentioned in this article.

acid; that is, unless a current flows. The formation of bubbles shows that chemical action is taking place, and so chemical action requires a current for it to continue. Nos. 1 and 2 showed that some action took place even with zinc alone, but this was only because the zinc was impure; if you had used perfectly pure zinc, then it would not dissolve at all. Also, if the impure zinc were amalgamated (as explained in Experiment No. 2) there was no action. The reason for this is very difficult to explain to a beginner, but can be understood later. Here we can say no more than that it is overvoltage.

No. 4. The decrease of the current after some time is due to polarisation. You will remember the very small bubbles which were attached to the copper plate; these "cause the current to diminish for two reasons:—

(a) They form another cell whose "electromotive force," i.e., the source of the voltage, acts in the opposite direction from that of the main cell.

(b) They cover the surface of the copper, so reducing the area available for carrying the current, and thus increas-

ing the resistance of the cell. This decreases the voltage obtained from the cell, as is easily seen when the reader has come to the study of simple electrical circuits.

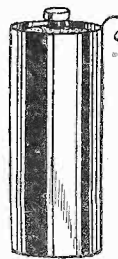
The problem of polarisation is the most important one in cells which are to find practical use in wireless. It can be overcome theoretically in two ways, either by brushing away the bubbles, which is impracticable; or by adding to the cell some chemical agent which can take away the hydrogen. This is quite easily done. Water is nothing but hydrogen combined with oxygen, and since water is a very "stable" substance, it follows that if we add oxygen in some form or other to the cell, it may combine with the hydrogen and form water. In fact, that is what happened when we added potassium permanganate to the cell. That substance, which can be used for making some rather dangerous fireworks, contains a great deal of oxygen which can be given off very easily. Therefore the hydrogen bubbles become "oxygenated" in water, and the other stuff which, if unwise, you can make fireworks with, is de-oxygenated to a new substance which chemists call chromium sulphate; this is green in solution, and so any primary cell which uses potassium permanganate as a "depolariser" becomes green when it has been used for a long time.

### The Dichromate Cell

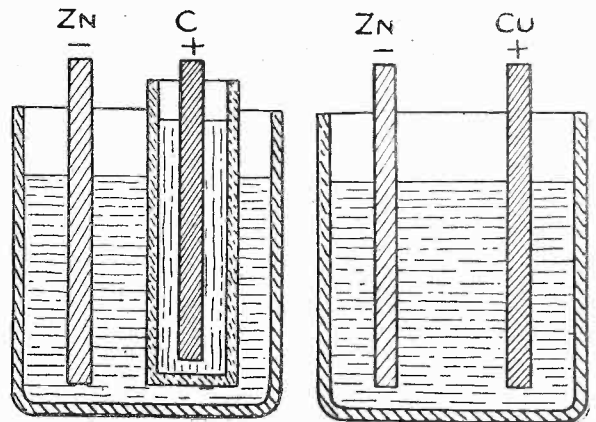
This has been described above; but you must use carbon from dry batteries instead of copper; and if you have no mercury handy you must have some arrangement to lift the zinc electrode out of the acid when the cell is not working, otherwise it will continue to dissolve. Another important point is to have as many as possible carbon rods.

### Leclanche Cell

In this cell the negative pole is again zinc, and it dips into a jar of water containing sal ammoniac, or ammonium chloride to give it its proper name: there is also a pot, made of unglazed earthenware, standing in the jar. This pot is called a "porous pot," because it allows very small particles, or drops of liquid, to pass through it. Inside the porous pot is solid manganese dioxide (a very cheap substance) and little granules of carbon. The action of the cell is practically the same as the dichromate cell, except that the manganese dioxide acts slower.



A cell from a dry battery.

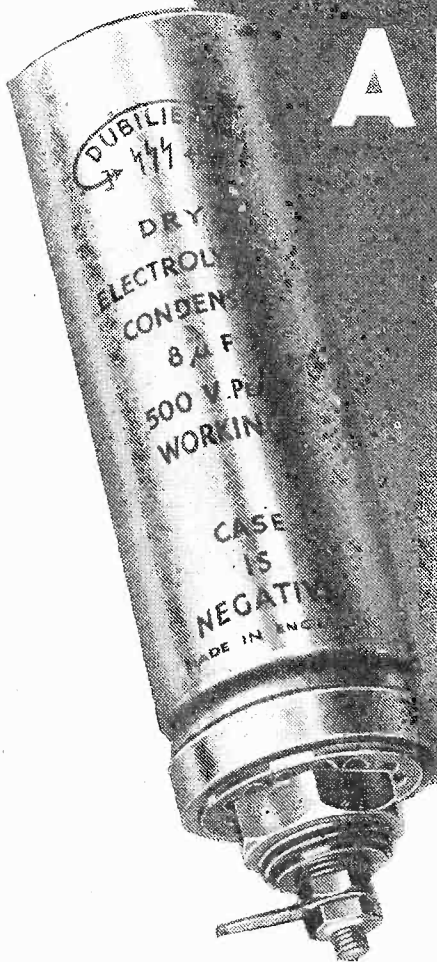


Section of a Leclanche cell.

This diagram explains the function of the primary cell.

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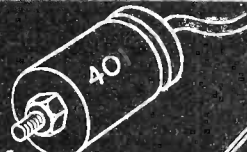
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SUPPLEMENT TO "PRACTICAL WIRELESS"

# AMATEUR TELEVISION

## PHONIC WHEELS

By H. J. BARTON CHAPPLE, B.Sc., A.M.I.E.E.

FROM time to time, when discussions take place concerning mechanical forms of television receivers, references are made to phonic wheels and motors, and these are confused with the synchronising or correcting devices which function in such a manner that they keep the image steady within its normal

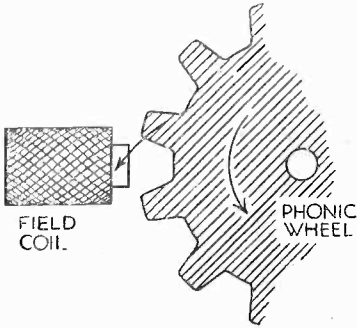


Fig. 2.—Indicating the influence of the magnetic flux on a tooth of a phonic wheel.

observation frame. The phonic motor or La Cour Wheel, as it is known on the continent, is really a simple driving motor which, in its very common form, is used for rotating light scanning discs, consists of a laminated armature of ferro magnetic material (preferably soft iron) rotating between pole pieces of electro magnets which are fed from a source of alternating current. An actual television receiver, designed by Mihaly some time ago and incorporating one of these motors, is shown in Fig. 1. The toothed wheel or armature resembles somewhat the gear wheel of a lathe with the tops of the gear teeth turned down, the width of the wheel in this case being much greater than an ordinary gear wheel.

### Operation

In Fig. 2 is indicated one pole piece of such a motor, together with a portion of the rotating wheel, one arrow indicating the direction of rotation, while the inclined arrow shows the influence of the magnetic flux which is developed between the pole piece and an approaching "tooth," due to the current in the field coil.

For simplicity of explanation it is best to assume that a sinusoidal waveform of alternating current, as indicated in Fig. 3, is fed to the field magnet system of this motor. During each current reversal the magnetic flux will reverse in sense also, but since the magnetic attraction depends upon the square of the current, this attraction, which, of course, produces the mechanical force between each individual tooth and pole tip, will rise to the same

maximum positive value for each half cycle, as shown diagrammatically in Fig. 4. It is, therefore, plain to readers that what we term the synchronous speed of the rotor will correspond with the passage of the teeth past a pole piece. This is not equal to the number of cycles per second but is twice that number.

Under ordinary circumstances a phonic wheel motor is not self-starting, and requires to be run up to speed. In the case of the receiver shown in Fig. 1 this was done by allowing the wheel shaft (shown vertical) to protrude slightly through the metal cover (shown inclined), and this engaged with a small hand crank to provide its initial revolutions. It is possible to bring standard electrical practice into play, however, and bifurcate each pole piece so that

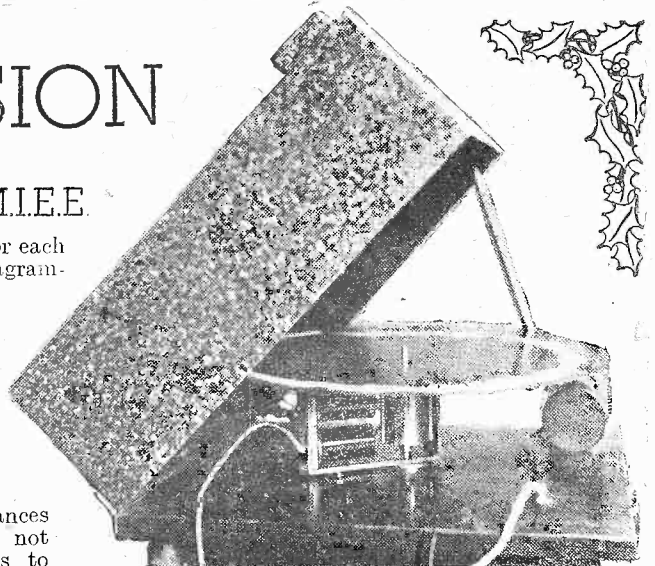


Fig. 1.—An actual television receiver incorporating a simple phonic wheel motor.

of ways, but one which is very ingenious brings into play a valve oscillator so arranged that it can be pulled in frequency over a limited range by properly timed impulses. An oscillator of this character is generally termed a relaxation oscillator,

and the simple circuit of Fig. 5 illustrates one form of this device in which a phonic-wheel motor serves as the drive for the scanning mechanism.

First of all, the received television signal is amplified and rectified, and then fed to a dual low-frequency transformer in order to split the signal and transfer it to two different valves. The first of these valves,  $V_1$ , feeds the light modulating device incorporated in the television receiver in the usual manner. The second valve,  $V_2$ , is fed from the other transformer secondary, via a volume control, a stage of R.C. coupling serving to link this valve to the grid circuit of  $V_3$ .

This valve is maintained in a weakly oscillating condition, and magnetically linked with the tuned anode circuit is another tuned coil which feeds to the grid of a power oscillator valve,  $V_1$ , in the anode circuit of which is included the field winding of the phonic motor shown in a simple diagrammatic manner. The power generated is sufficient to drive the wheel at the correct speed, but to reduce objectionable hunting to which this form of complete device is very prone.

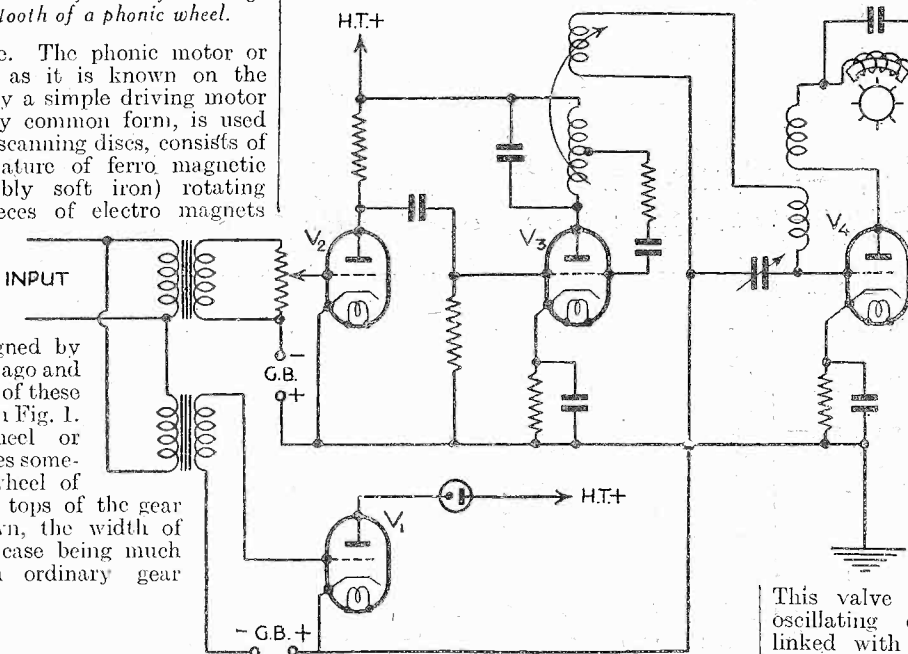


Fig. 5.—A simple oscillator circuit for providing power to drive a phonic-wheel motor.

sections of it lie opposite two teeth simultaneously, and then "shade" one section of each pole piece with a copper ring. The motor is then rendered both unidirectional in rotation and self starting.

