Practical and Amateur Wireless, December 5th, 1936.

Greatly Enlarged Xmas Number!

Practical and Amateur Wireless

AND PRACTICAL TELEVISION

4D EVERY WEDNESDAY

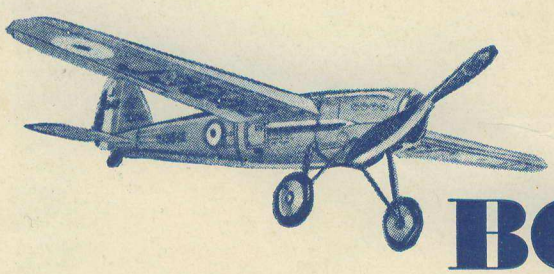
Edited by F.J.CAMM

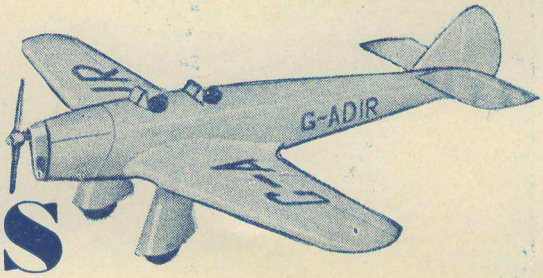
A GEORGE NEWNES Publication

Vol. 9. No. 220.
December 5th, 1936.

Special Xmas Features

A SOUND-SYNCHRONISED CINÉ
A RADIO PLAY FOR HOME BROADCASTING
FUN WITH MICROPHONES
RADIO THROUGHOUT THE HOUSE
SIMPLE SETS FOR TELEVISION SOUND
RAPID REMEDIES FOR RADIO FAULTS
A SIMPLE TRANSPORTABLE
RADIO XMAS PRESENTS
USING A PICK-UP, Etc., Etc.





BOOKS *for* AERO - MODELLERS

MR. F. J. CAMM, Editor of *Practical Mechanics*, **writes:** "I can recommend no hobby with more enthusiasm to the modern handyman or his son than Model Aeroplane Building, for there is no other hobby which can be followed at such small cost, and with such a minimum of tool equipment. It is the only practical hobby which combines the fascination of a scientific indoor recreation with the benefits of healthy outdoor exercise. It is possible to reproduce in miniature all of the evolutions of a full-size machine. You may use elastic, steam, or tiny petrol engines as motive power. I, myself, have devoted many thousands of pleasurable hours to the building and flying of model aircraft. There is the additional advantage that it will provide the magic key to the door of opportunity in the aircraft profession, where skilled labour is short and urgently required. Profitable jobs await those with technical knowledge. You cannot obtain this in any better or more rapid way than by building and flying models."

THE MODEL AIRCRAFT BOOK

By F. J. CAMM. Here is a book which the author himself describes as a second course in advanced model aircraft construction. It follows upon the success of his two earlier books—"Model Aeroplanes and Airships" and "Power-driven Model Aircraft"—and is necessitated by the very rapid development of aero-modelling in the last few months. The book gives full constructional details for really expert modellers and is intended for the use of the expert or really ambitious novice, although the actual wording of the text can be followed by a mere tyro, and the lavish illustrations on each page would enable anyone with a reasonable flair for handicrafts to proceed right away to the construction and assembly of a workmanlike scale model reproducing in its evolutions and appearance the latest types of British and foreign aircraft. The book contains 10 extensive and detailed chapters.—A Petrol-driven Model Monoplane. A Petrol-driven Model Biplane. Power Units for Model Aircraft. The 1935 Wakefield Cup Winner. A Fuselage Model Biplane. A Light-weight Duration Monoplane. A Flapping-wing Model. Model Aeroplane Stability. Building Scale Models. Building a Primary Glider. This volume is handsomely bound and printed on strong art paper. It is as attractive to look at as a gift book as it is useful in the modern handyman's workshop.

3/6 net, or 4/- post free.

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By F. J. CAMM. The Standard Work for the Beginner. With Special Chapters on Gliders, Helicopters, Wing-flapping Models, Kites and Full-size Gliding. Everything the novice or expert wants to know clearly and lucidly set down by a man who is not only a theorist of repute but who has actually himself made and flown many thousands of models, and whose designs are known by model experts everywhere. The book traces the history of aero-modelling, deals with the first principles of flight, materials, and designs and passes on to the actual construction, from the cutting of the air-screws to the final assembling of the fuselage and mounting of the "engine." Stunt as well as straight models are dealt with—Helicopters and Wing-flapping machines. There are also valuable chapters on important accessories, such as apparatus for winding elastic motors. The book has also an introductory chapter on full-size gliding and includes ample notes on the actual flying of all models. A complete index makes it an immediate and handy reference for every handyman's workshop. With over 120 illustrations, including photographs and diagrams.

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By F. J. CAMM. The growing interest in model aircraft propelled by some form of engine, such as compressed air, steam, or petrol, has induced Mr. Camm to produce this volume, which is supplementary to his "Model Aeroplanes and Airships." He deals extensively with the older-fashioned rubber-driven type, and although pointing out the disadvantages of this method of propulsion gives ample instructions for the construction of models employing it. He is, however, more interested in the compressed air, steam, and midget petrol engines which have been produced in recent years. These units are thoroughly reliable and simple to make, and capable of propelling a model weighing up to 6 lbs. (the record stands at over 15 minutes' flight, until, in fact, the petrol ran out). In every case he amplifies his carefully detailed text with constructional diagrams, and where possible with photographs of models constructed by himself, on the workshop bench and in flight. The book consists of 96 pages, fully packed with up-to-date information for all aero-modellers and including over 130 illustrations.

A Newnes Home Mechanic Book. 1/- net, or 1/2 post free.

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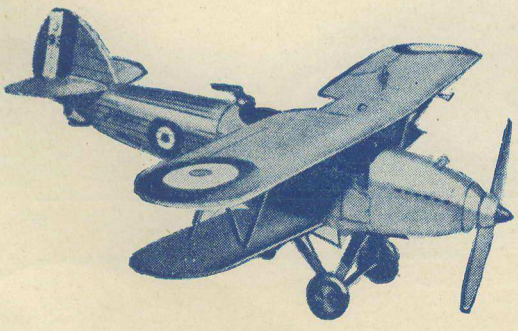

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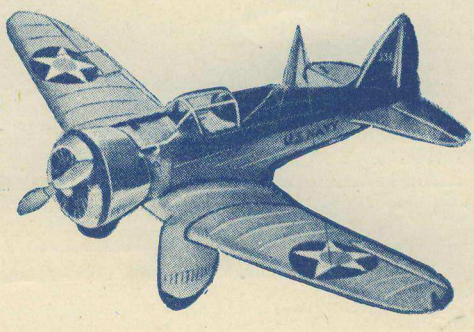

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THE COLT ALL-WAVE BATTERY THREE—

See page 380

Practical and Amateur Wireless

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F. J. CAMM.
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W. J. Delaney, H. J. Barton Chapple, Wh.Sch. B.Sc., A.M.I.E.E., Frank Preston.
Vol. IX. No. 220. December 5th, 1936.

Round the World of Wireless

Greetings!

THE time has come again for us to convey to all our readers the compliments of the season and our best wishes for a really enjoyable Christmas. Although it is still early in December, it is the custom for Christmas numbers to be published at this time of the year and this is just as well, as the many seasonal articles in this large issue will point the way to an improvement in the usual holiday festivities. There is ample time to make up the devices explained in this number so that when the festival arrives you may prove that your hobby is more than a mere interest in your life, and those who spend the holiday with you will benefit from your activities. All tastes are catered for in our feast of wireless articles, and in addition to the ordinary regular features which are found each week in our pages, you will this week find constructional articles for three separate receivers, hints on making receivers to pick up the television sound programmes, and other valuable articles. To all those who have been with us from No. 1, as well as to all new readers, we again repeat, a Merry Christmas.

American Programmes

IT is stated that the amount of programme time which is devoted in the U.S.A. to advertising is less than 40 per cent. In 1935 the Columbia chain broadcast a total of 18,372 programmes, of which 6,624 were sponsored by commercial firms. The Columbia network provides approximately sixteen hours' programme service each day.

Irish S.W. Station

IT now appears that the proposed short-wave transmitter for Ireland is off—at least for some time to come. The Minister of Posts and Telegraphs replied recently to a Deputy's question in the Dail in a manner which did not even provide a hope that the matter was to be regarded as important.

Automatic Receivers

THERE have been many suggestions for automatic receivers, the majority of devices taking the form of a time switch. It is now stated that a French inventor has succeeded in developing a relay which operates according to the call note of a station, and it will automatically switch on when the station starts up and tune the set to the correct wavelength. We await further details!

Radio Beacons

MORE beacons are to be used as a guide to aircraft, and certain countries are now suggesting that these should be compulsory along regular airways. These beacons operate on different systems, but in general are of a similar type. They give either an audible or a visual indication when the pilot leaves the correct course.

Unbreakable Valves

IN a railway crash recently a receiver was completely demolished, but when examined the debris was found to be in such a peculiar condition that certain coil leads were still intact and as a test the makers connected batteries and found that the set worked. It was afterwards stated that the condenser was completely crushed, but the breaking of a lead prevented a short circuit, and the local station was heard from the remnants of the speaker.

Television Systems

IT is now announced that a further manufacturer is to place on the English market a mechanical television receiver. This is to give a projected picture, approximately 12in. by 15in., in black and white. No price has been fixed and no other details are available.

Radio Flagship

THE United States Air Force has established the latest thing in flying headquarters. This is a completely-equipped Douglas Monoplane in which is installed transmitting and direction-finding apparatus in addition to the receiver, and the 'plane is fully equipped so that a superior air officer could give instructions over a wide area and keep in touch with ship, shore and air stations.

Electronic Nose

THE General Electric Company of America announced last month that they had developed an electronic nose having a sensitivity about one-fifth that of the human nose. It was developed for detecting minute traces of mercury vapour in the air, and consists of a photo-electric cell and associated apparatus.

More Uses for Radio

TO add to the various uses of radio which have been given on this page from time to time we are now able to mention the tuning of an organ. This is the new Westminster Abbey organ, and in order to tune the various pipes, which are obviously situated at some distance, the tuner wears headphones connected to an amplifier which is fed with the signals picked up by a microphone, and in this way he can hear the notes which would otherwise be inaudible at a distance.

Mr. J. F. G. Troughton

THE B.B.C. announces that Mr. J. F. G. Troughton has accepted the appointment of Empire News Editor and took up his new duties on November 30th. Since 1926 Mr. Troughton has been a member of the Colonial Administrative Service.

After service as a District Officer in Central Kavirondo, Kenya, Northern Turkana and Digo, he was seconded in 1933 for special duty with the Carter Land Commission. Later he became District Commissioner, Kitui, then Clerk to the Executive Council and Acting Clerk of the Legislative Council. This year he was awarded the M.B.E. and seconded to the Colonial Office in London.

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

THE PICK of the PROGRAMMES

"When Day is Done"

ANOTHER programme in the popular series "When Day is Done" will be broadcast on December 11th. The artists, as usual, will be Esther Coleman, Mai Jones, and Haydn Adams. The B.B.C. Welsh Singers will also take part in the programme, and the Variety Orchestra will be conducted by Idris Lewis. Glyn Jones will produce the show.

Christmas Music

A CONCERT of Christmas Music by the Bristol University Madrigal Singers, conducted by Arthur Warrell, will be broadcast from the Western Regional studios on December 7th. The programme will contain works new and old, grave and gay. Among the old are English, French, and German carols—the last will be sung in German. The arrangements of the English and French carols are by Arnold Foster, Vaughan Williams, and Kennedy Scott.

Darvel Burgh Band

ON December 8th the Darvel Burgh Band, conducted by Frederick Rogan, will broadcast a programme of popular music. James Mason (baritone) will sing "The Grenadier," "Süsette," "Galloping Dick," "The Old Farmhouse," and "The Pride of Tipperary." The history of Darvel Burgh Band goes back to 1840, and indeed is the oldest institution in the town. It has been very successful in band competitions.

Badminton Broadcast

BADMINTON enthusiasts will be interested to know that an eye-witness account of the International Badminton Match between Wales and Scotland will be broadcast by E. Trevor Williams from the Craigside Hydro Hotel, Llandudno, on December 4th.

City of Birmingham Orchestra

IN the concert on December 10th from the Town Hall, Birmingham, Leslie Heward will conduct the City of Birmingham Orchestra. The principal work is to be Handel's Organ Concerto with G. D. Cunningham as organist.

Gypsy Band Concert from Cardiff

WALDINI'S Gypsy Band will come to the Cardiff studio once again on December 4th to entertain listeners. With him will be Little Joan (the personality girl), the Sisters Pereira (vocalists), Mervin Morris (impressionist), Charles Gordon, who plays the hand-bells, the Tricity Four (harmonisers), Sylvester Stuart (entertainer), and Hughes and Taylor (comedians). Waldini's Park Hall Concerts have been a popular feature in Cardiff for the last two or three years, and it may be of interest to Welsh people to know that his band is practically entirely composed of Cardiff players.

MAKE THESE DATES WITH YOUR RADIO

Ballet Music and Folk Dances

ON December 4th (Regional) there will be a concert of British Ballet Music in which Philip Sainton will conduct his "Dream of a Marionette" and Clarence Raybould will conduct "Douanes" by Geoffrey Toye and Holst's Ballet Music to "The Perfect Fool." On the same day Folk Dances from Rumania, Japan, Poland, Ireland, Sardinia, Hungary and England will be broadcast by Edmund Rubbra in his pianoforte recital. Edmund Rubbra is known both as pianist and composer, and a choral work of his—"Five Motets"—was performed at a B.B.C. Contemporary Music Concert last season.

THE FESTIVE SPIRIT

The receiver seen in this illustration is the Marconiphone, model 382, four-valve AC/DC all-wave superhet—price 13½ guineas.

"Swift Serenade"

THIS is the title of a new series of concerts starting on December 9th. They will be presented by Tommy Matthews and his Concert Orchestra, which is the new name for the Northern Revue Orchestra formed in December last. The composition of the orchestra remains unchanged and the new series of concerts will have much in common with those broadcast in the past under the heading "Swing Low Sweet Music." Denise and Dale Smith will be soloists in the opening concert by the new orchestra.

Harry Tate

ALWAYS popular with Midland listeners, Harry Tate, the comedian, will come to Birmingham on December 8th for a studio engagement. He is to give his sketch on gardening.

The Cardiff Ensemble

THE Cardiff Ensemble Chamber Orchestra, conducted by Ronald Harding, will broadcast a concert from the Reardon Smith Lecture Theatre of the National Museum of Wales on December 5th. The programme will include Bach's Brandenburg Concerto No. 6, "An Old Song," by Peter Warlock, and "Three Poems of Li-Po," by Constant Lambert. The vocalist in this work of Constant Lambert will be Magdaline Jones (soprano).

Royal Marines Band Concert

JANE VOWLES (soprano) will be the soloist in a concert by the Band of His Majesty's Royal Marines, Plymouth Division (by permission of Brigadier H. G. Grant), conducted by F. J. Ricketts, Director of Music, Royal Marines, to be broadcast from the Abbey Hall, Plymouth, on December 10th.

A Nottingham Quartet

THE Angelus Male Voice Singers and Harold Gray (pianoforte) are to give a recital in the Midland programme on December 7th. The quartet is well known in Nottinghamshire, and consists of R. H. Clarke, G. Hodgett, P. Riley, and S. Jeacocke. Mr. Gray is conductor of the Choral Societies at Derby and Sutton-Coldfield.

SOLVE THIS!

PROBLEM No. 220.

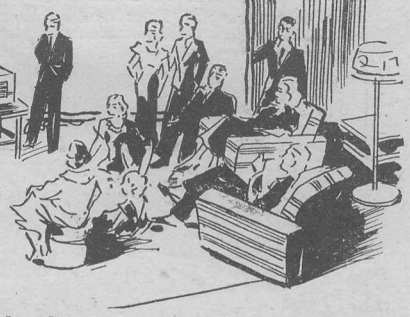
Watkins built a simple battery, S.G. three valve receiver using tuned-anode coupling between the S.G. and Detector valves and a transformer Coupled L.F. stage. London National tuned in at good volume, but when reception of London Regional was tried the fuse blew. What was the fault? Three books will be awarded for the first three correct Solutions opened. Address your Solutions to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton St., Strand, London, W.C.2. Envelopes must be marked Problem No. 220 in the bottom left-hand corner and must be posted to reach this office not later than the first post on Monday, December 7th, 1936.

Solution to Problem No. 219.

The Cathode bias resistance in Wyndham's receiver was burnt out.

The following three readers successfully solved Problem No. 218, and books are accordingly being forwarded to them: J. Whitten, 81, Fernlea Rd., Balham, S.W.12; John Robertson, Ankengill, Wick, Scotland; Ernest Hewitt, 6, Lincoln Ave., Bournemouth.

Producing Your Own Programmes



Some Ideas for "Home Broadcasting" with a Description of Different Methods of Connecting a Microphone and Pick-up, and Using a "Fader"

THERE is a considerable amount of entertainment to be had from so-called "home broadcasting," and the essential apparatus need not be expensive. Moreover, this form of scientific amusement will be found an ideal addition to the games played at Christmas parties. The scheme can be varied in a number of different ways, but the main idea is that members are invited, in turn, to put on their own "show." A time allowance of, say, five minutes can be made, and the "producer" takes his or her place before a microphone in a room away from that in which the loudspeaker is installed. Those who sing or recite can give their "turns" in one of these forms, whilst those who are good at telling yarns or making witty remarks can "broadcast" in this form.

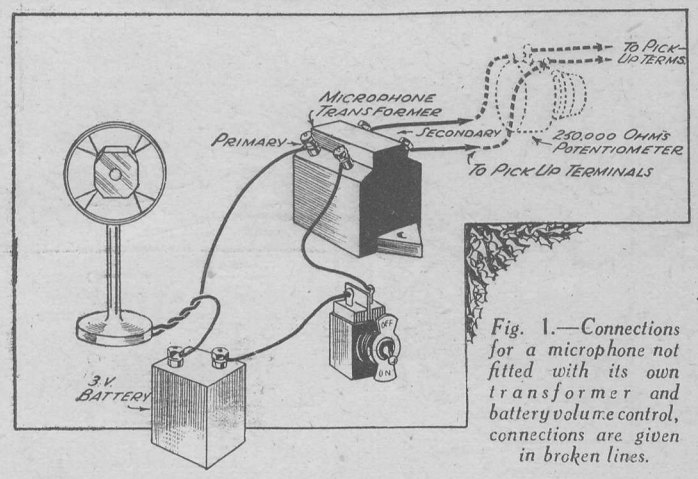


Fig. 1.—Connections for a microphone not fitted with its own transformer and battery volume control, connections are given in broken lines.

The Microphone

The first requirement is a microphone, and this is connected to the pick-up terminals of the receiver. By making use of the volume control, a variety of effects can be given. Additionally, a good deal of fun can be had by making various noises in front of the microphone and asking members of the party to identify the sounds. Rustling paper, rattling keys, bursting balloons, and so forth provide good tests and cause many laughs. If desired, the effect can be improved still further by using a gramophone pick-up and records in addition to the microphone and using a "fader" to bring the pick-up and microphone into circuit as desired. As B.B.C. listeners are aware, remarkably interesting programmes can be produced by mixing speech and excerpts from records.

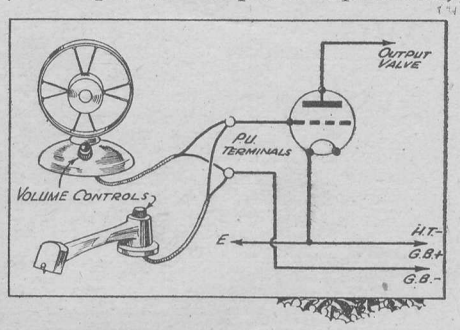


Fig. 2.—How a microphone and pick-up can be used together when each has its own volume control.

But let us consider the more practical aspects of the question. The choice of a microphone must be the first step, unless the reader already has one. There are numerous types on the market, and they can be obtained at prices from a few shillings to several pounds. For present requirements, a microphone costing up to about a pound is adequate, since perfect reproduction is by no means essential. It is most convenient to obtain a microphone of the table type which is supplied complete with transformer, switch, volume control, and battery. This can be joined directly to the pick-up terminals of the receiver by means of the leads supplied with the unit. When such terminals are not already fitted to the receiver, they can easily be added as explained in another article in this issue entitled "The Pick-up and the Party."

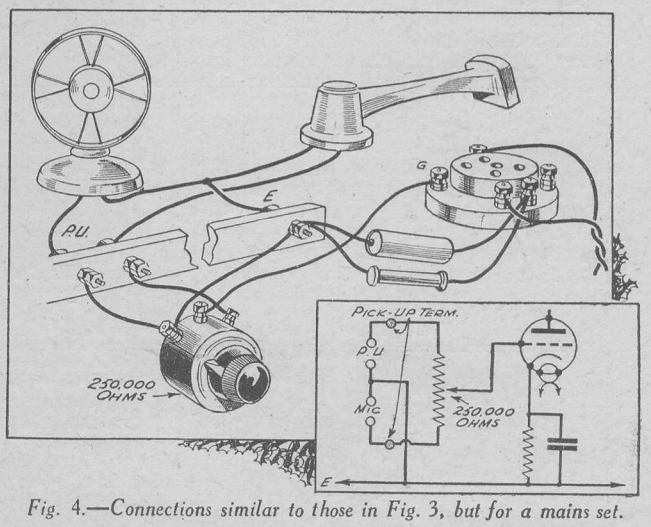


Fig. 4.—Connections similar to those in Fig. 3, but for a mains set.

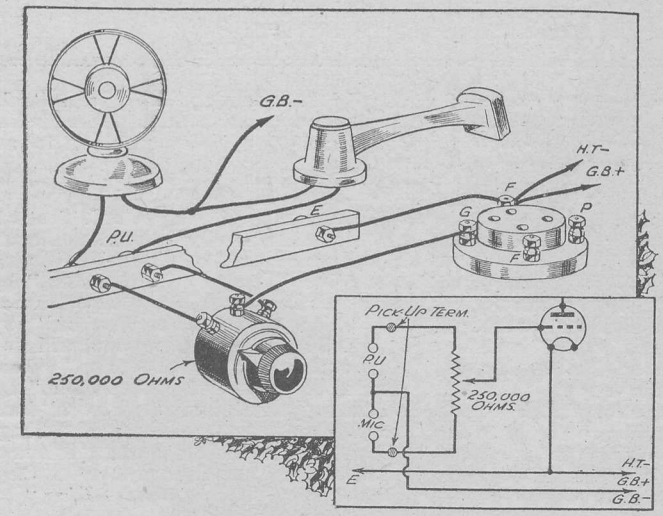


Fig. 3.—Using a simple potentiometer as dual volume control.

It is generally best to place the microphone fairly near to the receiver so that the connections to it are short, but if this is

(Continued overleaf)

PRODUCING YOUR OWN PROGRAMMES

(*Continued from previous page*)

not convenient the leads should be of screened wire, the screening being earth-connected. The speaker should be in another room if possible. If it is in the same room the microphone should be shielded from it by means of a cardboard box or sheet of non-resonant material. The reason for this is that should the sound from the speaker reach the microphone a peculiar form of instability will be noticed, which will result in a low-pitched "howl."

Microphone Connections

When using a microphone which is not provided with its own transformer and other "etceteras," the connections shown in Fig. 1 should be followed. It can be seen that there is a microphone transformer (ratio about 1 to 100), an off-on switch, and a 3-volt dry battery. The last-named is generally satisfactory, but with some microphones a higher voltage is required. As the current consumption is low, however, quite an inexpensive battery can be used. A volume control is not shown in Fig. 1, but is always desirable. In some cases the low-frequency volume control in the set can be used, but the voltage of the microphone-energising battery should first be adjusted to the most suitable value. This should be such that there is no appreciable distortion or "blasting" when speaking into the microphone with the control set to its "full-on" position. When an external volume control is required, it can be connected between the transformer secondary and the pick-up terminals, as shown in broken lines in Fig. 1.

Combining Pick-Up and "Mike"

As was suggested earlier, a better effect can be obtained by using a pick-up in conjunction with the microphone, when the "broadcaster" can try his skill at compering a programme. Assuming the use of microphone and pick-up, each having their own volume controls (and when the microphone has built-in transformer and battery), the connections can be as shown in Fig. 2, where both instruments are joined to the pick-up terminals of the receiver. When both volume controls are turned full on the outputs of the microphone and pick-up will be reproduced at about equal strength by the speaker, but by turning down one of the controls the relative strengths can be varied over wide limits. This arrangement is not ideal, and is incorrect in theory because the two volume controls are in parallel, so that the total resistance in the grid circuit of the input valve is too low. The arrangement is, nevertheless, good enough for many requirements, especially after a little experience has been gained in operating the two knobs.

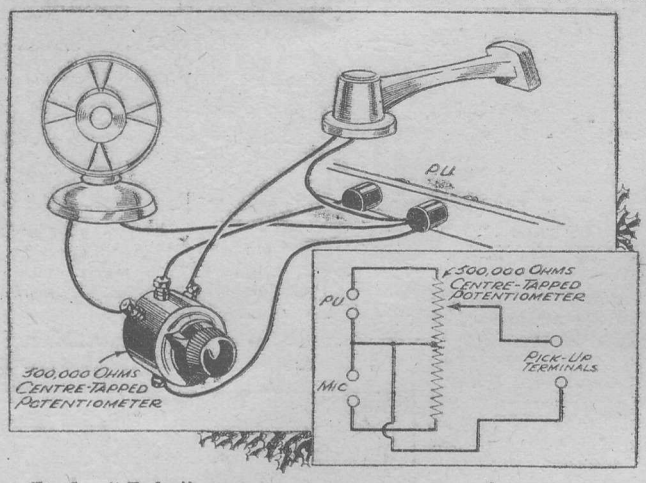


Fig. 5.—"Fader" connections, using a centre-tapped potentiometer.

Dual Volume Controls

Another arrangement which is better in some respects is shown in Fig. 3. In this case a 250,000-ohm potentiometer (preferably of the ungraded type) is used as a simple "fader," the pick-up and microphone being connected in series. In speaking of the microphone in this case, it is assumed that it is attached to the appropriate transformer and battery, of course. When the slider is moved to one end the pick-up is in circuit, and when moved to the other the microphone is in circuit; between these two extreme positions a certain proportion of the output from each is applied to the amplifier. The connections shown apply to a battery-operated set, but corresponding connections for a mains receiver are given in Fig. 4.

This general system of connections is fairly satisfactory when it is preferred to use ordinary components which will probably be to hand, but somewhat better results can be obtained by using a special centre-tapped potentiometer, as shown in Fig. 5. This is more effective because the pick-up and microphone do not require to be in series with each other, so that one connection from each is always "in the air." In this case, both instruments are definitely cut out of circuit when the slider is moved to its central position, and either can be brought into use by moving it in one direction or the other from the midway setting. If a centre-tapped potentiometer is not readily available, the same result can be obtained by using two separate 250,000 ohm components in series and joining together their sliders, as shown in Fig. 6. The two potentiometers must be of such a type that they can be ganged together and operated by means of a single knob. This system of connection gives very smooth control and an effective method of "fading out" the microphone or pick-up whilst the other is "faded in."

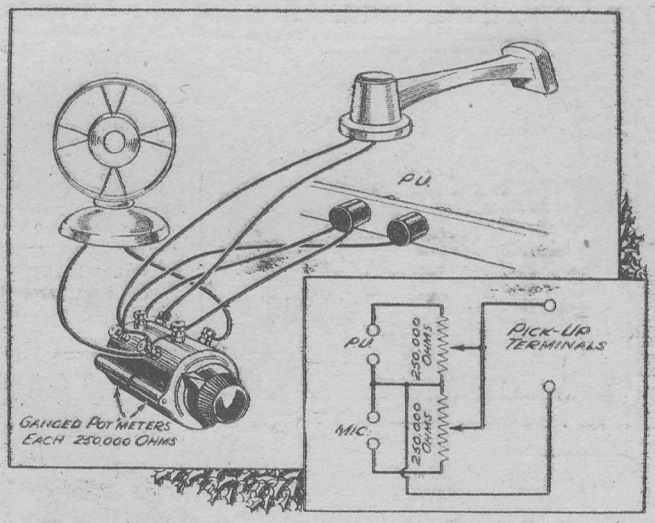


Fig. 6.—An alternative arrangement to that shown in Fig. 5, where two ganged potentiometers are used.

PROGRAMME NOTES

International Table Tennis

THE Hungarian Table Tennis team, consisting of Barna, Bellak, and Szabados, began a seven-weeks tour of the country early in November. Several matches have been arranged, and A. A. Haydon, of Birmingham, is captain for those in London and Birmingham. The latter is to be played at the Central Hall, Birmingham, and a twenty-minutes running commentary will be broadcast on December 8th.

Police Band Concert

ON December 7th Birmingham City Police Band, conducted by Richard Wassell, with Doris Watkins (soprano) as the vocalist, is to give a Town Hall concert, which will be broadcast from the Midland Regional. There is to be a popular programme including a selection from "H.M.S. Pinafore" and Chabrier's "Suite de Valses," arranged by Dan Godfrey.

Press Gang Play

ARTHUR MACFARLAND, a new Liverpool author, has written a play about Liverpool in the eighteenth century, called "Hawks Abroad," which is to be broadcast on December 4th. "Hawks Abroad" was the warning cry uttered when the Press Gang men were seen in the streets of Liverpool. The action takes place in the year 1778, at the crisis of the American War of Independence, when England found herself faced not only with the newly-formed United States but also with France. The difficulty in obtaining willing recruits in the British Navy stimulated the activities of the Press Gang in all the sea-port towns.

B.B.C. Scottish Orchestra

ON December 3rd the B.B.C. Scottish Orchestra, led by J. Mouland Begbie and conducted by Guy Warrack, will play Overture to "Mason and Locksmith," by Auber; Suite by Cedric Thorpe Davie; and Waltz "The Blue Danube," by Strauss. Mae Johnston (soprano) will sing with orchestra "Jewel Song" from "Faust," by Gounod; "Ciribiribin," by Pestalezza; "As through the Street," from "La Bohème," by Puccini; "Bird Songs at Eventide," by Eric Coates; "I hear a Thrush at Eve," by Cadman; and "Only a Rose," from "The Vagabond King," by Friml.

MUSIC throughout the HOUSE

This Article Explains How Extension Speakers Can be Connected to Different Types of Receiver, and Also Describes Methods of Remote Volume Control and Receiver Switching.

AT the festive season in particular, it is very desirable that a loudspeaker should be available in almost every room in the house. "Overflow" parties generally call for the use of a speaker in both dining and drawing rooms at the same time, and there are many who like to have music in the hall, bedroom and other parts of the house.

Every year, in our Christmas Number, we have published an article on the use of

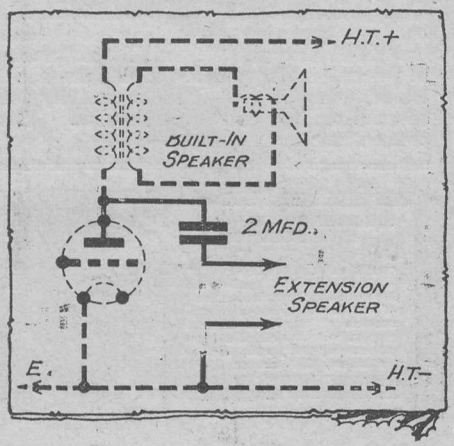


Fig. 1.—The best general method of attaching an external speaker.

extension speakers, but this is an "evergreen" subject, as well as one which is changing to a certain extent. In changing, the matter is becoming increasingly simplified, because manufacturers almost without exception are introducing new and improved speakers with special easy-matching devices for extension use. It is not essential that a special type of speaker be used, but it is certainly desirable if good quality is required—and who does not insist upon this to-day?

"Extension" Terminals

When it was the custom to have the normal loudspeaker separate from the receiver, it could be moved into any convenient position, and even carried to the next room without much trouble, but when the speaker is built-in it is better not to disturb it, and to obtain another for use away from the set. If terminals are provided on the receiver for an extension speaker, it is necessary only to connect the new speaker to them by means of a length of ordinary twin flex which will reach to the remote point. There is one slight difficulty here, however, which is that quality might suffer if the length of wire exceeds about 15ft., and if the speaker is of an earlier type not fitted with a matching device. In a case such as that an improvement can be obtained by using two separate wires and keeping these a short distance apart. When this is done it might be necessary to try two or three different positions for the leads if the house is wired for electricity. This is because if the leads run parallel to the mains wiring within a wall a certain amount of "hum" might be induced.

Low-resistance Speakers

There is one other point which applies to commercial receivers; some of them require a low-resistance external speaker. This generally means that the speaker must be of the type not fitted with its own input transformer. This point should be borne in mind, and the makers' recommendations followed with regard to the correct type of speaker for use. It is also very important in these instances that the connecting wires should not be unduly long, and that they should be a stout gauge or of good-quality multi-strand cable. If several yards of ordinary thin flex were employed there would be a pronounced loss of signal strength. Good "power" flex

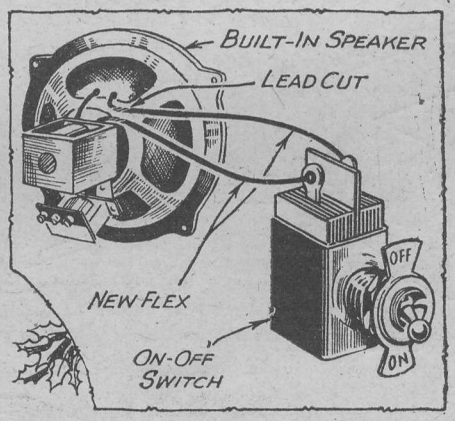


Fig. 2.—Method of fitting a switch to "mute" the built-in speaker when using the connection shown in Fig. 1.

is suitable, or as an alternative 18-gauge bell-wire can be used.

When using a special extension speaker it is necessary only to experiment with the different connections or matching-switch positions until the most suitable are found. Instructions are generally supplied with the speaker.

One Method of Connection

When terminals or sockets for an extra speaker are not provided on the set, there are various alternative methods of connection which can be employed. That which is generally most suitable is shown in Fig. 1. It will be seen that one speaker lead is attached to one side of a 2-mfd. (approx.)

