

Greatly Enlarged Xmas Number!

Practical and Amateur Wireless

4^D
EVERY
WEDNESDAY

Edited by F.J. CAMM

a GEORGE
NEWNES
Publication

AND PRACTICAL TELEVISION

Vol. 11. No. 272. December 4th, 1937.

MANY GRAND XMAS FEATURES

Including:

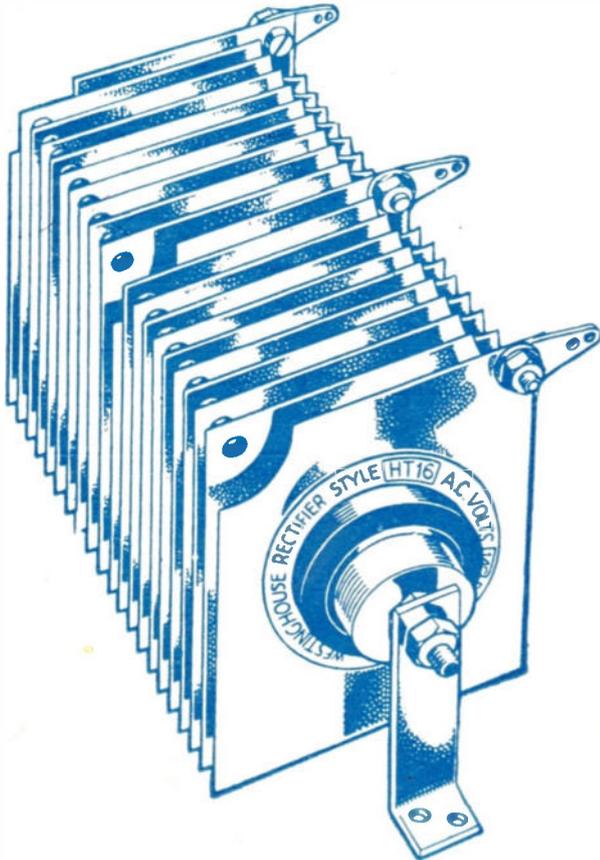
- Using Microphones and Pick-ups
- A Radio Play
- Room-to-Room Communication
- Extension Loudspeakers
- Xmas Presents
- Radiograms and Records
- Etc., Etc.



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1947



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BUILD THE D—XMASTER—See Page 319

Practical and Amateur Wireless

Round

Greetings!

IT is the custom for Christmas numbers to be published somewhat in advance of the actual week in which the festival is celebrated, and thus we present this week our greatly enlarged number designed for Christmas consumption. To all our readers we wish to convey the Compliments of the Season and our very best wishes for an enjoyable Christmas. To signalise the event, we present numerous articles of interest, together with a play which may be produced to enliven the proceedings and to make the party spirit all the more enjoyable. In addition, there are full constructional details for two broadcast receivers and a room-to-room communication set which will be found of great interest and value. Among the general articles are those dealing with the use of microphones and pick-ups, Broadcasting Your Own Play, and the usual regular features, such as Wrinkles from Readers, Practical Television, Short-wave Section, and so on. To all those who have been readers from No. 1, as well as to all new readers, we again repeat, a Merry Christmas.

Police Radio

ANOTHER proof of the value of radio to the police authorities has been given in the London area where a wanted man was reported to own a Rolls-Bentley car, and a police broadcast was made to this effect. Ten minutes later officers in a patrol car saw the car and stopped it. As a result the wanted man was arrested.

Television by Wire

THE news recently published concerning German wired-television tests has been eclipsed by British engineers. During some recent experiments it was found possible to transmit and receive good pictures over 400 miles of land line, and a much higher definition was employed than in the German system.

Philips Broadcast, 1938

THIS film which, as has already been mentioned in these pages, has been circulated throughout the country will, when the present series of bookings finishes, be released for retailers who wish to make their own arrangements for having it shown locally. The film is available free, on loan, from December 6th onwards.

Christmas Packing

IT is announced that the novel Pye Baby Q Portable is now available in a special Christmas packing, with labels

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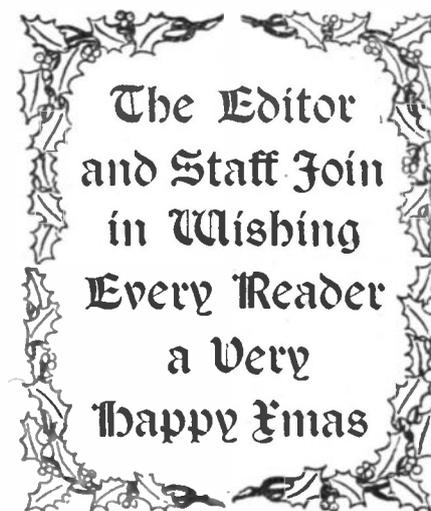
Technical Staff:
W. J. Deane, H. J. Barton Chapple, Wh.Sch.
B.Sc., A.M.I.E.E., Frank Preston.
Vol. XI. No. 272. December 4th, 1937.

the World of

ready to despatch. A slogan "Here's to a Happy Christmas" is affixed and the general colour scheme of the whole presentation blends easily with the usual holly (green and red) motif of window and other decorations.

World Radio Convention

A WORLD Radio Convention is to be held in Sydney, N.S.W. from April 4th to 14th, 1938. A cordial invitation



is extended on behalf of the Institution of Radio Engineers to all visitors to Australia during the Celebration period, which commences on January 26th and concludes on April 25th, 1938.

More Electric Wiring

IT is announced, as a result of a recent survey, that owing to the increasing demand for electric-mains-operated radio receivers, more homes are being wired for the electric supply. There is thus a general improvement in domestic lighting as well as in the use of other useful electrical apparatus, which has resulted from the use of radio equipment.

Wireless

Note These Changes

AS a result of the introduction of a new Melnik transmitter to be called Praha 11, the wavelength of Moravska Ostrava will be changed to 249.2 metres—1,204 kc/s, and Praha 11 will transmit on the former wavelength of Moravska Ostrava, namely 269.5 metres—1,113 kc/s. The changes will be made early this month, as soon as the new transmitter is completed.

Telepathy Tests

TO endeavour to prove whether or not telepathy can be carried out through radio, the National Broadcasting Company of New York recently carried out some tests in conjunction with several of America's leading scientists. A colour selection was employed, and the results given by listeners were stated to be approximately one-third above the mathematical laws of chance in the point of correctness.

New Variety Feature

A NEW weekly variety feature is to be added to the list of B.B.C. programmes shortly to start. This is to be called "Band Waggon," and will have an experimental run of about six weeks. John Watt, B.B.C. Director of Variety, will then decide whether its success warrants its continuation. The feature is to be based upon the dance band and will be produced by Gordon Crier. Arthur Askey is to be resident comedian. An important feature of this item is that it is hoped to find room in it for artists who have never before had a chance of broadcasting though they have passed a B.B.C. audition. The B.B.C. announce that they hope to use three of such people in each programme, and it will run for 45 minutes.

Xmas Presents Appeal

ON December 6th, an appeal is to be made in the Midland Children's Hour for presents for Christmas for poor children. The appellant is Binnie Hale, who is to be the principal attraction at Emile Littler's Prince of Wales Theatre pantomime in Birmingham this season.

Effects of Broadcasting?

THE manufacturers of musical instruments are reporting increasing sales. Does this indicate that the effects of broadcast music are such that more people are now becoming interested in performing on various instruments and are thus taking up a musical profession?

ROUND the WORLD of WIRELESS (Continued)

Broadcasts from Cinemas

MANY listeners will welcome an arrangement which has been made between the B.B.C. and cinema managers, as a result of which more variety turns are to be broadcast from cinemas. It means that artistes of the first rank will be heard more often. The first broadcast under the new scheme was given on November 25th from a Clapham cinema, and others will be given on December 14th, and on December 20th. In the New Year relays of variety programmes from cinemas are likely to become a regular feature.

"Serenade in the Night"

WHILE working in the Mitcham district recently, B.B.C. engineers picked up that haunting melody, "Serenade in the Night." They traced the broadcast to the house of a young amateur who was playing the record on his unlicensed transmitter. The magistrate fined the offender 40s. and told him he must get his licence. The moral is obvious.

Japan's School Radio

MISS MARY SOMERVILLE, B.B.C. director of school broadcasts, who recently returned from a world tour, was greatly impressed by the general attitude towards children in Japan. According to Miss Somerville, Japan offers children greater educational resources than we do in this country, and she would like to see experiments on Japanese lines of broadcasts to infant schools.

Red Indians on the Air—

ACCORDING to a recent report, talks by Red Indian chiefs are to be a feature for Canadian radio listeners in the near future.

Extending Television!

IT was stated recently by the Assistant Postmaster-General that further experience of the working of the London television station will be necessary before the Advisory Committee, presided over by Lord Selsdon, can make definite recommendations for the establishment of other stations for providing a television service in other areas.

Variety from Carlisle and Leeds

IN the Northern programme on December 8th "Northern Music Hall" will bring a variety relay from Her Majesty's Theatre, Carlisle, and "Northern Concert Party on Tour"—an excerpt from the Arcadian Follies' show at the Grand Theatre, Leeds, a playhouse which has not been on the air for some time. The theatre has indeed a "grand" style—it was constructed in the eighteen-seventies on similar lines to the famous Opera House at Milan. It has twenty-two boxes and altogether can accommodate over 2,000 people. Wilson Barrett was the first lessee.

INTERESTING and TOPICAL NEWS and NOTES



THE CRAZY GANG from the London Palladium—stars of the recent Command Performance—are all proud owners of Pilot receivers in their homes. Here they are seen in their dressing-room listening intently to a Pilot Model CU-535.

India's New Short-wave Stations

IT is anticipated that the first of the new 10 kW short-wave stations for India, which is to be installed at Delhi, will be operating by the end of the year. The transmitter for the new Bombay station is being installed during the present month. The new equipment, which embodies the latest developments in broadcasting technique, will provide India with the nucleus of a highly efficient broadcasting system.

In Remembrance of Marconi

IT is reported that at the instigation of Signor Mussolini the Italian Government has made the birthday of the late Marchese Marconi a National Memorial Day.

Our Village: Getting Ready for Christmas

STANWELLSTEAD folk are going ahead with their Christmas preparations, and on December 2nd listeners will hear about winter flowers, the making of Christmas gifts, lace-making, glove-making, and similar home industries.

Coast Radio Pioneer

SIR CHARLES BRIGHT, pioneer of coast wireless stations and radio in aircraft, died recently at his home at Bishop's Stortford. He was seventy-three years old.

Military Band and Vocalist

HAYDN HEARD will conduct the Birmingham Military Band, which he founded about a year ago, in a popular programme on December 8th. The vocalist will be Frances Fox,

the blind soprano from the Black Country; she was first in the Midlands in the Gaumont Golden Voice contest.

Theme Song

FAMOUS songs from famous films will be presented on December 2nd by the B.B.C. Welsh Orchestra (Variety Section) and a revue chorus conducted by Mansel Thomas. The programme has been devised by Mai Jones, and it will be produced and presented by Glyn Jones, whose programmes, "When Day Is Done" and "By Firelight," have become very popular. The soloists will be Elsie Eaves, Teifion Williams and Morgan Davies.

Broadcast from a Submarine

IT is reported that voice signals have been successfully broadcast direct from a submerged submarine for the first time by radio engineers in Connecticut, U.S.A. The signals, transmitted from a submarine submerged off Bartlett Reef Light, were picked up ten miles away at the naval submarine base at New London. Hitherto, broadcasts from submarines have been made over a waterproof cable line to a short-wave transmitter on the surface.

SOLVE THIS!

PROBLEM No. 272.

Nicholls constructed an A.C./D.C. set of the H.F. Detector, Pentode type, connecting the valve heaters in series, with the H.F. valve joined to the negative mains lead. Reception could not be obtained until the aerial lead was connected to the cap of the H.F. valve. The H.F. valve was tested and found to be in order; the correct voltage was applied to its anode, but it did not pass any heater current. Where was the fault? Three books will be awarded for the first three correct solutions opened. Solutions should be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Envelopes must be marked Problem No. 272 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, December 6th, 1937.

Solution to Problem No. 271.

The dropping resistance had been chosen to pass .1 amp. to suit the original valves. When a .2 amp. pentode was used in the output stage, the current passed through the filament of this valve was too low. The following three readers successfully solved Problem No. 270, and books are accordingly being forwarded to them: R. B. Warr, 342, Yardley Wood Road, Moseley, Birmingham; J. Richards, 25, Kings Place, Buckhurst Hill, Essex; J. Munday, 3, Paston Place, Kempton, Brighton.

Constructing the D-Xmaster

A Simple Three-valve Receiver for the Medium and Long-wave Bands Only

OUR recent all-wave designs have aroused tremendous interest amongst home-constructors, but there are still many who do not require short-wave reception. In some cases this is due to a prejudice concerning the results which are obtainable, and in others the listener is already using a standard short-wave receiver. To those in the first category,

may be unable to hear even a trace of the signals.

The Circuit

The first consideration in designing a receiver for what might be termed "all-round" results, is a good H.F. stage. There are several types of valve available for this type of amplification, and a modern H.F. pentode, using the variable-mu principle will, if incorporated in a suitable circuit, give stable results and the volume may be controlled smoothly over the complete

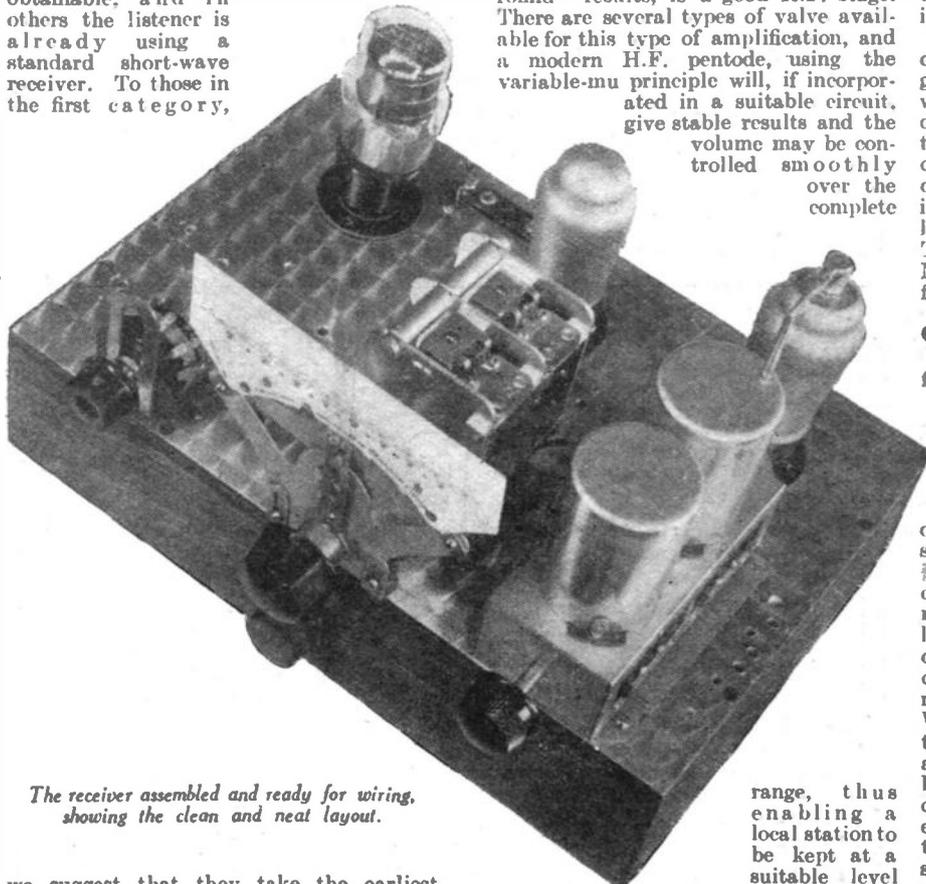
range, thus enabling a local station to be kept at a suitable level whilst enabling a distant station to be given the maximum amplification before passage to the output stages. A reacting grid-leak detector will provide a further stage in control, the reaction if carefully adjusted giving a very valuable build-up in signal strength. For the output stage a modern tetrode is also

high amplification with a low input voltage requirement. Thus in the receiver now to be described we find this combination of three valves, the coupling between the first two being carried out by means of an H.F. transformer and between the detector and the output stage a good L.F. transformer is employed. For tuning, a modern dual-gang screened coil assembly is utilised, and a standard two-gang condenser is employed in conjunction with them. The remaining incidental details of the circuit may be gathered from the theoretical diagram and wiring diagrams on page 320, show the layout and disposition of the components on the chassis, which is of the ordinary wooden type having a layer of aluminium on the upper surface. This may be obtained from the makers, Messrs. Peto-Scott, with the necessary holes for the valveholders ready drilled.

Constructional Details

If the chassis is obtained undrilled, the first procedure is to drill the large holes for the valveholders, and these are 1 in. in diameter. An ordinary wood- or centre-bit should be employed for these, and the marker should be allowed to penetrate the aluminium carefully until the wood is reached, when the chassis may be turned over and the hole completed from the underside. In the front runner of the chassis a 3/16 in. hole is drilled for the reaction condenser, but the one-hole mounting bush may be found too short to permit of the lock-nut being given a good grip. Consequently, a good idea is to mark the position of this hole, which is in the centre of the runner, and then to drill a 3/16 in. pilot hole. With a 3/16 in. or 1/8 in. bit drill from the front through about three layers of the plywood, and then complete the hole with the 3/16 in. bit from the back. This will leave a recess on the front in which the lock-nut may be embedded. On the rear runner of the chassis two slots should be made for the terminal socket strips. Alternatively four 3/16 in. holes may be drilled into which the sockets may be passed. Eleven holes will also be needed on the top of the chassis through which connecting leads pass, and these may all be 3/16 in. or 1/8 in. in diameter. When making these holes a very good plan is to drill them first, and then with a large twist bit, say 3/16 in. or 1/8 in., to countersink the aluminium

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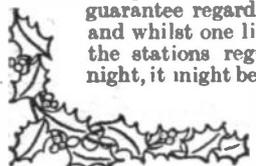
The receiver assembled and ready for wiring, showing the clean and neat layout.

we suggest that they take the earliest opportunity of hearing a really good short-wave or all-wave receiver working under favourable conditions, when we are certain they will find that the short wavebands add a very high standard of entertainment to that which is obtained on the usual broadcast bands. However, the present set has been designed for those who are anxious to have a really high-class broadcast band receiver, which may be relied upon to give a fair number of stations at really good quality, not only from this country but from abroad. It should be borne in mind that it is not essential to use a short-wave receiver in order to hear the American broadcast stations. On the medium-wave band there are several high-powered American stations which may be received during the evening or in the early hours of the morning. As with the short-wave stations, however, it is not possible to give any definite guarantee regarding these stations, and whilst one listener may receive the stations regularly, night after night, it might be found in the same neighbourhood that another listener with the same receiver

range, thus enabling a local station to be kept at a suitable level whilst enabling a distant station to be given the maximum amplification before passage to the output stages. A reacting grid-leak detector will provide a further stage in control, the reaction if carefully adjusted giving a very valuable build-up in signal strength. For the output stage a modern tetrode is also hard to beat, having the advantages of

COMPONENTS FOR THE D-XMASTER

	s.	d.
One 2-gang coil unit—type BP114 (Varley)	13	6
One 2-gang condenser .0005 mfd. (C1, C2)—Bar type (J.B.)	12	0
One slow-motion drive—No. 2134 (J.B.)	5	9
Five fixed condensers: one 2 mfd. (C8), type BB; one .5 mfd. (C5), one .0005 mfd. (C4), one .0001 mfd. (C6), one .005 mfd. (C7)—type tubular (Dubilier)	8	6
Two fixed resistances: one 1 meg. (R2), one 500,000 ohms. (R1)—type F1 (Dubilier)	1	0
One volume control, 50,000 ohms with 3-point switch (R3)—type VM60 (Bulgin)	5	6
One reaction condenser, .0002 mfd. (C3), No. N23 (Bulgin)	3	0
One all-wave H.F. choke—type HF15 (Bulgin)	5	0
One L.F. transformer 3/1 (B.T.S.)	4	6
One component bracket (Peto-Scott)	0	4
Three valveholders: one 5-pin, two 4-pin—chassis mounting type (Clix)	2	1
Six plugs: H.T.—, H.T.1, H.T.2, G.B.—, G.B.—1, G.B.—2 (Clix)	1	0
Two spades: L.T.—, L.T.—+ (Clix)	0	4
One 100 mA fuse with holder (Microfuse)	1	6
Two socket strips: A.E. and L.S. (Clix)	1	0
One Plymax chassis, 12in. by 8in. by 2 1/2in. (Peto-Scott)	6	0
Three valves: VP215, D210, Y220 (Flivac)		
One P.M. speaker—Stentorian Junior (W.B.)		
120 volt H.T. battery (Drydex)		
9 volt G.B. battery (Drydex)		
2 volt L.T. accumulator (Exide)		



The Amateur Set Designer

The Fundamental Principles of A.V.C. are Dealt With in this Thirteenth Article of the Series

(Continued from page 294, November 27th issue)

THE amateur who has no ganging oscillator should endeavour to enlist the aid of somebody who has got one; otherwise, patience will probably be exhausted before that one and only combination of trimmer and padder settings which will be satisfactory is at last obtained. While on the subject of testing gear it is well to note that a very low reading milliammeter can be used to make a check upon the oscillator's conditions of working.

this minimum will tend to cause overloading and bad distortion. To rely on the manually operated volume control to overcome this trouble is not desirable, particularly in view of the fact that a fast run up and down the scale through a large number of signals is a common event when programme searching is the object. With A.V.C. in action, however, the tendency for overloading can be corrected automatically.

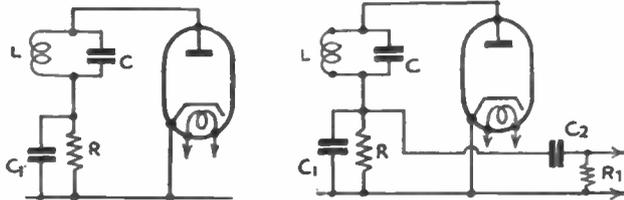


Fig. 61 (left).—Fundamental detector circuit.

Fig. 62 (right).—The same circuit with the addition of L.F. components, C2 and R1.

Referring to Fig. 53, it should be appreciated that if the frequency changer is being used with the correct operating voltages and if the locally generated oscillations have the correct amplitude, then, appropriate to these conditions, there must be a certain particular value of rectified D.C. passing through the oscillator's grid leak. To insert a milliammeter at the lower end of the grid leak will not interfere with the generation of oscillations, and the comparison between the milliammeter reading and the correct current value specified for the valve may be valuable. A sensitive milliammeter is required because the current will be well below 1 mA. Should it be discovered, by any chance, that the oscillating amplitude is considerably greater than optimum it may not be necessary to condemn the oscillator coil assembly, nor to modify its construction. Some trial and error experimenting with resistance shunts across the reaction winding may lead to an improvement.

Where A.V.C. arrangements are concerned the receiver circuit diagram must appear to a beginner to be greatly complicated. Actually the complications are more apparent than real. For the amateur set designer there is one pleasing feature of plain (and delayed) A.V.C. The whole A.V.C. system comprises a valve plus a resistance-capacity network, and the latter lends itself admirably to experimenting with the minimum of inconvenience. The amateur will usually be advised to rely on

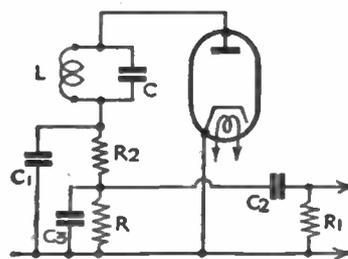


Fig. 63.—In this circuit an H.F. filter has been added.

receiver will increase for weak signals and decrease for strong signals, and it will be obvious that any fluctuation of carrier amplitude will be, at least partly, counteracted by the changes of receiver sensitivity.

The functions of signal detector and A.V.C. detector can be combined in one single diode valve if the A.V.C. system is of the simple non-delayed type, and although this system has a sufficiently bad disadvantage to make it of little interest from the practical utility point of view; nevertheless it is worth consideration as a means of getting clear ideas of the basis of A.V.C. circuit make-up. Figs. 61, 62, 63 and 64 show, progressively, the development of a simple non-delayed A.V.C. system.

Fig. 61 shows the fundamental detection circuit. LC is the tuned input circuit (the last I.F. secondary in the case of a superhet). R is the load resistance and C1 is the H.F. by-pass condenser typical of a detector circuit. The L.F. component of the fluctuation of voltage that takes place across R we need for the operation of the valve that follows the detector and Fig. 62 shows the addition of a connection from the high potential end of R and another condenser and resistance, C2 and R1. The latter form the grid condenser and leak, respectively, of the L.F. valve (not shown in the diagram). If desired, R could be of potentiometer form, with C2 connected to the slider, and this arrangement would very conveniently provide manual volume control.

As Fig. 62 stands there is no special provision for keeping H.F. out of the L.F. section of the receiver. C1 certainly helps, but it will not normally be satisfactory to rely on C1 only. Fig. 63 shows a possible modification of Fig. 62, a resistance-capacity H.F. filter R2C3, being added to the circuit. There are a number of ways, differing in detail, in which H.F. filtering could be provided. A filter of more elaborate type than R2C3 might be used; also the filter components might be shifted to come between R and C2 (Fig. 63) instead of being between the LC circuit and R.

Automatic Biasing Voltage

Now comes the question of getting hold

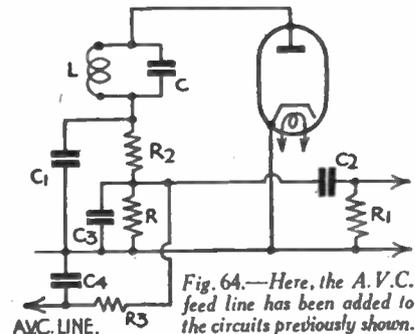


Fig. 64.—Here, the A.V.C. feed line has been added to the circuits previously shown.

Automatic Volume Control

There are two points of view regarding the usefulness of A.V.C. which does definitely minimise the effects of signal fading, and it is the "no fading" ideal which appeals to the average non-technical person. The latter, however, is rather apt to expect too much from an A.V.C. system, and does not take too kindly to rising background noise, and distortion that may occur during a deep fade.

The set designer will look upon the prevention of overloading of the output stage as being at least of equal importance to that of the minimising of fading. This point merits our consideration. A receiver to be really satisfactory for distant reception must be capable of giving full output from the last stage on other than local signals. To give full output will require a signal input of a certain minimum amplitude so it necessarily follows that signals exceeding

trial results in preference to calculations based (quite possibly) on incomplete data. It is necessary, however, to have a very clear idea of the functions of the various sections of an A.V.C. system

Fundamental Principles

The fundamental principle of A.V.C. is as follows: A direct voltage is developed by a diode detecting valve, and this voltage is applied as grid bias to one or more of the valves preceding the detector. The A.V.C. valve is, of course, signal operated, and the A.V.C. bias fed back to the earlier valves will be dependent upon the signal amplitude; the stronger the signal the greater will be the bias, the weaker the signal the less will be the bias. Thus the sensitivity of the

of the automatic biasing voltage that we want for the purpose of controlling the earlier valves. A diode detector under the action of modulated H.F. signals passes through the load resistance a direct current the value of which has an L.F. component of variation. This, as we know, we need for the succeeding valves, although we do not want to pass it back to the earlier valves. The mean value of the D.C. in the load resistance will be dependent upon the signal carrier amplitude and corresponding to this mean D.C. value there will be a (direct) voltage drop across the load resistance. It is this particular voltage that constitutes the control bias, a fact which suggests at once that we should take

(Continued on next page)

THE AMATEUR SET DESIGNER

(Continued from previous page.)

a connection from the top of R (Fig. 62) back to the grid circuits of the controlled valves. Filtering will be necessary as it is a direct voltage that we want to pick out and one that does not contain a signal modulation fluctuation. Fig. 64 shows the A.V.C. voltage line connected to R via the filter R3 C4. The latter can be regarded in the light of grid decoupling as well as A.V.C. filtering.

The disadvantage of simple non-delayed A.V.C. is that some degree of A.V.C. bias comes into operation immediately any signal is received. When very distant transmissions are to be received, the maximum of sensitivity will be required, but the receiver cannot give full sensitivity if the H.F. valves are being biased back. What is desirable is that the A.V.C. system should be out of action for signals below a certain amplitude, and then come into play directly this amplitude is exceeded. In other words, there is much to be said for "delayed A.V.C."

As the A.V.C. voltage is dependent upon the carrier amplitude of the oscillations applied to the detector it follows that a large A.V.C. bias necessitates a large signal input. As a consequence, it is not worth while attempting to incorporate A.V.C. unless the receiver has adequate H.F. amplification. It can be taken as a reasonable rule that A.V.C. should be regarded as a proposition only when there are at least two valves in front of the detector.

It should, of course, be understood that the valves which are controlled by the A.V.C. bias must be of variable-mu characteristics.

Delayed A.V.C. with the Double-diode Valve

Having dealt with the fundamental principle of A.V.C., we will get down to closer details of practical circuits. The fact that modifications and adjustments can quite conveniently be made while the receiver is "on the stocks," makes it important that the amateur designer should understand the problems that may be met, and should know the possibilities of correcting any defects of operation that may show up on first test.

With a delayed A.V.C. system the A.V.C. action does not commence until a certain minimum signal amplitude is reached. The principle upon which the delay effect is introduced is very simple. A diode detector does not become conductive until its anode potential is made positive with reference to its filament (or cathode), so that, if the anode is biased negatively, the valve will remain non-conductive even under the application of an alternating e.m.f., provided that the peak value of the latter is less than the bias voltage. Once the alternating voltage reaches a peak value exceeding the bias voltage, then the valve will commence to rectify. Thus negative bias will give us the "delay" voltage which will keep the diode out of action until such time as the signal input reaches the bias value.

It is obviously out of the question to try this method with the main detector of the receiver, so it will be necessary now to have two diodes, one for the normal signal rectification, and the other for the A.V.C. action, the latter being biased to give the required delay.

Two separate valves and valveholders will not be necessary, for it is to meet

such a case as this that the valve manufacturers have given us the range of double-diode valves. A double-diode valve contains two separate anodes with a common cathode (or filament), all being in the one bulb. As far as the action is concerned, however, we can regard the valve as providing us with two separate detectors. This raises the first problem—that of feeding two detectors from the last H.F. (or I.F.) valve. Obviously we cannot just parallel the two diode anodes; remember that the A.V.C. diode will be negatively biased while the signal diode will have no bias.

The two anodes can be fed from the same point of the last H.F. circuit, provided that a blocking condenser is inserted in the lead to the A.V.C. anode (See Fig. 65). With this condenser in use we can bias the A.V.C. diode without adversely affecting the signal diode.

It may seem logical to feed the two detectors from the same H.F. point, and this arrangement is often used, but the question as to whether it will always prove to be the best arrangement deserves consideration. Imagine that a strong broadcast signal is tuned in, and that it is then desired to tune over to another station. As the receiver tuning passes off the carrier

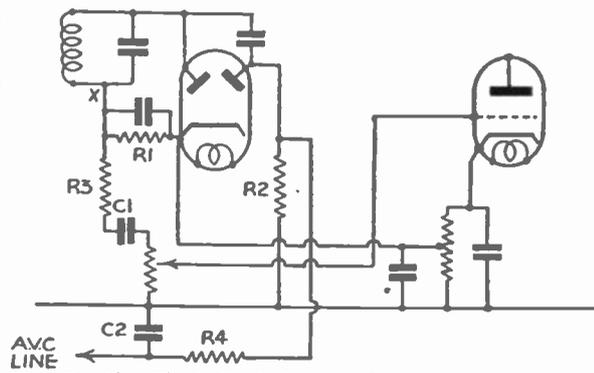


Fig. 65.—The double-diode circuit showing the method of obtaining A.V.C.

frequency of the signal the H.F. amplitude will fall and the sensitivity of the receiver will rise. The extent of the first decrease of A.V.C. bias will depend upon the characteristics of the A.V.C. system as a whole, but as soon as the H.F. amplitude gets down to the delay voltage the receiver will be up to full sensitivity. There is the possibility that when tuning away from a strong station the sensitivity of the receiver may rise so quickly that when the tuning is on the outer sideband frequencies, there may be decidedly unpleasant amplification of the latter. Obviously, the greater the A.V.C. delay voltage the earlier will the receiver come into full sensitivity (with reduction of H.F. amplitude), so the problem we are considering may be anticipated as being most likely to arise when high delay is used.