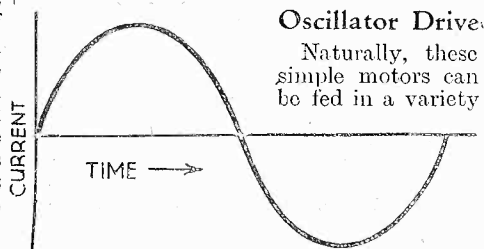


Fig. 3.—The simple sinusoidal current waveform applied to the field coils.

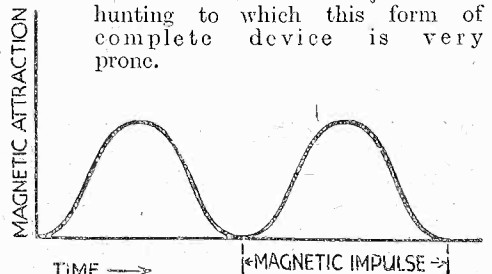
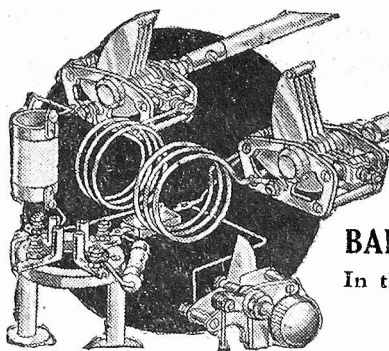


Fig. 4.—The magnetic attraction is always unidirectional.



# Short Wave Section

## BAND SPREADING ON THE SHORT WAVES

In this Article a System is Outlined which is Simple to Incorporate in a Set, and Easy to Operate

By A. W. MANN

**B**AND-SPREAD tuning, whilst an attractive proposition to the short-wave enthusiast, appears to many as a complicated business a little beyond their ability in so far as the practical application of the system is concerned. It has undoubtedly been responsible for more hard words and disappointing failures than anything else associated with the design and construction of short-wave receivers.

The principal complaint usually was that the operator never knew where he was working, and instead of simplifying tuning the reverse was the case. There are but two reasons for such a state of affairs. The application of the system was wrong, or the operator did not try to master the new arrangement, which is drastically different from straight tuning.

Readers who carry out the instructions given in this article will find that their troubles will end as the system outlined, together with the data given, has been carefully worked out in theory and applied in practice. Not only is it possible to spread the amateur bands, but every band within the tuning range of your receiver, when using the coils outlined, together with tuning condenser capacities recommended.

The materials required are as follows:—

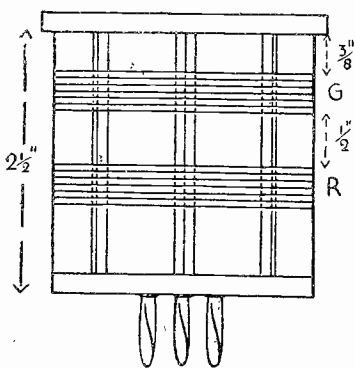


Fig. 2.—Coil suitable for 30m. to 55.5m. G=7 turns 26 D.C.C. R=7 turns 26 D.C.C. G and R turns spaced 1/16in.

- 4 lengths of 2 1/2 in. diameter ebonite six-ribbed former.
- 8 hard-wood discs (sec text).
- 4 3/16 in. ebonite discs (D2), 2 3/4 in. diameter.
- 4 3/16 in. ebonite discs (D1), 2 1/2 in. diameter.
- 16 valve-pins and double nuts and washers.

- 1 four-pin valve holder.
- 1/2-oz. reel 26 D.C.C. wire.
- 1 .0001 mfd. (Lissen) midget variable condenser.

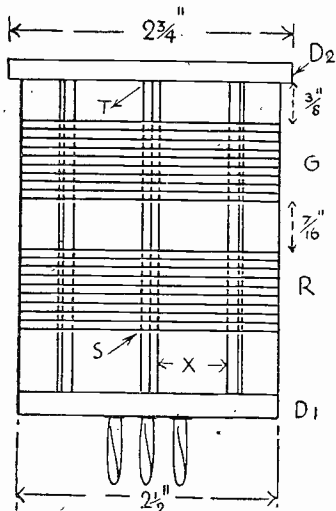


Fig. 1.—A coil for 39m. to 68m. G=10 turns of 26 D.C.C. R=10 turns 26 D.C.C. G and R turns spaced 3/32in.

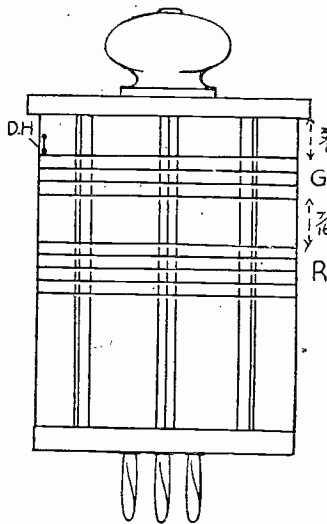


Fig. 3.—A coil for 28.1m. to 35m. G=4 turns 26 D.C.C. R=5 turns 26 D.C.C. G and R turns spaced 1/8 in.

- 1 Ormond small SM dial.
- 1 discarded square-law variable condenser. Any capacity from .0007 mfd. to .00025 mfd. will do. Remove all plates, and assemble with 2 fixed plates double spaced, and 1 moving plate.
- 4 bakelite knobs (optional).

The waveband shown under each coil is that covered with the tank condenser to its minimum capacity

### Making the Coils

First cut and square the ebonite formers as shown in the illustrations. Various wrinkles have appeared in PRACTICAL

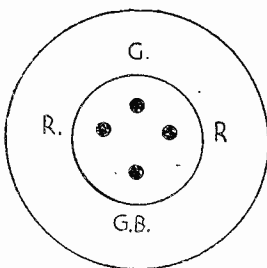


Fig. 5.—The valve base which is used as a coil holder. The reference letters indicate the connections to the various coil windings.

WIRELESS, showing how to cut the slots accurately.

The four ebonite discs D1 (Fig. 1), should next be cut. Follow this by cutting out four hard-wood rings to fit tightly inside the formers, and drill a 1/4 in. hole through the centre. Mark out (with the PRACTICAL WIRELESS presentation gauge), the holes for valve legs to suit a 4-pin valve-holder, and then drill four holes in ebonite discs and screw them to the wooden rings. Follow on by fitting valve pins and lay this part to one side. Cut out the top discs D2 next, also the other four hard-wood discs, omitting the 1/4 in. diameter hole, and fasten them together as previously described. Fit bakelite knobs to these discs if desirable.

Having completed the various parts of the coil formers, the actual winding may now be taken in hand. First study Fig. 5, and note that the top of reaction winding goes to one filament, and the bottom of grid coil goes to plate socket, as marked on valve-holder, which is used as a coil base. Before commencing winding, place the valveholder in your receiver in order to see how these connections will work in with the existing wiring. When the best position is found, wire up the coil base permanently. Take the formers and drill the usual double holes at the top and bottom of the windings. It is advisable to wind round the turns required, just to make sure as to the exact location of the bottom double holes, before winding permanently. Wind all turns in a clock-wise direction, and leave sufficient wire at each end to enable connections to be made to pins. Fasten the ends to appropriate pins, and wind evenly around a pencil, like a coil spring.

The coils may now be assembled. Glue the edges of the wooden base rings, and fit them into the bore of the former. Fit

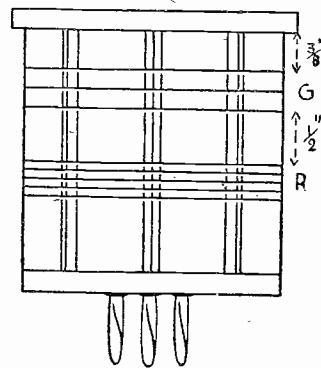


Fig. 4.—A coil wound for 12.5m. to 26.5m. G=3 turns 26 D.C.C. R=5 turns 26 D.C.C. G turns spaced 3/16 in. R turns spaced 3/32 in.

the top disc D2 in the same way. If found desirable a 2BA screwed rod may be passed through the knob, top discs and bottom discs, thus making a very satisfactory job. Double nuts should be fitted at both ends.

### The Necessary Alterations to Set

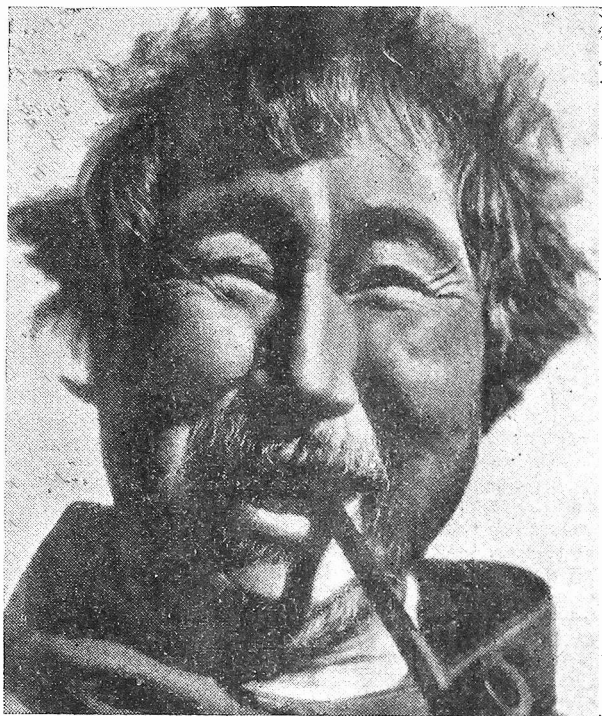
Next we come to the most interesting

part of the work, i.e., altering the receiver. The existing tuning condenser may be a .00025, .0001, or a .0003 mfd. Whatever it happens to be does not matter; just take it out and fix the two fixed- and one moving-plate condensers in place. Make quite sure that the fixed vanes are double spaced. A place for the .0001 midget condenser must now be found. If there is sufficient room on the front panel mount it there. I find that the detector end of the cabinet is a much better position from the operating point of view. Having fitted the tank condenser and band-spread condenser in the receiver, wire the fixed vanes of each in parallel, also each set of moving vanes, that is fixed to fixed, and moving to moving. In order to find the wave-band you require plug in the appropriate coil, set the three plate condensers at zero; then tune the receiver with the .0001 tank condenser. For example, the coil shown in Fig. 3 covers the waveband from 28.1 to 35 metres. If you wish to spread the 31 metres band tune in Zeesen DJA, using the tank condenser, and then adjust the three-plate spread condenser to the centre of the dial. By reducing the capacity of the tank condenser DJA will come in again. Now leave the tank condenser set, and tune with the spread condenser each side of the centre point of the dial.

Another method is to set the tank condenser at zero and tune the spreader over the full scale, bring back to zero, increase the tank condenser one degree, and repeat the former operation until the whole tuning range is covered. Briefly advance the tank condenser one degree at a time with spreader at zero, and cover the full scale with the latter. If desirable, set spreader half-way on a 100 dial, and search each side of that point to zero and 100, then advance the tank condenser and repeat.

The writer does not claim that this system of band spreading is the best. It has one defect, and that is the spread is not constant over all wavelengths. The tapped coil system is better, and the constant band-spread system developed and used in American commercial spheres is ideal. Both, however, are complicated. The system outlined in this article, however, has the following advantages. It is simple to incorporate, to operate, and to understand, and providing that the enthusiast is not hypercritical is quite a satisfactory proposition. In conclusion, readers will find that a few hours spent in tuning with the tank condenser (spreader at zero), and calibrating the dial of the former, will be well repaid. Before doing this, however, set the aerial series condenser at its minimum capacity, i.e., vanes right out. If you require a special coil for the amateur 40 metres band, so that spreader puts this band in the centre of the dial, reduce the coil shown in Fig. 1 to nine turns by removing one turn on each coil T and S. To further increase spread-over on all coils, reduce spreader to one fixed and one moving plate. Don't forget, however, that by doing so maximum wavelength will be reduced on all coils.