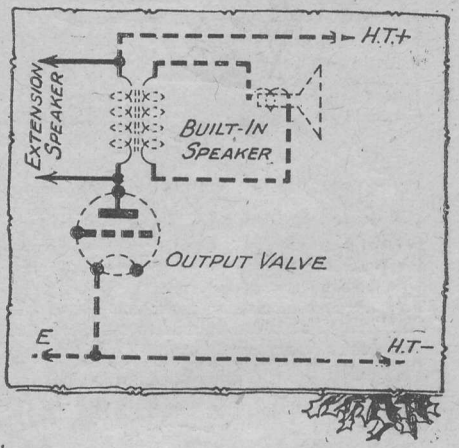


Fig. 3.—Another method of connecting an external speaker, which is fairly satisfactory, although not usually as good as that in Fig. 1.

fixed condenser of which the other terminal is connected to the anode terminal of the output valve, whilst the second speaker lead is earth-connected. The primary winding of the transformer attached to the built-in speaker is used as an output choke, and this with the condenser provides choke-capacity output coupling. An advantage of this is that the earth-return connection can be made either to the receiver (using twin connecting wires), or to any convenient earthing point near the speaker. The latter might be a water pipe, gas pipe

(Continued overleaf)

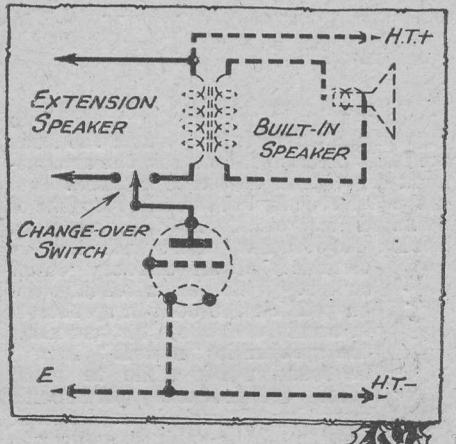


Fig. 4.—How a change-over switch can be used when employing the arrangement shown in Fig. 3.

MUSIC THROUGHOUT THE HOUSE

(*Continued from previous page*)

or earth spike driven into the ground just outside a nearby window.

"Muting" the Built-in Speaker

In using this system there is sometimes a difficulty in silencing the built-in speaker when necessary. Obviously, the speaker cannot be disconnected completely, and the best method is to disconnect one end of the speech coil from the transformer secondary. This is not easy in most cases, because the speech-coil leads are usually soldered to tags on the transformer. Where the leads are fairly accessible, however, the arrangement shown in Fig. 2 can be followed. One of the leads is cut, and two short lengths of insulated flex are soldered to the two ends. The lengths of flex are then attached to the terminals of an ordinary on-off switch. When the switch is in the on position the built-in speaker is in circuit, and when it is turned off the speaker is "muted." It will be found worth while to make these connections permanent, mounting the switch on the back or side of the cabinet, as near to the speaker transformer as possible.

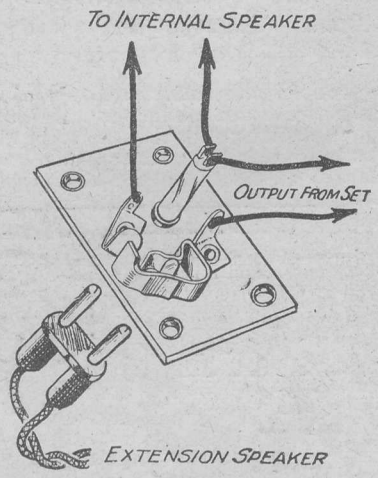


Fig. 5.—This illustration shows how the special "Clix" plug switch can be used as an alternative and safer arrangement than that in Fig. 4.

Alternative Connections

Another method of connecting the extra speaker, which is not generally as satisfactory, is as shown in Fig. 3, where it is simply in parallel with the built-in unit. In this case it is generally a convenience to employ a change-over switch for bringing either one speaker or the other into operation. An ordinary single-pole-change-over switch could be used as shown in Fig. 4, but this is not ideal. The reason is that if the switch were operated while the set were switched on there would be a voltage surge in the anode circuit of the output valve, and this might cause serious damage to the valve and other components. An excellent and inexpensive way out of this difficulty is by using the special plug switch which was recently introduced by the makers of the famous "Clix" connectors. This switch, along with the connections, is shown in Fig. 5.

Remote Control

One of the objections to the use of an extension speaker is that it is sometimes impossible to control the volume at the speaker. This does not apply, of course, in the case of extension speakers such as many of those in the W/B range which have a built-in volume control. When this is not fitted to the speaker which it is proposed to use, a potentiometer volume control can be added as shown in Fig. 6. The .01-mfd. fixed condenser shown in Fig. 6 is not essential, but it is desirable in the interests of quality at low volume levels. It is worth mentioning that a special graded volume control for this purpose is made by W/B. Another method is to connect a variable resistance in parallel with the speaker; a value of about 50,000 ohms is suitable.

Another difficulty which presents itself when using an extension speaker is that the receiver cannot normally be switched off from the remote point. This is not impossible of solution to-day because special relays are available at reasonable cost. One of these is made by Bulgin, and typical connections are given in Fig. 7, where it will be seen that double-push switches are used for on-off control; these are supplied by the makers of the relay. Another model is the W/B "Long Arm," and this is used in conjunction with the adiabatic volume control-switch unit which is fitted to some of the extension speakers of this make, and which can be obtained separately for connecting to existing speakers. The connections are given in Fig. 8.

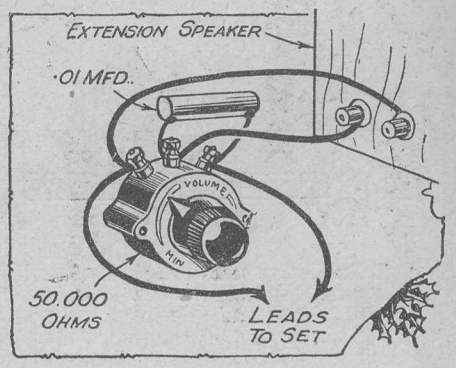


Fig. 6.—A useful volume control for an extension speaker.

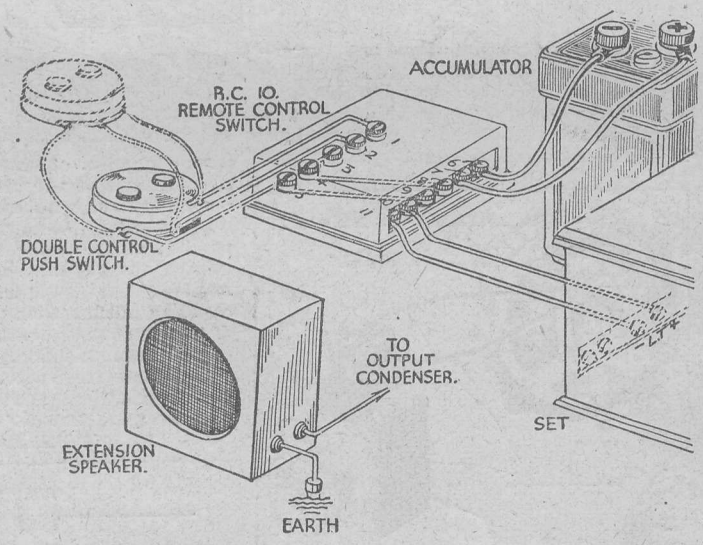


Fig. 7.—How the Bulgin remote control relay can be used for switching the set on and off from a distant point. Connections are for a battery set, but the device can also be used with a mains receiver.

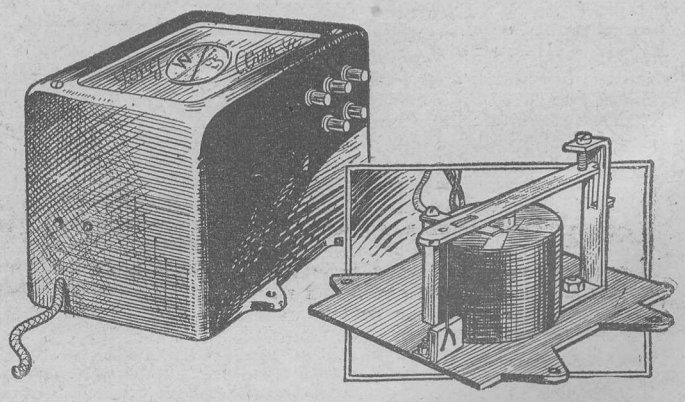


Fig. 8.—Connections for the W/B "Long Arm" used in conjunction with a W/B extension speaker having a special combined volume-control-switch.

The Pick-up and the Party

How to Connect and Use the Gramophone Pick-up with Any Existing Receiver, and Suggestions for Increasing the Entertainment Provided by Gramophone Records with Various Devices—by W. J. DELANEY

THERE are occasions when the broadcast material does not provide the necessary entertainment, and in the ordinary way this would mean that at a party or family gathering a sudden lull descends upon the proceedings. The usual problem then arises as to what to do next. Some would like to play games, others want to do something else, and so on. Where, however, a gramophone pick-up is fitted as part of the radio equipment no such problem can arise, as the vast variety of gramophone records which is available will enable any desired programme to be given to your guests. You can have any of your favourite radio stars, instrumentalists, or dance bands, and there is no need for any dull moment when you possess a radiogram. Contrary to the views held by many listeners, it is not necessary to have access to the electric-supply mains before you can use a radiogram. Although the majority of radiograms on the market are designed for mains operation this does not indicate that mains are essential, and this point seems to have prevented many listeners from obtaining a pick-up and converting their receiver into a radiogram. Provided that the volume delivered by your receiver on the radio programmes is ample for your normal listening needs without the necessity for using excessive reaction, then you can obtain a similar volume from a gramophone pick-up.

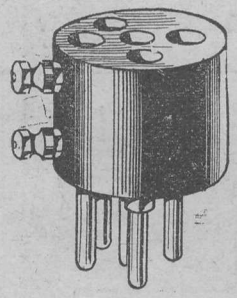


Fig. 1.—This adapter enables the pick-up to be used with any receiver which is not already provided with pick-up terminals or sockets

Fitting a Pick-up

To explain the last point it may be mentioned, for those who are not familiar with the subject, that the gramophone pick-up operates at low frequency, or audio frequency, and the reaction control operates at high frequency. Therefore, the high-frequency portion of the receiver is out of action when a pick-up is being used, and although you can use the detector valve in addition to your L.F. stages, you cannot employ the reaction control. The pick-up may be used with any receiver without the need for breaking or disconnecting a single wire, and it is possible to purchase a special plug to which the pick-up may be joined, and this plug is inserted into the valve-holder beneath the valve. That is to say, the valve is pulled out of its holder in the set, the plug inserted in its place, and then the valve is put back on top of the plug. The pick-up is then in position and may be used in the usual way. From what has been said previously, it is obvious that an H.F. valve must not be removed, and thus the pick-up plug or adapter is inserted only in the detector or L.F. valveholders. If there is no volume control on the L.F. side of the receiver it may be found with some pick-ups that overloading and consequent distortion will take place if the pick-up is used with the detector valve, due to the fact that the amplification is too great to enable the output valve to handle the signal. In such a case the pick-up would be joined to the L.F. valve.

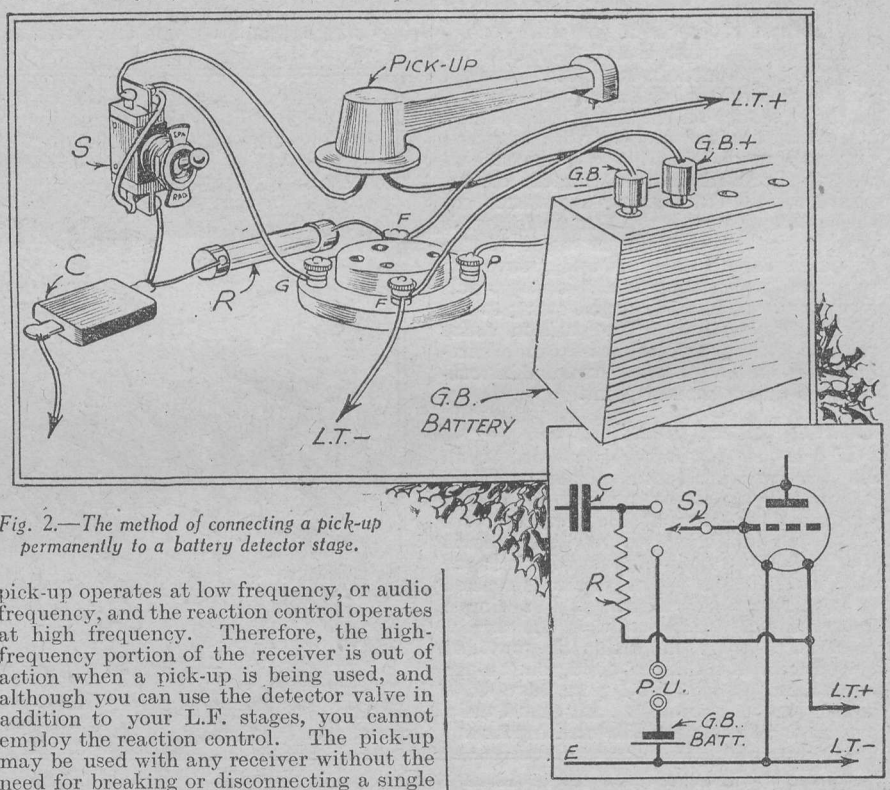


Fig. 2.—The method of connecting a pick-up permanently to a battery detector stage.

Choosing a Pick-up

When obtaining your pick-up, therefore, you must first consider your circuit. If

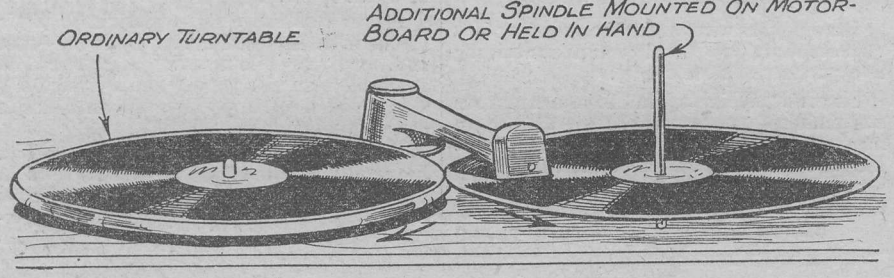


Fig. 3.—By playing a record backwards as shown here, you can obtain some very weird effects.

there is only one L.F. stage, you can only use the detector with that stage and this will provide quite a good degree of amplification. Consequently you should obtain a pick-up with a moderate voltage output. Similarly if your receiver employs a metal rectifier feeding the output stage, you can only use one stage of L.F. amplification, and a very sensitive pick-up would be needed to obtain sufficient volume. You can obtain a pick-up for as low as 5s., or if

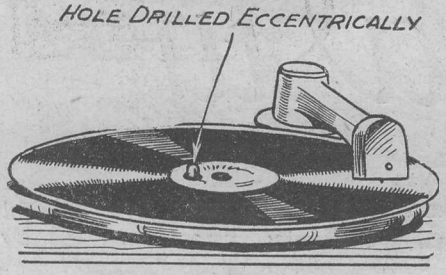


Fig. 4.— Adding to the fun by playing a record eccentrically.

you have no portable gramophone with which to use this simple type of instrument, you may obtain one complete with a carrier arm. As a motor has to be used to turn the record, however, a simple portable gramophone of the standard type may be obtained quite cheaply and will enable you to make your receiver into a radiogram at the minimum of expense. If you desire to redesign your present receiver to make it into one of the modern types of radiogram, you can obtain a clockwork or electric motor to mount on the top of the cabinet, and fit a standard pick-up with arm and volume control. In this case the makers will supply a template showing the correct position for the carrier arm to ensure that the tracking is correct. That is to say, if not correctly mounted, the angle of the needle in respect to the sound grooves on the record will change and this may result in the records being damaged owing to the sides being scraped. The position varies according to the type of pick-up and, therefore, you should follow the makers' instructions on this particular point.

Correct Motor Speed

If you use a clockwork motor, or an electric one with speed control, you will only obtain the correct musical pitch when the turntable turns at the correct speed. With the majority of modern records this speed is seventy-eight revolutions per minute, and if the speed regulator is marked in revolutions per minute it is a simple matter to set the indicator to the correct position. If no indication is provided or you wish to check the speed you can use a stroboscope (provided you have A.C. lighting mains available). This consists of a disc having black and white markings round the edge and these are in such a position that when the disc rotates at the correct speed, and it is viewed in the light from an ordinary 50-cycle A.C. lighting supply, the markings appear to remain stationary. Such a speed indicator may be obtained free on application to the Cosmocord Company whose advertisement appears from time to time in this journal.

If the motor runs slowly the pitch of the music will fall and you can add to the amusement of your guests by playing a record at half-speed. It is interesting to note the effect of this arrangement, as the instruments which have few harmonics (such as the saxophone, trumpet, etc.) do not sound much altered, but the piano, which is rich in harmonics, has a most weird tone and you will find that many people cannot identify it as a piano. Similarly, by running at a very high speed the pitch is raised and the human voice becomes very squeaky, producing an effect similar to the old-fashioned gramophone, owing to the apparent elimination of the lower frequencies. A further scheme to add to the liveliness of a party is to play records backwards, or by the use of an eccentric hole. For the latter another hole should be drilled (or burnt with the aid of a cigarette end) about ¼in. from the correct hole. As the record then rotates eccentrically it is not possible to start it, and then place the needle on the groove. The needle must, therefore, be placed into position first, and the motor started up, spinning the record so as to obtain the correct speed as soon as possible. (Fig. 4.)

To play a record backwards, a separate spindle should be mounted on the motor-board, and the record may then be placed on this with its edge resting against the edge of the turntable.(Fig. 3.) Alternatively, you can hold the record on a pencil or similar round object, resting the under surface on your thumb, and can then press the edge of the turntable giving the required pressure to prevent the record from slipping.

A Permanent Connection

If you require the pick-up to be a permanent connection, a simple single-pole change-over switch may be fitted as shown in Fig. 2. The grid condenser and grid leak are disconnected from the grid terminal of the valveholder and are connected to one side of the change-over switch. The grid is joined to the arm of the switch, and the other side of the switch is joined to the grid bias battery. If the receiver is of the mains type the grid-bias connection is ignored, and that side of the switch is joined direct to earth. To provide the bias for the detector valve (which, you will remember, is not operating as an L.F. valve), a suitable resistor is joined in the cathode lead and by-passed by a suitable condenser. The grid leak is then joined direct to the cathode. The arrangement is shown in Fig. 5, and in the majority of cases a resistor of 1,000 ohms would be needed for the bias circuit and a 25-mfd. electrolytic condenser may be used for by-pass purposes.

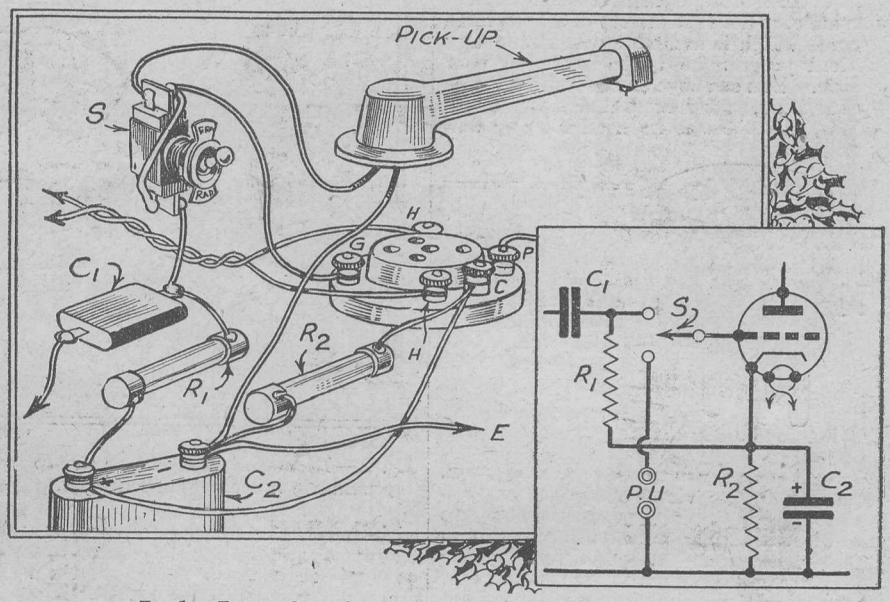


Fig. 5.—Fitting the pick-up to a detector stage in a mains receiver.

ANNOUNCER'S OPENING REMARKS

Fade in gramophone playing "In an Old-fashioned Town" for about 30 seconds. Fade out music whilst Announcer speaks.

Announcer. "Ladies and gentlemen, we present a comedy entitled, 'Genuine Frauds'. The characters in order of 'appearance' are :—

Sadie Gullhiemer.
Cyrus Gullhiemer.
John Marlow.
Jane Marlow.

The action of the play takes place at the "Lilac Cottage Tea Rooms" at Chancton, a charming old-world village nestling in a hollow of the Sussex Downs.

Imagine, Ladies and Gentlemen, a beautiful summer afternoon; a gentle breeze lightly sways the lilac, clustering so thickly by the garden-gate and swings the newly-painted sign which invites the passer-by to wander up the garden-path and have a home-made tea at "Lilac Cottage."

Let us wander up that cobbled path and push open the front door of the cottage. A quaint, low-ceilinged, cool, little room invites us to step inside and the gaily-coloured curtains and polished brass ornaments make the invitation irresistible.

Three small tables are laid for tea and it is at the one near the window that we find Sadie and Cyrus just finishing their tea and discussing a pair of quaint old candlesticks on the table in front of them. (Announce the following quietly and confidentially.)

Keep very quiet, everybody! Let us hide behind this screen and listen to "Genuine Frauds."

Fade in music for a few seconds and then fade out completely.

Sadie. "Oh gee! . . . But Cyrus, they're just too *wonderful!*"

Cyrus. "Yeah, Sadie, it's beginning to dawn on me that they *are* too wonderful. You've told me that eight times and described every square inch of them to me in detail. Personally, I'm more interested in that quaint little teapot at the moment. Could you just tear yourself away from those candlesticks for just one moment, darling, and pour me out another cup of tea."

Sadie. "Aw, you've got no art in you . . . no understandin' . . . no soul! . . . Momma was right. I shouldn't have married you. All you're interested in is concrete-mixers. Ever since we started on our honeymoon, I've had nothing but concrete, concrete . . . and then more concrete!"

Cyrus. "Waal, what did they build the Statue of Liberty with? . . . Glucose?"

Sadie. "I'm not interested in the Statue of Liberty! . . . You can't call that art . . . it's not old enough!"

Cyrus. "Oh, so it's not old enough! Waal, what about that cigarette box I've got way back home; the one with 'Mayflower' stamped on it? . . . Is that art?"

Sadie. "Yeah, but that's different. What I mean . . ."

Cyrus. "And what about the fourteen carat gold salt cellar used by Louis Fifteen? . . . Is that art?"

Sadie. "Yeah, sure, Cyrus, that's all right but I do wish you wouldn't mix history with concrete!"

Cyrus. "Say, kiddie, if I didn't mix concrete, we wouldn't be here to-day in this quaint little shack. Aw, don't get me wrong, kid! Gee, I'm kinder sorry I've bin talking shop too much but you know I'm all for history as much as you are. Tell you what I'll do, Sadie! Do you like those candlesticks?"

Sadie. "Do I like 'em? . . . I'll say I do!"

Cyrus. "Right! (*Bangs table.*) I'll buy 'em for you!"

Sadie. "You mean that, Cyrus?"

Cyrus. "Sure I mean it, kiddie! They're as good as yours . . . history and all!"

Sadie. "Aw, gee, Cyrus . . . why they must be years old."..

Cyrus. "More like centuries."

Sadie. "Centuries? Do you mean . . . do you mean seventeen hundred and something?"

Cyrus. "Waal, I'm not a bad judge and I'll say sixteen hundred and something. Anyway, I'm goin' to buy 'em for you."

Sadie. "But . . . but supposin' they won't part with 'em, Cyrus?"

Cyrus. "Say, you just leave this to Cyrus Q. Gullhiemer! . . . Remember what Julius Caesar said, Sadie . . . 'Every gink's got his price.' Remember that! If I leave this house without 'em . . . waal, I'll give up sellin' concrete-mixers!"

John. "Er . . . good afternoon . . . I'm not intruding, I hope?"

Cyrus. "No, stranger! Welcome! Come right in and sit down."

John. "Thanks! By Jove it's warm to-day . . . especially carrying this suitcase all the way from the station."

Cyrus. "Sure thing! It looks a heavy case, too. Sit down, stranger, and take a breather."

John. "Er . . . thanks . . . it's nice to feel at home."

Cyrus. "Sure it's nice to feel at home. Do you know, we like this little island of yours?"

John (*with forced surprise*). "Do you! Er, that's splendid!"

Sadie. "Yeah, it's just too cute! We've bin lookin' around a bit and we're real glad we came over."

John. "That *is* a relief!"

Cyrus. "Yeah, we've bin lookin' around and do you know what tickles Sadie most of all?"

John. "My dear sir, as the novelists would say, I am all agog!"

Cyrus. "Waal, of all the big sights you've got, the things which get her most are your old-fashioned houses and curios and things. Mind you, I appreciate art, too, and I'm a pretty shrewd judge."

John (*earnestly*). "Yes, by Jove, I'll bet you are."

Cyrus. "Do you know, I'd rather ship this little cottage across the Atlantic than Buckingham Palace."

John (*in awed tone*). "Just fancy that . . . and I don't suppose that it's worth half as much!"

Cyrus. "I see by the date over the door that this little shack goes back to fifteen twenty-three."

John. "So you're fond of antiques, eh?"

Sadie. "Fair crazy! Why, just before you came in Cyrus was saying that he was going to buy these old candlesticks."

John. "Is that so?"

Cyrus. "Yeah! Sadie, here, fell for 'em, and, believe me, they'll look just great way back home with my 'Mayflower' cigarette casket."

John. "Yes, no doubt! But I don't think you'll be able to buy them."

Cyrus. "Eh? What's that?"

John. "I simply said, Mr.—er—I don't think I know your name."

Cyrus. "Gullhiemer! Cyrus Q. Gullhiemer, of New York City!"

John. "Well, Mr. Gullhiemer. I don't think that you'll be able to buy them."

Cyrus. "Oh! Is that so! Well, Mr. er—I don't think I know *your* name."

John. "Marlow! John Marlow, of London Town!"

Cyrus. "Well, Mr. Marlow, I just think you've slipped there. If there's something I want—real bad, that is—I buy it."

John. "Is that so, Mr. Gullhiemer. But perhaps you've forgotten that there are some things which you *can't* buy."

Sadie. "Are you trying to say that Cyrus couldn't afford to buy them. Why, when we were in Berlin——"

John. "I have no doubt that Mr. Gullhiemer's dollars could purchase a fair

amount of antiquity, but I merely remarked that there were some things which could not be bought—not even with dollars."

Cyrus. "Waal! Waal! Waal! Now this is becoming real interestin'! You're trying to tell me, Mr. Marlow, that if I really wanted these candlesticks I couldn't buy 'em?"

John. "That's what I said."

Cyrus. "Waal—we'll just settle that. (*Rings handbell on table*). "Now, in Stratford-on-Avon, we did that the other day, there was a guy there in a little cottage we had tea in. Now, he wasn't going to part with an old oak workbox that he had kickin' around. But do you think we came away without it? No sir! I just rustled the bills and he forgot all his objections. When we got back to the hotel, and Sadie took out the old lining and put in a swell satin affair, it looks just great now!"

Sadie (*sentimentally*). "Yeah—that's romance!"

(*Bell Rings*).

Jane. "Did you ring, sir?"

Cyrus. "Now, look here, girlie, just run along to your grandfather and ask him how much he wants for the old candlesticks. And make it snappy!"

Jane. "I haven't got a grandfather, sir."

Cyrus. "Waal, it doesn't matter—whoever these belong to."

Jane. "Well, you'll have to ask my husband here, sir.

Cyrus (*surprised*). "Eh, what's that?"

John. "Yes—they belong to me."

Cyrus. "Waal, waal, waal. And here have I bin wasting my time. That's not like me—wasting my time over a deal."

John. "I'm afraid you're wasting your time altogether over this deal, Mr. Gullhiemer."

Cyrus. "Now, look here, Mr. Marlow. I want these sticks. How much?"

John. "Mr. Gullhiemer . . . I . . . I quite appreciate your desire to . . . to . . . acquire *Romance*, but, as I said before, there are some things which are not for sale and these candlesticks happen to be amongst those things."

Cyrus. "I'll give you twenty dollars."

John. "There is a certain sentimental value attached to these candlesticks. They've been in the family for many centuries! In fact, they're older than this cottage."

Sadie. "What? Older than one, five, two, three."

John. "As a matter of fact they go back to the thirteenth century."

Sadie. "Do you hear that Cyrus? Thirteenth century!"

Cyrus. "Yeah! Well, I'm always willing to pay for age. Mr. Marlow I guess fifty dollars will close the deal then!"

John. "Your knowledge of market values on Wall Street, Mr. Gullhiemer, is no doubt very thorough, but I'm afraid that your appreciation of antique values is rather hazy. Why, I could take them into any curio shop in London and get ten pounds apiece for them."

Cyrus. "Waal! If that's the case—what about twenty-five pounds the pair."

Sadie. "Thirty pounds, Mr. Marlow."

Jane. "Thirty pounds . . . John . . . think . . . what we could . . ."

John. "No Jane . . . it's no good. I can't sell the things."

Cyrus. "Come now, Mr. Marlow. You see, even your wife advises you to sell."

John. "Hang it all, I can't. Why! as I said before, they've been in the family for all those years. Why—dash it all—I can get twenty for them anywhere and you're wanting to give me a miserable ten pounds for the sentimental value. Why! that's worth more than the candlesticks to me."

Jane. "Yes, but John, we could have that summer-house built . . . for teas in the garden."

Cyrus. "There you are, a summer-house for teas, Mr. Marlow—that will bring in more money than the candlesticks."

John. "I can't. No, I can't."

Sadie. "Thirty-five pounds, Mr. Marlow."

Cyrus. "Yes, we'll jump to thirty-five."

Jane. "Take it John."

John (*after a pause*). "All right! Only . . . only . . . it . . . it seems like losing something that's part of you."

Cyrus. "Waal, now, that's real sensible of you. There you are, Mr. Marlow, everything's got its price. Here's the cash. Ten, twenty, thirty, thirty-five! Now if you want a business deal put over, just get on that little Atlantic telephone. I'll fix you up!"

Sadie (*in awed whisper*). "Gee, Cyrus. Thirteen hundred A.D., isn't that great?"

Cyrus. "Sure, kiddie, it's great."

Sadie. "I'll run along and put 'em in the car and I'm going to drive you back to London like I promised."

Cyrus. "Right you are, Sadie. Now you just try and back the car out of the lane."

Sadie. "Yes—big boy—leave that to me!" (*A door shuts.*)

John. "Your wife must be very proud of your being such a cute business man."

Cyrus. "Waal, yes, I guess she may be."

John. "Well, now she's gone. . . I'll let you into a little secret. What do you think of the curios in this suitcase, Mr. Gullhiemer?"

Cyrus (*puzzled*). "Gee, what are they?"

John. "Why, they're 11th century antiques."

Cyrus. "What? Older than the other?"

"What will you give me for this bag full of Romance, Mr. Gullhiemer?"

John. "Yes, sir! And these are B.C., guaranteed by the makers."

Cyrus (*seeing light*). "What the . . . do you mean?"

John. "Sh! Not so loud! Now, you're a cute business man, Mr. Gullhiemer. What'll you give me for this bag full of *Romance?*"

Cyrus (*shouting*). "Waal, of all the. . . *Why, it's stark, raving, daylight robbery.*"

John "Sh! Not so loud! Your wife will hear you and she thinks the world of you as a business man."

Cyrus. "Well. . . I'll be . . ."

John. "Say, Mr. Gullhiemer! If ever you want any genuine antiques—just you get on to that little Atlantic telephone—I'll fix you up! (*A door slams.*)

Fade in gramophone playing "Old-fashioned Town."

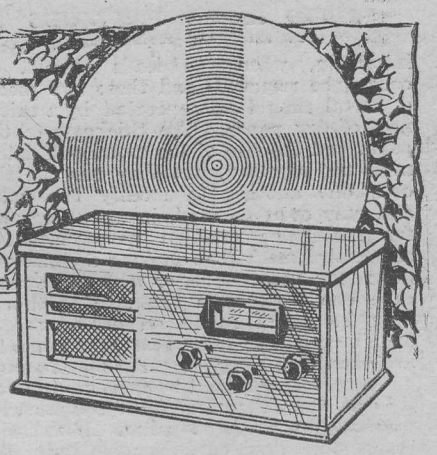
HOW TO PRODUCE A RADIO PLAY

It must be remembered, when presenting a radio play, that the whole plot depends upon the spoken word. Great care should therefore be taken to study the script so that the correct inflections of the voice will convey the meaning of the lines to the audience quickly and clearly. No doubt must be left in the minds of the listeners as to which character is speaking. In the case of "Genuine Frauds," this danger is automatically obviated by the fact that "Sadie" and "Cyrus" naturally adopt an American accent whilst "John" and "Jane" speak ordinary English.

It is helpful for the producer, when rehearsing his cast, to close his eyes, for in this way he is able to put himself in the place of the listener, and for the final rehearsals he should hear the play in another room through a loudspeaker. He will then be able to judge any phonetical ambiguities and clear them up.

Unfortunately, the average listener to a B.B.C. play does not realise that to be thoroughly appreciated it must be taken quite as seriously and attentively as a production in a theatre.

Rapid RADIO FIRST-AIDS



What to Do When Your Set Goes Wrong and the Shops Are Not Open, or You Are Unable to Obtain Spares and Replacements

IT is one of the perversities of nature that everything goes wrong when least expected and at an awkward time. It is as well, therefore, to be prepared for a temporary breakdown during the Christmas festivities, as no matter how careful you are beforehand to make certain that everything will be all right, it will be found that if anything does break down it will be on Christmas Day, when all the shops are shut. To be forewarned is to be forearmed, and therefore the following hints should be studied before the festival arrives and then you will be able to take the necessary steps to avoid a complete stoppage of the radio entertainment during this period.

For the battery user, the sudden breakdown of the battery supplies is the most likely defect which may arise, but the majority of listeners will no doubt make quite certain that a spare H.T. and accumulator is available, or at least will measure the batteries in order to be certain that they will last out over the holiday. If the unforeseen happens and this point is overlooked, a breakdown in the H.T. supply will be indicated by a gradually fading signal accompanied by distortion, the latter being due to the fact that the grid bias will remain unaltered. If, therefore, signals begin to get weaker, reaction becomes difficult to obtain, and distortion sets in, you may look to the H.T., and if no replacement is available, a temporary aid, where a special item must be heard, is to heat the battery. Place it in the oven for a few minutes with the door *open*, and do not make it so hot that the sealing compound runs. This will often give sufficient power to enable a complete musical item to be heard, but, naturally, it will not last very long.

The L.T. Supply

If the accumulator runs out, this will be indicated by a weakening signal, without distortion, and again the reaction control will be found to fail in most circuits. You cannot boost up the accumulator, and the only alternative is to use another source of supply. In the majority of small battery receivers the L.T. supply for, say, a news bulletin may be obtained from a dry battery, and perhaps a bell battery may be in use and may be removed for the purpose. Make quite certain, however, that it is not a 3-volt cell, in which case the filaments may be over-run. The condition of the battery will determine this, but it is desirable in such a case to include a resistance in series to ensure that only 2 volts are applied to the L.T. terminals.

