LATEST TELEVISION NEWS INSIDE!

Practical and Amateur Wireless

3D EVERY WEDNESDAY

Edited by F.J. CAMM

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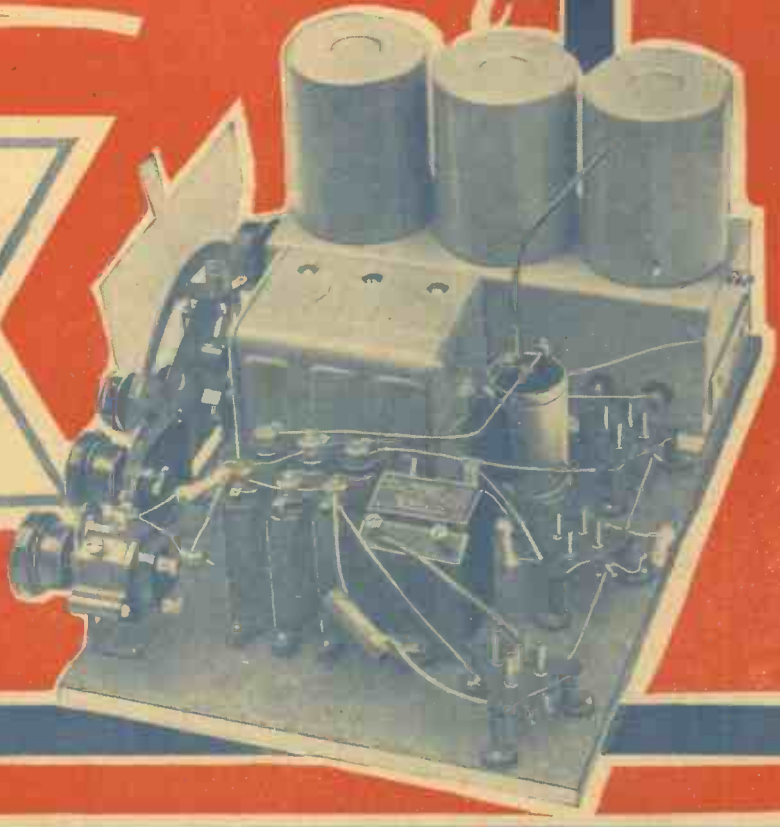
Vol. 9. No. 216. November 7th, 1936.

AND PRACTICAL TELEVISION

Operating & Adjusting

F.J. CAMM'S "RECORD" All-Wave 3



NOVEL TUNING DIALS—SEE PAGE 231

Practical and Amateur Wireless

Edited by F. J. CAMM

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VOL. IX. No. 216. November 7th, 1936.

ROUND *the* WORLD *of* WIRELESS

An Automatic Radio Transmitter

A BALLOON equipped with recording gear and an automatic radio transmitter has been developed by the Franklin Institute to provide data of cosmic rays at extreme heights.

Bombay Police Radio

THE Bombay City Police are to be provided with radio for use in times of disturbance. A wireless transmitter and associated equipment is to be installed at Police Headquarters, and two mobile receivers are to form the initial installation.

U.S.S.R. Television

IT is reported that the high-definition television transmitter will be ready for service in Moscow at the beginning of next year. The present test transmissions are stated to be satisfactory, and a regular service is now being planned.

American Wind Charger

AN American company has placed on the market a battery charger operated by the wind. A fan turns under the influence of the slightest breeze and generates 7 amps, under average wind velocities.

Czechoslovakian S.W. Station

A NEW S.W. transmitter is nearly ready for use at Podibrad. Test transmissions are at present being carried out on 10.06, 25.51 and 49.05 metres.

K.B. Sets in the Air

SIX of the aeroplanes owned by Plane Advertising, Ltd., have been fitted with Kolster Brandes receivers so that the pilots may pick up the weather reports as soon as they are sent out.

Queer Fault

FROM Dublin we hear that a Cossor receiver, which was sent for servicing, was found to contain a dead mouse with the H.T. leads in its mouth. When removed the set still refused to function, but a further test showed that the speaker (which was enclosed in a dust bag) had half the cone eaten away and was filled with pieces of newspaper shredded up. It had served as the nest for the mouse!

Marconiphone-Arsenal P.A.

THE newly-installed public address equipment at the Arsenal Stadium is a great success. This is the largest equipment ever fitted in a football ground. The microphones are used for addressing the crowd from the directors' boxes and by the police for crowd control, stand packing, and S O S purposes. There are 17 loudspeakers.

Town Planning

"BELFAST—An Industrial Capital" is the sub-title of the second in the series of talks on Town Planning to be broadcast by E. Maxwell Fry in the Northern Ireland programme on November 10th. He will deal with such questions as how Belfast as a city has developed, and how its future development should be controlled so as to secure wise planning, healthy buildings and congenial conditions for the citizens, and he will deal with both the artistic and economic aspects of town planning in a large industrial city.

ON OTHER PAGES

Radio Pie

FOR the last six months the Two Leslies, Leslie Sarony and Leslie Holmes, have allotted considerable time to the preparation of their first radio revue, christened "Radio Pie." Many listeners do not realise how many hours' preparation these top-of-the-bill artists have to give to a radio production. As far as they are concerned, it must be successful, so no pains or effort are spared to obtain a laugh or a telling point in every line.

At the moment the Leslies are feeling confident over a new song, "Long Live the King," which they have written for their Coronation Palladium appearance. In "Radio Pie," "Long Live the King" will be heard for the first time, and the chorus will be sung by Steffani and his Twenty Singing Scholars and the B.B.C. Revue Chorus.

"Radio Pie" will be a fast-moving revue, having a strong cast including the Two Leslies, Tommy Handley and Mario de Pietro. Incidentally, this will be the first time Mario de Pietro has spoken over the air. A discovery of considerable interest is the "Singing Porter." Recently, while the Leslies were having tea in a large Manchester store, the Entertainments Manager told them they had a singing porter and brought him up, complete in uniform, to sing with the orchestra. He was so good that the Leslies are bringing him south for "Radio Pie." Other members of the cast of "Radio Pie" are Tessie O'Shea, whose first appearance this will be since her return from New York, Hugo, and Anne Ziegler, the well-known radio artist. The broadcast takes place from the London Regional on November 5th.

Another Broadcaster of War News

EDZ-EAH, Madrid-Vallecas (Spain), a 15-kilowatt station previously solely used for commercial telegraphy and telephony with the Argentine Republic, has now been appropriated twice daily by the Madrid Government for the transmission of news bulletins in Spanish and other languages at G.M.T. 12.00 and 20.00. The wavelength is 31.65 m. (9,480 kc/s).

From the Canary Islands

EHZ, el Tablero, on 28.93 m. (10,370 kc/s), which serves as the official mouthpiece of the Radio Club de Tenerife, can be readily identified by the fact that nightly at G.M.T. 20.40 it closes its broadcast by playing the two German National Anthems (*Deutschland ueber Alles* and the *Horst Wessel March*), followed by the Italian Fascist hymn (*Giovinezza*) and two Spanish patriotic marches.

More Power for Ruysselede

TO increase the range of the Brussels broadcasts on 29.04 m. (10,330 kc/s), the Belgian Government is erecting at Ruysselede (near Bruges) a 40-kilowatt transmitter to take the place of the 9-kW station at present used for the transmission of the daily French and Flemish programmes.

THE PICK of the PROGRAMMES

"Laburnum Grove"

J. B. PRIESTLEY'S comedy of suburban life, which enjoyed a successful run at the Duchess Theatre two years ago, should prove ideal material for adaptation as a broadcast play. It will be heard on the London Regional on November 3rd, and from the National on November 5th.

MAKE THESE DATES WITH YOUR RADIO

with ages ranging from twelve to sixteen. Having received further auditions at the studios, half-a-dozen of the more talented of these juveniles are to broadcast a special

MUSIC HATH CHARMS

It is to be hoped that McMichael lived up to their slogan "Never lets you down," when this portable was demonstrated at Bertram Mills's circus by a McMichael dealer in Truro recently.

A Flying Lesson

IN the Midland Children's Hour series, "How and Why," a programme entitled "How an Aeroplane Flies," will be broadcast on November 11. The B.B.C. Mobile Unit has visited Castle Bromwich aerodrome to take recordings which will assist in building up an impression of a flying lesson. Flying Officer J. K. Rotherham, of 605 (County of Warwick) Bomber Squadron of the Auxiliary Air Force, will be the speaker in the studio, and will link up the recorded material. The Squadron has a distinguished record; it won, and still holds, the Esher Cup.

Variety from Cheltenham

THE first broadcast of a variety bill from the Opera House, Cheltenham, on November 10th (Midland) will include Leon Cortez and his Stage Band. David Gretton is the commentator for these outside broadcasts. The Opera House was opened in 1891. Cheltenham was a notable dramatic centre over a hundred years ago, and was visited regularly by Sarah Siddons, the Kembles, and the Keens.

The Younger Generation

DURING September, Francis Bolton, the B.B.C.'s variety talent-spotter, made a tour of the North Region, giving auditions in ten big Northern towns to people from the surrounding districts. Over a thousand men, women and children availed themselves of the opportunity. There was a large proportion of children—or, at least, of juveniles, that is to say, boys and girls variety programme from Manchester on November 13. Further details are not yet available.

Melody and Mirth

ON November 9th Archie Campbell compères a Midland programme entitled "Accent on Melody with a Break for Mirth." The melody is provided by Vincent Ladbrooke and his augmented dance band, known as The Cosmopolitan Orchestra. Mr. Ladbrooke only entered the dance band business a little over two years ago, and now controls seven or eight bands in the Midlands. The mirth makers are Elsie and Doris Waters, who come to Birmingham as guest artists.

Variety from Chester

THE Western Brothers—"Kenneth" and "George"—will be heard by Northern listeners when variety is broadcast from the Royalty Theatre, Chester, on November 12th. The remainder of the bill, from which excerpts will be chosen, will include: Arthur Pond (comedian); Helen Mitchell and Dad; The Brennans (comedians); Elsie Sterndale (Lancashire comedienne); Fisher and Ariana (solo violin and Italian prima donna); and Adrian et Audrée (comedy speciality act).

"Aïda" from Leeds

A CONCERT version of Verdi's opera "Aïda," as performed by the Leeds Choral Union, will be broadcast from the Town Hall, Leeds, on November 10th. The Northern Philharmonic Chorus and Orchestra will be conducted by Norman Strafford and the soloists will include Ina Souez (soprano), Constance Willis (contralto), Alec John (tenor) and William Parsons (baritone). F. H. Shera, Rossiter Hoyle Professor in the University of Sheffield, will give the "During the Interval" talk.

Eve of Armistice Day

ON November 10th an Armistice Commemoration will be broadcast from the Scottish National War Memorial, Edinburgh. The programme is the same as that broadcast a year ago, which was then said to be one of the most moving programmes heard in the Scottish Region. As listeners may remember, it consists of appropriate dialogue, readings and music.

Ulverston Hiring Fair

ULVERSTON Martinmas Hiring Fair begins on November 14, and on the preceding night some of the people who frequent it are going to the Northern microphone to tell listeners all about the fair. Ulverston is in Furness, Lancashire, and the fair is one at which farmers find farm servants, and at which farm servants get jobs. The speakers will include a farmer, a farm labourer, the secretary of the local branch of the National Union of Farmers, and a local parson. One of the speakers will tell of the fair as it was some forty years ago, when the workhouse master used to bring down often boys from the workhouse and hire them out to the fair.

"Question Time"

THE second of the series of monthly broadcasts in which Leslie Heward, with the B.B.C. Midland Orchestra, answers questions which have been sent in by listeners regarding orchestral matters, will be given on November 9th. A number of the questions received concerned the contribution which certain instruments made to the whole. Some of these have already been answered but others relating to the brass section have yet to be dealt with. Henry Riddell, Announcer, represents the average listener.

SOLVE THIS!

PROBLEM No. 216.

Ellison's receiver suddenly stopped functioning, and when voltage tests were made it was found that no voltage was registered at the anode of the triode detector valve. Further tests indicated that there was continuity between the detector anode and H.T.+, and the resistances in this circuit had the correct value. What was the fault? Three books will be awarded for the first three correct solutions opened. Address your solutions to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo, Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 216 in the bottom left-hand corner, and must be posted to reach this office not later than the first post on Monday, November 9th, 1936.

Solution to Problem No. 215.

Webster had forgotten to wire the centre socket of the pentode valve-holder and therefore no voltage was being applied to the priming grid.

The following three readers successfully solved Problem No. 214, and books are accordingly being forwarded to them: R. Cabell, Higher Sea Lane, Charmouth, Dorset; L. M. Gordon, Harlington, Milford-on-Sea, Hants; F. H. V. Feuillade, 23, Overbury Street, Clapton, E.5.

Novel Tuning Dials

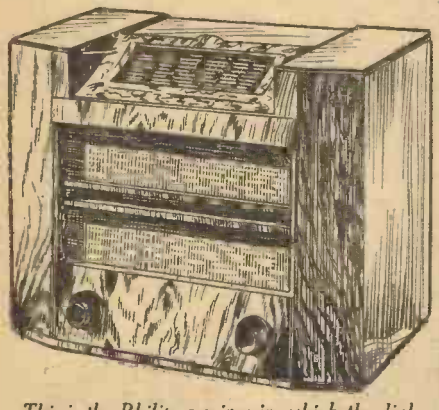
Details of the Most Common Types of Commercial Tuning Indicator with Special Modifications and Details for Home Constructed Dials. By G. V. COLLE

BEARING in mind that every set maker endeavours to interpret the exact requirements of the listener, it is interesting to consider some of the main ideas embodied in commercial tuning dials.

Backlash, one of the main snags of accurate and fine tuning adjustment, has largely been obviated by careful attention to the fit, alignment, and the automatic "taking up" of wear on the various spindles employed. The usual friction action of the tuning control knob directly driving the main dial on the edge of an inside slot on the latter has largely been superseded by more ambitious schemes.

Owing to the inclusion of short-wave features in receivers of the all-wave type the necessity for a slow-motion movement, in addition to the reduction drive for medium and long waves, has also led to engineering practice much sounder than hitherto applied.

The tendency is towards larger and more accurately calibrated dials. Commencing years ago with small aperture inspection dials fitted with arbitrary scales, it may be said that designs have covered the whole gamut of shapes and sizes. A present tendency is towards full-vision scales, sectionalised for the number of wavebands covered, calibrated mostly in units of 10 kilocycles and with the names of the



This is the Philips receiver in which the dial is hinged, and may be set at various angles without affecting the indicating mechanism.

principal broadcasting stations opposite. Ease of inspection is assured by diffused back lighting and is invariably simplified by colouring the translucent dial different shades for each waveband or by masking those not in use.

Parallax errors of vision are avoided by keeping the knife-edge or hair-line cursor "finger" close to the calibrated dial.

Cord Drives

Similar dials, remote controlled, are also employed and are actuated by means of cords and drums similar to winches. Contraction and stretching of the cord due to wear and changes of atmospheric humidity are taken up by contraction springs fitted in the main drum and at the ends of the cord. Even so, it is not possible to guarantee really accurate maintenance of calibration with this system. The difficulty has been overcome by making the dial extremely large since by providing a "space" rather than a "line" for each station the error due to the cord is then insufficient to be noticeable.

One desirable feature which set makers have endeavoured to embody in the design of their tuning dials is that of making them fully visible to the operator whether he

A full-vision scale as fitted to the Vidor receivers.

be standing or sitting for the purpose. One arrangement now common to a few makes is to arrange the full vision dial on central or bottom pivots like a mirror and to fix the pilot bulbs illuminating the scale so that they move with it. By controlling the pointer or cursor on the cord-and-drum principle, mechanical considerations of action do not arise. These dials are fully visible when the operator is immediately facing the receiver, but are not capable of clear inspection from an acute side angle. So far no scheme has been devised for providing additionally a vertical pivot to give the complete dial a universal joint action. It is doubtful whether any manufacturer would consider the latter kind, since apart from its expense, a simple full-vision scale of a vertical type with a cursor moving up and down such as found on a number of sets would seem to meet this desirability.

Remote Control Dials

Wherever a tuning dial cannot be inspected closely during the process of operating it, it must be remembered that an accurate setting can be achieved merely by watching the usual tuning indicator. The scale or movement of the latter is usually arbitrary, but even at arm's length it is sufficiently clear to inform one when the set is tuned to resonance.

For those listeners who are reluctant to leave the comforts of a favourite arm-chair even when it is desired to listen to a particularly good programme, there is at least one commercially-made set which in addition to allowing normal full-vision tuning, is also arranged for remote control. The main operating controls, including the tuning scale, are literally duplicated on the faceplate of a small box which can be mounted on the arm of the chair. A multi-way cable connects the control box to the receiver, the action being purely electrical between the two.

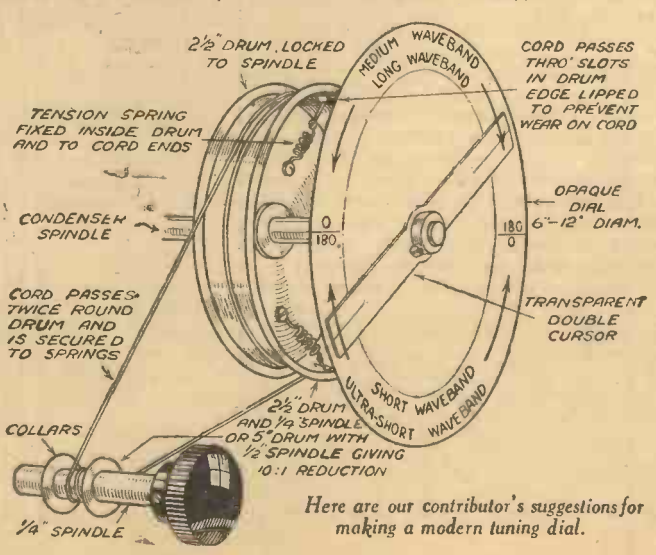
With regard to accuracy of calibration, it must be remembered that nearly all scales are printed to carefully prepared standards taken from what might be termed final production laboratory receiver models. Whether the sets on the factory production line maintain the same accuracy depends on the severity of the earlier tests conducted on the coils for inductance matching, the tuning condensers for balanced capacity changes per degree rotation and similar factors of lesser importance. Slight irregularities in the tuning circuit constants are invariably corrected by small trimmer capacitors which are adjusted and then sealed by the set maker. Even so, it will be found that considerable errors do occur, the percentage of inaccuracy normally becoming less the more expensive the receiver.