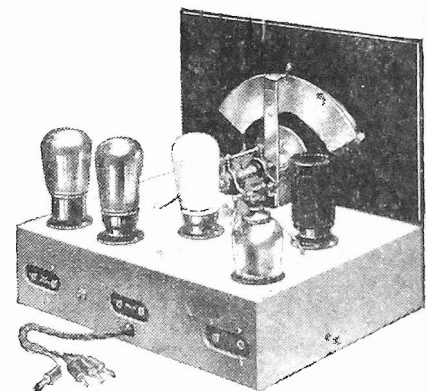
# THIS ICELANDER—



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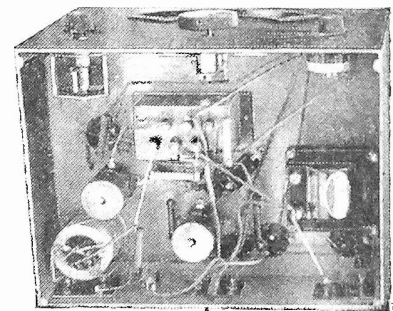
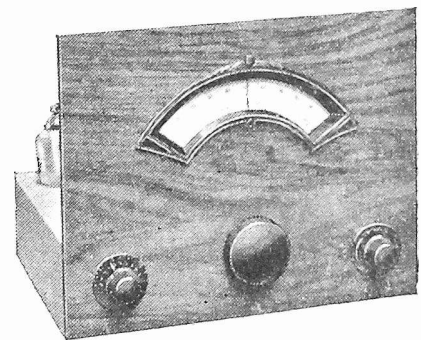


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(Editor of "Practical Wireless.")

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**2/6**

# EDDYSTONE KILODYNE 4

**UNIVERSAL VALVE POINTERS**

(Continued from page 432)

of an undistorted output in the neighbourhood of two watts, and while this is ample for most purposes, many constructors who are strong advocates of good quality prefer to use a power stage capable of at least twice that output.

It has already been pointed out that the heaters of all the valves in a set using A.C./D.C. valves, are connected in series with a regulating resistance across the mains. It is at once apparent, therefore, that all the heaters must be rated to take exactly the same current. Unfortunately, the various valve manufacturers have not achieved standardisation in this respect at the moment. Some makers have adopted 0.2 ampere for their heaters and others 0.25 ampere. Valves of different makes, providing their heater currents are equal, will, however, work perfectly well together. A study of the valve catalogues makes it clear that different valves taking the same heater current, do not necessarily require the same heater voltage. This does not matter in the slightest, since the valves are to be connected with their heaters in series. The reason for the differences in heater voltage is really a matter of heater wattage.

For most valves, such as H.F. pentodes, detectors, and so on, a heater wattage of between 2 and 3 watts will provide ample electron emission from the cathode for satisfactory working. In the case of output valves and rectifiers, however, which have to pass a fairly large anode current, the heater wattage must be correspondingly increased. It is for this reason that, to quote one

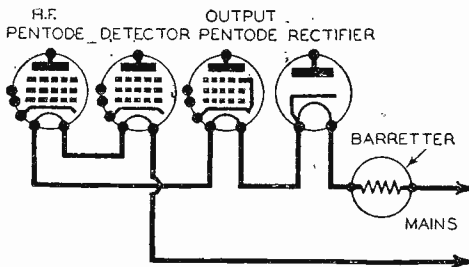


Fig. 2.—The arrangement of the heater wiring to avoid hum and large potential differences.

maker's figures, as an example, the early stage valves have heaters consuming 0.2 ampere at 13 volts, while the heater of the output pentode consumes 0.2 ampere at 24 volts, and that of the full-wave rectifier 0.2 ampere at 30 volts.

**Proper Series Connection**

All that really matters is that the total voltage drop required by all the heaters in the set shall not exceed the mains voltage available. The ratings of all makes of valves have been so arranged that this condition is fulfilled easily even in a set employing six or even eight valves.

In fact, as already hinted, there will always be an excess voltage which must be absorbed by a regulating resistance. The ideal form of regulator for this purpose is a device known as a "barretter." It is a form of electric lamp having a long filament, usually of iron wire, the resistance of which varies with its temperature in such a way that it compensates for fairly wide variations in voltage.

As an alternative to a barretter a wire-wound resistance of suitable value and capable of carrying the heater current continuously without overheating may be used. The actual voltage of the resistance will depend upon the mains voltage and the voltage required for the heaters, and can be calculated by adding up the heater voltage ratings of all the valves, subtracting this from the mains voltage, and dividing by the value of the heater current in amperes.

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- P.T.2. Pentode.
- S.2. Screen-grid H.F. Amplifier and Det.

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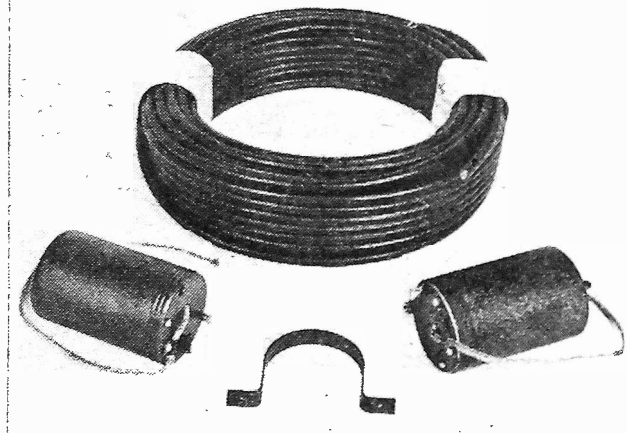
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# FACTS & FIGURES

Components tested in our Laboratories

## E.M.I. Anti-static Equipment

A USEFUL anti-interference aerial system will shortly be released by Electrical and Musical Industries Service, Ltd., for the elimination of man-made static in those districts where reception is spoiled by this form of interference. The illustration below shows the complete equipment, from which it will be gathered that it consists of a length of screened lead and two impedance-matching transformers. The latter two components are of the step-up and step-down type designed respectively for use in the aerial and at the receiver, and to connect the two the special feeder cable which is supplied with this kit is of the twin balanced variety. The covering of this cable is of the heavy waterproofed type, and thus the equipment may be fitted and forgotten, with the certainty of complete reliability at all times and in all weathers.



The E.M.I. anti-static aerial equipment.

Supplied with the outfit is a comprehensive book of instructions, which, in addition to giving the necessary details to enable the equipment to be fitted to a normal household receiver, includes details for wiring from one to twelve receivers for dealers' demonstration purposes, and the use of the screened cable for underground aerial-feeder lines, etc. The price of the complete outfit is 57s. 6d.

## The Rotameter De-luxe

THIS novel instrument gives eight different ranges for testing purposes, all difficulties regarding the setting for each range being completely removed by means of a very novel switch, which, in addition to inserting the necessary resistances, etc., in the leads also changes the appropriate scale. The latter is printed on an eight-sided roller, situated behind a small window, which permits only one side to be seen at a time. Thus, by rotating the knob at the side until the required scale is brought into view all the necessary internal connections and modifications are made and there is

thus very little risk of damaging the instrument through wrong use. In addition to the eight scales, two terminals are provided on the top for the connection of two substantial testing leads, and a set of holes arranged in standard valve-leg formation enables a valve quickly to be inserted for testing the continuity of the filament or heater. The instrument has a resistance of 500 ohms per volt and the eight ranges are:—

- 0—5 volts                      0—10 mA.
- 0—20 „                            0—50 „
- 0—100 „                           0—250 „
- 0—400 „                          Resistance test.

To enable the instrument to be set accurately a zero adjusting screw is provided, and a small cell is included in the case for the resistance and continuity tests. The ranges which are covered are adequate for all normal requirements, and the instrument has been thoroughly tested and the calibration has been found very accurate. The case is attractively finished in black bakelite, and the eight ranges are engraved in black on a matt aluminium panel above the scale, and this, together with the attractive booklet of instructions, will ensure that no difficulties can arise. A neat velvet-lined black leatherette case houses the instrument and it is thus protected from dust, etc., and is a very attractive present for this time of the year. The price is two guineas.

## General Release of Mullard A.C./D.C. Valves. New Type Added to Range

ALTHOUGH a large number of commercial receivers employing Mullard Universal valves have appeared on the market and the valves themselves have been available for replacement, no official "general release" of the complete range has been notified. It is now announced, however, that these valves are available.

The original range, it will be remembered, comprised the octode frequency-changer (F.C.13); the variable-mu screened pentode (V.P.13A); a "straight" screened pentode (S.P.13); double-diode (2.D.13) and output pentode (Pen.26), together with a half-wave rectifier (U.R.1) and full-wave rectifier (U.R.2).

A new type has now been added

and will shortly be available. This is a general purpose triode, H.L.13, with the following characteristics:—

- Heater current . . . . . 0.2 A.
- Approx. heater voltage . . . 13 V.
- Anode impedance . . . . . 10,000 ohms.
- Amplification factor . . . . . 40
- Mutual conductance . . . . . 4.0 ma./V.
- Price . . . . . 13/6

This valve will, of course, find its chief application as L.F. amplifier following the S.D.13 diode detector.

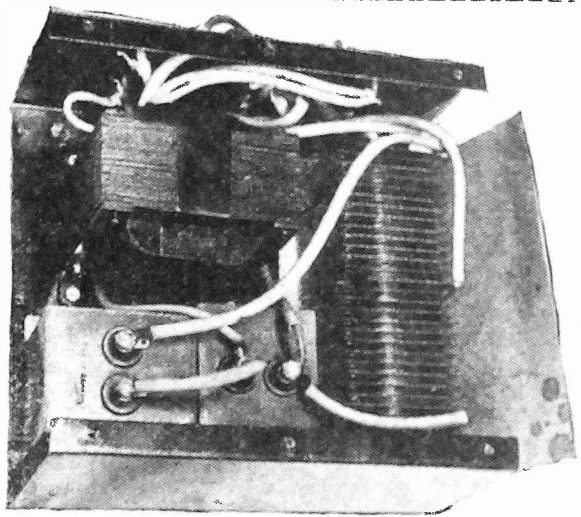
## The Adey Key

WE have previously mentioned in our pages the neat portable which is manufactured by the Adey Portable Radio Company, and for the benefit of those who are unacquainted with it we would point out that the case measures only 8 1/2 in. wide. Inside is a complete four-valve battery receiver, loud-speaker, and batteries for L.T. and H.T. supply. The most interesting feature of these receivers is the device known as the Adey Key. This is a modified plug of the type which used to be popular for plugging in the loud-speaker, and the upper portion contains a small tapped coil, together with a selector switch projecting through the edge of the plug. The jack into which the plug fits is wired in the L.T. and detector anode circuits, and thus removal of the plug interrupts the L.T. supply and puts the receiver out of action. Owing to its very small size, the plug may then be placed in the pocket or otherwise carried about and no unauthorized person can use the receiver. When plugged into the jack, not only is the L.T. circuit completed and the valves switched on, but the small coil in the top of the plug is then included in the detector anode circuit and thus comes within the field of the frame aerial winding situated inside the cabinet. By rotating the plug the degree of coupling may be varied, and the manipulation of the small switch enables the actual control to be modified according to the wavelength, etc. This is a most novel arrangement and works very well in practice.

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This is the Heayberd mains unit which was specified for the A.C. Superhet Three.

# The Peto-Scott S.G. Three Kit

Details of an Interesting Complete Outfit for the Beginner

THE kit under review is highly suitable for the beginner or newcomer to radio, containing in its case, in addition to the receiver and necessary batteries, the aerial and suitable insulators. The carton in which the outfit is delivered bears the inscription "From Factory to Fireside," and certainly there is very little left for the listener to worry about when he receives this kit. The receiver is housed in a neat cabinet, of strictly modern design, the controls and tuning escutcheon occupying one half of the front and the loud-speaker grille occupying the remaining half. The reduction in size which results from this side-by-side arrangement enables a really small cabinet to be employed and yet permits of the batteries being enclosed out of the way. The cabinet in question is just under 9in. deep and is less than 18in. long. The height, including the small ornamental feet, is only 11in., so that it may be placed on a really small table without looking clumsy or ponderous.