If, when tuning away from a signal carrier, the H.F. voltage applied to the A.V.C. detector could be made to fall away less rapidly than the input to the signal detector, the effect described above would, naturally, be lessened, and such a condition may not be impossible to bring about. In the case of the last I.F. transformer or a superhet transformer we are mainly interested, from the selectivity point of view, with the H.F. characteristic as shown at the secondary terminals (allowing, of course, for the influence of the primary) and we are not usually very concerned with the H.F. response characteristic of the primary itself (allowing for the influence of the secondary). Now, there is every

possibility that the characteristic of the primary may be "flatter" than that of the secondary. If there happens to be a marked difference between the two circuits in this respect then it will probably be worth while to connect the A.V.C. diode coupling condenser, not to the I.F. secondary, but to the primary instead. This is an easy test to make. Try the A.V.C. coupling condenser connected first from A.V.C. diode anode to signal diode anode and, secondly, from A.V.C. diode anode to the anode of the last I.F. valve. Make due allowance, by the way, for the trimming needing a slight adjustment. The value of the A.V.C. diode coupling condenser is normally of the order of .0001 mfd.

Since two diode detectors are in action, it follows that two separate load resistances will be required. The L.F. signal voltage for the next valve will be picked up from the load resistance associated with the signal detector, while the "controlled" valves will derive their automatic bias voltage from the load resistance associated with the A.V.C. detector. In Fig. 65, R1 is the signal diode load resistance while R2 is the A.V.C. diode load resistance. The possibility of using the signal diode load resistance as a manual volume control potentiometer has already been mentioned. There is the alternative of making the grid leak of the next valve act as the volume control potentiometer, and this arrangement is illustrated in Fig. 65. C1 is the coupling condenser, and the usual run of values for this range from .01 mfd. to 0.1 mfd.

Arranging the Delay

The first question is that of a suitable value for the delay voltage. If it is made too great, then a certain range of signal input amplitudes will be able to cause overloading. On the other hand, if the delay voltage is too small, there will be a certain range of signal amplitudes for which the sensitivity of the receiver will be less than it ought to be. Considering an increasing input signal amplitude, it should be obvious that the A.V.C. detector should be in operation as soon as the output stage becomes fully loaded. Thus, the minimum signal amplitude which, applied to the signal detector, will give full output from the receiver could be taken as the required value for the delay voltage. The greater the degree of L.F. amplification between the detector and the output stage, the smaller will be the signal input amplitude which will give full output. As a consequence, high delay voltages are usually associated with receivers having only low amplification after the detector.

There is no need for the amateur designer to trouble over the matter of deciding upon the correct value for the delay voltage. Different values of delay are quite easy to try out when the receiver is undergoing test adjustments.

The designer can exercise his mind over a number of alternatives when it comes to deciding how the delay voltage for the A.V.C. detector can be introduced. Incidentally, it is because of these and other alternatives associated with the details of A.V.C. that such a host of different A.V.C. circuit diagrams can be drawn.

(To be continued)



Battisin Belfry is At Large Again!
 Here are Some More of His
 Rollicking Wrinkles which are
 Guaranteed to Disorganise Your
 Christmas

By ARTHUR ASHDOWN

BATTISIN BELFRY 'phoned me and I shuddered with anticipatory delight. "I would like you," he cooed (with a touch of the iron hand in the velvet glove concealed in his voice), "to come along to my laboratory and inspect some of my Christmas radio inventions on which I have been working during the past year."

When I say that I shuddered at this invitation I mean that I shuddered!

It is not possible to come into contact with this radio prodigy without peculiarly mixed feelings of horror, pleasure and terror—together with a pain in the stomach! The more advanced technicians of the radio world accept this youthful genius and it is only a question of time before he is universally certified. Undaunted by the sneers of derision which have greeted his epic radio inventions (such as the "Santa Trap" and the "Bon-

siren screamed mournfully in the innermost gloom of the building, and the front door swung noiselessly open with a gruff creak. I braced my nerves, injected morphia, and entered.

Enshrouded in gloom I waited for twenty minutes, and eventually the figure of a faithful retainer appeared, neatly encased in a suit of ebonite armour.

"Have you a disappointment?" he asked, with a query in his voice.

"I am a friend of Master Battisin's," I answered with nonchalance, and caught sight of a derisive sneer behind the insulated visor.

"Come that way," he tittered, pointing downwards. Escorting me up the spiral staircase he brought me face to face with an iron-studded door which swung open outwards.

"A visitor to see you, Master Belfry," he announced in a very "B.B.C.-faithful-retainer" voice. The door clanged behind me and I was alone in the presence. Battisin rushed at me with a frenzied charge.

"Come, my friend, make yourself at home," he said, pulling up two deep arm-chairs by the refrigerator and sighing contentedly.

"Thank you very much," I answered, carefully stepping over a retort tube containing white mice.

"And now for my inventions," said Battisin. "You must be all agog!"

"Agog" is the word," I echoed, playing for time.

"I have not been idle during the past year for nothing," he continued. "I have worked without remission of toil and—although I say it myself as shouldn't—I have triumphed!"

His eyes gleamed and glowed, his nostrils quivered and quaked, his ears flipped and flapped as his mouth gibbered and gabbered. For hours he talked of his beloved inventions, whilst I made rapid notes on the front of my dress shirt. As his story of progress developed before my ears, my senses numbed with the overwhelming calamity of the situation. It would be useless for me to try to relate his descriptions as they tormented from his lips, but I can at least try to outline for you a few of his radio activities. I have considered the best way of carrying out this almost

superhuman task, and, after much deliberation, I have decided that the "Becton" method is most suitable.

Recipe No. 1.

First-rate Aid for Carol Singers.

Ingredients: 1 powerful radio receiver, 1 aerial, 1 earth wire, 6 loudspeakers, 1 hand-barrow.

Arrange the receiver on the hand-barrow, connect the aerial, earth and loudspeakers. Camouflage with holly, etc. Push the barrow into the street and group the singers around. Tune in to the station which is broadcasting carols and induce the singers to open and shut their mouths at irregular intervals.

Result: It looks just as if the people are singing the carols.

Recipe No. 2. Carol Singer's First Aid.

Ingredients: 1 powerful amplifier, 7 loud-output speakers, 6 microphones, 1 hand-barrow.

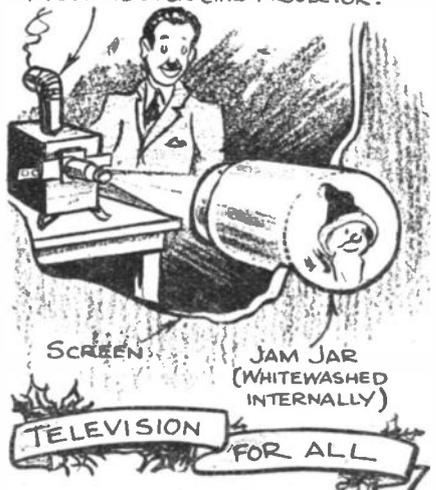
Local inhabitants sometime become annoyed with carol singers. If things become too hot, the singers should switch on the amplifier and bawl, "Help" into the microphones. Result: Police and ambulances arrive.

Recipe No. 3. The Crooner Choke.

Ingredients: 24 chokes, 19 bits of wire, 1 switch, 1 piece of flex, 1 piece of wood.

Fix the chokes to the wood, connect in series and incorporate the switch. This

MAGIC LANTERN OR CINE-PROJECTOR.



bon Buster"), he ploughs his lonely furrow in the plebeian field of unenlightened radiology. (Given his head he will go far—as I said—"given his head!")

A dreary November wind was swirling the late autumnal fog in and out of the nooks and crannies of the countryside as I drove up to his (private) house on the outskirts of the Peak district. Alighting from the van which had been sent to collect me at the station, I mounted the steps and pulled the bell handle marked "Push." A shrill

choke unit should be wired to the input terminals of the radio receiver. When the dance band programme is in progress and a member of the party says, "I would like to choke that crooner," switch in the unit. Result: The crooner is choked.

Recipe No. 4. The Talking Turkey.

Ingredients: 1 turkey, 1 midget loud-speaker, 1 length of flex.

(Continued overleaf)

(Continued from previous page)

This recipe, although in lighter vein, justifies inclusion through sheer ingenuity. Place the loudspeaker in the turkey and connect to the radio receiver. When the party is assembled around the table, switch on the radio. The programme will be heard coming from the bird. It is much more amusing if the transmission selected is a



Turkish one. Everyone will think that they are suffering from delirium tremens. Result: A great economy in alcoholic drinks.

Recipe No. 5. *World-wide Radio.*

Ingredients: 1 pair of earphones, 1

microphone, 1 amplifier, 1 loudspeaker, 1 screen, 1 interpreter.

When listening to foreign programmes at Christmas, much fun is lost through not being able to understand the language. This will put it right. Place the interpreter behind the screen and allow him to listen, through the earphones, to the programme. He should then translate it into English in front of his microphone.

Result: Laughs from Lithuania, gurgles from Greece, titters from Turkey, and English from U.S.A.

Recipe No. 6. *Television for All.*

Ingredients: 1 magic lantern, 1 large jam jar, 1 gill of whitewash, 1 screen.

Television is very much in the public eye at the moment, but the receivers are somewhat expensive. Here is a method by which you may give your friends the impression that you are terrifically wealthy. Cut a circular hole in the screen, to accommodate the end of the jam-jar. Before placing the jam-jar in position, pour the whitewash into it and then empty it out. This will leave the bottom of the jar white and give the effect of a cathode-ray tube when it appears through the hole in the screen. By projecting pictures from the magic lantern on to the bottom of the jar a very realistic impression of television is obtained. By substituting a cine-projector for the magic lantern moving pictures are obtained.

Result: Your friends will assume that you are very wealthy and try to touch you for money.

* * * * *

I have quoted only half a dozen of Battisin's inventions as the remainder which he evolved are somewhat muddled up on my shirt-front. There is, however, one point which must be very clearly understood. It is that all of these whirlwinds of scientific imagination are strictly copyright, and should any person dare to impinge that copyright, they will be hounded down in every court in the world.



Battisin, however, is human enough to relent sufficiently to allow anyone to experiment on these lines on receiving written permission from him. Postcards should be addressed to him personally and marked "Bats" on the top inside corner.

BOOKS FOR XMAS

ONE of the most useful presents which can be given at Christmastime is a book. If you have any friends who are interested in radio, but who have not yet taken up the hobby, make a gift of one of the various books which we publish on the subject. There is, for instance, the "Wireless Constructor's Encyclopaedia." This explains practically all of the terms mentioned in radio practice and is lavishly illustrated, making it a simple matter for the beginner to become acquainted with modern receiver construction and repair. For those who require something simpler, there is "Everyman's Wireless Book," which may be regarded as a reference book for the listener, the expert and the amateur, and deals with operation, upkeep and overhaul of modern receivers, as well as providing an explanation on the principles of radio telephony. For the more advanced hobbyist you can obtain a book of "Fifty Tested Wireless Circuits," covering all normal requirements from the simple crystal receiver to the superhet. There are diagrams showing the theoretical circuit, explanations regarding the construction, and in many cases detailed wiring diagrams. Notes on the choice of components and operation are also included.

The experimenter who delights in making his own components would be highly delighted with a copy of our latest book on "Coils, Chokes and Transformers." This explains in detail the construction of various types of these components and includes many useful tables of data and reference. It is profusely illustrated.

In addition to the above-mentioned books there are also the various blueprints, which are full-size drawings of the wiring required for receivers which embrace practically every required type of wireless set, from

the humble but efficient crystal set up to the multi-valve mains-operated superheterodyne. A list of these is given in each issue, and in this particular number will be found on page 360, from which any type of set may be chosen. These prints cost 1s. each, and in certain cases it will be

found that they give the practical development of receivers which have been described either in these pages or in the book already mentioned—Fifty Tested Wireless Circuits.

Some of these receivers are of interest apart from the actual use of the set, as they show in a practical form the developments which have taken place in the past few years, and thus a receiver constructed to one of the early designs may be built up for experimental purposes and for comparison with the more up-to-date sets.



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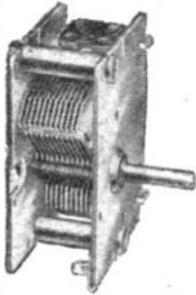
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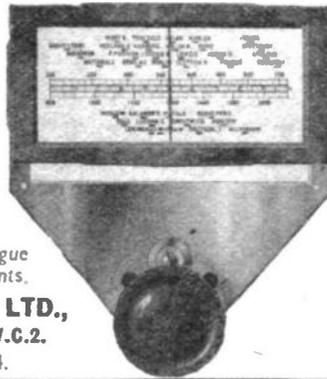
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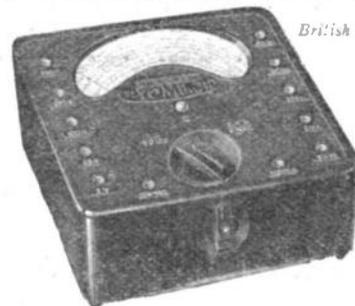
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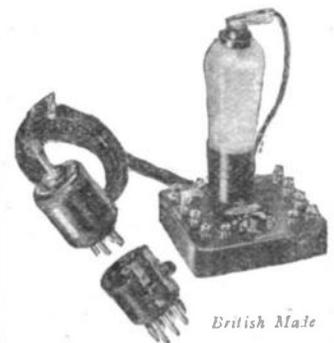


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Easy Fault Tracing



Some Simple Hints That Might Avoid Reception Troubles During the Festive Season. It is Also Suggested That Fault-tracing Might be Made the Subject of a Radio Game

RECEIVERS are so reliable nowadays, especially home-constructed receivers, that the amateur frequently has little experience of tracing and rectifying faults. The annoying part about it is that any faults that can possibly arise, do so at the most inopportune moment. Just when you have a house full of friends and intend to

by The Experimenters

will be assumed that little or no test gear is available, and that you are called upon to make a speedy diagnosis. Cures are generally quite easy to effect once you know what is wrong—but it is not always an easy matter to know just where the "spot of bother" is.

An Interesting Game

So that we do not bore those of our regular readers who are expert at trouble shooting, as the Yanks call it, we might suggest that some of you might care to make an interesting game of this fault-finding business. For example, a number of enthusiasts might take turns at creating a minor fault such as some of those that will

be described; the others will then attempt to trace it without the use of any equipment. Another method of playing this game is for each member of the party to go out of the room for a few minutes in turn while the rest "rig" the set so that a small fault known to the rest of the party exists. A time limit of, say, three minutes might be allowed for the member "not in the know" to find what is wrong and to set it right.

Grid Tests

Another quick test is to touch the grid terminals of the various valveholders with the moistened tip of the finger. See that you are standing on a mat, and take care that nothing but the grid terminal is touched—especially in the case of a mains set. Start with the output valve and work

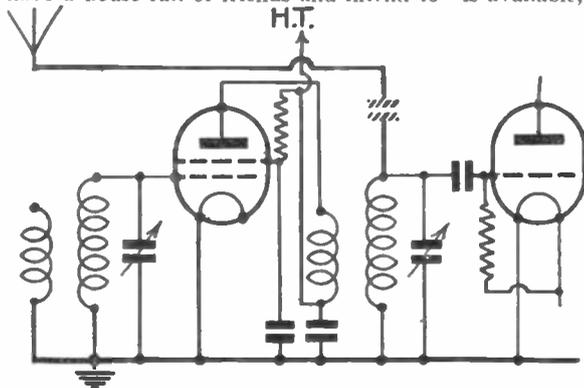


Fig. 1.—Cut out the H.F. stage by transferring the aerial lead as shown here.

listen to a special Christmas broadcast or to a special programme—that is when trouble is most likely to occur.

We are not going to deal with general methods of tracing and remedying faulty operation, but rather with a few quick

External Connections

However, to get back to the main subject of this article. Suppose in the first place that signals cannot be heard, although the set had previously been working properly. An obvious check is to see that the aerial lead is attached to the aerial terminal, and that the speaker leads are intact. Next

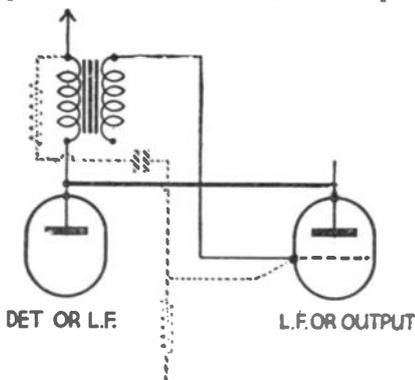


Fig. 2.—The connection shown by a heavy line will enable the L.F. transformer to be tested.

tests that can be made, and with expedients that can be adopted to enable the programme to be enjoyed. For that reason it

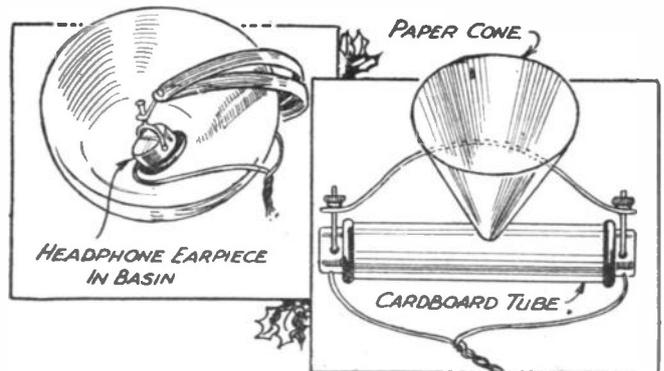


Fig. 3.—An improvised loudspeaker from headphones.

backward toward the first. There should be some kind of noise from the speaker in
(Continued overleaf)

(Continued from previous page)

each case, although it will vary from a very dull "thud" to a howl.

Still silence. Connect one speaker lead to the negative socket of the G.B. battery and touch the other against the 1½-volt socket. A "plop" should be heard as the contact is made and broken; if not, the speaker is probably at fault. In that case, there isn't much to be done unless a pair of 'phones is available. If it is, and provided that the output is not very great and that the H.T. current consumption of the last valve is no more than about 10 mA., the 'phones can be used in place of the speaker if they are placed in a large flower bowl or hung near to the door of a cabinet with plywood panels.

Mains Valves

Tests of a mains set are not as easy to make, for considerable caution must be taken to avoid receiving a nasty shock.

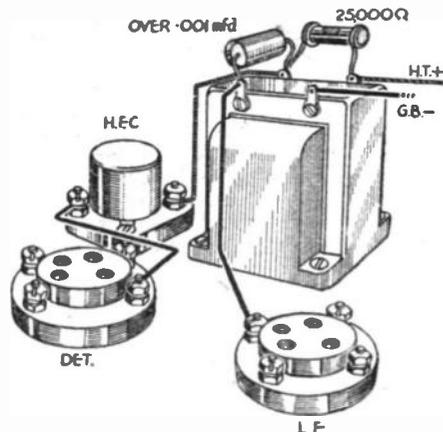


Fig. 4.—If the primary of the L.F. transformer is burnt out a quick makeshift remedy can be effected as shown here.

A rough-and-ready check of the valves can be made after the set has been switched on for some time by touching each valve in turn. All the glass bulbs should be slightly warm, and the output valve will probably be hot. Any valve that is quite cold is probably faulty. A further check is to touch its grid terminal and then to touch that of the following valve. The suspicion will be confirmed if there is no sound in the first place and a "click" in the second.

The on-off switch might be defective. Disconnect the batteries or mains supply, short-circuit the terminals with a short length of wire and reconnect. If the set then works the switch is faulty, and the shorting wire should be left in place until a new switch can be fitted. On the other hand, if the switch is of the open, push-pull type it might be possible to clean the contact faces with a strip of glasspaper.

An apparently faulty valve might be sound but making bad connection with its holder. Remove it, clean the pins with fine glasspaper, open out if of the split type and replace. Take care with pins of the banana type if you propose to open them out, because the lead from the electrode runs down the centre and is easily broken. This also applies to other plug-in components, such as coils, transformer connections and wander plugs.

Try the Pick-up

When pick-up terminals are provided it is often a good plan to try using these for a pick-up or

microphone (a makeshift alternative is a pair of 'phones) to find whether the fault is before or after this point in the circuit. If before, normal results will be obtained when using the pick-up connections. Should the fault appear to be at a later stage of the circuit than the pick-up terminals, try connecting the speaker leads in the anode circuit—across the transformer primary, choke or resistance—of valves between that to which the pick-up terminals are attached and the output valve. It might even be possible to continue reception by eliminating one or more of the valves in this manner.

If the set appears to be "alive" and yet will not bring in radio signals, although it operates from the pick-up terminals, it might be found that the only fault is that the condenser vanes are not turning with the tuning knob. This will probably mean that the grub screws through the collar fitting on the condenser spindle are loose. On the other hand, it might be found that the lead from one set of fixed vanes has come adrift, so that the condenser is out of circuit.

Bad H.T. Connections

If the set is not completely "dead," although the reaction control has no effect, it will generally indicate that there is a bad connection in the detector-anode circuit. The H.F. choke, anode resistance, decoupling resistance or transformer primary might be defective. First short-circuit the H.F. choke terminals; if signals can then be received in a practically normal manner the choke should be replaced or left out of circuit. In the case of a suspected resistance, moisten a strip of blotting paper and press that against the two connecting wires. The moisture will carry a certain amount of current, and might permit of the set being used.

When an L.F. transformer is needed the same idea can be tried by connecting a resistance—real or improvised—between the primary terminals and connecting a fixed condenser of any value over .001 mfd. between the anode and grid terminals. This will enable the set to work if the primary winding is burnt out, even though signal strength will not be quite up to par. This test can also be made, with or without the condenser, if there is a persistent crackling noise indicating a bad connection, probably in the H.T. supply.

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Run-down H.T.

Serious distortion with a battery set might show that the H.T. battery is run down, but a cure can often be effected simply by reducing the G.B. voltage. On the other hand, a dry H.T. battery can sometimes be rejuvenated to a certain extent by warming it in front of a low fire or in a not-too-hot oven. If the battery is gently warmed for half an hour or so it will often drive the set again for a few hours.

A run-down L.T. battery—indicated by the fact that signals are fairly normal when the set is first switched on, and then begin to fade out—presents a more difficult problem. With a small set, however, reception can be obtained by using a couple of bell cells or a three-volt cycle-lamp battery in place of the accumulator. The voltage will be slightly too high, but it can be reduced sufficiently by using two 8ft.

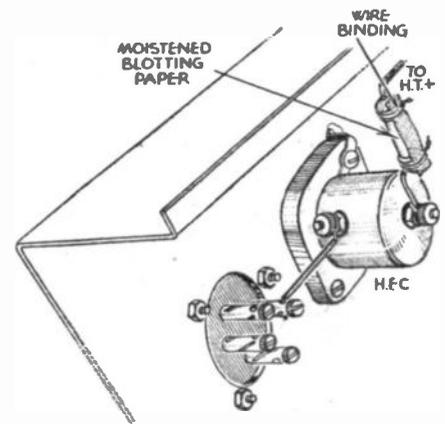


Fig. 5.—Trouble due to a faulty resistor might be overcome by using this simple dodge.

lengths of 24-gauge d.c.c. wire for connecting it to the set. At least, that will do when there are three valves taking about .4-amp. between them. If there are only two valves use leads about 12ft. long; if there is only a single valve it will be safer to employ only one 1½-volt cell connected directly to the normal L.T. leads.

In the case of a receiver taking not more than, say .3 amp. low-tension, reception can be obtained for a short time by using a 3-volt torch or flash-lamp battery for L.T. This can be connected directly to the L.T. leads without much danger of over-running the valve filaments, although to be on the safe side it is better to use long leads until the battery has been used for a short time.

Microphony

If the set suddenly becomes microphonic, so that a "moan" gradually builds up in the speaker after switching on it means that a valve—probably the detector—is coming to the end of its life. A temporary remedy is to cover the valve with felt or to stick a lump of plasticine on top of the bulb. Another way is to move the speaker away from the set and arrange it so that it points away from the valves. With a built-in speaker, the unit can be taken out and temporarily placed on a table, with three match-boxes between the rim and the table top.

Anyhow, we hope that none of you will need to make use of the above suggestions during Christmas, and take this opportunity of wishing you the compliments of the season. Happy Christmas!



BROADCAST YOUR OWN PLAY



How to Combine Mike and Pick-up, and Suggestions for Sound Effects, with Especial Reference to the Play Published in This Issue

THE production of sound effects which will come through the loudspeaker in such a manner that they may be recognised, is a difficult matter. There is also some difficulty in so arranging input circuits that it is possible to carry out any desired form of mixing or combining of the outputs of pick-ups and microphones, and this type of experimental work will

put circuit be used for feeding the reproducers.

Mixing Circuits

The microphones and pick-ups must be joined to the input valve and to avoid unnecessary repetition the reader is referred to the article in this issue on the use of Microphones and Pick-ups for the various incidental details. For the play referred to, the opening consists of a fade-in reproduction of a gramophone record which fades out and a cross-fade of another tune is superimposed. This in turn has to fade out for the announcement. A fader is therefore one essential on the input side. Where expense is of no account it is possible to have a number of separate controls for fading and mixing purposes, but with a little care in arranging switches it is possible to carry out practically any desired fading and mixing with only two controls. The use of a minimum of this type

indicates that the music or speech from the speaker is gradually reduced in strength until it is inaudible. "Mixing" indicates that whilst one item is being reproduced, say speech, music is gradually introduced in the background, being maintained at a low level as a background, or being gradually built up in strength and the speech simultaneously reduced until one

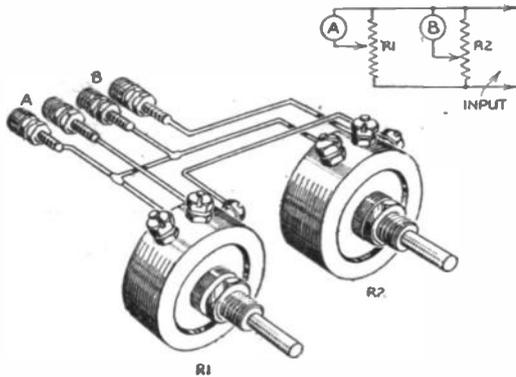


Fig. 1.—How to connect the two controls for perfect mixing on mike and pick-up, etc.

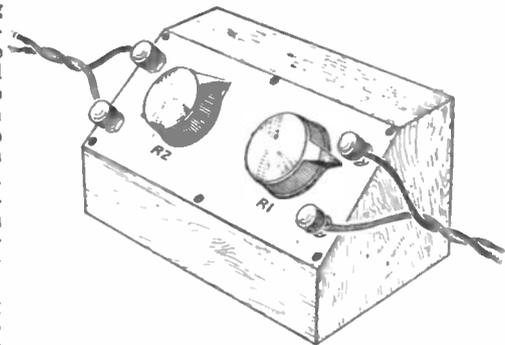


Fig. 3.—How to mount the controls and terminals for ease of handling.

be found of great value to those who are interested in producing plays for reproduction through a loudspeaker. In order to make the various phases of this work clear, it is proposed in this article to show how to carry out the "electrical" side of the work of the play which is given on pages 333 and 334, and therefore the stage or production directions should be followed in conjunction with the details given in this article.

Firstly, there are two ways of reproducing a play of this type. An input circuit (consisting of microphone or microphones and pick-ups) will be needed, and an output circuit consisting of one or more loudspeakers must also be used. As the reproduction must take place in a room distinct from that in which production takes place (so that the only sounds heard by the audience issue from the loudspeaker(s)) this means that either the input or the output leads must be very long. On the input side, it is possible to use long leads, but a 1/1 transformer must then be employed to avoid various types of trouble such as instability, L.F. howling, etc. On the output side, however, an extended lead up to any distance may be used very easily and therefore it is preferable that the amplifier or radio receiver used for amplifying the sounds be situated in the room with the actors, whilst the standard out-

will also prevent difficulties on the input side. If desired, a single component of the "fader" type may, however, be employed, but this will not permit of "mixing." For

takes the place of the other. For mixing, therefore, two separate controls will have to be employed.

In the play in question, it will be possible to carry out all of the necessary production work with two standard volume controls, and these should preferably be of the .25 megohm type. As, however, certain input circuits (depending on the amplifier design) are not standard, it may be desirable before purchasing them to try the effects of different values, and standard fixed resistances may be used for this test. Fig. 1 shows the arrangement of the circuits for the production of "Nightlight Robbery." It will be seen that the input imped-

ance is constant, and consists of the two volume controls in parallel. The two components marked A and B are either microphones or pick-ups, and in order to give all the necessary effects for this play one of these should be the permanent microphone into which the performers speak, whilst the second will have to be changed in turn from pick-up to microphone. In the opening they will both be pick-ups. Thus a double-pole change-over switch will be needed and should be connected as shown in Fig. 2. During the course of the play it will be necessary to make changes to one pair of contacts on the switch and this may be done by disconnecting the unwanted component from a pair of terminals and

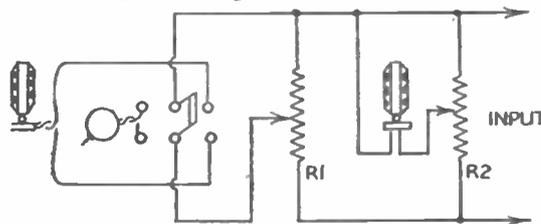


Fig. 2.—By using a change-over switch as shown here you can use mike and pick-up as desired and obtain various mixing effects.

the benefit of those readers who are not familiar with these terms, perhaps it would be as well to explain them before dealing further with the subject. "Fading" simply

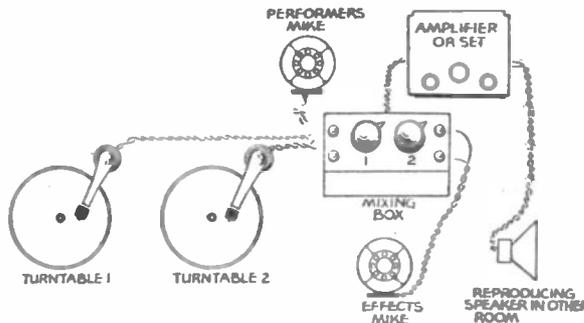


Fig. 4.—The complete lay-out for broadcasting your own play as mentioned in this article.

(Continued on next page)

BROADCAST YOUR OWN PLAY

(Continued from previous page)

connecting the required one. Alternatively plug and jack connections may be adopted.

Method of Working

Taking our play a microphone will be joined to one pair of the terminals shown in Fig. 3, and a pick-up to the other. The announcer will make the necessary introduction, and then the needle of gramophone pick-up No. 1 will be placed on a record of "Chanson Triste." The volume control for this pick-up will, of course, be set back to minimum. When the announcement is complete the control for the pick-up will be gradually turned up, and during this a second pick-up must be connected to the terminals on the other control in place of the microphone. After a few bars of "Chanson Triste" the second pick-up is placed on the record of "Teddy Bears' Picnic," and the turntable started. The first control is then slowly turned off, and at the same time the control for the new record is slowly turned up. As soon as the control of the first record is right off, the pick-up leads should be disconnected and the leads from the microphone to be used by the performers should be connected in place of them. The play may now commence as the "Teddy Bears' Picnic" is faded out.

During the play incidental noises are required and there may be some difficulty in getting these to "come over" to be

recognisable. The following hints will show the lines upon which the effects may be produced, but they may have to be modified according to the type of L.F. amplifier which is used, and the type of speaker. In the opening scene a grandfather clock is heard ticking. A stick of wood may be used to simulate the ticking, tapping it slowly on a piece of wood. To get the "dull" effect of a real old clock the piece of wood should be thick and placed on a thick piece of cloth. Do not place it too near the effects microphone. The Westminster Chimes and the hour strikes may be produced from a real chiming clock if you have one of this type in the house, but if not, a record in which the sounds occur will have to be employed.