Hand Calibration

A suggestion recently put forward that prospective owners of expensive radiograms should have the option of paying five guineas extra for hand-calibrated tuning scales at least gives one a clear idea of how the cost of a set can be raised in this respect, since the calibration would need to be the same whatever the initial outlay.

A recently issued patent granted to a well-known company covered the construction of a full-vision rectangular horizontal dial which incorporated a most ingenious system for correcting errors of calibration. The patent assumed the use of a printed scale, a cord and drum control,

(*Continued overleaf*)



Here are our contributor's suggestions for making a modern tuning dial.

NOVEL TUNING DIALS

(Continued from previous page)

and coil and condenser constants to the usual inexpensive receiver standards. At certain settings of the cursor or pointer it was found that the scale lagged and at other settings was in advance of the actual transmissions for which it was marked. The control knob actuating the drum, cord and cursor, which in the normal manner transmits an equal movement to the latter, is allowed to do so also in this case, but the cursor, instead of travelling on level supports, is made to ride on a spring which can be distorted to produce troughs and hills by means of numerous grub screws or stops pressing on to it.

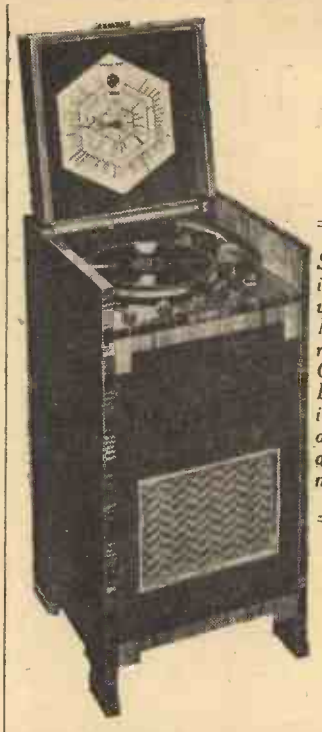
On the test bench in the factory and by creating the usual artificial signals, the operator undertaking the calibration can quickly ascertain whether the calibration is in advance of the cursor, in which case a "hill" is provided at that point. On the other hand, where the cursor itself is in advance of the appropriate calibration, the former can be retarded by a trough and so on.

Making Your Own Dial

Those readers of PRACTICAL AND AMATEUR WIRELESS who are sufficiently keen to construct their own tuning dials should find enough material from the foregoing descriptions to evolve designs which embody all the salient features of each type mentioned.

Unless a reliable wave-meter is available, it will be necessary to start with a "blank canvas," which can be marked with an arbitrary scale and later filled in with the names of known stations under operating conditions. The most simple and satisfactory arrangement is to provide a circular dial at least six inches in diameter, although preferably larger. An opaque celluloid material can be employed so that the calibration may be illuminated by two or three flashlamp bulbs mounted in small clip-on holders, the bulbs being connected in parallel with the L.T. or 4v. A.C. heater supply.

Where a full 360 degree scale for each wave range is required, the cursor will need to be geared 2 to 1 to the main tuning condenser spindle, as the latter normally only moves through 180 degrees. A better scheme is to employ a *direct* drive by clamping a double-ended cursor or pointer very firmly on the main spindle and using 180 degrees only for each wave range. The top half of the dial can then be used for, say, medium and long waves (one scale being under the other) and the bottom half of the dial for two short wavebands.



Simplified tuning is provided in this McMichael receiver by the Giant Tuning Dial fitted inside the lid, and which is operated by the normal controls

Parallax errors can be avoided by making the double pointer from a transparent and fairly thick celluloid and marking hair lines at each end, the lines to be on the surface of the pointer, which is to be nearly touching the actual scale, or in other words, the thickness of the pointer material must not intervene.

Marking the Scale

Rigid and central mounting of the opaque scale is essential, but it should preferably be detachable, as it can be calibrated with a sharp but soft pencil in position on the set and later removed for permanent marking with indelible ink. A material having fine eggshell surface finish is required, because a glazed celluloid transparency will not easily mark.

The mechanical operation can be on the cord and drum principle, especially as errors cannot occur due to the direct cursor coupling. A 10 to 1 reduction for broadcast wavelengths is ample, and can be obtained by coupling a control knob working a ¼in. diameter spindle to a 2½in. diameter drum mounted on the main condenser spindle behind the dial plate. The cord should be of woven silk or similar material, and it must be wound around the ¼in. spindle at least twice to ensure a proper purchase. Constant tension can be assured by bringing the cord ends inside the 2½in. drum and attaching them to contraction springs (initially drawn out). Collars or lips on both spindle and drum will guard against the driving cord slipping off.

For short-wave purposes a reduction drive of 100 to 1 is desirable, and is best obtained by providing a further 10 to 1 reduction scheme on the control knob itself. It can take the form of a friction gear, the short-wave knob being mounted on control knob. Alternatively, an entirely separate "S.W." knob can be provided and worked by a friction drum on the main control, on an extension of the spindle beyond the point where the cord grips.

New McMichael A.C./D.C. Superhet

McMICHAEL RADIO have just introduced a popularly priced A.C./D.C. superhet, thus completing their current range with a total of eleven different models covering every possible requirement.

The new superhet is to be known as Model 369, and will retail at 12½ guineas. The five-valve (including rectifier) seven-stage circuit is contained in a horizontal type of inlaid walnut cabinet.

The general performance of Model 369 is notable for exceptionally quiet background, resulting from the use of an elaborate mains filter in each lead, with high sensitivity, and 2 watts undistorted output. Interesting features of this new model include the "precise-indication" scale used on previous McMichael models, in which the intersection of a vertical knife-edge pointer with a diagonal line appearing behind the station names when the scale is illuminated gives the exact tuning position, the low power consumption of only 60 watts, a special constant-gain aerial coupling circuit, a very complete cooling system, and provision for extra speakers with full switching control. The price is 12½ gns. for A.C./D.C. mains.

The new McMichael A.C./D.C. Superhet (Model 369) with "precise indication" tuning scale and mains static suppression.

Fitting the Set in its Cabinet

Methods of Drilling the Cabinet, of Using a Separate Panel, and of Fitting a New Set into an Old Drilled Cabinet

By FRANK PRESTON

MORE cabinets than one have been spoiled due to carelessness in drilling for the control spindles, or due to lack of knowledge of the proper procedure to adopt in carrying out the work. It is usual to-day to dispense with a panel as part of the receiver unit, since the front of the cabinet replaces it, and although this is excellent in many respects it is inclined to cause certain difficulties. When dealing with a receiver of which constructional details have been given in this journal, the drilling of the cabinet should be a fairly straightforward job, due to the fact that front-of-set dimensions are always given. In consequence, it should be possible simply to make a paper template from the dimensioned drawing and to use this for marking out the cabinet. The first trouble arises, however, due to slight inaccuracies in construction, which throw the dimensions slightly "out."

A Template

One simple method of overcoming any such trouble is by first marking out the positions from the front elevation (a typical one is shown in Fig. 1) on a sheet of stout paper or thin card, and then making holes one at a time to fit the spindles. The procedure is first to pierce the paper at the point corresponding to the position of the longest spindle. Slip the card over that spindle, and then pierce for the second longest, and so on until all the spindles have been passed through the card. Make quite certain that the template is perfectly flat at this stage, and also see that its lower edge is parallel to the baseboard or bottom of the chassis. The template thus made can be lightly glued to the inside of the cabinet in the correct position and ⅛in. holes drilled through the centres of the various holes. These holes are best made with a small twist drill held in a mechanic's brace, but they can be made with a very fine bradawl, or with an archimedean drill of the type used for fretwork. Care must be taken that the drill is not forced, for that might cause the front facing of the plywood (which is generally used to-day) to be split or cracked.

Drilling the Holes

The next step should be to drill the holes partly through the wood from the outside. For all holes over ¼in. the best tool is a centre-bit held in a joiner's brace (Fig. 2), whilst for smaller holes a twist drill can be used in a mechanic's brace. Best results can be obtained with the centre bit when it is applied to the front face only until the bounding circle of the hole has been traced and the surface fibres cut through. After that the cabinet can be laid on a flat, smooth board of soft wood until the holes are completed from the inside. Where the cabinet is too large to be laid down in this manner, a block of wood should be held firmly against it by an assistant. In making the smaller holes with a twist drill, go about half-way through from the front and then finish from the inside.

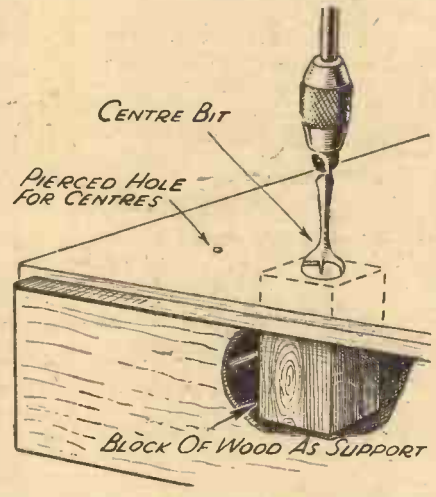


Fig. 2.—After making small centre holes from the inside of the cabinet full size holes should be traced out on the front, using a centre bit.

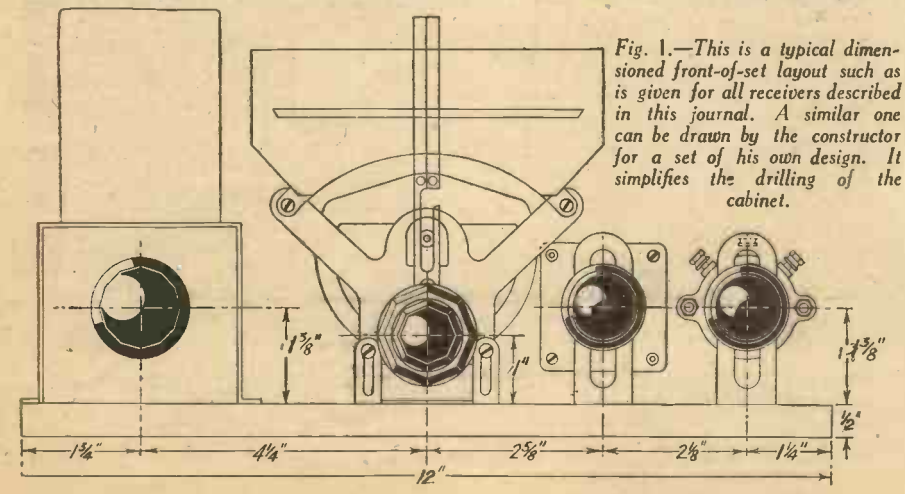


Fig. 1.—This is a typical dimensioned front-of-set layout such as is given for all receivers described in this journal. A similar one can be drawn by the constructor for a set of his own design. It simplifies the drilling of the cabinet.

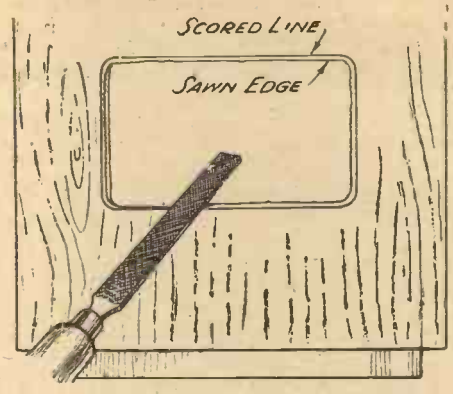


Fig. 4.—How the opening in the cabinet is finished off. The file is inclined.

With regard to the size of the holes, it is always a good plan to make them slightly larger than the diameters of the spindles, provided that the knobs are large enough to cover them. The reason for this is twofold; it allows for slight inaccuracies of workmanship, and also prevents the spindle from being a tight fit. If they are at all tight the controls are more difficult to operate, and vibration from the speaker is more readily transmitted to the set, where it might cause a certain amount of microphony. Still further to assist in this direction, it is a good plan to allow the chassis or baseboard to stand on a piece of felt or baize, or even to glue small strips of soft rubber to the corners. This might appear to be unnecessary with modern valves, but it should be remembered that when tuning is extremely sharp, vibration of the connecting wires, coils, and condenser vanes can be a serious matter. Examination of commercial sets will show that many manufacturers adopt this course!

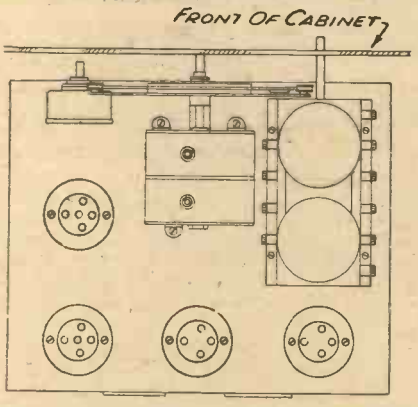


Fig. 3.—The set can be used as its own template by first making a hole for the longest spindle, and then marking the positions of the others, and drilling the holes in turn.

Marking Out from the Set

When a template cannot well be used, a similar method to that described above can still be followed, although the work takes up rather more time. The idea is to place the set approximately in position in the cabinet, push it against the front, and carefully mark the position of the tip of the longest spindle. A small hole can then be made at this point and afterwards

(Continued overleaf)

FITTING THE SET IN ITS CABINET

(Continued from previous page)

enlarged so that the spindle will slip through. The centre of the next-longest spindle can then be marked and the hole drilled in similar manner (see Fig. 3); the process can be continued until all of the holes have been made. In this way absolute accuracy should be ensured.

In every case, however, care should be taken not to apply too much pressure to the drill, and to see that the drill or bit is perfectly sharp. It is also wise to have a firm support behind the hole which is being drilled, so that there can be no danger of splitting the wood or splintering the edges of the holes.

Experimental Receivers

When the set is an experimental one and might be modified or replaced, it is always better to employ a panel—either plywood, metal, or ebonite—and to cut an opening in the cabinet to accommodate the controls (see Fig. 5). The opening can be made most satisfactorily by first drawing the shape on a sheet of paper and then lightly gluing this to the inside of the cabinet, and drilling holes near the corners. These should first be run through with a small drill and then enlarged to half-inch in the manner described above. After that, the holes can be joined up by means of a pad-saw, or key-hole saw, as it is sometimes called. In sawing, keep about eighth-inch away from the outside lines, and for preference work from the outside of the cabinet. Another point is that care should be taken to put all the pressure on the forward stroke of the saw; if this is not done the edges of the cut are almost sure to splinter. After cutting out the unwanted portion, lightly score the outside lines on the front of the cabinet and file down to them, using a medium-cut file. Again, care must be taken to avoid splintering, and it is best to tilt the file, as shown in Fig. 4, and to go right down to the line on the outside. Do the same on the inside, always applying the pressure on the forward stroke only, and finally remove the rounded ridge by filing from the outside and holding the file at a sharp angle to the edge which is being filed. It should then be possible to make a perfect finish by means of fine glass-paper, which should be held on a steel rule or flat stick. The final finish is best obtained by running the glass-paper from end to end of the edge. Incidentally, the same method can be followed in making the opening for the tuning-dial escutcheon plate.

Finishing the Edges

If the cabinet is polished, as it probably will be, the next problem concerns the method of colouring and polishing the raw edge which is left. An attempt to match the colour and finish of the cabinet will generally result in failure, but if the edge is blackened with good black japan a good job can be made of it. The japan can be applied with a linen rag or with a brush, but the former is generally easier to use, because with a brush there is a tendency to overrun the edge. This can be prevented by lightly sticking a length of gummed paper against the edge of the hole on the outside of the cabinet; the excess of japan will then go on this, and the paper can be stripped off when the colour is dry.

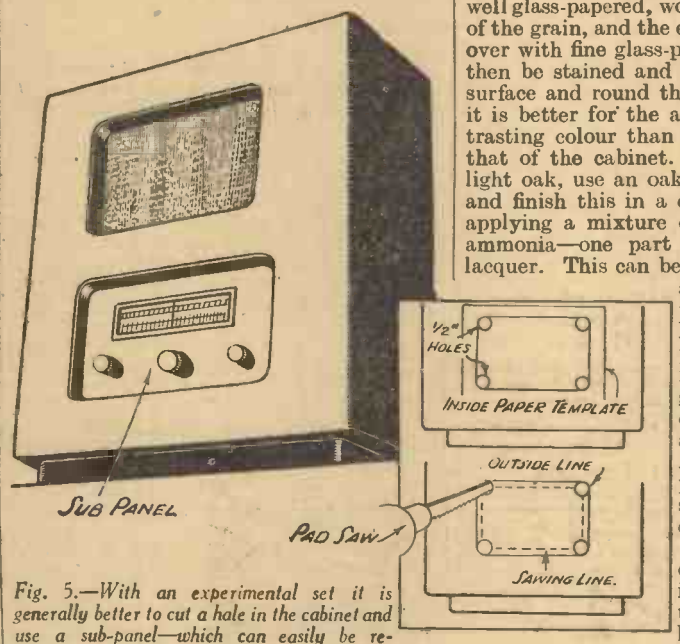


Fig. 5.—With an experimental set it is generally better to cut a hole in the cabinet and use a sub-panel—which can easily be replaced. Methods of making the hole are shown inset.