### The Kit

When the carton is undone the cabinet will be found securely held in position by corrugated boards, and with the battery cords neatly tied and arranged, and the instructions together with a spare fuse—a very thoughtful point on the part of the makers—securely fixed to the base of the cabinet with drawing pins. Thus, before anything can be done with the receiver, the spare fuse and instructions are almost

placed into your hands. Three valves (Hivac manufacture) are packed in the lower part of the carton, each in their individual boxes, and an accumulator, grid-bias, and H.T. batteries, a coil of aerial wire, and a package containing the insulators completes the kit.

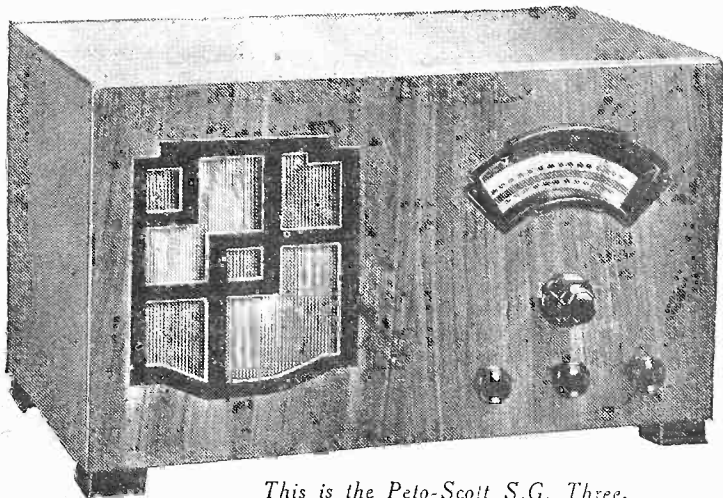
The receiver chassis is probably one of the neatest which we have seen, measuring only 8in. by 6in., yet it contains all the essentials of a really well-designed modern three-valver. Two screened coils; a ganged and totally screened condenser; full-vision drive calibrated in metres; combined wave-change and radio-gram switch; reaction control and volume control are all included in this small chassis. A permanent-magnet moving-coil loud-speaker is employed with the chassis, and thus fully meets the demands of the modern listener.

### The Circuit

The valve combination is the already popular S.G., detector, and super power, the

appropriate valve sockets being clearly identified by indelible markings on the rear edge of the chassis. The choice of circuit arrangements has been so made that the maximum signal strength will be obtained in any part of the country, and the normal selectivity is adequate. To enable adjustments in this direction to be made, a small plug projects from the rear edge of the chassis, and two terminals, marked 1 and 2, are provided in addition to the aerial socket. Thus the aerial is plugged into the aerial socket, and then the small plug may be inserted into socket 1 or 2 according to the results desired. Socket 1 gives greatest selectivity, but results naturally in a slight loss of signal strength. On the other hand, socket 2 gives greatest signal strength but

*(Continued on opposite page)*



*This is the Peto-Scott S.G. Three.*

Registered Trade Mark

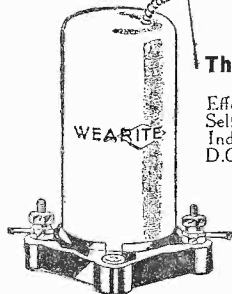
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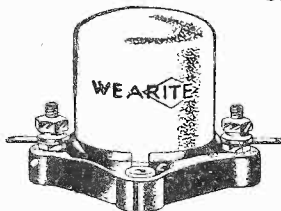


#### The H.F.P.A. CHOKE

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Effective impedance 15-2,500 metres  
Self-capacity 4.5 m.mfd.s.  
Inductance 250,000 mh.  
D.C. Resistance 300 ohms.

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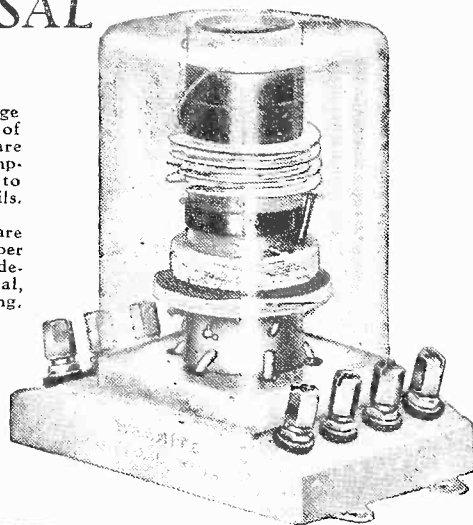
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THE PETO-SCOTT S.G. THREE KIT

(Continued from opposite page)

is not so selective. A separate H.T. lead is provided for the voltage on the screening grid of the H.F. valve, and this enables maximum efficiency to be obtained. To many listeners this arrangement is preferable to the use of a potential divider, although by inserting the appropriate plug into, say, the 70 or 80-volt socket on the battery, it may be forgotten about and no experiments need be carried out to see if any improvement is possible.

Results

The receiver was connected up and tested in our laboratories. Following the makers' instructions, the various battery connections were made, and the tuning dial was set to the wavelength of the London Regional station. The combined switch knob was then turned to the medium-wave position and the London station was immediately heard. The volume control was then turned to provide good signal strength, and no further adjustment was found necessary. The tuning control was then turned to the Midland Regional wavelength and nothing was heard. However, the particular ganged condenser which is fitted to this receiver is provided with a concentric knob on the front which controls a trimming condenser, and the moment this was manipulated the Midland station was brought in at comfortable strength. During a test of the receiver this trimming control was found of inestimable value, and it enabled the very last ounce to be got out of the receiver by accurately balancing the two circuits. With this control and the reaction control very accurate settings are obtainable on weak foreign stations, whilst the volume control enables the strength of the local to be very finely controlled. The kit will prove ideal for a Christmas present, and the price is six guineas. It is available, if desired, on hire purchase terms of 5s. down, and eighteen monthly payments of 7s. 9d.

British Radio Institution Lectures

THE remaining lectures for the 1934-5 session, to be held at King's College, Strand, W.C.2, are as follows:—

December 11th: "Effects of Radiation on Living Matter," by Dr. Hugh Davies, M.A., M.R.C.S., D.M.R.E.

February 12th: "Transmission of Pictures Over Communication Circuits," by E. S. Ritter, M.I.E.E.

March 12th: "Recording and Reproduction of Sound Motion Pictures," by H. S. Hind, A.M.I.E.E.

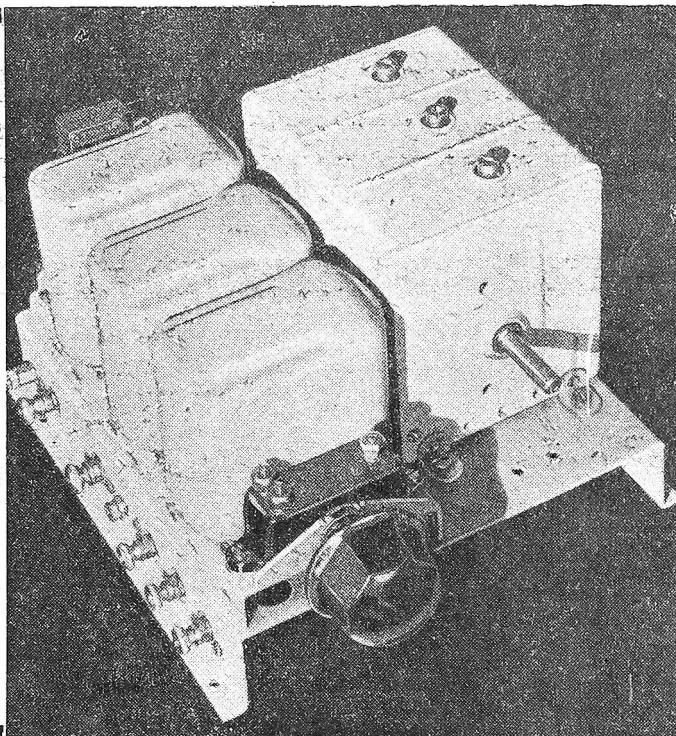
April 9th: "Radiology and High Frequency Engineering," by Dr. Bernard Leggett, M.I.E.E., F.R.C.S.

Invitation Cards to these lectures, which commence at 7 p.m., can be obtained on application to the Secretary, The British Radio Institution, 36, Gordon Square, London, W.C.

Sterno Records

Charlie Kunz, the popular director of the Casani Club Orchestra, is again in the British Homophone Company's current list on Sterno 1519 and 1520. These two records introduce such popular tunes as "I Saw Stars" and "Who Made Little Boy Blue," and "Sitting Beside o' You" and "What are You Going to Do" (the last two tunes are from the musical comedy "Yes, Madam," which is now running at a London theatre).

# Best wishes for Xmas



Made under licence from patentee, Hans Vogt.

# Best results for 1935

## COLPAK TUNING UNIT

The finest resolution you can make is to fit the finest tuning unit of all in your Set—the Colpak tuning unit. When all those happy and important broadcasts at Christmas and during the New Year are coming through crystal-clear and uninterrupted, you will be glad you were so wise in your choice. Incorporating Ferrocart Coils, the efficiency and precision of the Colpak is unparalleled. The fact that it has been specified time and again by all the leading experts in the country is ample proof in itself of the Colpak's superiority. Price complete—57'6d.. Send to-day for latest Colvern booklet No. 13 to Colvern Ltd., Romford, Essex.

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**What Can Be Filmed Between Now and Christmas**  
**ALL THE NEW APPARATUS DESCRIBED**

# HOME MOVIES AND HOME TALKIES

**CHRISTMAS WITH THE RADIO STARS**

(Continued from page 417)

to put up his cinema show, which includes all kinds of delightful films, and the party closes with a burst of hilarity. In the evening, Christmas dinner is held at the Jack Hulberts' house. Pamela is allowed to sit up for this, and so is Sinbad, Claude's nephew, who lives with them, but Jill and Jaqueline are not considered quite big enough as yet! Broad hints have been dropped for months past as to the nature of their Christmas presents, and point blank requests for a pony, although Claude and Enid feel that a pony is somewhat difficult to accommodate in a London flat. However, they think of compromising with a stuffed pony for Jaqueline, one of those lovely ones on wheels, with harness that takes off and which can be put on again only after a great deal of thought and concentration. Jill will probably get a new bike, a real one this time, not a fairy cycle, for after all, she feels she is old enough—a grown-up woman of seven.

**Topliss Green Junior**

Topliss Green's son, aged ten, is going to have a marvellous time this year. Topliss is going down to Folkestone to sing, as he has done for the past few years, and Mrs. Green and William are accompanying him. They are staying at the Pavilion Hotel, down by the harbour, and Mrs. Green says that William has the time of his life there. They have ping-pong tournaments and all sorts of fun, and on Christmas afternoon an enormous Christmas tree for all the children staying in the hotel, and a fancy dress party. William hasn't yet decided what he is going to be for this, and anyway, he is keeping it very secret. He is devoted to animals, and ever since he was four he has declared his intention to be a farmer when he grows up. Mrs. Green thinks it would be a good plan for him to be trained as a vet., as that would give him plenty of scope to indulge his love of animals, and would also help him considerably as a farmer. William's one desire at the moment is for a Shetland pony. Mrs. Green tells him that he is sure to have one some day, even if he has to wait till he is grown up, but William feels that is rather poor consolation! He seems to imagine that it would be quite easy to keep the pony in the flat in London, and to take it to the hotel at Christmas, but his parents share with the Claude Hulberts the view that ponies in London flats are not really practicable. What is going to be purchased for him is a dog, a wire-haired terrier.

**Anne and Eve Foort**

Reginald Foort's two little girls, Anne and Eve, make a lot of their Christmas decorations at school. They are clever and always have a big party on Christmas Day, and spend weeks beforehand preparing for it. They are both very fond of books and reading of all kinds. They have a great weakness for Teddy Tail and follow his daily adventures with the greatest enthusiasm. Reginald is sure to include Christmas Annuals amongst their presents. Anne and Eve love animals, anything that is alive and interesting, but are frankly rather bored with dolls.