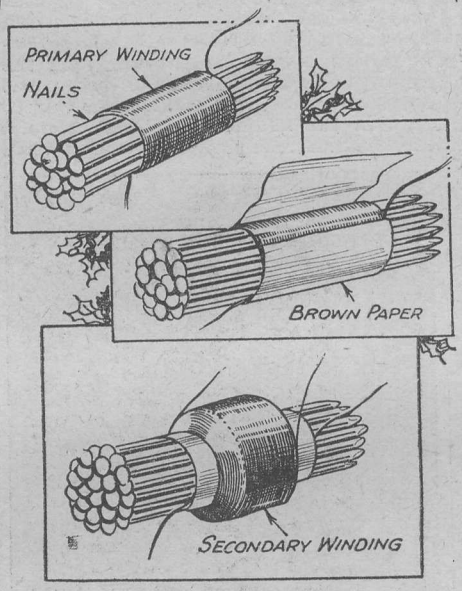


Fig. 1.—A quickly-made L.F. transformer.

Component Replacements

Should a component fail, this may be difficult to locate quickly, and, therefore, the simplest "first-aid remedy" in such a case is to eliminate stage after stage in the receiver. Such a fault would generally arise suddenly and no warning would be given. A resistor which is becoming faulty would perhaps give rise to crackling or other similar noises, whilst a leaky condenser would probably give rise to distortion. By joining the anode of one valve to the anode of the next but one a stage is completely cut out, and this will answer in the majority of circuits. If the receiver employs H.F. amplification, the aerial may be removed and connected to the grid condenser in the detector grid circuit, whilst if two L.F. stages are employed, the lead from the detector reaction choke may be taken over to the anode of the next valve. If the output stage has gone, the loudspeaker or filter choke may be connected in the anode circuit of the valve preceding it, and even if this is the detector stage it will function. Obviously, however, if the receiver is of a very simple nature, headphones would be preferable in such a case, as signals would no doubt be very weak with such an arrangement.

Making Components

If the fault may definitely be identified there are one or two simple schemes which may be adopted to effect temporary replacements. For instance, if a resistor is found to have broken down, a temporary one may be taken from the junk box even if not of the correct value, and some sort of signal will be obtained in most cases. If no spare is available, one may be made by soaking a piece of blotting paper in ordinary Indian ink. A high resistance may be made by rubbing ordinary soft lead pencil between two terminals, or at a pinch in some cases an ordinary piece of wet blotting paper may answer. It must, of course, be kept wet or it will fail to function as a resistor.

A temporary condenser may be made up in several ways. Two pieces of metal may be connected to the terminals of the faulty component (unless it has short-circuited

(Continued overleaf)

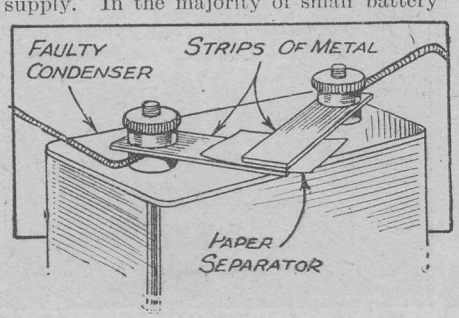


Fig. 2 left.—An improvised condenser, which can, of course, only be adopted if the component is not internally short-circuited.

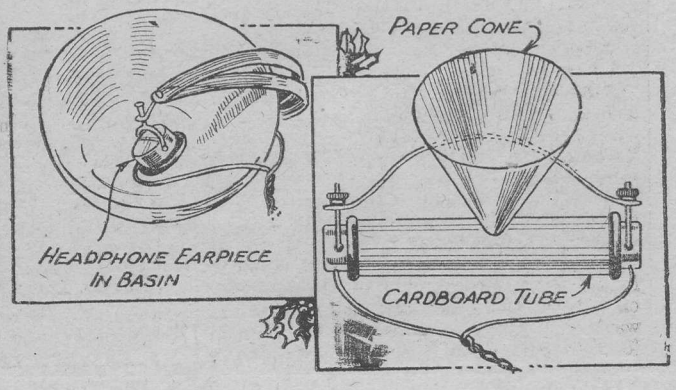


Fig. 3 right.—Improvised loudspeakers in which ordinary headphones are employed.

RAPID RADIO FIRST-AIDS

(Continued from previous page)

internally, when the leads should, of course, be removed) and these two pieces of metal should be separated by a thickness of dry paper. The thickness of the paper and the size of the metal will determine the capacity, but they may be slid over one another to modify the value and may even be used, in an emergency, for tuning or reaction purposes. An alternative method of making a condenser is to take two lengths of wire and double each one back upon itself. One should then be coiled round an ordinary lead pencil, each turn lying close up against its neighbour. When one layer has been wound a layer of paper should be over-wound upon it, and the other length of similar wire wound on top of the paper. If the wire is not first doubled back upon itself, the turns of wire must be soldered together.

A very temporary transformer may be constructed for the L.F. side of the receiver by winding a coil of wire for the primary over a handful of ordinary iron nails. Count the number of turns of wire, overlay a strip of brown paper and then wind a further coil of wire on top, the relationship between the two separate sections governing the ratio of transformation. That is, if 100 turns are wound over the nails, and then 500 turns are wound on top of the paper, the transformer would have a ratio of 5 to 1. The smaller or inner winding is the primary, and the outer and larger winding the secondary.

A Temporary Loudspeaker

Should the loudspeaker fail, and the defect be of a type which cannot be repaired quickly, a temporary speaker may be made up from a pair of ordinary headphones. The simplest idea is to place the earpiece inside an ordinary china basin, the sound being reflected from the inner surface with quite good volume, provided the initial signal is loud enough. Alternatively, a tube of cardboard may be constructed about 6ins. in length and placed inside the two earpieces, and a hole cut into the side of this tube and a trumpet made from paper or thin card inserted into the hole.

If the aerial collapses, due to strong winds or broken supporting rope, any indoor aerial may be used temporarily, but a better scheme is to pin the aerial wire along the top of a wooden fence, or simply stretch it from one end of the garden to the other. Temporary indoor aerials may be arranged in many ways, a short wire twisted round an existing bell-wiring system being quite good, provided that no electrical connection is made.

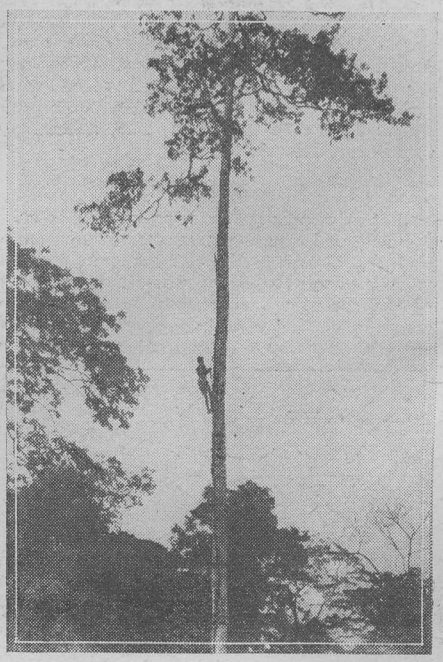
Radio Among the Pygmies!

McMICHAEL sets have probably found their way into more strange corners of the world than even their manufacturers have ever heard of, and the files at Slough contain many records from explorers and big-game hunters of satisfactory reception in the most difficult places. Nevertheless, the latest adventure to be recorded makes most interesting reading, in addition to providing a wonderful testimony to the value of radio in remote places and the reliability of modern productions.

Some two years back Commander Attilio Gatti, the well-known Italian explorer and big-game hunter, began his eighth expedition into the Belgian Congo in search of okapi and pygmy elephant for zoological purposes, and knowing full well the lengthy nature of such an enterprise, and the monotony of the rain-soaked African forests, decided to take with him a radio equipment. His choice fell upon a McMichael Colonial receiver, which duly departed with the expedition for the Belgian Ituri Forest, complete with large reserves of batteries, tropical coverings, etc. Nothing was heard from the expedition until a few weeks ago when Commander Gatti arrived back in Europe with his mission duly completed.

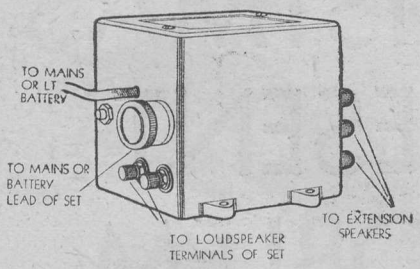
Chimpanzees versus the Earth Connection

The difficulties of operating a radio set in virgin forests such as these are many, but very largely compensated for by the numerous and interesting sidelights which are secured on the effect of this latest development of the modern world on the entirely uncivilised denizens of these parts. Aerial and earth, which to us seem easy to erect in the middle of a forest, were a continual source of petty trouble. The earth connection was time and again removed entirely by mischievous chimpanzees during the daytime, and prowling leopards at night; the aerial was attached to a 150ft. tree in the centre of the clearing where the base camp was established, but one of the terrific storms which sweep the jungle forest daily during the rainy season soon proved too much for the forest giant, and down it crashed carrying the aerial with it. The aerial was re-erected frequently, but the earth connection proved more obstinate; eventually a palisade of small sticks was built round it with the result that the chimpanzees, at least, tired of their destructive amusements before the wire itself was reached. This arrangement brought unexpected advantages to the camp; the natives in this part of Ituri are pygmies and worship their gods by little temples of leaves, twigs, and so forth built on the ground. The earth protection was obviously a temple to the white men's god whose powerful voice could often be heard coming from a box in the camp.

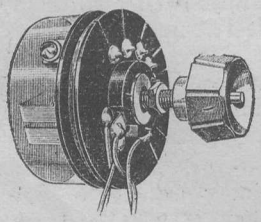


These illustrations show Commander Gatti assembling the aerial, and the pygmy bearers carrying the McMichael receiver through the jungle and erecting the aerial.

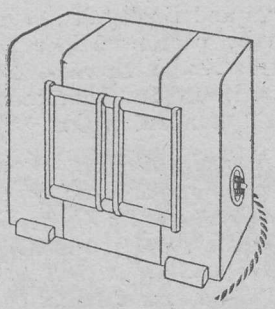
1937 *Stentorian chassis, for better Christmas radio. Wider response—less colouration—greater realism . Matches to any set. Prices from* **23/6** *upwards.*



"Long Arm" remote control, for switching **the set** *on or off from any extension point. One "Long Arm" serves any number of* 1937 *Stentorian extension speakers. Price* **15/6.**



Volume control, type R/C—for use in conjunction with the "Long Arm" and 1937 *Stentorian chassis models. Price* **5/6.**



1937 *Stentorian cabinet model. All models except the "Baby"* (**29/6**) *incorporate volume control type R/C. Prices* **29/6, 39/6, 49/6, 63/-.**

EXTRA CHRISTMAS ENJOYMENT!

A sense of achievement—the thrill of enjoying (*and* giving your family) a brand new extra comfort or pleasure—what else could so positively ensure an even happier "Happy Christmas" than usual?

For a moment, picture the real pleasure which *you*—in *your* home—can obtain from the new W.B. developments. You can have a new standard of radio reproduction, with wider frequency range and smaller "colouration" than ever possible before—or you can enjoy a novel convenience from the "Long Arm"; which (in conjunction with a 1937 Stentorian) enables you not only to listen in another room, but also to switch the set on or off without stirring from the extension-point!

The process of fitting provides a keen interest. The results are certain—and remarkable. The cost is extremely small (and H.P. terms are available from your dealer, if you wish).

Make up your mind that this shall be a *memorable* Christmas! Fit a new Stentorian, or a "Long Arm" extension point—or both. You will be glad you did!

1937 STENTORIAN

PERMANENT MAGNET MOVING-COIL SPEAKERS

WHITELEY ELECTRICAL RADIO CO., LTD. (Technical Dept.), MANSFIELD, NOTTS

Synchronising Sound with your Cine

How Gramophone Records Can Be Made for Use in Conjunction with Cinematograph Films.

By FRANK PRESTON

THE home ciné may frequently be used to provide considerably better entertainment if it can be converted to a form of "talkie." Of course, it is now possible to obtain a complete "home talkie" outfit, but the price is very high. Even when cost does not prohibit its use, it is seldom that suitable sound-picture scenes can be "shot." As an alternative, the ciné enthusiast might consider the possibilities of making gramophone records to synchronise with the reproduced pictures. Briefly, the idea is that the film should be thrown on to the screen at the same time as a gramophone record is being made. If both film and record are started together, they can later be reproduced at the same time to give the same effect as a sound film.

Question of Cost

The method of procedure can be either simple or fairly complex, cheap or rather costly, according to the amount which can be spent and the quality of reproduction demanded. When it is not proposed to spend more than a few shillings an ordinary gramophone pick-up can be used as a recording head in conjunction with a loud-tone needle; it might be found necessary to weight the pick-up head in order to ensure a better "cut" in the record blank. As to the latter, it might be possible to obtain a few aluminium blanks very cheaply, although it appears that there are not now many of these on the market. There are many other types, however, although many of them cannot be used satisfactorily, except in conjunction with a complete recording and tracking head—which costs something like four guineas on the average. One well-known type of record blank is the "Musikon"; this requires a proper recording head and has to be "processed" after recording. The "processing" consists of baking the comparatively soft original record. The baking makes it quite hard and reasonably permanent. Makers of the blanks, which cost 1s. 6d., 3s., and 4s. 6d., according to size, will do the "processing" quite cheaply, whilst they can also supply an electric oven of special type at 27s. 6d. With this the amateur can bake his own blanks cheaply and effectively.

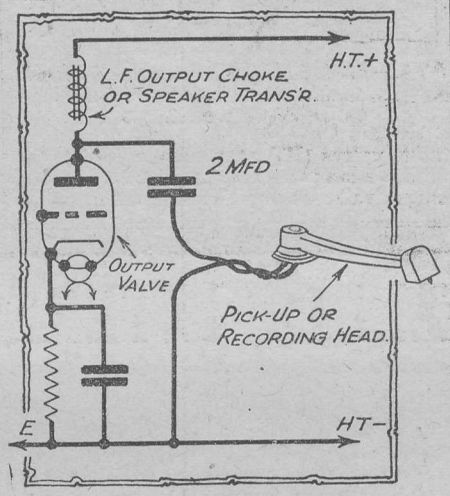


Fig. 1.—Connections suitable for a pick-up used as a recording head. A mains set is assumed, but the method is the same for a battery receiver.

Another Record Blank

There is another type of record blank available which does not require to be baked. This is similar in appearance to the normal type of record and must be used in conjunction with a tracking head. After recording, a small amount of special chemical is applied to the surface with a wad of cotton wool, and then the surface is polished by applying a second solution in a similar manner. This simple treatment renders the record perfectly hard and suitable for use time after time. Yet another pattern is of semi-transparent material, rather like celluloid in appearance. With this record no processing is necessary, but it is not as permanent as the others.

There are several points to watch when making records, and it is not proposed to deal with them here, since space does not permit. Most of the suppliers of record blanks, however, will provide the necessary instructions for their efficient use.

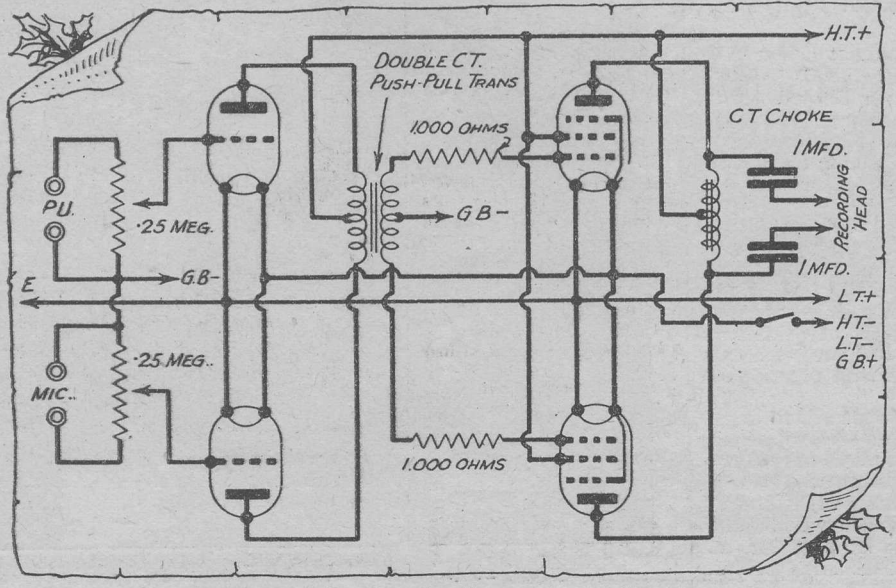


Fig. 2.—A useful type of double-push-pull circuit for recording

Recording

In the first place, it will be assumed that aluminium blanks are being used, these being ready tracked and requiring only a recording head or pick-up. The recording pick-up can be connected as shown in Fig. 1, where it takes the place of the loudspeaker in a choke-capacity output circuit of the broadcast receiver, which is to be used as an amplifier. When choke-capacity output is not used, the speaker being connected directly between the anode of

(Continued overleaf)

SYNCHRONISING SOUND WITH YOUR CINÉ

(Continued from previous page)

the output valve and H.T.—, the pick-up can be connected as shown in Fig. 1, but using the speaker in place of the choke. In that case it will be desirable to disconnect one of the secondary terminals on the transformer from the speech coil, but this is not essential when the set provides upwards of 2 watts output. Incidentally, an output of at least ¼ watt is needed for good results.

A microphone should be connected to the pick-up terminals of the receiver or amplifier as explained in the article in this issue, entitled "Producing Your Own Programmes." Then, with the film running and the pick-up on the record, it is necessary only to speak, play, sing, etc., into the microphone, making the sounds coincide with the pictorial events.

Preliminary Experiments

It might be necessary to make a few experiments before the desired results are obtained, for which reason it is suggested that the record be stopped every half-minute or so and "played back." This will enable the operator to judge the best positions for the microphone volume control for certain kinds of sound, and will necessitate the waste of only a single record blank. Before commencing the "full dress" performance it will be helpful to run through the film three or four times, making notes of the best sound accompaniment and of the number of words which can be spoken in connection with the various scenes. Those who are able to write shorthand will probably write out the script, correcting and "cutting" it each time the film is shown through as a preliminary to recording.

Input Connections

In many cases it will be found better to record both speech and music, "fading in" either as required. Gramophone records will be useful for the musical portions, and so both a pick-up and microphone will be required. These may be connected by one of the methods described in the article "Producing Your Own Programmes," although a better system is as shown in Fig. 3. In this case there are two triode-

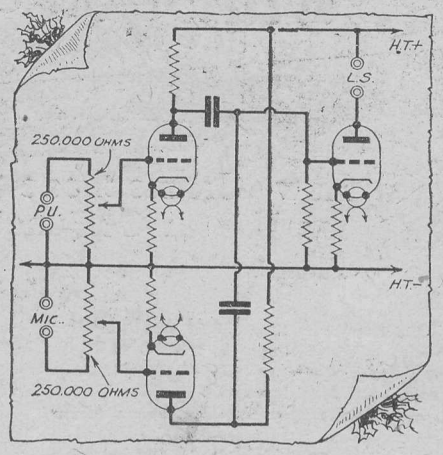


Fig. 3.—Method of using two input valves for the pick-up and microphone. Both feed into a single amplifier valve.

input valves (H.L. type are suitable), the output from these being fed into a common output valve, or into a pre-output amplifier. Two separate volume controls are used, and these might be either on the microphone and pick-up respectively, or mounted separately near the amplifier. The latter arrangement is better, since they are then more accessible and can be operated simultaneously without difficulty. The connections given are for resistance-capacity coupling, but transformer coupling can be employed by using a push-pull transformer with centre-tapped primary, and by employing the centre-tapping and one end connection only of the secondary.

A Simple Amplifier

Another method is to use a double-push-pull amplifier, of the general form shown in Fig. 2. This is for a battery-fed amplifier using two triodes and two high-efficiency pentode valves. Those who propose to build an amplifier especially for recording or low-power public-address use will find that one based on this general circuit is very satisfactory. Of course, the output, when using battery valves, will not be more than 1 watt for an H.T. current consumption of about 20 mA. But by using a mains-operated amplifier a much greater output could be obtained. It would not be possible to give full constructional details here, but the brief particulars supplied by the circuit diagram will be sufficient for the guidance of experienced constructors.

After the records have been made they can be played through in exactly the same manner as commercially-made records, using a pick-up, amplifier and speaker. If they are labelled to agree with the title of the film to which they are appropriate, a complete album of sound-ciné combinations can be built up.

ITEMS OF INTEREST

"Warbled Watts"!

FERRANTI, LTD., the well-known radio manufacturers, sent us the following amusing letter recently received by them from a prospective customer in Belgium:

"Sir,—I take the freedom to ask you if you will be so kind to send me a quite complete documentation of your alimentation-transformers suitable to strong and quite powerful receptors and also microphonical amplificators reaching 20 warbled watt with their price.

Thanks befor,
my very respectful salutations."

Trinity House Broadcast

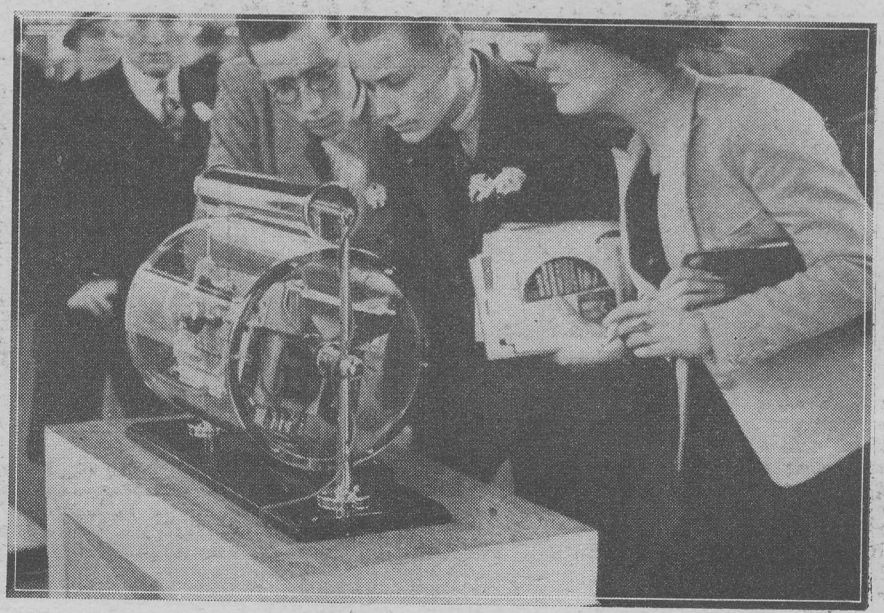
AN interesting broadcast will be given from the National on December 16th, and Regional on December 18th, when H. L. Morrow will introduce listeners to the workings of Trinity House, the institution controlling navigation round the British Isles.

The early history of Trinity House, a Corporation responsible for maintaining lighthouses, lightships and pilot services, is lost in the obscurity of the late Middle Ages. Its history becomes clear only from the reign of Henry VIII. Originally a charitable institution, it has grown into the most important maritime organisation of the British Isles.

Listeners will be introduced to light-house-keepers, officers and crews of several east coast lightships, and pilots of the Ports of London and Southampton. At both these ports the microphone will "board" an incoming ship and listeners will be able to hear what actually happens on the bridge of a great liner as the Trinity House pilot takes command.

"The Sea"

ON December 8th, from Northern Ireland, a programme will be given of selected prose, poetry and music, which has been chosen and linked together to present the sea in symbolical aspect. It is another example of the creation of a charming cameo by the judicious use of gramophone records and appropriate linking narrative. These programmes of gramophone records, for the production of which a special department exists at Broadcasting House, have lately proved extremely popular.



Admiring the "works" of one of the latest Ferranti receivers which is conveniently mounted in a revolving glass case.

On Your Wavelength

By THERMION

The Festive Season.

NOT the least important part of the festive season is the attention which the Press devotes to it. The Special Christmas Numbers produced by publishers help to inculcate that *joie de vivre* which is so much a part of the English Christmas. Now shall we have a spate of Christmas cards showing round plum pudding, dripping with ice which no one has ever seen; snowbound houses which we do not have in England, and the usual sickly sentiments in the form of doggerel printed on cards because people are so speech-bound to-day that they cannot find words to express the filial feelings they have towards you. As with crooners, I dislike Christmas cards. You know the sort of things you are going to get :—

"Here's lot of joy and lots of wealth,
Here's wishing you the best of health;
May skies be blue and friendship true,
For you love me and me loves you."

Or again, here is another gem which I offer free of charge to these putrid poetasters who earn their sickly living writing tripe of this sort for the best part of the year :—

"Peace on earth, goodwill to men,
The clock struck one, the clock struck ten,
Whate'er befall we ne'er must part,
For you are mine my own sweetheart."

You see how easy it is. Anyone can do it, and I think it is the quintessence of bad taste to visit the stores about a week before Christmas and sort over the fourpennies, envelopes supplied free, in order to find some piece of childish nonsense in the form of manufactured sentiments which you think will apply to the recipient. I preface my remarks with this because I feel that sincerity is the very soul and fabric of English life, and owing to the difficulties of our language it is a most difficult thing to find words with sufficient warmth which will express our feelings when sincere. I have a feeling of extreme gratitude for my readers in all parts of the world. We agree to differ on many things; we differ to agree on many others. When I wish with every sincerity and from the bottom of my heart every reader a cordial, convivial, and right Royal Christmas, I mean it, and I mean it in a sense which cold print cannot convey. So, my masters, I ask you to be upstanding, to charge your glasses, and to drink any merry old toast to fit the occasion. I drink to you, my readers, to you! For Christmas comes but once a year, when we can bury the old hatchet, forget our differences, and meet on the common platform of kindred feeling and let the jolly old world go by. For me it marks another milestone in my life. The years roll on, leaving me the memory of former days, and the age creepeth on apace, alack-a-day. Anyhow, what I mean to say is cordial greetings to all of you. May your brickbats be gilded, thus making the pill easier to swallow, if you get me. May home-construction flourish, if you follow me; may we all be together when the next Christmas Number goes to press, if you get my meaning. This journal has seen just a few Christmases go by. In the early years there was the glorious uncertainty of whether the set would be finished by Christmas, the greater uncertainty of whether it would work. Now we take wireless very much for granted. Perhaps by next year we shall enjoy those glorious uncertainties when we commence to dabble with television; I hope so, for there is greater pleasure in the doing than in the eating, if I may mix my metaphor. The Editor, like a good housewife, mixes his typographical pudding well in advance of the glorious 25th. He chooses his ingredients, stones the plums, and guides the erring hand of his contributors, so that the issue shall have the necessary gala effect. I suppose it is necessary to adopt this warming-up process so long before Christmas. Directly the holiday is over we go back to our offices and to our appointed places, and, like the witches in "Macbeth," we bubble, bubble, toil and trouble. It is good for us that once a year we bear feelings of goodwill to our enemies.

And now to business!

The Component Shortage.

ANOTHER reader adds his quota to my growing dossier on the component shortage. J. H. McK., of Pitlochry, says: "I am a good distance from my local dealer, and I usually first send straight to the manufacturers for components. About a year ago I asked my dealer to obtain a J. B. two-ganged condenser, and I had to wait about three or four weeks for it. When I asked him about the delay he said that so few people were building sets that the firms did not make components for them. This autumn I sent to a well-known mail-order house for components for Mr. Camm's Superhet receiver, and I had to wait three weeks for them. Last month I sent to the same firm for a Westector and fixed condenser, and it was three weeks before I received them. Messrs. Hivac, however, were able to supply me with valves by return. I look forward to PRACTICAL AND AMATEUR WIRELESS every week and think it would be a good idea to have a weekly crossword puzzle." Constructors are really having a bad time of it at the hands of dealers. Can something be done about it?

Here is a chance for the Radio Component Manufacturers' Federation to show a leg and do some really useful work.

Worms Driven to Suicide.

A DURBAN reader, C. H. J., sends me a cutting from a foreign paper which says: "Jazz music will rid the Japanese silkworm industry of a parasitical worm which causes losses at present of 15,000,000 yen annually, according to the claims of Dr. Yoshimasa Yagi, a parasitologist. The doctor states that he has found that jazz music from phonographs drives the kyochu variety of maggot deep into the body of the silkworm, where it dies of asphyxiation in less than half an hour."

This reader naively adds the pious hope that this quotation will prove another hefty nail in the coffin of wild and woolly jazz. He says: "Even here in Australia jazz is prominent on the air, damn it! More power to your elbow, Thermion, and continue your hammer blows on the jazz fiend."

Another Raw Deal

H. R. P. (Bellingham) writes: "Seven weeks ago I ordered some short-wave gear. After waiting five weeks I received two parts, one of which proved to be the wrong type. Of course this had to go back. After waiting six weeks I lost my temper, then my interest in the set. After seven weeks I received the rest of the parts, three of which had to go back as they were the wrong type. This is the eighth week and I am still waiting for three parts to finish the set. Now that I have pen in hand I will tell you about three dealers I visited for a coil of connecting wire, two of which didn't stock it; the third, after ten minutes waiting, brought out a box in which was about six coils, three of which I purchased. It seems that in my district (Catford) the dealers don't care two beans about us constructors any more; in fact, I think that they get so much profit from commercial sets that they can't be bothered with sixpenny articles on which they make about twopence or threepence. Well, I hope you will excuse my letter as I am not much good at this sort of thing. Hoping you get many letters on this subject so that you can send them to the firms concerned and get something done about it."

Cabaret Cartoons

I SEE that "Cabaret Cartoons" is the title of a television show on December 7th, which will develop an ingenious idea of Cecil Madden, the producer. The cartoonist will be Harry Rutherford, and his cartoons will be presented in a novel fashion. Televiewers will first see the names of the artists pencilled in bold characters; then, as the show proceeds, the camera will be faded over at intervals to Harry Rutherford's rapid sketches of each turn in succession. Artists on the bill will be Janet Lind, in songs and tap dancing; Levanda, foot juggler; Leona and de Leon, acrobatic dancers; and Chaz Chase, the American "silent comic."

Notes from the Test Bench

Hall Mark Extension Speaker

NUMEROUS readers have written to ask us for a diagram indicating the best method of connecting an extension speaker to this popular receiver. The Hall Mark has a push-pull output stage and therefore constructors are in doubt concerning the type of extension speaker required—most of them have been under the impression that a special push-pull extension is necessary. This is not so, however, any reliable type of P.M. speaker having tappings for pentode and power valves may be used. Its two leads should be joined via 1 mfd. 300 volt condensers to the anodes of the two output valves respectively. Alternatively the leads from these two condensers may be joined to speaker leads A and B.

Eliminating L.F. Oscillation

IN some cases readers have complained of a high-pitched whistle from the A.C. Hall Mark. This is commonly experienced in push-pull receivers, and is generally due to incorrect matching of the output valves or the two halves of the push-pull transformer. It can easily be cured by connecting a resistance in the grid circuit of the output stage. In the case of the Hall Mark 4 this resistance can have a value of approximately 50,000 ohms, and should be connected between the GB terminal of the push-pull input transformer and the leads at present joined to this terminal.

I.H. Output Valves

A READER complained to us the other day that he had experienced a good deal of trouble with the smoothing condensers in the A.C. Silver Souvenir. He admitted, however, that he had used an indirectly heated output pentode in place of the specified type in the output stage. This was the cause of his trouble. The voltage surge which occurred before the output valve became heated caused the condenser breakdowns. When a metal rectifier is used in conjunction with an indirectly-heated output valve the voltage across the smoothing condensers will be very high during the first 15 seconds after switching on—in the case of the Silver Souvenir it will be approximately 550 volts. This is too high for the condensers normally fitted in table model receivers, the average working voltage being 350 volts.

"The Tragedy of Nan"

AS for the radio production of "The Campden Wonder" last year, I understand that a company of Cotswold Players have been engaged for Masefield's more famous work "The Tragedy of Nan," which has its scene in a farmhouse within sight of the Cotswolds. Grace Wright plays Nan, and other important parts are taken by Percy Dewey, Minnie Nichols, Margaret Benfield, William Payne, and Garnet Keyte, who come from Chipping Campden and district. Owen Reed is the producer, and the broadcast will be given in the Midland Regional programme on December 14th.

Radio Engineering

I FREQUENTLY receive letters from youths and their parents asking how boys can enter the wireless profession. It is not easy to give an answer, especially since so many appear to think that the work consists of twiddling knobs, assembling parts, and looking intelligent. The work is just as highly-skilled as that required in any other form of engineering, with the addition that it might sometimes prove more tedious.

The prospective radio engineer should have a good general education, have a respectable knowledge of physics and mathematics, and be accustomed to thinking and working systematically. If he does not possess these qualifications he should be prepared to attend a wireless college, technical school or evening school, or take a correspondence course, until he does.

In the meantime he should seek to obtain work as an assistant in a reputable firm of service engineers or manufacturers, and be prepared for hard work and regular study. He must not expect a high salary until he can prove that he has mastered the science and craft of his job; by that time he should be able to command good pay.

A SIMPLE TRANSPORTABLE

Let Your Guests have the Choice of Alternative Programmes by Arranging to have Two Receivers Working at the Party. No Extra Licence is Required for This Receiver

ALTHOUGH no doubt the majority of listeners now have loudspeaker extension points in various rooms, or will arrange to do so as described in another part of this issue, there are occasions when this arrangement is not all that can be desired. When a large crowd is gathered you will always find mixed likes and dislikes, and it may often happen that the programme from one station is not appreciated by quite a number of people, and this means that they either have to put up with it, or the set is switched off and the remainder have to miss an item or programme in which they are interested. A portable or transportable will enable his difficulty to be overcome, and the choice of programmes which is now provided will enable the main receiver to be kept going in one room, and, if necessary, feeding several distant listening points through extension loudspeakers, whilst a separate programme may be provided in another room through the medium of this simple receiver.

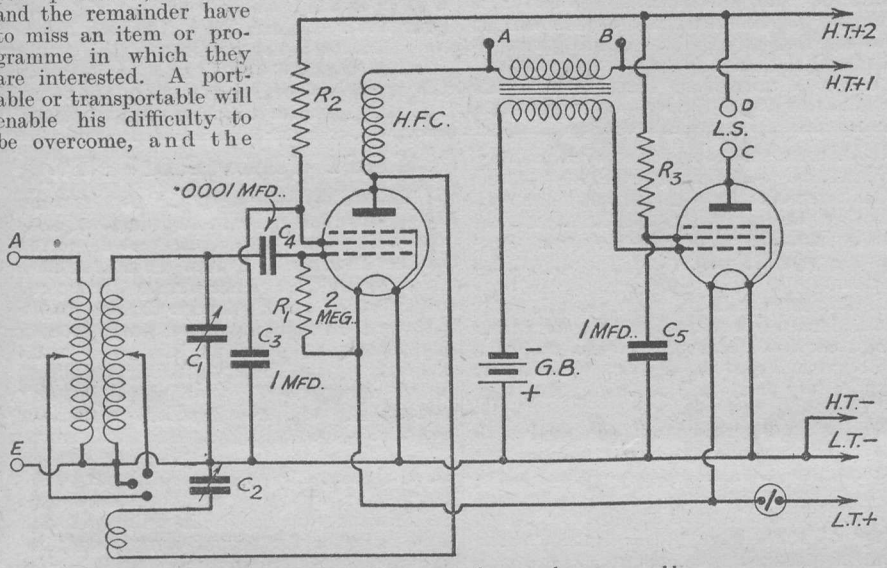


Fig. 1.—Theoretical diagram of a simple transportable.