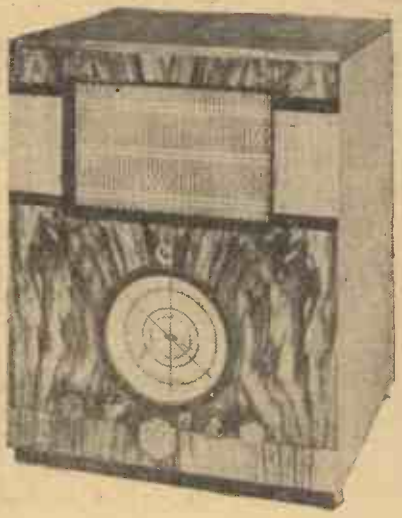
Preparing An Extra Panel

If a cabinet has already been drilled and it is wished to fit a new set with different control positions, the method just described can still be followed. Another one is to fit a plywood panel over the front of the cabinet. Before adopting this method, however, make sure that the spindles are long enough to pass through this as well as through the cabinet front with sufficient length to spare to permit of the knobs being fitted. The new panel can first be drilled—before polishing—by one of the methods described above. After that the surface should be well glass-papered, working in the direction of the grain, and the edges slightly rounded over with fine glass-paper. This panel can then be stained and polished on the front surface and round the edges. Here again, it is better for the amateur to use a contrasting colour than to attempt to match that of the cabinet. If the cabinet is of light oak, use an oak-faced plywood panel and finish this in a dark-brown colour by applying a mixture of black lacquer and ammonia—one part ammonia to two of lacquer. This can be applied with a brush and then rubbed over with a non-fluffy rag. Incidentally, the application should be made where there is a good draught of air, because ammonia fumes are far from pleasant! A final polish with prepared wax or linseed oil will give the desired effect.

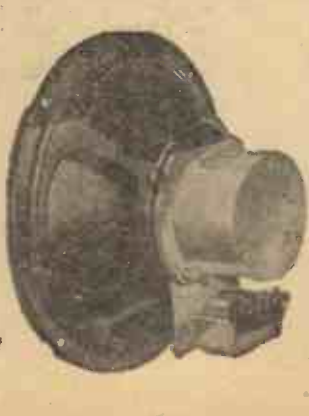
When the cabinet is of dark oak or walnut it will be found better to leave the panel a light shade. It can be simply well rubbed down with glass-paper and waxed, or it might be given a couple of coats of shellac varnish, well glass-papering between the two.

Use this panel as a template, and attach it to the front of the cabinet with neat screws (chromium plated or bronzed), and then drill the holes through the cabinet front. A modern finish may be obtained by blackening the panel and fitting chromium control knobs or a white panel with black controls.

NEW RECEIVERS AND AN EXTENSION SPEAKER



A large clock-face full-vision dial is an important feature of this new R.G.D. receiver.



For use as an extension speaker this Rola Model, with special input transformer, will prove very satisfactory. It may be obtained in a cabinet if required.

Some novel features are to be found in the tuning arrangements of this new C.A.C. receiver.

Practical Television

November 7th, 1936. Vol. 3. No. 23.

Things to Come

THE title chosen by H. G. Wells for the wonderful film which has been shown at the cinemas during the last few weeks is very appropriate insofar as television is concerned. In the film itself a wonderful picture is painted of how television will be dovetailed into everyday life as a service of far reaching importance, not only as an entertainment in the home, but as a means of appealing to the masses when an important decision has to be made. Blind oratory does not sway a crowd as much as actually watching the speaker and hearing his voice at the same time, and this is an incident so well portrayed in the film itself. Wells is outstanding as a writer with a vivid imagination, but we have often wondered how much of the television side of "Things to Come" was a direct outcome of conversations between Baird and Wells in 1931. These two men met on a liner on the way to America, as the accompanying illustration (Fig. 1) shows. On a trip of this nature (an eventful one as far as Mr. Baird was concerned, for he married in New York in the same year), many friendships are made, and the possibilities of television were no doubt outlined to good effect by these two outstanding personalities.

Fig. 1.—An informal chat between J. L. Baird and H. G. Wells in 1931, which may have had some bearing on "Things to Come."

A Reverse Process

The development of radio and television, although akin in many respects, can be regarded as starting in opposite categories. Radio started its career as a commercial proposition for the establishment of communication between distant places not linked by telegraphic means via a cable. It was only many years later that its benefits spread to the world of entertainment with the vast ramifications of the present day. Television, however, seems to be destined to start as a service providing a new entertainment medium. It is certain, however, that its use in commercial, naval and military life will very readily make itself manifest, but it is curious that the beginnings of the two subjects should be just opposite to one another.

A Common Mistake

A conversation was overheard the other day in which two people were discussing the subject of television. One was endeavouring to explain to his friend some of the problems associated with the provision of a public service, and stated that undoubtedly one of the most difficult things was to achieve synchronism between sound and vision, so that when a person was seen speaking on the receiver screen, voice and lip movement exactly coincided. To substantiate this remark the speaker went on to say that this was due to the widely differing speeds with which light and sound travelled through the air. The former was quoted as 186,000 miles per second, while the latter was given as 1,100 feet per second. Now while both these figures are correct the original statement is quite wrong, and it is surprising how many people make the same mistake. In radio telephony no actual sound is sent through space, but an electrical replica of the original sound waves, this being the modulating signal of the electromagnetic carrier wave. As readers know, this is reconverted into sound waves by the combination of radio receiver and loudspeaker. Similarly, with television, the scene to be radiated is converted electrically and optically into a somewhat similar modulating signal to be radiated by the electromagnetic carrier wave for reconversion at the receiving end by the picture reproducing device into a visual replica in miniature of the original scene televised. Both the sound and light conversion to electrical signals take place simultaneously and travel through space at identical rates. Synchronism between sound and vision is therefore quite automatic and needs no human agency to rectify it. The process bears no relation to seeing a lightning flash and hearing some seconds later the noise of this electrical discharge. With television neither light nor sound travels through the ether, but two quite separate, although synchronised, modulated electromagnetic ultra-short carrier waves.

Sport and Television

The B.B.C. seem to be fully alive to the possibilities of portraying nearly every phase of sport by means of television. Not only is it intended to see games of all types, but lessons of all the most popular forms will be featured. A taste of what is to come was given when Archie Compston demonstrated strokes and putting on a green quite close to the Alexandra Palace station, so that the Emitron camera could televise the scene in the usual manner. Compston himself was amazed at what he saw on the receiver screen when a man drove from the tee and made approaches to the green. He commented on the clearness of the picture and ventured to suggest that we were living in the age of miracles. Boxing has also been featured, and the whole work serves to recall some of the earlier television experiments, especially those in multi-zone television where the scheme was regarded as one solution to the provision of much higher definition than the thirty-line standard then being featured. In one case a three-zone experiment giving a total of

(Continued overleaf)

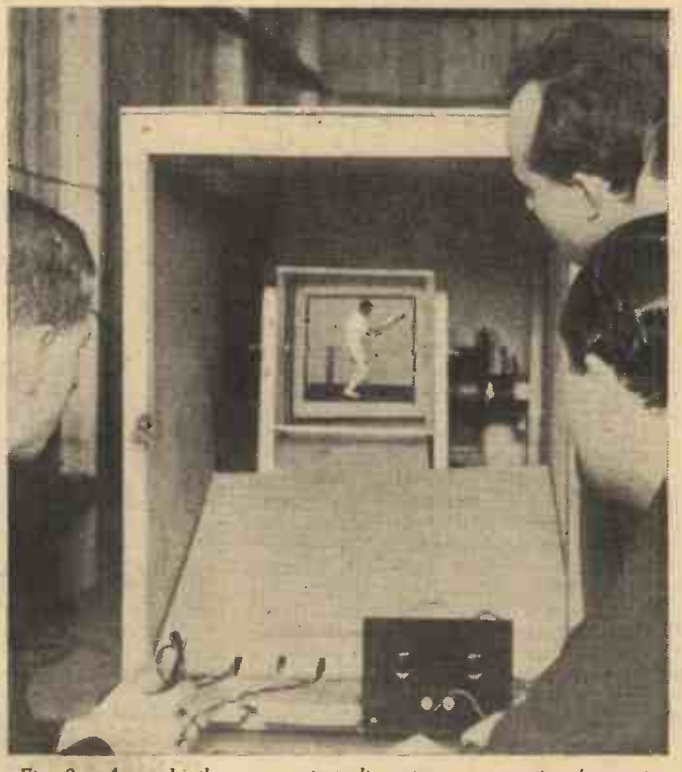


Fig. 2.—An early three zone ninety-line picture, portraying lessons in sport as now featured on high-definition B.B.C. television service.

(Continued from previous page)

ninety-line definition was used to portray cricket strokes and wicket-keeping by Strudwick, the well-known Surrey player. An idea of the receiver built up for this purpose is shown in Fig. 2. It was undertaken by Baird, and at the receiving end he used a single-mirror drum with three separately modulated point light-source type neon lamps. Each of these handled the signals of one zone, and by matching up the three zones the resultant picture was built up something in the manner shown in the photograph.

Television and Photography

During the last two or three years the Royal Photographic Society has included an exhibit showing the close relationship between photography and certain sections of the television processes. This year the results shown dealt with the actual recording of television pictures on standard 35 millimetre film by means of the intermediate-film projection receiver. A standard of 25 frames per second was employed with 240 line definition. In addition to films showing the good results that can be obtained selections were included to illustrate certain faults which have to be cured. One of these was the picture resulting from over modulation, while another demonstrated very clearly the effects of hum or mains ripple induced into the cathode-ray tube time base. In either case the quality of the picture is ruined, but both these defects can be rectified by a proper attention to equipment design and layout.

A view of "His Master's Voice" factories at Hayes, Middlesex, showing the research building and television mast.

Television Notes

Speed of Electron Beam

THE electron beam of a cathode-ray tube when receiving high-definition television, travels at an average speed of approximately 4,600 miles per hour, although during the fly back from one line to the next it attains a speed of more than 50,000 miles per hour.

Air Pressure Inside a Cathode-ray Tube

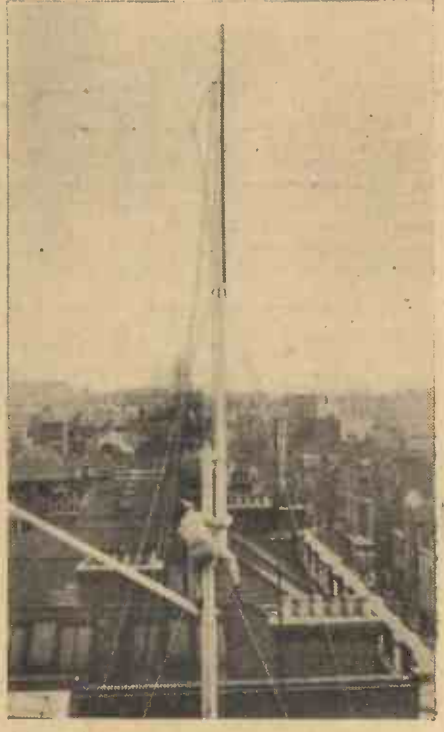
FOR all *mechanical* considerations the air pressure inside a cathode-ray tube may be considered negligible, which means that the screen of the 12in. variety is subjected to an atmospheric pressure of some three tons, while the atmospheric pressure on the whole tube is anything between ten and fifteen tons, according to its shape.

The Television Film, November 2nd

"TELEVISION comes to London," the new B.B.C. film, had its première in the evening transmission from Alexandra Palace on November 2nd. Produced by Gerald Cock, Director of Television, and Dallas Bower, this film gave a vivid picture of the establishment of the television service, dealing first with the reconstruction of the East Corner and Tower of Alexandra Palace. It showed also how the transmitting apparatus was constructed and tested in the laboratories of the Marconi-E.M.I. Company and the Baird Company. The scene shifted once more to Alexandra Palace, and televiewers were given glimpses of the tower under construction. Incidentally, these shots were taken at considerable risk to the cameramen who were swung aloft in a bo'sun's chair. Drawing towards its climax, the film portrayed the "Station in Being." Various departments were seen at work; the announcers in the make-up room; a typical programme being presented in the studios; Adele Dixon singing "Television" in her first television performance, and, finally, the Television Orchestra, playing in uniform, in a series of ingenious camera shots. The commentary to "Television Comes to London" was by Cecil Lewis, and the narrator was the television announcer, Leslie Mitchell. The photography has been carried out by Major L. G. Barbrook and James Carr.

Marconi's Original Mast

ON the roof of Radio House's, headquarters of Marconiphone, is now in position a 60 ft. mast consisting of main mast and topmast, and carrying a gaff with a Union Jack at the peak. This mast has a unique history, inasmuch as it is the original mast used by His Excellency the Marchese (then Signor) Marconi during his early experiments in the Isle of Wight.



Marconi's original mast, now on the roof of the Marconiphone headquarters in Tottenham Court Road, London.

It stood in the grounds of the Royal Needles Hotel, Alum Bay, Isle of Wight, and carried an aerial with which Marconi succeeded in establishing communication over a distance of several hundred yards. He increased this to two miles and then moved to Niton, eight miles away, taking the mast, which took two days to transport owing to its size and weight. He erected it in a field quite near to where St. Catherine's Lighthouse now stands, and established communication with the mainland after further experiments.

Altogether, Marconi used this mast for three years in the Isle of Wight, and at the end of that time he was convinced that the time had come for his big onslaught on the Atlantic. The mast (at that time 160 feet in length) was reduced to 60 ft.—its present length—and was used to carry a flag in the garden of a lady's house on the Island.

Last year it was bought by Marconiphone and shipped to England. It now carries the first Television aerial in the West End of London to be erected for the purpose of supplying programmes for public demonstration and experiment. Thus, the very old meets the very new with considerable benefit to everyone.

Some advance details of this mast were given in our issue dated Oct. 24th, and the accompanying illustration shows the mast being given a final overhaul after its installation on Radio House.

IMPORTANT TELEVISION EVENTS OF THE WEEK.

Mon.	Nov. 9.	Picture Page.
Tue.	„ 10.	Pageant reconstructing Lord Mayor's Show.
Wed.	„ 11.	Armistice Day Programme.
Thu.	„ 12.	International Poultry Show.
Fri.	„ 13.	Operatic excerpts.
Sat.	„ 14.	Veteran Cars Parade.

On Your Wavelength

By THERMION

"Knowledge of Music Not Essential"

SO many readers are expecting a weekly comment on jazz that I must not disappoint them. May I, therefore, direct their attention to the following advertisement which appeared in a South Wales newspaper :

"An amateur band in———— require instrumentalists, string or piano-accordion ; knowledge of music not essential. Apply————."

I am obliged to a reader for this cutting, which proves up to the hilt, without dubiety, beyond equivocation, and Q. E. D., that my remarks against jazz are more than justified. The reader says that he has taken a band of fourteen players, none of whom had ever performed or rehearsed with the others, and put over a full programme, not only without the public detecting that they had been unrehearsed, but with rapturous, cataclysmic, spontaneous, and resounding applause (cheers). He says that the only essential to jazz is a good general utility man, the remainder is and may well be "dirt." This epitomises modern music to perfection.

Now, my masters, what have you to say? Ye who support this aboriginal nigger nonsense—are you going to smite me hip and thigh? And will those ayes write and add to my bulging file in further support of my rhetorical, metaphorical, and calligraphical objurgations, execrations, and anathematized castigations of this parasitic barnacle-like appendage to modern entertainment. Play the game, you scugs, play the game!

Baseboards, Still More Baseboards

AND now to another hoary old subject. Baseboards *versus* chassis! It is too early to assess the success of the "Record," so I must defer judgment. Two more readers want to have their say, and so they shall.

Here is E. P. R., of Royston, who says :—

"Dear Thermion, —May I have a word to say in this 'baseboard *versus* chassis' controversy? I have constructed a few circuits on the baseboard, and it has many advantages, being very easy to get at, and therefore different components may be changed with ease. But for neatness and compactness give me the chassis, which must be the better of the two, otherwise the best designers would not use it.

"I agree with S. T. P., of Bethnal Green, as to the ease of building up a circuit on the baseboard, but once you have your circuit, try it on a chassis and after a little shifting and changing about you will find it even better.

"I have not seen anything referring to the cycle radio lately, but I did try one set out on the wheel. It was a two-valver with a frame aerial mounted on the handlebars, but was not an entire success, owing to the directional properties of the aerial. I should like to hear of other readers' results in this line.

"Thank you for 'On Your Wavelength,' and I think you get more interesting as the weeks roll by."

Another reader contributes the following views to the problem :—

"Dear Thermion,—I have been a reader of your articles for a long time —they are always the first I turn to.

"I have been very interested in your remarks about the baseboard *v.* chassis controversy. Personally, I have always used the baseboard; in fact, the one I started with in 1929 is still doing yeoman service. Before I came here, eighteen months ago, into the country I was curate in one of the poor parishes in Sunderland. Most houses, of those of the unemployed, had some sort of wireless, and as I was interested, too, I had many conversations about it. I gathered that many men make up a set, using cheap parts to start with, and then, later on, they may be able to afford a better component or pick one up secondhand. Most of us have some of last year's valveholders, etc. One important point I don't think you have mentioned is this: I think the baseboard construction has a better educational value. I first made up sets from the pictorial diagrams, and then with the theoretical circuit in my hand have sat gazing at the set for a long time on many days, comparing the set with the circuit. I now find that I can read a theoretical diagram fairly well, and can build a simple set from one.

"Another curious result of constructing your own sets is the sentimental attachments to various components which are used and have done good service. I look at a coil or transformer, which has served me well and feel it a shame to put it in the junk box. I feel like framing it or crowning it with laurels and standing it on the mantelpiece! Then a set becomes associated with important events in our lives, and it is difficult to put them on one side. The first set I made up was after I was ordained in 1929, and I felt it quite a wrench when I pulled it to pieces. In fact, I still use the same baseboard, panel, valveholders, condenser, etc.

"There is a romantic side to wireless besides the so-called romance of big business.

"I must finish by saying how much I enjoy the paper. I really look forward to it each week."—L. G. (Hovingham).

Back Numbers for Readers

MR. W. MORRIS, 5, Corser Street, Smethwick, Staffs, says that he has back numbers of this journal dating from September 28th, 1935. If any reader would like them he can have them for the price of postage. Remember—first come, first served.

"Where are the Clubs?"

I REALLY must find room, too, for the following epistle, missive, or letter :

"Dear Thermion,—In reply to

your query, 'Where are the Clubs?' I am writing you a long-threatened letter. I have read your article regularly, with approval or criticism, as the case merited. Crooners, I detest, but baseboards every time for short waves. To return to Clubs, we have been running ours nearly a year, and are getting healthier. Not a big cash balance, all money goes in gear. Tri-tet TX and regen. receiver under construction now, and besides this, the best crowd in the district all ready for a chin-wag. Mansfield started a club about a month ago, and both clubs are working with a view to co-operation in experimental transmissions. Stand by for reports in your club columns." —H. D. (Notts).