Ronald Frankau's small daughter, Rosemary, although she is not yet two, is already manifesting an interest in housekeeping, and is never so happy as when she is pouring out tea from her dolls' tea-set. Ronald is giving her an enamelled tea-service for Christmas.

**CHRISTMAS DELIVERIES**

Ensure early delivery of your radio requirements by entrusting your order to us. Our central position enables us to supply much equipment of which at present there is a shortage. **CASH & C.O.D. ORDERS DESPATCHED BY RETURN, POST FREE.**

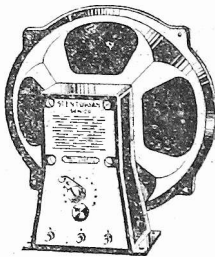
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Complete Kit of parts for this remarkable set exactly as used by Mr. F. J. Gamm.

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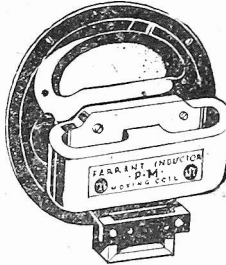
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MODEL	OUTPUT	PRICE
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## IMPRESSIONS ON THE WAX

Interesting News About Recent Records.

ONE of the problems of a record company is to be on time with titles. Often, as in the case of *Brunswick*, the titles are American and the matrices are already in the possession of the English company, but the publishers hold up the titles—usually because the numbers in question are in some musical show or film and cannot be released until the opening in London. A typical example was "Night and Day," which was held up for so many months, although the song was well known here all the time. Often, too, by the time

the records are on-sale the demand for the song has dwindled because people are becoming tired of the melody.

The case of "Heat Wave," however, is more happy. This song, from the most successful musical show, "As Thousands Cheer," which was played to capacity in the States for over a year, has not been overdone in this country. And the English Decca Company are dead on time with three records of it—by Joe Venuti (F5202), the Casa Loma, with vocal refrain by Mildred Bailey, the coloured star and wife of Red Norvo, the famous exponent of the marimba and xylophone (O1868), and by The Dorsay Brothers (O1867), who are one of the outstanding combinations in the States.

### A Crippled Singer

Connie Boswell's rendering of "Say It" (O1865) is a very beautiful number. Connie

Boswell manages to give something to a song that no one else seems to achieve. Maybe this is due to her intensive musical training. She even "arranges" her accompaniments note by note, and spends endless hours in perfecting her phrasing and moulding the scheme of her song. As you know, she is unhappily crippled and has to be carried, or wheeled in an invalid chair. Realising, therefore, the physical handicap under which she has to work, her results are even more astounding. Maybe she is compensated for her affliction by being given this glorious voice, which is the most phenomenal musical factor in America to-day, and her services on the radio are consequently in tremendous demand.

### "Love in Bloom"

Next comes the "Street Singer" singing "Love in Bloom" (F5209). Bing Crosby has already recorded this, and the song is becoming an outstanding hit. Remembering the amazing sales the Street Singer reaches, you can rest assured that his new record is going to be in best-selling class within a few weeks.

Frank Crumit makes his first appearance for Decca on F5210. As you will know, he has long been a big seller in this country, and is, of course, one of America's "sure-fire" hits. His capture for Decca is regarded as a great scoop. His songs are always simple in melody, with humorous words which form a complete short story. His most famous effort was "Abdul Abulbul Amir." He writes his own material, and with the provincial market should be a tremendous success.

### The Bolero

"Bolero," by Ravel, is a piece of modern music that has had a startling world success in recent years. The film of that title has been built around Ravel's music, and has been a tremendous success in this country, where it is still showing to crowded houses. The complete dance is recorded on Decca-Polydor—which takes up four sides, played by the Lamoureux Orchestra of Paris, conducted by Ravel himself, and which is the only authentic recorded version in existence (CA8015-6).

Realising the importance of this composition, Decca decided, in response to an overwhelming number of requests, to record a condensed version on a one-and-six-penny record. The choice of orchestra was difficult, but it was finally handed over to Harold Ramsay. The reason that Harold Ramsay was chosen was that he has lately formed a Symphony Orchestra on most novel lines, and which is the first of its kind in England. In effect, it is modelled on Paul Whiteman's Orchestra, which is a combination of jazz and symphony players. As an indication of the importance of this record, the "arrangement," as played by Harold Ramsay's Orchestra, had to be approved by Ravel's musical representatives before the record could be made. The number of this interesting record is F5236.

"Valencia," which had a world-wide popularity a few years ago (it sold more records than any single composition in history), has been revived by the Massed Bands of Lew Stone, Alfredo Campoli, and Don Rietto and his Accordion Band, conducted by George Scott-Wood (F5167).

### A Mystery Singer

I am often amazed at people's efforts to gain notoriety for themselves. In the case of this Mystery Singer, however, I am

(Continued on next page)

## Mr. F. J. Camm says:

"Hivac Valves contribute no small part to the efficiency of the Hall-Mark Three. My aim was to produce a receiver utilising high-class components in a modern circuit to give a first-class performance, hence the name Hall-Mark Three. Rigid adherence to my specified parts will ensure entirely satisfactory results."



Mr. F. J. Camm, Editor of PRACTICAL WIRELESS, and designer of the "Hall-mark Three."

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## THE SCIENTIFIC VALVE

BRITISH MADE

FOR THE

## "HALL-MARK 3."

Thousands of Dealers already hold supplies of all these Hivac Specified Valves. Furthermore we carry ample stocks to fulfil forthcoming orders by dealers.

Special Notice to Dealers.

Urgent orders may be telephoned from any part of Gt. Britain, between 7-9 p.m. at our expense.

\*Phones: Clerkenwell 7587 and 8064.

These are the Hivac Specified Valves:

D210	3/9
PP220	6/6
VP215 (4-pin)	10/6

## IMMEDIATE DELIVERIES GUARANTEED

High Vacuum Valve Co., Ltd., 113-117, Farringdon Road, London, E.C.1.

forced to be inquisitive, because I do not think his is "stunt" publicity.

This singer was recently found by the B.B.C., and Decca were approached by them to record him, his first broadcast having caused considerable stir. I was naturally interested to know who this Mystery Singer might be, and I visited the recording studios to find out. Imagine my surprise, therefore, when I found him alighting from a taxi, completely masked, and with a member of the B.B.C. either side of him!

I followed into the studios and watched him make his record ("A Roving Medley," F5252), in the hope that the veil might be lifted. I was unlucky; as soon as the record was completed, he was escorted out of the building by these two stalwarts and vanished quickly into thin air, leaving the whole of the recording staff in complete wonderment!

**A 27-year-old Hit!**

In these days of radio, and the reputed short life of popular hits, it is interesting to see that the star "His Master's Voice" record of recent times is of a song which was a hit twenty-seven years ago. "I love you so," the waltz song from the "Merry Widow," has been a public favourite for two generations. Before the first night of "The Merry Widow" at Daly's, in 1907, Lehar had some conception of the possibilities of the song he had written, and strict orders were given to all members of the staff not to whistle the tune outside the theatre. Lovers of good singing must, therefore, hear the famous American tenor's, Richard Crooks, recording of "The Merry Widow Waltz," which is issued on H.M.V. DB2336, coupled with "Kathleen Mavourneen."

**Records of Banned Band Concert**

Many thousands of brass band enthusiasts who were unable to hear the performance of the massed bands at the Crystal Palace festival at the end of September, owing to the ban imposed on the broadcast by the organisers of the festival, will be interested to know that this did not extend to the "His Master's Voice" mobile recording laboratory, which was stationed outside the Crystal Palace, and captured on tape four of the pieces played by the massed bands. These include "Excelsis" march and "Jesu, Lover of my Soul," on H.M.V. B8229, and "May Day Revels" and "Champion" march medley on H.M.V. B8230.

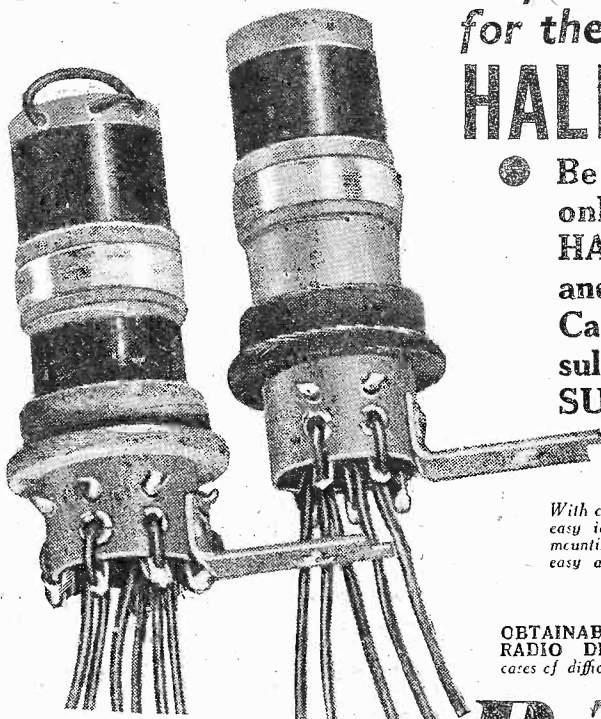
Another product of this marvellous laboratory is a medley of war-time songs and other marches played by the Massed Bands of the Southern Command, which was recorded during the Aldershot Tattoo, and now released on H.M.V. B8224.

**First Peter Pan Record**

The imminence of Christmas makes the "Peter Pan" selection by the London Palladium Orchestra, on H.M.V. C2693, of topical interest. The London production of Barrie's piece, for which this music was specially written, is always an event of the Christmas season, and young and old will have many pleasant memories conjured up by listening to the first recording of this music.

Children will want a selection of nursery rhymes, arranged by Henry Hall, which is played and sung on H.M.V. B8231 under the title of "Noah's Ark," whilst Gerry Fitzgerald, the new star B.B.C. light vocalist, has made a good record of "I love you so much, Madame" and "Then I'll be tired of you," on H.M.V. B8226.

**SPECIFIED and USED by Mr. F. J. CAMM for the HALL MARK 3**



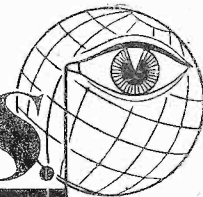
● Be well advised—use only the specified B.T.S. HALL MARK 3 COILS and duplicate Mr. F. J. Camm's published results. There are NO SUBSTITUTES.

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With coloured leads for easy identification and mounting brackets for easy assembly. **THE PAIR**

OBTAINABLE FROM ALL RADIO DEALERS. In cases of difficulty, send direct.

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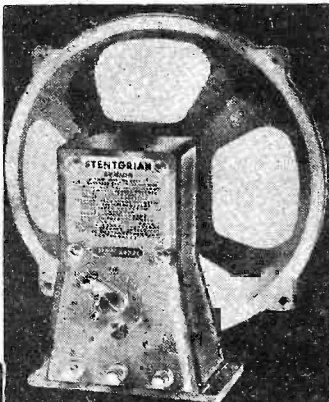
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Will bring an unbelievable improvement to your set, because the new and exclusive magnet gives nearly twice the volume of any previous commercial speaker, and a new method of speech coil assembly obtains astoundingly clear and faithful tone. Also, an improved "Microlobe" device provides accurate matching with any set, or when used as an extra speaker.