A set of chiming rods for use in a clock may be obtained from a clock-dealer if you think the expense is justified. The 'phone bell may be imitated by an ordinary domestic electric bell, and the receding of the voices may be obtained realistically by the performer walking slowly backwards from the mike. Alternatively, the producer can turn down the volume control when he gets his cue, and turn it up to give the effect of a person entering the room. This method of producing the effect will enable the performers to keep together and devote all their attention to their lines. The smashing of the vase may be produced by dropping a number of pieces of metal on to the table close to the effects mike. Any old pieces of

metal will do, and if you are an old radio experimenter you will find that a handful of discarded condenser vanes dropped on to the table from a height of about 1ft. so that they fall 3 or 4ins. from the mike will give a very realistic effect. The tapping on the window may be best carried out by placing a sheet of tin or other thin metal on the table 4 or 5ins. in front of the mike, and tapping this with the end of a pencil. The breaking of the window and tinkling of the falling glass will be realistically represented by dropping four or five condenser vanes or similar thin pieces of metal on to the metal plate just mentioned. The creaking of the opening window must not be overdone. There are several ways of accomplishing the effect, and the old idea of a wetted cork being drawn along the side of a medicine bottle will be quite as good as any. Light pressure should be used to start with, holding the bottle close up to the mike, and then a heavier pressure to produce the squeak, taking off the pressure to finish with just the faint rubbing sound.

Other ideas will, of course, occur to readers, but the hints given will show how to produce the play, and the diagrammatic layout of Fig. 4 shows how the various accessories for this particular play will be arranged.

PETO-SCOTT ALL-WAVE KIT

THE accompanying illustration shows the Peto-Scott Battery 1-valve All-wave Kit with a novel Unit method of construction, by means of which amplifying sections may be added. In the illustration the section nearest to the panel is the 1-valve unit, and the rear section is

any time be changed into a more comprehensive receiver, or an experimental circuit may be tried out. Secondly, additional sections may be added so that a two-valve circuit, for instance, may be converted into a three or four valver, and the minimum of constructional work will be involved and there will be no need to scrap one chassis and re-drill another. These kit sets are obtainable complete, or the separate parts may be purchased from time to time. The panel is of steel and has a crackle finish to harmonise with a neat steel cabinet with the same finish, of which the panel forms the entire front. The cabinet has ventilating louvres and a hinged metal lid. The chassis is of stove enamelled steel measuring 10ins. by 4½ins. by 3ins., and is ready drilled with a rubber bush and A.E. and L.S. socket strips bolted in position.

The 1-valve kit consists of a standard circuit with a new All-wave tuner, used in conjunction with a standard .0005 mfd. tuning condenser operated through a special slow-motion dial of the type hav-

ing a small escutcheon window for viewing the dial settings. The tuner is self-contained, that is to say, it incorporates a special low-loss switch for changing from the short-wave to the standard broadcast wavebands. There are only six connections to be made to this tuner. The ranges covered are from 18 to 52, from 200 to 550 and from 900 to 2,000 metres, and the complete Kit for the receiver (exclusive of

valve and cabinet) costs £1 9s. 6d. With valve and cabinet the price is £2 5s. 9d. If the complete receiver is required, ready wired and tested and with the 2-stage amplifier added, the complete cost is £4 10s.

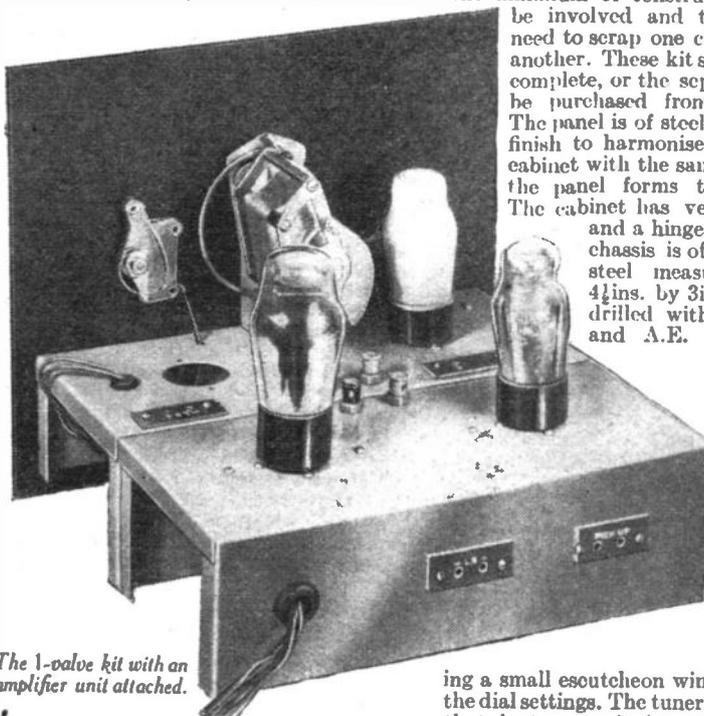
NEW VARLEY PUSH-PULL TRANSFORMERS

MESSRS. VARLEY announce a new addition to the range of push-pull transformers, in the form of a dual-ratio output transformer. This component is of a similar type to the existing models, having a primary inductance of 48 henries with no D.C. and designed to carry 65 mA through each half. The secondary winding is in two sections, brought out to four separate terminals, and thus it is possible to place the two sections in series or parallel. By this means it is possible to vary the output ratio to obtain a step-down of either 25 to 1 or 50 to 1. This component is, of course, intended for use with low-resistance loudspeakers, and completes the range of double-output push-pull transformers, in which there are now three models.

Other Models

The two remaining models are similar in construction but provide ratios of 20 to 1, 40 to 1, 34 to 1 and 68 to 1, thus covering practically every requirement for the push-pull feeding of low-resistance speakers. It is, of course, possible to use any of these models to feed a high-resistance speaker by feeding from the two anodes of the push-pull stage through fixed condensers in the usual way.

The transformers are substantially made with sectionalised and interleaved windings, and have an exceptionally good frequency response, giving splendid results with modern high quality speakers and standard power valves. The price of all three models is 18s. and the dimensions are 3½ins. by 3½ins. by 3½ins., whilst the weight is 2½ lb.



The 1-valve kit with an amplifier unit attached.

a two-stage amplifier, and this scheme has many interesting points of value to the home-constructor.

Firstly, the kit is built on standard chassis units and may thus at



A Comedy-thriller Specially
Written for Home Broadcasting
By ARTHUR ASHDOWN

(Fade in gramophone playing "Chanson Triste" for about thirty seconds. Gradually fade out and fade in record of "The Teddy Bears' Picnic" for about another thirty seconds, and then fade out music whilst Announcer speaks.)

ANNOUNCER: Ladies and Gentlemen, we present "Nightlight Robbery," a comedy-thriller. The characters are: Henry Shannon, Artur Scholer, Steve Smith, and "The Girl."

The action of the play takes place in the library of Scholer's house at Hampstead.

Ladies and Gentlemen—"Nightlight Robbery."

(Fade in "Chanson Triste" for about fifteen seconds, and fade out into the tick-tock of a clock for about another fifteen seconds. The clock chimes and strikes eleven very slowly. As the clock finishes striking a telephone rings about four times.)

SHANNON.—"Hullo, hullo. . . . You want Mr. Scholer? Who is that speaking? . . . (Pleasantly.) Oh, hullo, Rosa—Nickey this end. I didn't recognise your voice. . . . What's that?—I wasn't meant to? . . . Oh, I see, my dear, you're in disguise. I thought it was Greta Garbo at first. . . . We'll have to get you a radio contract doing impersonations; it would pay as well as this racket, and it would be much more respectable. . . . All right, all right, don't get the wind up. I'm not going to say anything incriminating. In any case, who would be listening in? . . . All right, I'll get Mr. Scholer. (Shouting off.) Fitzey, you're wanted on the 'phone. (Con conversationally into 'phone.) Mr. Scholer will be right along, my dear. By the way, what do you think of the new name, 'Artur Scholer'? Not bad, eh? If you want 'phone me up sometime, to kiss me good-night, don't forget my new name is Henry Shannon. . . . No, not 'Cannon'—'Shannon'—'S' for escalator . . ."

SCHOLER (he speaks with a slight guttural accent).—"Come on, Nickey, give me the 'phone."

SHANNON.—"Here is Mr. Scholer, Rosa, my dear. We are now taking you over."

SCHOLER.—"Hullo, Rosa. Is everything all right? . . . Good! You have the tickets for the boat train? . . . That is good. . . . Yes, I'll send the passports. . . . Yes, that is right. . . . Yes, I have everything worked out and it cannot fail. . . . Listen, Rosa, do not say too much on the 'phone."

We had a crossed line the other night and I heard another conversation. . . . No, I don't think that they heard us. . . . Good-bye, my dear, and—bon voyage. (He chuckles as he replaces the receiver.) That is good. Rosa has everything ready at that end. Now we must make our final plans here. There must be no mistake."

SHANNON.—"Do you want Steve?"

SCHOLER.—"Yes, call him, please."

SHANNON (from a distance).—"Steve! The gov'nor wants you."

SCHOLER.—"Is he coming? There is no time to waste."

SHANNON (close-up again).—"Yes—oh, here he is."

STEVE.—"O.K., gov'nor—all correct and on duty."

SCHOLER.—"Good! Now sit down, both of you. We will just go over the plan to make sure that we have forgotten nothing. Remember there must be no single mistake—or else. . . .!"

STEVE.—"Oh, gov'nor, don't 'arp on the 'or else' so much. It makes me 'omesick'."

SHANNON.—"Which home, Steve? Maidstone or Pentonville?"

SCHOLER.—"If you slip this time—I'm afraid that it will be Dartmoor. (He chuckles.)"

STEVE.—"Go on! Go on! Why not make it the Devil's Punchbowl?"

SHANNON.—"You're thinking of 'Devil's Island.' But you have to be French to go there."

STEVE (despondently).—"Just my bloomin' luck!—I'm 'alf Continental."

SHANNON.—"In that case you'd do ten years home and ten away."

SCHOLER.—"Come, now, it is getting late—we will just go over the plan again. The diamonds are in the safe behind that picture. I think, Steve, that you know the combination by now?"

STEVE.—"Like the bloomin' h'alphabet, gov'nor."

SHANNON.—"There's no 'H' in the combination."

SCHOLER.—"When we have finished this little—er—discussion both of you will leave by the back door. The servants are due to return from the dance at 12 o'clock. I shall be in here and will tell Jackson to make sure that the window is shut. Then I will go to bed—and to sleep—as usual. That is my part complete."

STEVE.—"Lumme, gov'nor—you do pick the easy bits!"

SCHOLER (sternly).—"Don't be a fool, Steve! Do you not forget I have spent months arranging this—er—business? Where would you be, I ask you, without my brain?"

STEVE.—"Without your brain, gov'nor—I'd be me—and with your brain, gov'nor—I'd be in bed at ten-past twelve."

SCHOLER (heatedly).—"Enough—you little rat! (Almost shrieking.) Do you not think that. . . .?"

SHANNON (soothingly).—"Steady, Fitzey. Steady, old man. We'll need all our nerves—later on. Steve didn't mean anything—it's just his sense of humour."

SCHOLER.—"Then I am glad that he has at least one sense!"

SHANNON.—"Now let's forget it. Where did we get to?"

STEVE.—"The Guv'nor's in bed."

SCHOLER (with calm determination).—"At two o'clock exactly—you will both return to that window, force it open and enter. Steve will open the safe and take the diamonds. Then you will both get away as quickly as you can and meet Rosa."

SHANNON.—"She'll have the car waiting by the cemetery?"

SCHOLER.—"Yes."

STEVE.—"Ow jolly!"

SCHOLER.—"You will drive to Dover and—er—disappear. We shall all meet at Rotterdam—to-morrow week."

SHANNON.—"I still don't see why Rosa has to come with us."

SCHOLER (quietly and sweetly).—"Rosa is such a careful woman—don't you think? And so capable."

SHANNON.—"Look here, Scholer, if you don't trust us—"

SCHOLER.—"Of course I trust you, my dear Nickey! Why shouldn't I? After all, I know a lot about you both—yes—such a lot!"

STEVE.—"Lumme—don't 'arp about the past! Let's forget it and look to the future."

SCHOLER.—"That is right, Steve—the future! It will be bright for all of us."

SHANNON.—"All right—let's cut it out and get a move on."

SCHOLER.—"Well—that is all! As I say, you will all go to Rotterdam and I will

follow as soon as I have arranged the insurance claim. Are there any questions?"

SHANNON.—"You still want me to come back with Steve to-night?"

SCHOLER.—"I thought that we had settled all that. If you are disturbed by the servants—it is for you to deal with them—while Steve looks after the diamonds. Are there any more questions?"

SHANNON.—"No—it's pretty straight to me."

STEVE.—"Yes—dead straight!"

SCHOLER.—"Good—then you must go—both of you."

SHANNON.—"Come on—let's get going, Steve!"

SCHOLER.—"Good-night, my friends—and good luck! . . . Don't forget . . . you are expected at (very slowly) exactly two o'clock!" (Fade in the tick-tock of the clock for about thirty seconds. The clock chimes the hour and slowly strikes two. A gentle tap-tap is heard on the window, followed by the tinkle of falling glass. A creak as the window opens.)

STEVE.—"Ere we are Nickey—ome once more. 'Ow the old place 'as changed!"

SHANNON (in a hoarse whisper).—"Shut up, you fool—the servants! (more loudly) Oh—damn that chair!"

STEVE (mimicking).—"Shut up you fool—the servants!"

SHANNON.—"Come on, let's get it over as quickly as possible. Here you are—here's the safe. Get to work!"

STEVE.—"Not so much 'urry, Mr. bloomin' Shannon. This is where I get temperamental. This is when the h'artist in me comes h'out!"

SHANNON.—"Will you shut up and get on with the job?"

STEVE.—"Ain't that a luvly sight. All gleamin' and glistenin'! I can see it's goin' to be a real pleasure to a h'artist like me."

SHANNON.—"Come on—come on!"

STEVE.—"All right—don't get me flustered. Now then—one, two, three—four, five, six—click! Good! One, two, three—four, five—click! That got you, didn't it? One, two, three—four, five, six, seven. Click!"

SHANNON.—"Is that the lot?"

STEVE.—"One, two, three—four and five, six—Clickety—clickety—click! Open Sesame!"

SHANNON.—"Good! Come on, get the diamonds and let's get away."

STEVE.—"Certainly, sir—diamonds I think you said—and diamonds you shall 'ave! There—aren't they beautiful? The Dorit Diamonds to be sure. Will you take them or shall I send them?"

THE GIRL.—"I'll take them, please!"

SHANNON (surprised).—"Who the devil—!"

STEVE.—"Lumme—a ghost!"

THE GIRL.—"Quite still, both of you, please. May I have the necklace? Thank you!" (A crash is heard as she smashes a vase.)

SHANNON.—"What are you doing—your little fool?"

THE GIRL.—"Just giving the alarm. Er—it's quite usual, I believe."

STEVE.—"Excuse me, miss, but h'are you a ghost—or—real?"

THE GIRL.—"Fairly real, I believe. Anyway, I know the revolver is quite real. Would you both mind standing by the table? A little further—thank you!"

SCHOLER (from a distance, and getting nearer).—"What is this? What is happening?"

THE GIRL.—"I'm afraid you were being burgled."

SCHOLER (stupidly).—"Burgled? Burgled?"

THE GIRL.—"A burglar? Oh, no!"

SCHOLER (still groping).—"Then—how—how did you know about all this?"

THE GIRL.—"Well, you see, it's rather difficult for me. I'm a telephone operator at the local exchange, and some time ago I overheard a conversation about this burglary."

SCHOLER.—"Then why did you not tell the police?"

THE GIRL.—"As I say, it's rather difficult for me. If I had reported it they would have



"I'm just somebody who happened to know."

STEVE (dryly).—"Yes, guv'nor—burgled!"

SCHOLER.—"Who are you? Who are you, I say?"

THE GIRL.—"I'm just somebody who happened to know."

SCHOLER.—"Know what?"

THE GIRL.—"I happened to know that you were going to be burgled. But don't worry—I was just in time—here are your diamonds."

STEVE.—"Crikey! She is a ghost!"

SCHOLER.—"You mean to say that you are not a burglar?"

known that I had been listening-in. I stood a good chance of losing my job."

SCHOLER.—"And so you came alone! (Pleasantly.) You were a very brave little girl. I don't know how to thank you."

STEVE.—"Give her a kiss, guv'nor!"

SCHOLER.—"Silence! I will deal with you presently."

THE GIRL.—"Well, I must be going now."

SCHOLER.—"If you would keep these men covered, I will go to the safe. Perhaps you will accept a small present from me."

(Continued on page 351)

PRODUCTION NOTES

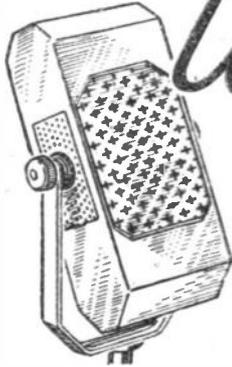
Here are a few points which should be kept in mind by those who are producing their first radio play. The entire action has to be conveyed to the audience by the spoken word. Great care should therefore be taken to rehearse the dialogue very carefully and to put as much meaning as possible into every line. No doubt must be left in the minds of the audience as to which character is speaking. In the case of "Nightlight Robbery," the character parts are typed widely apart. "Scholer" speaks with a slight guttural accent, "Shannon" talks quite naturally, and "Steve" employs the Cockney brogue.

It is helpful for the producer, when rehearsing his cast, to close his eyes. In this way he is able to put himself in the place of the listener. For the final rehearsals he should hear the play in another room, relayed by a loudspeaker.

Elsewhere in this issue will be found an article entitled "Broadcast Your Own Play." This explains how the various effects called for in the script may be produced, and should be carefully studied by the "Effects Manager."

It is suggested that the audience should listen to the play in a darkened room, as this will help to create "atmosphere."

Using Microphones and Pick-Ups



How to Connect these Components to Standard Apparatus, and Methods of Controlling Volume, Fading, Mixing, etc.

It is possible to use a microphone or a gramophone pick-up with practically any receiver, but in certain commercial sets designed for Universal mains (A.C. or D.C.) operation, the fact that no pick-up sockets or terminals are provided may indicate that it is unsafe to use this type of accessory with that particular receiver. This is because the negative side of the

apparatus, the grid leak will be joined to the cathode, and, therefore, a biasing resistance with by-pass condenser must be inserted in the cathode lead, and the pick-up or mike may then be left permanently connected. Obviously it is desirable to fit a switch so that the radio signals may be cut out, or so that no bad effects will be experienced on radio due to

voltage. Similarly, the ordinary pick-up may need the inclusion of a volume control to prevent the detector valve from being overloaded.

Volume Control

Some pick-ups are provided with a built-in volume control on the carrier arm, and thus there will be two leads from the component which may be connected as shown in the diagrams already mentioned. If, however, no such control is provided it will be necessary to fit one either on the motor-board close to the pick-up or on the receiver chassis in a convenient position. The value of the control will depend upon the pick-up in use, and it may vary from .25 megohms to 1 megohm. The makers' instructions should therefore be followed when selecting this component. Fig. 3 shows how it is connected in most cases, although it is possible to reverse the connections to the grid and the arm of the control. This is usually only done when two or more pick-ups are employed. If it is desired to mix gramophone records, or fade from one gramophone record into speech or another record, a fader must be used, and this may consist of a centre-tapped volume control or two separate volume controls joined together, as shown in Fig. 4. With this device, however, it is

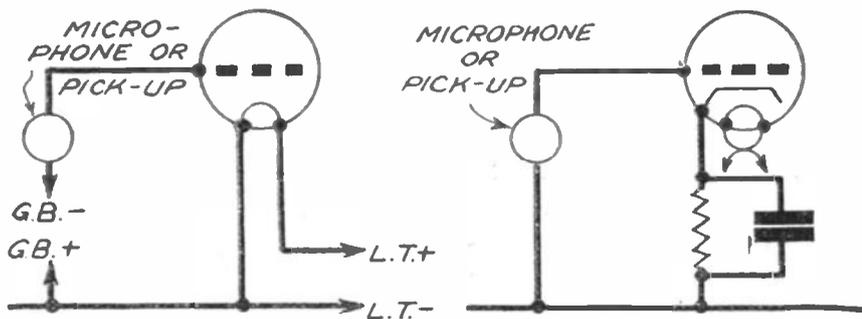


Fig. 1.—Method of connecting mike or pick-up to battery and indirectly-heated valves.

supply is internally connected to the chassis of the receiver, and thus one side of the mike or pick-up may become "live." With an ordinary receiver, however, either battery or A.C. mains operated, the pick-up or microphone is joined between the grid-cathode circuit. If a battery valve is employed, one side of the instrument will be

connected to a tapping on the grid-bias battery at a voltage which is correct for the particular valve in use. The arrangement for both types of valve is shown in Fig. 1, the circle indicating either pick-up or microphone. To obtain maximum amplification from an existing radio receiver the instrument should, of course, be connected as early in the circuit as possible, and one of the best places is in the grid circuit of the detector stage. In the A.C. type of

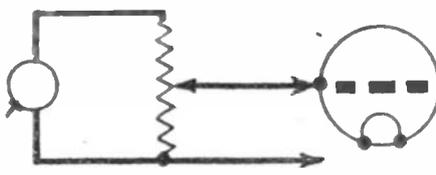
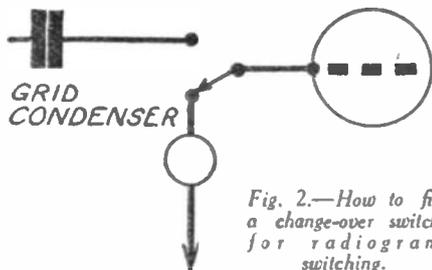


Fig. 2.—How to fit a change-over switch for radiogram switching.



Connecting the Pick-up

If the receiver is not already fitted with pick-up terminals or sockets, and provided that it is not a Universal mains model, a terminal or socket strip may be mounted on the rear of the chassis and the connections made as shown in Fig. 2. If the grid terminal on the detector valveholder is a long way from the terminal strip it may be found necessary to enclose the lead to the switch in metal screening which should be connected to earth. Failure to do this may result in hum or some form of instability. The pick-up leads may be connected direct to the pick-up terminals, but if a microphone is employed additional precautions are necessary. The ordinary carbon or transverse current type of mike will require a high step-up transformer joined between it and the terminals, and it will also have to be provided with some form of polarising

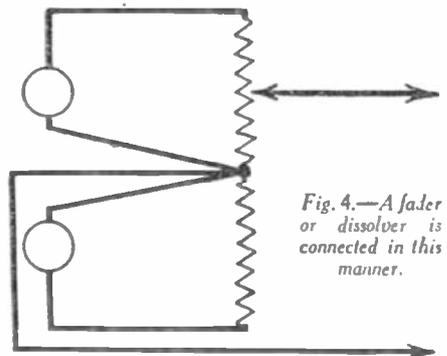


Fig. 4.—A fader or dissolver is connected in this manner.

only possible to decrease the volume from one source until it is at zero, and then build up the signal from a second source. The two cannot be mixed. When one signal has been faded out, the pick-up may be replaced by a microphone if it is desired to introduce speech.

Microphone Circuits

The standard carbon microphone will be fed from a small voltage, say, about 4.5 volts, and through a

(Continued overleaf)

connected to a tapping on the grid-bias battery at a voltage which is correct for the particular valve in use. The arrangement for both types of valve is shown in Fig. 1, the circle indicating either pick-up or microphone. To obtain maximum amplification from an existing radio receiver the instrument should, of course, be connected as early in the circuit as possible, and one of the best places is in the grid circuit of the detector stage. In the A.C. type of

Important Broadcasts of the Week

NATIONAL (261.1 m. and 1,500 m.)

Wednesday, December 1st.—Symphony Concert from the Queen's Hall, London.
Thursday, December 2nd.—Stanelli's Party.
Friday, December 3rd.—Memories of St. George's Hall, feature programme.
Saturday, December 4th.—Music Hall programme.

REGIONAL (342.1 m.)

Wednesday, December 1st.—A running commentary on the second half of the International Association Football Match, England v. Czechoslovakia, from White Hart Lane, Tottenham.
Thursday, December 2nd.—Royal Philharmonic Society's Concert from the Queen's Hall, London.
Friday, December 3rd.—"Il Tabarro," opera by Puccini, from Sadler's Wells.
Saturday, December 4th.—Brightlight, from the novel by J. B. Priestley, adapted as a radio play.

MIDLAND (296.2 m.)

Wednesday, December 1st.—Variety from the Grand Theatre, Derby.
Thursday, December 2nd.—Choral and Orchestral concert from the Albert Hall, Nottingham.

Friday, December 3rd.—Melody and Rhythm, dance band programme.
Saturday, December 4th.—The Musician at the Gramophone by Sir Ivor Atkins.

NORTHERN (449.1 m.)

Wednesday, December 1st.—Concert Party programme.
Thursday, December 2nd.—Madrigal recital.
Friday, December 3rd.—Port Sights—2, Loading and Unloading.
Saturday, December 4th.—A running commentary on the second half of the Rugby League match, Barrow v. The Australians, from Craven Park, Barrow-in-Furness.

WELSH (373.1 m.)

Wednesday, December 1st.—A Recital of Welsh Songs.
Thursday, December 2nd.—Theme Song: Famous songs from famous films.
Friday, December 3rd.—Organ recital from the Odeon Theatre, Llandudno.
Saturday, December 4th.—Benighted, from the novel by J. B. Priestley, adapted as a radio play.

WEST OF ENGLAND (285.7 m.)

Wednesday, December 1st.—God's Admiral,

Robert Blake, General-at-Sea, a sequence for radio.

Thursday, December 2nd.—Chamber Music concert from the Victoria Rooms, Bristol.
Friday, December 3rd.—Are you Interested? an informal debate.
Saturday, December 4th.—Offenbach's Opera, "Tales of Hoffmann," from the Pavilion Theatre, Bournemouth.

SCOTTISH (391.1 m.)

Wednesday, December 1st.—Choral programme, from the St. Andrew's Hall, Glasgow.
Thursday, December 2nd.—Reid Orchestral concert from the Usher Hall, Edinburgh.
Friday, December 3rd.—Per Contra, a study in contrasts.
Saturday, December 4th.—Scots Songs.

NORTHERN IRELAND (307.1 m.)

Wednesday, December 1st.—Made in Ulster, Tweeds: A talk.
Thursday, December 2nd.—Orchestral concert.
Friday, December 3rd.—Organ recital from the Cathedral Church of St. Patrick, Armagh.
Saturday, December 4th.—Military Band concert.

USING MICROPHONES AND PICK-UPS

(Continued from previous page)

transformer as shown in Fig. 5. If, however, a condenser microphone or crystal microphone is employed, it will be essential to use a small amplifier connected close to it in order to avoid loss or hum which would be introduced by long leads. Usually a single stage of amplification is sufficient in the head amplifier, as it is called, and the output will consist of a feed from a fixed condenser joined to the anode, and the H.T. negative lead, thus leaving two leads, as in the previous cases which have been dealt with.

Using Microphones

When using a microphone, do not speak directly into it, but slightly to one side and in a natural voice. Much of the disappoint-

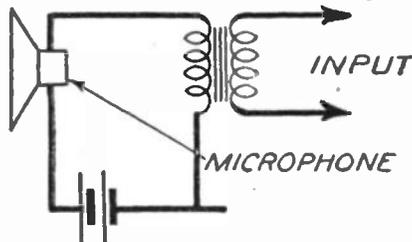


Fig. 5.—When using a microphone an input transformer is connected in this manner.

ment which is experienced by beginners is due to the fact that the voice is raised and this causes blasting. A quiet conversational tone is all that is required, and if this does not give good results additional amplification should be employed in the receiver or amplifier rather than the raising of the voice. The microphone will also have to be placed rather carefully, and if the loudspeaker is to be used in the same room or hall, the two should be placed as far away from each other as possible, to avoid "howl back".

AN AUTOMATIC TIME SWITCH

A New Accessory which will be Found of Wide Application

FROM the earliest days the design of various types of time switch has intrigued engineers and designers. We have seen clocks designed to switch on the radio at certain times and to switch off after a certain duration. Unfortunately, there are many factors which render such a device of little use—such as the unknown length of a given item, and the over-running of time which is often experienced on B.B.C. programmes. The device is, of course, of great value in countries such

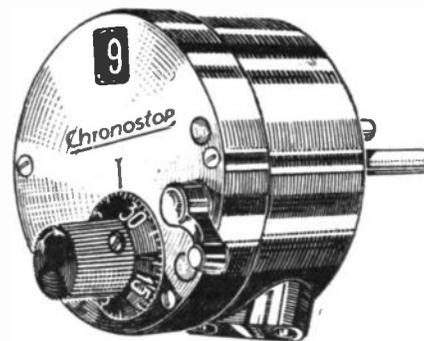
whilst occupied on other work. A new switch is shown in the accompanying illustration, and it will be seen that it is both neat and simple, consisting merely of a standard two-pin plug, two-pin socket, and clockwork mechanism.

This particular device may be used to switch on or off at will, and a small lever—seen on the right of the setting knob, enables the actual operation to be controlled. Indications are engraved on the casing, showing the setting for on or off.

Using The Switch

If it is desired to switch the receiver on, it is first necessary to calculate the time which must elapse before the set is required. For instance, if at 5 o'clock one wishes to hear the 9 o'clock news, it is obvious that four hours must elapse. Accordingly the setting lever is set to the "off" position and the control knob is turned until the figure 4 appears in the window at the top of the device. If there is any odd period of minutes, these are indicated round the edge of the setting knob and this will therefore be turned a little further to indicate the number of minutes after the hour. The lever is then set to "On," and at the expiry of four hours (or that to which the control was set), the receiver, will be switched on.

To switch off after a given period of time, the same procedure is followed, the lever being set to "On" whilst the mechanism is wound, and then turned to "Off." The range of time which can be covered by the switch is 11½ hours and the loading of the device is up to 1,000 watts. If desired, of course, the device may be used in conjunction with any electrical apparatus, other than a radio receiver. It is supplied by Messrs. Milnes Bros. and costs 37s. 6d.



A general view of the Chronostop switch.



A Radio Robot

Constructional Details of an Amusing Robot that Talks and Sings are Given in this Article. By EVERARD EDMONDS

MAN has created figures in his own image from the very earliest times. One recalls the Colossi of the Ancient World; the marble statuary of Phidias, so perfect that it became imbued with life; the figurehead that, bound to the bow of their ships, brought our Norse forefathers to this England; and, finally, those re-creations of historical characters which have made Mme. Tussaud famous.

speaking doll of a ventriloquist, my excitement knew no bounds, and I sent a shilling off post haste to learn this fascinating art—but, alas! for my ambition, my patience failed to match it, and the power was never acquired.

Simple Construction

To-day, however, it is possible for almost anyone to construct in relatively little



Fig. 4 (above).—The completed robot ready for work.

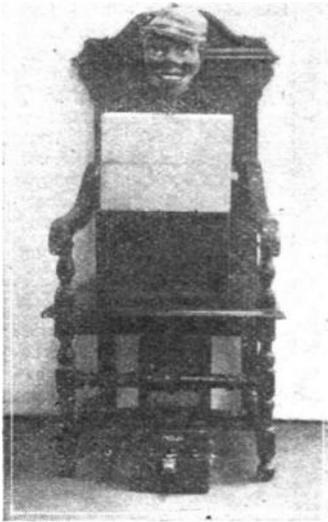


Fig. 1.—The robot mounted on a chair with the portable set underneath.