Television Public Address!

ON Thursday, October 22nd, the world's first Public Address Television job was carried out by Marconiphone.

The work was undertaken on behalf of the Society of Motor Manufacturers and Traders, and took place in the Exhibitor's Club at the Motor Show, Olympia. The occasion was the television broadcast by Sir Malcolm Campbell of a description of each of twelve cars selected by the S.M.M.T., and four Marconiphone "701" Television receivers were installed in the Exhibitors' Club to convey to a selected audience Sir Malcolm's gestures and remarks.

The S.M.M.T. invited members of the Press, the directorate of each of the firms whose cars formed the subject of Sir Malcolm's broadcast, the President and Executive of S.M.M.T., and other prominent members of the Motor Trade.

Altogether, about 120 people witnessed the reception, each of whom saw everything perfectly. This is the largest number of persons ever to witness a regular television programme.

New Home of the B.I.E.T.

I AM interested in the great strides which have been made by the B.I.E.T., which was originally located at Shakespeare House, Leicester Square, on the site now occupied by the Leicester Square Theatre. But a growing business demands space, and the Institute was moved to Shakespeare House, Oxford Street. It occupied one floor, but within one year a second floor was taken over; then a third; next a fourth; then the volume of business burst over the banks, so to speak, and additional accommodation was found in Soho Square. This proved inadequate, and finally, the Institute has settled down in the large building upon the corner site of Oxford Street and Stratford Place. This large building, the work of independent architects and the professional staff of the Institute, houses every modern efficiency device, and the new Shakespeare House is now as up-to-date as money and brains can make it. From the time an enquiry for a prospectus is received right through the process of advising and conducting the student's studies and piloting him through his selected examinations, an efficient organisation ensures the successful termination of his studies. They have an electrically-operated postal machine and a printing factory, and many publishers have placed commissions with the Tutors of the Institute for technical books. I wish the Institute well.

Speaker Field Windings

WHEN a set is fitted with a permanent magnet speaker it is a fairly easy task to find a suitable substitute when a replacement is necessary. In most cases it is only necessary to find a speaker having the correct ratio output transformer attached, and, as most speakers of the permanent magnet type are fitted with multi-ratio transformers, no trouble need be experienced. When the speaker is of the energised type, however, substitution cannot be so easily effected—the field winding has now to be considered. Speaker field windings are made in several standard resistance values, the most common being 1,250 ohms, 2,500 ohms, and 6,500 ohms.

Importance of Resistance

THE first type is generally used in quality receivers having a high anode current consumption, the field winding being connected in the common H.T. lead, either in the positive or negative line. If this type of speaker were incorrectly replaced by a high resistance type, too great a voltage drop would occur across the winding, and the valve anodes would be starved. The 2,500 ohm type is commonly connected in the same manner as the 1,250 type, but in lower power receivers. If the low resistance type were fitted in this case, excessive voltage would be applied to the valve anodes. The 6,500 ohm speaker is generally energised direct from the 200-250 volt D.C. supply, or the field winding is connected across the rectifier output circuit. A low resistance winding connected in the latter position would become damaged, and, what is more serious, the rectifying valve would also be damaged.

Extension Speakers

THE addition of an extension speaker is also a matter which cannot be tackled haphazardly. The extension speaker sockets on some sets are connected to the speech coil of the set speaker. When this is the case the extension speaker should be of the low-resistance type (between 2 and 15 ohms approximately), and if a high-resistance type is used a step-up matching transformer should be connected between the extension sockets and the extra speaker.

The Post-War Generation

WHICH reminds me that never was it more necessary that youth should absorb in such easily-assimilable form the world's heritage of knowledge. Unfortunately, the War upset the mental balance of the world. Before the War, young men were trained in the arts and the professions; they had to serve an apprenticeship of from five to seven years; to start work at six o'clock in the morning, and to work for a modest wage. Moreover, they had to pay a premium before they could become indentured. At the end of their period of apprenticeship they put in a further year or so as improvers, and by that time were highly skilled. The apprenticeship system has completely broken down, and never has the need for skilled labour been greater. The very skill which created machinery has died off, and no one seems willing to become apprenticed. Youths to-day wish to start work at the age of seventeen or eighteen, and at once to command a man's wage. There is little wonder that there are 3,000,000 unemployed. The correct term for a large percentage is that they are unemployable. Some of them will tell you, somewhat tragically, that they are prepared to do anything, which is precisely what they cannot do. A man who says that he can do anything can usually do nothing. The radio trade is no exception. It does not take apprentices. How does it expect to get skilled labour? Does it think that individuals are *born* with specialists' knowledge?

Correspondence schools are performing a national useful work in bringing their country back to a knowledgeable state.

Feeding the Loudspeaker

Some Important Points Regarding the Output Stage are Explained in This Article and Some Doubtful Points Cleared Up.

By W. J. DELANEY

A NUMBER of listeners bemoan the fact that, although they are using a 2-watt valve in their output stage, the volume which they get is far less than one watt. Similarly, others who do not understand the meanings of the various valve terms, purchase a valve for the output stage which is of the L.F. type and of low price and then wonder why they cannot obtain more than a very weak signal without severe distortion. As a matter of fact it may rightly be stated that the output stage of a receiver is the most important, and should receive more care and attention in its design and in the voltages applied to it than any other part of the ordinary receiver. First of all it must be remembered that the loudspeaker can only deliver what is fed to it. It cannot amplify, although a poor speaker will not deliver the maximum signal voltage which is applied to it. Assuming, however, that the speaker is a good one of sound design, then it will deliver a faithful replica of the signal fed to it, and the makers will state the maximum signal which it will handle without distress. For the battery user this figure will not be of much importance as it is very unlikely that he will be able, with battery supplies, to obtain a sufficiently powerful signal to overload the speaker. In the case of a mains receiver, however, it may be possible under certain conditions to obtain a signal in excess of that which may be handled by the speaker and thus this point should be studied.

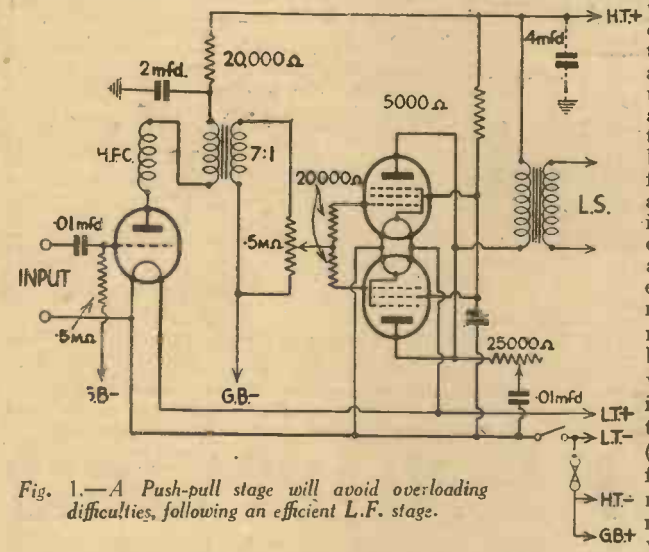


Fig. 1.—A Push-pull stage will avoid overloading difficulties, following an efficient L.F. stage.

Pentode or Triode?

Many listeners purchase a pentode valve on the understanding that it will deliver a greater volume than a simple power valve, and when the change is made in the receiver find that in some cases the volume is not so great as with the original valve. This may be due to two reasons—either the extra anode current taken by the pentode results in a loss of voltage to the remaining valves owing to the fact that the H.T. battery or mains unit will not deliver the extra current, or the input voltage is too great and the pentode is severely overloaded. Whilst the pentode valve has a higher amplification factor than a simple triode, it will not, in the majority of types, handle such a large input and therefore, the correct place to use the pentode is when insufficient amplification is afforded after the detector to provide adequate loudspeaker volume. It may be taken as a fairly general rule that a pentode should only be used immediately following a detector valve, and that if an L.F. stage is inserted between a detector and output stage a pentode should not be employed in view of the risk of overloading. This rule may, of course, be broken if a suitable L.F. volume control is included in the first L.F. stage, as then the loudest signals (such as may be obtained from the local station) may be sufficiently reduced to bring them within the range of the pentode valve, whilst weak signals will receive the benefit of the additional amplification and will afford better loudspeaker results.

Tone Correction

In most circuits the pentode must be used in conjunction with a tone correction circuit, as the reproduction is normally rather high-pitched. This tone corrector is required although the loudspeaker used with the receiver has a pair of terminals or other input arrangement marked "Pentode." Some amateurs appear to be under the impression that if the speaker is designed for use with a pentode no tone corrector is required, but the fact that the speaker will be suitable for use with a pentode concerns its impedance or resistance, and not its tone of reproduction.

In designing the output stage the maximum volume which is desired should be the first consideration, and one should then work backwards to the remainder of the circuit. For the battery user a maximum of 3 watts should be considered for normal circuits, but, of course, this will need a very efficient H.T. supply, and will be expensive to maintain. With a single valve a maximum of 1½ watts only is available The mains user, on the other hand, can obtain a single valve to deliver an output of 15 watts. Valves of this type are, however, in many cases, subject to the same limitations as the pentode valve; namely, their inability to handle a very large input. The amplification factor is high, and thus they need only a small input in order to deliver the maximum output. The range of the input signal may be ascertained from the grid bias figures. If a valve is rated for 3 volts grid bias it will only take half the signal that a valve requiring 6 volts grid bias will accommodate. Thus, if designing the output stage for a simple receiver without any L.F. amplification between it and the detector one would select a valve with the highest possible amplification factor, and with a low grid bias figure. On the other hand, if one is designing a very powerful receiver to use an output stage delivering 10 watts or so, one would select a low amplification factor output valve with a very high value of grid bias, and each intervening L.F. stage would have a higher amplification factor and lower grid bias.

Push-pull and Parallel

The push-pull stage will handle just slightly more than double the signal which the single valves will handle, and thus such a stage could be used where overloading takes place with the single valve. Obviously, however, the additional anode current and L.T. current drain must be considered at the same time, or the existing supplies may be found inadequate, with the result that the additional gain will not take place. The parallel stage, on the other hand, will not handle any more than the single valves, but the amplification will be greater. Assuming, therefore, that we have a receiver which provides very poor volume,

(Continued on page 252)

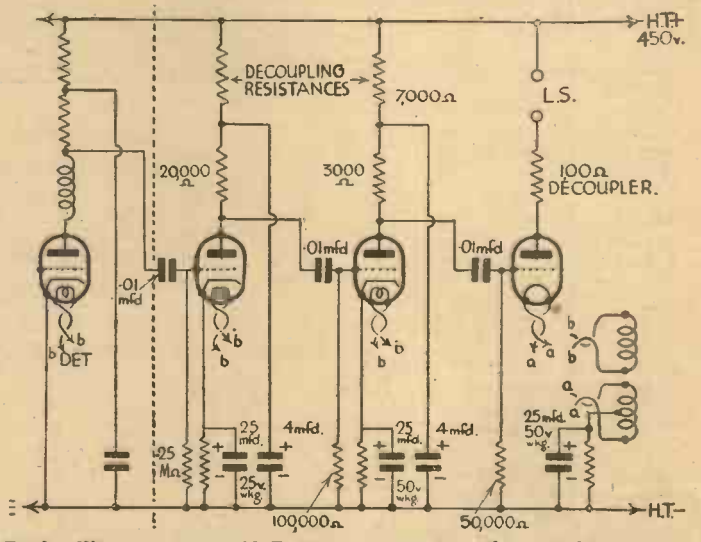


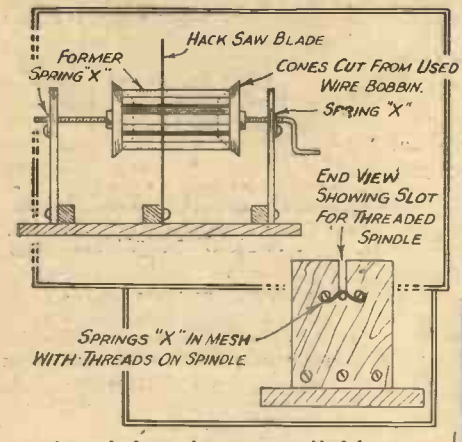
Fig. 2.—Where a succession of L.F. stages is employed, an efficient triode output valve should be used, and one with a large grid swing is necessary to avoid overloading.

A PAGE OF PRACTICAL HINTS

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

Grooving Machine for Ribbed Formers

THIS simple machine can be made quite cheaply and can be used for cutting spiral grooves on any size of former. The pitch of the grooves depends on the number of threads per inch on the shaft.



A simple device for grooving ribbed formers.

The former is held on the threaded shaft by cones cut from spent wire bobbins and secured with locknuts. The spindle may be bent into a crank handle at one end.

The steel springs at each end engage with the thread of the spindle, and as it is rotated the spindle and coil-former moves forward. The hack-saw blade is held against the former with sufficient pressure to cut the grooves to the required depth.

This machine can also be used for space-winding coils by substituting a slotted feeder for the hack-saw blade.—J. SOMERS (Flixton).

Multi-purpose Testing Unit

NEEDING a multi-purpose testing unit, and not wishing to go in for an expensive commercial model, I utilised a good voltmeter of the pocket type which I had by me. This is mounted on a polished wood case, size about 5½in. by 4in. by 2¼in., so that the face is flush with the top, simply by cutting out a circular hole of sufficient diameter to hold the case firmly. The terminals of the meter are thus left inside the box. Eight sockets and an ordinary bulb holder are fitted as in the diagrams, and connections soldered up. Two flex leads connect to a 4½v. cell which clips inside the box for convenience. An ordinary flash-lamp bulb is screwed into the holder.

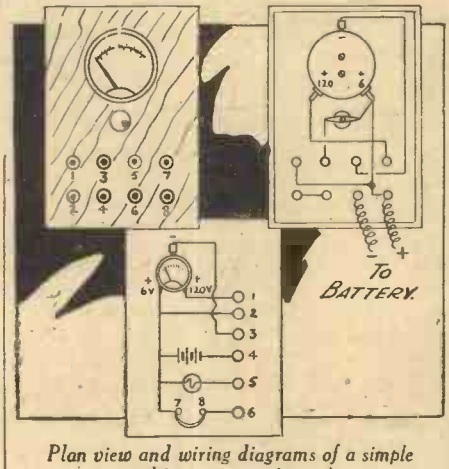
The unit will now test as follows, using two leads which plug into the sockets and which terminate in prods or clips as desired :—

Sockets	1	and	3	to	test	up	to	120 volts.
,,	2	,,	3	,,	,,	,,	6	,,
,,	3	,,	4	,,	,, circuits on meter.			
,,	4	,,	5	,,	,,	,,	,,	lamp.
,,	4	,,	6	,,	,,	,,	,,	'phones.

THAT DODGE OF YOURS!

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

The lamp is sufficient for a rough circuit test, the meter being used for a more accurate one, while the use of 'phones enables one to test grid leaks and small condensers for break-downs, this being impossible with the ordinary meter.

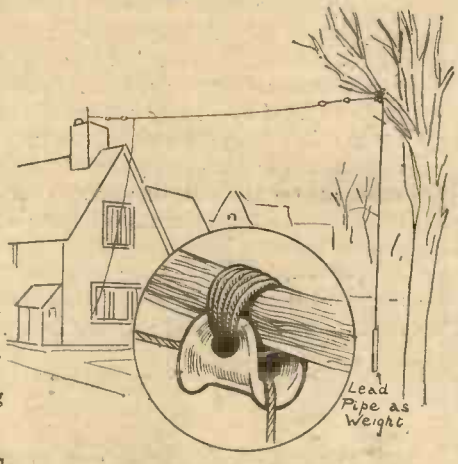


Plan view and wiring diagrams of a simple multi-purpose testing unit.

The sockets may be coloured if desired, but a numbered code as indicated is all that is necessary. Sockets are, of course, simpler and speedier than terminals.—W. C. ENGLISH (Newcastle-on-Tyne 4).

A Self-adjusting Aerial

THE accompanying sketches illustrate a method of self adjustment for tension of an aerial suspended from a tree that may swing in the wind. The lead pipe may be replaced by any other weighty object as counterweight, but the lead pipe looks the tidiest. This method is far more practical than springs, which are susceptible to the vagaries of the weather and there is also a limit to their movement, which, of course, does not apply in this case.—E. W. FURBANK (Bromley).

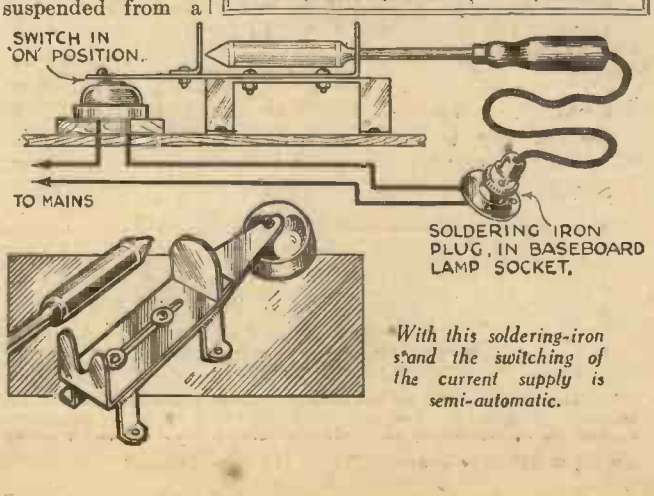


A method of suspending an aerial to allow for automatic adjustment.

A Switching Stand for a Soldering Iron

THE accompanying sketch shows a device which I have made and find most useful. It operates the switching of the current to my electric soldering iron simply by the removal or replacement of the iron itself.

It will be seen by the sketch that when the iron is replaced the point is pushed against the projecting plate and so switches on the electricity. If the operator desires to switch off, the iron itself engages in the "V" slot in the plate and by pulling same the switch is thrown in the off position. The device should be firmly mounted upon the soldering bench and the sliding plate well greased so as to ensure its easy action.—G. W. ARNOLD (Ilford).