In the design now given, arrangements have been made to couple the speaker, or one stage of L.F. amplification, to a standard listening point so that when the main programme is suitable, it will only be necessary to switch off the transportable and connect the extension listening point, and thus the purchase of a separate extension speaker will be avoided.

The Circuit

As it will be assumed that a rough aerial will be erected, the design of the circuit may be considerably simplified, and this enables any spare parts which the constructor has available to be used. Similarly, spare valves may be used in this receiver, and this is preferable to the building of a receiver containing a frame aerial. The construction of such a receiver would be rendered more difficult, and the layout would require more care. The signal picked up by a wire arranged round the picture rail, or by one of the special indoor aerials, such as the Pix, is greater than that obtained from a small frame, and results in a lower expenditure for the complete equipment. Consequently, a two-valver may be considered adequate, as it will be assumed that this will be employed for the local programme, while any alternative from a more distant station will be picked up on the main receiver. To ensure a high gain in the detector stage an H.F. pentode is employed, but if you do not have one of these valves by you and do not wish to go to the expense of buying one, an ordinary S.G. valve may be employed. Fig. 3 shows the modifications required according to the type of detector valve base which is used. An ordinary pentode is employed in the output stage and further to ensure a good step up a high-ratio L.F. transformer should be used. One of the special Q.P.P. or Class B transformers may be employed for this purpose, or alternatively a simple 5 to 1 component of standard type. The tuning may be quite simple, as the problem of selectivity should not arise, and therefore a standard single coil is employed with a single tuning condenser. There are now several suitable coils on the market, but the coil shown in the diagrams and recommended is the Bulgin type C20. The wiring at this part of the receiver may, of course, be modified to suit any particular coil you have handy.

Construction

The receiver may be built on quite a small baseboard, and this should be of such a size that it fits neatly into the cabinet housing your extension loudspeaker. If you do not possess one at the moment, you can, of course, construct the cabinet to suit. The receiver should be on the bottom of the cabinet, and the batteries may then be accommodated upon a shelf across the centre behind the loudspeaker. There are only four controls, and these are quite simple to arrange for; the opening for the tuning scale may be reduced to a mere circle if the J.B. dial is employed. A full-vision component is not required as the receiver will be more or less a local station set.

The wiring is clearly shown in the wiring diagram, and may be carried out without the aid of soldering, thus making the apparatus still simpler to build up, and wiring should be carried out with the standard insulated connecting wire, scraping

(Continued overleaf)

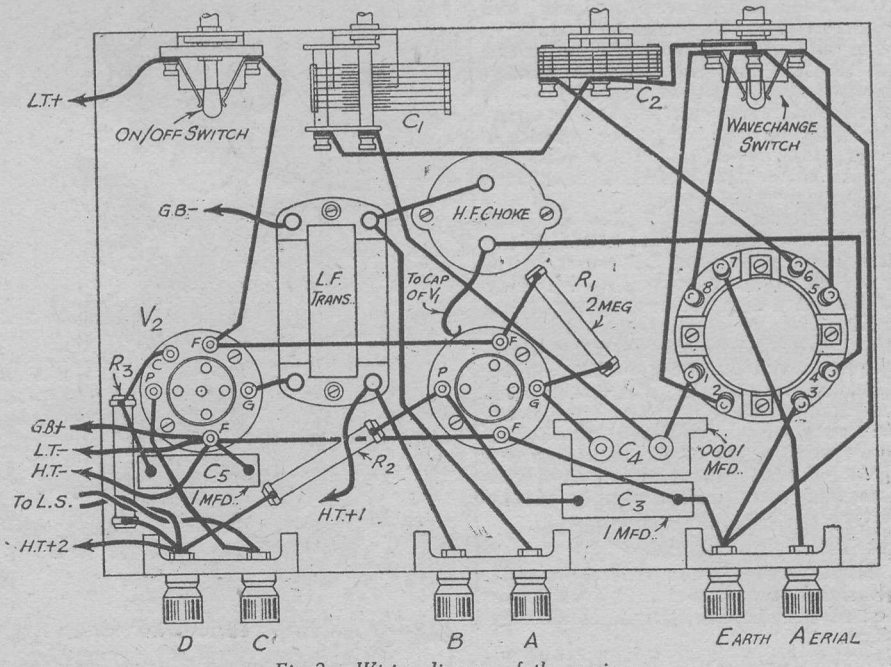


Fig. 2.—Wiring diagram of the receiver.

(Continued from previous page)

away the insulation at the end before attempting to join it to the terminals.

For temporary use such as this receiver is intended to provide, a small capacity L.T. and H.T. battery may be utilised and this enables the overall size to be kept within reasonable limits. It also reduces the weight and makes it more convenient to carry from room to room. A 9-volt grid bias battery will be required.

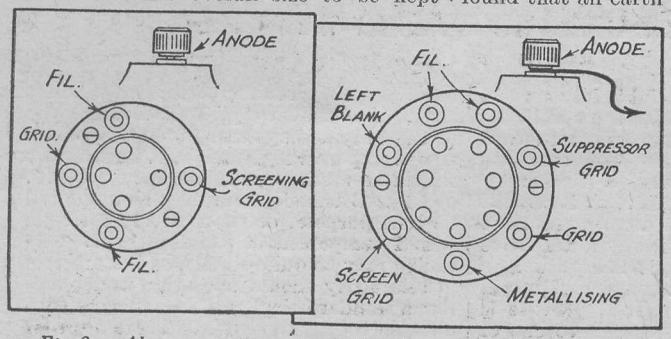


Fig. 3.—Alternative connections for 5 and 7-pin base for battery H.F. Pentodes.

Operation

The operation is extremely simple, it being only necessary to switch on and turn the single condenser to the required station. Signal strength may be boosted by the reaction control, and it will probably be found that an earth connection will enable slightly greater signal strength to be obtained. As, however, the receiver is intended for room-to-room use, it will be assumed that an earth is not always available, and thus it may be ignored. Where, however, a convenient earth is available (such as a water pipe or radiator system), a lead may be joined from this to the L.T. negative terminal on the accumulator.

When not required as a complete receiver the two points A and B should be connected to the extension speaker sockets in the room, and the transportable switched off. It is assumed, of course, that the extension point is taken from an output filter circuit in the usual way (See Fig. 1 on page 357). Alternatively, if the additional amplification is not required at this point, the two points C and D may be joined to the extension speaker sockets in the room, and this connects with the speaker alone.

COMPONENTS REQUIRED FOR THE TRANSPORTABLE.

One tuning coil, Type C20 (Bulgin).
One .0005 mfd. tuning condenser and dial (C1) J.B.).
One .00025 mfd. reaction condenser (C2) (J.B.).
One L.F. transformer
One 2-point switch (Bulgin).
One 3-point switch (Bulgin).
Three terminal mounting blocks (Belling-Lee).
Six terminals (Belling-Lee).
One H.F. choke (Bulgin).
One .0001 mfd. fixed condenser (C4).
Two 1 mfd. fixed condensers (C3 and C5).
One 2 megohm grid leak (R1).
One 2,000 ohm resistor (R3), 1 watt type.
One 20,000 ohm resistor (R2).
Two baseboard mounting valve-holders, one 4-pin and one 5-pin.
One S.G. or H.F. pentode valve.
One L.F. pentode valve.

NOTES & NEWS

Television Trade Activity

WITH the official television programmes only in their third week the response of the public has already led to considerable trade organisation for the production of receivers. The experience gained from years of development and research has now been applied to the production of home sets of a high order and the initial sales have amply justified the preparations made by the large manufacturing concerns.

Already a considerable proportion of the 3,000 employees at the Coventry radio works of the G.E.C., whose experts have from the earliest days of television been carrying out intensive research in both transmission and reception, are engaged in the development, production and sales of receivers to meet the present demand.

Receiver has 3,980 Parts

SOME idea of the work and material involved in the manufacture of a single television receiver will be gained from the fact that the standard twenty-three-valve G.E.C. set contains 3,980 parts. The alternative set, incorporating an eight-valve all-wave sound receiver, carries a further 2,000 pieces. All these parts are made by the company themselves, mostly from the raw materials.

Some of the most highly qualified technicians in the world are engaged in the research and development laboratories of the G.E.C. The researchers at Wembley have their own high-definition transmitters, enabling them to experiment at all times of the day. At the Coventry factory, which is at present outside the Alexandra Palace radius, the development and testing staff have produced their own test equipment, remarkable apparatus which even gives visual reproductions of the characteristics and efficiency of the many components, both before and after final assembly of the receiver.

First Television Parties

A SERIES of television parties, probably the first of their kind ever to be organised, were held recently in North-west London.

They were arranged by a member of the G.E.C. research laboratories at Northway, N.W.11, on a standard production model G.E.C. receiver for the purpose of experimenting on receiving conditions in the garden suburb. The visitors, both young and old, were invited to give their unqualified criticism.

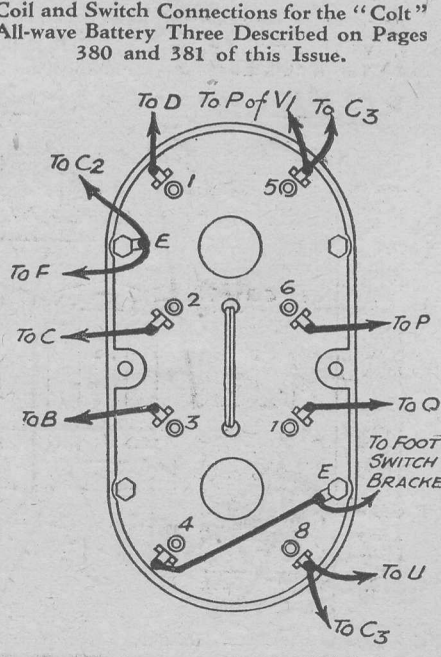
Receiving conditions were consistently good. There was exceptional freedom from motor-car interference, and the use of a D.C. converter on the Finchley mains was found easily practicable. The six-foot wire aerial gave a very strong signal.

The visitors were much impressed with the quality and clarity of reception and the programmes themselves were greatly enjoyed. The composition of the Armistice Day film was adjudged excellent, while a party of schoolboys got a special thrill from the parade of pioneer cars.

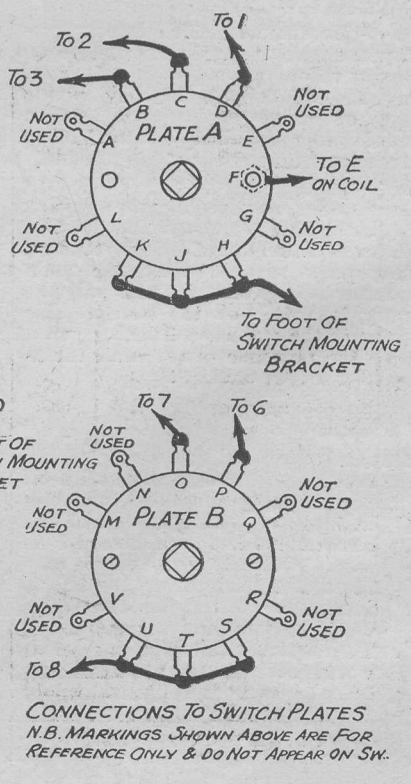
LATEST TELEVISION NEWS

TELEVIEWERS may be forgiven on December 3rd for imagining that they are seeing the Crown Jewels as displayed in the Tower of London. In actual fact, full-size replicas of the Crown Jewels are being taken to Alexandra Palace to be televised in the afternoon and evening transmissions, with an historical commentary by Mr. Kenneth L. Davy, who has spent many years in making "jewels," swords and similar theatrical properties. He will show and describe five crowns copied from originals in the Regalia. Of these the most important is, of course, the Coronation Crown, sometimes known as St. Edward's Crown, fashioned in gold and used only for the actual coronation ceremony. The original was made for Charles II.

Coil and Switch Connections for the "Colt" All-wave Battery Three Described on Pages 380 and 381 of this Issue.



CONNECTIONS TO COIL UNIT



CONNECTIONS TO SWITCH PLATES

N.B. MARKINGS SHOWN ABOVE ARE FOR REFERENCE ONLY & DO NOT APPEAR ON SW.

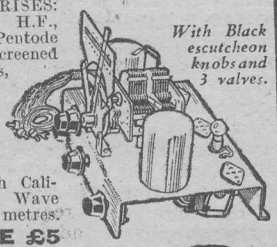
N.T.S. XMAS BARGAINS

● AMAZING PRICE REDUCTIONS ● WONDERFUL VALUE ● BRITISH MADE ●

Two Guinea S.G.3 CHASSIS

Including 3 British Valves with Screened Wave-Wound Coils.

Each chassis brand new and tested on British and Foreign Broadcasts before dispatched to you. CIRCUIT COMPRISES: Screened-Grid H.F., Detector and Pentode Output Valves, Screened wave-wound coils, 2-Gang Air Dielectric Condenser. Metal Chassis. Only 9 m.a. H.T. consumption. Illuminated and Wavelength Calibrated Dial. Wave range 200-2,100 metres.



With Black escutcheon knobs and 3 valves.

LIST PRICE £5

BARGAIN 42/-

Cash or C.O.D. Carriage Paid. Or **2/6** down and **12** monthly payments of **4/-**.

2/6 DOWN

Recommended P.M. Moving Coil Speaker, **15/-**.

Walnut finished Consolette Cabinet, **10/-**.

COMPLETE RECEIVER comprising above chassis housed in walnut-finished Consolette Cabinet with valves and P.M. speaker, less batteries. Cash or C.O.D. Carriage Paid **£3 : 7 : 6** or **5/-** down and 12 monthly payments of **5/9**.

N.T.S. S. W. ADAPTOR

12-94 METRES

Hear America and all the World DIRECT on your present set, for only 17/6. Complete Kit of parts to build a reliable short-wave adaptor for use with any BATTERY receiver.

Kit comprises all parts for instant assembly including metal-sprayed base-board, 2 variable condensers, .00016, .0001 MFD., 2 baseboard mounting 4-pin holders, short-wave H.F. choke, grid leak, fixed condenser, adaptor plug, terminal mount, two terminals, 3 4-pin plug-in coils, 12/26, 22/47, and 41/94 metres, 1 component bracket, slow-motion drive, trimming condenser, connecting wire and wiring diagram. **Built in one evening.**

2/6 DOWN

Cash or C.O.D. Carriage Paid 17/6 or 2/6 down and 7 monthly payments of 2/6.

N.T.S. SHORT WAVE 2

12-94 METRES

Two-Valve Short-Wave Set of remarkable range that will give you hours of entertainment on the fascinating short-wave bands. **Kit comprises** all necessary components, including metal-sprayed baseboard, three variable condensers, .0001, .0002 and .00016 MFD., on/off switch. L.F. Transformer, three baseboard mounting four-pin holders, short-wave H.F. choke, two terminal mounts, four terminals, three fixed condensers, slow-motion drive, grid leak, connecting wire, three 4-pin short-wave coils, 12/26, 22/47, and 41/94 metres, 2 component brackets, and wiring diagram.

2/6 DOWN

Cash or C.O.D. Carriage Paid 27/6, or 2/6 down and 11 monthly payments of 2/6.

COLT ALL-WAVE 3

DESCRIBED IN THIS ISSUE

Every part guaranteed Matched-Proved-Tested

KIT "A" Cash or C.O.D. Carriage Paid. **47/6**

Comprising N.T.S. Kit of Matched components, including exclusively specified BULGIN COIL, CLIX S.W. VALVEHOLDERS, PETO-SCOTT BASEBOARD AND PETO-SCOTT COMPONENT BRACKETS, less valves, cabinet and speaker.

5/- DOWN

Balance in 11 monthly payments of 4/3

THESE ARE THE PARTS CONTAINED IN KIT "A"

Any part available separately. Orders over 5/- carriage paid. C.O.D. extra.

	£ s. d.
3 **CLIX** 4-pin S.W. type baseboard mounting valve-holders	5 3
1 **BULGIN** 4-range coil type C.56	8 9
1 **PETO-SCOTT** Baseboard 12" x 8", with condenser support	1 0
6 **PETO-SCOTT** Component brackets	2 3
1 **N.T.S.** Rotary switch	3 0
1 **N.T.S.** .0005 mfd. slow motion condenser	4 6
1 **N.T.S.** .0003 mfd. differential reaction condenser	2 0
1 **N.T.S.** .0001 mfd. solid dielectric reaction condenser	2 0
4 **N.T.S.** fixed condensers	4 0
3 **N.T.S.** 1-watt fixed resistances	1 6
1 **N.T.S.** 1 meg. potentiometer with 2-point switch	5 0
1 **N.T.S.** L.F. Transformer ratio 3 : 1	4 6
1 **N.T.S.** All-Wave screened choke	2 6
2 **N.T.S.** Terminal strips with terminals	1 6
6 Wander Plugs	0 9
2 Spade Terminals	0 4
Connecting wire, screws, flex	1 6
KIT "A" CASH or C.O.D. CARRIAGE PAID	**£2 7 6**
3 Specified Valves	12 3
1 W.B. Stentorian 37.J Speaker	£1 12 6

or 2/6 deposit and 11 monthly payments of 3/-.

KIT B. As for Kit A, but including set of 3 specified valves only. Cash or C.O.D. Carriage Paid **£2 19 9**, or 12 monthly payments of **5/6**.

KIT C. As for Kit A but including set of valves and cabinet. Cash or C.O.D. Carriage Paid **£3 19 3**, or 12 monthly payments of **7/3**.

RECORD BATTERY ALL-WAVE 3

KIT "A" Cash or C.O.D. Carriage Paid **63/-**

Comprising N.T.S. Kit of matched parts, less valves, cabinet, and speaker.

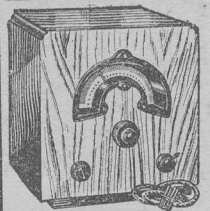
5/- DOWN

Balance in 11 monthly payments of 5/9.

With 3 specified valves, Cash or C.O.D. Carriage Paid £4.9.9 or 12 monthly payments of 8/3.

AMAZING BARGAIN

THE FAMOUS B.T.S. 1937 SHORT-WAVE ADAPTOR



BRAND NEW AND GENUINE.

Simply plugs into your battery or A.C. Mains set. No alterations necessary. **100-1** ratio aerial tuning and slow-motion reaction: for use either as Plug-in or Superhet Adaptor. Walnut finished Cabinet (illustrated). With 2 plug-in coils, 12-26, 22-47 metres. Ready assembled.

LIST PRICE £2 : 12 : 6

BARGAIN 39/6

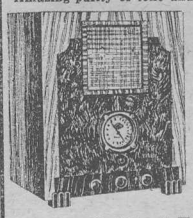
2/6 DOWN

Balance in 10 monthly payments of 4/-.

BATTERY CLASS B4

INCLUDES 4 BRITISH VALVES

Amazing purity of tone and volume rivalling that of powerful all-mains models. Wide choice of foreign stations. The perfect mains quality battery receiver. Four matched British valves of guaranteed life. Moving-Coil Speaker. Single knob slow motion tuning, bronzed escutcheon, illuminated circular aeroplane dial. New type switch. Combined volume control and on-off switch. Sensitivity and graded volume control. Wavelengths 200-550 and 900 - 2100 metres. Oldham Long-life 120-volt H.T. and 2-volt L.T. Accumulator and G.B. Batteries. Output 1¼ watts at 120 volts. Exquisite Walnut Veneered Cabinet illustrated above. **Absolutely complete with aerial equipment ready to play.**



5/- DOWN

List Price £8 : 8 : 0

BARGAIN £4:19:6

Cash or C.O.D. Carriage Paid or 5/- down and 12 monthly payments of 8/9

A.C. BANDPASS S.G.4

INCLUDING 4 BRITISH VALVES

Wonderful sensitivity and selectivity. Simplified operation, a bandpass circuit of advanced design . . . the greatest All-Electric receiver value obtainable.

4 British Valves, Screened Bandpass Tuning Coils, M.C. Speaker, S.M. tuning, Airplane dial wavelength calibrated, Triple gang wavechange and radiogram switch, volume control with on-off switch, Gramo. sockets, 3 watts output. **200-550 and 900-2,100 metres, A.C. 200-250 volts, 40-100 cycles.** Walnut-veneered cabinet, as illustrated above. Aerial equipment.

LIST PRICE £8 : 12 : 6

BARGAIN £5 : 12 : 6

5/- DOWN

Cash or C.O.D. Carriage Paid. Or 5/- down and 12 monthly payments of 10/-.

STRAIGHT 3v. BATTERY RECEIVER

INCLUDES 3 BRITISH VALVES

A wonderful opportunity. New type highly selective circuit. Slow-motion illuminated dial. Pick-up sockets. Metal chassis. Low H.T. consumption. Complete in cabinet, illustrated, with valves and speaker, less batteries.

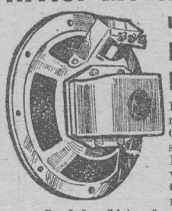
LIST PRICE £4 : 19 : 6

BARGAIN 35/-

2/6 DOWN

Cash or C.O.D. Carriage Paid. Or 2/6 down and 9 monthly payments of 4/-.

N.T.S. Moving Coil SPEAKERS



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the players throw the pennies on to the board. When a coin rests upon two adjacent drawing pins and these are connected respectively to the output terminals, the speaker will be brought into action. The game may be played with borrowed money, or the banker may take all the coins which fail to operate the speaker. Alternatively, the squares may be marked in ink on white cloth and numbered to indicate the number of coins which are paid out in the event of a successful throw.

Adding to the Fun

The interest of these two games and others in which the circuit to the speaker is completed is increased when a talk is being received, as the completion of the circuit results in a few words being heard from the speaker and these disjointed sayings very often sound most incongruous, or may have some direct bearing upon something that has just happened or been said by the players. With musical items, of course, this additional fun does not enter into the game. Other modifications of these schemes will be obvious to the handyman, but there are other ideas which may now be mentioned in brief.

Fault Finding

For the gathering where a number of keen wireless fans are present, fault finding may be arranged. Here one player goes to the receiver and in a given time has to introduce some fault to prevent the receiver from functioning. The other players then enter one at a time and are given a time period in order to locate the fault. The winner is the one who locates it in the shortest time. Alternatively, all the players may enter together and a scramble then ensues in an endeavour to be first to find the fault. In this case, of course, it should be some fairly obvious defect and not an obscure fault. For instance, a valve pulled out of the holder, or a wire removed from a component, but in the latter case care must be taken not to disconnect some point which may result in damage, such as the anode circuit of an output valve.

Station location, simple repairs, simple improvements, and other similar schemes may also be adopted where the players understand the subject, and no doubt these ideas will enable the members of a local Radio Club to enliven the Christmas meetings.

B.B.C. XMAS PROGRAMMES

AT the time of going to press full details of the arrangements made by the B.B.C. are not available. As is already known, certain major changes had to be made in the tentative programmes which had already been prepared, and this has led to some difficulty at the moment in producing a suitable programme. We are, however, in receipt of information which shows that many popular items will be included this season, and some of the more important of these are given below.

On Christmas Eve we have a feature in the afternoon which has been regularly heard since the year 1928. This is a Carol Service from King's College, Cambridge, and this will be broadcast from 3.30 to 4.45. Later in the day there will be the Kentucky Minstrels, who need no introduction, and on the National programme a seasonable thriller, "Strange to Relate," featuring Charles Brewer and Leslie Bailey.

On Christmas Day there will be a morning service from St. George's Chapel, Windsor, from 10.45 to 11.30, and a Christmas Party later in the day. This will include the old gang, Tommy Handley, Clapham and Dwyer, etc., and although the broadcast may make this sound a spontaneous affair, it is actually a very carefully rehearsed broadcast, and it owes its success to this fact.

A Marconiphone radiogram acting as commander-in-chief at a happy Christmas party.

On Boxing Day there will be the usual Music-hall programme and the In Town To-night feature will on this occasion include a "behind stage" broadcast from a circus. This topical feature promises to be really good, and will no doubt be appreciated by young and old.

Pre-Xmas Broadcasts

Earlier in the week the programmes will naturally take on the Christmas atmosphere, and on the 21st there will be an interesting broadcast entitled "Street Show." The recording van is now busy touring the streets getting material for this interesting item and it will endeavour to provide a composite picture of the seasonal hustle. A sound picture of the activities in the big stores, at the toy bazaars, and the thousands of shoppers busy examining the multitudinous goods offered in the shop windows should provide an interesting background for this item.

On the following day, December 22nd, the December Review will be revived on the National programme. In this the music will be directed by Charles Shadwell, who came from the Coventry Hippodrome to direct the B.B.C Variety Orchestra.

Dance Music

For those whose main interest is dance music there is ample material available. On the eve of Christmas there is an afternoon session by Joe Loss, and in the early evening Van Philipps and his Two Orchestras. Late music will be provided by Charlie Kunz and his Casani Club Orchestra.

On Christmas Day the B.B.C. Dance Orchestra will play from 12.30 to 1.15 p.m. on the National, and Bram Martin and his band will provide the music from 5.15 to 5.55. An interesting broadcast from 9.20 to 11 p.m. will be provided by Henry Hall and the B.B.C. Dance Orchestra, in which a special programme of seasonal music will be given to which listeners can dance or play games. From 11 to 12 midnight Joe Loss will take over the dance music.

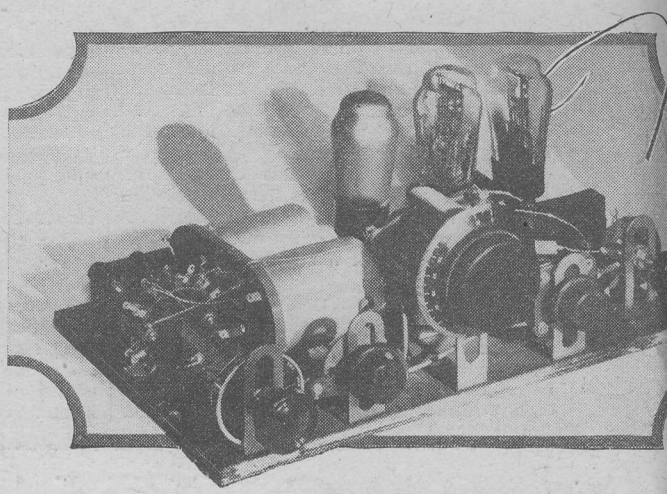
On Boxing Day Henry Hall will again be heard in two separate broadcasts, from 5.15 to 6 and from 8.30 to 9.30. The late music on this day will be by Jack Jackson and his Band from the Dorchester.

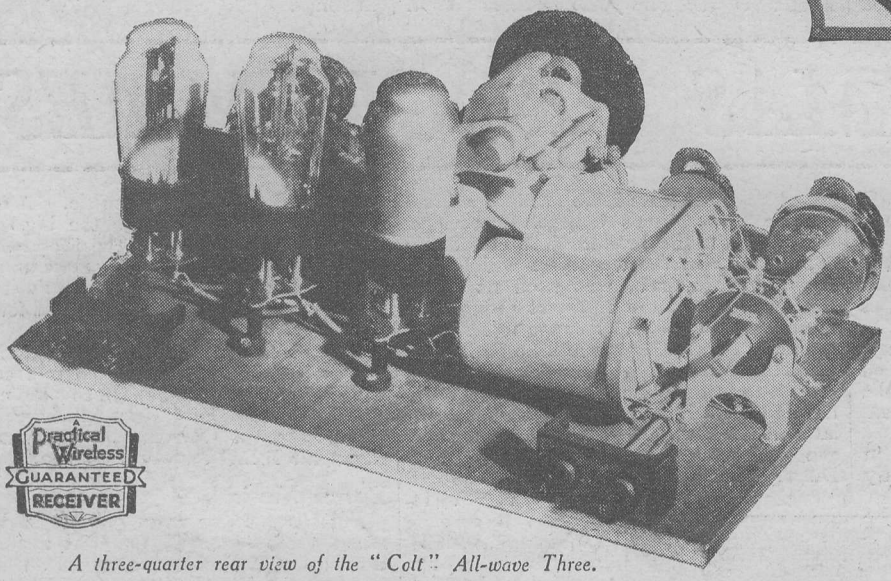
Television

The Television director is now busy at work arranging for the television transmissions, and it is unfortunately impossible at the time of going to press to give any details of the broadcasts. We are assured, however, that it will be a real television Christmas, and special programmes will be given from the Monday in Christmas week.

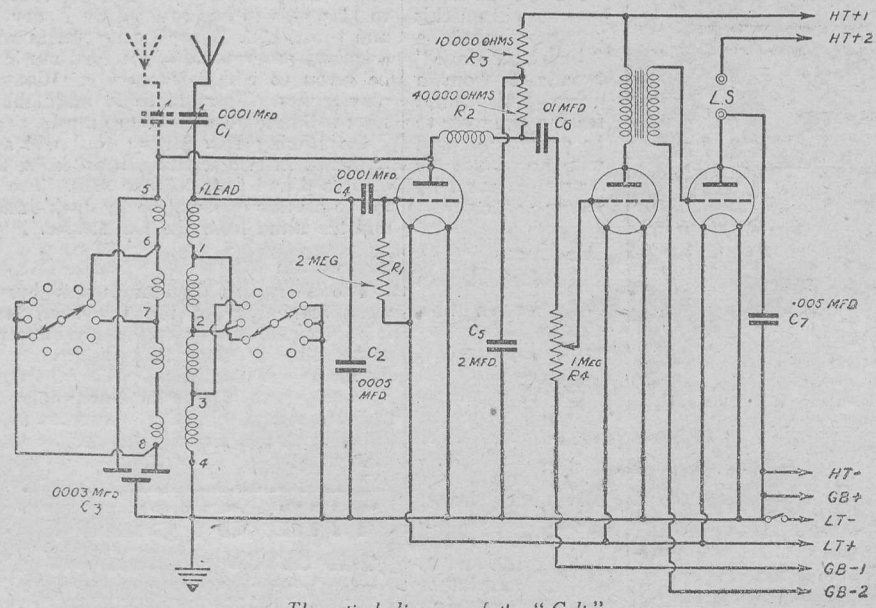
A Simple Three-valve All-wa Employing Screened Coils ar Constr

THE tremendous popularity of the Record Three which employed the baseboard method of construction has led other readers to request that further designs on similar lines be produced. Accordingly, we present the "Colt," a similar type of receiver, covering four separate wavebands, and embodying the simplest of circuits. The main features are to be found in the initial stage, which is a simple detector in the grid circuit of which a pair of Bulgin coils are fitted. These consist of the broadcast and short-wave coils arranged on separate formers and in separate cans, the connections being brought out to soldering tags on a special insulating base. As these are designed for chassis construction, however, they are used in this receiver in a rather different manner, and the illustrations on this page will show that the coil unit is mounted on its side, by the aid of an ordinary component-mounting bracket, and this results in two important features. Firstly, the connections are rendered perfectly accessible, even whilst the receiver is working, and it is thus a simple matter to carry out tests or measurements in this part of the circuit. Secondly, the overall height of the receiver is reduced and this results in a much more compact layout.





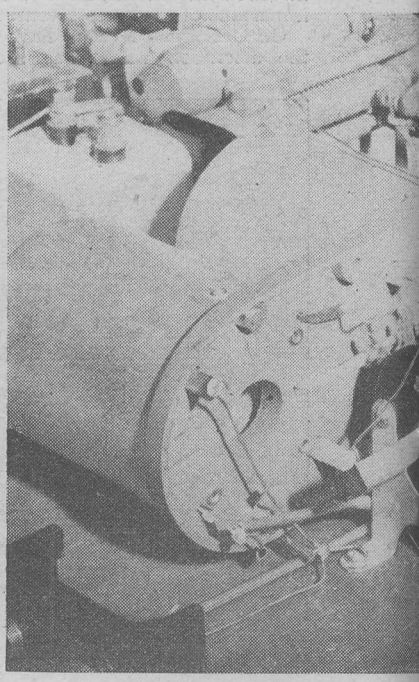
A three-quarter rear view of the "Colt" All-wave Three.



Theoretical diagram of the "Colt."

The Circuit

The aerial is normally connected to a lead on the coil unit through a series aerial condenser, whilst a reaction winding on each coil section is employed in the usual manner through a differential reaction con-



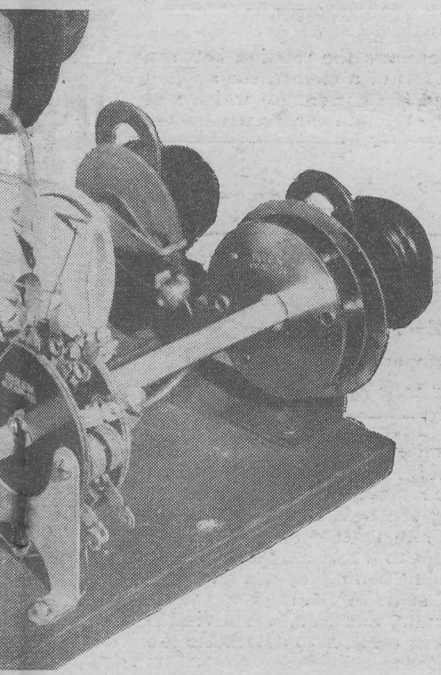
This illustration shows the method

denser. However, an alternative scheme is made available and the aerial lead may be transferred to point No. 5 on the coil, thus providing a combined aerial coupling coil and reaction circuit, and in some cases it may be found that this offers better results. However, this point will be explained more fully in the operating

The "COLT" All-Wave 3

ave Receiver for Battery Use, nd the Baseboard Method of uction

notes. In the anode circuit of the detector valve the usual H.F. choke is connected, but connection between this stage and the first L.F. stage is by means of resistance-capacity components, and this enables the grid leak to be used in the form of a poten-



of wiring the coils and switch units.