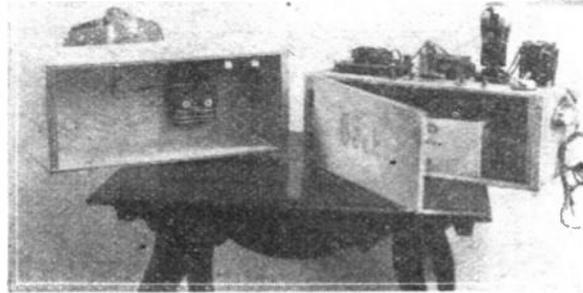


Fig. 3. (left).—The battery and relay sections of the apparatus.

time, and with inexpensive materials, a most amusing Robot, whose active jaw and dancing eyes as he recites a poem or sings a song will entertain for hours!

First a suitable mask is required—one of those sold for the celebrations of Guy Fawkes Day will do very well. This may be mounted as shown in Fig. 2—the lower jaw having been first cut away. To the latter a T-shaped piece of paper may be glued, so that, when the jaw is fixed in position, the cross of the T stands behind the eyes, and may have drawn upon it two lovely black—er—pupils!

pieces of the magnets, and, in order to prevent sticking, a small square of thin sheet-copper was soldered to the contact face of the armature.

Relay R1 is operated by R2 and a small 4.5 volt flashlight battery. R2 is the sensitive 5mA "Fulton" Relay sold by Electradix, Ltd., and it, in turn, is actuated by a valve. The latter may be any amplifying or power valve, and should have the requisite grid bias battery, as indicated

(Continued on page 349)

I remember, as a lad, becoming so enchanted with the Sleeping Beauty and her clockwork-heaving breast that I could scarcely be dragged away! And, on another occasion, when I first witnessed the

On the upright support are mounted the magnets and armature of a discarded electric bell. To the armature the lower jaw is now affixed, and we have the simple elements of our Talking Robot.

As the actual operating current will be relatively large, it is necessary to construct the following relay system—a system well worth assembly, as it may be used for wireless control of models, selenium cell operation, etc.

Referring to Fig. 5, the wires leading from the Robot are connected to a relay R1, also made from a discarded bell, which closes the circuit of a two-cell cycle lamp battery (Fig. 6), thus operating the jaw and eyes of the figure. The contacts of this relay are the armature itself, and the pole

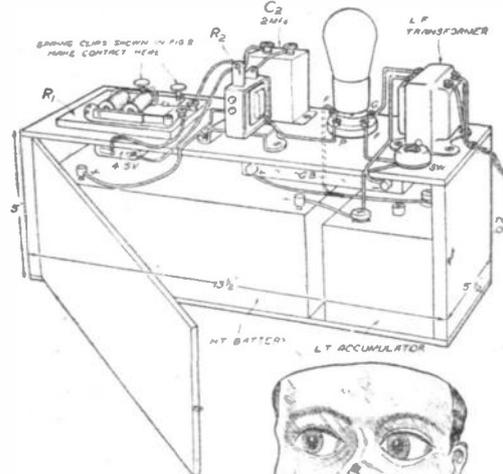


Fig. 5 (above).—The arrangement of batteries, components and connections

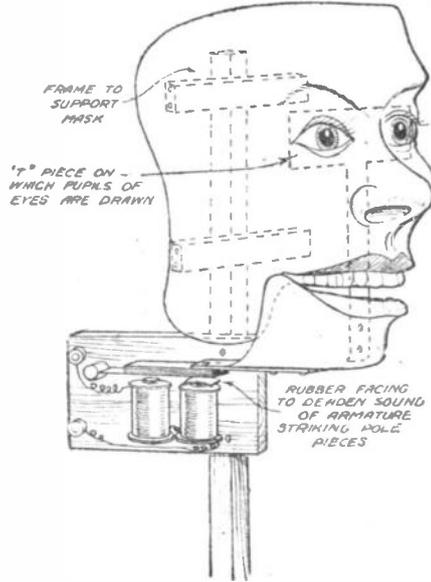


Fig. 2.—Method of mounting the face mask and lower jaw.

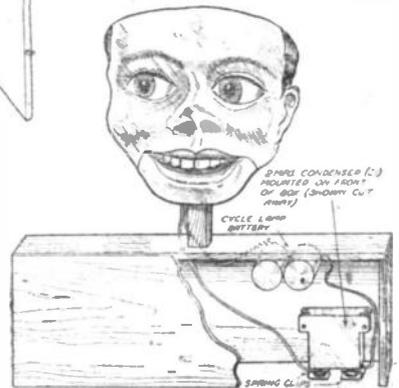


Fig. 6 (right).—How the relays are covered to deaden sound.

Practical Television

December 4th, 1937. Vol. 3. No. 77.

The R.C.A. Again

THE Chairman of the Radio Corporation of America has repeatedly made statements about television in an endeavour to prove to the American public that the United States is not lagging behind in the development of this important science. He was recently invited to address the Society of Motion Picture Engineers in New York and give his views on the possibilities and general position of television. During the course of his remarks he laid stress on the relationship between programmes and the number of viewers. He went on to say that if television programmes are to be provided through the medium of commercial sponsored support, on lines similar to those now ruling in the States for aural programmes, then advertisers would quite naturally be justified in asking for sufficient evidence of the extent of viewing public to compensate for any material expenditure. It is the dual problem of simultaneously creating a cause and effect. First of all it was essential to create large audiences in order to give sufficient support to what would admittedly be costly programmes, and on the other hand, it was quite obvious that expensive programmes would have to be organised in order to attract a large or substantial viewing audience.

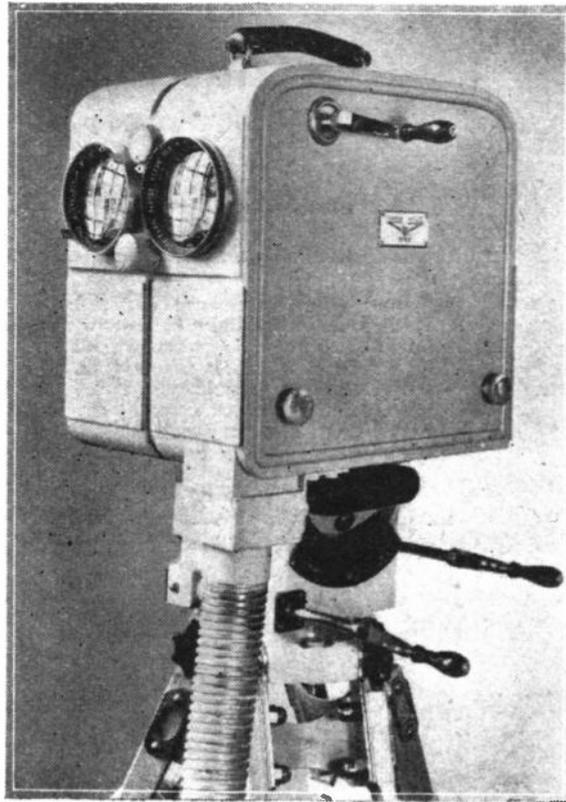
Component Parts

In an endeavour to meet this apparent state of impasse the R.C.A. propose to take a lesson from the early days of radio and create an experimental or home-constructor audience. To this end it was stated that component parts will be placed on the market in the New York and Philadelphia areas, where experimental transmissions of high-definition television are undertaken. In this way amateurs will be encouraged to build their own television receiving sets and so extend the field of viewing very materially. No doubt this decision will be watched with interest by manufacturers in this country, for there seems no doubt that home constructors within the present service area of the B.B.C. television signals would wholeheartedly welcome an opportunity of building their own sets, provided parts were available and designs published which would enable sets to be built at a reasonable cost. There are signs already that manufacturers are realising that there is a healthy market in this connection, and any extension by the release of more equipment in part form with adequate design data would be of material benefit to all.

A Standardisation Plea

Those readers of this journal who were amateur constructors in the early days of radio will remember that valves were available covering a very wide range of filament voltages that included not only the standard 2, 4 and 6 volts, but also several intermediary values which necessitated series resistances, and voltmeters, if the correct working values were to be adhered to. It introduced a measure of confusion that was only removed when an attempt at standardisation of filament voltages was undertaken,

and a reference to any modern valve catalogue will show that all the awkward valve ratings in this connection have disappeared. The increasing importance attached to cathode-ray tubes for television reception purposes is creating a big market for this particular product, but a study of the working data and rating of the different makes and types of tube will show that there is at the moment an apparent complete lack of standardisation. C.R. tube sizes range in screen diameters from 1in. to 15in., while heater volts are from



The small German mobile electron camera which has a view finder lens system similar to that used in this country.

0.6 to 6.3, and heater currents from 0.6 to 2.5 amps. While appreciating that one single rating is impossible, and that a range of screen diameters is essential, it would surely help in reducing costs if the variety of working conditions was narrowed very materially. The customer would benefit because his outlay would be reduced and the manufacturers because sales would increase. Most of the cathode-ray tube heaters at the present time derive their cathode-heater power from the mains, and exact ratings of 2, 4 and 6 volts would enable transformers to be simplified in design and be interchangeable for different makes of tube. Anode-voltage problems are certainly a little more complicated owing to the presence of multiple anodes for focusing purposes in the case of electrostatically-operated tubes, while a single anode with a high-voltage potential applied is

required in the case of electro-magnetically operated tubes. Even so, it seems incumbent upon manufacturers to endeavour to arrange for some form of a standard voltage and current supply requirements, as this would undoubtedly simplify somewhat the task of designers and effect economies in receiver costs, whether home constructed or built and sold as complete sets.

Electron Cameras

Electron cameras seem to have been very much in the news of late. First of all a certain amount of information has become available concerning the new highly sensitive form of Emitron which works on a somewhat different principle to the original type used for some time at Alexandra Palace. These first cameras relied on the direct optical image "excitation" of the mosaic wherein the light and shade of the picture released electrons from the photoelectric surface in direct proportion to the light stimulation received by each isolated element. The electronic charge lost was

replaced by electrons in the scanning beam, the restoration of each element to its equilibrium potential giving the picture signal to the first valve of the amplifier associated with the camera. The new camera, however, embodies what at first sight seems an adaptation of part of the original image-dissector tube principle. At the front of the glass cylindrical tube is a semi-transparent photoelectric cathode surface on which the scene to be televised is focused by means of the conventional optical system. The electron image so produced has an electron density at every point equivalent to the light intensity of the image to which it has been exposed. This electron image is then electrically accelerated towards the remote end of the tube and focused on to a plate by means of a solenoid coil mounted external to the cylinder's glass walls. The signal plate is a mosaic made from a secondary emissive material deposited on to the surface of a mica sheet. Owing to the established principles of secondary emission each primary electron impact on the mosaic releases an average of from eight to ten secondary electrons

which makes each element acquire a positive charge with reference to the signal plate at the back of the mica sheet. It is seen quite readily, therefore, that the value of each elemental signal is very much greater than that secured by the direct optical image method, and this gives a materially increased sensitivity to the camera as a whole, so much so that reduced illumination is necessary to give a good picture, an extremely important factor where outside television broadcasts are concerned, and the vagaries of the English climate contended with. Each mosaic element's acquired capacity charge due to the secondary electron emission is neutralised by the scanning beam of electrons in the usual manner. These new Emitron cameras mark a material step forward in improvements at the transmitting end.

A PAGE OF PRACTICAL HINTS

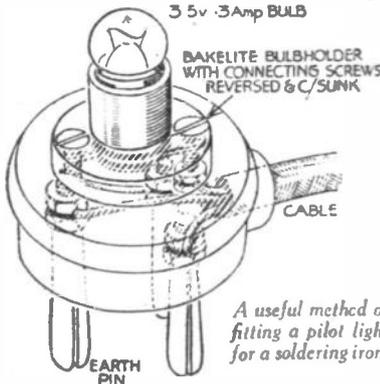
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Pilot Light for a Soldering Iron

There are, no doubt, many readers who do not know that an ordinary torch bulb is suitable as a soldering-iron pilot



A useful method of fitting a pilot light for a soldering iron.

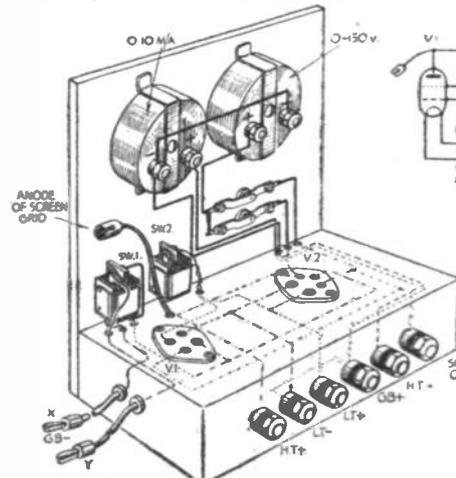
lamp. The usual electric soldering iron consumes about 50 watts, i.e., .25 amp., therefore, by using a 3.5 v. .3 amp. bulb in series, it will indicate whether the iron is switched on or off, perhaps saving considerable current at times. Readers will, no doubt, have their own ideas of fixing the bulb neatly.

The accompanying sketch shows how the bulb can be fitted to a 3-pin plug.—G. D. MUNDAY (Brighton).

A Midget-valve Tester

The necessity for a straightforward and quick midget-valve tester prompted me to design the model illustrated in the accompanying sketch, and although two valveholders only are required, five classes of valves may be tested for grid anode curves and mutual conductance.

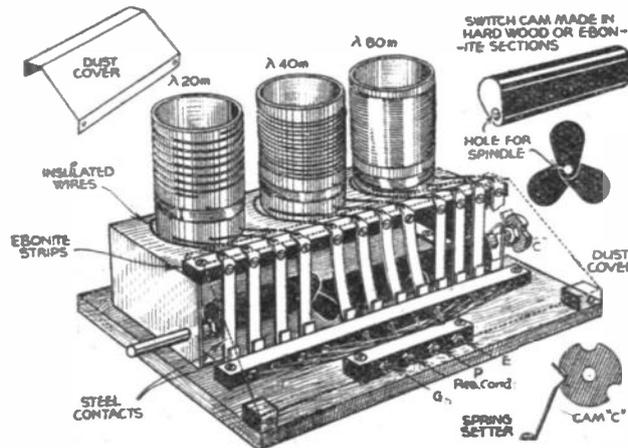
The only home-constructed parts are the two push-buttons, and the chassis is of the metallised wood type; the front panel is of ebonite, and the meters, toggle switches, 6 terminals, and two wander



Rear view and circuit diagram of a midget-valve tester.

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., Tower House, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every notion sent in must be original. Mark envelopes "Radio Wrinkles." DO NOT enclose Queries with your wrinkles.



A novel short-wave coil assembly.

plugs and fly leads, constitute the apparatus employed.

One push-button registers the anode voltage for S.G., triode, and pentode, the other registers screen voltages only. The milliammeter is inserted in the H.T. negative side thus giving not only the anode currents, but in the case of the pentode, particularly the anode current + screen-grid current, thus giving a true reading.

The mutual conductance of any of the five valves—XSG, XL, XD, XP and XY can be obtained by operating the switch S1—S2 being the on/off switch.

It will be remembered that a variation of 1 volt in G.B. will register a variation of current on the milliammeter, and the difference between the two figures in mA/V gives the mutual conductance.

The theoretical inset clearly shows the fundamentals of the circuit and its simplicity will be evident. V1 is for the XSG, XD, XL and XP, and the V2 is for the pentode XY.

The fly lead "X" is for the mutual conductance G.B. voltage difference, and "Y" for the normal G.B.—E. A. WITHERINGALE (Bolton).

S.W. Coil Unit

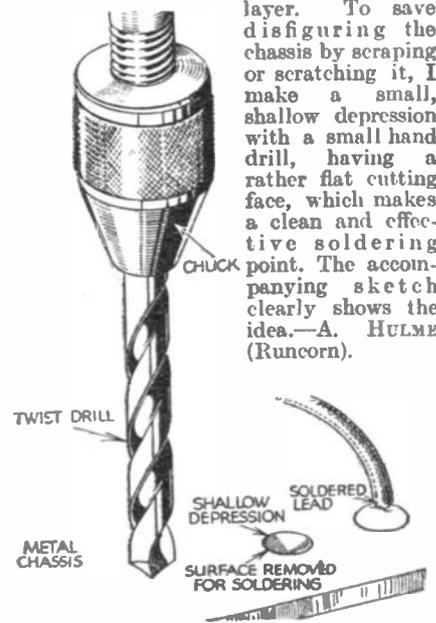
The accompanying illustrations show a novel short-wave coil assembly I built up from spare parts. The whole job did not cost me 1s. 6d. The contact arms for the switching were made from dismantled radio jacks as these have small silver contacts to improve efficiency. The operating cam is built up from pieces of ebonite or hard wood, assembled on a spindle as shown in the smaller sketches, and a set of home-made coils for the particular bands required will thus provide the listener with a most useful unit which will

be found very serviceable and will not give rise to some of the usual troubles experienced when switching is employed for short-wave sets. To protect the contacts on the switch from the effects of dust a metal cover was made and screwed in place as shown by the dotted lines, and I have had this in use for six months before I took it out to sketch it, and on examining the contacts I found they were perfectly clean—no dust, no damage through arcing.—R. D. PATE (Kirkdale, Liverpool, 4).

A Soldering Tip

With modern steel chassis, coated or plated, soldering direct is impossible without first removing this protective

layer. To save disfiguring the chassis by scraping or scratching it, I make a small, shallow depression with a small hand drill, having a rather flat cutting face, which makes a clean and effective soldering point. The accompanying sketch clearly shows the idea.—A. HULME (Runcorn).



Method of preparing a metal chassis to ensure effective soldered joints.



AS we have previously pointed out in these pages, it is possible to use an ordinary moving-coil type of loud-speaker both as a microphone and reproducer, and we have also already shown how the speaker may be switched from one position to the other. The unit described in this article utilises this principle and incorporates a two-stage A.C. amplifier, with which it is possible to obtain two-way communication over quite considerable distances and with high input sensitivity. Of course, it is possible to arrange that the speaker acts in the dual capacity without the need for a change-over switch for "Talk" and "Listen" positions, but this

is a more complicated process and will also be more expensive to construct. It is also easy to arrange that any pair of sub-stations can call each other and maintain conversation whilst other lines are in action, without interference. The unit here described, however, is of the simplest type, and will be found ideal for installation in the home so that communication may be established with five different rooms from a central point, and it will also be found of value to a business man who wishes to provide such an installation so that he may be in communication with his various offices or workshops. The illustrations show the general appearance of the finished Master

Unit, from which it will be seen that it is neat and of simple appearance and may take its place on any standard desk without being obtrusive.

The Circuit

Fig. 1 shows the circuit employed, from which it will be seen that an input transformer is provided and fed from a five-point selector switch via a special type of change-over switch. The input valve is coupled to the output pentode through a resistance-capacity unit which is incorporated for two reasons. Firstly, it is cheap and avoids troubles which might be introduced owing to the proximity of other transformers in the set, and secondly, the grid leak may be made variable so that a simple but efficient form of volume control may be utilised. The built-in speaker is provided with an output transformer which is also fed to the selector switch through the special change-over switch already mentioned. A standard mains section, consisting of transformer, rectifying valve and smoothing circuit, is fitted, and this has only one difference from the standard devices as used in radio apparatus. This consists of a split negative H.T. feed, the use of which will be explained at a later stage. The wiring diagram shows how the various parts are arranged, and it will be noted that five pairs of terminals are provided for connection to the five sub-stations. It is possible to dispense with five of these terminals by using a common earth return, but there are drawbacks to this arrangement and the saving of expense is very small.

The selector switch is a standard Bulgin

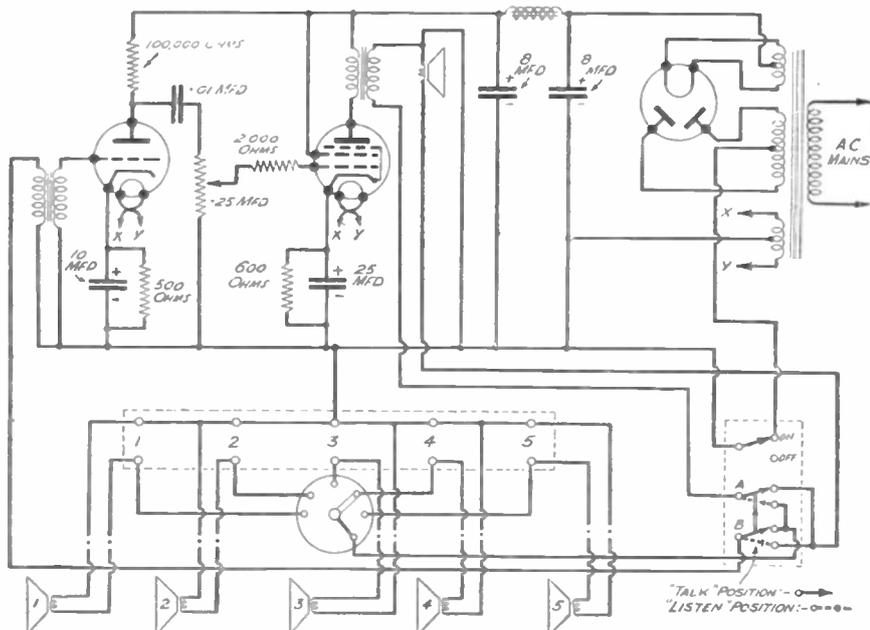


Fig. 1.—This is the theoretical circuit of the Room-to-Room Communicator, showing the switching to the five sub-stations.

om Communication

*Constructional Details of a Simple Master Unit
Designed to Operate Five Sub-stations with Two-
way Communication. By W. J. DELANEY*

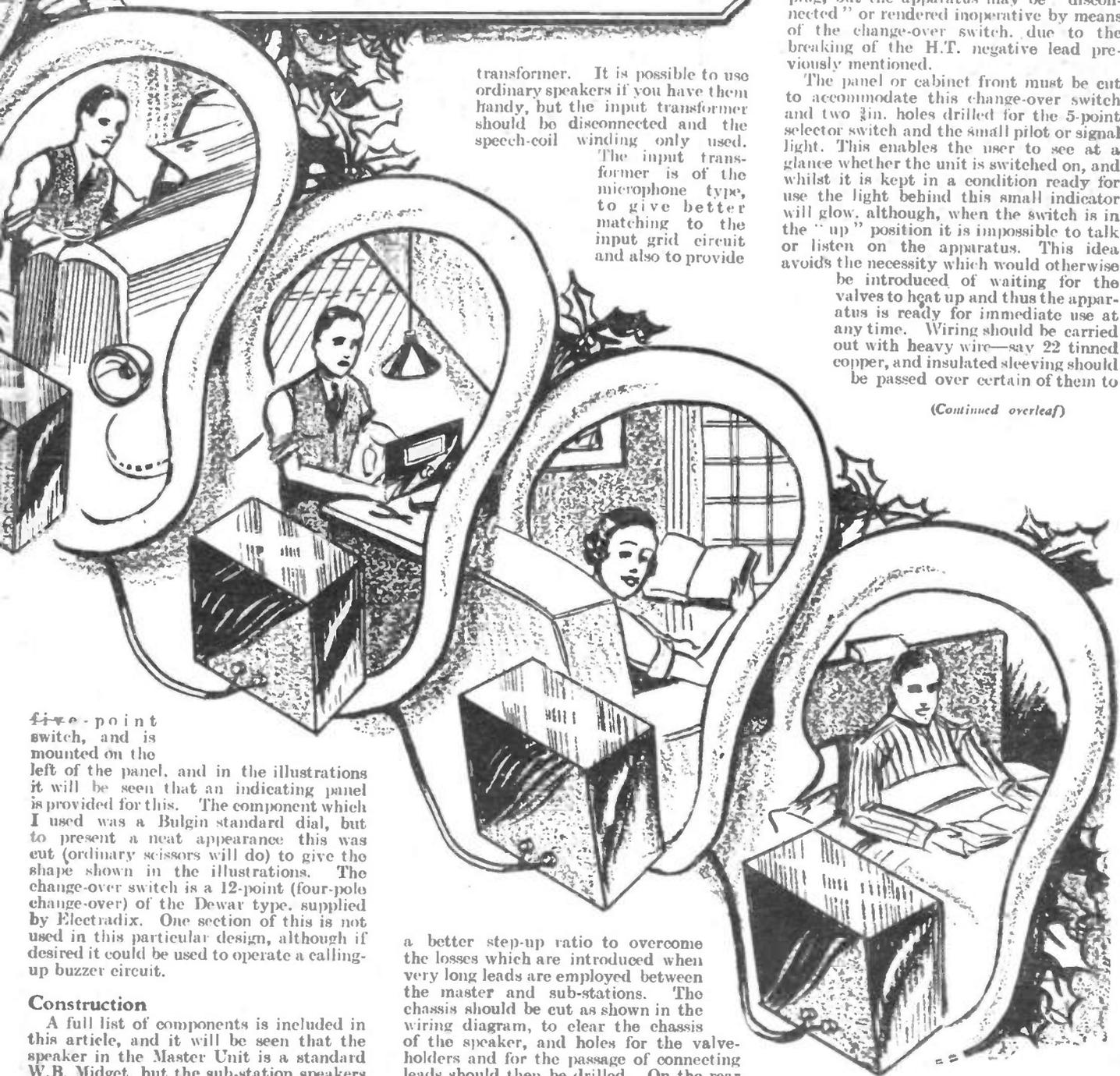
transformer. It is possible to use ordinary speakers if you have them handy, but the input transformer should be disconnected and the speech-coil winding only used.

The input transformer is of the microphone type, to give better matching to the input grid circuit and also to provide

the terminals, and a 2in. hole for the Bulgin volume control. A mains connection is shown on the other end of the rear strip, but if desired, a mains on-off switch may be placed here instead and the leads to the nearest mains socket may be permanently attached to the switch and mains transformer. In the design as published the mains must be switched on at the mains plug, but the apparatus may be "disconnected" or rendered inoperative by means of the change-over switch, due to the breaking of the H.T. negative lead previously mentioned.

The panel or cabinet front must be cut to accommodate this change-over switch and two 2in. holes drilled for the 5-point selector switch and the small pilot or signal light. This enables the user to see at a glance whether the unit is switched on, and whilst it is kept in a condition ready for use the light behind this small indicator will glow, although, when the switch is in the "up" position it is impossible to talk or listen on the apparatus. This idea avoids the necessity which would otherwise be introduced of waiting for the valves to heat up and thus the apparatus is ready for immediate use at any time. Wiring should be carried out with heavy wire—say 22 tinned copper, and insulated sleeving should be passed over certain of them to

(Continued overleaf)



five-point switch, and is mounted on the left of the panel, and in the illustrations it will be seen that an indicating panel is provided for this. The component which I used was a Bulgin standard dial, but to present a neat appearance this was cut (ordinary scissors will do) to give the shape shown in the illustrations. The change-over switch is a 12-point (four-pole change-over) of the Dewar type, supplied by Electradix. One section of this is not used in this particular design, although if desired it could be used to operate a calling-up buzzer circuit.

Construction

A full list of components is included in this article, and it will be seen that the speaker in the Master Unit is a standard W.B. Midget, but the sub-station speakers should be of the same type, without input

a better step-up ratio to overcome the losses which are introduced when very long leads are employed between the master and sub-stations. The chassis should be cut as shown in the wiring diagram, to clear the chassis of the speaker, and holes for the valve-holders and for the passage of connecting leads should then be drilled. On the rear chassis strip ten holes should be drilled for

(Continued from previous page)

avoid possibility of short-circuits. The wiring is very simple and the only point which might introduce difficulty is the change-over switch. The cross-connections should be made before the switch is mounted as the contacts will otherwise be found rather inaccessible.

Using the Apparatus

When wiring is completed the unit should be tested out to make certain that the connections are correct. The valves should light up (with the signal light) when the mains switch is in the "on" position, and the right-hand lever switch should be pushed

(Continued on opposite page)

WIRING DIAGRAM

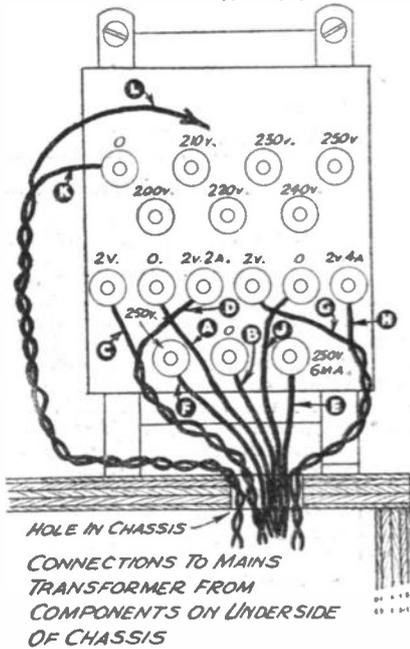
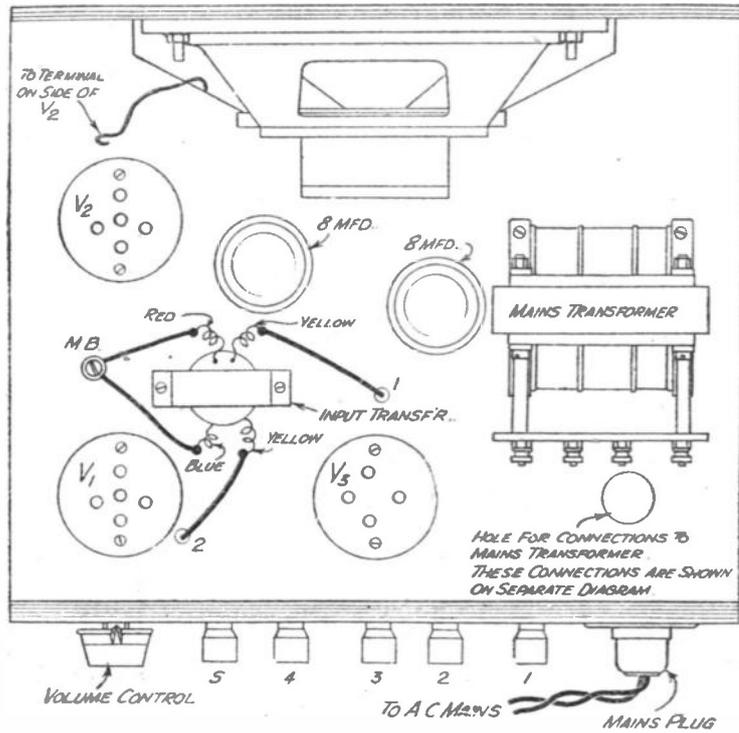
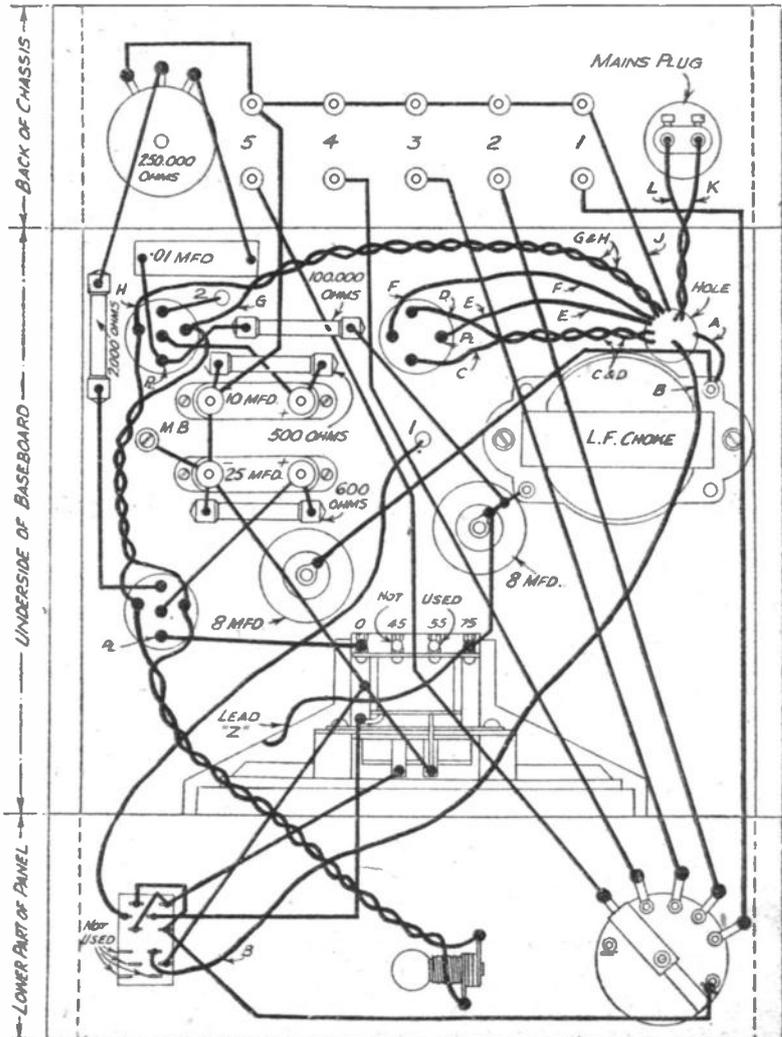


Fig. 2.—This diagram shows the connections to the mains transformer, and must be read in conjunction with the wiring diagram on the right.