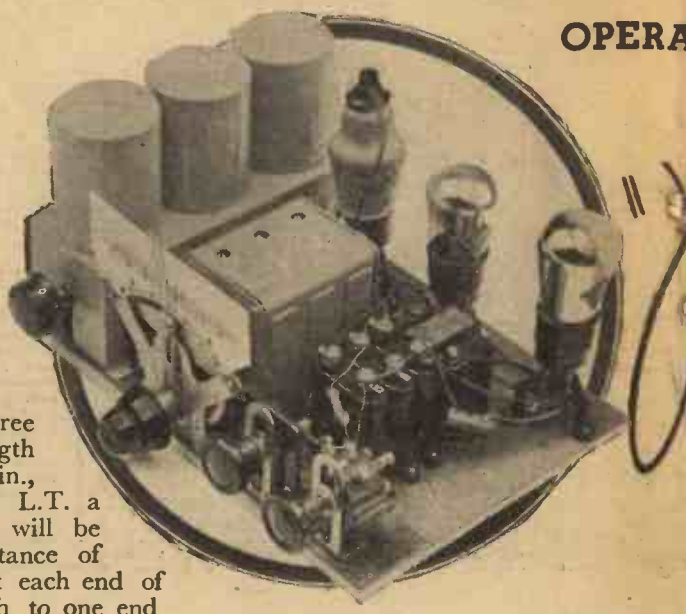
With this soldering-iron stand the switching of the current supply is semi-automatic.

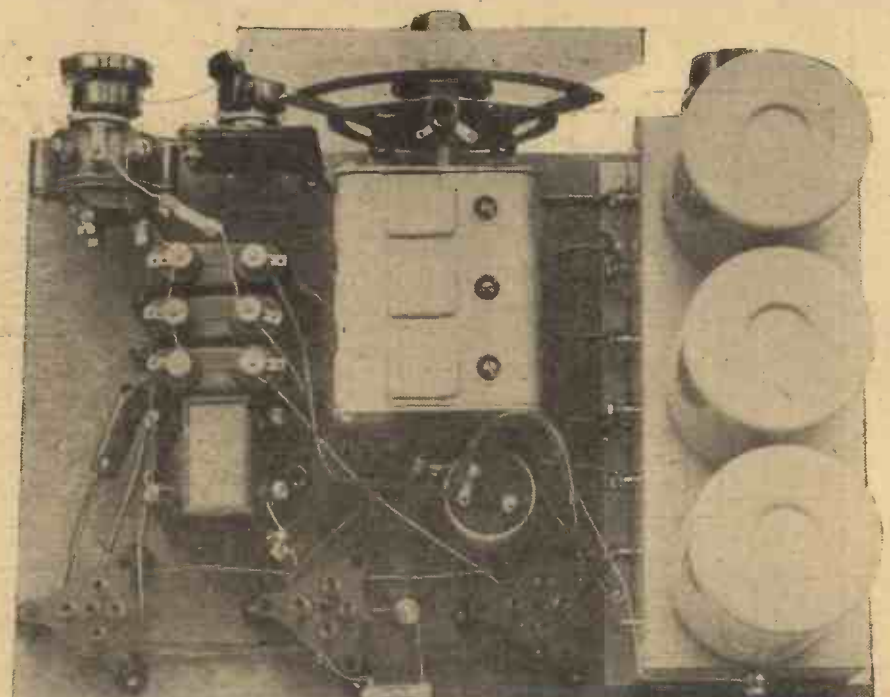
THE instructions given last week terminated at the point where the wiring was completed with the exception of the battery leads. Included in these are the leads to the loudspeaker, and it will be seen from the latter three leads are required in this particular design in order to simplify the general receiver wiring In addition to the usual anode and H.T. positive lead to the speaker, the additional lead is employed in order to convey to the screen of the output pentode the necessary H.T. positive potential. No confusion should arise from this scheme, however, as in the blueprint the lead from the screening terminal on the output valveholder is marked L.S.1 and the lead from the anode L.S.2. These are both joined to the loudspeaker terminals in the usual way. The lead from condenser C11, marked L.S.1, is then connected to the loudspeaker terminal to which is also joined the lead from the screening-grid terminal on V3, and thus the two L.S.1 leads are joined together. This is therefore quite simple, but if for any reason the individual constructor desires to dispense with the third lead on the speaker he may join the lead marked L.S.1 on condenser C11 to the centre valve leg on V3, taking a lead from this point for connection to the loudspeaker.

The Battery Leads

There are nine battery leads, and lengths of ordinary flex may be used, or a nine-way battery cord may be purchased. For the three grid-bias leads the length of lead may be about 6in., but for the H.T. and L.T. a length of about 12in. will be required. Bare a distance of about half an inch at each end of these leads and attach to one end of each one of the Bowspring wander-plugs or spades. The lead marked L.T.+ should be joined to the filament socket on V3 furthest from the panel, and L.T.— to one of the switch contacts on the combined volume-control and on-off switch. To the remaining empty terminal on this switch the G.B.+ lead is attached. To the empty side terminal on the control the G.B.—2 lead is attached and G.B.—1 is attached to the terminal on the L.F. transformer which is marked G.B. H.T.— lead is joined to the right-hand terminal on C9, and H.T.+3 is joined to the left-hand terminal on C11, the remaining two leads being joined to the L.F. transformer and condenser C9, the latter H.T.+1 and the transformer lead H.T.+2.

The receiver is now ready for test,





All components are neatly arranged, and terminals are in convenient positions for voltage tests, etc.

OPERA

The Completion of the Bui Various Operating Adjus This A

FOUR WAVEBANDS WITHOUT COIL CHANGING

14-30, 27-60, 200-550 and 850-2,100 Metres

LIST OF COMPONENTS FOR F. J. CA

1 All-wave Coil Unit
1 Three-gang condenser, Type K (.00025+.00025+
1 Slow-motion Drive (type 2135) including .00005 mf
1 .0005 mfd. Reaction condenser (C5)
6 Fixed Condensers:
Three .1 mfd. type B.B. (C9, C10, C11)
One .005 mfd. type 4421 E (C12)
One .0001 mfd. type 670 (C8)
One .0002 mfd. type 670 (C7)
3 Half-watt resistors:
One 15,000 (R.3)
One 50,000 (R.1)
One 2 megohm (R.2)
1 Volume control potentiometer with switch, 50,000
1 All-wave H.F. choke, type H.F.15
1 L.F. transformer, ratio 3.5 to 1, type Niclet
2 Component-mounting brackets
3 Baseboard-mounting Short-wave valveholders, two V8)
7 Bowspring wander-plugs: H.T.—H.T.1, H.T.2, H.T.3, G.B.+, G.B.—1, G.B
2 Spades, L.T.+and L.T.—

1 Wooden baseboard, 12in. by 8in. (Metaplex).
23 No. 3 ¼in. round-head screws.
8 No. 3 ¼in. ditto.
2 No. 4 ¼in. ditto.
2 Lengths insulated sleeving.
Quantity of tinned copper wire or insulated connecti

ACCESSOR

Three valves, 210VPT, 210HF and 220 HPT
One W.B. Stentorian Speaker
One 120 volt Drydex Super-Life H.T. battery
One 9 volt G.B. battery, Type H.1001
One 2 volt L.T. accumulator, Type DMG-C
One "Record" Cabinet

ATING AND ADJUSTING F.J.CAMM'S "Record" All-wave Three

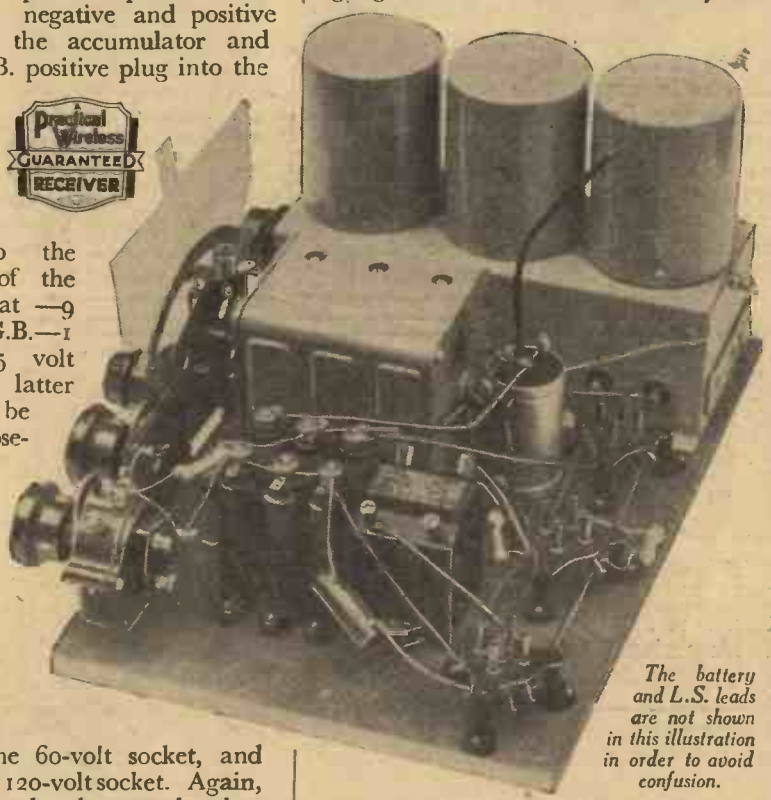
ilding Instructions and the tments are Explained in Article

and before plugging in the valves the wiring should be very carefully checked by the blueprint. If you have a meter it is advisable to make a voltage test to ensure that the valves will not be burnt out due to a mistaken connection. For this purpose the H.T. and L.T. batteries should be connected up as described in the next section and the switch placed to the "on" position. The voltmeter should then be applied to the filament sockets on the valveholders and the reading should not be greater than 2 volts.

Preliminary Adjustments

If this is in order the valves may be inserted, the H.F. valve being plugged into the holder next to the coil unit, the detector valve in the centre holder and the pentode in the remaining holder. A short flexible lead should now be joined to the anode terminal on V1 and taken down and connected to the terminal on the H.F. choke to which is connected condenser C7 (.0002 mfd). Connect the L.T. negative and positive spades to the negative and positive terminals on the accumulator and insert the G.B. positive plug into the positive socket on the G.B. battery. G.B.—2 should be inserted into the other end of the G.B. battery at —9 volts, and G.B.—1 into the 4.5 volt socket. The latter voltage may be modified subsequently when the receiver has been put into correct working order. H.T.1 should be inserted into the 84-volt socket on the H.T. battery, H.T.2 into the 60-volt socket, and H.T.3 into the 120-volt socket. Again, it may be found subsequently that H.T.1 and H.T.2 may be modified in order to provide the maximum operating conditions.

Connect the earth lead to the socket marked E on the rear of the coil unit and the aerial lead into the socket next to it, A2. Turn the reaction condenser to its maximum position in an anti-clockwise direction and set the control knob on the wave-change switch so that the orange-coloured spot is on top. This sets the coils to the medium-wave band from 200 to 550 metres. Turn the right-hand control slowly to its maximum position, and the receiver will then be in its most sensitive position and the local station should be heard. Turn the main tuning control until the signal is picked up, or until any signal is heard, and in the case of a listener situated in the London district, for instance, the London National should be heard at a setting about one-third of the way from the lower end of the tuning dial. To ensure that the minimum wavelength of 200 metres is tunable, the trimmers on the three-gang condenser must be correctly set.



The battery and L.S. leads are not shown in this illustration in order to avoid confusion.

The trimmer on the section furthest from the panel should be unscrewed to its minimum setting, and that on the next section should be set as near the minimum position as can be obtained, and this will be ascertained

(Continued overleaf)

SIMPLE TO CONSTRUCT : EASY TO OPERATE
NO TRICKY TRIMMING ADJUSTMENTS
A TESTED AND PROVED CIRCUIT

AMM'S RECORD ALL-WAVE THREE.

.0005 mfd.) (C1, C3, C4)	B.T.S.	25s. 0d.
d. trimmer (C2)	J.B.	15s. 0d.
	J.B.	6s. 6d.
	Graham Farish	2s. 0d.
	Dubilier	5s. 6d.
		1s. 0d.
		1s. 0d.
		1s. 0d.
	Bulgin	6d.
		6d.
		6d.
ohms type VM.36 (R.4)	Bulgin	5s. 6d.
	Bulgin	5s. 0d.
	Varley	7s. 6d.
	Peto Scott	8d.
4-pin and one 5-pin (type		
	Clix	5s. 6d.
3.—2	Belling Lee	10½d.
	Belling Lee	4d.

ing wire.

RIES.

	Cossor.
	Whiteley Electricali
	Drydex.
	Drydex.
	Exide.
	Peto-Scott.

THE "RECORD" ALL-WAVE THREE

(Continued from previous page)

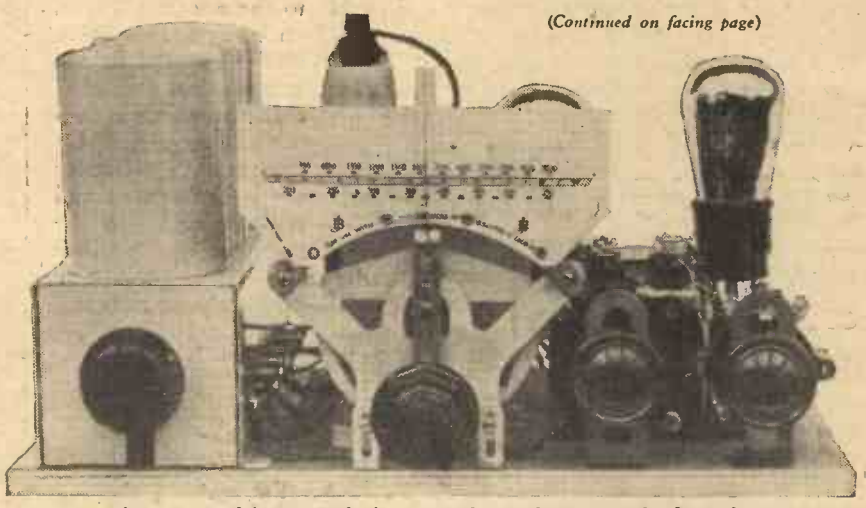
by the spread covered by the concentric trimmer on the slow-motion drive. When a station has been tuned, therefore, adjust the trimmers as near to the minimum setting as possible and swing the trimmer to make certain that no further improvement is obtained. Then turn to a position at the opposite end of the tuning scale, and again swing the trimmer to make certain that the correct band is covered.

The Short Waves

The reaction control should, of course, be adjusted to strengthen those stations which are not normally sufficiently powerful to provide adequate loudspeaker signals. The change from one waveband to another is carried out by means of the wave-change switch mounted on the coil unit, the colour of the spot which is uppermost showing the actual setting which is in use. The Green spot signifies the lowest waveband from approximately 14 to 30 metres, the Red spot the next short-wave band from 27 to 60 metres, the Orange spot the medium waves as above-mentioned, and the Blue spot the long waves from 850 to 2,100 metres.

These ranges are, of course, only approximate, and will be modified according to the setting of the trimmers and to the aerial with which the receiver is employed. The modification of the aerial lead, by inserting it into either socket A1 or A2, will also modify the range and, furthermore, will be found essential to obtain smooth reaction on the short waves. The selectivity is best when terminal A1 is in use, but, naturally, a slight loss in signal strength is then obtained. When transferred to A2 the selectivity will be poorer, but better signal strength will be obtained. The adjustment of the volume control will also be found to modify slightly the selectivity as well as the sensitivity, and thus it will be necessary in some cases to make use of the transfer-aerial tapping, the volume control and the reaction condenser in order to obtain a signal free from interference. For instance, it may be found at some parts on the dial that a station may be heard at full volume with reaction at zero and with the volume control in

(Continued on facing page)



A neat control layout, with the principal controls conveniently disposed.

(*Continued from facing page*)

its maximum position. But there may be a background from some other more powerful station on an adjacent wavelength.

Selectivity Control

In such a case the following procedure would be adopted. Firstly, the aerial lead would be transferred to terminal A1 and the panel trimmer adjusted for correct tuning. If interference still continues, the H.F. input should be reduced by turning down the volume control, but signals should then be restored to the original strength by turning up the reaction control. A slight adjustment of the panel trimmer might then be desirous in order to keep the circuits accurately in tune. This method of balancing the volume control against the reaction control will be found to enable any desired selectivity to be obtained, but the panel trimmer will have to be operated in order to keep the H.F. and detector circuits in step.

On the Short Waves

On the short waves the aerial will, generally speaking, have to be connected to socket A1, but this will depend upon the aerial system. If possible, a separate short-wave aerial should be erected in order to obtain maximum results on the short-waves, although an aerial system of the all-wave type will be found quite effective. Naturally, in order to obtain the best results on the short waves, a standard full-length outdoor aerial would not be the best arrangement, and each listener should try for himself the various schemes which have been detailed in these pages from time to time so as to obtain the maximum performance on every waveband.

Next week further operating instructions will be given.

Random Jottings

By JACE

"Extremes Meet—Which Music?"

DISCUSSION about the relative merits of different kinds of music is perennial even if it is useless, and the Western Amenities Council will deal with this question at its meeting on November 9th. Listeners will hear the views of the serious student of music, the devotee of jazz, and the supporter of light music. The presumably detached laymen will also make his contribution to the discussion. Whatever they decide, the discussion should at least be spirited and the participants well-informed.

Anatomy of Swing

"SWING Music" has always been well represented in the Northern programme. "Swing" gramophone recitals have become a feature, and the Northern Revue Orchestra has usually included a proportion of "swing" numbers in its programmes. Now Henry Reed, the well-known Manchester pianist and composer, is forming a special dance orchestra which will broadcast nothing but "swing" music. In a series of four or five concerts, it is proposed to give listeners, by practical illustration, some idea of the part played by each individual instrument in the swing ensemble. The opening concert, on November 13th, will be in the nature of an introduction, showing the whole orchestra in action. Subsequent instalments will be devoted to individual sections of the orchestra. Brent-Wood, whose gramophone recitals of dance music are well known, will act as compère.

"1066 and All That"

AN excerpt from "1066 and All That" will be broadcast in the Western programme from the Prince's Theatre, Bristol, on November 14th. Reginald Arkell, who is a West Countryman, has written the book and lyrics, based on the work of that name by W. C. Sellar and R. J. Yeatman, and he will act as commentator.