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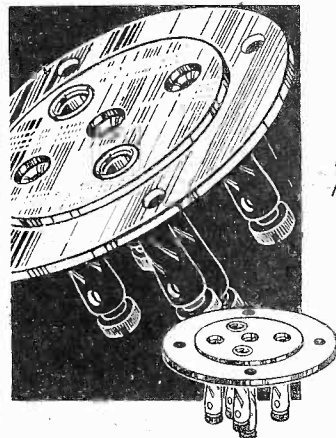
W.B. "STENTORIAN" SENIOR model, PMS 1. Specified for F. J. Camm's Superhet 3. Sent to approved customers for 7 days' trial for only 2/6 deposit. If satisfied, pay further 2/6 at once, then 8 monthly payments of 5/-. (Cash in 7 days, 42/-)

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**CLIX Specified for the "HALL-MARK THREE"**

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**A NEW PRACTICAL HOME MICROPHONE** for broadcasting at home. It is a general purpose, robust mike, with solid bakelite body, back terminals, front metal grille. No. 11. New design, finely finished. 5/6



**No. 11A.** Special in solid brass body, unequalled at the price on speech and music, 7/6.  
**P.W. No. 11 TABLE MIKE.** No. 11, 5/6  
This is a splendid Microphone for speech and music. The bakelite case, containing a 2-in. mike and transformer, is on a bronze pedestal. Switch and plug sockets are fitted on the case. It stands unrivalled for quality and price. 15/-

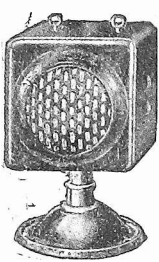
## Fun on your Radio



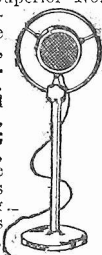
Lesdix Microphones reproduce your voice amplified from your radio set to loud speaker.

**5/- MICROPHONE BUTTONS** for all purposes. Usually sold at 3/6. Our price has always been 1/-. We have supplied thousands to home users.

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Lesdix No. 10B Pedestal, 10in. high, 12/6. Lesdix Superior No. 12BB Ring, 14in. Pedestal, 18/6. W.E. Type Table Model, 5in. dia., for lectures, 35/-. Studio Recording Mikes. B.T.H. Moving Coil P.M.L. 25/-; Amphon, 25/-; Browns D, 28/-; Igeranic Transverse, 28/-; Western Electric P.A., 10/-; Siemens H. Ribbon, 50/- Moving Coil for 25/-; famous Marconi-Reisz B.B.C. Model, 28/-. 15/-



"N.W." No. 11  
15/-  
Mikes for Dance Bands, American type model .. 12/6

**CROONERS** Lapel No. 12 "B.B." 18/6



**Ericsson model transmitters**, standard type, with stand and mouth-piece, as illus., 4/6. Postage 1/-.

**PARTS for Home Constructors.** Buttons 1/- each. Microphone Carbon Granules, in glass capsule, for four buttons. Grade No. 1, 8d., No. 2, Medium 1/-; No. 3, Fine, 1/6; Carbon, solid back, blocks, 4d. Mouthpieces, curved or straight, 10d. Carbon diaphragms, 55 M/m., 6d. Panel Brackets, pivoted, 5/-. Reed Receiver for Button Amplifier making 3/-. Headphones, L.R., 2/9.

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**FREQUENCY RECORDS.** Great demand for these. We can deliver from stock any of the Nos. 90 to 99 previously advertised at the price of 2/6 per record, or 20/- for the 20/7,000 cycles set of ten.

**LIGHT SENSITIVE CELLS.** Small sensitive resistance model, gold grids, moisture-proof. L to D ratio 5 to 1, 5/- each. Mounted in Bakelite, 7/6. Super Model in Oxy-brass body with window, 10/-. Bulb photo cells, R.C.A., 25/-, B.T.P., 15/-. Relays for above from 7/6.

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The Regent Fittings Co. (D285),  
120, Old St., London, E.C.1.



# PRACTICAL 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).

## Pictorial versus Theoretical Diagrams

SIR,—I would like to second the suggestion of your correspondent, Peter Edwards (Cophthorne), in the current issue of PRACTICAL WIRELESS, relative to the doing away with pictorial diagrams. I find it impossible to "visualize" the circuit that is being referred to without first translating the "pictorial" into its corresponding "theoretical" diagram.—PERCY J. FOSTER (Cardiff).

## The A.C./D.C. Superhet

SIR,—It is a pleasure to read your live paper, as it is right up to the minute in keeping your readers in touch with the latest ideas in wireless. The A.C. Superhet 3 is a good example of your foresight in this respect, as this type of set will appeal to many. My only regret is that you should have decided to follow with a D.C. model, as I should have thought that most D.C. users, in view of the eventual change over to A.C., would have preferred the universal model version. Anyhow, I hope you will introduce the A.C./D.C. model in time to be built before Christmas.—R. G. MARTIN (Birkenhead).

[We have already described the D.C. and A.C. models, and in this issue will be found advance details of the A.C./D.C. (universal) model.—ED.]

## A Super Receiver!

SIR,—In the issue of PRACTICAL WIRELESS for Nov. 17th, a reader, Thomas J. Evans, mentions a set with 2 H.F., A.V.C. and push-pull output, band-pass tuning, tuning indicator, and an output of 4 to 6 watts. This is just the set I am wanting, and I hope you will publish a suitable circuit shortly.—S. PADGETT (Boosbeck).

[Are any other readers interested in this type of receiver?—ED.]

## A Short-wave Wanted

SIR,—In reply to the query regarding a short-wave receiver, as suggested by L. Buckley in PRACTICAL WIRELESS dated November 17th, 1934, I should like to mention that such a receiver would suit my requirements, as I have recently successfully passed the P.M.G. second class examination, and I am considering building a short-wave transmitter and receiver when I am permanently settled. As I would only require to receive the short waves, such a receiver would be particularly suitable.—T. F. TYSON (Earl's Court, London, S.W.)

## Another Tribute

SIR,—I am very interested in the superhet receivers you are bringing out. The prices are quite reasonable, and you appear to have got over many of the faults from which the superhet suffers. I shall not built one of your sets yet, but shall probably tackle the A.C./D.C. version.

I like your paper; it is chatty and well informed, and I feel there is a personal note—to do the best for your readers. Many of your ideas I have taken advantage of with profit. There is one thing which I

think would be of benefit to constructors, and that is the inclusion in the list of components of the price of each item. I am very interested in power packs, and I liked the "Armada" mains unit—this set was quite up to a high standard.—WILLIAM LUEWHELLIN (Coulsdon, Surrey).

[The prices of the various components may always be ascertained from the advertisement pages, especially in the kit advertisements.—ED.]

## A Colonial Set Wanted

SIR,—May I suggest that your excellent paper designs a "Colonial set" for short waves and the medium-wave band for listeners overseas? I am sure that there are thousands of other enthusiasts who at present strive with mediocre results to hear English broadcasting to whom a set designed especially for their needs would have an instant appeal. May I suggest that a compact battery set with some provision against "fading" would be just the thing?—C. A. RUMBALL (Aboukir, Egypt).

[What do other readers overseas think of this suggestion?—ED.]

## Earthing to Water Pipes

SIR,—With due respect to the writer of the article "Aerials and Earths for the Flat Dweller," appearing in your issue of October 27th, I would like to make a few comments as to suitable earths.

(Continued on opposite page)

## CUT THIS OUT EACH WEEK

# Do you know

—THAT a simple spark-gap for the aerial circuit may be constructed by arranging two pointed strips of metal close together.

—THAT a soldered joint should not be cooled by dropping water on it or holding it under the tap.

—THAT a gramophone needle may be used to cut out circles of aluminium for screening purposes.

—THAT a quick make-and-break should always be employed when connecting or disconnecting components in a circuit carrying heavy currents.

—THAT an electrolytic condenser must be mounted in the position indicated on the containing case.

—THAT small-capacity condensers of the variable type may be constructed by inserting thick wires into systoflex tubing.

—THAT a rectifying valve glowing blue indicates a severe overload—most likely from a punctured reservoir condenser.

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

(Continued from previous page)

It is frequently difficult to find which pipes run direct from the main, and which from a cistern. Pipes which supply sinks can be relied upon as being of the former category, and, therefore, suitable for earths. Radiators are questionable for using as earth connections, as pipes to these never run into the earth. I should also like to point out that if main pipes from earth are of iron, they cannot be relied upon as well as if of lead, for while the latter have soldered joints, the former merely have screwed joints, sealed in red lead, and they, therefore, do not make good electrical contact.

I trust you will pardon my criticism, but the errors pointed out might be made by anyone not acquainted with plumbing and hot-water fitting.—E. DENIS KNIGHT (Brighton).

**Short-wave 3-valver: Gramophone Records**

SIR,—I have taken your valuable weekly from No. 1, and I have gained a large amount of knowledge from it. It is the finest radio tutor for the amateur, and its pages are full of interest. I have never written to you before—not even to thank you for the splendid gifts I have received, but I do so now, and also make a special request. Please let us have a good long-distance short-wave 3-valver. It is always easy to get the medium or long waves. The winter is now at hand, and most of us who have built sets find nothing else to do except to sit down and tune in. I would very much like PRACTICAL WIRELESS to tell us in simple language how to make a few records for the gramophone; the apparatus required, how to use it, and where to procure the necessary parts.—HAROLD F. RUBURY (Belfast).

**The £5 Superhet Three: Another Appreciation**

SIR,—I should like to congratulate you upon your latest Home Constructor's Set—the £5 Superhet Three. The circuit is obviously a good one, capable of extracting the last ounce from the valves specified. I cannot help admiring the modesty with which you introduce your set to the constructing public.

With compliments, and again congratulating you.—ARTHUR W. SMITH (Haselmere).

**Astounding Offer!**

**YOUR FAVOURITE  
SNAPSHOT MADE  
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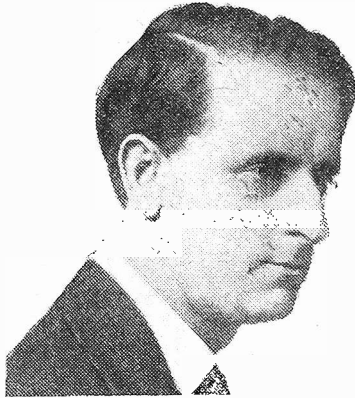
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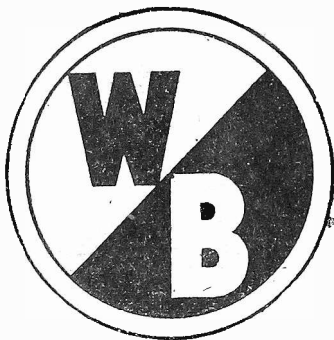
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"I cannot speak too highly of this marvellous instrument." G. H. N., Altrincham.

"Thank you for the opportunity to hear radio so perfectly." R. C., Sninton.



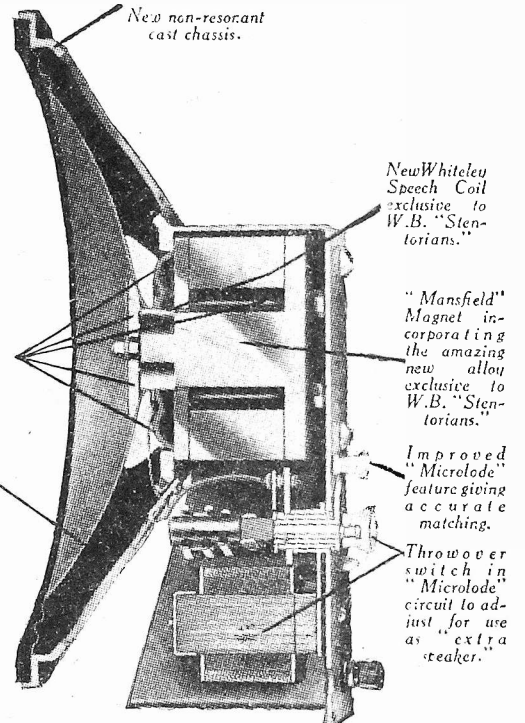
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Sole Agents in Scotland: Radiovision Ltd., 233, St. Vincent Street, Glasgow, C.2.  
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At making Radio Sets he was sick.  
Every Set a success—  
Nothing more—nothing less—  
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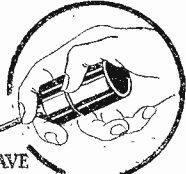
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and have advised the radio trade to at once get in full supplies in readiness for your demands.