LIST OF COMPONENTS

ROOM - TO - ROOM COMMUNICATOR (3-WAY)

- Two 8 mfd. electrolytic condensers, type 502 (T.C.C.).
- One 10 mfd. electrolytic condenser, type 521 (T.C.C.).
- One 25 mfd. electrolytic condensers, type 511 (T.C.C.).
- One .01 mfd. fixed condenser, type 300 (T.C.C.).
- One 100,000 ohm 1 watt resistor (Dubilier).
- One 2,000 ohm 1 watt resistor (Dubilier).
- One 500 ohm 1 watt resistor (Dubilier).
- One 600 ohm 1 watt resistor (Dubilier).
- One L.F. smoothing choke (B.T.S.).
- One volume control .25 megohm, type V.C.62 (Bulgin).
- One mains connector, type P.20 (Bulgin).
- One 5-way rotary switch, type S.119 (Bulgin).
- One signal light, type D.19 (Bulgin).
- One mains transformer, type E.P.20 (Varley).
- One microphone transformer (Bulgin).
- 10 terminals (5 red, 5 black) (Clix).
- One four-pole Dewar switch, type 81 (Electradix).
- One chassis, 10in. by 8in., metallised surface (Peto-Scott).
- One cabinet (Peto-Scott).
- One 41 MHL valve } (Cossor).
- One MP/pen valve }
- One 506 BU valve }
- One Midget Stentorian speaker, type 37M. (W.B.).

SUB-STATIONS

- One Midget loudspeaker, type 37M. without transformer (W.B.).
- (One each for each sub-station).
- Cabinet to suit above, and to harmonise with room furnishings (Peto-Scott).

(Continued from opposite page)
 into the up, or "off" position. If leads are not connected to the five pairs of terminals, when the right-hand switch is

to the distant point to which he wishes to speak. An ordinary conversational tone may be adopted, and there is no need to raise the voice. When he has spoken

and wishes to hear a reply, the right-hand switch is depressed, and held in position. On this model the switch remains in an "off" or "talk" position only, and thus to hear signals from any of the sub-stations the lever has to be held. If the apparatus is to be used by a business man who is anxious to eavesdrop on his various offices, the inconvenience of holding the switch down to listen may be overcome by changing round the wiring to the two bridged pairs of contacts on the switch, in which case the normal central position will be "Listen" and it will have to be depressed to talk. If, in the case of any special announcement, it is desired to talk to all five sub-stations at once, this may be done by bridging all of the five terminals at the rear by means of a piece of bare wire.

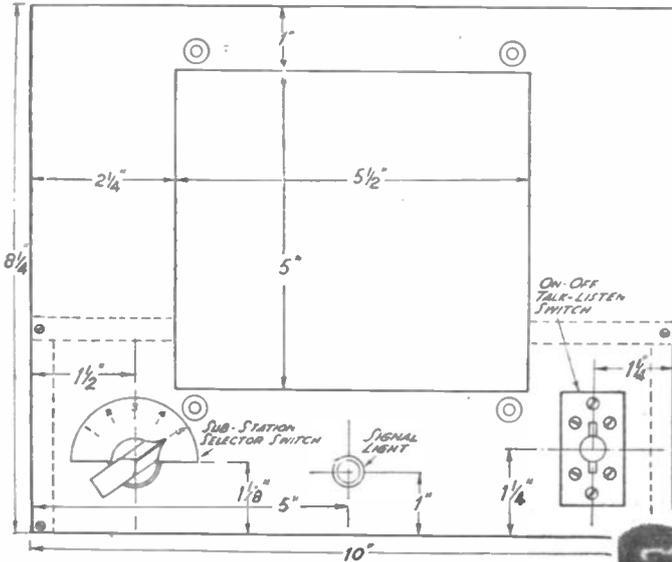
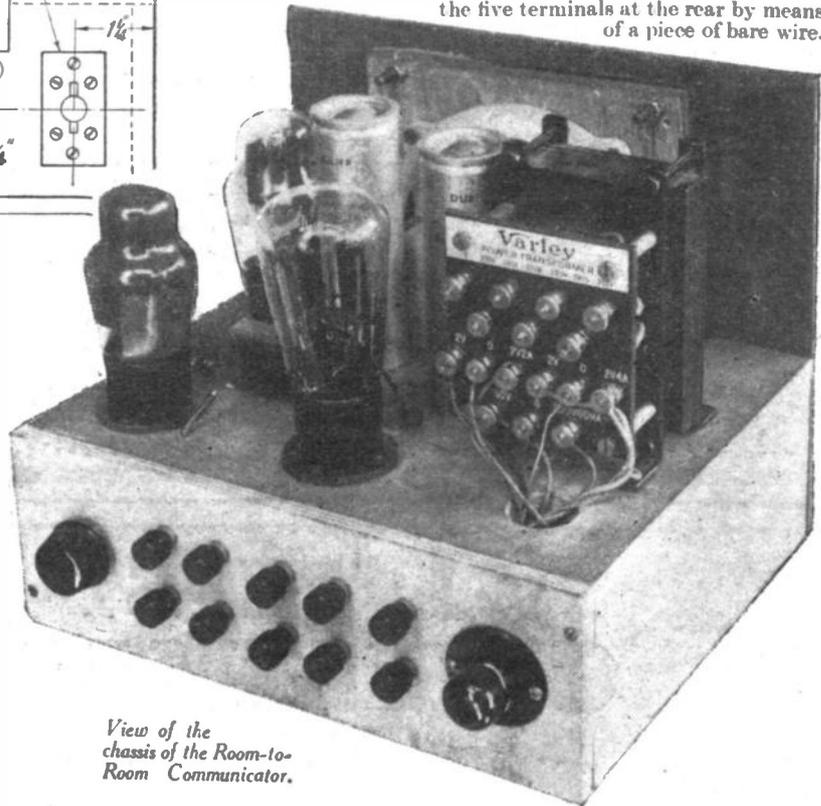


Fig. 3.
 Panel dimensions for cutting the cabinet front.

pushed down, the speaker on the Master Unit should hum, showing that the switch is operating correctly. The sub-units or stations consist merely of the small speakers and these may be mounted in small cabinets, or simply placed in a convenient position in the room. They need not be placed close to where a person sits, and may be tucked away in any convenient position as they will pick up the normal conversation volume of a person in even a very large room although not pointing at the person. Ordinary twin bell-wire may be used for wiring between master and sub-stations, and if a common earth return is employed the lead to one side of the speech coil on the distant speaker should be connected to the nearest earth point. An earth wire must then be attached to one of the terminals on the rear of the Master Unit which are shown connected together in the wiring diagram.

In use, the user of the Master Unit simply pushes the change-over switch down to a horizontal position and turns the 5-point switch to the number corresponding



View of the chassis of the Room-to-Room Communicator.

XMAS TELEVISION PROGRAMMES

THE Christmas television programmes, which open on December 20th, will, it is hoped, be representative of the best yet radiated from Alexandra Palace. The season begins with a display of Christmas toys in the afternoon and evening programmes on December 20th. "The Ghost Train," Arnold Ridley's thriller, will be performed on the same afternoon.

The afternoon programme on December 21st will include a star production of "Hundred Per Cent. Broadway," Cecil Madden's all-American cabaret show with David Burns and the Merriell Abbott Girls from the Dorchester. Arthur Marshall, the "school-mistress" broadcasting star, will make his television debut in the afternoon on December 22nd, and the "Picture Page" programmes on that day will have a special Christmas flavour.

"Hansel and Gretel," Humperdinck's fairy-tale opera, will be televised in the evening programme on December 23rd, and the leading parts will be taken by children acting in mime with vocal accompaniment "offstage." The B.B.C. Television Orchestra, conducted by Hyam Greenbaum, will be specially augmented for the occasion. On Christmas Eve, Jack Payne and his Band will appear in both the afternoon and evening shows.

A Christmas edition of "Coffee Stall" will be televised in a snowstorm on the same afternoon.

Christmas Day

Christmas Day programmes will open with a short address by the Rev. Pat McCormick. Viewers will then be taken into Alexandra Park for a football match between the Alexandra Palace Football Club and a Welsh team. On Christmas evening Harry Pringle will

introduce a Music Hall Cavalcade with old-time artists. The studio will be decked out as an Edwardian music hall and an audience will be present. On Boxing Day Reginald Smith hopes to present a television pantomime.

Mr. Gillie Potter will be among the stars making solo appearances in the Christmas programmes. He will be seen in the evening programme on December 20th and again in the afternoon programme on Christmas Day. Noni, the clown, and his partner, who visited Alexandra Palace in the early days of television, will make a joyful re-appearance in the afternoon programme on December 23rd. It is hoped that Lydia Lopokova, the celebrated ballerina, will appear in the different rôle of story-teller on December 23rd, recounting the adventures of Little Red Shoes in the afternoon programme. In the evening programme on the same day, Marcel Boulestin, the cookery expert, will explain how wine should be served. Irène Prador, the Viennese soubrette, who is one of the first stars created by television, will sing German, French and English songs in the evening programme on December 24th, and again on Christmas night. On Christmas Eve, Nicholas Bentley will draw cartoons.

TUNGSRAM VALVES

specified for the Practical Wireless "Rapide Straight 3"

In the specifications of the PRACTICAL WIRELESS "Rapide Straight 3," given in this issue, are included two Tungfram L.D. 210 valves, and one L.P. 220.

The former are battery detector valves and the latter a low consumption power valve.

The selection of these valves by PRACTICAL WIRELESS is a striking testimonial to Tungfram's reputation for quality and reliability. They are only two of the exceptional range of Tungfram valves, which includes both British and American types, pin and octal bases.

TUNGSRAM Barium VALVES

MANUFACTURED AT
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"THE VALVE WITH THE NAME BEHIND IT!"

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Here are the Biggest and Best Christmas Magazines you can buy—packed with Tip-Top Christmas Reading-Stories and articles by famous Writers and Popular Humorists. Laughable Drawings and Cartoons by Leading Artists on practically every page.

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Capture the Spirit of Christmas with these Special Christmas Numbers.

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EACH

Of all Newsagents and Bookstalls.



Building the "Rapide" Straight 3

An Easy-to-Build Detector-Two-L.F. Receiver which is Especially Suitable for the Beginner. The Performance is Extremely Good Despite the Moderate Cost
By FRANK PRESTON

THE so-called "straight three," by which is generally meant a detector valve followed by two low-frequency stages, is apparently as popular as ever with home constructors. The first complete receiver that I described in these pages was of this general type and proved to be very satisfactory. This time I am going to deal with a simpler type of set, but nevertheless one that is particularly efficient. It is not supposed to have any revolutionary features; there is no claim that it will receive many hundreds of stations; but it is a completely sound job that can be built and operated successfully by the newest constructor.

Metallised Baseboard

In order to simplify construction to the greatest possible extent, I have used a flat baseboard, as you can see from the accompanying illustrations. That is not a retrograde step, because the components have been carefully chosen to suit this form of construction. By having a flat baseboard, wiring is simplified, especially for the beginner who has to follow every wire on the wiring plan and strike it through as it is fitted into the set. Further, to enhance simplicity of construction, the baseboard used is fairly large. This makes the complete assembly less compact than it might have been, but at the same time it leaves more room for the wiring and leaves all terminals accessible.

When the receiver was first decided on

it was considered important that cost should be kept down to reasonable limits, but that there should be no "cutting" of components. As a result, the complete kit of specified parts, exclusive of valves, batteries and speaker, costs well under 50s. In spite of the low initial cost, every component is of thoroughly sound design and construction, and every item in the list can be relied upon to give trouble-free service.

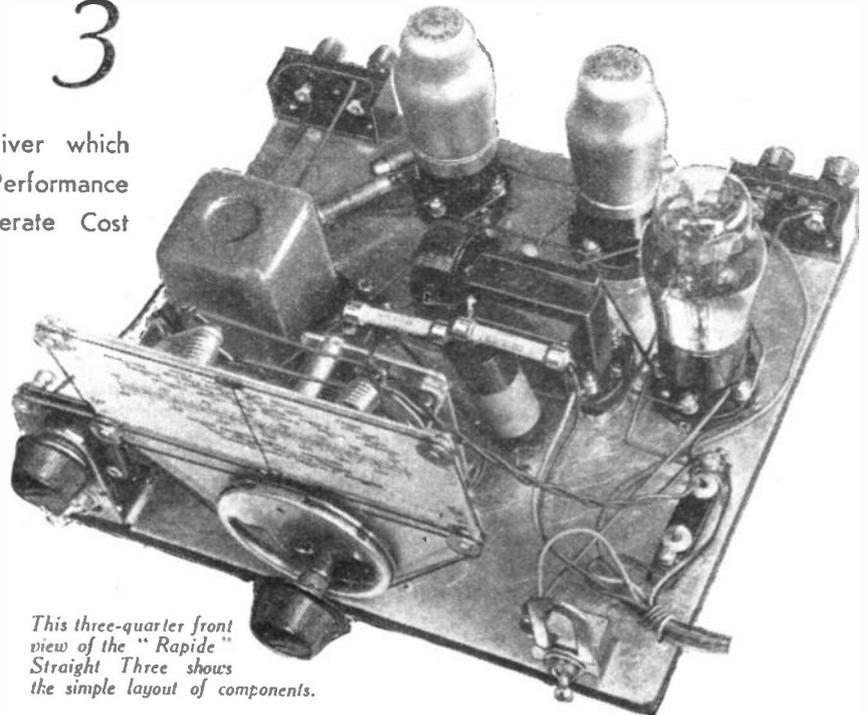
Circuit Details

The two-range screened coil is of modern design, with separate aerial, grid and reaction windings. Additionally, the aerial winding is tapped so that a portion

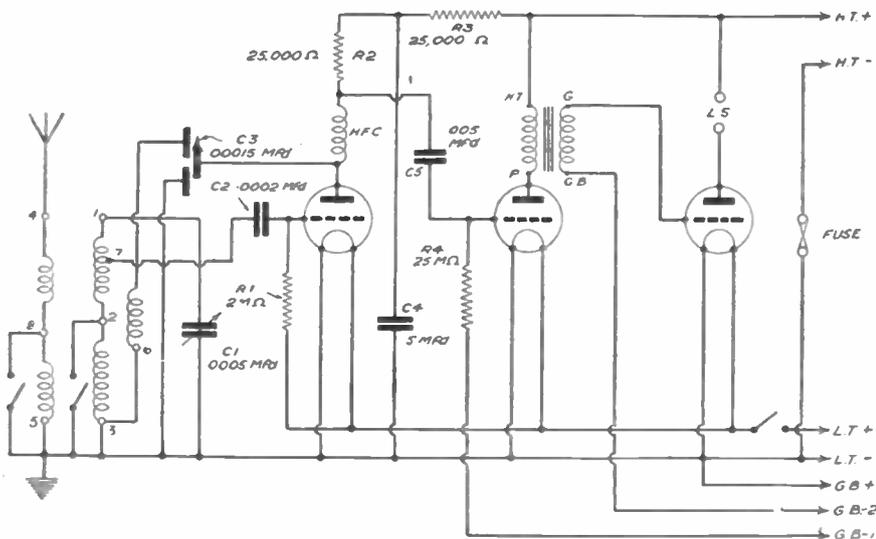
can be short-circuited to ensure maximum efficiency on the medium-wave band. This inexpensive coil provides a very satisfactory degree of selectivity without efficiency being sacrificed to any noticeable extent. A differential reaction condenser is used to ensure smooth reaction control in conjunction with the detector valve.

Resistance-capacity coupling is used between the detector and the first L.F. valve, and the detector anode circuit is decoupled. The second valve is designated L.D.210, and it makes a very good low-frequency amplifier, as well as being an efficient detector. It gives slightly more amplification than does the average L.F. type of valve, and it has a low anode current consumption. The latter is important, not only because it reduces running costs, but because it permits the effective use of a small and inexpensive L.F. transformer. As the anode current requirement of the L.D.210 is well under 2 mA at 120 volts and appropriate grid bias, there is no danger of the transformer primary winding being overloaded or of the iron core being saturated. This means absence of distortion in the L.F. coupling circuit.

For the last valve an L.P.220 is specified. This is a small-power valve with a fair handling capacity, able to do justice to the full output from the first L.F. stage. It can be operated with 120 volts H.T. and 6 to 7½ volts grid bias to pass only about 5 mA high-tension current. In consequence, the total H.T. current drain can be kept down to between 7 and 8 mA, so that the least expensive dry battery will have a reasonably long life. It is true that rather greater output can be obtained, particularly from the local stations, by using a rather lower G.B. voltage on the output valve, but if that is done a double-capacity type of H.T. battery is to be



This three-quarter front view of the "Rapide" Straight Three shows the simple layout of components.



Theoretical circuit diagram of the "Rapide" Straight Three.

preferred. In fact, a large-capacity battery is always an economy in the end, since it gives considerably longer useful service.

It will be seen from the circuit that a fuse is included in the H.T. negative lead to safeguard the valve filaments in case of wrong battery or wiring connections. As the fuse costs only a few pence, the security which it affords merits the small cost.

Component Specification

So much for the main circuit details. A list of components is given below, and it is strongly advised that this be followed closely. You might feel inclined to buy a cheaper condenser drive, but by so doing you would sacrifice a good deal of ease in operation and simplicity of construction. Besides, you would probably have to forgo the benefits of the station-calibrated scale, which is sufficiently accurate to simplify very considerably the choice of transmissions. The two quick-make-break switches specified have solder-tag connections, but similar switches with terminals can be obtained if there is any objection to soldering. Thus, the S.80T could be replaced by the S.80, which costs 3d. more, and the S.123 could be replaced by the S.88, which costs 3s. as against 2s. 6d.

Order of Mounting Components

The arrangement of the components on the baseboard is clearly shown on the right which is the wiring plan. It is best to duplicate the layout since the "key" components have been placed in such positions that short and very direct connections can easily be made; this is in the interests of efficiency. For example, the coil is close to the wave-change switch, tuning condenser, reaction condenser and grid terminal of the first valveholder. In the same way, the H.F. choke is close to the anode terminal of the detector valveholder, while the L.F. transformer is between the second and third valveholders.

Despite the simplicity of layout, it is wise to follow a systematic method in mounting the various parts. First place them all in the approximate positions indicated in the plan. Faint pencil lines can then be drawn round them if "Metaplex" is used for the baseboard; if you prefer to use aluminium-covered ply-board—which gives a rather more professional finish—the marking can be carried out by pressing the point of a scriber through the mounting-screw holes. An alternative suggestion is made concerning the baseboard material because the aluminium-covered material is not quite as easy to deal with, due to the fact that holes must be made through the aluminium covering with a drill before the screws can be inserted. When using the "Metaplex" it is sufficient to make small "starting" holes with a bradawl.

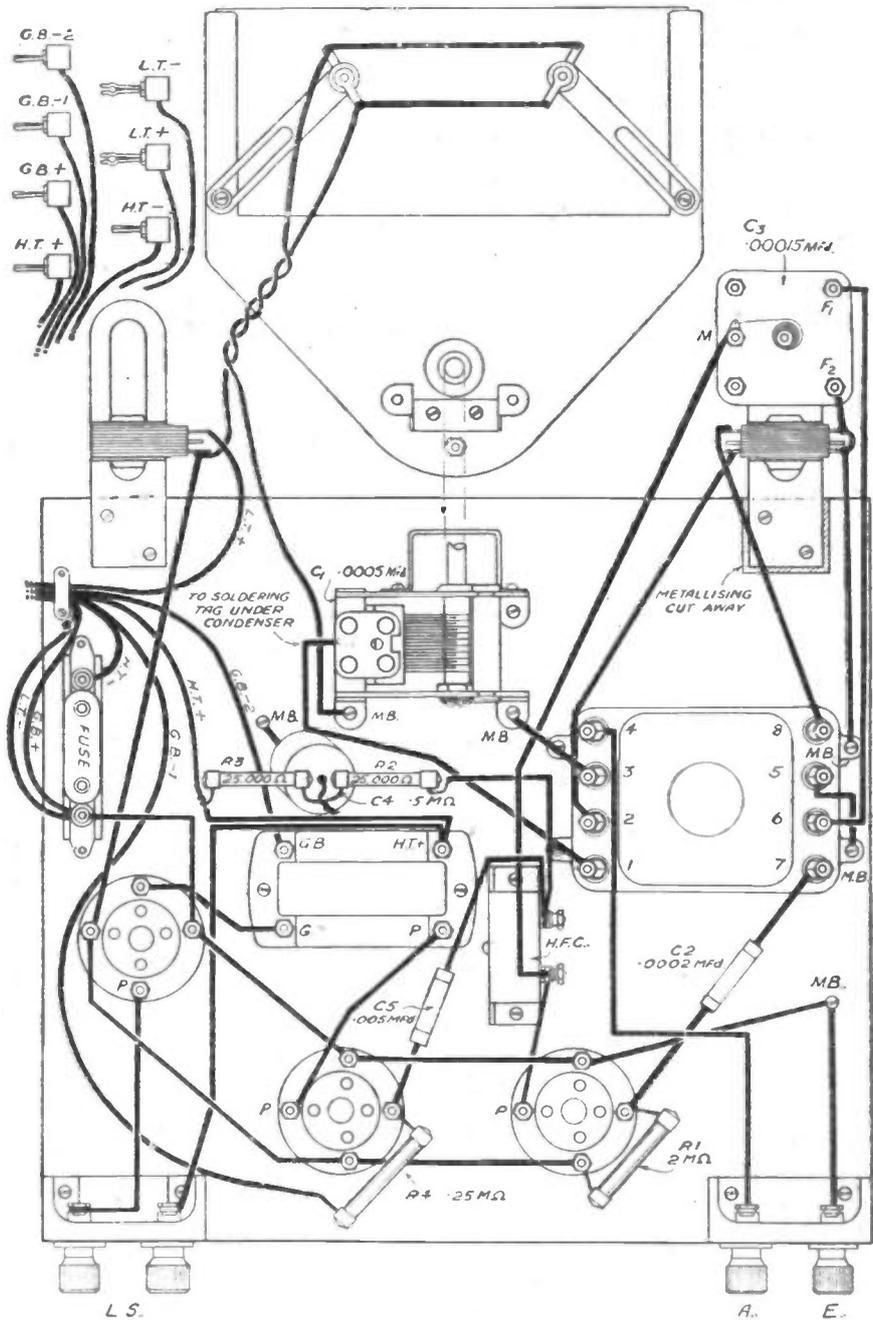
Safety Precaution

A square of metallising or aluminium must be cut away beneath the bracket carrying the reaction condenser, the spindle of which is connected to the moving vanes and the detector anode.

Before any components are mounted, the drive should be fitted to the condenser and a short length of connecting wire should be attached to the soldering tag that comes on the underside when the component is screwed down—this tag is not accessible after the condenser has been fixed in place. It is best to solder the wire, but it can be attached by hooking it through the hole in the tag and nipping up the loop with a pair of pliers.

(To be continued.)

Wiring Diagram of the "Rapide" Straight Three



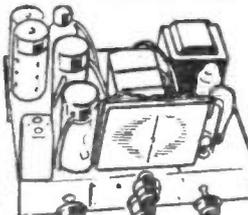
LIST OF COMPONENTS—"RAPIDE" STRAIGHT THREE

	s.	d.
1 Metallised baseboard, 10in. by 9in.—Peto-Scott	1	6
1 "Unigen" coil—Wearite	5	0
1 .0005-mfd. baseboard mounting condenser—Polar No. 5	4	6
1 Condenser drive with station names—Polar V.P. horizontal	6	6
1 .00015 mfd. differential condenser—Polar	3	0
3 baseboard mounting valveholders—W.B. rigid	2	0
1 H.F. choke—British Television Supplies: type 600	2	6
1 3/1 L.F. transformer—British Television Supplies	4	6
2 Component mounting brackets—Peto-Scott	0	8
1 On-off switch—Bulgin S.80.T	1	6
1 Double-pole on-off switch—Bulgin S.123	2	6
4 Fixed resistors—2 meg.; .25 meg. and two 25,000 ohm.—Dubilier 1 watt	4	0
3 Fixed tubular condensers—.0002 mfd.; .005 mfd. (type 300), and .5 mfd. (type 250)—T.C.C.	3	0
2 Terminal mounts—Belling-Lee	1	0
4 Terminals marked A, E, L.S., L.S.—Belling-Lee	1	2
5 Winder plugs marked H.T.+, H.T.—, G.B.+, G.B.—1, G.B.—2—Belling-Lee	0	10
2 Spade terminals marked L.T.— and L.T.+—Belling-Lee	0	4
1 fuse and holder, 100 mA.—Microfuse	1	6
Connecting wire, screws, flex, etc.	2	6
1 L.D.210 metallised valves—Tungram	7	6
1 L.P.220 valve—Tungram	4	9
1 120-volt H.T. battery—Drydex		
1 9-volt G.B. battery—Drydex		
1 2-volt accumulator—Exide		

Peto-Scott — for REAL XMAS BARGAINS

BARGAINS that ARE Bargains
Peto-Scott's 20 years' trading is your guarantee of satisfaction!

6-valve All-Wave A.C. SUPERHET



List Value : £9:0:0
OUR PRICE £7:19:6

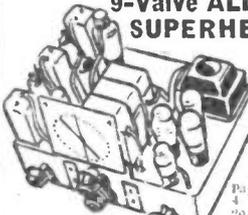
Cash or C.O.D., or 17/6 down and 11 monthly payments of £1 10s. 10-21, 20-34, 200-550, 900-2,000 metres.

Rationalised tri-mit construction. 6 octal base valves; pre-I.F. Selector, radio frequency amplifier, triode-hexode frequency changer, bandpass I.F. transformer, I.F. amplifier, double-diode triode, phase reversing, output power pentode. With 6 British valves, knobs and escutcheon. For A.C. Mains 200-250 volts, 40-80 cycles.

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17/6 DOWN

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List Value £15:19:6
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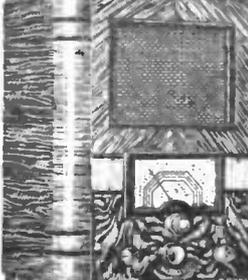
Cash or C.O.D., or 27/6 down and 11 monthly payments of £1 3s. 10-21, 20-34, 200-550, 900-2,000 metres. Rationalised tri-mit construction, 9 octal base valves; pre-I.F. selector, radio frequency amplifier, triode-hexode frequency changer, 2 I.F. Amplifiers, bandpass transformer coupled to double-diode triodes providing rectification, automatic volume control and low frequency amplification, followed by phase reversing valve, 2 A.F. power pentodes, 7-watts audio output. With 9 British valves, knobs and escutcheon. For A.C. Mains 200-250 volts, 40-80 cycles.

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EXCEPTIONAL XMAS OFFER - BARGAIN ALL-WAVE FOUR BAND S.G.3

LIST PRICE £9:15:0 **OUR PRICE £6:19:6**



- 14-31, 28-62, 200-550, 900-2,100 metres
- Variable-Mu H.F. Pentode Detector
- Hartley Distortionless Output Pentode Valves
- 8-1 and 100-1 Slow-motion Drive
- Full vision Dial
- Beautiful Walnut Veneered Cabinet Illustrated.

This Peto-Scott all-wave technical triumph will bring you stations galore from every part of the world. Screened coils. "Tone compensated" moving-coil speaker. Complete with 3 British valves and 18 batteries.

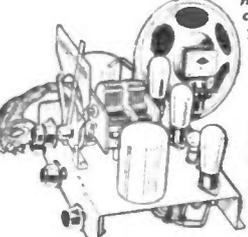
List Price £8:15:0, Bargain £6:19:6 or 5/- down and 18 monthly payments of 8/6.

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ONLY A FEW AVAILABLE - AMAZING BARGAIN - BROADCAST S.G.3 CHASSIS

With Knobs and escutcheon, less valves. LIST VALUE £2:2:0
OUR PRICE 21/-



CASH OR C.O.D.

- S.G.3 Circuit.
- Screened coils.
- Wavelength dial, 200-2,100 metres.
- Wide choice British and Foreign stations.

CHASSIS and VALVES as described and illustrated above but less speaker. List value £4:4:0. Bargain 39/6 or 2/6 down and 11 monthly payments of 3/6.

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D-XMASTER KIT "A"

CASH or C.O.D. £3:15:0 or 7/- down
C.O.D. £3:15:0 or 7/- down and 11 monthly payments of 7/-.

Comprises complete kit of specified parts, ready drilled plymax chassis and including all necessary screws, connecting wire and flex, but less valves. Cash or C.O.D. £3:15:0 or 7/- down and 11 monthly payments of 7/-.

If set of specified valves required add £12/9 to Kit VALVES. Price or 2/2 to deposit and each payment. Orders value over £1 sent post charges paid.

KITBITS

- 1 B.T.S. I.F. Transformer 4/6
- 1 Peto-Scott Plymax Chassis ready-drilled 6/6
- 1 Varley 2-band coil unit Type B.P.114 13/6
- 1 J.B. 2-band condenser-Bar Type 12/-
- 1 J.B. Slow-motion Drive No. 2134 5/9

RAPIDE STRAIGHT 3 KIT "A"

CASH or C.O.D. £2:9:6 or 4/6 down
C.O.D. £2:9:6 or 4/6 down and 11 monthly payments of 4/6.

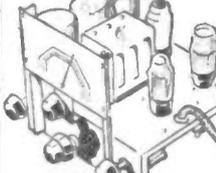
Comprises complete kit of parts as specified with Metaplex base-board and includes all necessary screws, wire flex, etc., but less valves. Cash or C.O.D. £2:9:6 or 4/6 down and 11 monthly payments of 4/6.

If set of specified valves required add 12/3 to Kit VALVES. Price or 1/2 to deposit and each weekly payment. Orders value over £1 sent post charges paid.

KITBITS

- 1 B.T.S. Type 900 Reaction Choke 2/6
- 1 B.T.S. Type I.T. 135 I.F. Transformer 4/6
- 1 Peto-Scott Metaplex Baseboard 1/6
- 1 Polar No. 5 condenser and V.P. drive 11/-

XMAS BARGAIN KITS - ALL-WAVE BATTERY S.G.3 KIT



Wavelengths 14-31, 28-62, 200-550, 900-2,100 metres. Illustrated on the left is the assembled Peto-Scott All-Wave S.G.3 Kit. Efficiency, economy and simplicity of construction and operation are the keynotes of this modern to-the-minute circuit.

LIST PRICE £4:9:3 **OUR PRICE £3:3:0** or 5/- down
S.W. ADAPTOR CONVERTER KIT LIST PRICE £1:14:4 **OUR PRICE £1:5:0** or 2/6 down
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BATTERY STRAIGHT 3 ALL-WAVE KIT LIST PRICE £3/2/0 **OUR PRICE £2:5:0** or 4/- down

All the above mentioned Kit Prices are less valves and are fully described in the Peto-Scott Radio and Television Catalogue sent FREE on request.