Money for Jam

A FULL-BLOODED musical comedy, with the conventionally impossible story, has fallen from the pen of Max Kester, of the B.B.C. Light Entertainment Department. His musical collaborator, Peter Mendoza, is responsible for the music and lyrics. The story hinges round two young men who, having lost all their money on slow horses, determine to recover their fortunes in the marriage market. One bets the other that not only will he marry a rich woman, but the first girl he asks will say "yes." She does. Her father owns a jam factory, and the young man, unable to suppress his "brilliance," invents a liqueur chocolate. All the customers become habitually inebriated. The young man is sacked, ends up in prison, is rescued by an American cabaret star, and so the plot goes on.

The cast includes Tommy Handley, Trudi Gordon, Eddie Pola, C. Denier Warren, Pat Tayleur (originally of the "Step Sisters" featured in B.B.C. Music Hall programmes), the Radio Three and the Three Ginx. This play will be radiated on the National on November 13th and from the London Regional on the following day.

What for Wheesie-Whassigo!

THIS programme for the Scottish Children's Hour on November 9th consists of rhymes and stories from Orkney, prepared by Ann Scott Moncrieff; "The Cairn of the Lovers"—a tale of the Findhorn by Helen Dreyer—and songs by John Tainsh. Writers and singer are all well known to Scottish listeners.

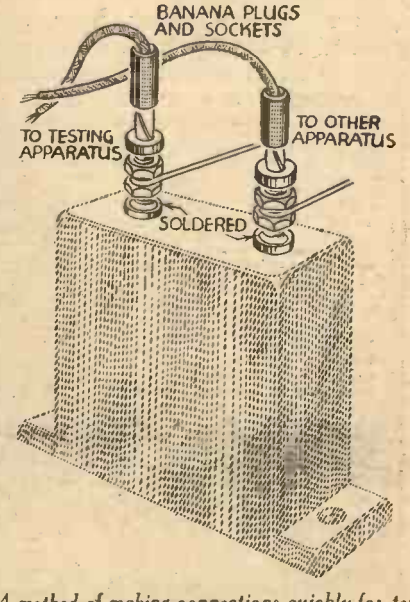
Arias by Isobel Baillie

ISOBEL BAILLIE, the famous soprano who lives in Manchester, is to broadcast for Northern listeners a recital of arias from famous operas and oratorios on November 8th. Her programme will include works by Offenbach, Puccini, Handel, Bizet, and Verdi.

Facility Testing

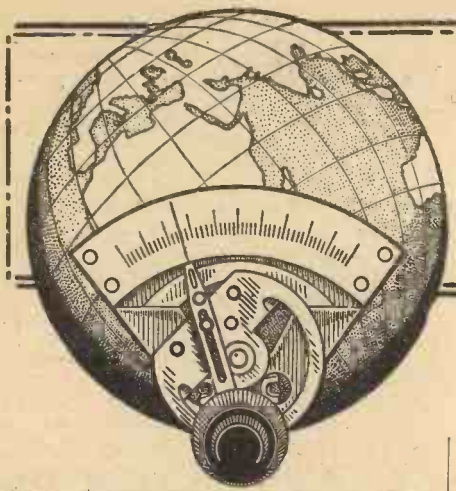
HAVING used a D.C. eliminator constructed simply on a baseboard, and without the necessity of a panel for separate H.T. tappings, I thought that other readers may find the principle I employed of use for "quick test" purposes.

The illustration shows clearly that sockets are simply soldered to the existing screw terminals of the component being used, in this case a condenser.—E. R. WATSON (W.C.2).



A method of making connections quickly for test purposes.

[*The idea may, of course, be applied to practically any standard radio component for test purposes, and is a development of the scheme illustrated on page 585 of our issue dated August 22nd last.—Ed.*].



SHORT WAVE SECTION

CHASSIS OR BASEBOARD ?

Some Important Details in Connection with this Controversial Subject. By A. W. MANN

SHORT-WAVE experimenters are invariably prolific readers and keen students of design and development. Whilst they are collectively in agreement as to the pleasures, thrills, interest, and instruction to be derived from short-wave listening and experimental work respectively, they do not agree so far as technical considerations are concerned.

For example, in the correspondence columns, at club meetings, and wherever members of the short-wave fraternity foregather, individual opinions are expressed and arguments entered into, and in no uncertain manner. To the beginner, reading or listening to the views expressed, it is apt to be a little confusing, and the problem so far as he is concerned is that of knowing who is right.

Chassis and baseboard construction, compact layouts, circuits, etc., are all subjects of discussion, and opinions expressed are usually based on practical and individual experience. Baseboard construction is favoured in many instances because every component is accessible. Accessibility is a commendable feature, but there is absolutely no point in carrying it to extremes. Admitted, quick changes can be carried out conveniently. On the other hand, however, it must be remembered that experimental work does not consist of building a receiver and then fitting alternative components of different values throughout.

Fixed Components

For example, there are certain definite values for decoupling condensers and resistances; also definite combinations of resistances and fixed condensers associated with resistance-capacity coupling, according to the type of valve used. It is unlikely that decoupling components will be altered and values chosen against accepted recommendations, and as resistance-capacity values are based on the characteristics of the preceding valve, such values will be decided upon, or should be, during the initial stages of construction, and if different types of valve are to be tried it is quite possible to build up resistance-capacity coupling components in unit form.

Accessibility allows quick changes of components to be made, but, in the writer's opinion, does not offset the disadvantages associated with necessity for a baseboard of comparatively large dimensions in order that the various components can be suitably spaced, or of long leads and an excessive amount of wiring in circuit.

"Yes!" you may say, "but by using copper foil under the baseboard, wiring can be reduced." Granted, but in doing so are not chassis principles being adopted? In referring to baseboard construction, I mean the original method.

The general trend appears to be to do things in a violent hurry, overlooking the fact that there is a vast difference between a hook-up and a "lash-up." Even an experimental receiver should be built as a finished job, devoid of time considerations.

Whilst chassis construction is in some instances not in favour, a metal panel or some form of screening is used, and thus the earth potential sides of the tuning condensers are earthed directly. This is a great advantage, yet it is offset by the extra amount of metal panel which is necessary, due to the comparatively large baseboard. In deciding one's policy, so far as experimental work is concerned, is it not advisable to follow current practice, bearing in mind that there must be a reason for the present trend, and that increased efficiency must be obtained? Otherwise, designers and manufacturers are wrong; and if this is so, there must be, one would imagine, millions of sets which are not as they should be. Clearly such reasoning is unsound.

Chassis construction enables most of the smaller components to be placed underneath out of sight and this gives a neat appearance to the receiver.

Standard Circuits

Let us examine and discuss the matter from an entirely different but most practical viewpoint. We will not take into consideration modern receiving circuits of the tuned radio-frequency and superheterodyne types, but the simple straight circuits of the 0-V-1 and 0-V-2 types, because they were originally used for S.W. reception, and are still deservingly popular.

During the early days, receivers employing the above types of circuit were built on baseboard lines. The foil-lined baseboard was unknown, metal panels were also unknown.

All points at earth potential were taken directly to the earth terminal of the receiver. Thus a considerable amount of wire was in circuit, and comparatively long leads were common due to this, and the fact that all components were mounted above the baseboard.

The result was instability, poor sensitivity and volume due to excessive damping. Whilst valves and components as used in those days left much to be desired an experiment some years ago convinced the writer that chassis construction was much better. An old 0-V-2 was reconstructed on modern chassis lines, using all the original components, including valves. This receiver was used for over two years for DX work and proved entirely satisfactory and far ahead of the original in every way.

(*Continued overleaf*)

SHORT-WAVE SECTION

(Continued from previous page)

Benefits of Modern Components

Nowadays we have available special components in which losses have been reduced to the absolute minimum and, therefore, in order to obtain the last ounce of efficiency, it is advisable to adopt modern methods of construction. To do otherwise is to introduce avoidable complications. The advantages of the chassis method of construction are many. Wiring is reduced to the minimum, and, due to the fact that decoupling components, R.C.C. components, GB batteries, etc., can be fitted underneath the chassis, it is possible to build short-wave receivers in compact form without fear of interaction.

In the writer's opinion, the advantages of chassis construction are many, and entirely offset the featuring of inaccessibility as a colossal disadvantage. Whether our receivers are permanent or experimental, we must choose wisely, and in deciding as to the form of construction to be adopted ask ourselves this question: Which is to be preferred, a high standard of efficiency, i.e., sensitivity, stability, average selectivity and volume, or accessibility?

To the serious and methodical experimenter, the correct answer will be obvious. Modern components and modern applications go hand in hand. To recognise this fact means progress, otherwise one's receivers will never be anything else but experimental.

Don't Be In a Hurry

In any case, whatever changes are necessary, do not depend upon working to a split second, and the excuse that when testing on actual short-wave signals it is necessary to make quick changes appears to be weak, and does not take into account that signal volume may increase or decrease considerably during even a quick change of components such as resistances, condensers, etc.

During experiments of the kind in which alternative valves are to be compared, a simple modulated oscillator is advisable. With a constant signal available, the time factor does not arise. If an output meter of the most simple type can be made up, so much the better.

Whilst choice of circuit is a most important factor, it should not be imagined taken type for type, that there are some circuits which function when built in practical form, and others which do not. The beginner usually possesses one great fault, and that is, he thinks big. For example, how many who read this, build and use either experimental or sponsored two or three valvers to suit their pockets, yet have visions of one day building a seven valve superheterodyne?

Whilst ambition is commendable so far as the average experimenter is concerned, and may, in due course, be realised, it is better to start in a modest way and progress in easy stages. It will be found that during the early part of an experimental career, the realisation that all circuits function, but apparently someone else knows how and why, but you do not seem to get away with it, comes to the fore.

It is much better to start with simple circuit receivers and get to understand them fully. By doing so, when the big receiver is about to become a realisation, its construction will be easier and its good points more easily appreciated.

Leaves from a Short-wave Log

DURING the past fortnight conditions have so much improved for the reception of DX that from the early afternoon the listener may now sit near his wireless receiver with the assurance that broadcasts from short-wave stations overseas can be tuned in at good strength. The volume of the signals rises rapidly with the advent of dusk, and by tea-time, as a rule, he should, without difficulty, be able to log transmissions from several quarters of the globe. As is usual at this period of the year, the reception of broadcasts on the 30- and 40-metre bands is rapidly becoming pleasanter; atmospherics have greatly decreased and stations which a month ago offered but a mere whisper are producing signals at good readable strength.

Careful Tuning Necessary

If transmissions are not to be missed, tuning must be carried out very carefully, and, provided the listener resorts to true "slow motion" when handling the condenser dial, the log will be daily enriched by many entries.

Signals from the West

There are a number of broadcasts on channels between 31.06 m. (9,660 kc/s) and 31.58 m. (9,500 kc/s), a section of the band much favoured by trans-atlantic studios, and a little patience should bring you clear speech and music from the United States, Brazil, Argentine Republic, and others. The number of transmissions in the Spanish and Portuguese language found in this band will surprise you if you carry out your search on this section between G.M.T. 21.00 and 24.00. LRX, relaying LR1, Radio el Mundo, Buenos Aires, on 31.32 m. (9,580 kc/s), is a regular performer every evening; it has been logged on a channel slightly above CT1AA, Lisbon (31.07 m., 9,655 kc/s), with which it should not be confused. Between the two you may find occasionally HP5J, Panama City (31.22 m., 9,610 kc/s), and more frequently HJ1ABP, Cartagena (Colombia), on 31.25 m. (9,600 kc/s). The latter gives out an English call: *Radio Cartagena of the Cartagena Broadcasting Company.* YNLF, Managua (Nicaragua), previously on 46.47 m. (6,451 kc/s), has now also crept into this band and its separation from HJ1ABP is only 5 kilocycles, namely, 9,595 kc/s (31.26 m.). If you hear a military march accompanied by bugles and drums, log the broadcasts as from YNLF. W3XAU, Byberry (Pa.), the short-wave outlet of WCAU, Philadelphia, is now well heard on 31.28 m. (9,590 kc/s) from G.M.T. 18.00 onwards, and the condenser reading should be well noted, as it is needed for finding VK2ME, Sydney (N.S.W.), on Sunday mornings. Slightly above this position—barely a hair's breadth—you may pick up HJ1ABG, Barranquilla (Colombia), on 31.31 m. (9,583 kc/s); the station has been tuned in on several occasions on the south coast of England during the past week. The call: *Emisora Atlantico* and the four chimes used as interval signal every fifteen minutes assist identification. Again moving up with caution will bring you W1XK, Millis (31.35 m., 9,570 kc/s), taking the WBZ, Boston, programme of the N.B.C. network; signals have so much improved lately that the station is logged nightly. On 31.38 m. (9,560 kc/s) DJA, Zeesen, may prove disturbing from G.M.T. 23.00, when it comes on the air for its third daily broadcast, but from about 17.30-23.00 it is silent, and, in consequence, allows you to search the neighbouring channels.

Lisbon, CSW

CSW, Lisbon, the new Portuguese national transmitter on 31.41 m. (9,550 kc/s), will be discovered testing from G.M.T. 22.00 and will offer no difficulty, as the call is often given in English, with a request for reports on reception. LKJ1, Jeloy, although advertised as working on 31.48 m. (9,530 kc/s), is slightly below W2XAF, Schenectady, on the same official channel, and the two broadcasts are easily separated. A slight movement brings in GSB, Daventry (31.55 m., 9,510 kc/s), which, when carefully cleared, reveals PRF5, Rio de Janeiro (31.58 m., 9,501 kc/s), and HJU, Buenaventura (Colombia), at a later hour.

Italy Speaks to the Moslems

Should you tune in a transmission reminiscent of the language often heard from Algiers or Rabat, do not log it as a broadcast from North Africa. If on 25.4 m. (11,801 kc/s), it is a news bulletin or talk given through 12RO, Rome, daily in Arabic between G.M.T. 17.40-18.00.

VK2ME November Schedule

Sydney on 31.28 m. (9,590 kc/s) is a worth-while catch in the early morning hours, and now may be heard at good volume on Sundays between G.M.T. 05.30-07.30. Other broadcasts are made from G.M.T. 09.30-13.30 and from 14.30-16.30. Listen for the Kookaburra laugh, which will confirm your reception at the end of each transmission.

Neighbouring Channels

Although when referring to U.S.A. short-wave transmitters mention is more frequently made of the Schenectady and Pittsburgh stations than of any others, such broadcasts as those from W1XK, Millis (Mass.), on 31.35 m. (9,570 kc/s), are by no means a difficult capture. Relaying, as it does, WBZ, Boston, it provides an alternative N.B.C. programme on most nights. The station is on the air daily from G.M.T. 11.00-05.00 and at its best during the evening between 19.00-21.00 and after midnight. Log the condenser dial reading carefully when identification is assured as it will assist materially in your search for VUB, Bombay, working on the next channel, 31.36 m. (9,565 kc/s). Broadcasts take place on Sundays (G.M.T. 06.00-07.00); Tuesdays (16.00-17.30), and on Saturdays between 16.30-17.30. As no doubt you have already logged DJA, Zeesen, on 31.38 m. (9,560 kc/s), the German will provide a good jumping-off point and careful tuning at the times given should bring in VUB at audible strength.

ABC of the Modern Receiver—7

The Low-frequency Amplifying and Output Stage; Triode and Pentode Valves; Low-frequency Volume Control; Tone Correction

IT was seen last week how the audio-frequency signal voltages from the detector are applied to the grid-cathode circuit of the low-frequency amplifier, so now we must study the amplifying valve itself. In the simple type of circuit such as that which we have been taking as an example, there are two principal forms of output valve which can be used: a triode and a pentode. Besides this point, however, it must be appreciated that there are several different models of valve in each of these two general classes, so that the final choice is not always easy.

Grid Voltages

As was previously explained in connection with the H.F. valve, fluctuating voltages are applied to the grid, and these cause greater fluctuations in the voltage developed across the anode-circuit "load." The voltages fed to the grid of the output valve are, naturally, considerably greater than those previously dealt with, so that the valve has to operate differently. It is easily possible to "overload" the wrong

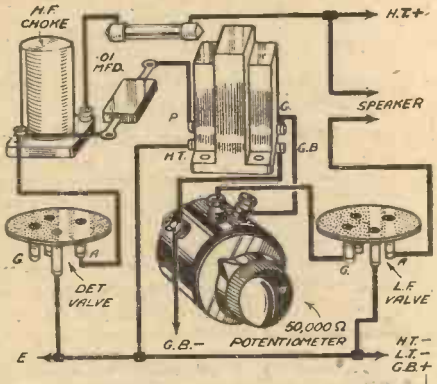


Fig. 2.—Connections for an L.F. volume control when using transformer or resistance-fed-transformer coupling.

type of valve, and this is an important aspect of the question. It is evident that the most important factor is that the valve must not cause any distortion—or at least, the minimum amount of distortion. This means, in effect, that it must respond proportionately to signal voltages of every value. Put another way, it means that the change in anode current produced by varying the grid voltage from three to four must be the same as that when the signal voltage varies between half and one and a half.

The Characteristic Curve

This brings us to an important matter concerning any valve: its grid voltage-anode current characteristic curve. The name sounds rather formidable, but it should not be difficult to understand the meaning of this curve of which a typical example is given in Fig. 1. This curve applies to a typical small battery power valve, and it can be seen that when 120 volts is applied to the anode the "curve" is practically a straight line between about eight and zero grid volts. If we are to obtain the kind of working mentioned above, the valve must be used so that the grid voltage is always between these two limits. This means that a steady voltage must be applied to the grid in addition to the signal voltages, for these become positive and negative in turns. And if a positive potential were actually applied to the grid, part of the

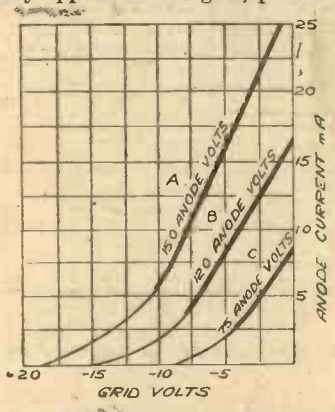


Fig. 1.—Anode-current-grid-volts characteristic curves for a typical small power valve. Straight portions of the "curve" are shown heavier to simplify reference.