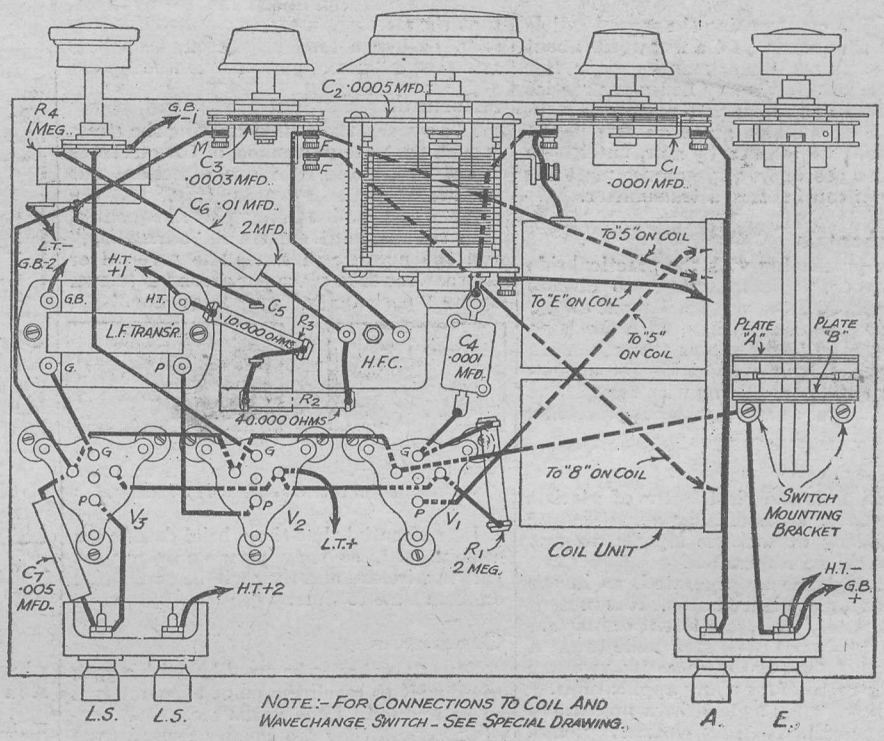
tiometer so that the input to this valve may be controlled. The result is that a most effective volume control is formed for use when headphones are employed for searching, and this avoids the sudden bursts of volume which are liable to be met when no such control is fitted. Ordinary transformer coupling is employed between the L.F. and output stage, and for the latter a Power valve is used in preference to a pentode, both in the interests of economy and simplicity.

All the other usual circuit refinements which may be fitted to this type of receiver are to be found, and the illustrations give a good idea of the neat layout which has been adopted. The List of Components is published on this page, and the Wiring Diagram is also given so that those who are anxious to make a start can go right ahead. The main features are made clear by the illustrations, and the only point which requires any considerable care is the wiring to the coil units. The illustration in the centre of this page should make this point clear, however, but on page 376 of this issue we give a further diagram in which all of the connections are clearly shown. It will be noted that two of the special Bulgin coil switch units are employed, and the method in which these operate is clearly shown in the theoretical diagram.

The four ranges covered by the receiver are approximately from 15 to 35 metres, 30 to 85 metres, 200 to 550 metres and 1,000 to 2,100 metres.

Construction

The baseboard should preferably be of the polished type to avoid risk of losses, and if ordinary plywood is used it should be painted with shellac or varnish.



Wiring diagram of the receiver, with the switch connections omitted for clarity. They are shown on page 376.

LIST OF COMPONENTS FOR THE "COLT" ALL-WAVE THREE

One four-range coil, No. C56 (Bulgin).
One driver-locator unit, No. S150 (Bulgin).
One five-way contact unit, No. S153 (Bulgin).
One .0005 mfd. condenser, No. 2SM (C2) (Polar).
One .0003 mfd. diff. reaction condenser (C3) (Polar).
One .0001 mfd. Compax condenser (C1) (Polar).
Four fixed condensers: .0001 mfd. (type M) (C4), .005 mfd. (C7), .01 mfd. (C6) (type 300 tubular), 2 mfd. (type 65) (C5) (T.C.C.).
Three fixed resistors: 2 meg. (R1), 40,000 (R2), 10,000 (R3) (1 watt type) (Erie).
One potentiometer, 1 meg. with two-point switch (R4) (Erie).
One L.F. transformer, 3/1, No. LT135 (B.T.S.).
One all-wave choke, No. A.W.C1 (B.T.S.).
Three four-pin S.W. type baseboard mounting valveholders (Clix).
Two terminal blocks with A.E. and L.S. terminals (Belling-Lee).
Six plugs: H.T.-, H.T.1, H.T.2, G.B.+, G.B.-1, G.B.-2 (Belling-Lee).
Two spades: L.T.-, L.T.+ (Belling-Lee).
One baseboard, 12in. by 8in. (Peto-Scott).
Six component brackets (Peto-Scott).
Three valves: D210, L210, P215 (Hivac).
One speaker, type 37J (W.B.).
H.T. Battery, 120 volts (Drydex).
G.B. battery, 9 volts (Drydex).
L.T. accumulator (Exide).
One tin Filt (G. Farish).
One slot aerial filter (G. Farish).

NEW SERIES

Amateur Transmitting

The Fundamentals of Electricity, Periodicity and Frequency are Among the Subjects Herein Discussed

By L. O. SPARKS

BEFORE commencing the second article of this series, just a few words about the Morse Code, mentioned in last week's issue. How many hours of practice have you had? Can you write down, in code, the Test Block given on this page? You should be able to by now, but if you can't, then get busy, as you must master it before you can become a transmitter.

Fundamentals

Before proceeding with the practical side of the work, it is important to discuss fundamentals. However, I will make all the details as short as possible, with the hope that readers will refer to past comprehensive articles which have appeared in these pages from time to time, dealing with most of the items, and thus secure a wider appreciation of the various subjects.

Electricity

Electricity is the vital factor of wireless transmissions. Without it, broadcasting and the radiating of wireless signals, in any form, would be impossible.

It is not made or generated, as in the case of, say, gas, glass or soap. It is present in all "matter," but, in a latent or inactive form, and it is not until it is made to get a "move on," that it indicates its presence by one or more of its many applications.

All "matter" is formed by a mixture of what scientists call "*electrons*" and "*protons*." An "electron" is the smallest possible quantity of "*negative electricity*."

If, by some means or another, the electrons can be made to move, it is said that an electric current has been set up; or, if you like to put it another way, an electric current is nothing more than a movement of electrons which are present in all "matter." It is necessary, of course, to provide some means to create the stress or strain in the matter to cause the movement of electrons. Dynamos and batteries are two of the most common means, but they do not generate or make the electricity.

Unit of Measurement

As the stress or strain can be a variable quantity, some Unit of measurement had to be adopted, so it is usual to refer to it as the "Electro-Motive-Force," written E.M.F. or just plain "E," and use the name "Volt" for the units of force or pressure.

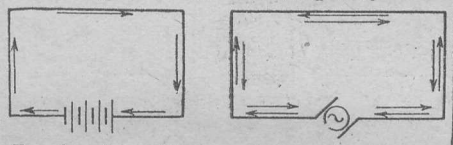
Direct Current

Every constructor is familiar with the terms A.C. and D.C., which are abbreviations of "alternating current" and "direct current," both of which are used in radio and domestic work.

If conditions are so arranged, that the electrons move in *one direction only* (Fig. 1), like a long procession, then it is said that a "direct current" is flowing.

Alternating Current

If, however, the source creating the stress is such that the movement of the electrons is *not* continuously in one direction, but backwards and forwards (Fig. 2), the reversal of direction taking place frequently, then the resultant current is "*alternating*," and the number of times the reversal or alternations take place per second is known as the "periodicity" or "frequency."



Figs. 1 and 2.—Diagrams showing the movement of electrons in a D.C. and an A.C. circuit.

It is essential that these brief details are remembered, as they play an important part in wireless, and they will be elaborated on from time to time.

Conductors

Electricity has to be provided with a path to allow it to reach the point to which it is to be applied. Such paths are called conductors, and they are usually formed from metal, although certain liquids and gaseous substances will also serve.

Some materials allow the electricity to flow without any appreciable hindrance, while others will offer sufficient opposition to stop the flow. The first types are good conductors, the others, if no current flows, are known as "insulators."

Resistance

The opposition to D.C. is always called "resistance," and denoted by the letter "R." A perfect insulator has, of course, infinite resistance. The Unit of measurement is the "Ohm."

The resistance of a conductor depends on its size, i.e., its cross-sectional area, the material of which it is formed, and its length. The formula can be written: $R = p \frac{L}{A}$ where p is a constant depending on the material, and known as the "specific resistance," L, the length of the conductor, and A, the cross-sectional area. L and A must be in the same units of measurement. The "specific resistance" of a material will be found in most electrical text-books. The accompanying table shows the values of the more common metals.

Morse Test Block

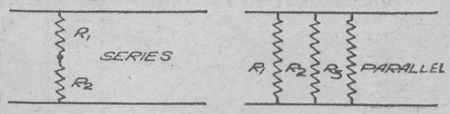
N	O	A	T
S	M	B	H
D	V	I	R
E	C	L	U
P	G	K	J
Y	Q	F	W

SPECIFIC RESISTANCES in MICROHMS

Copper (annealed)	1.561.
Copper (hard drawn)	1.647.
Aluminium (annealed)	2.665.
,, (hard drawn)	3.160.
Iron (annealed)	9.065.
Zinc	5.751.

Ohm's Law

This Law concerns the relation between the resistance (R) of a circuit, the applied E.M.F. (E) and the current (I) which will be set up. The relation can be written:—



Figs. 3 and 4.—The difference between series and parallel connections.

$$I = \frac{E}{R} \text{ or } E = I \times R \text{ or } R = \frac{E}{I}$$

where I is in Amperes (the Unit of Current), E in Volts and R in Ohms. If the above is memorised as $\frac{E}{I \times R}$ it is always very easy to determine one unknown quantity. For example, if the item under consideration is covered, the remaining formula is correct for calculating the unknown value.

It must be remembered that the above law only applies to direct current.

Resistances in "series," as in Fig. 3 and in "parallel," as in Fig. 4, are quite usual in wireless circuits, therefore, it is advisable to be quite clear on how to determine the resultant resistance.

When they are in series, R=R.1+R.2+R.3+R.4, etc., but when they are in parallel, the calculation is a little more complicated.

$$R = \frac{1}{\frac{1}{R.1} + \frac{1}{R.2} + \frac{1}{R.3} + \frac{1}{R.4} \text{ etc.}}$$

Power (Watts)

When a current flows in a circuit possessing resistance, a certain amount of power is lost through being dissipated in the form of heat. It is possible to calculate the power or

(*Continued on facing page*)

(*Continued from facing page*)

wattage from the formula $W=I \times E$, but from Ohm's Law it is known that $E=I \times R$, therefore, it can be re-written:— $W=(I \times I) \times R$, or more correctly:

$$W=I^2 \times R$$

By further substitution, it will be seen that still another method of expressing it can be obtained, namely:—

$$W=\frac{E \times E}{R} \text{ or } \frac{E^2}{R}$$

Later on, it will be a question of considering or calculating the input and output of valves, and as such quantities are usually measured in watts, readers should get familiar with the above methods.

Periods and Frequencies

I have mentioned "periodicity or frequency" or an alternating current, but I did not give any indication of the characteristics of such current.

It is usual to speak of a "period," during which the current starts, reverses and returns to starting point again, as a "cycle," i.e., cycle of operations, and the average frequency of commercial electricity supplies is 50 cycles per second. With wireless, however, the frequencies of the alternating currents can be anything between 30 and several millions c.p.s.; in fact, the figures become so large that the terms "kilocycle" and "megacycle" are used. Kilo meaning 1,000, and Mega 1,000,000. For example, a wavelength of 1,500 metres is equal to 200,000 cycles or 200 kilocycles per second, while a wavelength on the short-wave band of, say, 30 metres, has a frequency of 10,000,000 cycles which is equal to 10 megacycles.

Those frequencies which correspond to the frequency of sounds audible to the human ear, are usually referred to as "low-frequencies," while those outside the range of hearing are known as "high or radio frequencies."

The low-frequency range is from 30 cycles to 10,000 cycles per second, approximately, although it is not always possible to reproduce the entire range, owing to other limiting factors. When a current is alternating at the frequencies met with in wireless work, it produces certain effects which have to receive special consideration.

With D.C. it is quite an easy matter to determine the behaviour of a current in a circuit, but, in the case of A.C. it is not just a question of the material and size of the conductor, especially where high-frequencies are concerned.

Oppositions

From the formula for D.C. resistance it can be seen that the current is concerned with the whole conductor, whereas, with A.C. currents, above the low-frequency range, they tend to travel on the surface of the conductor, producing what is known as the "skin effect" which produces further opposition to the current flow. The higher the frequency, the more pronounced the effect, therefore it is usual to use conductors offering large surface areas, often hollow, like copper tubing, for coils carrying the higher, or radio frequencies.

Eddy Currents

When a conductor is carrying a current, a magnetic field is produced around it, and if the current is alternating, then the magnetic field will also be alternating.

Now, if a metal object is within this alternating magnetic field, currents will be *induced* in it, such currents being called "eddy currents."

(*To be continued*)

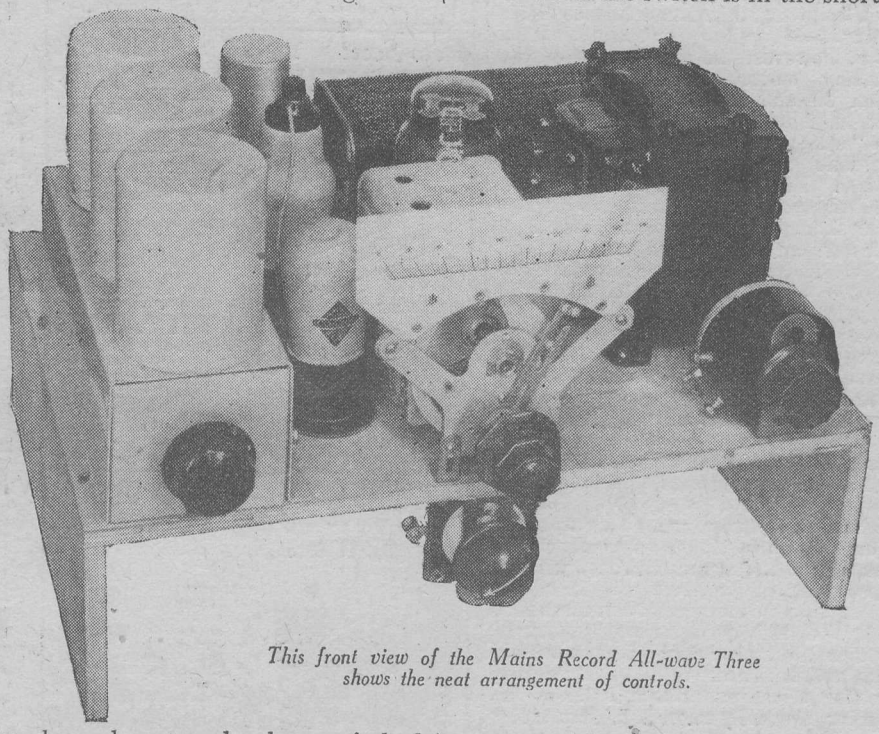
J. J. Camm's "Mains RECORD" All-Wave 3

Preliminary Details

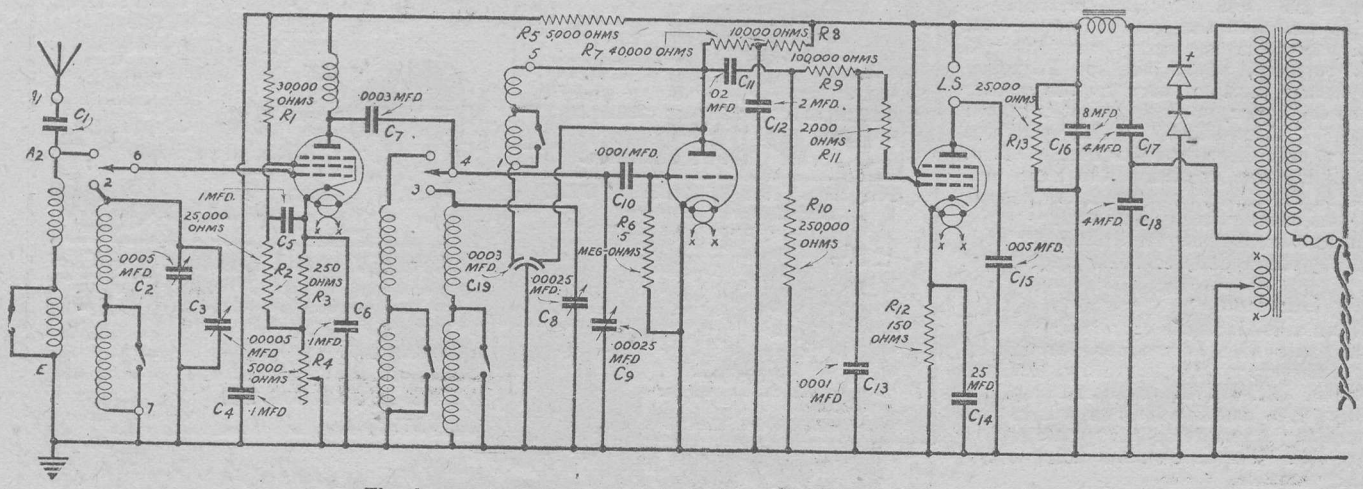
THE Battery Record Three, described in recent issues of PRACTICAL AND AMATEUR WIRELESS, has proved to be one of the most popular sets of the year. The modern, yet simple all-wave design has appealed to the beginner and advanced constructor alike, and satisfactory reports are pouring in from all parts of the country. A large proportion of our readers have A.C. mains available, however, and do not feel disposed to rely on a battery H.T. and L.T. supply. Owing to the phenomenal success of the battery version we therefore decided to experiment with an all-mains design, using the main components incorporated in the battery version. The A.C. Record presented in this issue is the outcome of these experiments, and readers may rest assured that results will be even better than those obtainable from the battery receiver owing to the high efficiency of the mains valves used.

The Circuit Arrangement

The circuit arrangement is the H.F., detector, L.F. type, using pentode valves in the H.F. and L.F. stages and a triode detector. A study of the theoretical diagram will indicate that the aerial circuit is tuned on the medium and long wavebands and untuned when switched to the short wavebands. The primary winding of the medium-long-wave coil acts as an effective H.F. choke when the switch is in the short-wave position. The switch is, of course, incorporated in the coil unit



This front view of the Mains Record All-wave Three shows the neat arrangement of controls.



The theoretical circuit diagram of the Mains Record All-wave Three.

and has been completely wired by the manufacturers. In the past we have found that more trouble has been experienced by beginners in wiring multi-contact switches than any other components, and it was this fact that prompted us to use a coil unit with an integral switch for the Record. The use of this type of unit also ensures correct disposition of the switch plates and connecting leads.

H.F. Stage

The H.F. valve is of the modern variable-mu pentode type, having seven pins, and volume is controlled by means of a 5,000 ohms potentiometer connected in series with its cathode resistance. The coupling between the H.F. and detector valves is of the tuned grid type, the H.F. choke being of a modern screened type. It will be noted that the tuning arrangement in this stage is of a novel type. The wave-change switch connects two .00025 mfd. sections of the gang condenser in parallel on the medium and long wavebands thus forming a capacity of .0005 mfd. On the short wavebands one of these .00025 mfd. sections is disconnected leaving a tuning condenser of .00025 mfd.

The L.F. Amplifier

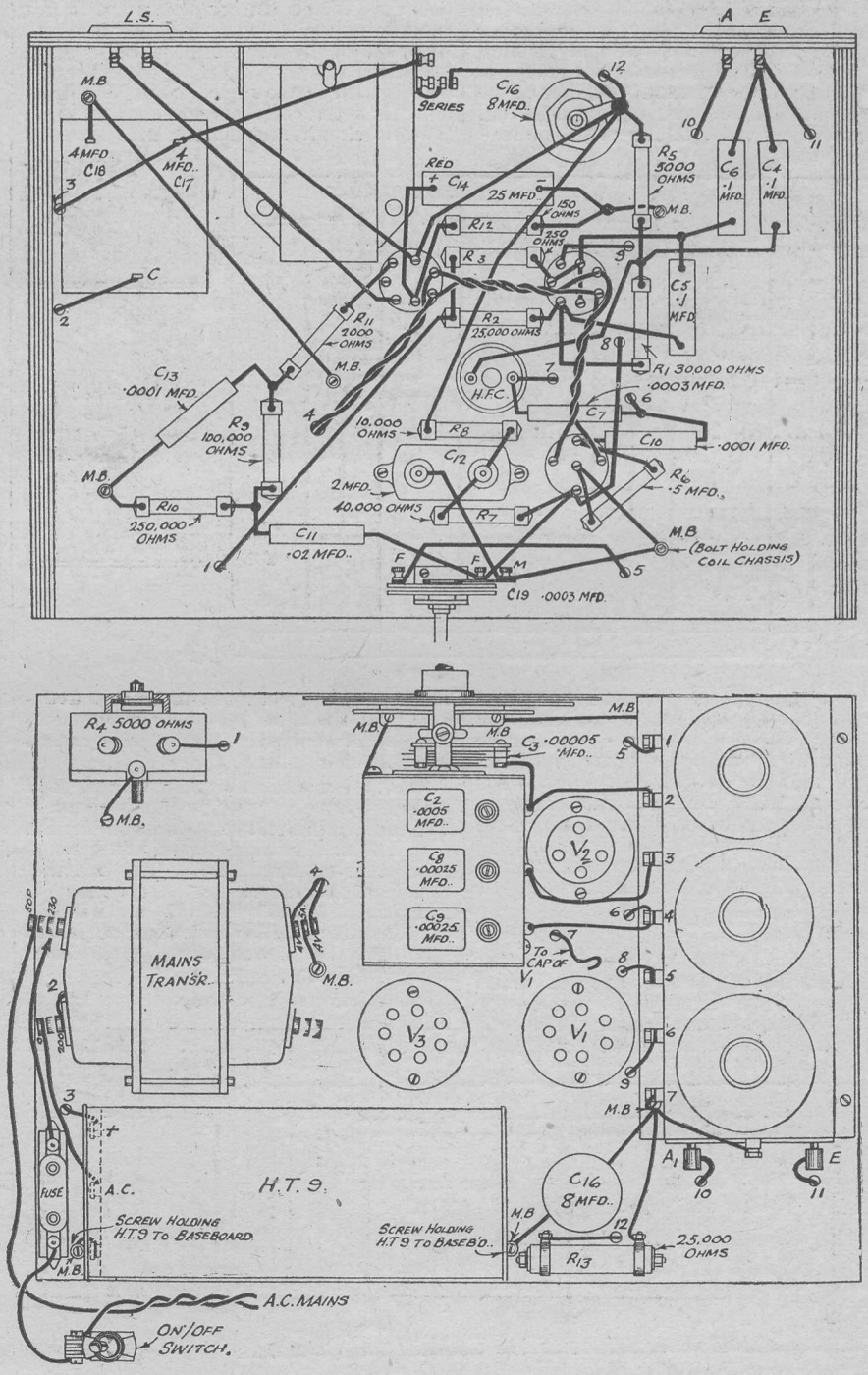
It was decided to use resistance-capacity coupling between the detector and output valves, in order to avoid the possibility of mains hum occurring due to interaction between the L.F. amplifier and mains unit. Resistance coupling also ensures good quality reproduction, and by using a high efficiency pentode in the output stage adequate volume is obtained. Constructional details of this interesting receiver will be given next week.

The rectifier used in the Mains Unit is of the Westinghouse metal type. This was chosen owing to its reliability and consequent popularity amongst home-constructors. Style HT9 rectifier is specified, but Style HT8 may be used if one of these is on hand. The HT8 has now been discontinued, Style HT9 taking its place. An explanation of the function of resistance R13 is probably called for. This has been added owing to the use of an indirectly-heated output valve. It acts as a loading resistance and prevents damage occurring to the rectifier and smoothing condensers during the time the output valve is heating up.

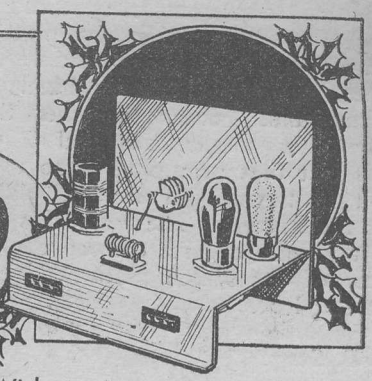
LIST OF COMPONENTS

One all-wave coil unit (No. 4BTU) (B.T.S.).
One 3-gang (.0005+.00025+.00025) condenser (C2, C8, C9) (J.B.).
One drive with trimmer (SL9) (C3) (J.B.)
Twelve fixed condensers: 8 mfd. (F2920) (C16), 4/4 mfd. block (BE355) (C17, C18), 2 mfd. (BB) (C12), .02 mfd. (C11), .005 mfd. (C15), .0003 mfd. (C7), two .0001 mfd. (4421/E) (C10, C13), three .1 mfd. (4423/S) (C4, C5, C6), 25 mfd. (3016/25v.) (C14) (Dubilier).
Eleven fixed Resistors: 40,000 (R7), 30,000 (R1), 25,000 (R2), 10,000 (R8), 5,000 (R5), 250 (R3), 150 (R12) (F1), 500,000 (R6), 250,000 (R10), 100,000 (R9), 2,000 (R11) (F½) (Dubilier).
One all-wave H.F. choke (HF15) (Bulgin).
One power Resistor, 25,000 ohms (R13) (PR14) (Bulgin).
One Potentiometer, 5,000 ohms (R4) (CP157) (Varley).
One L.F. choke (DP11) (Varley).
One metal rectifier (HT9) (Westinghouse).
One mains transformer (W31) (Heayberd).
One fuseholder with 1 amp. fuse (Microfuse).
One Q.M.B. switch (S80)(Bulgin).
Two terminal sockets L.S. and A.E. (Belling-Lee).
Two component brackets (Peto-Scott).
Three valveholders: Two 7-pin, One 5-pin (Standard) (Clix).
One metallised chassis 14 in. by 10 in. with 3½ in. runners (Peto-Scott).
Two ft. length metal screened lead (Ward and Goldstone).
Three valves: MVS/Pen 7-pin, 41MHL, 42MP/Pen (Cossor).
One P.M. speaker (37S) (W.B.).

WIRING DIAGRAM OF THE MAINS RECORD ALL-WAVE THREE



Simple Sets for Television Sound



Some Circuit Suggestions Which Will Interest Those Constructors Who Wish to Experiment with Ultra-short-wave Reception

COMPLETE television receivers, even if home-made, are still too expensive to be found in many homes, but a good deal of interest is to be found in listening to the "sound" portion of the television transmissions. Apart from the entertainment value of the programmes—and the quality is excellent—the constructor has an excellent opportunity of becoming familiar with ultra-short-wave technique. It must be remembered, of course, that the television transmissions cannot normally be received outside a circle of twenty-five miles from Alexandra Palace, but listeners outside this area will often find that there are now a number of amateur transmissions available.

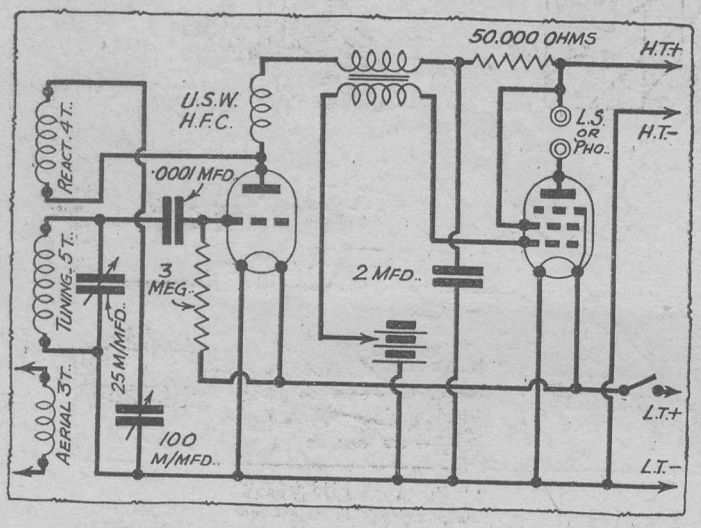


Fig. 1.—Circuit for a simple two-valve "straight" set for 6-10 metre reception.

Simple Det.-L.F.

A sound-and-vision receiver is a rather complicated affair, but a television sound receiver can be even simpler than the average broadcast set, whilst the cost is very low. The old and tried "straight" detector-L.F. circuit can be used with fair success, and a two-valve circuit such as that shown in Fig. 1 provides a good "starting point." A set of three 7-metre coils is used in the input circuit, one being used for aerial coupling, another for tuning the grid circuit, and the third for reaction. There are plenty of ready-made coils available, and the three should be mounted in line, as indicated in the circuit, and separated by about half an inch.

The tuning condenser should be of good make and have a capacity of approximately 25 m.mfd. It should be used in conjunction with a 3-in. extension spindle and a really good slow-motion drive. The reaction condenser should have a capacity of approximately 100 m.mfd., and should also have a reduction drive, although this need not be geared down more than about ten to one.

The other components are of usual type, with the exception of the H.F. choke, which should, naturally, be of a pattern intended for use on wavelengths below 10 metres. Construction and use of the receiver will follow normal short-wave lines.

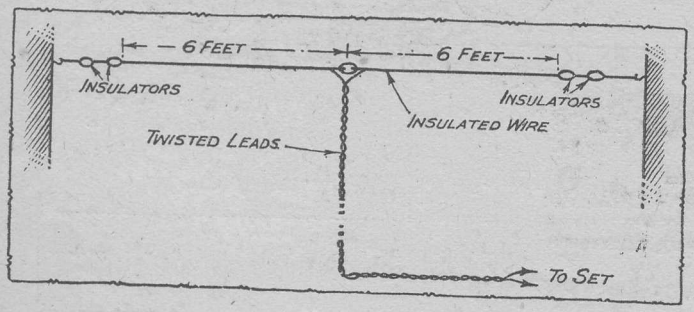


Fig. 2.—A suitable doublet aerial for use below 10 metres.

The Aerial System

For best results a simple form of dipole or doublet aerial should be employed, the two leads being connected to the ends of the aerial-coupling coil. A vertical dipole aerial is best, but for experimental purposes the constructor can use a horizontal doublet similar to the arrangement shown in Fig. 2. This consists of two lengths of rubber-covered flex, with the ends 6ft. long arranged in line. The remainder of the wire is twisted together to form a double lead-in. Theoretically, the length of the lead-in should be about 12ft., but this can be provided only when the aerial is an inside one in the same room as the receiver. Actually it will generally be found that results can be obtained over a wide range of lead-in lengths.

Super-regenerative

Those who want something rather better than the "straight" circuit described above will find a super-regenerative system very efficient, although not quite as selective. With reasonable care, however, the selectivity should be quite high enough to prevent the picture signals from interfering with the sound. A typical and useful circuit is given in Fig. 4, from which it will be seen that three valves are used. One of these is the normal regenerative detector, the second is the "quench" valve, and the third the low-frequency

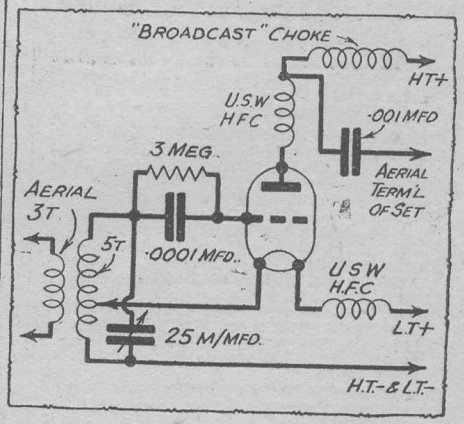
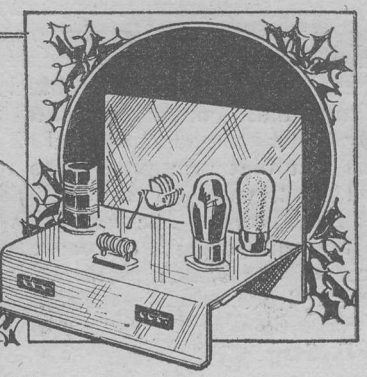


Fig. 3.—Circuit for an electron-coupled oscillator type of superhet converter.

(Continued on page 389)

Simple Sets for Television Sound



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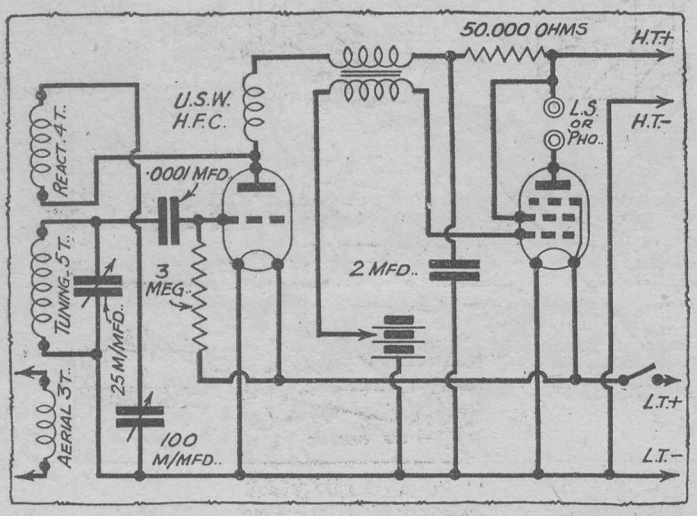

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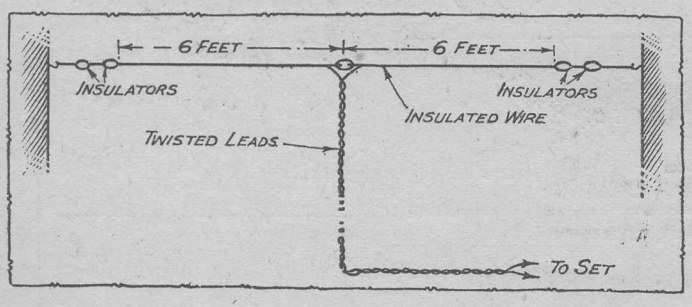

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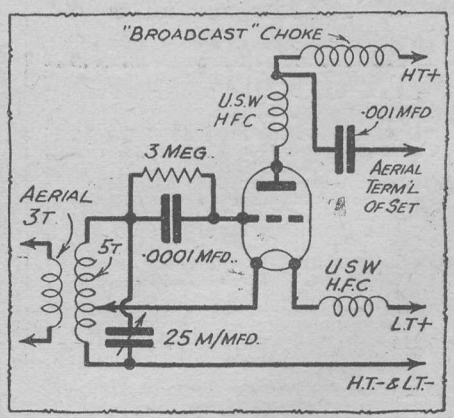


Fig. 3.—Circuit for an electron-coupled oscillator type of superhet converter.

(Continued on page 389)

SIMPLE SETS FOR TELEVISION SOUND

(*Continued from page 386*)

amplifier. The tuning coils are of the same physical form as those referred to above, and can be similarly placed, although connected differently. Two four-turn coils should be used for tuning, with either a three- or four-turn coil for aerial coupling.

The reaction condenser in this case is of the pre-set kind, having a maximum capacity of about 160 m.mfd. After it has been set initially, reaction control can be carried out by means of the variable resistance in series with the high-tension feed to the detector valve. Details regarding the operation of a set of this nature were given in the issue of PRACTICAL AND AMATEUR WIRELESS dated October 10th, 1936.