3/6 DOWN

A MERRY XMAS is yours with this amazing new Peto-Scott HOME BROADCASTER

GET OVER YOUR "MIKE-FRIGHT!" Croon to your heart's delight... produce at will the Family Ghost... make THIS YEAR'S PARTY the MERRIEST YET! Attach the Peto-Scott "Home Broadcaster" to the pick-up sockets of your existing receiver, whether battery or A.C., and your own broadcasting station is instantly ready to amplify the individual efforts with that professional touch to which we are all accustomed. Everyone hears everything with the aid of the Peto-Scott Home Broadcaster. Running costs are nil and you've nothing more to buy. Supplied to you absolutely complete and ready for immediate use. 2/6 down and 9 monthly payments of 3/-.

CASH OR C.O.D. **21/-**
2/6 down and 9 monthly payments of 3/-



PETO-SCOTT CROONERS AND DANCE BAND OUTFIT for amateur or professional crooners, dance bands, soloists, electricians, and announcements of all kinds. This high grade outfit reproduces speech and music with perfect clarity and is clearly audible up to 500 feet.

This marvellous outfit comprises Peto-Scott professional type transverse current microphone and transformer, 7-watt A.C. Mains High Fidelity Amplifier, Peto-Scott High Fidelity moving-coil speaker, braided microphone lead, and cable for loud-speaker extension (send for leaflet 18/81).

CASH OR C.O.D. Carriage Paid £8:10/-, or £1 down and 11 monthly payments of 15/9.

1938 STENTORIAN SPEAKERS

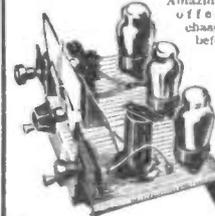
Model 388. Cash or C.O.D., Carr. Pd., £2:2:0, or 2/6 down and 11 monthly payments of 4/-.

Model 387. Cash or C.O.D., Carriage Paid, £1:12/6, or 2/6 down and 11 monthly payments of 3/-.

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STRAIGHT 3 CHASSIS - LIST PRICE 45/- BARGAIN 29/6



Amazing Peto-Scott offer! Each chassis tested before dispatch.

CIRCUIT COMPRISES detector reaction, followed by R.C.C. and triode super-power output stage. Metal chassis. Slow motion tuning. Dial calibrated degrees. 200-2,000 metres. Low H.T. consumption. Complete with 3 British valves, all knobs and escutcheon. Cash price 29/6 or 2/6 down and 11 monthly payments of 2/9.

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H.T. for 1d. a Week! - Peto-Scott H.T. ELIMINATORS



Cost only a penny a week to run!

Model A.C.12 Eliminator. Suitable for sets operating on an output of up to 12 m.A. A.C. 200-250-v., 40-100 cycles. Output 120-v. at 12 m.A. 4 tappings: 60-v., 75-v., 90-v. and 120-v. Cash or C.O.D. Carr. Pd. **30/-**

Or 2/6 down and 10 monthly payments of 3/-.

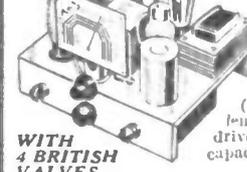
Model MA 10, 30 Eliminator and TRICKLE CHARGER. £2:19:6, or 5/- down and 11 monthly payments of 5/6.

Model A.C.25. Suitable for O.P.P. and Class B operation on outputs up to 25 m.A. H.T. Tappings. Screen Detector and Power Output 25 m.A. at 150v. For A.C. Mains 200-250 volts. 50-100 cycles. Incorporates Westinghouse Rectifier. Cash or C.O.D. Carriage Paid **£2:9:6**

Peto-Scott TRICKLE CHARGER for 2-watt accumulator at 1 amp. Metal rectifier. Air-cooled transformers. A.C. mains 200-250 volts, 40-100 cycles. Cash or C.O.D. **10/-**.

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ASTOUNDING XMAS BARGAIN - 4-VALVE A.C. ALL-WAVE CHASSIS



3 WAVEBANDS 18-52, 200-550, 900-2,100 metres

Band-pass tuning; Full-vision illuminated dial (stations and wavelengths); Slow-motion drive; Rotary low capacity switch.

WITH 4 BRITISH VALVES

LIST VALUE £7:15:0 **OUR PRICE £4:19:6**

BRIEF SPECIFICATION: 4 British valves, variable-mu H.F. Pentode, Screened Grid Detector, High Efficiency Output Pentode and Rectifying valves, Steel Chassis, Sensitivity and Volume Control, 3 Watts undistorted output. Gramophone Pick-up Sockets. For A.C. Mains only, 200-250 volts, 40-100 cycles. CASH OR C.O.D. CARRIAGE PAID, £4:19:6, or 7/6 down and 12 monthly payments of 8/6.

Or with High Fidelity 2,500 ohms Energised Moving-Coil Speaker, £5:19:6 or 7/6 down and 12 monthly payments of 10:4.

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Please send me..... for which I enclose £..... Cash/H.P. Deposit.

Please send also the Peto-Scott Radio and Television Catalogue and the Pilot "Short-Wave Experimenter," describing 8 new PILOT Short Wave Kits. I enclose 2d. (stamp) to cover postage.

NAME.....

ADDRESS.....

EST. 1919

All P.O.'s must be crossed and currency registered.

RADIO CLUB REPORTS

(See also page 358 for further Club Reports.)

PROPOSED CLUB FOR PORT ISAAC

IT is proposed to form a Radio Club at Port Isaac, Cornwall, and any readers residing in the district, and who are interested in the idea, are invited to get in touch with Mr. J. W. Rowe, 3, Alma Place, Port Isaac, Cornwall.

NEWCASTLE RADIO SOCIETY

THE above Radio Club was formed on April 18th, 1937, to further the science of radio, to increase the knowledge of members, to cover all aspects of Radio Theory and Construction, and to make wireless construction and listening more interesting, as well as instructive.

The newcomer to Radio will be given tuition in constructional work and theory, while the experienced members find pleasure in teaching, and the advanced

most of them-elves through the facilities of this Society.

Demonstrations, lectures, visits to places of interest are included in the programme, and instruction in Morse code is given in the final half-hour of every meeting. One of the aims of this club is to have a transmitter installed, built by the members as funds allow.

Competitions and co-operation with other clubs throughout the country are other items to add to members' interest. The headquarters have ample accommodation.

The present entrance fee is 1s., and the weekly subscription, 6d.—until sufficient members have enrolled to reduce these fees enabling the club to be self-supporting.

SHEFFIELD SHORT-WAVE CLUB

THE above club has been re-located in new premises in Ebenezer St., Shalesmoor. Meetings are held every Wednesday at 8 p.m., and special meetings for classes, etc., will be held on other nights. Various pieces of apparatus are being set up for use of the members, including oscillators, receivers, resistance and capacity bridges, etc., and very shortly an artificial aerial transmitter will be installed.

Morse classes are held regularly now, as well as classes for beginners, and for set building. We shall be glad to see any readers of PRACTICAL AND AMATEUR WIRELESS at the meetings, and any further details can be obtained from the Hon. Sec., D. H. Tondia, 32, Moor-side Avenue, Sheffield, 10. Subscriptions are 10s. per year, payable quarterly.

PARTY LIGHTS

OSRAM "Party Lights" and Christmas Tree outfits can be used very effectively for adding to the Christmas atmosphere.

These "Party Lights" with their coloured shades representing English nursery rhymes are certain to be in wide demand. They are non-inflammable, and translucent, and are supplied in assorted colours, complete with twelve 19-volt 3-watt cone type Osram lamps, one spare, substantial flex (braided in three colours to match the bakelite lampholders) complete with adaptor for attaching to lampholder.

The popular Osram Christmas Tree Outfits consisting of twelve 19-volt 3-watt lamps in assorted colours, and the small illuminated Christmas Trees for use as table centres provide an ideal decorative setting for Yuletide festivities. An illuminated cakestand is an attractive addition to the Osram range. It can be used alternatively as a cakestand or a hanging centre light.

There are also outfits suitable for shop-windows, hotel bars, ballrooms, restaurants, cinemas, and scores of other situations where light and colour contribute materially in creating a cheerful atmosphere—a range of decorative lighting material which should certainly warrant a comprehensive display from now until Christmas, and indeed until well into the New Year.

A RADIO ROBOT

(Continued from page 337)

in Fig. 5. The plate and H.T.+ terminals go to the relay, and the grid and filament to the secondary of an ordinary intervalve L.F. transformer in the usual way.

A lead from the primary of the transformer is plugged in to the loudspeaker output terminals of a wireless receiving set (a portable receiver makes the whole assembly entirely independent of connecting wires to the mains, etc.) and it is now only necessary to tune in to a broadcast of speech or song when the Talking Robot will tell you all he hears! A microphone connected to the pick-up terminals of the wireless set will enable you to talk through the figure so that, with a friend, you might give a most entertaining dialogue!

The figure may be completed with an overcoat and hat (Fig. 4) or in almost any way the constructor fancies. My own model sits on a chair the portable receiver being arranged underneath (Fig. 1) so that there shall be no interaction between the relay circuits and the aerial of the set. Condensers C1 and C2 have been included for this reason, but, of course, there is still a little interference, which can only be entirely eliminated through the use of separate wireless sets for the sound, and for the operation of the figure—the latter set having the loudspeaker switched off.

FOR ONLY
3/9

YOU can buy a British Made Super-sensitive, Non-microphonic HIVAC Detector valve.

This simple replacement will add enormously to the performance of your set.

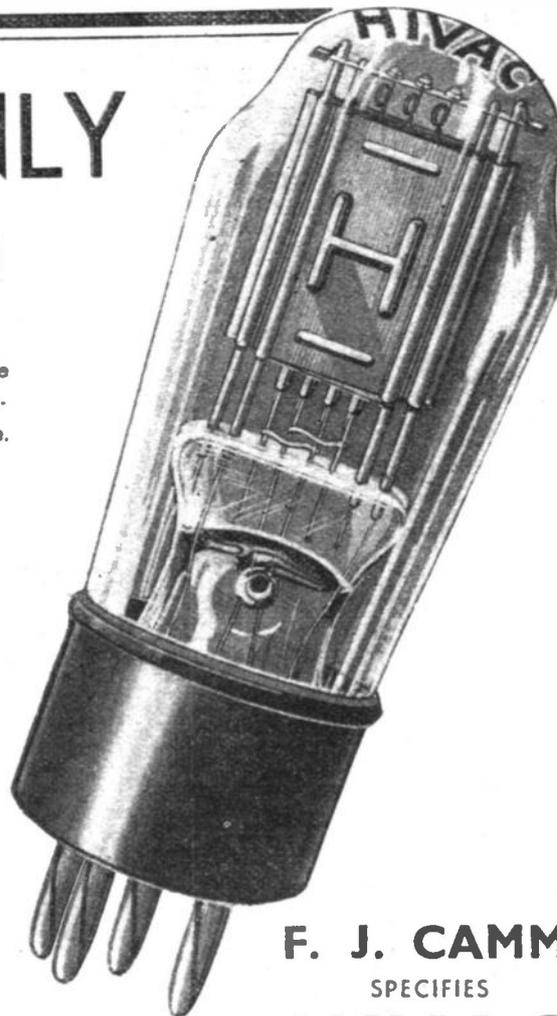
There is also a Complete range of HIVAC Battery, Mains, Special Short-wave, and "Midget" valves, ALL highly recommended by the leading technical experts. HIVAC give you High Quality at Low Price.

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SPECIFIES

HIVAC

FOR HIS

"D-XMASTER"

SEE DETAILS IN THIS
ISSUE.

USING EXTENSION SPEAKERS

Instructions for Wiring Extension Speakers, with Details of the Precautions to be Taken, and the Best Methods of Controlling Volume

It is often desirable, especially during the Christmas holiday period, to have wireless in more than one room. This can be done by having more than one set, of course, but a much cheaper way is to install extension speakers.

Commercial Receivers

Most of the modern commercial sets are fitted with extension speaker sockets, and therefore it is only necessary to plug the extension speaker leads into these sockets. Care must be taken to choose the correct type of speaker, however, if best results are to be obtained. In some receivers the extension sockets are connected to the speech coil of the internal speaker, whereas in others connection is made to the primary of the internal speaker transformer. When connection is made to the speech coil the extension speaker must be of the low impedance type, or a step-up transformer must be connected between the extension

one of these is used it is only necessary to adjust the controlling switches until best results are obtained. If a special speaker of this type is not readily available the

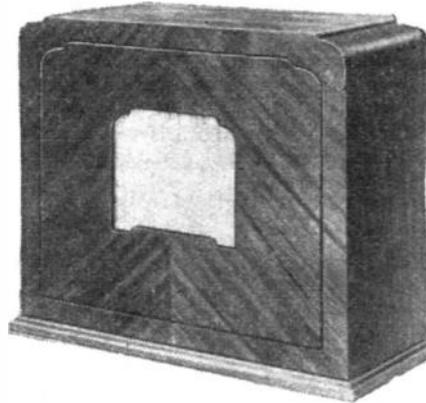


Fig. 2.—Extension speakers are obtainable in various types of cabinet to harmonise with room furnishings.

ordinary type of moving-coil permanent magnet speaker can be wired to suit high or low-impedance sockets. If low-impedance (speech coil connection) sockets are fitted they must be connected direct to

speaker transformer terminals. It should be realised that if the old type cone speaker is used it is essential to use a matching transformer if low impedance sockets are fitted. This type of speaker will, however, give quite satisfactory results with direct connection in most cases where high-impedance sockets are fitted.

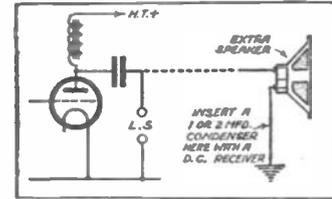


Fig. 5.—It is always desirable to use an output filter circuit for extension speakers.

Home-constructed Sets

In home-constructed receivers extension speaker sockets are not generally fitted, and, therefore, if an extension is to be installed great care must be taken to wire this correctly. The safest method is to connect one terminal of a 2 mfd. condenser to the anode of the output valve, the other terminal of the condenser to one of the extension speaker leads, and the other extension lead to H.T.—. With this method of connection direct current will not flow through the extension leads, leakage and the possibility of a shock being therefore avoided. A simpler method is to connect the extension leads to the L.S. sockets, either direct or via 2 mfd. condensers—by connecting a condenser in each lead leakage and shock are again avoided.

Special Output Stages

When a special type of output stage is used care must be taken to wire the extension leads correctly. In the case of push-pull, Class B, and Q.P.P. output stages the method of connection is the same. The internal speaker fitted to sets of this type has three terminal connections, two to the valve anodes, and one to H.T.—. The extension speaker leads should be

(Continued on next page)

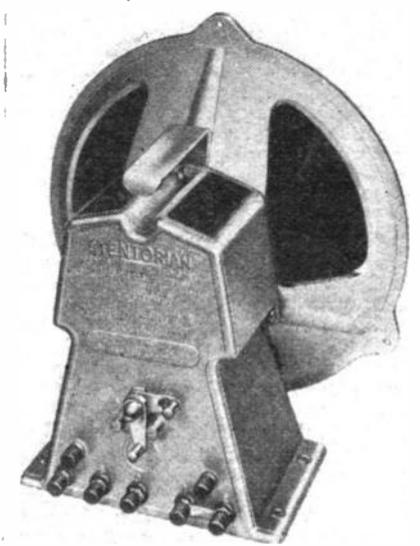


Fig. 1.—This W.B. loudspeaker has a special matching device and is ideal for an extension model.

sockets and the extension leads if the extension speaker is of the high-impedance type—the normal type of speaker transformer may be used with the secondary winding connected to the extension sockets. If an ohmmeter is available it can easily be decided whether a low-impedance speaker should be used, as the difference in the resistance measured across the extension sockets is unmistakable. When the sockets are joined to the speech coil the resistance will be between two and fifteen ohms approximately, but if they are joined to the primary of the internal speaker transformer a resistance of between 200 and 500 ohms approximately should be registered.

Special Extension Speakers

There are special extension speakers obtainable which are designed to match any type of set and are fitted with a switch for high or low-impedance matching. If

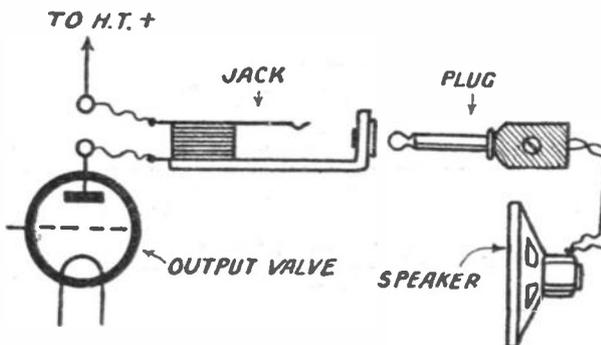


Fig. 3.—A plug and jack method of connection will facilitate changes in speakers.

the speech coil tags on the extension speaker; if these tags cannot be traced an ordinary speaker transformer may be interposed between the sockets and the extension leads, as mentioned above. When high-impedance sockets are fitted, direct connection is made to the extension

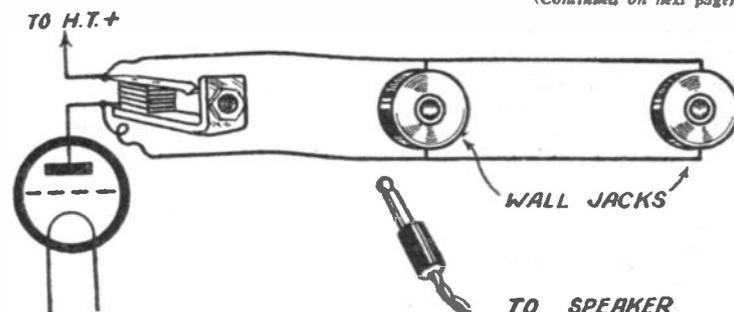


Fig. 4.—Wall sockets may be used for listening at different points as shown here.

USING EXTENSION SPEAKERS

(Continued from previous page)

connected to the two valve-anode terminals, either direct or via 2 mfd. condensers. It is not necessary for the extension speaker to be of a special push-pull type. If two valves are connected in parallel in the output stage the normal method of connection outlined above for a single valve should be used.

Switching

Some readers will probably wish to silence the internal speaker when this is not required. The best method of doing so is by means of a switch connected in the speech coil circuit of the set speaker. If it is only desired to silence one speaker, a two-point switch will be suitable, but by using a three-point change-over type, one or other of the two speakers may be brought into use at will. The switch could

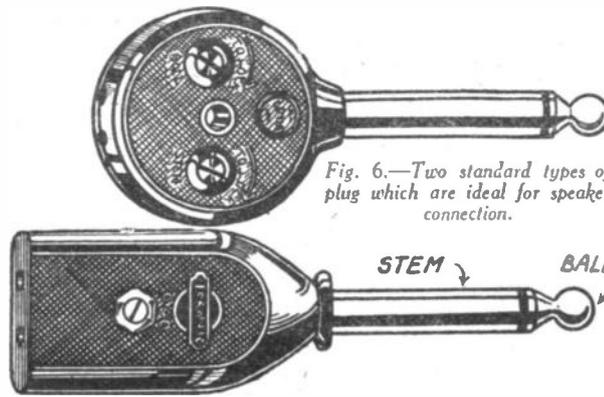


Fig. 6.—Two standard types of plug which are ideal for speaker connection.

be connected in the anode circuit of the output valve but this method of connection is not recommended unless a special type of switch, such as the Clix, is used. With

the normal type of switch the anode circuit of the output valve would be momentarily open during the switching process, and this could possibly cause damage to the valve.

Controlling Volume

For smoothest control of volume it is also advisable to use the speech coil circuit in preference to the transformer primary circuit. A variable resistance of approximately 100 ohms is suitable for most speakers. This should be connected

in series with the speech coil of the speaker to be controlled, and may be fitted with an off position if it is desired to silence this speaker. Control of volume can also be effected by connecting a control having a resistance of approximately 50,000 ohms in series with, or across, the extension speaker transformer primary winding, but it is generally found that the speech coil method of connection gives better results.

Varley AS USUAL!

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BP 21 NICLET Transformer**

**NEW
PUSH PULL TRANSFORMERS**

- DP 49. Parallel Feed Input. Ratio 1 : 4, 12/6.
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- DP 47. Output. 25 : 1 and 50 : 1, 18/-.
- DP 48. Output. 34 : 1 and 68 : 1, 18/-.

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Please send me Free Circuit Diagrams of Push Pull Amplifiers.

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A TELEVISION CATCH-PHRASE

No less a person than Sir Noel Ashbridge thought it fit to draw attention to the catch-phrase that people were not buying television receivers now because of the possibility of them becoming obsolete in a few months. He quite wisely pointed out during the course of an address to the Aldwych Club on Armistice Day that no invention could proceed at that enormous rate. If there is any alteration of picture definition standard, present-day sets can be quite readily and simply adapted to meet the case at a small cost. The improvements that are needed are not those linked up with receivers, but with the transmission side, primarily on the extension of the hours of television broadcasting, and the ability of the provinces to have services of their own. As Sir Noel said, this last-named item would be met most economically by signal distribution through the Post Office co-axial cables, linking London with the more important cities. How soon the first of these provincial stations will be put into regular service is still a matter for conjecture, owing to financial reasons, but no doubt early in the New Year, when the Television Advisory Committee have reported, definite plans will materialise.

"THE WIRELESS TRADER YEAR BOOK," 1938.

THE new 1938 edition of this handy reference handbook which has just been published has been specially revised and enlarged, at the same time retaining the standard radio features. The main directories include a Buyers' Guide, arranged under some 300 different headings; a directory of radio wholesalers indicating R.W.T.A. members; lists of trade addresses, giving 1,500 entries, and including telephone numbers and telegraphic addresses, and a separate directory of Electrical Wholesalers. There are also detailed specifications of 578 receivers marketed in 1937-38, by forty-nine different manufacturers. Data given includes types of valves fitted, wave ranges, output, intermediate frequencies, extra speaker resistances, and prices.

Amongst the other technical matter included in the Year Book are lists of mains voltages for nearly 1,200 districts; and valve reference tables for about 800 different types and makes.

NOTES FROM THE TRADE

Belling-Lee Eliminoise

THE well-known Eliminoise Anti-interference Aerial is now available in a special Christmas packing, consisting of a gilt box with red and green label, and will form an admirable Christmas present to anyone who is experiencing difficulty in obtaining signals free from interference arising from local electrical apparatus. This kit, complete with 50ft. of screened cable, and with aerial and receiver impedance-matching transformers, costs 55s. The aerial is of 7/22 enamelled wire and is 60ft. in length.

Philco-Ford Car Radio

A special 6-valve receiver has been designed by Philco for use in Ford V8 cars and is now available at 15 gns. It is

of the two-unit type, for medium-wave reception only, and the receiver section is mounted between the steering column and the dashboard, with the speaker concealed behind the top of the windscreen. Separate interference suppressors are stated to be unnecessary.

Ever-Ready Batteries

Makers of the Ever-Ready H.T. batteries announce that in future these are to be sent out packed in a special type of corrugated cardboard sleeve to ensure that they shall be adequately protected from damage during transit.

The Hushatone

Messrs. R. A. Rothermel announce that the Hushatone device is now obtainable from them at 35s. This is a small piezo-crystal reproducer, designed for incorpora-

tion in any desired apparatus so that an individual listener may follow a programme or item without annoying other people in the room. It may also be used by the deaf as a bone-conduction hearing aid. It weighs only 4oz. and is supplied complete with a 9ft. moulded rubber cable.

Tungram 6B8G Valve

The makers of this valve wish to remind set designers that it is of great value in designing a receiver which will bring in weak and distant stations on a satisfactory high volume level, and at the same time give good quality reproduction from the local without overloading the output valve. Ordinary A.V.C. does not permit of this, but with the 6B8G it is possible to employ an A.V.C. controlled L.F. stage and a leaflet showing the arrangement is supplied by Messrs. Tungram. The valve is of the 6.3 volt .3 amp. heater type, and costs 14s.

NIGHTLIGHT ROBBERY

(Continued from page 334)

THE GIRL.—"Oh, no—really—"
SCHOLER.—"There, my dear—just a little token of esteem for a very, very brave little girl."

THE GIRL.—"Twenty pounds! Oh, really—"

SCHOLER.—"It is a very small return for such a great service."

THE GIRL.—"Thank you very much indeed. Do you mind if I go now?"

STEVE.—"Oh, won't you stay to breakfast, miss?"

SCHOLER.—"Good-bye, my dear—and thank you again."

THE GIRL.—"Good-bye—and thank you—ever so much!" (There is a short pause.)

SCHOLER.—"Damnation!"

STEVE.—"Oh, gov'nor—naughty!"

SHANNON.—"Well, what do you know about that?"

SCHOLER.—"Ruined—everything ruined. Months of scheming and planning ruined in a second. The interfering little fool!"

STEVE.—"Changeable—that's what you are! She was a sweet, brave little girl a minute ago."

SHANNON.—"Oh, shut up, Steve! Here, Fitzzy, what about the servants?"

SCHOLER.—"They won't disturb us. They had some tea when they came in, and I arranged to dope it for them."

SHANNON.—"Why the devil did you have to give the girl twenty pounds, anyway?"

SCHOLER.—"Oh, don't be a fool, Nickey. I had to pretend that I was grateful to her. In any case, it was no good to us."

SHANNON.—"You mean, dud stuff?"

SCHOLER.—"Yes—some of your very worst work."

STEVE.—"Cruel—that's what I call it."

SCHOLER.—"Anyway, here are the diamonds. We must make a new plan. (Almost shouts.) Look—Nickey—look! The diamonds!"

SHANNON.—"Good God! Dud stuff!"

SCHOLER.—"The little vixen!"

SHANNON.—"She's double-crossed us!"

STEVE.—"Lumme—that's what I call nightlight robbery!"

Fade in "The Teddy Bears' Picnic.")

The CYCLIST - - 2d.
Every Wednesday.

YOU HAVE BEEN WARNED BY RADIO—

Professor Hilton, on November 19th, 1936, from the B.B.C. broadcast a warning. The warning was to the effect that while there are many really good and reliable Colleges teaching by correspondence, there are many others which are colleges by name only. He said some so-called colleges rented a couple of rooms in a large building in a well-known street. Some made great promises which they did not intend to fulfil. Some claimed successes they could not prove. In some cases the names of prominent men were quoted who were in no way connected with the working of the College.

NOW BE ADVISED BY ME.

The big name of a College is no proof of its national standing. The Bennett College has been established over 30 years and our entire building is devoted to Bennett College work. No other business of any kind is either on or attached to The Bennett College. We have seating accommodation for over 10,000. We have a permanent staff of over 190 people on the College premises. Our Professional Staff have all passed their examinations, and our tutors are all experts in their own specialised work. We do not send out any homework to be corrected by tired, spare-time tutors. All students' homework is corrected on the College premises the same day that it arrives, and is returned by evening post. This College is Technical, Scientific, General and Commercial, thus enabling us to cater for all requirements; this is important to Cost and Works Accountants, and all who have to deal with rate-fixing, machining-allowance, and it is also of great importance in many of the Civil Service Examinations. This is an entirely British College. Most of our textbooks are written on the College premises by our own professional staff, especially for tutorial purposes. Our tutors specialise in teaching students for the examinations they themselves have already passed.

THERE IS NO OTHER COLLEGE IN THIS KINGDOM THAT CAN CLAIM ALL THE ABOVE ADVANTAGES.

It is not necessary for students to attend the College; we can send exactly the same tuition to you by post for a reasonable fee payable monthly. Anyone who reads the journals knows that there are many things advertised that one can study, and any kind of study is good. It is training for the brain, but the best thing to study, surely, is a course specially prepared to teach you your own vocation, or prepare you for the examination which you have in view. Knowing that you are master of your job gives you self-confidence and personality, but a Diploma from the College is absolute proof of your efficiency. We have agencies in all English-speaking corners of the world. The nature of our business makes us keep in touch with employment requirements in all parts of the world; therefore we specialise in preparing students for the good positions which we know exist, and for all the worth-while examinations.

THE ABOVE VAST ORGANISATION CAN HAVE BEEN CREATED ONLY BY THE SUCCESS OF OUR STUDENTS.

There is a tide in the affairs of man which, if taken at the flood, leads on to fortune and success. There are three things which come not back: the sped arrow, the spoken word, and the lost opportunity—this is your opportunity. If it is your desire to make progress and establish yourself in a good career, write to us for free particulars on any subject which interests you, or if your career is not decided, write and tell us of your likes and dislikes, and we will give you practical advice as to the possibilities of a vocation and how to succeed in it. You will be under no obligation whatever. It is our pleasure to help. We never take students for courses unless we feel satisfied they are suitable. Do not forget of the brilliant. Our experience will to succeed achieves more than for courses unless we feel satisfied they are suitable. Do not forget of the brilliant. Our experience will to succeed achieves more than



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Young men physically fit and whose careers are not definitely fixed should join the Police Force. We have Special Courses for Entrance and Promotion. Full particulars Free. Address: POLICE Dept. 104.

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DEPT. 104, THE BENNETT COLLEGE, LTD., SHEFFIELD

THE BRITISH LONG-DISTANCE LISTENERS' CLUB

Mast Design

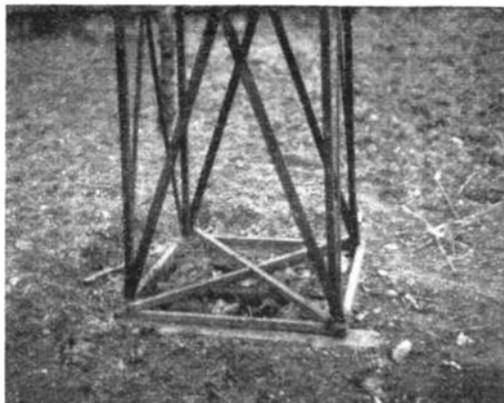
A MEMBER who lives in a closely populated suburb of London is rather puzzled concerning the design of an aerial mast which he wishes to erect. His garden is very short and his neighbours are not very co-operating. Consequently, the erection of a high flagstaff or scaffold-pole is difficult, as it would have to rest in the neighbouring garden before hoisting in position. He writes to ask what he can do about the matter, as he cannot get to his roof for a pole fitting and later wishes to carry out transmitting tests. In such a case there is nothing to beat the lattice type of mast such as was recently described in these pages. By using thin quartering (say from $\frac{3}{4}$ in. to $1\frac{1}{2}$ in. thick) it is possible to build up a most efficient mast which may be erected in stages without trespassing on any other property. The mast should first be planned on paper, then scaled and divided into sections. The length of each section, and the design of taper, will depend upon the overall height of the mast, but even with the highest mast it is possible to erect in a garden each section will be quite manageable.

A hole is not required for this type of mast, as it may be stood flat on the ground, as shown in one of the accompanying illustrations. Of course, it will have to be guyed satisfactorily, and this may be carried out at each section. The top section should be made first, and sufficient length of guy rope or wire attached for subsequent anchoring. If wire is employed, of course, insulators should be inserted at intervals to avoid losses.

Erecting the Aerial

When all the sections are completed, they should be placed handy, and an assistant will be needed to help in hoisting. The top section should be stood upright, and the guy ropes passed through rings attached to posts driven in the ground or attached to the garden wall (if of brick). By paying out the guys equally all round, the section may then be lifted vertically without fear of tipping. Alternatively, if the sections are very long, a pole may be used with a pulley tackle for hoisting, but the same vertical lift

may be obtained. When high enough the next section may be placed in position, the two bolted together, both lifted, and so on. A ladder may be needed for assisting in the bolting process, although if well made it should be possible to climb up the cross-pieces, additional strength being given to the complete mast by means of cross-bracing wires of light steel. Obviously, a pulley should be attached to the top of the upper section with a long cord through it for the subsequent erection of an aerial, and



How the base of the mast rests on the ground.

a mast of this type not only proves very efficient, but greatly adds to the appearance of a wireless installation and is much less unsightly than a bending or swaying pole made up of odd lengths of quartering.