H.T. current from the filament to the anode would flow to the grid instead, resulting in several peculiar effects which would give rise to serious distortion. Additionally, of course, the H.T. current passed by the valve would be excessive, and probably more than the H.T. battery could supply—certainly more than the valve could stand without its being damaged.

Maximum Signal Voltage

Theoretically, the steady grid voltage (grid bias) which should be applied ought to be such that, when signals are not being received, the valve operates at the centre of the straight portion of the "curve"; 4 volts in curve B in Fig. 1. This would enable the valve to handle a maximum signal voltage of eight (four on each side of the centre), before distortion set in. In practice, a valve of this type would never require to deal with a signal voltage anything like as high as this, and so the grid bias voltage can be increased, in order to ensure more economical H.T. consumption. The signal voltage would not normally exceed two, and so a G.B. voltage of seven could be used. Batteries are not tapped at 7 volts, and so we should employ either 7½ or 6 volts. The higher figure would be maintained if this did not result in distortion causing the reproduction to become "thin," and the smaller one if this were found to give a marked improvement.

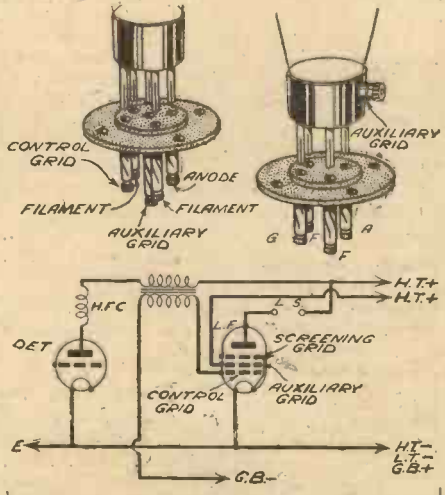


Fig. 4.—This shows the simplest connections for a pentode, as well as the corresponding connections for five-pin and base terminal valves.

H.T. Voltage Variations

If the signal voltage exceeded 4 volts—and it would not in a circuit such as that

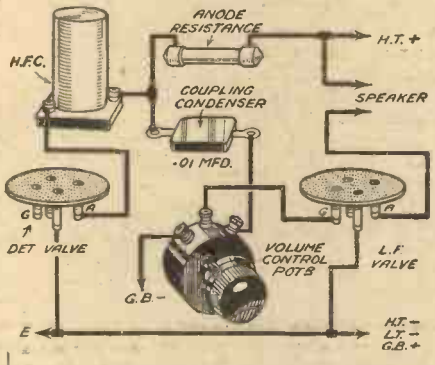


Fig. 3.—L.F. volume control in an R.C.C. or choke-capacity coupled amplifier. The potentiometer volume control replaces the grid leak and should be of similar value.

taken as an example—the G.B. voltage could be reduced with advantage to reproduction, or the H.T. voltage could be increased. The better and more correct method would be to increase the H.T., so that a longer straight portion of the "curve" would be available, as can be seen in curve A in Fig. 1; the G.B. voltage could then be increased to 7½ or 9. Before leaving this question of the characteristic curve, it should be mentioned that a reduction in the H.T. voltage reduces the length of the straight portion, making it necessary to use a lower G.B. voltage, and also making distortion far more probable; this is an important reason for reducing G.B. voltage as the battery runs down, and for obtaining a new H.T. battery when distortion sets in.

Amplification Factor

A valve having characteristic curves similar to those shown in Fig. 1 would have an amplification factor of about 9 (at 150 volts H.T.). This means that a

(Continued overleaf)

ABC OF THE MODERN RECEIVER

(*Continued from previous page*)

change of 1 volt on the grid would be equivalent to a change of 9 on the anode. When the input voltage to the valve is comparatively low—not more than $1\frac{1}{2}$, say—it is possible to use a valve having a higher amplification factor, and so to obtain a greater output volume. There are special valves designed for such use, these generally being referred to as "steep-slope" valves, because the characteristic curve rises more rapidly. Valves of this type have an amplification factor of about 15, and can successfully be used in a simple H.F.-Det.-L.F. three-valve circuit. But even then overloading might occur on the local stations, especially if a good aerial system were employed. This explains why it is often necessary to turn down the volume control to avoid distortion.

L.F. Volume Control

In conditions such as these it is often beneficial to include an L.F. volume control, in addition to that acting on the variable-mu valve, and connections for this are given in Figs. 2 and 3. Those in Fig. 2 apply to transformer, or resistance-fed-transformer coupling, and those in Fig. 3 to resistance-capacity or choke-capacity coupling. Although not essential, this extra volume control gives additional latitude, particularly on powerful though distant stations.

Using a Pentode

A pentode valve provides results which are similar in many respects to those given by the "steep-slope" valve, but provides still greater amplification. This valve is the same in general construction to the high-frequency pentode which has been described before. In addition to the grid, filament and anode, there are two extra grids—the auxiliary grid and the screening grid—arranged as shown in Fig. 4. The auxiliary grid requires an H.T. positive connection, whilst the screening grid is normally connected (inside the valve) to the filament. Most battery pentodes are of the five-pin type, the auxiliary grid being joined to the centre pin, although there are still pentodes available in which this grid is connected to a terminal on the side of the base. The latter type is becoming obsolete, and the former is always recommended for this reason, and because it is more convenient in use.

In Fig. 4 the auxiliary grid is shown as simply being connected to a tapping (generally about 20 volts below maximum) on the H.T. supply, but a rather better method is to connect it to the maximum tapping through a fixed resistance of

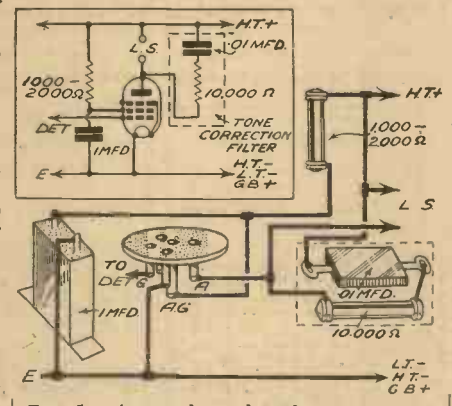


Fig. 5.—A pentode used with tone-correction filter and decoupler for the auxiliary grid.

between 1,000 and 2,000 ohms, and to connect a by-pass condenser of 1 mfd. between the auxiliary grid and earth. This is shown in Fig. 5. The resistance and condenser serve for decoupling (see previous articles) and also obviate the need for a separate H.T. tapping.

Pentode Disadvantages

Since a pentode gives greater amplification, it might be asked why it is not invariably used instead of a triode. There are several reasons, one being that the valve is more expensive, another that it generally requires rather more H.T. current, and another that it does tend to give slightly more distortion. The last-mentioned reason is rapidly vanishing, due to the improvement in valve construction, but it is still often worth while when using a pentode to employ a simple tone-correction filter to curtail the response to the higher sound-frequencies. This explains the reason for the series resistance and condenser in Fig. 5. The values given are average ones, but the fixed resistance might well be replaced by a 25,000-ohm variable one, so that simple tone control is possible.

The Harries Valve

A valve of fairly recent introduction, which functions in a similar manner to a pentode, and also provides a similar degree of amplification without the same tendency toward high-note emphasis, is the Harries output valve. This has two grids only, the screening grid being dispensed with, although it is connected in circuit exactly as is a pentode, but does not call for the tone-correction filter. The difference in construction is in connection with the "critical" spacing of the anode and grids; the distance is exact to a calculated figure, so that its construction calls for a high degree of accuracy.

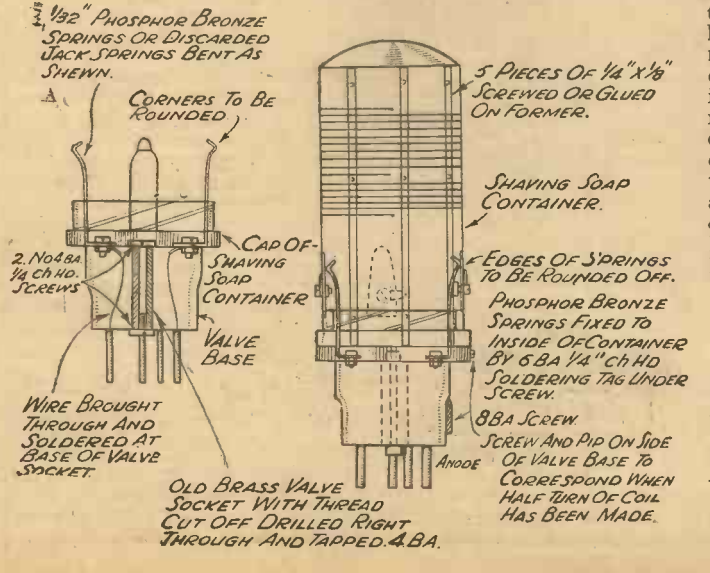
In the next article the use of automatic grid bias will be explained. The importance of this will be appreciated from what has been written above, for it causes the exact bias voltage to vary in sympathy with the H.T. voltage. Thus, as the battery runs down the G.B. voltage is reduced. Additionally, it permits the use, where necessary, of a voltage different from that which can be obtained from a battery which is tapped in $1\frac{1}{2}$-volt steps only.

(*To be continued*)

A NOVEL QUICK-CHANGE COIL

THE former of this novel coil is a bakelite shaving soap container with a screw cap, half a turn of which screws it up tight. The plug is an old valve base and the springs came off an old jack that I had by me.

The drawing more or less explains itself, the idea is that the plug is connected into the holder on the baseboard and left there. Having made two or three coils from the tops it is a simple matter to twist on and off the coils for different wave-lengths, and I find it very efficient.—R. W. HORNE (West Ewell).



The diagrams explain clearly the idea mentioned by Mr. R. W. Horne for the construction of an easily-changed short-wave coil.

FEEDING THE LOUDSPEAKER

(*Continued from page 242*)

and that the H.T. and L.T. supplies are more than sufficient to supply the set, an improvement could best be effected by fitting a pentode in the output stage, or by using a valve in that stage which has a greater amplification factor than the existing valve. If a pentode is already fitted and the voltage supplies are adequate, an existing stage could be inserted between the last two stages, or an exactly similar valve could be connected in parallel with the output stage. In this case, the additional cost would be small, but the running costs would be increased. By adding an intervening L.F. stage, the initial cost would be greater (as the L.F. coupling components would have to be purchased), but the running costs would be lower.

Where a receiver is fitted with a volume control and it is found that this can never be turned more than a short distance without distortion setting in, the output valve should be replaced by one which requires a much greater grid bias voltage, and valve lists should be studied so that a valve may be found in which very little additional anode current is taken, so as to keep the operating conditions more or less the same.

Those readers who are not familiar with the meaning of grid swing and input voltages should read the article on page 251.

THE BRITISH LONG DISTANCE LISTENERS' CLUB

Aerial Efficiency

WE have received some interesting information from Mr. Harold Leigh regarding aerial experiments. This communication has been written as a result of the request made in our issue dated October 24th last regarding some of the results which have been experienced with special aerials designed for short-wave reception. Here is Mr. Leigh's communication :—

"I have given this subject much attention and herewith give some details. My aerial system consists of three separate aerials, all using 14 gauge copper wire.

(1) 66 ft.

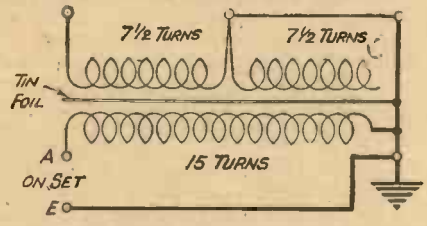
(2) 16½-16½ft. Dipole (with twisted flex lead in).

(3) Broadcast aerial.

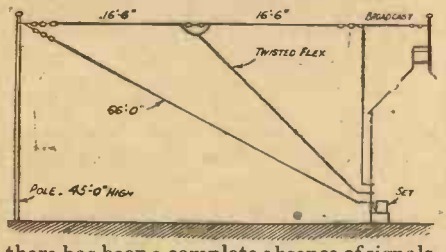
(See attached sketch.)

The "lead in" comes through glass tubes.

The 66ft. aerial is certainly a good all-wave aerial, but on the 20-metre band when



These two diagrams show Mr. Leigh's aerial arrangements; the upper diagram depicting the transformer, and the lower, the arrangement of the aerial wires.



there has been a complete absence of signals, I have switched over to the Dipole and managed to hear one or two. Another advantage of the Dipole is that during windy weather signals are much more steady. Of course, it must be coupled up to the set by some means, and I find a transformer as follows the best way :—

Two-inch diam. cardboard tube wound with fifteen turns 18 gauge insulated wire, centre tapped. Then layer of tinfoil, layer of insulating tape, and fifteen turns of 18 gauge wound on top for secondary coil.

This, without any doubt, is the best system for 20 metres ; in fact, it is good from about 13 to 30 metres. For the higher wavelengths (40 to 80 metres) all that is necessary is to remove the earth wire from the centre tap of the primary winding. I might add that while I was first testing the Dipole 344 stations were logged from June 22nd to September 1st on the 20-m. band. In just over a year seventy countries have been logged and the number of stations 2,030 on all-wave bands.

The receiver is a two-valve Det. and Pen., resistance coupled, supplied with 100 volts H.T. from accumulators."

A Protest

FROM Mr. Everard we have received a strong protest regarding our correspondence on QSL collectors. This is what he says :—

"I wish to make a strong protest against the tone of the letter in your paper of October 17th by E. de Coltignies (Prittlewell), and most strongly disagree *re* 'QSL collectors.' I wonder *how many* of these Mr. Coltignies possesses (as he mentions '*G*' QSL and which are of *no* DX value at all). I have been a steady listener on 14-mc/s, etc., bands for 2-3 years and have on file here many letters from American and other 'hams,' thanking me for my very FB and useful reports (and which were *not* QSA5, R9+ either, as QSA5 R9 signals must be heard all over and outside the house before I'll call any signal that). Re SU1CH's remarks *re* S.W.L., I was quite aware of these (probably before Mr. de Coltignies). In any event Egyptian 'hams' are *not* very important DX. But I most heartily agree with E. R. Crane's letter in your same issue, and will go further and say that a *good detailed* report (sent to a real DX station) should be worth a QSL, whether a reply coupon is sent or not. Total QSL's here, 1,215 from 79 countries, all on 'phone or music, so *I should* know a little about DX'ing and S.W.L."

[*Mr. Everard was, incidentally, the winner of the B.L.D.L.C. DX contest.*]

RADIO CLUBS AND SOCIETIES

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

The Short-wave Radio and Television Society (Thornton Heath)

A MEETING of this Society was held on Tuesday, October 6th, at St. Paul's Hall, Norfolk Road, Thornton Heath. Mr. R. E. G. Copp presided.

Mr. F. G. Stanfield gave a talk on the nickel-cadmium battery and the Milnes H.T. Unit. Dealing first with the battery, the lecturer said that the active material employed is composed of nickel hydrate mixed with specially prepared graphite of high conductivity for the positive plate, the negative consisting of intimately mixed oxides of cadmium and iron. The electrolyte employed is a solution of potassium hydrate in distilled water, the specific gravity being 1.190. It was interesting to note, Mr. Stanfield pointed out, that the electrolyte used was a preservative of all the materials used and it was therefore impossible for sulphation or corrosion to take place. Further, the plates are practically indestructible.

The main feature of this battery which would appeal to all experimenters is the length of time it will retain the charge without attention. On actual test this type of battery has been found to be absolutely efficient after having been left for two years or more.

Mr. Stanfield then gave a description of the Milnes H.T. unit. The normal voltage of a nickel-cadmium cell is 1.25 which rises when fully charged to 1.5. Mr. H. R. Milnes, the inventor of the unit, found that if four nickel-cadmium cells were connected in series they would give an output of 5 volts, and if these four cells were connected in parallel with a 6-volt lead-acid accumulator, current would flow from the latter into the former and continue to flow until they were fully charged.

The Hon. Secretary of the Society is Mr. Jas. T. Webber, of 368, Brigstock Road Thornton Heath.

The Croydon Radio Society

THE Croydon Radio Society was honoured on Tuesday, October 13th, by the presence of Mr. Frank Davey, M.A., of E.M.G. Hand-made Gramophones, Ltd., in St. Peter's Hall, Ledbury Road, S. Croydon. His subject was: "Some points in Quality Design," and firstly came views on tuned circuits, where some interesting graphs gave a new outlook on this part of the circuit. For instance it was seen how drastic band-pass tuning caused stray and unwanted field effects to appear. A linear detector was wanted, and many suggestions were given, and criticisms made of various circuits. The L.F. valve must have linear characteristics of the right magnification, and Mr. Davey went on to criticise push-pull amplification. It was at least an interesting suggestion, but there were inherent disadvantages such as ageing of valves, and difficulty of keeping the apparatus correctly matched. He preferred a triode output valve with choke capacity filter output. Finally, Mr. Davey deplored the exaggerated high-note response of some loudspeakers, as he wanted reproduction with neither top nor bass more conspicuous than the original.—Hon. Pub. Sec., E. L. Cumbers, Maycourt, Campden Road, S. Croydon.

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.

W. H. T. (Ridgewell). Your receiver is not one of our designs, but we think the S.W. converter-adapter shown in Blueprint P.W. 48A will function satisfactorily with it. Consult the designer in order to make quite certain.

W. B. H. (Southville, Bristol, 3). We have no details of a converter at the price mentioned. The best unit of this type is shown on Blueprint P.W. 48A, but it costs much more than the figure named.

W. N. (Belturbet, Co. Cavan). You cannot step up a D.C. supply. To carry out your idea you would have to obtain a converter to change your accumulator supply into A.C. and then this could be stepped up by means of a trausformer in the ordinary way. You cannot obtain a greater wattage, however, and therefore, the resultant A.C. would only have a very low current value.

H. R. P. (Dagenham). The coils cannot be identified by us. There were numerous coils turned out by the manufacturers named and each differed so far as the pin connections were concerned. A good local radio dealer should be able to trace out the connections and you could then employ the coils in any desired circuit.

J. J. M. (Cork). There are dozens of faults which could result in the trouble named. The receiver may be out of alignment and need re-trimming, or a valve or some other components may have broken down. With regard to your other query we advise you to have the receiver examined by a local service agent of the manufacturers.