The "quench" coils used in the grid and anode circuit of the "quench" valve will not be understood by those unacquainted with super-regeneratives, so it should be explained that they are available from two or three manufacturers as a single unit. It is again preferable that a doublet or dipole type of aerial be used, but this is not essential, and an ordinary short-wave aerial can be used if preferred in conjunction with an earth lead.

Electron-coupled Converter

Those who do not wish to build a complete receiver for the reception of 7-metre transmissions can employ a simple superhet converter in conjunction with the standard H.F.-Det.-L.F. broadcast receiver. A variety of alternative circuits is available, but one of the simplest is that known as an electron-coupled oscillator and shown in Fig. 3. A three-electrode valve of the HL type is used in conjunction with a tapped five-turn 7-metre coil, and a good low-resistance U.S.W. high-frequency choke must be employed in the L.T. + lead. The tuning condenser may be of 25 m.mfd., and should again be used with a slow-motion drive and extension spindle. Aerial coupling, as in the previous circuits, is by means of a separate coil, which may have aerial and earth connections, or be joined to a doublet aerial system.

The lead (through a condenser) from the anode circuit of the valve should be taken to the aerial terminal of the broadcast receiver, whilst the L.T. and H.T. leads can be taken to the appropriate points in the set. Tuning of the broadcast receiver will be fixed while the converter is in use, and the most suitable wavelength can be found by trial. It will generally prove to be the highest wavelength which can be reached on the medium-wave band, but it must be adjusted to avoid interference from other stations.

It should be made clear that the circuits given in this article are intended for use by those constructors with sufficient knowledge and experience to follow them. They are of an experimental nature and wiring diagrams and constructional details cannot be supplied. Those who require more complete particulars of sets suitable for ultra-short-wave use are referred to previous constructional articles which have appeared in these pages.

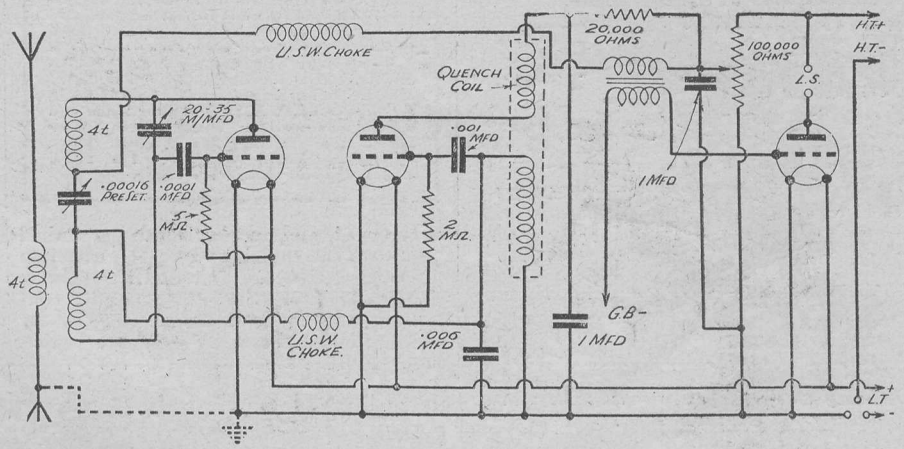


Fig. 4.—A three-valve super-regenerative receiver shown for use with a doublet aerial.

TOPICAL NOTES

From Assembly Lines to Headlines

AN enchanting voice rose above the noise of the assembly line in a famous motor works the other day. A chance visitor happened to hear, and arrangements were promptly made for the mechanic to be properly trained and launched upon a career.

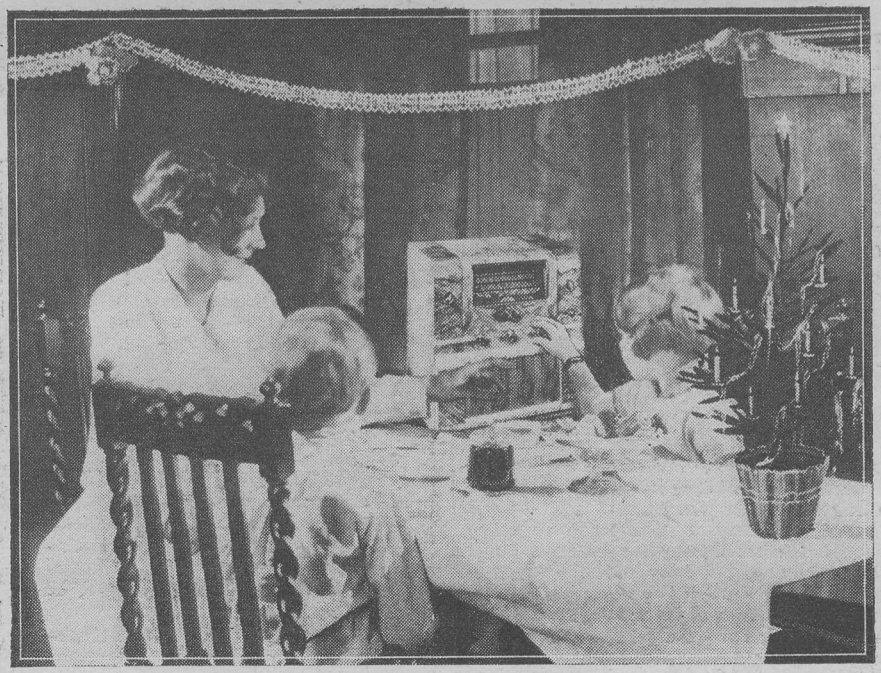
This incident, which suggests an episode from a film, was enacted at Ford Works, Dagenham, the other day, but in case other budding concert stars imagine that a job at Dagenham is a short cut to platform success, it should be explained that it *was* an episode from a film. The owner of the voice was Keith Falkner, the famous concert singer, making his screen debut in a new Warner Bros. First National production. In the film the Ford factory will be the gigantic works of Ludboro Motors, Ltd. ("Ludboro for Luxury").

Keith Falkner's part in the picture is that of a motor mechanic. He is heard singing by the millionaire-employer's daughter, who promptly insists on having him properly trained and on launching him into Society. There was no need to call "Quiet, please!" when Falkner, dressed in white overalls, and surrounded by 50 Ford employees similarly attired, began to sing. His voice enchanted artists and the regular factory staff alike. A title for the picture has not yet been chosen.

Progress of Deaf Aids

MR. R. H. DENT, the well-known acoustician, after years of experiment has succeeded in devising the Aurameter which accurately measures deficiency of hearing, and he confesses to being a little proud of this invention as it has proved of great value in enabling him to discover and meet the particular needs of each individual case—an all-important point to those who are hard of hearing.

In the old days many partially-deaf persons seemed ashamed to reveal their infirmity. The results of neglect are often very serious, and he states that those in doubt about their hearing, or actually suffering from deafness are calling in ever increasing numbers for a free Aurameter test which keeps them abreast of their hearing requirements.



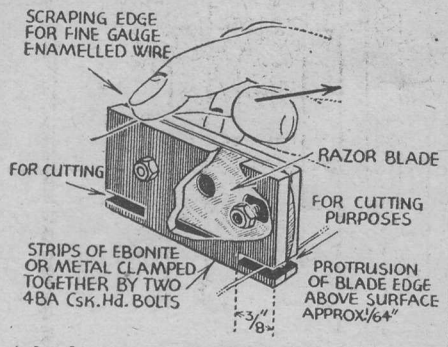
A Happy Christmas meal to the accompaniment of music from a Marconiphone Model 534 six-valve superhet.

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA — READERS WRINKLES — THE HALF-GUINEA PAGE

A Handy Wire-cutter and Scraper

THE accompanying illustration clearly shows the adaptability of this very useful addition to the test bench. For the device to be most effective the fine-gauge

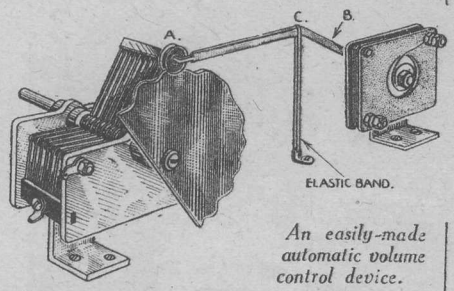


A handy wire-cutter and scraper made with an old razor blade.

wire that is to be scraped should be only gently pressed, as shown, and without removing the first finger the wire should be "drawn" by the thumb and second finger. The slots provided at each end of the blade should be sufficiently wide to allow a clearance between the edge of the blade and ebonite to accommodate about 20 S.W.G. wire. The unit can be screwed to the bench in a handy position by affixing small brackets by means of the 4BA bolts, or it can be simply held by the hand.—H. FREEMAN (London, W.C.2).

A Simple Automatic Volume Control

THIS efficient device, which can be incorporated on most sets for automatic reaction, volume control, or suppression of local stations, was made as follows. A semi-circular card about 3in. diameter



An easily-made automatic volume control device.

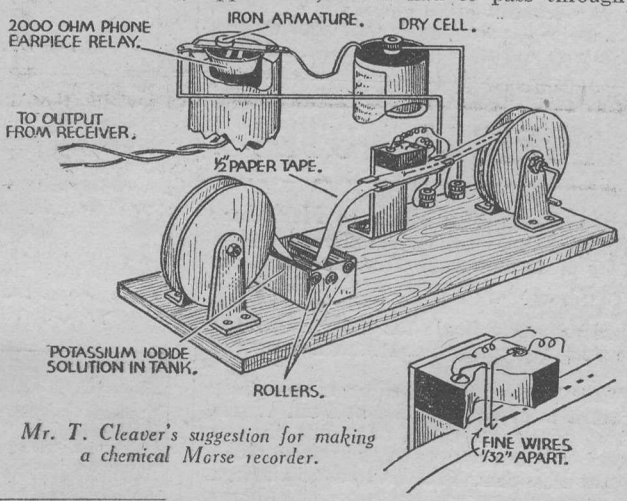
was fixed on the spindle of the tuning condenser, the base being horizontal when the tuning condenser was closed. For setting, a pencil was fixed at A, and the set tuned through the medium wave, volume being adjusted by means of lever A B. The end of the lever at B was fixed on the spindle of the reaction condenser or volume control. When an irregular line on the card had been traced, the card was cut along it (a metal disc cut similarly would be more efficient). A small wheel was fixed at A to run along the edge of the card, and an elastic band stretched from C to the chassis to keep the wheel on the coil. As the set is tuned the volume is varied automatically. Separate condensers may be fitted if desired; one for hand-tuning, and one for automatic operation.—P. H. RIVERS (London, S.W.).

THAT DODGE OF YOURS!

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

Recording Morse Signals

HERE is a useful way of making a record of Morse signals which will prove of value to those who are anxious to improve their Morse knowledge, as your records may easily be checked. The main parts are a relay (made from a disused phone-earpiece) and an inker. This is a chemical device operating by means of fine wires which press against the paper tape as it is drawn across a contact. Before reaching this point the tape is passed through a solution of potassium iodide retained in a photographic developing dish fitted with a roller.

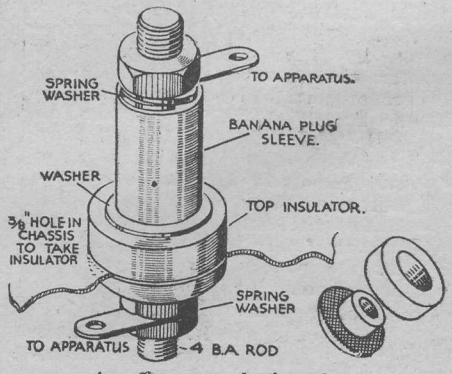


Mr. T. Cleaver's suggestion for making a chemical Morse recorder.

The tape may be wound on to one spool by hand or a small clockwork or electric motor may be used. A slight friction should be on the other reel to prevent the tape flying loose. The diagram clearly shows the connections and the method of arranging the essential parts, and the only difficulty which might occur is in the speed with which the tape is drawn along. If travelling too fast it may lift the roller or tear, whereas if too slow the dots and dashes may not be sufficiently differentiated. A little experiment will soon show the best speed and the apparatus will be found quite efficient to use.—T. CLEAVER (Romford).

A Neat Stand-off Insulator

IN designing an ultra-short-wave receiver on a metal chassis, and searching through my junk box for some suitable sleeving and anchorage for some 18-gauge copper wire, which had to pass through the chassis to the coil and condenser assemblies, I hit upon this simple but efficient dodge. The accompanying sketch shows clearly the method of fixing. The insulators I obtained some time ago for about one penny per pair.—D. G. FRANKS (Ilford).



An efficient stand-off insulator.

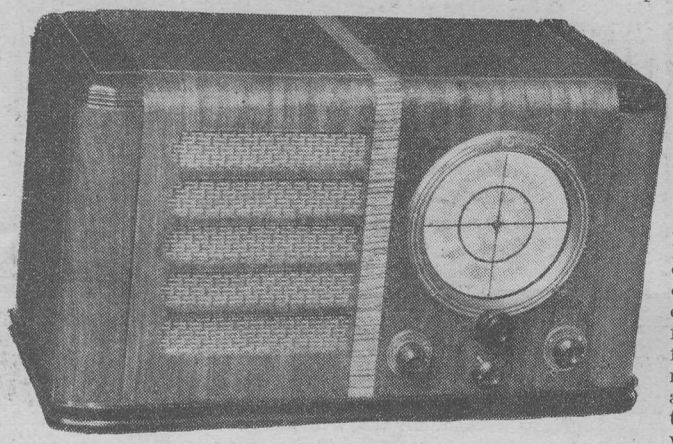
REVIEW OF LATEST RECEIVERS

TESTS OF STANDARD RECEIVERS ON OUR AERIAL

The 'Pilot' 12 Guinea Model U-355 Superhet

The All-wave A.C.

IN this model, Pilot Radio have incorporated the majority of the main features which are to be found in the Model U-650 which was reviewed by us a few weeks ago. The main modification consists of the elimination of one waveband (the 48-150 metre band) and the signal H.F. stage, and the incorporation of the complete apparatus in a horizontal type cabinet, as shown by the accompanying illustration. The chassis follows similar lines to other models, an all-metal method of construction being adopted. The H.F. valves are completely screened, and the coils and I.F. units are in metal screening cans. The same type of full-vision dial is fitted, with



Model U-355. This is a 3-band superhet for A.C. mains use.

double-ended pointer, but the lower section of the dial is in this case occupied only by the short-wave tuning scale, which ranges from 16 to 53 metres. The layout of control knobs is identical, the left-hand control effecting both on/off switching as well as the control of volume, and the right-hand control operating the wave-change switch. The lower central knob is for tone control and the knob above it is for tuning. This has a two-position setting; when pushed in it drives the condenser through a ratio of 12½ to 1, and when pulled out a higher gear is introduced through which a 95 to 1 reduction is effected.

The Circuit

The first valve in the circuit is a frequency-changer of the pentagrid type, with an H.F. aerial transformer operative on all wavebands. This is coupled to the I.F. valve, which is an H.F. pentode of the variable-mu type, through a standard I.F. transformer tuned to 456 kc/s. This in turn is coupled to a double-diode-triode through a similar I. F. transformer, and the two diodes of this valve are strapped and act in the dual capacity of detector and A.V.C. Resistance-capacity coupling is employed to couple the triode section of this valve to a power pentode, and the loudspeaker is included in the anode circuit of this valve. Extension speaker sockets are fed from this part of the circuit through fixed condensers whilst a socket for the accommodation of a gramophone pick-up is included in the grid circuit of the double diode-triode valve. A full-wave valve rectifier supplies the necessary H.T. voltages, and the mains transformer is fitted with a primary suitable for any mains voltage from 100 to 250 volts.

The self-contained speaker is of the energised type, and the output is rated at three watts. The aerial is connected to the receiver by means of a flexible lead which is fitted with a clip, whilst a similar clip is anchored to the chassis for the earth connection.

Test Results

The overall sensitivity is very high, and the performance on all wavebands is very good indeed. On the model which we tested there was only one whistle of any importance, and this fell at a point just above Motala on the long waveband, thus being of very little consequence. With a medium-sized aerial, the selectivity of the medium waveband was adequate for all normal requirements, and Radio-Normandie was quite clear of London. When a large aerial was employed, however, there was some difficulty in separating these two stations, but with even a 15ft. aerial in the centre of London the foreign station was more than sufficient for normal requirements and the volume control had to be set back from its maximum position. On the long waves all of the stations marked on the dial were easily tuned in, and on the short waves the majority of the marked stations were located during the testing period.

The quality is very good and even at maximum volume is free from cabinet resonance or boom. The tone control is most effective and provides a very full range of tone, and this will be found most useful when tuning to a long-distance station, as it enables the background to be reduced in such a case. Speech is very clear-cut and natural, and the judicious combination of the tone and volume controls enables even the weakest long-distance station to be comfortably listened to.

All of the controls act in a smooth and satisfactory manner, and the wave-change switch is very clean in its action, providing a definite setting at each position with freedom from noises due to poor contact. The receiver represents very good value and may be thoroughly recommended.

SPECIFICATION

Receiver: All-wave Superhet.

Circuit: Frequency-changer, H.F. variable-mu pentode I.F. stage, double-diode-triode second detector and A.V.C. stage, and pentode output stage. Resistance-capacity L.F. coupling, energised loudspeaker, and provision for gramophone pick-up and extension loudspeaker.

Tuning covers three wavebands, 16 to 53 metres, 180 to 540 metres, and 800 to 2,000 metres.

Controls: Four— tone, waveband selector, combined on-off switch and volume control, and tuning control. The latter has a two-position setting providing two separate gear ratios—12½ to 1 and 95 to 1.

Price: 12 guineas, for A.C. mains.

Makers: Pilot Radio, Ltd., 87, Park Royal Road, London, N.W.10.

XMAS PRESENTS

THERE is a vast range of articles from which the wireless enthusiast can select his Christmas presents. It will suffice here to mention just a few of the interesting items which you can give to your radio friend, or which you can choose for yourself if you are asked to make a selection by a relative or friend. A loudspeaker is, of course, a very acceptable present, and may be used at an extension listening point. The W.B. Stentorian range offers a wide choice, and these are fitted with a matching switch so that the output stage may be correctly matched.

Gramophone pick-ups are also obtainable in a wide range, prices rising from 5s. to three or four guineas, whilst amongst the component ranges there are many items, such as transformers, coils, valves, etc. These may be added to existing receivers in many cases and will greatly improve the performance of an old set. A good meter, such as the Avominor or the Pifco, is always acceptable.

For converting a battery receiver for mains working there are separate mains components, such as transformers, chokes, metal rectifiers, valves, etc., as well as complete mains units, some of which are very low in price. For the battery user, a trickle charger would no doubt prove a very acceptable gift if mains facilities are available for its use. It is even possible to re-house an old receiver in a modern cabinet, in which case there are many different types of cabinet from which to choose, including those for a radiogram, and an ordinary receiver could be converted to an instrument of the latter type as explained on another page in this issue.

Next week we shall deal more fully with this subject, and illustrations of many favourite items will be included to help in making a selection where it is not possible actually to inspect the components at your local radio store.

MASTER BATTISIN BELFRY IS AT IT AGAIN!

MASTER BATTISIN BELFRY—WHOSE TWISTED BRAIN HAS EVOLVED SO MANY INFAMOUS INVENTIONS—ONCE AGAIN DEFIES SANITY WITH HIS LATEST XMAS NOVELTIES—

THE "BON-BON BUSTER"—AN INGENIOUS LITTLE LABOUR-SAVING DEVICE WHICH ENABLES DISTANT FRIENDS TO PULL A JOVIAL CRACKER BY RADIO. (ANYONE INFRINGING THIS PATENT WILL BE ANNOYED.)

THIS HUMANE LITTLE DEVICE ENABLES EVEN THE SHYEST COUPLES TO TAKE PART IN "POSTMAN'S KNOCK"—

BEAT YOUR NEIGHBOUR! A SUPER SPEAKER ENABLES ONE TO RETALIATE WITH INTEREST—NO MATTER HOW LOUD NEXT-DOOR'S RADIO MAY BE.

MASTER BELFRY'S BRILLIANT WRINKLE FOR MIXING THE CHRISTMAS PUDDING.

A RADIO GHOST!—FRIGHTEN YOUR MOTHER-IN-LAW OUT OF HER WITS THIS CHRISTMAS!

Practical Television

December 5th, 1936. Vol. 3. No. 27.

On the Programme Side

STEADY improvement in the television pictures radiated from Alexandra Palace has been a noticeable feature since the service was inaugurated. The B.B.C. engineers who are being trained to handle the scanning and transmitting equipment are slowly but surely mastering the entirely new technique, and concurrently "technical hitches" are being reduced thereby. On the programme side, however, certain criticisms have been made. First of all, complaint is made of the clock face interval picture which, although useful, is kept on too long and over-emphasises the periods of waiting between programme items. The films are, on the whole, being handled satisfactorily, but care should be exercised to ensure that the film is not too dense, otherwise the degree of modulation in the radiated signal is reduced to such an extent that the received picture is very indistinct. This is very noticeable in the B.B.C. film "Television Comes to London," where some of the shots show up as an almost black picture. Furthermore, this film has been repeated so many times now that viewers are getting rather tired of the story it unfolds. It was revealed in the House of Commons the other day that the cost of the Alexandra Palace station was £110,000. This leaves a balance of £70,000 from the original sum allocated, and is the money now being used for both programmes and maintenance. No doubt this is being husbanded until a further allocation is made, when it is hoped that it will not be necessary to radiate quite so many repeat programmes. To assist the Television Advisory Committee in their deliberations, it is stated that the Radio Manufacturers' Association is to supply them with confidential information from time to time concerning the sales of television receiving sets. With the promise of special Christmas television programmes and the anticipation of television being an active agent in portraying the pageantry of Coronation year, it is confidently expected that the sales will assume unthought-of proportions, and it is certain that anything the manufacturers can do to reduce the cost of the sets will have a profound influence on the popularity and usefulness of the television service.

The Co-axial Cable

THE Postmaster-General made known the fact that the co-axial cable linking London and Birmingham is now completed, and an early start is to be made in laying a new section between Birmingham and Manchester. This cable is proving more efficient than at first thought, and hopes are expressed that it will carry frequencies up to two megacycles. If this materialises, then the relaying of television programmes will be a relatively easy matter, and will hasten the erection of provincial stations. In addition to interchanged programmes, it is certain that each station will have its own scanning equipment installed and so add considerably to the variety of fare which can be portrayed to picture "viewers." The Post Office is also giving careful consideration to the Committee Report on the questions of interference. The troubles found on ordinary sound broadcasting are fairly well known, but television is presenting new problems, and a statement on the Government's policy will no doubt be made within a short time.

A Difficult Case

THE service area of ultra-short-waves when radiated from a transmitting station with high power being still a matter for

(Continued on opposite page)

The Cossor television receiver model 137T in use.

(*Continued from previous page*)

conjecture, it is only natural that some of the smaller European countries should watch developments in England, France, and Germany before taking steps to inaugurate transmissions in their own country on any large scale. This is particularly the case in Switzerland, where the physical conditions, owing to the mountainous regions, make it difficult to estimate the area over which signals would extend. In an endeavour to secure quantitative data, however, it is learned that an ultra-short-wave station has been erected at Zurich, and field intensity measurements are being made. This will enable the Swiss Post Office to see whether one or two high-powered stations would cover the country adequately or whether the shadow effects in the valleys can only be overcome by a series of low-powered relay stations linked together either by co-axial cables or directional microwave links.

Televising a Football Match

THE other day the Germans were given a foretaste of what they may expect when television has become more highly developed. An association football match took place at the Olympic Stadium between German and Italian teams, and in addition to the 100,000 spectators on the ground itself, an additional number watched the run of play by television. The Witzleben station was responsible for the transmission and in eleven public televiewing rooms in Berlin itself the audiences were able to see the radiated pictures on cathode-ray tube receiving screens. The results were stated to be extremely good when the mobile intermediate-film equipment was in operation on the ground, but as soon as the electron camera came into play the pictures were inferior. This was stated to be due to the poor light, the sensitivity of the photo-electric surfaces in the electron camera then being insufficient to bring the picture signal well above the "mush" level. It is not stated what type of camera was employed, whether iconoscope or image dissector tube, since most of the development work on these electronic devices is being undertaken secretly by the government. Experiments of this nature, however, serve to remind potential viewers that the scope of the programme side will be increased enormously as soon as outdoor televising reaches a higher degree of perfection.

The Electron Camera

A SHORT time ago we drew the attention of readers to experiments which were being conducted at Alexandra Palace with the new Baird electron camera. Those looking-in lately have been rewarded with high-quality pictures using this latest device. The device is instantaneous in action, uses no mechanical methods of scanning and provides a much greater flexibility of operation than the intermediate-film method. Changing focus is a very simple operation and can be undertaken both optically and electrically. The last-named is due to the helical path taken by the electron image in its passage from the photo-electric cathode where it is generated to the target plane aperture at the front of the camera. A single control effects the change instantaneously, while panning and dissolves from one camera to the other in the studio give a wonderful latitude to the producer in his programme arrangements. Those who have seen the results on the very few occasions it has been used have commented most favourably on the pictures radiated.

LEAVES FROM A SHORT-WAVE LOG

Hong Kong Calling!

IF you have already logged W2XAF, Schenectady, you should have no difficulty in picking up ZBW3, Hong Kong, on 31.49 m. (9,525 kc/s) as the dial readings will be very close to each other. It is one of the channels used by the new short-wave transmitter which has been testing during the past month and is now coming shortly into daily operation. As Hong Kong local time is eight hours ahead of G.M.T., searching must be done between G.M.T. 04.30-06.30 on week-days and between 09.00-15.00 (Mondays and Thursdays); 08.00-15.00 (Tuesdays, Wednesdays, and Fridays) or from 08.00-16.00 on Saturdays. On Sundays Hong Kong is on the air between G.M.T. 02.00-06.30 and again from 08.00-14.30. The studio possesses a male announcer and at G.M.T. 14.00 you should hear a time signal reminiscent of the Big Ben chimes. News in English is broadcast at G.M.T. 13.00 and from 14.00-14.30 you may pick up a broadcast of gramophone records. As a rule the closing announcement reads: *This concludes the day's broadcast from the Hong Kong broadcasting station. We should like to receive reports on our transmission; address them to the Secretary, Broadcasting Committee, ZBW, P.O. Box* 200, *Hong Kong, China. Good night listeners, good night,*" following which *God Save the King* is played. The other channels to be used, as required, are ZBW5, 16.90 m. (17,755 kc/s); ZBW4, 19.75 m. (15,190 kc/s), and ZBW2, 49.26 m. (6,090 kc/s). From the frequencies you may see that the channels allotted are in close proximity to some already adopted by European and North American short-wave stations.

More Broadcasts from the Far East

The installation of high-power stations by Japan has impelled the Chinese Government to follow the same policy and in the more or less near future we may expect to tune in transmissions from Shanghai, Hangkow and Nanking. The channels allotted to these 20-kilowatt stations are as under: XGSA, Hangkow, 13.99 m. (21,450 kc/s); 16.90 m. (17,755 kc/s); 19.69 m. (15,240 kc/s); 25.56 m. (11,735 kc/s); 31.51 m. (9,520 kc/s); and 49.22 m. (6,095 kc/s). XGSB, Shanghai, will work on 13.95 m. (21,510 kc/s); 16.87 m. (17,785 kc/s); 19.75 m. (15,190 kc/s); 25.26 m. (11,875 kc/s); 31.56 m. (9,505 kc/s); and 49.14 m. (6,105 kc/s). XGOX, Nanking, will use 16.85 m. (17,800 kc/s); 19.69 m. (15,240 kc/s); 25.21 m. (11,900 kc/s); 31.58 m. (9,500 kc/s); and 50 m. (6,000 kc/s). Stand by, therefore, shortly for tests on the wavelengths usually adopted at this period of the year, namely, those in the 16, 19, 25 and 31 metre bands.

Another Mystery Station

On almost the channel used by CT1GO, Parede, Lisbon (Portugal), 48.50 m. (6,185 kc/s) a French call has been heard; it is: *Ici Tunis, Poste privé expérimental* (private experimental station). No lengthy broadcast was made, but merely two or three unconcluded gramophone records of very old vintage, broken off at intervals to insert the call. The time was G.M.T. 18.00, but on another occasion the same signals were heard towards G.M.T. 12.30. As no North African short-wave transmitter is listed to work on or around this channel the puzzle still lacks a solution.

THE BRITISH LONG DISTANCE LISTENERS' CLUB

Interesting Logs

SOME good logs are now coming in, and the following one, from Member 1399 (Tadworth, Surrey), shows how a simple set can be productive of good results:

"The following calls heard here during October on the 20m. 'phone band may be of interest to fellow readers:—

CE3DW, CO2KL, 6OM, 7HF, 8VZ, 8YB, CX1AA, 1CC, 3BL, CN8AA, 8AB, 8AD, 8KC, HI4N, 5X, 6O, 7G, HK3HA, K4DDH, LU1EX, 1HC, 1UA, 2AB, 4AW, 4BH, 6DP, 6KE, 7AG, 7ET, LU8AD, NY2AE, OA1J, PK1MX, 1PU, PY1AY, 2AK, 2AM, 2EJ, 2CK, 8AD, 8AG, TI2AV, 2HG, VE1AR, 1BR, 1CR, 1DC, VE1DR, 2BK, 2DC, 2CA, 2CR, 2FZ, 2HK, 2HY, 3NF, 3WV, VE4GU, 4LH, 4SS, 4WR, 5OT, GA5, VK2AW, 2BA, 2BG, 2MV, 3AM, 3HM, 3HS 3JJ, 5HD, 7JB, VO1I, 1J, 2Z, VP4TH, 6YB, 9R, 9O, W1, 2, 3, 4, 5, 6, 8, 9, W10XDA, XE1G, YV5AK, 7AA.

The receiver used is a two-valve battery set with bandspread tuning. The aerial a 66ft. straight, 30ft. high. May I take this opportunity to thank you for your helpful hints and tips found in your magazine."—Yours faithfully, H. F. HAMILTON, B.L.D.L.C. 1399.

A Transmitter's Point of View

BEFORE bringing to a close the correspondence on QSL cards, we should like to give a transmitting amateur's point of view. Mr. G. T. Ottley (G8BK) writes, "I have been following with some interest letters from readers regarding reports to experimental transmitting stations, and QSL's. Fifty per cent. of the S.W.L. *reports* that I receive are useless, and the wording of the so-called report is as follows: 'Dear Sir, I received you at loudspeaker strength on my all-wave set, using a 40ft. aerial. Please QSL.' I agree with 2ASA when he quotes: 'A good detailed report deserves a card.' If S.W.L.'s will give detailed reports, mentioning the type of set used for reception, direction of aerial, also, if possible, make the report cover several transmissions of various days, it would prove more helpful."

We are afraid that we must now close this particular correspondence. No doubt listeners are by now aware of the type of report they must make if they desire to receive a QSL card.

A Question of Harmonics?

MR. COTTIGNIES raises an interesting point for other B.L.D.L.C. members. He says that "With a friend last night we heard, while the television was on, the self-same vision and sound signals on 13.2 and 14.4 metres respectively, exactly double the wavelengths. The receiver was situated in Herne Hill. Having heard many varied explanations of this phenomenon might I ask if anyone has discovered the real cause? Surely it is not a question of harmonics? for, I think, no harmonics can appear *lower* in frequency than the fundamental. Nor can it be a question of beats; for a signal beating with another produces frequencies equal to sum and difference, and for a beat to appear on 13 metres signals on 14 and 4 metres would have to beat with the television signals (figures approximate only). This seems hardly possible. (N.B.—The figures convey more if worked out exactly in megacycles). Can anyone oblige?"

Now then, Experts, what solutions can you offer to this interesting letter?

Station COCD

A REQUEST has been received by a reader from the Havana station COCD, in which they say "We would appreciate it very much if you would listen in on our short-wave station COCD, 6.130 kilocycles, 48.92 metres, and send us a special report on the broadcast which we offer every afternoon from 5 to 6 o'clock (E.S.T.) which you should receive in from 10 to 11 o'clock G. M. T.

During this hour we advertise tobacco and offer a very attractive programme of the best orchestras, best Cuban singers and ensembles in Cuba.

The address of this station is COCD "La Voz del Aire, S.A." Box 2294, Havana, Cuba.

Australian Transmissions

THE popular Australian stations VK2ME and VK3ME have sent their new schedule, which is as follows: DECEMBER, 1936,

VK2ME.

	Sydney Time	G.M.T.
Sundays	4 p.m.-6 p.m.,	06.00-08.00
,,	8 p.m.-Mdt.	10.00-14.00
Mondays	Mdt.-2 a.m.	14.00-16.00

VK3ME.

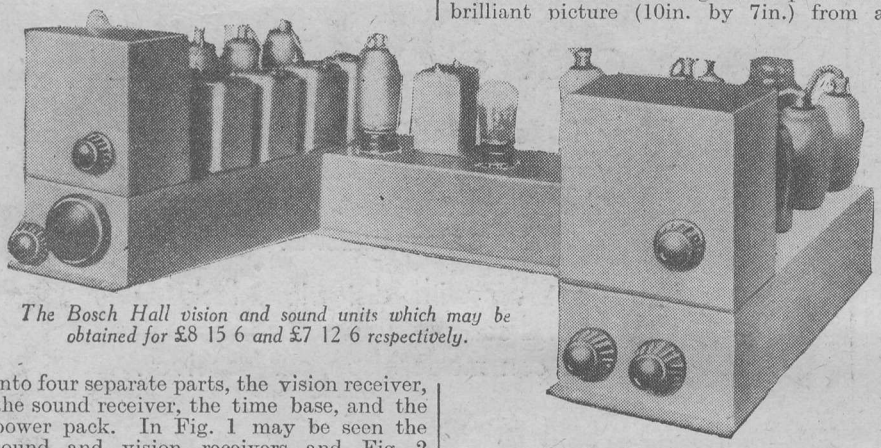
	Melbourne Time.	G.M.T.
Nightly Monday to Saturday (inclusive)	7 p.m.-10 p.m.	09.00-12.00

Home-constructor Television Kits

MANY readers will no doubt be interested to learn that a new company has made arrangements to supply complete television receivers (including the sound and vision section as well as the time base) in the form of constructor kits. This new company, Messrs. Bosch Hall, have released full details of the apparatus which has been designed by Mr. C. P. Hall, a Fellow of the Television Society. The kits are guaranteed, and it is stated that providing the units are assembled in accordance with the simple directions the results will give the utmost satisfaction, and the advice of the company's service bureau is available in the event of any difficulty. Furthermore, by arrangement, sets assembled by constructors can be inspected and tested by a qualified engineer on a payment of a small charge.