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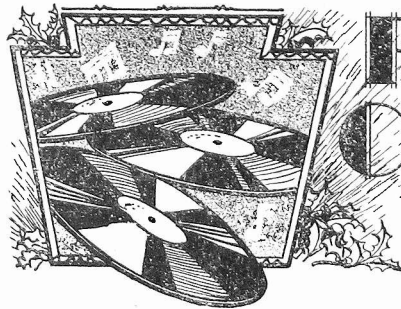
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# RECORDS for CHRISTMAS

By ROBERT TREDINNICK

CHRISTMAS, more than any other season in the year, is the season for the home. What could be more delightful, after the Christmas pudding has been finished, than to take a few well-chosen records and devise a programme entirely for your own personal amusement?

Quite often, these days, a small or large gift of money is sent to greet you, and there are few of us who do not like to buy something really lasting as a reminder of that kind donor. There is really no excuse to-day for anyone to grumble about the price of gramophone records. That excellent record The Rex costs no more than a shilling. From this supplement I would select the Band of H.M. Welsh Guards, playing a couple of really martial tunes, complete with vocal work from a quartette. No, don't be alarmed, for I am perfectly aware that many of you do not enjoy the Military Band in its waxen form, so that I hasten to say that Bobbie Comber, Peggy Cochrane, Sandy Powell, Morton Downey, and Bill Scott-Coomber are all issued on this make of record.

Of course, you may feel like spending an extra sixpence; if such is the case you will find the quiet piano playing of Charlie Kunz on Sterno entirely to your liking, to say nothing of the dance rhythms from Billy Merrin and His Commanders, Mantovani and His Tipica Orchestra, and Sydney Lipton's Band.

### A Fine Organist

There is a wealth of talent on Regal-Zonophone headed by Reginald Dixon. Here is an organist with an enormous following, and a record of his will certainly not be cast on one side if given to a friend or relation. George Barclay, having sung his way through the wax, has become an established favourite. He is an artist who is well worth watching. For the dance band fan there are records from Larry Brennan, Lew Stone, Joe Venuti, and Billy Cotton, whilst the Commodore Orchestra and that of the Café Colette make merry with the lighter type of standard work. No one who has heard Harold Ramsay's Rhythm Symphony would refuse a souvenir in wax of this orchestra, and Decca have seen to it that the public are not to be disappointed. Billy Reid with his Accordeon Band make grand records for the same company, and Roy Fox, one of the most popular of the band leaders, still retains the top notch in sales of Decca Dance Music. Titterton, Parry Jones and Gabriel Lavelle, Maggie Teyte, to say nothing of Piccaver, are but a few of the more serious singers who grace this well-balanced supplement, which also includes such favourites as Lupino Lane, George Formby, Marie Kendall, Hetty King, and Randolph Sutton.

If you are interested in American bands and artists you will have to search carefully before you find a more comprehensive list than that offered by Brunswick. These records cost two shillings and sixpence, and

bring Bing Crosby, the Boswell Sisters, the Mills Brothers, the Casa Loma Orchestra, Guy Lombardo and His Royal Canadians, Ruth Etting, Victor Young and His Orchestra, Red Nichols and His Five Pennies, and Don Redman and His Orchestra right over the Atlantic to your homes.

### Some Good Parlophone Records

Few of your friends or relations would refuse a record or records of Tauber, and this four-shilling Parlophone product is one of the most popular records on sale to-day. Jan Kiepura and Ernst Groh also appear on the same list. On the two-and-six Parlophone record we find Leslie Hutchinson, Patricia Rossborough, the Eastbourne Grand Hotel Orchestra, and Harry Roy and His Orchestra. Parlophone also conjures up the name of Sophie Tucker and Ronald Frankau to our minds, and quite recently Larry Gains, the famous boxer, was added to a list which always offers something out of the general run.

Columbia make a speciality of really first-rate variety records. Elsie and Doris Waters, Norman Long, Layton and Johnstone, the Western Brothers, Jack Buchanan, Jessie Matthews, Harry Robbins, and, of course, the one and only Stanley Holloway feature in the bill. The B.B.C. Dance Orchestra, Carroll Gibbons and the Savoy Hotel Orpheans, Debroy Somers and His Band, and Geraldo and His Sweet Music, are all to be obtained on the half-crown Columbia record. For those who delight in the more serious music, such names as Charles Kullman, Hubert Eisdell, Solomon, Lionel Tertis, Szigeti, Huberman, the London Symphony Orchestra, the Bournemouth Municipal Orchestra, and the B.B.C. Wireless Chorus are all to be found and obtained on Columbia.

### The H.M.V. Lists

His Master's Voice have without doubt the finest collection of records to interest the serious minded. The B.B.C. Symphony Orchestra, the Pro Arte Quartet, Heifetz, Kreisler, Gigli, Richard Crooks, Caruso, Miliza Korjus, and a host of other fine artists can make a permanent niche in our homes via H.M.V. These records cost in some cases six shillings each, in others four, and though that may seem rather a lot to many of you, I assure you that you cannot get better value for your money, always providing that you really appreciate genuine art. Gracie Fields, Harry Lauder, Derickson and Brown, Charles (Gerry) FitzGerald, and Paul Robeson, all established favourites, provide light and sentimental entertainment, whilst dance music is played by Jack Jackson and His Orchestra, Ray Noble and the New Mayfair Orchestra, Teddy Joyce and His Orchestra, and Duke Ellington and His Orchestra.

I can only hope that this all-too-rapid survey of the various supplements may help some of you when choosing records for Christmas gifts, and at the same time I trust that it will be a guide when spending some of that money you may be fortunate enough to be given.



## CATALOGUES RECEIVED

To save readers trouble, we undertake to send on catalogues of any of our advertisers. Merely state, on a postcard, the names of the firms from whom you require catalogues, and address it to "Catalogue", PRACTICAL WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton St., Strand, London, W.C.2. Where advertisers make a charge, or require postage, this should be enclosed with applications for catalogues. No other correspondence whatsoever should be enclosed.

### STANDARD WET H.T. BATTERIES

FULL particulars and prices of wet high-tension batteries are given in a folder we have just received from the Wet H.T. Battery Co. These batteries, which work on the same principle as the familiar bell type of cell, are composed of small Sac-Leclanche cells, each giving 1½ volts, and the number used depends on the voltage required. The cells consist of small square-shaped jars which contain the zinc and sac elements, and the exciting fluid is made by mixing the powder supplied with water. Batteries of cells for any voltage can be ordered, and convenient hardwood trays to hold 32 cells are available, the ends of the trays being slotted so that two or more trays can be placed one above the other. Terminals are fitted at each end of the trays.

### PETO-SCOTT RECEIVERS

MESSERS. PETO-SCOTT are known the world over as the leading suppliers of radio-by-mail on easy terms, and thousands of satisfied customers testify to the value-for-money obtained in purchasing their radio requirements from this firm. A good example of this service is shown in an attractive folder which gives full particulars and prices of four remarkable receivers, any one of which enables anybody to have up-to-the-minute radio in their homes for a few shillings deposit and the balance by monthly instalments. There are a battery Class "B" 4; a de luxe battery band-pass S.G.3; a 4-valve screen-grid A.C. receiver; and a 5-valve A.C. superhet. Each receiver, which embodies the latest refinements in its class, is housed in a beautifully finished walnut cabinet of modern design.

## 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.

### INTERNATIONAL SHORT-WAVE CLUB (MANCHESTER CHAPTER)

THE fifteenth meeting of the above Chapter was held at the British Legion, Long Street, Middleton, on November 20th, at 8 p.m. Business matters about the annual meeting on December 4th and the Potato Pie Supper on December 18th were talked over, then followed a discussion about Morse code, and several topics with regard to amateur transmitting were also discussed. Short-wave fans and readers of PRACTICAL WIRELESS in the district who are not members of the club will be welcome at the supper; full particulars, including price of tickets, etc., can be obtained from the secretary. This chapter will commence the New Year with a demonstration on January 7th of an excellent constructor's short-wave superheterodyne receiver by a representative of Messrs. Ferranti, Ltd., of Hollinwood. The meeting will commence at 8 p.m.—R. LAWTON, Sec., 10, Dalton Avenue, Thatch Leach Lane, Whitefield, Nr. Manchester.

### THE CROYDON RADIO SOCIETY

THE New Season's Valves and Their Uses" provided ample scope for an interesting lecture by Mr. P. W. S. Valentine, D.F.H., A.M.I.E.E., of the Mullard Valve Co., on Tuesday, November 20th, at St. Peter's Hall, S. Croydon. A new range of Universal valves for A.C., D.C. mains and car radio came first. Laufen slides made the features of their construction very clear, and suggested circuits for them provided much food for thought, a universal valve superheterodyne being particularly absorbing. In these days of the superheterodyne's popularity, the topic of how to effect frequency changing is always with us, and Mr. Valentine went through most methods. For instance, a screen-grid valve with screen or cathode coupling could be used, but the octode was better, for screen-grid frequency changer. Its advantage was due to its providing the coupling between oscillator and mixer by the electron stream inside the valve itself. In other words, it was a triode oscillator and pentode mixer in one envelope, and the state of affairs as electrons did their stormy passage from cathode to anode were dealt with in detail.

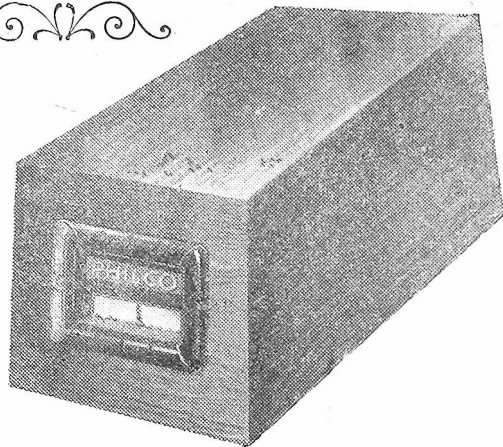
Automatic volume control, diode detection, delayed A.V.C. and pentode problems were only a few of the other valve topics discussed, and finally the hon. librarian, Mr. R. P. Jonas, led a crowded question hour.—Hon. Secretary, B. L. CUMBERS, Maycourt, Campden Road, S. Croydon.

## THE IDEAL XMAS GIFT!

Doubles your enjoyment of Radio

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CASH PRICE



THIS great little accessory enables you to tune in accurately and silently with your eyes. It tells you the relative strength of stations, whether the wanted station is on the air or not. It is housed in a neat walnut case and can be used with any set that has A.V.C. Full instructions with each meter obtainable from your local dealer or direct from us.

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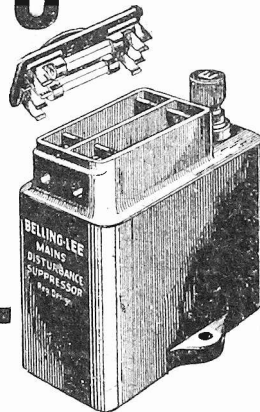
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Interference Suppressor, type 1118. Price, complete with full instructions for fitting, 10/6.



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Please send free information.

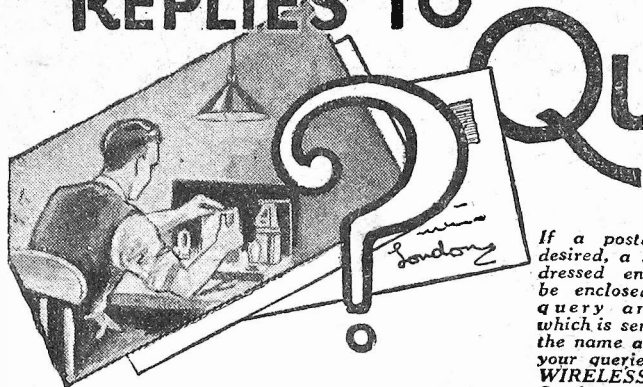
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## REPLIES TO

LET OUR TECHNICAL STAFF SOLVE  
YOUR PROBLEMS

# QUERIES and ENQUIRIES

by Our Technical Staff

The coupon on page 468 must be attached to every query.

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

## SPECIAL NOTE

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

- (1) Supply circuit diagrams of complete multi-valve receivers.
  - (2) Suggest alterations or modifications of receivers described in our contemporaries.
  - (3) Suggest alterations or modifications to commercial receivers.
  - (4) Answer queries over the telephone.
- Please note also that all sketches and drawings which are sent to us should bear the name and address of the sender.