The B.E.R.U. 56 mc. Contest

The Radio Society of Great Britain announce an international contest on 56 mc/s commencing on January 1st next. The following are the main rules, which should be noted by all transmitting members of the B.L.D.L.C.:

1. The contest will commence on January 1st, 1938, and conclude on December 31st, 1938.

2. The contest will be open to any radio amateur who is licensed to operate his station in the 56 mc/s band.

3. The winner of the contest will be the operator of the station scoring the most points based on the following system:

- 1 point for each contact over a distance between 200 and 1,000 miles.
 - 5 points between 1,001 and 2,000 miles.
 - 10 points between 2,001 and 3,000 miles.
 - 15 points between 3,001 and 4,000 miles.
 - 20 points between 4,001 and 5,000 miles,
- and so on, at the rate of five extra points for each additional 1,000 miles or part thereof.

All distances to be calculated by Great Circle.

To count for points the readability, strength and tone (both incoming and outgoing), must be logged, together with date, time and call-sign.

4. In addition, and in order to collect current data, each contestant must send to the Radio Society of Great Britain a monthly report of stations heard and/or worked, together with notes concerning conditions, power used for contacts, etc.

5. The Radio Society of Great Britain will present a suitable trophy to the winner of the contest, whilst certificates of merit will be awarded to the leading station or stations in each country.

6. No entrant may employ interrupted continuous waves, modulated continuous waves, telephony, or any other form of modulated carrier, for contacts claimed in this contest.

7. At the time of a contact both stations must be operating on 56 mc/s from their fixed station addresses.

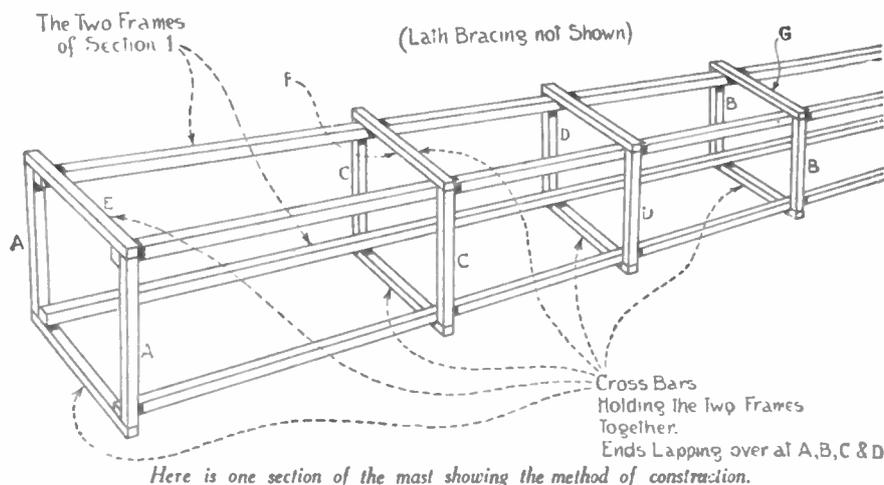
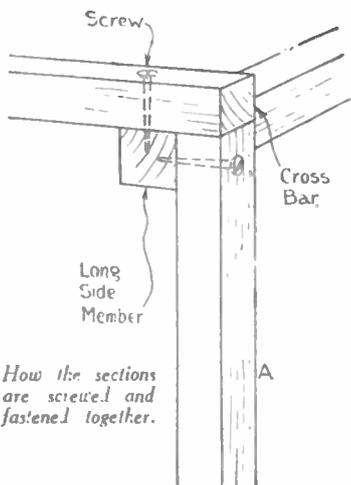
8. Only one contact with a specific station may count for points in any 7 Day period.

9. Entrants must adhere to the terms of their licence.

10. Final entries must be received by R.S.G.B., 53, Victoria Street, S.W.1, not later than February 28th, 1939.

11. The decision of the Council of the R.S.G.B. shall be final in all matters relating to the contest.

Note: In the above rules the term 56 mc/s refers to the amateur frequency band, 56 to 60 mc/s. For the purpose of this contest a non-transmitter shall be regarded as a person who did not hold a radiating permit on January 1st, 1938. For further details members who desire to take part in this contest should write to the Radio Society of Great Britain at the address given above.



MORE N.T.S. XMAS BARGAINS

STRAIGHT 3 RECEIVER

Complete with 3 valves. Speaker. Walnut Cabinet.

LIST PRICE £4:19:6 **BARGAIN**
£2:10:0



- New type highly selective Straight Battery 3 circuit.
- Slow-motion illuminated dial.
- Pick-up sockets.
- Metal Chassis.
- Low H.T. consumption.

Wavering: 200-2,000 metres.

Complete with 3 British Valves and Moving-Coil Speaker in the handsome horizontal-type walnut-veneered table cabinet illustrated. Less batteries only. Cash or C.O.D. £2 10 0, or 5/- down and 12 monthly payments of 4/3.

5/-
DOWN

SCREENED GRID 3

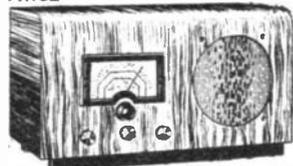
Amazing S.G. H.F. Detector and Pentode output circuit. Only 9 m.a. consumption. Moving coil speaker fitted housed in cabinet illustrated. Less batteries. **BARGAIN** or 5/- down and 12 monthly payments of 5/-.

£2:19:6

POSITIVELY YOUR LAST CHANCE TO SECURE THIS WONDERFUL BARGAIN

A.C. BANDPASS S.G.4

LIST PRICE £8:8:0 **BARGAIN** **£4:19:6**



With 4 Valves. CELESTION Field-Ener-gised Moving-Coil SPEAKER and Walnut-Veneered CABINET READY TO PLAY.

Wonderful selectivity and sensitivity. 4 matched British valves. Screened Band-pass Coils. Slow motion Tuning. Illuminated station name dial. Gramo pick-up sockets. 3 watts output. Wave-range 200-550, 1,000-2,000 metres. For A.C. Mains ONLY. 200-250 volts. 40/80 Cycles. Complete with beautiful walnut-veneered cabinet with silk fret illustrated and Celestion Field-Energised Moving Coil Speaker. READY TO PLAY. Cash or C.O.D. £4 19 6. Or 5/- down and 12 monthly payments of 7/3.

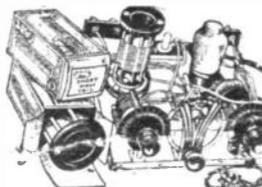
5/-
DOWN

DX SHORT WAVE KITS

THE IDEAL XMAS GIFT for YOUNG and OLD.

"3-in-1" SHORT-WAVE KIT RECEIVER—ADAPTOR—CONVERTER

List Value 37/6 **BARGAIN** **25/-**



12-94 metres. ADAPTS or CONVERTS your battery set for short-wave reception. It may be used as one-valve Short-Wave Receiver. Slow-motion handspread tuning SIMPLIFIES WORLD RECEPTION. Air-spaced handspread and tank condensers. SPECIAL ANTI-BLIND SPOT CONDENSER. 3 scales calibrated in degrees.

KIT "1" comprises every part for assembling, including 3 4-pin coils, wiring and assembly instructions, less valve only. Cash or C.O.D. Carr. Pk. 25/-, or 2/6 down and 10 monthly payments 2/6.
KIT "2" With 2-volt valve £1 8 9, or 2/6 down and 11 monthly payments 2/9.

2/6
DOWN

3-VALVE BANDSPREAD S W KIT 12-94 metres. Will bring a lifetime of fascinating short wave entertainment. Kit 1 including all coils but less valves. List value £3 0 0. **BARGAIN CASH OR C.O.D. 37/6**, or 2/6 down and 11 monthly payments of 3/6. **KIT "2"** With matched valves £2 15 0, or 5/- down and 11 monthly payments of 3/6.

4-VALVE A.C. BANDSPREAD KIT 12-94 metres. Entirely new design. Guaranteed world wide reception. **KIT "1"** Complete with all coils. List value £5 10 0. **BARGAIN** 188 18 0, or 3/4 down and 11 monthly payments of 7/6. If 4 matched valves required 2/6 to deposit and 3/6 to each monthly payment.

SAVE £1 ON YOUR CORONA ALL-WAVE 4

EVERY PART GUARANTEED MATCHED—PROVED—TESTED

KIT "1" CASH OR C.O.D. CARRIAGE PAID 67/6

Comprising all parts for Receiver, including Exclusively Specimen WEARLE TRIOGEN COILS, POLAR V.P. DRIVE with station names, CLIX Valveholders, BELLING-LIE Terminal Strip, FITO-SCOTT FLYMAX Chassis and mounting brackets. Less valves, cabinet and speaker.

5/-
DOWN

Balance in 12 monthly payments of 5/6

KIT "2" as Kit "1," but with 4 Specimen Valves, less Cabinet and Speaker, Cash or C.O.D. Carr. Pk. £4: 14: 0, or 7/6 down and 12 monthly payments of 8/-.

FURTHER PURCHASE OF

K.B. RECEIVERS

OFFERED AT ONE-THIRD LIST PRICES. LIMITED STOCK ONLY. ORDER IMMEDIATELY. Shipped only, these sets are offered in thorough working order and ready for immediate use. All models are housed in beautiful upright walnut cabinets and represent unique value for money which will be instantly appreciated by callers. The ideal set for everyday use or in that spare room. Order with confidence.

K.B. MODEL 429
Efficient circuit utilises H.F. Amplifier, detector and output pentode valves. K.B. "Foto-tune" dial Wave-range, 200-2,000 metres. Highflux moving-coil speaker. Wonderful volume and selectivity. Provision for pick-up. Less batteries. Housed in walnut cabinet. Overall dimensions, 17 1/2" high, 13 1/2" wide, 9 1/2" deep.



LIST PRICE £8: 18: 6 **BARGAIN** **£2: 19: 6**

Cash or C.O.D.

or 5/- down and 12 monthly payments of 5/9

K.B. MODEL 437. Battery Screened Grid 3. Similar to Model 429 but with Triode Power Output. Moving coil speaker. Wave-range, 200-2,000 metres. Special features provide excellent reception of many British and Continental stations. Beautiful walnut cabinet. Less batteries.

LIST PRICE £8: 8: 0 **BARGAIN** **£2: 17: 6**

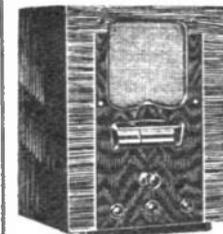
Cash or C.O.D.

or 5/- down and 12 monthly payments of 5/7

SPECIAL OFFERS

HEADPHONES. Super-sensitive type recommended for short wave work and testing. 3/6 (postage 6d.); 3 pairs 10/- (post paid).
VALVES. Give your set a tonic and fit new valves. Huge purchases enable us to supply at greatly reduced prices. Long and efficient service guaranteed. Battery, Det., I.F. and H.F. 2/9; S.O., V.M., Class "B" H.F., and L.F. Pentodes, 6/-.
Mains Types, A.C., H.T., 5/-. All A.C. S.G., V.S., Pentodes and H.F. Pentodes, 7/6. Grids and Heaters, 9/6. Dearth heated P.W. rectifiers, 5/6 each. 120 ma., 5/-, postage extra.

S.G. BATTERY 3



● Wavering 200-2,100 metres. ● Conceit-Grand Moving-coil Speaker. ● New-type No-trouble Switch. ● Complete with Valves, less Battery and Accumulator. ● READY TO PLAY.

Will bring you British and Foreign programmes with remarkable clarity and volume. A British Valve of guaranteed life; new screened-grid high-frequency, high-efficiency detector, and Pentode output. Latest improved components. Steel Chassis. Slow motion tuning. Illuminated wave-length scale. Beautiful walnut-veneered cabinet, 19 1/2" high, 14" wide, 10" deep.

LIST PRICE £6: 6: 0 **BARGAIN** **67/6**

5/-
DOWN

or 5/- down and 12 monthly payments of 5/9

BELMONT 6-VALVE ALL-WAVE SUPERHET

(18-2,000 Metres)

GENEROUS ALLOWANCE MADE FOR YOUR OLD SET IN PART EXCHANGE.

MODEL 600.

A receiver of out-standing world-wide performance and quality at a remarkably moderate price. Model 600 is a 6-valve all-wave superhet with a high gain circuit of extreme sensitivity. It incorporates all the modern improvements — A.V.C., provision for extension speaker, latest Octal Type Valves and 6-in. Moving Coil Speaker. The oval dial is calibrated in metres and station names, with a different colour for each wave-band. Output is 3 watts undistorted. Cabinet is of modernistic lines of beautifully figured walnut. Overall size is 20 in. high, 15 1/2 in. wide, and 8 1/2 in. deep. Cash or C.O.D. £10: 10: 0, or 10/6 deposit and 18 monthly payments of 13/6.



10/6
DOWN

B.T.S. ADABAND

★ AMAZING BARGAIN! ★

List Price **£5: 5: 0**
BARGAIN
£3: 3: 0



● Your Set rests on top of the ADABAND. ● BRINGS AMERICA and War News to your present set! Stand your receiver on this amazing unit and hear the whole world! Walnut figured cabinet. Single tuning control. One-touch without disconnecting. Wave-range 13-74 metres.

BATTERY MODEL. List Price, £5/5/0. **Battery Model.** £3/3/0. Or 5/- down and 12 monthly payments of 5/6.

5/-
DOWN

B.T.S. SHORT-WAVE ADAPTOR

LIST PRICE £2:12:6 **BARGAIN**

Brand New and Ready for Instant Use. Nothing to Assemble **39/6**



America Direct on your Present Receiver! This amazing unit 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 (11 1/2" x 12" x 2 1/2"). 2 phisim coils. 12-25, 22-47 metres. Ready assembled. Yours for 2/6 down and 10 monthly payments of 4/2.

2/6
DOWN

New Times Sales Co.

56 (Pr. W. 43), Ludgate Hill, London, E.C.4

Please send me..... Cash H.P. Deposit.

For which I enclose.....

Please send also your Free Booklet describing in detail 5 new Short Wave Kits, and General Bargain Catalogue of Components, Valves, Receivers, etc., etc.

NAME.....

ADDRESS.....

Please cross all P.O.'s and register numbers. Orders must be accompanied by full cash and appropriate postage.

Buy Yourself a Radio Present

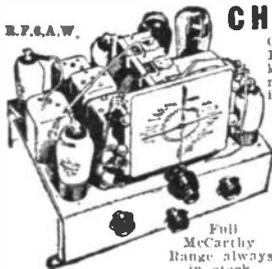
AND EARN THE APPRECIATION OF ALL THE FAMILY! Now is the time to think about your Christmas Radio—to make sure of getting the best out of the wonderful Xmas fare offered by the B.B.C. and the other stations of the World, but be sure to order at once.

CASH or C.O.D. Orders despatched by return.

Any of these lines will help to give you a **HAPPIER RADIO XMAS.**

McCARTHY ALL WAVE CHASSIS

R.F.C.A.W.



Complete with B.V.A. Valves, knobs, leads, etc., ready for fitting into any cabinet. **R.F. & A.W. 17/6 WITH ORDER** and 12 monthly Payments of 14/9. Cash price **£9.17.6.** S.S. A.W. **14/6 WITH ORDER** and 12 monthly Payments of 11/5. Cash Price **£6.17.6.** Full McCarthy Range always in stock

The W.B. SENIOR STENTORIAN



Still the finest Permanent Magnet Unit on the market. A model of unusually high performance. Ideal as principal or extension speaker for any set. Other W.B. Models a similar term. **2/6** with order and 11 monthly payments of 4/- Cash price **42/-**

GARRARD A.C.6 Radiogram UNIT

Comprising all essential running, enclosed, economical Induction motor for A.C. 100-250 volts, 50-60 cycles. Unit plate with pick-up, needle cups, etc.

5/6 WITH ORDER and 11 monthly payments of 7/- Cash price **75/-**

GARRARD A.C.6 MOTOR only

Similar to above but with fully automatic start and stop, and without pick-up, needle cups, etc. Complete with 12in. push-covered turntable.

4/- WITH ORDER and 10 monthly payments of 4/3. Cash price **42/6**

AVOMINOR TEST METER



The equivalent of thirteen testing instruments in one. Measures Current, Voltage and Resistance with ease and accuracy. Its handy use with leads, interchangeable crocodile clips and testing probe.

5/- with order and 10 monthly payments of 4/6. Cash price **45/-**

ROTHERMEL PIEZO PICK-UP ELECTRIC

Unsurpassed for wide frequency response and amazingly high output. Extreme lightness reduces record wear and tear to practically nil.

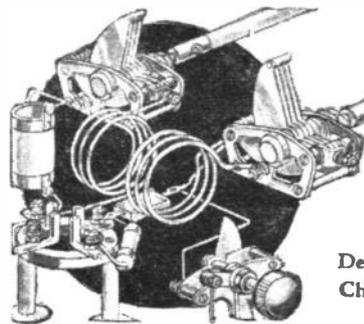
4/- with order and 10 monthly payments of 4/3. Cash price **£2-2-0**

Whatever your needs let us quote **EASY TERMS.**

EVERY offer carrying this symbol is: Fully Guaranteed, Sent Carriage Paid, Available for immediate Delivery, On the Best and Lowest Terms.

LONDON RADIO SUPPLY COMPANY ESTD. 1925 11, OAT LANE, NOBLE ST. LONDON, E.C.2. Phone: NATIONAL 6828-9

Would you get it **QUICKER** and on **BETTER TERMS** from **L.R.S.**



Short Wave Section

S.W. COIL DESIGN

Details of the Main Considerations Underlying the Choice of Coils for Simple Short-wave Receivers.

MANY beginners are confused when they come to select the tuning coil for use in a simple short-wave receiver. A glance through radio component catalogues shows many different types, and in the plug-in variety there are 4- and 6-pin components. It is about these that this article is principally written, as many amateurs seem to be unable to make a selection regarding the type of base to adopt. The accompanying illustration shows a standard 4-pin plug-in coil, whilst the theoretical circuit indicates a simple detector stage utilising one of these coils. It will be seen that there are two windings only, and in the circuit shown these are employed for the grid and for the reaction windings. If, however, the coil is required for use in an H.F. stage, it would be possible to use the smaller winding (L2) for an aerial coupling coil, in which case L1 would remain across the grid-filament circuit, but the aerial would be joined to one end of L2 and the other end of this would be joined to earth. What are the advantages and disadvantages, therefore, of this type of coil compared with the 6-pin component? The difference in construction is that the 6-pin coil has a further winding, joined across the two additional pins, and this is employed as an aerial coil in the manner just mentioned, thus leaving a winding for reaction purposes. It will be obvious, therefore, that in a simple detector stage such as that shown, the 6-pin coil will provide an additional winding which may be used or omitted as desired. Thus for experimental purposes alone, this type of coil is to be preferred.

Aerial Damping

If the aerial is joined direct to coil L1 in the theoretical circuit shown, it will be

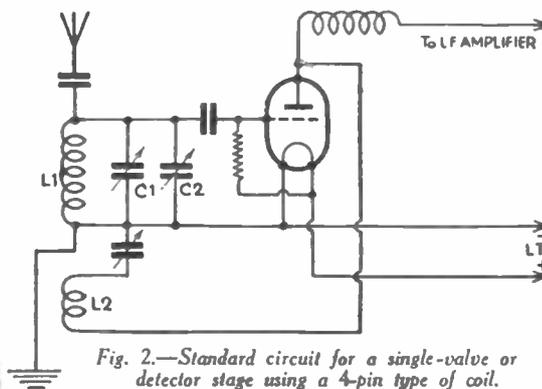


Fig. 2.—Standard circuit for a single-valve or detector stage using a 4-pin type of coil.

found in most cases that reaction will be difficult to obtain. This is because the aerial and earth leads, when connected to the coil have the effect of what is known as "damping" the circuit. That is to say, they "load" the circuit and prevent the valve from oscillating easily. To remove the damping effect the aerial is therefore connected to the coil through a small condenser, which may be fixed or of the semi-

variable type. This may then be adjusted to provide the required degree of damping, or, in other words, to remove damping so that the valve will oscillate.

If a separate coil is coupled to the L1 coil, and this additional coil is joined between aerial and earth, it will not only remove the damping effect but will also be found to provide better selectivity,

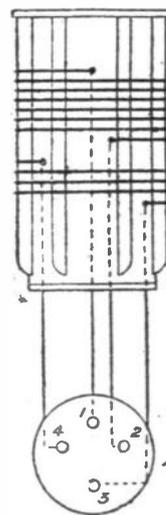


Fig. 1.—The method of building a 4-pin short-wave coil, showing the connections to the pins.

BASE OF COIL VIEWED FROM UNDERNEATH

although it is important to see that the coil is carefully chosen, both as regards the number of turns and their relation to the grid coil. If a commercial coil is obtained, the coil may be relied upon to provide the correct degree of coupling, but when a home-made coil is used it may be found desirable to experiment and carry out some tests with a view to finding the best coupling and the best position for the coil. Naturally, one is able with this type of coil to ignore the aerial coupling winding and use the standard connections shown in the theoretical diagram herewith.

H.F. Coils

When, however, he wishes to use a receiver in which an H.F. stage is employed it will be found that the three windings are needed, the first (corresponding to the aerial coil already mentioned) being joined between the anode of the H.F. valve and the H.T. positive line, and the grid coil and reaction winding being used in the ordinary way in the detector stage. Such an arrangement will provide better stability and greater magnification than a plain tuned-anode circuit. It will be seen, therefore, that the choice of the type of coil must rest with the individual, and will depend not only on the circuit to be used, but also the experiments which it is wished to carry out.

Leaves from a Short-wave Log

That Obstinate Carillon

NOTWITHSTANDING the fact that the majority of buildings in the centre of Madrid have been destroyed in the course of the Civil War, the Chimes installed in the tower of the Home Office in the *Puerta del Sol* Square have escaped damage, and are nightly relayed to all Government transmitters, including short-wave stations.

Change of Call-sign

CT1AA, Lisbon (Portugal), on 31.00 m., (9.65 mc/s), should now be entered in your log under the new call-sign CS2WA, and Radio Catolica (*Radio Renascenca*), also in the Portuguese capital, as CS2WD. The latter station works on 50.25 m. (5.977 mc/s).

New Moroccan Station Testing

Listeners report hearing test broadcasts from a French station on 48.88 m. (6.1375 mc/s). This would appear to be CNR2, the new 2 kilowatt transmitter installed in the vicinity of Rabat (Morocco). The station has been heard working towards G.M.T. 20.15.

La Voz Del Pueblo

On 49.42 m. (6.07 mc/s) HP5H, situated at Colon (Republic of Panama), has now been logged almost nightly towards midnight. The slogan adopted by the studio is given out after the full call, namely *La Voz del Pueblo* (The Voice of the People).

The Other Georgetown Station

VP3MR is not the only station operating at Georgetown (British Guiana); it possesses a competitor, VPP3BG, which is now transmitting regularly on 48.9 m. (6.135 mc/s). Reception reports should be addressed to: J. La Motte Kerr, 1 Wellington Street, Georgetown (British Guiana).

New West African Short-wave Station

French listeners report hearing broadcasts from a short-wave transmitter installed at Duala (Cameroons-French Mandated Territory); the wavelength advertised is 23.66 m. (12.68 mc/s).

Rotating Aerials

According to the *Nieuwe Rotterdamse Courant*, one of the leading Dutch newspapers, so far, wireless transmitters desiring to beam their broadcasts on different quarters of the globe have been compelled to erect a series of aerials for the various directions required. The report states that at Huizen (Holland), Philips Radio have installed a new system of rotating aerials. Two pylons mounted on a moveable platform in some ways similar to an engine turntable, and worked by electric motors, are fitted with eight vertical aerials, each consisting of three insulated sections, constituting in this manner, twenty-four dipole aerials. It is further stated that each supporting pylon weighs eighteen tons. By means of the motors the platform is made to turn in order to beam the respective aerials on the required area overseas to which it is desired to beam the broadcast.

Make this a Memorable Christmas!

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

Think of the real pleasure which any of this up-to-date WB apparatus can bring into your home—the comfort of an extension speaker in that other room, the novelty and convenience of a Long Arm remote control, or the added zest which realistic modern reproduction can give to your radio programmes!

This Christmas, fit a new Stentorian in place of your old speaker. Or rig up a new extension, with remote control. Not only will you enjoy doing the job; you will be able to look forward to years of extra pleasure as a result of it.

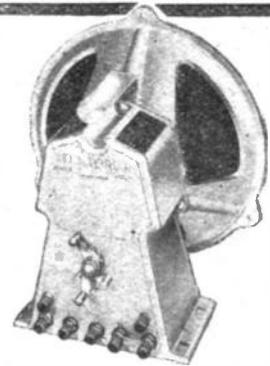
Your dealer has stocks.
Let him show you—to-day!



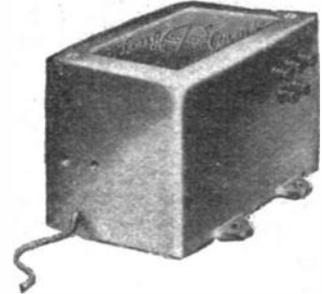
Stentorian

QUALITY REPRODUCTION APPARATUS

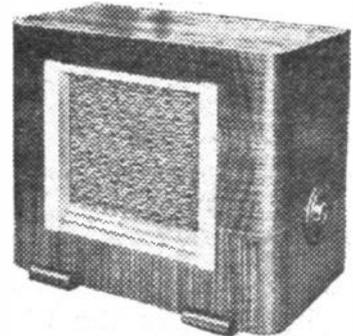
WHITELEY ELECTRICAL RADIO
CO., LTD.
(technical dept.), MANSFIELD, NOTTS.



1938 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 1938 Stentorian extension speakers. Price 15/6.



1939 Stentorian cabinet model. All models except the "Baby" (29/6) incorporate volume control type R.C. Prices 29/6, 39/6, 49/6, 63/-.



Especially useful at Christmas is the Stentorian junior portable receiver, with self-contained aerial and full-size batteries. Price £6-6-0, or 11/- down and 12-monthly payments of 1/14.



Here Familiarity Breeds Respect!

Setmakers and designers must know condensers... know that they will work as "per specification"... will stand up to dozen or more exacting conditions. Only through years of continuous contact with these condensers... being really familiar with their performance can the designer make sure. For over 30 years, T.C.C. Condensers have been the almost invariable choice of they who know. T.C.C. have earned their respect.

T.C.C.

ALL-BRITISH
CONDENSERS

The Telegraph Condenser Co. Ltd., Wales Farm Road, N. Acton, W.3.

3X83

LETTERS FROM READERS

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

Our 12-watt Amplifier

SIR,—I have completed the 12-watt amplifier recently described in PRACTICAL AND AMATEUR WIRELESS, and it is really a joy to listen to.—H. COTTON (Grays, Essex).

A Good Log from Ealing

SIR,—I have not seen a log of stations from my district, so I thought mine would interest other readers. All stations were received between October 1st and October 22nd.

On the 20-metre band: ON4UF, G8SB, G15KE, G5NW, W1ADF, W1ADM, W1CRW, W1DLO, W1HED, W2IFL, W4CYU, W8KA, PY2AJ (Brazil), S3EQ.

On the 40-metre band: G8IO, G6XJ, G6ZK, G2XG, G8GM, G5CJ, G5SO, G15MZ, G2SQ, GM2SE, GHKB, G2SU, G2NL, G2UQ, G8IO, G5ZN, G8KP, G2RW, G2KP, G5BP, G2NP, G15MZ, G6SW, G8TY, G18J, G8CB, G2RW, G6CO, G8JE, G8IG, G5NW.

Among the commercial stations I have received are: HAS3, DJR, W2XAD, GSP, DJQ, W2XE, GSI, W1XAL, PC5, W8XF, DJB, GSO, GSF, HVJ, DJL, RKL, LZA, SPW, RNE, TPA3, W8XK, GSE, DJB, GSN, 12R04, DJD, GSD, PHI, TPA4, SPB, ORK, PMN, CSW, EAQ1, CTIAA, HBL, BCJ, W3XAU, GSC, DJA, DJN, W2XAF, OZF, GSB, HJU, EAQ2, COCH, HAT4, HBP, GSL, W3XAL, W9XAA, OER2, SBO, W3XAU, W8XAL, GSA, W1XAL, DJC, HJ3, ABH, COCO, HVJ, XGOX, JZJ, JZK, XEUF.—I. A. WALKER (Ealing, London, W.5.)

More Prizewinners' Thanks

SIR,—I have received the W.B. Stenorian Junior Loudspeaker which I won in your recent Radiolympia contest. It is a marvellous speaker, and I wish to thank you very much for it.

Wishing your paper every success in the future.—A. S. WOODLEY (High Wycombe).

SIR,—I have now received the "Stenorian Speaker" awarded me in your recent competition and for which I thank you. I always read what you have had to say about these speakers—your praises of them—and you have certainly not exaggerated their high quality.

I am tremendously pleased with the speaker and, incidentally, it has proved to me how much I need a new set!—C. RAINES (Whitstable).

VP3MR (British Guiana)

SIR,—In the November 20th issue of PRACTICAL AND AMATEUR WIRELESS, on the "Leaves from a Short-wave Log" page, there is a statement: "Do not apply to VP3MR, Georgetown (British Guiana), for a 'veri' as they do not reply by post." This station comes in here R8 at present, and the announcer mentions that "Q.S.L.

cards will only be sent to those sending International or Imperial reply coupons," as the case may be. All who do not send coupons will only be answered over the air."

I have just received their Q.S.L. card for a report I sent on the 28th September. Their schedule, as shown on the Q.S.L. card, is: "The Voice of Guiana," Monday to Saturday, 5.30-9.30 p.m. (B.G. time). Sundays, 9.00 a.m.-12.00 p.m. (B.G. time). British Guiana time is three and three-quarter hours behind G.M.T. and one and a quarter hours ahead of E.S.T.—E. BRIAN (South Croydon).

Our Free Service

SIR,—I feel I ought to thank you for your letter and the very helpful information it contained. I can now carry on with confidence the construction of the £5 Superhet, whereas without your valuable help I should not have tackled it.

Home constructors must be very grateful to you for your unstinted free advice—I'm afraid I should have given up making sets but for your help. I don't mind the expense—I very much enjoy the hobby—providing the results of my labours and financial outlay are successful.

The very fine set I am using at the present time—the "A.C. Leader"—was unsatisfactory when I first tried it out, owing to

CUT THIS OUT EACH WEEK.

Do you know

—THAT an A.V.C. circuit may be tested by using a short length of aerial lead and moving this about. No variation in signal strength should be noticed.

—THAT signal strength may be measured visually by suspending a mirror in front of the speaker and focusing a spot of light on the wall.

—THAT an ordinary pocket compass may be used for various forms of testing in H.F. and L.F. circuits.

—THAT the capacity of a condenser connected in the earth lead of a D.C. set will govern the severity of shocks which may be experienced when touching certain "live" parts in the set.

—THAT aerial insulators should not be greased when erecting an aerial as the grease will attract carbon deposits from the air and provide a leakage path. Rain should keep ordinary insulators clean.

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 Newman Ltd., Tower House, Southampton Street, Strand, W.C.2.

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

the very disturbing hum which quite ruined all programmes. Nothing I did had the least effect. Eventually I did what I ought to have done earlier—I asked for your advice. By return of post came the very simple remedy. I say simple, because it was accomplished in about two minutes. Just a matter of rotating the I.F. transformer about 30 degrees relative to the smoothing choke, and behold, the hum faded out!

It must take a lot of your valuable time dealing with the troubles of your readers, but you can be happy in the knowledge that you are keeping home construction very much alive.—C. E. HOLT (Stechford, Birmingham).

Heard at Guildford

SIR,—I have been a reader of your excellent paper for some years, and having seen many logs submitted from various parts, I enclose mine from Guildford. The receiver used is a 2-valve detector-L.F., as described in PRACTICAL AND AMATEUR WIRELESS dated July 18th, 1936, with a 60 ft. "L" type aerial. W1XAL, W3XAL, W2XAD, W2XAF, W3XAU, W8XK, W9XF, CJRX, VP3MR, COCM, VK3LR, ZBW3, JVN, VE9HX, RAN, RNE, DJJ, DJC, CT1AA, OLR3A, OLR4A, OLR4C, IUC, I2R03, EAJ28, RR6VS, EAR, EA4TSD, ERGU, OER2, PCJ, HBO, SU'ICH, TPA3, HAT4, and W2XE.