Details of the First Television Receivers to be Marketed for Home Assembly

The apparatus so far available is divided into four separate parts, the vision receiver, the sound receiver, the time base, and the power pack. In Fig. 1 may be seen the sound and vision receivers and Fig. 2 shows the time base unit with the cathode-ray tube mounted on the special socket in the centre, and it will be noted from this illustration that the vertical method of assembly is arranged for. Therefore the cabinet in which the receiver is housed must be provided with a reflecting mirror in the lid in order that the picture on the end of the cathode-ray tube may be viewed.



The Bosch Hall vision and sound units which may be obtained for £8 15 6 and £7 12 6 respectively.

Vision and Sound Receivers

The vision receiver embodies an amplitude filtering circuit dividing the synchronising signals and providing separate outputs for the time base and the sound unit. Nine valves are employed in this part of the apparatus, and the kit, with drilled chassis but without valves, may be obtained for £8 15s. 6d.

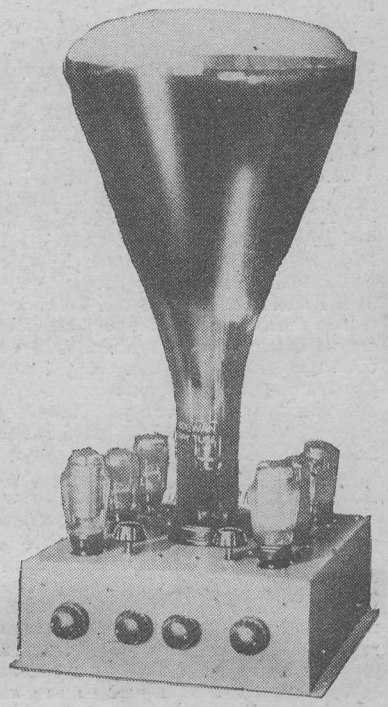
The sound receiver is a five-valve arrangement designed to provide high quality from the television sound signals combined with simplicity of control. It is quite free from interference. The kit for this portion, with drilled chassis and without valves, is £7 12s. 6d.

The Time Base

The time base is designed to provide a brilliant picture (10in. by 7in.) from a standard tube in black and white. The scanning circuit is very efficient and a brilliancy control is fitted. A special holder for the cathode-ray tube is mounted in the centre of the chassis so that the tube may be plugged in and this leaves it in a vertical position, with the result that it takes up less space and enables the remaining part of the equipment to be arranged round it. The kit with drilled chassis is £9 15s., valves and cathode-ray tube being extras.

The Power Pack

To supply the necessary voltages for all parts of the complete equipment a mains unit or power pack is designed to fit in with the entire assembly, and a potential divider is fitted for supplying the H.T. to the anodes of the cathode-ray tube at 400, 1,250 and 4,000 volts, with negative bias up to 150 volts. Again, an all-metal chassis is employed and a special safety switch is fitted. It is designed for mains inputs from 100 to 240 volts, and the kit with chassis ready drilled costs £6 6s. 0d.



The time base unit with cathode-ray tube in position.

Complete Equipment

The complete receiver (sound and vision) utilises 20 valves, and if desired it may be obtained ready assembled with 12in. cathode-ray tube for £85. Where it is not desired to carry out the assembly of the kits at home, they may be obtained ready assembled, in which case the vision receiver costs £18 18s. with valves, and the sound receiver £14 14s. with valves. The time base may be obtained with valves for £17 17s. and the power pack for £10 10s.

"THE WIRELESS TRADER" YEAR BOOK, 1937

THE 1937 edition of "The Wireless Trader" Year Book is now available. Further improvements have been made this year—notably the provision of index tabs to the five most-used sections of the book.

These sections are: Receiver Specifications—condensed technical details, with valve types of nearly 500 current receivers and radiograms by 48 different makers; Valve Data—characteristics of all valves in common use, with diagrams of base connections; Trade Addresses—printed on green-tinted paper; Buyers' Guide and Proprietary Names Directory—both on salmon-tinted paper.

The 28-page Trade Addresses section is invaluable to all engaged in the radio industry. It contains names, addresses (postal and telegraphic), and telephone numbers of radio manufacturers, and both radio and electrical wholesalers, the lists being separated under individual headings for ease of reference.

The Buyers' Guide to goods supplied is arranged under some 200 different headings, and there are nearly 1,200 names listed in the Proprietary Names section.

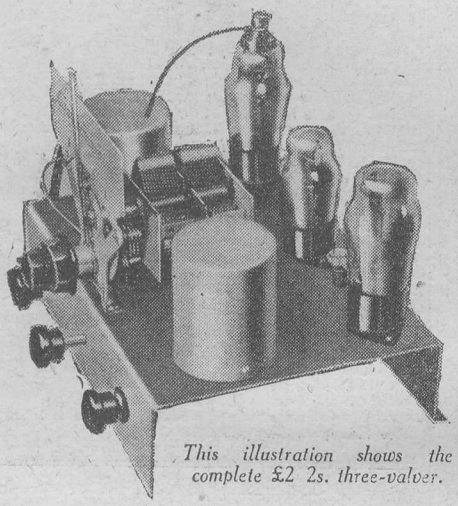
Other features include a full-sized diary, ruled with cash columns, for the whole of 1937, a directory of mains voltages for some 1,000 districts, and sectionalised legal, technical, and general information which is constantly needed by the radio dealer and, in fact, by everyone engaged in the radio trade.

"The Wireless Trader" Year Book costs 5s. 6d. post free (overseas 7s. 6d.), or 3s. 6d. post free to "Trader" subscribers. It is obtainable from The Trader Publishing Co., Ltd., Subscription Department, Dorset House, Stamford Street, London, S.E.1.

THE N.T.S. S.G.3

A Low-priced Three-valve Receiver for the Battery User.

THE New Times Sales Co. are now offering a very low-priced receiver for battery operation, designed to provide the maximum performance with the minimum of expense. The illustration below shows the general appearance of this interesting receiver, and it will be seen that a neat and practical layout has been incorporated to combine modern screened coils with an all-metal chassis assembly. The standard H.F., detector and pentode output circuit is employed, and the valves which are fitted are of Tungsram manufacture. Two tuned circuits are employed, and the coupling between H.F. and detector stages is carried out by means of an H.F. transformer, designed with a primary to offer a suitable load for the H.F. pentode. This is not a variable-mu valve, but the aerial is fed to the first tuned circuit through a series-aerial condenser mounted on the control panel and thus a fair measure of control over volume may be obtained by reducing the aerial input. With the types of coil employed, this will not seriously affect tuning, although any slight modification which is brought about may be compensated for



This illustration shows the complete £2 2s. three-valver.

by means of the concentric trimming knob. This is fitted to a small trimming condenser which forms part of the slow-motion dial and it is thus possible to get both circuits dead in tune at all parts of the tuning scale.

Working Details

The two-gang condenser is not of the screened type, but the separation of the two sections and the general rigid assembly enables the receiver to operate in a stable manner, and the two coils, as will be seen, are split on either side of the condenser. The trimmers fitted to the condenser are adjusted at the factory and sealed so that the panel trimmer will afford a correct degree of balance at all points.

Automatic Grid Bias

A refinement, not often found in a low-priced battery receiver, is the inclusion of an automatic grid bias circuit for the output valve and this naturally enables the receiver to be put into commission without the necessity of a grid-bias battery. The price of this interesting receiver is only £2 2s. complete with three valves.

REPLIES IN BRIEF

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

H. G. N. (N.1). Although it is not essential to use a tapped control, we do not like to recommend alternatives in the case of a receiver which is not of our design. There is, unfortunately, no alternative component now on the market, and thus it will be necessary to use an ordinary type of control. The wattage rating and other factors must be ascertained.

A. L. W. (Peru). We suggest that you get into touch with Messrs. Stratton and Co., the makers of the well-known Eddystone components.

C. F. Q. (Folkestone). It would not be practicable to add the winding, and the best suggestion we can make is to replace all of the tuning coils. In such a case, however, the correct inductance values must be chosen in order that the ganged tuning condenser will track correctly, and the intermediate frequency must be known.

W. A. B. (Whitchurch). It would be quite possible to use the coils in the £5 superhet. circuit, but not in the Tutor. As, however, we have not used these particular components, we cannot give you a guarantee of performance.

F. H. B. (Teignmouth). We suggest that your coil is not of a suitable type for your Heptode circuit. Therefore, you will either have to obtain a modern coil designed for the purpose, or otherwise modify the Heptode circuit to enable the coil you are trying to use to give the desired result.

A. J. F. (Birmingham). The two resistors which touched may have resulted in damage to these parts or to some other components, valves or batteries. We suggest that you check each stage with a milliammeter, and this will no doubt enable you to verify voltages and components in the simplest manner.

J. B. (Birmingham). We are sorry that none of our blueprints gives details of a receiver which would enable you to use the parts mentioned in your letter.

B. C. (Marlow). The circuit is in order, but perhaps the addition of an H.F. choke between the anode of the valve and the 'phones would help to improve the reaction circuit.

J. H. F. (Maidstone). We are not certain that the coils in question would gang with the condenser, as these are of different make and the former are not of recent design. Unless the condenser is designed for use with coils having an inductance value similar to the coils you mention, they will not track correctly. We do not recommend the incorporation of these components in the Monitor 3.

D. W. (Llandough). The connections given in your letter are incorrect. The leads to the extension speaker should be taken from each anode of the Class B valve, through a 2mfd. fixed condenser. No earth connection is required.

A. H. J. (Yorks.). We have no blueprint of a set of the type outlined. Almost any simple short-wave set could be used in the manner described, but there may be some difficulty with regard to hum when an A.C. mains supply is employed for H.T.

L. G. C. (Camperley). Messrs. Peto-Scott can give you a quotation, and can also supply a complete kit for the apparatus.

A. M. B. E. (Tavistock). We refer you to the advertisements of Messrs. McCarthy Radio and Universal High Voltage Radio, Ltd., which appear in our issue from time to time.

C. E. H. (Stechford). The alterations shown by you are quite in order and the apparatus may be used as a one-valve headphone set. You cannot improve on this in any way.

E. L. P. (W.12). Only very simple A.V.C. can be incorporated as there is little H.F. amplification. We have not found a satisfactory method of including it in this particular set.

G. K. M. (Nottingham). The receiver was described in September, 1935. The illustration was simply used to make clear the points raised in the article referred to. We may reprint the article if further requests are received. The H.F. choke is on a ¾in. former with 150 turns of 38 enamelled wire, and the tuning coil is on a 2in. former. The condensers are .0005 mfd. (tuning) and .0003 mfd. (reaction). The set may be used as an adapter, hence the plug.

A. S. (Enfield, Co. Meath). Whilst it should be quite in order to use different speakers, there may be difficulties due to unmatched impedances, balances, resonances, etc. By using a speaker with a matching device, such as that mentioned, you could obtain better results as you could then match the output to your set.

K. E. F. (Walton-on-Thames). We have three blueprints of crystal receivers (see our blueprint list in this issue), and an article on the subject was published with two or three diagrams in our issue dated Feb. 8th last.

R. C. L. (Walthamstow). Although we have no blueprints of a set using the main parts mentioned, the coils and condenser could be used in a circuit of the Monitor Three type (or Tutor 3). We cannot, of course, give instructions for using alternative parts, but you may be able to incorporate the coils from the coil-makers' data sheet.

F. E. S. (St. George, Bristol). The Kit A costs £4 16s. 6d. This is, of course, less valves, cabinet, speaker and batteries. With valves, the Kit costs £6 3s. 0d.

I. J. H. McK. (Pitlochry). Generally, the blue glow indicates that the valve is being over-run, due either to excessive H.T. or lack of G.B. Some types of super power mains valve do appear to give a similar effect without damage, but in most cases the valve will be ruined if left operating in this condition, and you should, therefore, try and find the cause of it and obtain working results without the glow.

J. G. W. (Dublin). The trouble is not due to the method of connecting, but to the fact that the hum is already there but is not audible on the speaker owing to its lack of good bass response or to the weakness of the hum. Naturally, it is heard much more clearly in the 'phones.

RADIO CONTACT

A NEW issue of the Graham Farish magazine, *Radio Contact and Television*, is now available, price 1s. This interesting number contains constructional details of a two-valve battery short-wave receiver, a battery all-waver designed to utilise plug-in coils so that every wavelength may be covered, as well as two other constructional receivers. A full-size blueprint is given free for the construction of the all-waver mentioned, which is a three-valve straight set employing the popular detector-2 L.F. arrangement, with resistance-capacity coupling.

The issue also includes an interesting article on the ganging of condensers, as well as operating details for the receivers which are described in the book. All of the receivers are, of course, constructed from Graham Farish or Formo components, and the efficient Graham Farish Ring short-wave detector valve is employed in some of these sets. The book also contains full component lists for the receivers, and these may be obtained on hire purchase terms if desired. The 2-valve S.W. set may be made for 47s. 6d., the 3-valver for 57s. 6d., the S.G. three for 50s., and the all-mains three for 110s.

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.)

Correspondents Wanted

SIR,—I have been a reader of PRACTICAL AND AMATEUR WIRELESS for eight months and have found it a fine paper. I look forward to getting my copy every week, but I have one complaint to make. I have answered three requests for correspondents over a month ago now and I have not had a single reply.

I shall be glad to correspond with any reader interested in 5-metre reception or short-wave reception in general. Also, if there is a reader in my district who is willing to co-operate in learning the Morse Code, will he please drop me a line ?—T. MOORE (Junr.), 4, Orange Grove, Lodge Lane, Liverpool, 8.

"The One and Only!"

SIR,—I have been unavoidably detained in writing to you, but I now wish to thank you for the Stentorian Speaker, which you awarded to me in the recent Speaker Competition. Having tested the speaker I find it a splendid addition to my set; the volume and quality are excellent.

As a regular reader of your paper I can remember purchasing not only the first issue of PRACTICAL WIRELESS but also the first number of AMATEUR WIRELESS and would like to say how much I have enjoyed all articles, theoretical and practical, and how helpful they have been to me in my experiments.

I also found PRACTICAL TELEVISION most interesting and hope that it may again appear as a separate journal.

As wireless is my special hobby, I have had many wireless papers on the market, but PRACTICAL AND AMATEUR WIRELESS is "The One and Only." As I have never written you before I take this opportunity of wishing your paper every success.—JAMES MILLER (Dovercourt).

Hydrofluoric Acid: A Warning

SIR,—In reference to the article entitled "A Non-Parallax Tuning Scale" on page 315 of PRACTICAL AND AMATEUR WIRELESS for November 21st, 1936, I do not know if the author is acquainted with the following properties of hydrofluoric acid:

(1) Burns caused by it almost invariably become infected.

(2) Immediate amputation is usually the only cure.

This being so, I would suggest that a rather more urgent warning be given than that conveyed in the article itself.—J. N. HALLETT (Wellingborough).

Component Shortage

DEAR THERMION—There are times when I violently disagree with your remarks, but recently you struck a sympathetic chord in my veins re "Component Shortage." My usual wireless dealers sent *direct* to the manufacturers (of world-wide fame) for two six-pin short-wave coils a fortnight ago and up to the present time nothing has been heard from them. I wonder if they do things like this in America! Already we have American sets and valves on our market, and if British manufacturers keep up this dilatory state of affairs we shall have to look across the "pond" for help. Trusting you will take up the cudgels again on our behalf.—R. HOPPER (March, Cambs.).

W1XAO on 9 Metres

SIR,—It may be of general interest that the Boston (Mass.) Police department, under the call-sign W1XAO, is being well received here. The wavelength is approximately 9 metres (33 megacycles), and the signal is of sufficient strength to give complete quenching of "Super-regen." hiss on a receiver consisting of a self-quench detector and one L.F. stage. Patrol cars can be heard replying on the same frequency. (14.00-17.30 G.M.T.).—E. DE COTTIGNIES (Prittlewell).

Back Number Wanted

SIR—I find that PRACTICAL AND AMATEUR WIRELESS No. 56, dated Oct. 14th, 1933, in which is described the all-wave Unipen (Pentode) is out of print.

I shall be glad if any reader who has this copy to spare would kindly notify me by post card.—F. J. BELL (Merton).

[*Post cards addressed to Mr. Bell, care of this office, will be forwarded.*—Ed.]

Station W1XGT

SIR,—Re experimental station W1XGT on 31.6 mc., 9.5 m., as reported in your issue of November 14th by E. de Cottignies (Prittlewell, Essex). The other transmitter which heterodynes is W9XHW, Minneapolis, Minn, U.S.A. Many U.S.A. 9-metre broadcasters are well received here including U.S. police and the 10-metre band.—L. C. STYLES (Ingatestone, Essex).

CUT THIS OUT EACH WEEK.

Do you know

—THAT special I.F. units are now obtainable for use in vision receivers in order to obtain the requisite band width.

—THAT it is generally accepted that a frequency band of at least 2 megacycles is necessary for good quality in a modern vision receiver.

—THAT a sandy soil makes a very poor earth connection and should not be employed unless no alternative can be provided.

—THAT an earth of the above type should be improved by using one of the proprietary chemical "earths" now on the market.

—THAT the H.T. battery should always be kept in a cool and dry position—not near a fire or radiator.

—THAT the tone of reproduction may be improved, when the bass is unduly accentuated, by removing the speaker to a short distance to the rear of the baffle instead of attaching it direct as usual.

—THAT ordinary flash-lamp bulbs are not always effective as a fuse in a battery receiver, and the special fuse bulbs should always be employed.

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

New Lisbon Station, CSW

SIR,—I notice in the November 21st issue of your fine weekly that a correspondent, Mr. S. L. Birchby, mentions reception of the new Lisbon station CSW on 30.21 metres. I have also heard this station on 31.21 m. and also on approx. 25.6 metres when it was making tests some weeks ago. I find that the signal of this station is usually at good QRK, but the quality is not too good.

Our old friend of last year, namely, VP3MR, is heard regularly at night after 22.00 G.M.T., on approx. 49.92 metres. They broadcast sponsored programmes and use the slogan "The voice of the West Indies." Whilst reception of this station is at good strength, quality is poor due to bad QRM.

I would very much like to correspond with other readers, especially any BLDLC members and overseas readers, preferably of my own age, seventeen years. Wishing your paper every success.—F. W. MOORE ("Woolmans," Ide, Nr. Exeter, Devon).

A Good 10-metre Log

SIR,—In a recent issue I saw a reader asking for a 10-metre log. I submit my own log, which is the result of my first attempt on the ultra-shorts. It was compiled during the past month.

W1AA, W1CCZ, W1HQN, W1IAF, W1XH—W2DYP, W2HFS, W2FWJ, W2FWK—W3VGC, W3CWZ—W4EDQ, W4DSY, W4CPG, W4BMR, W4DFU, W4EBQ, W4CYU, W4FT, W4ALD—W5FBE, W5BXA—W6OFR, W6FQY, W6MDN—W8HSP, W8MNJ, W8MWL, W8BBU (portable), W8AJU, W8HFC—W9KFI, W9LUX, W9PPI.

All were heard on the loudspeaker of a 5-valve superhet and converter. My aerial is an indoor one, vertical, and 20ft. high. I have also logged three police transmitters, namely, W2XEM (Newark), W2XEN (Roselle), and W2XFA (Jersey City). These are on 9 or 9.5 metres, but luck has a lot to do with logging these as they're only on for a minute or so at a time.

A log of broadcasting stations might interest some readers, and the following were also heard on the loudspeaker, but the aerial used was an indoor one, 66ft. over all, zig-zagged horizontally north and south.

W1XAL (25 and 49 m.), W1XK, W2XE (13, 19, 25 and 49 m.), W2XAF, W2XAD, W3XAL (16 and 49 m.), W3XAU, W8XK (13, 25 and 49 m.), W8XAL, W9XF, CRCX, VE9DN.

YV1RH, YV2RC, YV3RC, YV4RC, YV5RMO, YV7RMO, YV8RB, YV12RM, and YV6RV.

HJ1ABE—31 m., HJ1ABP—31 m., HJ1ABJ, HJ1ABG, HJ1ABC, HJ3ABX, HJ3ABH, HJ3ABD, HJ4ABB, HJ4ABP, COCO, COCD, COCQ, COCX, and COCH.

HIN (26 and 48 m.), HI1J. HIT, HI4D.

VP3BG—49 m., VP3MR, T1PG, HH2S, CSW, LSX, CT1AA, YDE, PMN, VUB, HS8PJ, HKV—34 m., VK2ME, ZSS, HP5K and CGA4.

These stations were all logged within the last five weeks. Wishing your magazine continued success.—JOHN C. BARROW, B.S.W.L25 (Aberdeen).

Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

Bulgin Precision Resistors

FOR the purpose of making up various types of meter, it is often necessary to employ series or shunt resistors with a simple meter, and it is often found necessary to use exact values for this purpose. Whilst the standard type of component may often be employed, the tolerance may not prove good enough for the construction of laboratory apparatus, and in such a case some form of precision component has to be employed. Messrs. Bulgin now have a full range of such resistors, wound with special nickel-alloy enamelled wire, non-inductively wound on specially made porcelain formers. These resistors are provided with protective covers and the windings are treated to prevent atmospheric effects. They are guaranteed to have an accuracy, at 15 degs., of better than 2 per cent. The actual value to a figure of approximately half of one per cent. is always stated on the resistance. For example, type R.23, nominally 1,000 ohms accurate to plus or minus 2 per cent., if accurate to 1.5 per cent would be labelled as 1015 ohms. They are rated at 1 watt, at which the values remain constant, but may be used to dissipate 3 watts if a slight change in value can be tolerated.

One of the Bulgin resistors shown with a portion of the casing removed to illustrate the method of winding.

Resistors accurate to half of one per cent. as the highest degree can always be selected and/or made to any particular exact figure, and there is only a slight increase of price, according to the work involved in such special values. Insulated terminals and soldering tags are fitted and the components are sufficiently light to enable them to be suspended direct in the wiring. The skeleton range covers from .1 ohm to 1 megohm, and values up to 2,000 ohms cost 6s., whilst the ranges from 5,000 ohms up to 1 megohm increase in price up to 24s.

H.M.V. Price Increase

TWO new radiograms, and an increase in price in others, is announced by His Master's Voice. Model 488 is increased to 29½ guineas and model 485A is increased to 38 guineas. The two new models are for mains operation, one an A.C. and one a Universal A.C./D.C. model, both priced at 25 guineas, and both being of the superhet type. The A.C. model embodies a frequency changer, I.F. amplifier, detector and A.V.C., L.F. and pentode output stages, with full-wave rectifier. The Universal model embodies a frequency changer, I.F. amplifier, detector and A.V.C. and pentode output valve with a U.30 rectifier.

Brown Headphones

THE well-known type "A" headphone with adjustable reed is again available to the home-constructor. This headphone is generally recognised to be the finest in the world, and in place of the usual type of flat diaphragm a spun aluminium diaphragm is employed and this is attached to a reed tuned to 900 cycles. The method of construction is novel. To a very powerful magnet made from 35 per cent. cobalt steel are attached two laminated pole pieces holding the coils, which are wound with the finest quality copper wire. The magnets and coils are adjustable in respect of the reed by means of a movable bridge, thus enabling each user to obtain the required degree of sensitivity. The double headband, made of polished aluminium, is universally and completely adjustable. These 'phones are used in the Royal Navy, Air Force, B.B.C. laboratories, etc., and are the most sensitive instruments of their type which are available. The price for the standard model is 50s. per pair, and a single handphone embodying one of the units costs 25s. The standard resistance is 2,000 ohms per earpiece, but special resistances can be wound to order without extra charge.

For those who require a cheaper model, standard featherweight models are available with the flat stalloy diaphragm, and these cost 20s. per pair, or a single handphone for 12s. 6d. The type D is a more sensitive flat-diaphragm model with 35 per cent. cobalt steel magnet, but otherwise similar to the Featherweight model. The double headband as fitted to the "A" type is provided and the cost is 35s. per pair or 18s. 6d. for the single handphone.

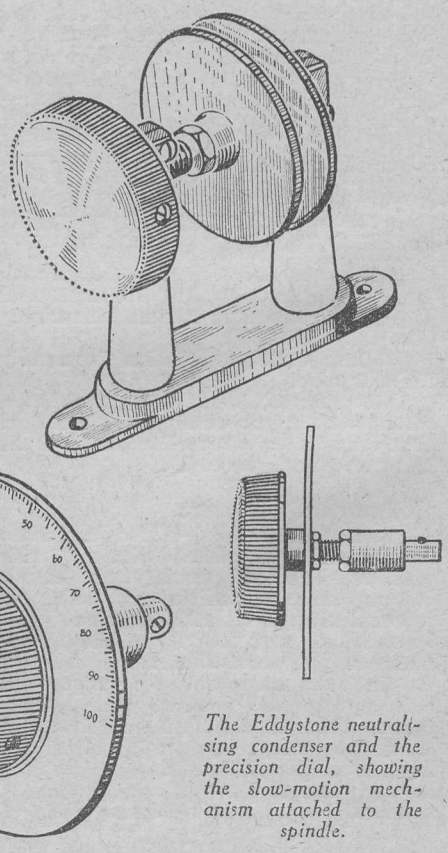
New Eddystone Components

AMONG the new Eddystone components introduced by Messrs. Stratton and Co. are a neutralising condenser and a precision 4in. slow-motion dial. The former consists of two large diameter brass plates, one of which is fixed, but the other is attached to a threaded rod passed through a supporting pillar of frequentite. The discs are turned and consequently the variation is proportional as the two discs approach one another and there is no erratic variation such as would be obtained if they had irregular surfaces. Screw adjustment is provided so that the degree of tension on the rod may be adjusted and the instrument rendered completely free from vibration or other variation. The maximum capacity is 5 m.mfd., and the price is 12s. 6d.

The precision dial consists of a 5/16th inch brass scale which is silver-plated and the graduations are machine cut. The slow-motion drive is incorporated in a large-diameter brass barrel mounted on the spindle and reduces the drive 6 to 1. For registration or setting purposes a small plate is supplied with a machine cut on it, and the edge is ground to coincide with the edge of the dial and two short bolts are provided so that it may be attached to a panel. The control knob is of large diameter and affords a comfortable grip which greatly simplifies tuning on an ultra-short-wave receiver. It may be used in transmitting equipment or laboratory apparatus, and can be supplied with ¼in. fitting. The price is 15s.

Loudspeaker Centring Gauges

SERVICE engineers will be interested in the new range of centring gauges produced by Messrs. Holiday and Hemmerdinger. These are designed for use when a moving-coil speaker has to be reassembled or when a speaker has been damaged or is to be tested. They are supplied in a neat wallet in which they are arranged in four sets, each set being a different colour and thickness. The four thicknesses are .015in .010in., .0075in. and .005in. To re-centre a speaker, or rather, speech coil, the locking screw or screws are loosened, and four gauges of the appropriate thickness are inserted symmetrically in the gap, and the screws are then tightened up and the gauges withdrawn. This makes the process very simple and it may be carried out in a very few minutes with the knowledge that the speech coil must be centred truly, unless it has warped or become distorted. The price of the set of gauges is 2s. 6d., complete with wallet. The makers are Messrs. Holiday and Hemmerdinger, Holmer Works, Dolefield, Bridge Street, Manchester, 3.



The Eddystone neutralising condenser and the precision dial, showing the slow-motion mechanism attached to the spindle.

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.

Wellingborough and District Radio and Television Society

THE fortnightly meeting of this Society was held at Wellingborough on Wednesday, November 4th, at which a lecture was given by Mr. Wilkins, of the Automatic Coil Winder and Electrical Equipment Co., makers of the celebrated Avometers, special mention being made of the practical use of such meters in the course of home construction.

Mr. Wilkins illustrated the various points in a receiver in which meters could be inserted when checking for faults, and also described the use of such meters for checking for distortion and correct tuning. The use of output meters was also fully explained and upon the completion of his lecture, a keen and interesting discussion took place.

All PRACTICAL AND AMATEUR WIRELESS readers are cordially invited to attend these meetings and particulars can be obtained from the Hon. Sec., Mr. L. F. Parker, G5LP, 127, Jubilee Crescent, Wellingborough.

The previous Saturday, October 31st, thirty members of the Society paid a visit to the Empire Short-wave Transmitters at Daventry, and were shown around the buildings and transmitting and amplifying gear by an engineer who explained in detail the crystal oscillators, frequency doublers, and push-pull amplifying stages. After the visit, tea was partaken at Daventry, and a discussion followed on the old problem of short-wave aerials. After discussion the party returned to Wellingborough and Rushden after a very enjoyable trip.

Exeter and District Wireless Society

THE usual weekly meeting of this Society was held on Monday, November 9th, and one of the finest lectures ever heard by the members was given by V. Searle, Esq., M.Sc., who is one of the most prominent Physicists of the University College of the South-West. He took for his subject "How and What We Hear," and this was not only dealt with very fully but was illustrated with many excellent lantern slides.

Much apparatus was also brought by the lecturer, and the one outstanding item, which excited considerable interest, was the actual demonstration of the fact that the highest frequencies of sound waves, when altered in their pitch, made very little difference to the human ear. These meetings are held weekly, on Mondays, at 3 and 4, Dix's Field, Exeter.

Further particulars of the Society may be obtained from the Secretary, W. J. Ching, 9, Sivell Place, Heavitree, Exeter.

The Croydon Radio Society

THE Vice-President of this Society Mr. G. S. Vellacott, presided for the lantern lecture on: "Cathode Ray Tubes, Their Construction and Use," on Tuesday, November 10th. It took place in St. Peter's Hall, Ledbury Road, S. Croydon, and the lecturer was Mr. A. F. Hollins, assisted by Mr. H. L. Bowen, technical representatives of the Mullard Wireless Service Co., Ltd. After dwelling on differences between gas-filled and high-vacuum tubes, Mr. Hollins produced some excellent slides which made their inner mysteries very clear. Then there were cathode-ray tubes with three anodes and the meaning of each was carefully discussed.

Radio variety filled the bill for the Society's meeting on Tuesday, November 17th. Various members each gave a ten-minute talk on special subjects. Mr. Sully began with a discourse on iron-core coils, particularly interesting because of the evident study having been given to the topic. Mr. Marshall was thoroughly at home on aspects of earthing A.C. and D.C. mains, and Mr. P. G. Clarke gave a fascinating account of his experiments in searching for high-quality reproduction at reasonable cost. Mention must also be made of Mr. Symonds' speciality, photo-electric cells. There was the use of them in Charing Cross Underground Station in automatically switching on and off the lights on the platform edges. Motion-picture sound reproduction, noctovision, as well as cigarette-packing machines, all came under his survey.

After the interval, the Chairman, Mr. W. J. Bird, asked the seemingly innocent question: "Should the Club set be modernised, and if so what circuit should be employed?" After a heated discussion the Technical Adviser will now proceed with the renovation, if it can be done within the limits of available funds. Even so, the Society would be grateful to hear from any PRACTICAL AND AMATEUR WIRELESS readers. —Hon. Pub. Sec., E. L. Cumbers, Maycourt, Campden Road, S. Croydon.

Practical and Amateur Wireless
BLUEPRINT SERVICE

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

Issues of Practical Wireless .. .. 4d. Post paid
" " Amateur Wireless .. .. 4d. " "
" " Practical Mechanics .. .. 7½d. " "
" " Wireless Magazine .. .. 1/3 " "

The index letters which precede the Blueprint Number indicate the periodical in which the description appears; thus, PW refers to PRACTICAL WIRELESS, AW to *Amateur Wireless*, PM to *Practical Mechanics*, WM to *Wireless Magazine*.

Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable), to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., Geo. Newnes, Ltd., 8-11 Southampton Street, Strand, W.C.2.

PRACTICAL WIRELESS
STRAIGHT SETS. Battery Operated.

	Date of Issue.	No. of Blueprint
One-Valve : Blueprints, 1s.		
All-wave Unipen (Pentode) ..	—	PW31A
Two-valve : Blueprint, 1s.		
Four-range Super Mag Two (D Pen)	11.8.34	PW36B
Three-valve : Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF (Trans))	—	PW10
Sixty-Shilling Three (D, 2 LF (RC & Trans))	—	PW34A
Leader Three (SG, D, Pow) ..	—	PW35
Summit Three (HF Pen, D, Pen)	8.8.34	PW37
All Pentode Three (HF Pen, D (Pen), Pen)	22.9.34	PW39
Hall-Mark Three (SG, D, Pow) ..	—	PW41
Hall-Mark Cadet (D, LF, Pen.) (RC))	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three)	13.4.35	PW49
Genet Midget (D, 2 LF (Trans))	*June* '35	PM2
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53
Battery All-Wave Three (D, 2 LF (RC))	—	PW55
The Monitor (HF Pen, D, Pen) ..	—	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P) ..	—	PW64
The Gladiator All-Wave Three ..	29.8.36	PW66
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen) ..	31.10.36	PW69
Four-valve : Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen) ..	—	PW11
Beta Universal Four (SG, D, LF, Cl. B)	—	PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-mark 4 (HF Pen, D, Push-Pull)	—	PW46
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P) ..	26.9.36	PW67
Mains Operated.		
Two-valve : Blueprints, 1s. each.		
A.C. Twin (D (Pen), Pen) ..	—	PW18
A.C.-D.C. Two (SG, Pow) ..	7.10.33	PW31
Selectone A.C. Radiogram Two (D, Pow)	—	PW19
Three-valve : Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, DDT, Pen)	10.6.33	PW23
D.C. Ace (SG, D, Pen)	—	PW25
A.C. Three (SG, D, Pen)	—	PW29
A.C. Leader (HF Pen, D, Pow) ..	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen)..	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	18.8.34	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50
"All-Wave" A.C. Three (D, 2 LF (R.C.))	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	—	PW56
Four-valve : Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	—	PW45
Universal Hall-Mark (HF, Pen, D, Push-Pull)	9.2.35	PW47
SUPERHETS.		
Battery Sets : Blueprints, 1s. each.		
£5 Superhet (Three-valve) ..	—	PW40
F. J. Camm's 2-valve Superhet (Two-valve)	13.7.35	PW52
F. J. Camm's £4 Superhet ..	—	PW58
Mains Sets : Blueprints, 1s. each.		
A.C. £5 Superhet (Three-valve) ..	—	PW43
D.C. £5 Superhet (Three-valve) ..	1.12.34	PW42
Universal £5 Superhet (Three valve)	—	PW44
F. J. Camm's A.C. £4 Superhet 4	—	PW59
F. J. Camm's Universal £4 Superhet 4	11.1.36	PW60
SHORT-WAVE SETS.		
Two-valve : Blueprint, 1s.		
Midget Short-Wave Two (D, Pen)	15.9.34	PW38A
Three-valve : Blueprints, 1s. each.		
Experimenter's Short-Wave Three (SG, D, Pow)	—	PW30A
The Prefect 3 (D, 2 LF (RC and Trans))	—	PW63
The Bandspread S.W. Three (HF Pen, D (Pen), Pen)	29.8.36	PW68
PORTABLES.		
Three-valve : Blueprint, 1s.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) ..	16.5.36	PW65
Four-valve : Blueprint, 1s.		
Featherweight Portable Four (SG, D, LF, Cl. B)	—	PW12
MISCELLANEOUS.		
S.W. Converter-Adapter (1 valve)	—	PW48A

AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.