## A Defective H.F. Stage

"I had a straight three, the first L.F. being resistance-capacity coupled and the output valve transformer coupled. Wishing to improve matters I added an H.F. stage, purchasing a pair of matched coils and a gang condenser. Selectivity is certainly vastly improved, but the volume from the four valves is just about half what the three gave. Also the "reach" of the three valves, when I put my aerial lead direct on the detector stage, is much greater. Can you tell me what is wrong?"—A. Izat (Glasgow).

As the three valves give a better performance when the aerial is joined direct to the detector stage it would appear that only the H.F. stage can be at fault, and we would suspect the method of coupling the coils. Without a diagram, however, we cannot help you to locate the cause. Send us a sketch of the complete H.F. and detector portion of the receiver and we will see what we can do for you.

## A Faulty Component

"I have built an S.G. Three as on the circuit enclosed. The results are very poor, the set sounding as if it were being operated from a very low battery, and I can only get the national programme. What can be the matter with it? The batteries are fully charged and I have a good aerial and earth."—L. Pegg (Manchester).

The circuit is perfectly correct in every detail and therefore one of the components or a valve must be faulty. We would advise you to check over the receiver carefully,

taking each stage in turn, and if you have no suitable testing instruments you will have to rely upon substitution in order to verify each part.

## Mains Transformer and Chokes

"In the article on making L.F. and output transformers in the issue of April 28th last, you mention previous issues containing information concerning the construction of mains transformers and chokes. I should be obliged if you would let me have details of these copies of "Practical Wireless."—J. F. Hughes (Coventry).

The issues in which the construction of mains transformers and chokes were dealt with were Nos. 5 and 11. These back numbers are obtainable from the Back Numbers Department, price 4d. post free.

## Modifying the Fury Four

"I have built the 1933 Fury Four but should like to improve the selectivity. What is the best way to do this?"—J. Burridge (Portsmouth).

Without going to the expense of converting the receiver into the 1934 Fury Super, the only thing we can suggest is to transfer the anode coupling condenser between V1 and V2 to terminal number 4 on the second coil, and to do the same thing in the case of the second and third valves. The result of this will also be a slight loss of signal strength, but it may prove worth while in your case.

## A Rectifier Query

"I recently purchased from an advertiser a Westinghouse rectifier, type L.B.1. Could you tell me the A.C. input to this and any other details please?"—F. E. Blamey (nr. Stockport).

The rectifier is now obsolete, but is designed for an output of 6 volts 5 amps. The A.C. input required is 11 volts, and therefore you must obtain a transformer to deliver this. Messrs. Heayberd will be able to supply this. The output may be modified for 2- or 4-volt accumulators by means of a series resistance, and for preference an ammeter should be included in the circuit.

## A Pick-up Point

"I have a 4-valve battery set used as a radio-gramophone. I have been using wet H.T. batteries, and for the pick-up I took one lead of the pick-up to the detector valve and the other lead to the E. terminal on the set, using a 2-point switch for this purpose. As I have now gone over to eliminators for the H.T., my instructions were to remove the earth lead and take it to the back of the eliminator, leaving the E. terminal on the set blank. My problem is now where to take the other pick-up lead. May it go to the earth terminal on the eliminator?"—G. H. Townsend (Bethnal Green).

The pick-up should not go to the earth line at all. It should be plugged into the 1.5 or 3-volt socket on a grid-bias battery, the positive side of which should be earthed. You will probably find that the quality will be much improved by this connection. In any case, the change-over to your eliminator will not affect things, and you may consider any point which is earthed in your receiver as still earthed, although it goes to a terminal on the eliminator. However, use bias with the pick-up and you will get better results.

## Four-range Super-Mag Coils

"I have made up the Four-range Super-Mag Two, but upon trying to get the coils I am told that they are not now made. It is rather a disappointment after making this set, and I should like to know where I can get the coils."—T. J. Williams (Llanelli).

We understand that these coils are still being manufactured, and therefore would advise you to communicate direct with the manufacturers, Messrs. Colvern Ltd., Mawneys Road, Romford.

## Microphonic Valve

"I have just bought a brand-new valve of well-known make, but find it impossible to use it on account of microphony. Is this usual with modern valves? If so, how can it be cured?"—T. Yelves (Hendon).

It is certainly an unusual fault with valves of recent manufacture, and if you are certain that it is a fault which is due to the valve, and not to the receiver, we would advise you to have it tested by the makers.

THE QUERIES COUPON APPEARS ON PAGE 468.

## FIX A PIX

## IN YOUR AERIAL

Rid your set of annoying overlap whistling and background and get really good results. Try one right away. Send us 2/- P.O. If not satisfied after a week's trial, return it for full refund. PIX, London, S.E.1.



WITH HANDY HOLDER, 2/6



Miscellaneous Advertisements

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

PREMIER SUPPLY STORES

ANNOUNCE a City Branch at 165 and 165a, Fleet St., E.C. (next door to Anderson's Hotel), for the convenience of callers; post orders and callers to High St., Clapham.

OFFER the Following Manufacturers' Surplus New Goods at a Fraction of the Original Cost; all goods guaranteed perfect; carriage paid over 5/- under 5/- postage 6d. extra, F.F.S. and abroad, carriage extra. Orders under 5/- cannot be sent c.o.d. Please send for illustrated catalogue, post free.

ALL-ELECTRIC 3-stage Amplifiers, 200-250v., 40-60 cycles. 10 watts undistorted output, complete with 5 valves, and Magnavox Super 66 energised speaker, £12/10/0.

ELIMINATOR Kits, including transformer, choke, Westinghouse metal rectifier, condensers, resistances, and diagram, 120v. 20 m.a., 20/-; trickle charger, 8/- extra; 150v. 30 milliamps with 4v. 2-4 amps. C.T., L.T., 25/-; trickle charger, 6/6 extra; 250v. 60 milliamps, with 4v. 3-5 amps. C.T., L.T., 30/-; 300v. 60 m.a., with 4 volts 3-5 amps., 37/6; 200v. 50 m.a., with 4v. 3-5 amps. L.T., 27/6.

PREMIER Chokes, 40 milliamps, 25 hrs., 4/-; 65 milliamps, 30 hrs., 5/6; 150 milliamps, 30 hrs., 10/6; 60 milliamps, 80 hrs., 2,500 ohms, 5/6; 25 milliamps, 20 hrs., 2/9; 250 milliamps, 30hrs., 20/-.

ALL Premier Guaranteed Mains Transformers Have Engraved Terminal Strips, with terminal connections, input 200-250v., 40-100 cycles, all windings paper interleaved.

PREMIER H.T.7 Transformer, output 135v. 80 m.a., for voltage doubling, 8/6; 4v. 3-4a. C.T., L.T., 2/- extra; with Westinghouse rectifier, giving 200v. 30 m.a., 17/6.

PREMIER H.T.8 and 9 Transformers. 250v. 60 m.a. and 300v. 60 m.a. rectified, with 4v. 3-5a. and 4v. 1-2a. C.T., L.T. and screened primary, 10/-; with Westinghouse rectifier, 18/6.

PREMIER H.T.10 Transformer, 200v. 100 m.a. rectified, with 4v. 3-5a. and 4v. 1-2a. C.T., L.T. and screened primary, 10/-; with Westinghouse rectifier, 19/6.

PREMIER Mains Transformers, output 350-0-350v. 120 m.a., 4v. 3-5a., 4v. 2-3a., 4v. 1-2a. (all C.T.), with screened primary, 10/-.

PREMIER Mains Transformer, output 250-0-250v. 60 m.a., 4v. 3-5a., 4v. 2-3a., 4v. 1-2a. (all C.T.), with screened primary, 10/-.

PREMIER Auto Transformers, 100-110/200-250v. or vice versa, 100-watt, 10/-.

WESTERN ELECTRIC Mains Transformers, 300-0-300v. 65 m.a., 4v. 1-2a., 4v. 2-3a., 6/6; 500-0-500v. 150 m.a., 4v. 3-5a., 4v. 2-3a., 4v. 1-2a. C.T., 4v. 1a. C.T., 19/6.

SPECIAL Offer of mains Transformers, manufactured by Phillips, input 100/110v. or 200-250v., output 150-0-150 volts m.a., 4v. 1 amp., 4v. 3 amps., 4/6; 200-0-200v., 4v. 1a., 4v. 3a., 4/6.

PREMIER L.T. Charger Kits, consisting of Premier transformer and Westinghouse rectifier, input 200-250v. A.C. output 8v. 1 amp., 14/6; 8v. 1 amp, 17/6; 6v., 2 amp., 27/6; 30v. 1 amp., 37/6; 2v. 1 amp, 11/-.

B.T.H. Trusped Induction Type (A.C. Only). Electric Gramophone Motors, 100-250v., 30/- complete. SPECIAL Offer B.T.H. Gramophone Motors. A.C. and D.C. 100-250v., 30/-; listed, £33/9.

COLLARO Gramo. Unit, consisting of A.C. motor, 200-250v. high quality pick-up and volume control, 49/-; without volume control, 46/-.

HEDSON BELL Double Firing Gramophone Motors, complete with turntable and all fittings, a really sound job, 15/-.

SPECIAL Offer of Wire-Wound Resistances, 4 watts, 50,000, 100,000, 200,000 ohms, 1/-; 8 watts any value up to 50,000 ohms, 1/6; 15 watts any value up to 50,000 ohms, 2/-; 25 watts, any value up to 50,000 ohms, 2/6.

CENTRALAB Potentiometers, 400 ohms, 1/-; 50,000, 100,000, 1/6; 200 ohms, wire wound, 1/-.

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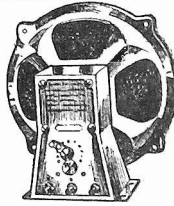
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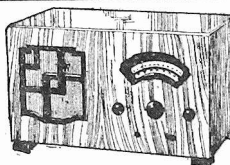
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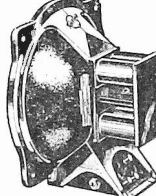
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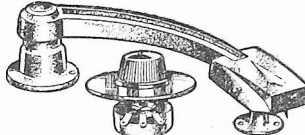
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(Continued from foot of column one)

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RELIABLE Interval Transformers, 2/-; multi-ratio output transformers, 2/6; Microphone transformers, 50-1 and 100-1, 2/6. 1-1 or 2-1 Output Transformers, 2/6.

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VARLEY H.F. Interval Coils, B.P.8, hand-pass, complete with instructions, in original cartons, 2/6.

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WESTERN Electric Condensers, 250v. working, 1 mf., 1/-; 2 mf., 1/-; 4 mf., 2/-; 400v. working, 1 mf., 1/-; 2 mf., 1/6.

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DUBILIER Dry Electrolytic Condensers, 12 mf. 20 v. working, 6d.; 50 mf. 50v. working, 1/9.

CONDENSER Blocks, H.M.V. 400v. working, 4+2+1+1+1+5, 3/9; 2+2+1+1+1+5, 3/-; Dubilier 300 v. working, 4+4+2+1, 3/-; Phillips 6+4+2+1+1, 4/6.

RADIOPHONE Logarithmic Wirewound Potentiometer, 10,000 ohms, with mains switch, 2/-; S.W. H.F. chokes, 10/200 metres, 9d.

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THE Following Types, 6/6 each: 42, 77, 78, 25Z5, 36, 38, 83, 39, 44, 53, 6B7, 2A5, 2A6, 207, 5Z3, 6C6, 6A4, 6D6, 6E7; 43, 59. Send for Complete Valve list.

GRAMPAN Permanent Magnet 9 inch Moving Coil Speakers, handles 4 watts, Universal Transformer, 18/6. Ditto Energised handles 5 watts, 2,500 ohms, 21/-.

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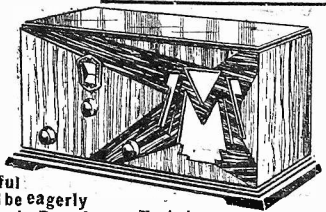
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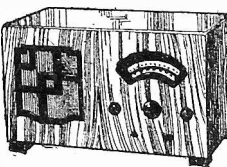
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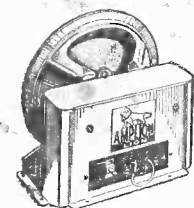
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