Also, the following amateurs were received: ON4US, ON4UF, ON4CC, ON4LO, ON4BG, CT1ZZ, CT1JW, F3HM, F3DI, F5BD, SP1CC, LXITW, HB9BI, E16J, E18J, E14L, W1BAL, and 160 G stations.—M. CANAGHER (Guildford).

From a Scottish Reader

SIR,—I have not seen a 20-metre log published in PRACTICAL AND AMATEUR WIRELESS from my district, so I send mine. All stations were received during the last four weeks and I only listen a short time each day—about two hours.

My set is a home-made o-v-2 transformer coupled L.F. and P, but the same detector stage as described in PRACTICAL AND AMATEUR WIRELESS for December 12th, 1936. The coil I am using is a six-pin type and I find it very good indeed. It was the one-valve circuit mentioned above that set me on the track of short waves, and like many other young beginners I owe all my thanks to PRACTICAL AND AMATEUR WIRELESS.—T. J. MILLER (Airdrie, Lanarkshire).

[We were greatly interested in your log, but unfortunately it was too long for publication.—ED.]

NOW READY!

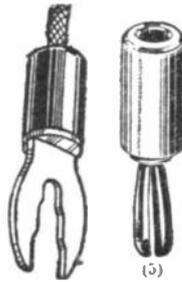
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(5)

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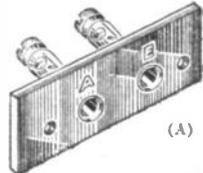
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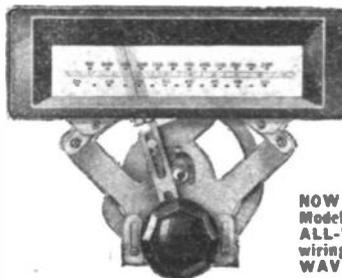
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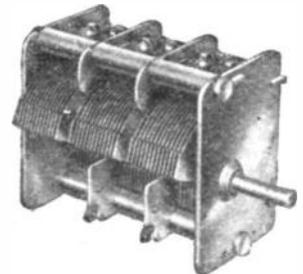
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RADIO CLUBS & SOCIETIES

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

ILFORD AND DISTRICT RADIO SOCIETY

ON Friday, November 12th, a representative number of our members visited the Southend Society at their headquarters at Leigh Technical College, where a lecture on Modern High-definition Television was given by Mr. Watson, of E.M.I. The lecturer gave a most interesting talk, and went very fully into his subject from most points of view. The proceedings terminated with many questions, especially in regard to the Emitron camera, which was shown to the meeting.

Visitors are welcome at all meetings, and prospective members are asked to come along at any time.—Hon. Secretary, C. E. Lagen, 44, Trelawney Road, Barking-side, Ilford.

THE EAST DORSET AND WEST HANTS RADIO CLUB

IT is proposed to form a club in the Bournemouth-Poole area, under the above title, meeting monthly. The co-operation of G5OH has been obtained, and others in the district are being approached. The proposed annual subscription is 5s. per annum. Inquiries will be welcomed from anyone in the district interested in the formation of this club, and these should be addressed to the undersigned at the address given.—David M. Williams, "Amberley," Cornwell Road, Poole.

LINCOLN SHORT-WAVE CLUB

THE headquarters of this club are now at 30, Tentercroft Street, Lincoln, where meetings will be held every Tuesday at 7.30 p.m. Constructional work on the club's own receiver is now in hand. All applications for membership should be addressed to Mr. Babbs (G5IG), 203, Wragby Road, Lincoln.

BIDEFORD AND DISTRICT SHORT-WAVE SOCIETY

ON Wednesday, November 3rd, this society held its second Annual Dinner, and were honoured with the presence of G6GM, Holeworthy; also Mr. A. Cornish (Torrington Radio Society), and members. Others present were G6FQ, Appledore, G8US, Bideford, and 2ADJ, Northam.

On Monday, November 8th, at the club rooms, tests were carried out on Messrs. Whiteley's "Stentorian" Speaker. This was voted a fine instrument, and the club decided to procure one for its own use.

Anyone interested in membership should apply to the Hon. Sec., W. G. Couch, Hillside, Glen Gardens, Bideford.

THE CROYDON RADIO SOCIETY

THERE was another popular loudspeaker night on Tuesday, November 16th, for the Croydon Radio Society's meeting in St. Peter's Hall, South Croydon. The Technical Adviser was in charge, and, indeed, he revelled in experiments on the various loudspeakers, each one having to pass stern tests before he was satisfied. It was very interesting to note that nearly all models had some special means of increasing the high-note response, and it could not be denied that such combinations had definite advantages over single-diaphragm units. Nor were the B.B.C. programmes neglected, as a sharp recital was particularly helpful in judging "attack" or "transient" response. Then Mr. Ménage's variable frequency oscillator did good work in finding flaws, as it uttered frequencies up to 15,000 cycles and hence many a loudspeaker fell by the wayside. Eventually, the choice was narrowed down to four models, and finally, one of the comparatively cheap models became the winner. Perhaps its secret of success was in its cone, designed so that the apex was made of harder material than the outside. On Tuesday, December 7th, there will be a lecture entitled "Searchlight on the B.B.C.," and PRACTICAL AND AMATEUR WIRELESS readers are invited to come to what is expected to be a novel evening.

Hon. pub. sec.: E. L. Cumbers, Maycourt, Campden Road, South Croydon.

KETTERING RADIO AND PHYSICAL SOCIETY

IN spite of the counter attraction of the Royal Command Performance on the radio, there was a fair attendance of members at the Kettering Radio and Physical Society's meeting on Monday, November 18th, to hear Mr. F. K. Webb, of Pye Radio, Ltd., lecture on "The Problems of Short-wave Reception."

Mr. Webb, who prefaced his remarks with a survey of what actually comprised the short-wave bands, proceeded to acquaint his audience with the effects of the Heaviside and Appleton Layers on short waves, and pointed out that it was through the reflecting properties of these layers that signals from the other side of the world were receivable by us here in England. These layers were constantly shifting, he said, and this accounted for the effect known as fading, and mentioned that several American amateurs used two

aerials for reception, so that one, placed some distance from the other, received the full signal at its peak, whilst the other aerial was under the effect of the fade, and the two were mixed just before entering the receiver, with the result that a comparatively steady signal was received.

This system was used very successfully by the B.B.C. in their efforts to relay American programmes, although the stations in this case were separated by several miles.

After the interval, the lecturer proceeded to discuss aerials for short-wave reception and demonstrated the Pye Anti-Static Aerial. He also demonstrated the Pye QAC5 all-wave receiver.

Secretary-treasurer: Irving L. Holmes (2ANF), "Miami," The Close, Headlands, Kettering.
 Headquarters: Ivy Cafe, Gold Street, Kettering.
 Permanent Club-room: Pollard Street.
 Meetings: Weekly, Monday evening, 7.30 p.m.
 Short-wave section and Morse class: Tuesday evenings, 7.30 p.m.
 Photographic section: Wednesday evenings, 7.30 p.m.

SOUTHALL RADIO SOCIETY

ON November 16th, the lecturer at Southall was Mr. H. A. M. Clarke, G6OT, who talked on "Transmitter Design." His very lucid lecture was greatly appreciated by the audience, who asked a number of questions at the end of the evening.

Future meetings to be held this month are as follows: December 14th: "Suppression of Electrical Interference," by H. J. Walters. This talk is arranged in co-operation with Messrs. Belling and Lee, Ltd. Mr. Walters is a member of their technical staff and an authority on the subject.

December 21st: Discussion—"The Future of Amateur Radio." This will be on the lines of the very successful "Television" discussion held recently, and it is hoped that members will keep things moving again on this occasion.

Headquarters: Southall Library, Osterley Park Road, Southall. Meetings: Tuesdays at 8.15 p.m. Visitors are welcome. Hon. sec.: H. F. Reeve, 26, Green Drive, Southall.

SLOUGH AND DISTRICT SHORT-WAVE CLUB

NOW that the winter radio season is in full swing the attendance at meetings is increasing, and with increased revenue our programmes can become more ambitious. At the last meeting a junk sale was held, and a great deal of gear was bought and sold by auction. A further listening contest, a very popular feature, was arranged, and score sheets of the last one were compared. Mr. Bramhill, 2BM, then demonstrated the operation of a T.N.T. oscillator, and explained its working. The meeting concluded with the usual Morse practice.

At the next meeting a further junk sale will be held, and G6PIL will lecture on receiving aerials. There will also be a display of members' apparatus. Further particulars of this club may be obtained from the Hon. Sec., J. H. White, 20, Chalvey Road, East Slough, Bucks.

WEYMOUTH AND DISTRICT SHORT-WAVE CLUB

THE above club (G8WQ) held their weekly meeting at the headquarters, 15A, Hope Street, on Wednesday, October 17th. The meeting was well attended. Owing to the lack of A.C. supply at the headquarters the members were invited to the chairman's home to hear a demonstration by two welcome visitors, G5OH and G8KX, of the Halliarafter's 1928 receiver, Super Skyriter. The club's own receiver has been constructed and their transmitter is in course of construction. New members are wanted, and will be welcomed on applying to the Sec., W. Bartlett, 15B, Franchise Street, Weymouth.

BRENTWOOD AMATEUR RADIO SOCIETY

A recent meeting of the above society, Mr. C. V. Jarvis gave a very interesting lecture on "Transformers." He dealt fully with both the technical and practical side of transformer design, and covered all types from mains to microphone transformers. Mr. Jarvis illustrated his talk with several home-made and commercial transformers, and also materials used in their manufacture.

Due to unforeseen circumstances the date of the lecture on "Valves," by Mr. W. G. J. Nixon, has been altered from December 3rd to December 17th. The open evening for the comparison of members' short-wave receivers will be held on December 3rd.

Meetings are held on alternate Friday evenings, and interested readers are invited to communicate with the Hon. Sec., N. K. Road (2BNK), "Netherton," Herington Grove, Hutton Mount, Brentwood, Essex.

THE EXETER AND DISTRICT WIRELESS SOCIETY

AT the last meeting of the Exeter and District Wireless Society, a lecture was given by Mr. V. Searle, M.Sc., of the University College of the South-West. He took for his subject, "Atoms, Electrons, and Ions." The lecture was fully illustrated with some excellent slides, and as usual, Mr. Searle put his talk over with great clarity, so that even such a difficult subject as he chose was made not only interesting but extremely instructive.

Mr. Searle showed how everything in the whole world was composed from only ninety-two elements, and this evoked some rather interesting discussions. At question time the lecturer was assailed from all sides, but each query was answered completely to the questioner's satisfaction.

Meetings are held each Monday at No. 3, Dix's Field, Exeter, at 8 p.m., and all those interested should get in touch with the secretary, Mr. W. Ching, 9, Sivel Place, Heavitree, Exeter.

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.

S. W. (Hull).—All of the sets indicated by you are rather out of date for modern conditions, and we recommend one of our more modern sets. If you can give any definite indication of the type of set, we may be able to recommend a suitable blueprint.

S. H. (Salford).—The consumption is certainly on the high side, but could be due to the use of certain types of valve. We advise a systematic test, with the valves in and with the valves out. There should be no current in the latter condition unless a potentiometer is joined across the H.T. supply, and in that case a switch should be fitted to break the potentiometer circuit when the set is switched off. So far as we can trace the firm is no longer in business.

A. G. S. (Edinburgh).—We cannot solve your problem without a circuit diagram. There may be no provision for a doublet connection.

I. B. (Southsea).—There is no other way of eliminating the effect you mention than by the use of the special valve.

T. W. D. (Fulford).—The voltage on the valves will be low with the arrangement shown and thus efficiency will also be low. You could utilise a voltage doubler circuit and obtain an increased output, but another transformer would be required.

M. G. T. (Cambridge).—The Wireless Constructor's Encyclopedia, and some other of our books would be of use to you. Read these in conjunction with the various articles designed for the beginner which appear in our pages.

W. W. (Croy).—A leaflet showing connections and suitable receiver circuits may be obtained from Messrs. Varley.

J. A. (Dublin).—We are sorry that we cannot assist you from the details given. Can you send us a sketch of the circuit so that we can follow the details more clearly.

F. J. H. (Crouch End).—The 12-watt amplifier recently described or the Enthusiast's Amplifier should be quite suitable. You do not state, however, whether you require it for battery or mains operation and we cannot therefore make a definite recommendation.

M. M. (Cawthorne).—Excessive voltage on the detector valve can cause the trouble, or the wrong value of reaction condenser. Try reducing the H.T. voltage first, and if this is unsatisfactory, use a smaller capacity reaction condenser.

S. E. P. (St. Leonards-on-Sea).—The trouble is only apparent because you are getting good top-note response, and is a transmitting fault. It should only be noticed with certain types of speaker or announcer, and is due to the closeness of the artist to the mike.

A DIFFICULT POINT

PUBLIC exhibitions of television are becoming more and more popular and quite frequently the point has been raised as to whether any organiser of such a function is entitled to make a charge for admission. There is no doubt that if this were done questions of copyright would arise owing to the rules governing programmes for paying audiences at entertainments. For example, in the case of those films now being hired and used as part of the daily B.B.C. programme matter, for private reception purposes, all is plain sailing, but if anyone paid for admission to a television exhibition then it would add one more problem to those which already seem to beset the path of progress of this new science. The rights of performers would also have to be considered, and this is one of the factors which must be settled before any of the B.B.C. transmissions can be shown to a public theatre or cinema audience, as has been promised so often within the last few months. The possible development of special television theatres seems to presage the time when there will be one or more established transmitting stations erected for the sole use of the theatres or entertainment industry. How the different film circuits will, for example, co-operate for this particular purpose is a matter which needs careful and delicate negotiation, but it is certain that that section of the industry can no longer regard television as a form of scientific novelty capable of being exploited in one form or another for showmanship purposes.

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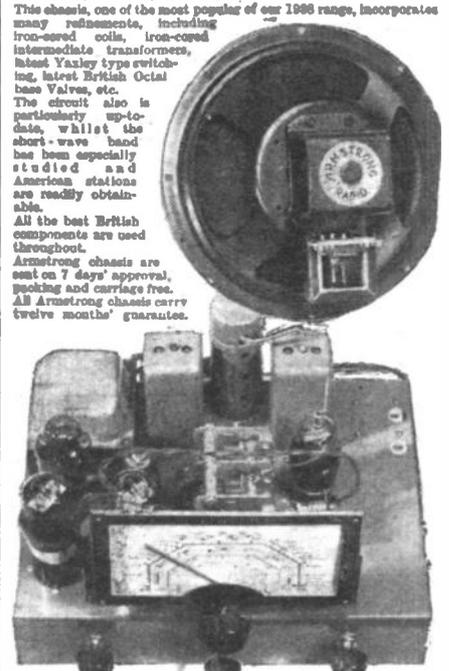
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Armstrong Company has published a new illustrated catalogue, fully describing Model 3BE/3, together with many other chassis of equal interest. A copy will gladly be sent on application. It is called 'Armstrong Technical Catalogue No. 12.'

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The Signet Two .. 29.8.36 PW76

Three-valve: Blueprints, 1s. each.

The Long-range Express Three (SG, D, Pen) .. 24.4.37 PW2

Selectone Battery Three (D, 2 LF (Trans)) .. — PW10

Sixty Shilling Three (D, 2 LF (RC & Trans)) .. — PW34A

Leader Three (SG, D, Pow) .. 22.5.37 PW35

Summit Three (HF Pen, D, Pen) .. 8.8.34 PW37

All Pentode Three (HF Pen, D, (Pen), Pen) .. 29.5.37 PW30

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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) .. 14.8.37 PW64

The Gladiator All-Wave Three (HF Pen, D (Pen), Pen) .. 29.8.36 PW66

F. J. Camm's Record All-Wave Three (HF Pen, D, Pen) .. 31.10.36 PW69

The "Colt" All-Wave Three (D, 2 LF (RC & Trans)) .. 5.12.36 PW72

Four-valve: Blueprints, 1s. each.

Sonotone Four (SG, D, LF, P) .. 1.5.37 PW4

Fury Four (2SG, D, Pen) .. 8.5.37 PW11

Beta Universal Four (SG, D, LF, Cl. B) .. — PW17

Nucleon Class B Four (SG, D (SG), LF, Cl. B) .. 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

All-Wave "Corona" 4 (HF Pen, D, LF, Pow) .. 9.10.37 PW79

Mains Operated

Two-valve: Blueprints, 1s. each.

A.C. Twin (D (Pen), Pen) .. — PW18

A.C.-D.C. Two (SG, Pow) .. — PW31

Selectone A.C. Radiogram Two (D, Pow) .. — PW19

Three-valve: Blueprints, 1s. each.

Double-Diode-Triode Three (HF Pen, DDT, Pen) .. — PW23

D.C. Ace (SG, D, Pen) .. — PW25

A.C. Three (SG, D, Pen) .. — PW29

A.C. Leader (HF Pen, D, Pow) .. 7.4.34 PW35A

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) .. — 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, 2LF (RC)) .. 17.9.35 PW54

A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen) .. — PW56

Mains Record All-Wave 3 (HF Pen, D, Pen) .. 5.12.36 PW70

All-World Ace (HF Pen, D, Pen) .. 29.8.37 PW80

Four-valve: Blueprints, 1s. each.

A.C. Fury Four (SG, SG, D, Pen) .. — PW20

A.C. Fury Four Super (SG, SG, D, Pen) .. — PW34D

A.C. Hall-Mark (HF Pen, D, Push-Pull) .. 24.7.37 PW45

Universal Hall-Mark (HF Pen, D, Push-Pull) .. 9.2.35 PW47

SUPERNETS.

Battery Sets: Blueprints, 1s. each.

£5 Superhet (Three-valve) .. 5.8.37 PW40

F. J. Camm's 2-valve Superhet .. 13.7.35 PW52

F. J. Camm's £4 Superhet .. — PW58

F. J. Camm's "Titese" All-Wave (5-valver) .. 27.2.37 PW75

Mains Sets: Blueprints, 1s. each.

A.C. £5 Superhet (Three-valve) .. — PW43

D.C. £5 Superhet (Three-valve) .. 1.12.34 PW42

Universal £5 Superhet (Three-valve) .. — PW44

F. J. Camm's A.C. £4 Superhet 4 .. 31.7.37 PW59

F. J. Camm's Universal £4 Superhet 4 .. — PW60

"Qualitone" Universal Four .. 16.1.37 PW73

SHORT-WAVE SETS.

Two-valve: Blueprint, 1s.

Midget Short-wave Two (D, Pen) .. — PW38A

Three-valve: Blueprints, 1s. each.

Experimenter's Short-Wave Three (SG, D, Pow) .. — PW30A

The Prefect 3 (D, 2LF (RC and Trans)) .. 7.8.37 PW63

The Bandspeed S.W. Three (HF Pen, D (Pen), Pen) .. 29.8.36 PW68

F. J. Camm's Oracle All-wave Three (HF, Det, Pen) .. 28.8.37 PW78

PORTABLES.

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F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) .. — PW65

Parvo Flyweight Midget Portable (SG, D, Pen) .. 19.6.37 PW77

Four-valve: Blueprint, 1s.

Featherweight Portable Four (SG, D, LF, Cl.B) .. 15.5.37 PW12

MISCELLANEOUS.

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

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Blueprints, 6d. each.

Four-station Crystal Set .. 12.12.36 AW427

1934 Crystal Set .. — AW444

130-mile Crystal Set .. — AW450

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Twenty-station Loudspeaker One-valver (Class B) .. — AW449

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Melody Ranger Two (D, Trans) .. — AW388

Full-volume Two (SG det., Pen) .. — AW392

B.H.C. National Two with Lucerne Coil (D, Trans) .. — AW377A

Big-power Melody Two with Lucerne Coil (SG, Trans) .. — AW388A

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A Modern Two-valver .. — WM409

Three-valve: Blueprints, 1s. each.

Class B Three (D, Trans, Class B) .. — AW386

New Britain's Favourite Three (D, Trans, Class B) .. 15.7.33 AW394

Homo-build Coll 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) .. — AW417

1934 Ether Searcher; Chassis Model (SG, D, Pen) .. — AW419

Lucerne Ranger (SG, D, Trans) .. — AW422

Cosor 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 AW433

Lucerne Straight Three (D, RC, Trans) .. — AW437

All-Britain Three (HF Pen, D, Pen) "Wireless League" Three (HF Pen, D, Pen) .. 3.11.34 AW451

Transportable Three (SG, D, Pen) .. — WM271

£6 6s. Radiogram (D, RC, Trans) .. — WM318

Simple-tune Three (SG, D, Pen) .. June '33 WM327

Economy-Pentode Three (SG, D, Pen) .. Oct. '33 WM337

"W.M." 1934 Standard Three (SG, D, Pen) .. — WM351

£3 3s. Three (SG, D, Trans) .. Mar. '34 WM354

Iron-core Band-pass Three (SG, D, QP21) .. — WM362

1935 £6 6s. Battery Three (SG, D, Pen) .. — WM371

PTP Three (Pen, D, Pen) .. June '35 WM380

"Certainty Three (SG, D, Pen) .. — WM393

Minutube Three (SG, D, Trans) .. Oct. '35 WM400

All-wave Winning Three (SG, D, Pen) .. Dec. '35 WM396

Four-valve: Blueprints, 1s. 6d. each.

£5s. Four (SG, D, RC, Trans) .. — AW370

"A.W." Ideal Four (2SG, D, Pen) .. 16.9.33 AW402

2HF Four (2 SG, D, Pen) .. — AW421

Crusader's A.V.C.4 (2 HF, D, QP21) (Pentode and Class B Outputs for above: Blueprints, 6d. each) .. 18.8.34 AW445

Self-contained Four (SG, D, LF, Class B) .. Aug. '33 WM331

Lucerne Straight Four (SG, D, LF, Trans) .. — WM350

£5 5s. Battery Four (HF, D, 2LF) The H.K. Four (SG, SG, D, Pen) .. Feb. '35 WM381

The Auto Straight Four (HF Pen, HF Pen, DDT, Pen) .. Mar. '35 WM384

April '36 WM404

Five-valve: Blueprints, 1s. 6d. each.

Super-quality Five (2HF, D, RC, Trans) .. May '33 WM320

Class B Quadradyne (2 SG, D, LF, Class B) .. Dec. '33 WM344

New Class-B Five (2 SG, D, LF, Class B) .. Nov. '33 WM340

Mains Operated.

Two-valve: Blueprints, 1s. each.

Consoelectric Two (D, Pen) A.C. .. — AW403

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Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable), to PRACTICAL AND AMATEUR WIRELESS, Blueprint Dept., George Newnes, 14d., Tower House, Southampton Street, Strand, W.C.2.

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Harris Jubilee Radiogram (HF Pen, D, LF, P) .. May '35 WM386

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Modern Super Scaler .. — WM375

Varsity Four .. Oct. '35 WM395

The Request All-Waver .. June '36 WM407

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Heptode Super Three A.C. .. May '34 WM369

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PORTABLES.

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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

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S.W. One-valve for America .. 23.1.37 AW429

Home Short-Waver .. — AW452

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Home-made Coil Two (D, Pen) .. — AW440

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Experimenter's 5-metre Set (D, Trans, Super-regen) .. 30.6.34 AW438

Experimenter's Short-waver (SG, D, Pen) .. Jan. 19, '35 AW453

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) .. — WM318

Standard Four-valver Short-waver (SG, D, LF, P) .. Mar. '35 WM383

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Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) .. Aug. '35 WM391

MISCELLANEOUS.

Enthusiast's Power Amplifier (1/6) .. June '35 WM337

Listeners' 5-watt A.C. Amplifier (1/6) .. — WM392

Radio Unit (2v) for WM392 .. Nov. '35 WM396

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QUERIES and ENQUIRIES

Obtaining Transmitting Licence

"I should be glad if you could give me any information as to how to set about getting an amateur transmitting licence."
—T. H. P. (Litherland).

THE first step is to obtain an artificial aerial licence, and a form must be obtained from the postal authorities upon which you enter the lines of experiment you wish to take up. Write to the Engineer in Chief, Radio Section, G.P.O., Armour House, London, E.C., for the necessary form and further particulars. Details were given in our issue dated November 28th last.

Biasing Output Valves

"I am going to build the 12-watt amplifier, but the mains transformer which I have got only has one L.T. winding—4 volts at 5 amps. What is the best way of providing bias for the P.X.25A's in this case?"—J. K. (Tonbridge).

AS the remaining valves in the amplifier are indirectly heated, the cathodes may be returned to H.T.—through biasing resistors, and it is therefore in order to include the bias resistor for the output valves in the centre tap of the heater winding. The total anode current will, of course, pass through the resistance, and thus careful calculation will be required to arrive at the correct value, and the arrangement is not very desirable. A better plan would be to obtain a small mains transformer having two 4 volt 2 amp. windings and to use this for the output valves. Such a component would not be very expensive and would provide much better results.

Volume Controls

"I enclose a diagram of my set in which I find that the volume control does not have any effect at all. I can turn it from one end to the other and it does not make the slightest difference. I changed it twice and I am told that the previous samples were in perfect working order. Can you help me by telling me the most likely cause of the trouble?"
—F. D. P. (Barnsley).

THE theoretical diagram is correct and so is the actual wiring on the diagram which you sent. We assume, however, that you are using a metal or metallised chassis and that the volume control is mounted on a metal bracket. In this case the spindle of the control will be in contact with the chassis if certain makes of component are employed and this will result in the control being short-circuited. Some makes of volume control have the spindle in direct metallic contact with the moving arm of the control and in such a case the bush must be fitted with insulating washers, or the metal surface of the chassis must be scraped away to accommodate the mounting

bracket. Alternatively, if a metal chassis is employed a wooden or other insulated bracket could be used.

D.C. Mains Polarity

"I am going to charge my own accumulators from the D.C. mains, and in order to make the board I want to find the polarity of the mains sockets. I have been told by one friend that this may be done by putting

RULES

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

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

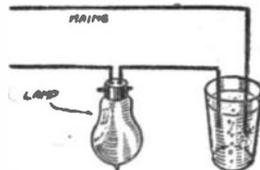
A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender.

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

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

the leads in salt water, but someone else has told me that this is dangerous. I should like to know what is the correct way of finding the positive and negative leads."
—M. A. (Aldershot).

THE use of pole-finding paper is the most practical way of finding the polarity of the mains leads, but you can adopt the water scheme with safety if you include a lamp in series with one lead. The lamp



The safe way of testing D.C. Mains polarity when using a saline solution.

should be mounted in a holder and the two ends of the wires inserted into the glass of salt water. Make quite certain before switching on that the wires are well separated and will not move. When switched on a profuse stream of bubbles will rise from the negative lead and your mains socket may be marked accordingly. The accompanying diagram should make the idea quite clear.

Aerial Coil Modification

"I have a home-made set in which a home-made coil is employed. I find that I

cannot tune down to Radio-Lyons and as I particularly want to hear this station I should like to know the best way of modifying the circuit to bring in this station. The London National comes in at 3 on the dial, which is standard and tunes a Polar condenser."
—G. E. (Bow).

AS the coil is home-made we presume that there are rather too many turns on the grid winding. Strip off two or three, and then try the set. A few experiments should enable you to find the number of turns to remove in order to permit the set to tune in the station you require.

Energising a Speaker

"I have a mains-energised type of speaker, but am uncertain regarding the best way of energising the field winding. I am told that it may be used for bias and also for smoothing the H.T., but I do not want to make any drastic alterations to my set to include this if I can avoid doing so."
—G. L. (York).

THE most important factor is the resistance of the field winding. Upon this will depend the position at which it is included. You can use it as a bias resistance or in the H.T. positive lead, but if you do not want to interfere with the circuit you can build a separate mains unit to energise it. This will make it entirely self-contained and for further details we suggest you refer to the article in our September 25th issue in which the problem was fully covered.

Coil Connections

"I built one of your midget portables some time ago, and dismantled this to use the parts in a different set. Unfortunately, some time has now elapsed and I am unable to locate the connections for the coil. This is non-screened and has a small angle bracket for mounting purposes. The leads are soldered to tags and are coloured. Is there any code for these or is it a special component? If so, could you give me the connections for it, please?"
—N. P. S. (Brockley).

WE presume that it is a B.T.S. coil such as we have employed on several sets and in that case the leads are coded as follows: White is the top of the grid coil (grid connection); yellow is the tapping to which the wave-change switch is connected; green is the earth end of the reaction winding; blue is the anode end of this winding, and red is the H.T. end of the primary winding (or earth if this winding is used as an aerial coupling coil). The top of the coil has a single lead which is joined to anode or aerial, whilst the earth end of the grid winding is connected to the mounting bracket which must, therefore, be mounted direct on the metal surface of a chassis or connected to the earth terminal if a wooden chassis is employed. An ordinary two-point (on-off) switch is used for wave-changing.

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1/- for 3, LISSEN R.C.C. UNITS, complete with resistance, etc. Boxed.

5d. LISSEN H.F. BY PASS UNITS, comprising 2 Mains-bridge type Condensers, Moulded Bakelite case. All orders 5/- or over Post Free; orders under 5/- must be accompanied by a reasonable amount for postage; C.O.D. orders under 5/- cannot be accepted.

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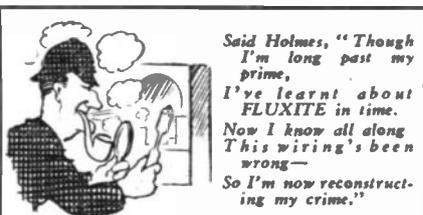
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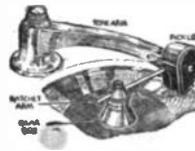
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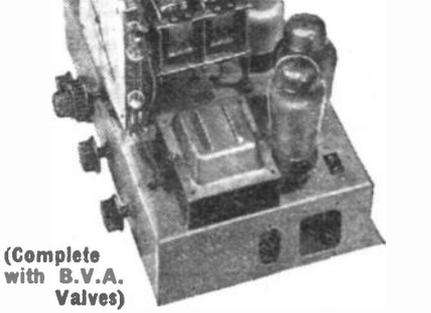
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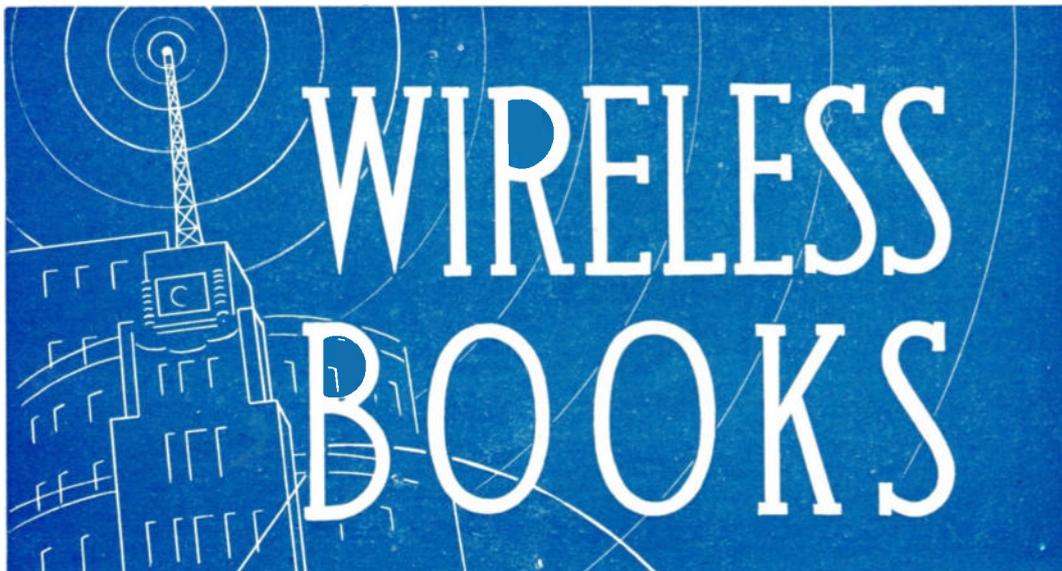
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