Blueprints, 6d. each.		
Four-station Crystal Set	12.12.36	AW427
1934 Crystal Set	—	AW444
150-mile Crystal Set	—	AW450
STRAIGHT SETS. Battery Operated.		
One-valve : Blueprints, 1s. each.		
B.B.C. Special One-valver ..	—	AW387
Twenty-station Loudspeaker One-valver (Class B)	—	AW449
Two-valve : Blueprints, 1s. each.		
Melody Ranger Two (D, Trans) ..	—	AW388
Full-volume Two (SG det, Pen)	—	AW392
B.B.C. National Two with Lucerne Coil (D, Trans)	—	AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans) ..	—	AW338A
Lucerne Minor (D, Pen)	—	AW426
A Modern Two-valver	*July* '36	WM400
Three-valve : Blueprints, 1s. each.		
Class-B Three (D, Trans, Class B)	22.4.33	AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394
Home-built Coil Three (SG, D, Trans)	—	AW404
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans) ..	2.12.33	AW412
1934 Ether Searcher: Baseboard Model (SG, D, Pen)	20.1.34	AW417
1934 Ether Searcher: Chassis Model (SG, D, Pen)	—	AW419
Lucerne Ranger (SG, D, Trans)	—	AW422
Cossor Melody Maker with Lucerne Coils	—	AW423
Mullard Master Three with Lucerne Coils	—	AW424
£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans)	—	AW437
All-Britain Three (HF Pen, D, Pen)	—	AW448
"Wireless League" Three (HF Pen, D, Pen)	3.11.34	AW451
Transportable Three (SG, D, Pen)	—	WM271
£6 6s. Radiogram (D, RC, Trans)	—	WM318
Simple-tune Three (SG, D, Pen)	*June* '33	WM327
Economy-pentode Three (SG, D, Pen)	*Oct.* '33	WM337
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 3s. Three (SG, D, Trans) ..	*Mar.* '34	WM354
Iron-Core Band-pass Three (SG, D, QP 21)	*June* '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen)	—	WM371
PTP Three (Pen, D, Pen) ..	*June* '35	WM389
Certainty Three (SG, D, Pen) ..	*Sept.* '35	WM393
Minitube Three (SG, D, Trans) ..	*Oct.* '35	WM396
All-wave Winning Three (SG, D, Pen)	*Dec.* '35	WM400
Four-valve : Blueprints, 1s. 6d. each.		
65s. Four (SG, D, RC, Trans) ..	—	AW370
"A.W." Ideal Four (2 SG, D, Pen)	16.9.33	AW402
2 H.F. Four (2 SG, D, Pen) ..	—	AW421
Crusaders' A.V.C. 4 (2 HF, D, QP 21)	18.8.34	AW445
(Pentode and Class-B Outputs for above: Blueprints, 6d. each)	25.8.34	AW445A
Self-contained Four (SG, D, LF, Class B)	*Aug.* '33	WM331
Lucerne Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, 2 LF)	*Feb.* '35	WM381
The H.K. Four (HF Pen, HF Pen, D, Pen)	*Mar.* '35	WM384
The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	*April* '36	WM404
Five-valve : Blueprints, 1s. 6d. each.		
Super-quality Five (2 HF, D, RC, Trans)	*May* '33	WM329
Class-B Quadradyne (2 SG, D, LF, Class B)	*Dec.* '33	WM344
Mains Operated.		
Two-valve : Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.	—	AW403
Economy A.C. Two (D, Trans) A.C.	—	WM286
Univorn A.C./D.C. Two (D, Pen)	*Sept.* '35	WM394
Three-valve : Blueprints, 1s. each.		
Home-Lover's New All-electric Three (SG, D, Trans) A.C. ..	—	AW383
Three-valve : Blueprints, 1s. each (*contd.*).		
S.G. Three (SG, D, Pen) A.C. ..	—	AW390
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW399
A.C. Pentaquester (HF Pen, D, Pen) A.C.	23.6.34	AW439
Mantovani A.C. Three (HF, Pen, D, Pen) A.C.	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	*Jan.* '36	WM401
Four-valve : Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen) ..	*July* '33	WM326
Harris Jubilee Radiogram (HF Pen, D, LF, P)	*May* '35	WM386
SUPERHETS.		
Battery Sets : Blueprints, 1s. 6d. each.		
Modern Super Senior	—	WM375
Varsity Four	*Oct.* '35	WM395
The Request All-Waver	*June* '36	WM407
1935 Super Five Battery (Superhet)	—	WM379
Mains Sets : Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C. ..	—	AW425
Heptode Super Three A.C. ..	*May* '34	WM359
"W.M." Radiogram Super A.C. ..	—	WM366
1935 A.C. Stenode	*Apl.* '34	WM385
PORTABLES.		
Four-valve : Blueprints, 1s. 6d. each.		
Midget Class B Portable (SG, D, LF, Class B)	20.5.33	AW389
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
TWO H.F. Portable (2 SG, D, QP21)	*June* '34	WM363
Tyers Portable (SG, D, 2 Trans)	—	WM367
Five-valve: Blueprint, 1s. 6d.		
New Class-B Five (2 SG, D, LF, Class B)	*Nov.* '33	WM340
SHORT-WAVE SETS—Battery Operated.		
One-valve : Blueprints, 1s. each.		
S.W. One-valve converter (Price 6d.)	—	AW329
S.W. One-valve for America ..	—	AW429
Rome Short-Waver	—	AW452
Two-valve : Blueprints, 1s. each.		
Ultra-short Battery Two (SG det, Pen)	*Feb.* '36	WM402
Home-made Coil Two (D, Pen) ..	—	AW440
Three-valve : Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-waver (SG, D, Pen)	*Jan.* 19, '35	AW463
The Carrier Short-waver (SG, D, P.)	*July* '35	WM390
Four-valve : Blueprints, 1s. 6d. each.		
A.W. Short-wave World Beater HF, Pen, D, RC, Trans) ..	—	AW436
Empire Short-waver (SG, D, RC, Trans)	—	WM313
Standard Four-valver Short-Waver (SG, D, LF, P)	*Mar.* '35	WM383
Superhet : Blueprint, 1s. 6d.		
Simplified Short-wave Super ..	*Nov.* '35	WM397
Mains Operated.		
Two-valve : Blueprints, 1s. each.		
Two-valve Mains short-waver (D, Pen) A.C.	—	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.	—	WM368
"W.M." Long-wave Converter ..	—	WM380
Three-valve : Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C. ..	—	WM352
Four-valve : Blueprint, 1s. 6d.		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) ..	*Aug.* '35	WM391
MISCELLANEOUS.		
Enthusiast's Power Amplifier (1/6)	*June* '35	WM387
Listener's 5-watt A.C. Amplifier (1/6)	*Sept.* '35	WM392
Radio Unit (2v.) for WM392 (1/-)	*Nov.* '35	WM398
Harris Electrogram (battery amplifier) (1/-)	*Dec.* 35	WM399
De-Luxe Concert A.C. Electrogram	*Mar.* '36	WM403
New Style Short-waver Adapter (1/-)	*June* '35	WM388
Trickle Charger (6d.)	*Jan.* 5, '35	AW462
Short-wave Adapter (1/-)	*Dec.* 1, '34	AW456
Superhet Converter (1/-)	*Dec.* 1, '34	AW457
B.J.D.L.C. Short-Wave Converter (1/-)	*May* '36	WM405
Wilson Tone Master (1/-)	*June* '36	WM406
The W.M. A.C. Short-Wave Converter (1/-)	*July* '36	WM408

QUERIES and ENQUIRIES

Small Tuning Indicator

"I have a set which has been built and in use for eight months or so. This is a superhet with fully-delayed and amplified A.V.C., but has the disadvantage that no tuning indicator is fitted. The cabinet is ready drilled and the panel and so on are part and parcel of the complete installation and I do not want to carry out many structural alterations. I do feel, however, that a tuning indicator would be an immense help and should like to know which is the smallest indicator I could fit, either cathode ray or meter type. I naturally do not want to alter the circuit if possible. Perhaps you could suggest something?"—F. P. (Holsworthy).

A SMALL meter could, of course, be mounted so that only the pointer could be viewed through a small hole, and this could be made in such a position that it gave sufficient visibility to enable the pointer to indicate over the usual range of anode current of the I.F. valve. A small button neon indicator is, however, obtainable from the General Electric Company, and this is only 12½ millimetres in diameter and 27½ millimetres in length. It has a standard S.E.S. cap and could easily be mounted above your present tuning scale, with a hole drilled through the cabinet to enable it to be seen. It should be joined between the anode of the I.F. valve and earth, with a series resistance to develop the necessary voltage. Full details are supplied with the component.

Converter Details

"I have obtained Blueprint P.W.48A for the S.W. Converter, but note that no value is given on it for the aerial tuning condenser. Can you tell me the value, and also what is the best type of valve to use in the converter? Also I have the issue dated August 29th last for the Signet 2, but require the other one dated September 5th. What is the cost of the back number, and where can I get it?"—L. S. (Leicester).

THE aerial tuning condenser is the standard Polar Type E component, which has a maximum capacity of approximately .00016 mfd. The other condenser, which is a series aerial tuning component, is a B.T.S. midget component with a maximum capacity of .0001 mfd. Best results with this type of converter are obtained when a valve of the H.L. type is employed, and this may, of course, be either battery operated or a mains valve. Back numbers of this paper may be obtained from the Back Number Department at this address, price 4d. by post.

Tantalum Strip

"I am interested in the trickle charger which was described in a past issue, but cannot obtain the tantalum strip which was recommended. Can you give me the address of the makers of this?"—E. R.W. (Gateshead).

THE tantalum may be obtained, in a suitable size for the charger, from Messrs. Blackwell's Metallurgical Works, Ltd., Speke Road Works, Garston, Liverpool.

Amateur Addresses

"Can you send me the names and addresses of a few wireless amateurs in my district? I am anxious to start some transmitting, and would like to get into touch with someone to learn the principles."—S. B. (Notting Hill Gate, W.2).

RULES

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

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

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

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

The Coupon must be enclosed with every query

THE best course for you to adopt is to join a local radio club or society. In addition to meeting other amateurs, this would also enable you to examine apparatus, and at the regular meetings you could raise points and hear the discussions of other members regarding the various difficulties met with and how they are overcome. Furthermore, most clubs run practice classes at which the Morse Code may be studied and mastered. The new series of articles which we are publishing on the subject will also be of assistance to you. We cannot supply names and addresses of transmitters, but you can obtain a copy of the "Radio Amateur Callbook" from F. L. Posthlethwaite, 41, Kinfauns Road, Goodmayes, Ilford, Essex, price 6s. Your nearest club is the Radio, Physical and Television Society, 72a, North End Road, West Kensington. The secretary is Mr. M. E. Arnold, 12, Nassau Road, Barnes, S.W.13.

Testing a Rectifier

"Could you please tell me what the symptoms are in an A.C. set when the rectifying valve is nearing the end of its useful life? Also, is it possible to determine, by means of voltage or current tests, if the valve is definitely getting old."—E. T. R. (Hull).

THE symptoms generally are gradually reducing volume, and failure to obtain reaction. As these symptoms may, however, also be obtained when a resistance or condenser breaks down, the only reliable test is a current test. Include a milliammeter in the H.T. negative lead and you will then see what the anode current of the complete receiver is. To make an accurate test of the valve, rig up a valveholder and a load resistance as given by the makers. You can then apply the output from the mains transformer and measure the rectified output.

Class B

"I have modified my set and fitted a Class B output stage, but the volume is worse than before. I have been told that Class B is no good, and should like to have your opinion on this. Why do I only get such weak signals with this additional stage, especially considering that my old output valve is now driving the Class B?"—G. R. (Hendon).

THE trouble may be due to two things. Either your H.T. is unable to deliver sufficient current for the complete receiver, or the driver valve is considerably overloaded. You should bear in mind that the Class B valve will require a current supply of 30 mA or more to enable the loudest items to be dealt with, and if you include a milliammeter in the H.T. negative lead, you will see that the needle will kick right over the scale when a drum is beaten or other similar sound is received. If the H.T. battery is too small, or a small mains unit is employed, the large current will result in a decrease in H.T. voltage.

S.W. Receiver Details

"I am interested in the layout shown in your issue dated November 21st, and should like details of the size of the tuning coil former and the H.F. choke former. How many turns are there on this, and what gauge of wire is used. Also, what is the capacity of the tuning and reaction condensers? The gauge of wire is not given for the coil."—S. W. A. (Bedford).

THE receiver was fully described in our issue dated September 13th, 1935, under the title of the Simplest Short-waver. The coil is wound on a 2in. diameter cardboard tube and the grid winding (that in the centre) is of 20 gauge enamelled wire. The windings at each end are of 26 gauge enamelled wire. The H.F. choke is wound on a ¾in. glass test tube and 150 turns of 36 enamelled wire are wound on in five sections. The tuning condenser has a maximum capacity of .0005 mfd. and the reaction condenser .0003 mfd.

The coupon on page 408 must be attached to every query.

PREMIER SUPPLY STORES

Get our quotation for your Short-Wave and Television Gear

Offer the following Set Manufacturers' Brand New Surplus Goods at a Fraction of the Original Cost; all goods guaranteed perfect; carr. paid over 5/-; under 5/- postage 6d. extra. Orders under 5/- cannot be sent C.O.D.

ALL POST ORDERS TO **JUBILEE WORKS, 167, LOWER CLAPTON RD., LONDON, E.5**

CALLERS, AS USUAL, TO 20-22, HIGH ST., CLAPHAM, S.W.4 (Macaulay 2381). 'Phone: Amherst 4723 And 165 & 165a, FLEET ST., E.C.4 (Next door to Anderton's Hotel.) **Central 2833.**

MAINS VALVES

MAINS VALVES, famous Europa 4 v. A.C. types, **4/6** each. HL., L., S.G., Var.-Mu-S.G., H.F.-Pens., Var.-Mu-H.F. Pens. 1, 3 and 4-watt A.C. directly-heated output Pentodes. Full-wave rectifiers, 250 v. 50 m.a. **A.C./D.C.** types. 20-volt. .18 amp. S.G., Var.-Mu-S.G., H., HL., Power.

Following types all **5/6** each. Full-wave rectifiers, 350 v. 120 m.a. and 500 v. 120 m.a. 2½ watt indirectly heated Pentodes. Frequency Changers, Octodes and Heptodes.

BATTERY VALVES. 2 volts, H.F., L.F., **2/3.** Power, Super-Power, **2/9.** S.G., Var.-Mu-S.G., 4- or 5-pin Pentodes, H.F. Pens., V.-Mu-H.F. Pens., 5/-. Class B, **3/6.**

AMERICAN VALVES. Genuine American **HYTRON** and **TRIAD** first-grade Valves. 3 months' guarantee. All types in stock, **5/6** each. 210 and 250, **8/6** each. New Metal-Glass Valves, all types, **6/6** each. Genuine American **DUOTRON** Valves, all types, **3/6** each. Valve holders for all above types, **6d.** each. Metal bases, **9d.** each.

SHORT WAVES

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

COIL FORMERS, in finest plastic material, 1½in. low-loss ribbed, 4- or 6-pin, **1/-** each.

SUPER CERAMIC CONDENSERS, S.L.F. .00016, .0001, **2/9** each; double-spaced, .00005, .000025, .000015, **3/-** each. All brass with integral slow motion, .00015 tuning, **3/9**; .00015 reaction, **2/9.** British Radiophone 2-gang .00016, **5/6.**

H.F. CHOKES. S.W. 10-200 metres, **9d.**; S.W. screened, **1/6**; standard screened 180-2,000 metres, **1/6.**

CERAMIC S.W. VALVE HOLDERS, 4-, 5- or 7-pin. Chassis types, **6d.**; B.B. type, **8d. GLASS AERIAL INSULATORS,** 4d. each. **BEEHIVE STAND-OFF,** 6d. each. **SCREENED FLEX,** single, **3d.** yd.; twin, **4d.** yd.

PREMIER AMPLIFIER KITS

3-WATT A.C. AMPLIFIER, 2-stage, for mike or pick-up. Complete kit of parts with 3 valves, **40/-.**

7-WATT A.C./D.C. AMPLIFIER, 3-stage, high-gain, push-pull output. Complete kit of parts with 5 specially matched valves, **£4 4s.**

10-WATT 3-stage A.C. Amplifier Kit with 5 valves, **£5 5s.**

20-WATT 3-stage A.C. Amplifier Kit with 5 valves, **£8 8s.**

ELECTROLYTICS. U.S.A., 4, 8 or 12 mfd. 530 v. peak, **1/9** each. **Dubilier,** 4 or 8 mfd. 500 v., **3/-**; 50 mfd. 50 v., **1/9**; 12 mfd. 20 v., **6d.**; 25 mfd. 25 v., **1/-.** T.C.C. 4 or 8 mfd. 650 v., **4/-**; 15 mfd. 50 or 100 v., **1/-**; 50 mfd. 12 v., **1/-. Paper Condensers.** W.E., 250 v. working 4 mf., **2/-**; 2 mf. **1/-**; 1 mf. **6d.**; 350 v. working 4 mf., **2/6**; 2 mf., **1/6.**

Dubilier 500 v. working 4 mf., **4/-**; 800 v. 4 mf., **6/-.**

Wego 450 v. working 1 mf., **1/-**, 2 mf. **1/9**, 4 mf. **3/-**; 700 v. working 2 mf. **2/-**, 4 mf. **3/6.**

COSMOCORD PICK-UPS, with tonearm and volume control, **10/6** each.

PICK-UP HEADS only, **4/6** each.

MAINS TRANSFORMERS

PREMIER wire-end type with screened primaries, tapped 200-250 v. Centre-tapped Filaments. Guaranteed one year. **H.T. 8 & 9** or **H.T. 10** with 4 v. 4 a. C.T. and 4 v. 1 a. C.T., **8/6. 250-250 v. 60 m.a.,** 4 v. 1 a., 4 v. 2 a. and 4 v. 4 a., all C.T., **8/6. 350-350 v. 120 m.a.,** 4 v. 1 a., 4 v. 2 a. and 4 v. 4 a., all C.T., **10/6.** Any of these transformers with engraved panel and N.P. terminals, **1/6** extra.

500-500 v. 150 m.a., 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 3-4 a., all C.T., **17/6. AUTO-TRANSFORMERS,** step up or down, 60 watts, **7/6**; 100 watts, **10/-.** Super Model, **19/6. FILAMENT TRANSFORMERS,** Tapped Primaries, 200-250 v. All secondaries C.T. 4 v. 3 a., **7/6**; 4 v. 5 a., **8/6**; 7.5 v. 3 a., **7/6**; 6 v. 3 a., **7/6**; 2.5 v. 8 a., **7/6**; 6.3 v. 3 a., **7/6**; 5 v. 3 a., **7/6.**

SMOOTHING CHOKES, 25 m.a., **2/9**; 40 m.a., **4/-**; 60 m.a., **5/6**; 150 m.a., **10/6.** 2,500 ohms, 60 m.a. Speaker Replacement Chokes, **5/6.**

MILLIAMMETERS, moving-iron, flush 2½in., all ranges from 0-10 m.a., **5/9.** Visual tuning, 6 or 12 m.a., **5/9.** Moving-coil meters, 2½in. 0-1 m.a., **18/6**; 3½in. 0-1 m.a., **22/6.** Multipliers, **1/-** each.

AMPMETERS, all ranges, from 0-1 amp., **5/9.**

TRANSFORMERS, latest type Telsen R.G.4 (list 12/6), **2/9.** Lissen Hypernik Q.P.P. (list 12/6), **3/6.**

OUTPUT TRANSFORMERS for Power, Pentode and Push-Pull, **2/6**; Multi-Ratio, **4/6**; Push-Pull Input Transformers by prominent manufacturer, **4/6** each.

ELIMINATOR KITS for A.C. mains, 120 v. 20 m.a., or 150 v. 25 m.a., **15/-**, tapped S.G., det. and output. Complete Kit with long-life valve rectifier (replacement cost only 2/-).

PREMIER L.T. CHARGER KITS for A.C. mains, including Westinghouse Rectifiers and Tapped Mains Transformers. 8 volts at ½ amp., **14/6**; 8 volts 1 a., **17/6**; 15 volts 1 a., **19/-**; 15+15 volts 1 a., **37/6**; 15+15+15 volts 1 a., **50/-**; 8 volts 2 a., **29/6.**

TELSEN iron-cored screened coils, W.349, **4/-** each.

Electric **SOLDERING IRONS,** 200-250 v., A.C./D.C., **2/3.**

LOTUS JACKS (and Jack-switches), all types, **1/-** each. Lotus Plugs, **1/-** each.

PREMIER H.T. KITS, all with Westinghouse rectifiers; tapped transformers and adequate smoothing. All Kits absolutely complete. 120 v. 20 m.a., **20/-**; with ½ a. L.T. Charger, **28/-**. 150 v. 30 m.a., **25/-**; with ½ a. L.T. Charger, **31/6.** 250 v. 60 m.a., with 4 v. 3 a., C.T., **30/-.**

SHORT WAVE KITS

SHORT-WAVE KIT for 1-valve receiver or adaptor, complete with chassis, **4** coils, 14-150 metres, condensers, circuit and all parts, **12/6. VALVE GIVEN FREE! DE LUXE MODEL, 17/6.** SUPERHET CONVERTER KIT, **13/6. S.W. SUPERHET CONVERTER,** for A.C. Mains Receivers, **20/-.** A.C. Valve given **FREE! 2-VALVE S.W. KIT, 19/6. VALVES GIVEN FREE! 3-VALVE S.W. KIT,** S.G. Det. and Pen., **42/-. VALVES GIVEN FREE! ALL-WAVE "ALL-WORLD RANGE"** 3-valve Kit, 12-2,000 metres in 4 wavebands without coil changing, complete kit of parts with 3 valves, S.G., H.F., S.G., det, and pentode (2 volts); **50/-.** Q.P.P. Model, **6/6** extra.

BAND-PASS TUNING PACK, comprising set of Telsen 3-gang iron-cored coils with switching, mounted on steel chassis with 3-gang condenser, illuminated disc-drive and 4 valve holders. **25/- the lot.** All Mains or Battery circuit. **FREE! LISSEN ALL-WAVE COILS,** 12-2,000 metres, complete with switching and wiring diagram, **12/6.**

3-VALVE BAND-PASS KIT, 200-2,000 metres. Complete kit of parts, including chassis, all components, valves, M.C. speaker and wiring diagram. Battery Model, **50/-.** A.C. Mains Model, **70/-.**

MOVING COIL SPEAKERS

MAGNAVOX. Mains energised. 154, 7in. cone, 2,500 ohms 4 watts, **12/6**; '152,' 9in. cone, 2,500 ohms, **17/6**; 152 'Magna' 9in. cone, 2,500 ohms, 6 watts, **37/6. Magnavox** P.M.s—'154' 7in. cone, **16/6**; '252,' 9in. cone, **22/6.** Reliable P.M.s, **10/6.**

ROLA latest type P.M.s, **18/6. KB** 7in. mains energised, 1,500 or 2,500 ohms, **7/9. GOODMANS'** 8in. mains energised, 1,000 ohms field, **10/6** each.

DIALS.—Clarion Illuminated S.W. slow-motion Dial with 2in. knob, **2/-. Premier** All-Wave 2-speed Dial, full vision straight-line, dual ratios 10-1 and 150-1, **6/6,** with escutcheon.

Potentiometers by well-known makers. All values up to 1 meg., **2/-**; with switch, **2/6. GRAMOPHONE MOTORS.** Collaro Gramophone Unit consisting of A.C. motor, 100-250 v. high quality pick-up and volume control, **45/-**; Collaro motor only, **30/-**; Collaro Universal Gramophone Motor, 100-250 v. A.C./D.C., with high quality pick-up and volume control, **67/6**; Collaro Universal Motor only, **49/6**; Edison Bell double-spring motors, including turntable and all fittings, **15/-**; Cosmocord Gramo unit, comprising A.C. motor, pick-up and volume control (list 55/), **35/9.**

TUBULAR CONDENSERS, non-inductive, all values up to .5 mfd., **6d.** each.

Wire-end **RESISTORS,** any value, 1 watt, **6d.**; 4 watts, **1/-**; 8 watts, **1/6**; 15 watts, **2/-**; 25 watts, **2/6** each.

Reliable **MORSE KEYS** with Morse Code engraved on bakelite base, **2/-** each.

Bakelite case **BUZZERS,** **1/6**; Walnut case "Loud-tone," **2/6** each.

Super Quality lightweight **HEADPHONES,** **3/9** pair.

PREMIER (Reisz Pattern) Transverse-current MIKE, High Output, Straight Line Response, 30/-. Transformer, 5/-. Table Stand, 7/6.

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RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance or Secondhand, etc.

SOUTHERN RADIO'S Wireless Bargains; all goods guaranteed and sent post paid.

G.E.C. 3-valve Battery Sets, "Battery Compact Three," with 3 Osram valves, moving coil speaker in beautiful bakelite cabinet, brand new, in sealed cartons, fully guaranteed; 50/- each (list £5/10).

SPEAKERS—Celestion Soundex permanent magnet 10/-; Telsen permanent magnet, with 10-ratio transformer to suit any receiver, 12/6; Telsen loud speaker units, 2/6; all brand new and in sealed cartons.

COILS—Telsen, iron core, W349, Midget size, 4/-; Type W478 (twin), 9/- pair; W477 (triple), 16/- set; Type W476 (triple superhet selector and oscillator), 16/- set, all ganged coils complete on base with switch; Telsen I.F. transformer coils, W482, 5/-; Telsen dual range aerial coils, with aerial series condenser incorporated; W76, 4/-; Telsen aerial series condensers with shorting switch, 2/-; Telsen L.F. transformers, Type R.G.4 (4 to 1), 3/-; all brand new, in sealed cartons.

MICROPHONES—Ace (P.O.) microphones, complete with transformer, ready for use with any receiver, 4/6 each.

RESISTANCES,—Tru-ohm 1-watt, colour coded and marked, 36 assorted capacities on card; 6/- per card.

POTENTIAL Dividers.—Lissen wire wound, 3-section, 60-watt, 4,500 ohms, 3,000 ohms, and 2,000 ohms; 3-section, 5 watts, 20,000, 20,000 and 20,000 ohms; 2-section, 5 watt, 50,000 and 30,000 ohms; 1-section, 5 watt, 8,000 ohms, all at 1/3 each; brand new and guaranteed.

AMERICAN Valves.—A full range of valves for all American receivers; 6/- each.

HEADPHONES.—Lightweight headphones, double pole type, 4,000 ohms, each ear piece; 3/- pair.

REPAIRS.—Any type of receivers. American, British, etc., repaired by expert staff.

WE Have Purchased the Complete Component Stock of a Well-known Radio Dealer and Manufacturer, and we are offering the complete stock in parcel lots as under:—

5/- Parcel, containing components to the value of at least 20/-, comprising chokes, resistances, coils, switches, condensers, wire and circuits, 5/- per parcel.

10/- Parcel, containing components to value of at least 45/-, comprising variable condensers, screened chokes, switches, resistances, screened coils, wire, circuits, etc., etc.: 10/- per parcel.

ALL Articles Included in These Parcels are Brand New and Modern.

SOUTHERN RADIO.—Branches at 271-275, High Rd., Willesden Green, N.W.10; 46, Lisle St., London, W.C.2. All mail orders to 323, Euston Rd., London, N.W.1.

SOUTHERN RADIO, 323, Euston Rd., London, N.W.1 (near Warren Street Tube). 'Phone: Euston 3775.

VAUXHALL.—Polar Midget 3-gang condensers, straight or superhet, 8/9; Polar full vision, horizontal or Arcuate dial and drive, 5/-.

VAUXHALL.—Flat, sheet aluminium, hard rolled, 18 gauge, 12in. x 12in., 3/-; 18 x 18, 5/6; other sizes proportionate.

VAUXHALL.—Polar station named scales, for horizontal dials, latest settings; 1/9 each.

VAUXHALL.—Hivac valves, mains or battery, all types. Usual discounts from new prices.

VAUXHALL.—Volume controls, Erie, Colvern, Centralab, 2/-. With Switch, 3/-. 2,000 to 2 meg. Fitted knobs and terminals.

VAUXHALL.—T.C.C. electrolytic condensers, 8 mfd. and 4 mfd., 550 volt, 3/-; 500 volt, 2/6; 200 mfd., 10-volt, 2/6.

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(Continued at top of column three)

(Continued from foot of column one)

ADVERTISEMENT INDEX

Radio Games for Xmas

Some Suggestions for Using the Standard Wireless Receiver as an Accessory to Various Games

THERE are dozens of interesting party games in which the wireless receiver may be introduced. No doubt many readers have already devised ideas of their own, and the following notes give some of the lines which may be followed during the festive season in adding to the enjoyment of your guests. Firstly, it should be emphasised that any receiver, other than a simple crystal or one-valver which will not operate a loudspeaker, may be used. Secondly, if the following notes are followed, there is no risk of damage to any part of

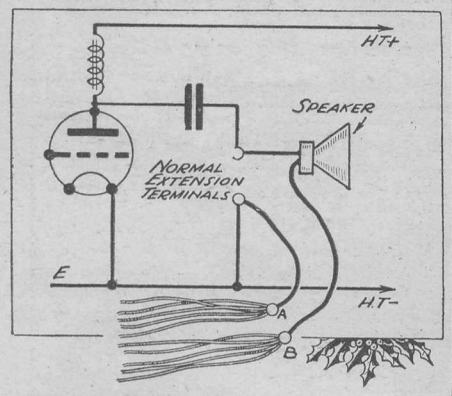

Fig. 1. How to arrange the output circuit for radio games.

the apparatus and no risk of electric shocks, even although a mains receiver is employed.

As a first essential in the employment of the ordinary receiver, an output filter circuit must be used. This is now standardised in the majority of commercial receivers, and many home-constructors, too, have fitted this in order to feed extension listening points. If one is not already fitted, the instructions given in this issue on page 357 should be followed.

Completing the Circuit

As a basis for the majority of the games in which the receiver is used, the completion of the speaker circuit may be taken as standard. Instead of two leads from the speaker point, a multiplicity of leads must be fitted as shown in Fig. 1. In some cases all of the leads on the earth side will be required, whilst in others only a single lead from this point will be employed. The simplest of games calling for no additional apparatus is a form of "Blind Man's Buff," where the players stand in a circle holding the leads from the point marked A in the diagram. Interspersed in these leads are a number of blanks or dummies. These may be any odd pieces of wire, and it is obvious that the numbers of "live" and "dead" leads may be varied according to the requirements of the game. A single lead from point B (the earth side) is then held by another player who stands in the centre of the ring and proceeds from one player to another, touching the bared end of the wire he carries against the bared end of one of the wires being held by the players. The receiver is switched on and tuned to a station, or if there is no broadcasting available, a gramophone record may be played through the pick-up. Failing the use of a pick-up, the aerial may be disconnected and the reaction control tuned up until the set howls, the removal of the aerial acting as a safeguard in the prevention of interference with other listeners who may be attempting to receive some distant station. It is true that some circuits will not radiate such oscillation into the aerial system, but the simple precaution of removing the aerial avoids the necessity of studying the circuit in order to find out whether or not it is of a suitable type. If there is a self-contained speaker in the anode-circuit of the valve this should be silenced by means of an appropriate switch, whilst if no switch is fitted, the speaker should be replaced by an iron-core choke.

Other Schemes

It will now be obvious that when the single player completes the speaker circuit by touching the wire he carried against a "live" wire (from the point A) the signal being received by the receiver, or the reaction howl or gramophone record, will immediately be heard through the speaker. A time limit may be set upon the game, and the player finding the greatest number of "live" points in that time may be declared the winner. Alternatives will suggest themselves to the reader.

An alternative arrangement employing the same system may be built up upon a piece of plywood, covered by a piece of American cloth such as may be obtained from the popular stores at a very nominal figure. That marked in squares and used for shelves is preferable and the size of the square should be just larger than a penny. The cloth may be pinned to the board by ordinary drawing-pins at the edges, and then drawing-pins should be inserted at all the square centres. Now, going round the board, holes should be pierced at various adjacent pins, and through these holes the bared ends of the leads from the extension point already referred to should be threaded. A single loop should then be placed beneath the head of the drawing-pin and it should be pressed firmly home. In Fig. 2 it will be noted that various pins are left blank, but as the wire will no doubt show and indicate to the players the correct point, short lengths of wire should be placed beneath the remaining pins to act as a misdirection. The game is played with pennies, or discs of metal of a similar size, and the board should be laid upon a table at a distance of about 3ft. from the player. The receiver is set into operation as already mentioned and

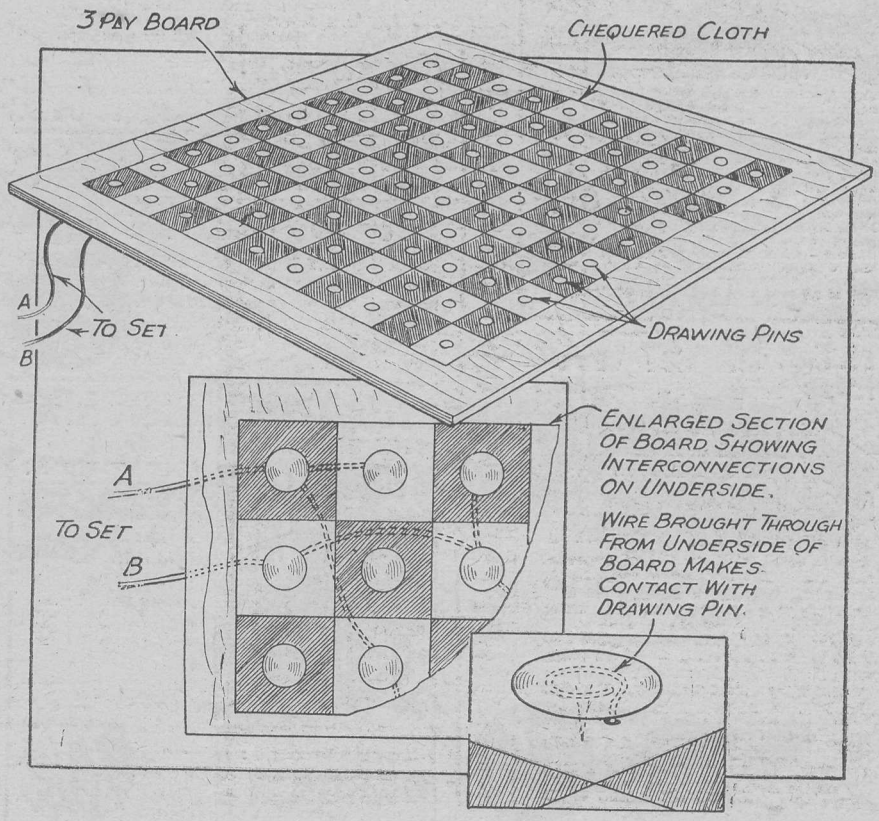

Fig. 2. An easily made electrical board which can be used with the wireless set to provide entertainment and amusement.