J. D. (Glasgow, S.W.2). The charging rate is generally that given by the rectifier, and the lower voltage ratings are obtained by series resistances. Therefore, although a low voltage cell is joined to a high-voltage point, there will be no substantial rise in current, but there will be a great risk of damage to the rectifier.

A. D. (Wavertree). You should write to the makers of the receiver and obtain advice regarding the correct impedance to use as an additional speaker, and what arrangements are necessary in order to preserve the correct load on the output valve.

A. F. (Ilford). The increased power of certain short-wave stations, and the effects of the longer hours of darkness are no doubt mainly responsible for your trouble. The remedy is to make a more selective circuit. A smaller diameter coil would not be of any material use, but some form of small aerial coupling coil should be fitted, with the facilities for changing the coupling to suit different conditions.

L. N. S. (Tyseley). You must measure the resistance of the coil before endeavouring to use it. A meter and voltage in series will enable this to be done. We have no data of the speaker, but probably the makers could assist you. We suggest you communicate with them if you are unable to measure the resistance. The method of using the speaker will depend upon its resistance.

F. R. (Longdon). We cannot give coil-winding data in the form of a reply. We refer you to the article entitled Short-Wave Coil Data, published in our issue dated May 9th, 1936.

W. B. (Lympstone). If the speaker is in order the trouble is due to the receiver. No doubt the faults now apparent were formerly masked by the speaker, and the more faithful reproduction obtained from your new speaker shows up the faults. The L.F. circuits should be improved. Attend to the H.T. and G.B. voltages.

R. S. (Hull). The receiver in question is not one of our designs, but we believe it was described in one of our contemporaries.

R. S. (Forres). We regret that we cannot give instructions for modifying our published circuits. The makers' instructions can be followed regarding the fitting of coils and valves. If sufficient interest is shown, we may publish details on the lines mentioned at some future date.

A. B. (Willington). Although a device of the type mentioned could be used, you would obtain much better results by using a converter. This is included in front of your first valve and would change the complete apparatus into a four-valve superhet. Blueprint P.W. 48A described a unit which may be used either as converter or adapter, without alteration, and we recommend this.

S. N. W. (Kilmainham). There is no unit of the type you mention on the market. You could build a simple L.F. amplifier to include with a pick-up, or why not use your present wireless receiver? It will not entail any alteration to this and the radio reproduction or operation will not be affected.

W. V. T. (Shepherd's Bush). The new valve probably had a much lower amplification factor. Alternatively, it may have taken very much more anode current and thus prevent the H.T. supply from delivering sufficient for the remainder of the receiver.

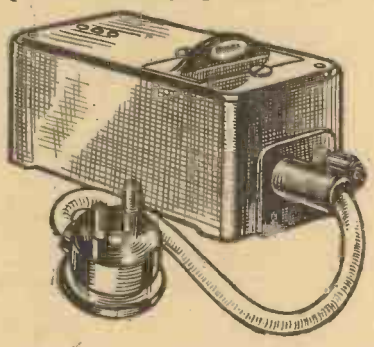
J. W. (Dundee). There are two possible explanations of the effect mentioned. Either the noise was brought in with the station, and removal of the earth shifted the tuning point and thus removed the noise, or it was introduced into the receiver by induction.

Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

Belling-Lee Set Suppressor

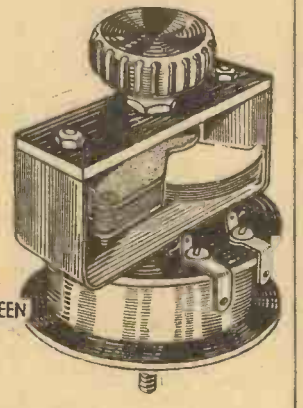
INTERFERENCE which is carried by the mains leads is not very difficult to eliminate, and in many home-built receivers a suitable input filter is permanently connected to the mains input circuit. In some commercial receivers this factor is missing, and also in certain home-made sets no such arrangement is incorporated, perhaps on account of the fact that no interference is experienced when the apparatus is first installed. In the event of interference arising, and the source being traced to the mains, the inclusion of an interference suppressing device is not a difficult matter nowadays, as there are several suitable components already produced for this particular purpose. In this column is illustrated a device of this nature manufactured by Messrs. Belling-Lee, and it will be seen that it consists of the necessary filter components and mains fuses incorporated in an insulated case, with an earthing terminal and a mains plug ready connected. The device is attached to the wall or skirting board near to the mains socket and the plug attached to the device is inserted into the mains socket. The plug which is attached to the radio receiver is then inserted into the holes in the suppressor, and this automatically interposes the filter in circuit, with the additional protection offered by the ½ amp. fuses. This device is reference No. 1211 and the price is 17s. 6d. It functions equally well on medium and on the long waves.



The Belling-Lee set suppressor, type 1211, which costs 17s. 6d.

Sound Sales Whistle Suppressor

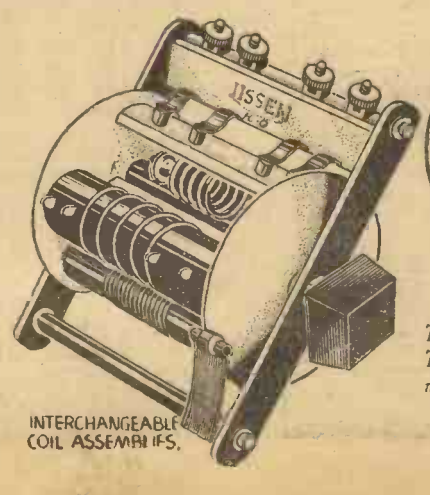
ALTHOUGH a superhet is looked upon as the only receiver which gives trouble from whistle interference, a well-designed quality receiver will also be found troublesome from the same cause. This is due to the heterodyning of the carriers of two stations working on a wavelength close to each other, and if the high-note response of the receiver extends well into the upper frequencies (as it should do in order to reproduce high quality from the ordinary broadcast programme) the whistle will be heard on quite a number of stations on both medium- and long-wave bands. In the case of a superhet the trouble arises from interference due to low selectivity on the aerial side, but in both cases the trouble may be avoided by fitting to the receiver a high-note suppressing circuit, the cut-off being arranged at a frequency of approximately 9,000 cycles per second. This will then take care of station heterodynes, and in many cases to second-channel whistles, although in the latter case it may even be necessary to cut off at a lower frequency. This will depend upon the design of the superhet circuit. The Sound Sales component illustrated on this page consists of a choke with parallel condenser, the two being combined to form a neat and compact unit. The choke is a special bobbin-winding, and the inductance value has been so chosen that the tuning is quite sharp, and the attenuation at 9,000 c.p.s. is of the order of 30 decibels, but at 8,000 c.p.s. it is only 7 decibels. Therefore, the musical quality is not unduly marred by the suppressor, although an interfering hererodyne whistle is completely suppressed. The unit is provided with a threaded bolt so that it may conveniently be mounted on a chassis (either metal or wood) and it is intended for inclusion between the detector and the first L.F. stage. The price is 10s. 6d.

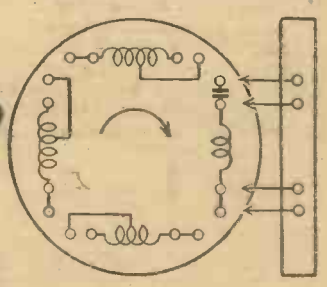


A 9,000 c.p.s. whistle suppressor from the Sound Sales range of components.

Lissen Rotary Coil Unit

MANY listeners find difficulty in deciding upon a suitable short-wave circuit on account of the coil-changing difficulty. Although it is possible to build a short-wave coil unit in which wave-change switches are incorporated, the efficiency is obviously not so high as when separate coils are used for each separate waveband, and there have been several suggestions for designing a coil-changing unit for use on the short waves only. The latest component of this type is illustrated on this page and is one of the new Hi-Q devices produced by Messrs. Lissen. It is a four-range tuner, in which separate coils are employed to cover the range from 4.8 to 91 metres, and each coil is wound in the most effective manner according to the range covered. Thus, the highest range is covered by means of a simple solenoid of enamelled wire on a paxolin former, whilst the lowest range employs a self-supporting thick wire coil mounted on a ceramic base. The latter coil may be seen at the top of the unit, whilst one of the higher range coil is seen at the bottom. The diagrammatic sketch shows how the coils are connected to the four terminals, and it will be noted that a series condenser is included on one range, whilst on another a transfer aerial tapping is included. Thus, maximum efficiency may be expected on every range covered by the tuner. The switch contacts are solid nickel and are of the self-cleaning type, whilst each position is accurately registered. No noises will arise due to poor contacts, and the tuner may be incorporated in practically any type of short-wave apparatus, including transmitters, converters, superhets, straight receivers, etc. The price of the tuner complete with four coils is 15s. 6d., but in addition an extra coil may be obtained to cover the range from 75 to 175 metres at 2s. 6d., and an unwound former, for those who wish to wind special coils may also be obtained for 9d.





The Lissen Hi-Q 4-range S.W. Tuner and diagram showing the method of bringing into circuit the individual coils.

New Varley Coils

A NEW series of iron-core coils has been produced by Messrs. Varley, reference numbers BP.111, 112, 113, and 114. These are available in two-and three-gang units and may be used in straight or superhet receivers. The coils are wound to the standard inductance values: medium waves 157 microhenries and long waves 2,200 microhenries. There is a special coil for oscillator circuits having inductance values of 126.9 and 1,056 microhenries, and this may be ganged with the other types of coil and tracked with a condenser designed to provide an intermediate frequency of 110 kc/s. For 465 kc/s there is another oscillator coil wound to inductance values of 85 and 400 mics. BP. 111 is a three-gang unit comprising a band-pass pair with a 110 kc/s oscillator coil; BP. 112 is an aerial and 465 kc/s oscillator coil; BP. 113 is a three-gang band-pass and H.F. transformer; and B.P. 114 is an aerial and H.F. transformer. The prices are as follows: BP. 111 and BP. 113 cost £1 1s. each, and BP. 112 and BP. 114 cost 13s. 6d. each.

LETTERS FROM READERS

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

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

QSL Cards and Reports

SIR,—I have read with interest the many letters you have published referring to reports and postage, and in reading that from G6JI I should like to make a few points clear for his benefit.

In his letter, he explains the experience of W. T. Cooper. I quite agree in the cases he has quoted, but has this any bearing on the title at the head of his letter which reads "Reports and Postage"? In every case none of the reports received included postage, and the majority of complaints published deal only with reports sent *with* postage. Therefore it is clear that G6JI is "barking up the wrong tree." I suggest that he ignores all useless reports sent without postage. Even when a report is useless it is only decency to use any postage sent, if only to tell the sender that his report was no good.

As to amateurs being wealthy men, I am well aware that this is not the case. I happen to be radio 2AFO, and even though only an A.A. man, I feel the expense very much, especially as I am not one of the few "wealthy men" among amateurs. I realise that I must spend money to make anything of a show out of my hobby. Like anyone else I do not want to throw money away on useless articles. Hence my complaint about my Reply Coupons.

Can any reader tell me what happens to reports *and* postage that are not required? Let me once again remind readers that it is the postage that all these letters are about, not mere QSL collections.

I might add that although only a working man earning an average wage of 45s. per week, I shall be very pleased to answer all reports on my transmissions, when I get properly on the air, providing postage is sent. That is all that is asked of all amateurs.—N. OWEN (2AFO) (Kettering).

Mr. Cooper Replies

SIR,—With reference to the question of QSL cards, there appears to be a great misunderstanding by most of the readers who have replied, whose letters you have been good enough to publish. As I am the original writer, may I ask you to publish another letter in the hope that this time it will be read and understood more fully?

Until two months ago I was the holder of an A.A. G.P.O. licence for experimental non-radiating transmission, and as I had never at any time transmitted on the air, I had received up to the time of my first letter thirty-seven SWL cards from Australia, New Zealand, and America, reporting having heard my signals on 20, 40, and 80 metres; these reports gave my signals as QSA5, R9, T9, and so forth.

My object in writing to you is to show how the collecting of QSL cards could be abused, at the same time killing their value from an experimental point of view. Since I last wrote I have received quite a lot more, also two letters from the Gold Coast asking for photo cards and gifts, etc. Now, strange to say, I have a transmitting licence, my call being G8BS, and since I have been carrying out experiments on 160 metres, I have asked for reports on my signals, stating that every report received will be answered, but I have not had a single reply. I agree with Mr. Ismay (G6JI) that QSL card collecting has got to a stage similar to collecting cigarette pictures. To some people the value of reports is not understandable, all that is wanted is the card. I think the above should help to clear up the matter.

May I add that I will send a QSL card to everyone who sends me a report on my signals, but unless there is a report, and not just a request for the card itself, my pocket will not allow me to take up the hobby of just swapping cards.—W. T. COOPER (G8BS) (Walthamstow).

Our All-wave Battery Set: Mains Version!

SIR,—I have followed your all-wave battery sets with great interest, but may I suggest that a mains edition would be appreciated by your readers.—R. STAGG (Wood Green).

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

Back Numbers Wanted

WOULD any reader kindly loan me the issues and blueprint describing the "A.C. Hall Mark Four," which appeared in January, 1935? I will, of course, return the issues promptly and refund any expense incurred.—R. A. MARWOOD (2, Blandford Road, Lower Compton, Plymouth).

Reports and Postage

SIR,—May I be allowed to encroach further on your valuable space in order to reply to Mr. E. R. Crane, who by his letter in your issue of October 17th appears to have overlooked the main point in my previous letter.

In attempting to justify the indiscriminate circulation of the large number of fictitious and exaggerated reports, he quotes a few cases of transmitters reporting "R9+ QSA5 repeat last part, etc." There are a number of circumstances which could cause a receiving operator to miss part, and the fact that he had missed it would not alter the QRK and QSA of a signal.

The QSL card was introduced as a means of confirming a QSO, a point Mr. Crane himself makes, and if these cards were plain instead of "Works of Art," this situation would never have arisen.

To suggest that I want to reserve short-wave work for "Hams," is ridiculous, and if Mr. Crane objects to my likening his hobby to collecting cigarette pictures, I do not mind changing the simile to "scalp hunting." But whereas the Red Indian hangs the result of his hunting on his belt, the short-wave reporter hangs his on the wall of his shack.

In either case, the victim is not supposed to have any say in the matter.—J. W. ISMAY (G6JI) (Walthamstow).

From an American Reader

SIR,—In a recent issue you ask for information regarding COCQ. This station relays the programme of CMQ, not CMCQ. The correct frequency is 9,750 kc/s, or 30.75 m., and the QRA, Calle 25, No. 445, Havana, Cuba. They send two veri's. South American stations are noted for their drifting habits, so that Mr. Casling is probably right. COCX, 11.55 megs., Havana, relays CMX (Say Emmay Eckis), QSA5 R9, 4-7 p.m. E.S.T. (16.00-19.00 G.M.T.), announces in English and Spanish, and uses a series of gongs. Another is D.R. HIN (N, Nebraska), Trujillo City ("The Voice of the Dominican Political Party"), 11 megs., QSA5 R8, also on 6.26 megs. They stated they would verify promptly. VK6ME, 9.59 megs., Perth, West Australia, will soon be testing, as also CE9GO, Santiago, Chile. Another good catch for DX-ers is ZPIO, Ascencion Paraguay, 6.666 megs, 15 watts, Saturday, 20.00-22.00 G.M.T., QSA4 R5-6 here. On 20 m. readers may build up their logs by trying some of the following amateurs: VK2AK and JU, 13,990 kc/s; CO7HF, HK1Z, LU1AX, LU1ES, LU2DA, OA4B, PZ1AA, VK2AP, UC, 3SU and VK4RW, all on 14,000 kc/s; VK2TI, 14,010 kc/s; VP3BG, PY2BD, ZU6P, 14,020 kc/s; CE1BC, PY1DK, VK2LZ, VK3JT, 14.030 kc/s; PY2EP, SU8MA, VK5DI, 14,040 kc/s; PY9HC, VK2ABG, AD, and VK4JU and VB, 14,050 kc/s; LU1EX, VK2AZ, 14,060 kc/s; ZS6AM, 14,070 kc/s; HK5AM, PY1BK, SU1GP, VK2BK, 3JC, 3MR, and VK4JA, 14,080 kc/s; OK3ID, SU1HH, VK2BD, 3AC, and VK4BB, 14,100 kc/s. The latest QSL's are XE2HF, VK3EG, PY2EJ, VP6YB, VE4QV, F8BR, OA4AA, CO2KY, G2NH, W8QBT (Great Lakes Exposition), SM5SX, LU8AB, G2XV, PY2CK, EA8AT, PI1AF, YV5AA, TI2FG, LU4BH, VK2CI (10 watts), PY2BA, G5BJ, PY1DK, VK3KX, and VK2IQ. I see, too, that DX-ers are having the same trouble that we've had for years—stations not answering letters, but there is nothing much we can do about it.

Hoping this will help listeners to build up their logs.—J. SANDERSON (Broad Street, Newark, N.J., U.S.A.).

CUT THIS OUT EACH WEEK

Do you know

—THAT a frequent cause of hum in an A.C. receiver is the unbalancing of a heater winding due to uneven wiring.
—THAT trouble from the above cause may be removed by using a Hum-dinger or Nodaliser across the winding instead of using the centre tap.
—THAT the scheme recently mentioned for obtaining an artificial centre-tap on a push-pull input transformer cannot be adopted for the output component.
—THAT a portion of a speaker cone may be stiffened for tone modification purposes by painting with shellac.
—THAT the main characteristics of most valves are taken at certain definite voltages—in the case of battery valves with 100 volts H.T.
—THAT the substitution of a metallised valve for an ordinary type may sometimes give rise to difficulty owing to the presence of the earthed screening near to some inductive component.

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

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

QUERIES and ENQUIRIES

matched pair of coils and tuning them both with a two-gang condenser.

The Monitor

"I wish to build the Monitor 3 for bedside use and I want to use headphones whilst listening at night, yet be able to use a speaker when my people are out. What alteration will have to be made for this purpose? I have some headphones with a resistance of 2,000 ohms. Will these be suitable? I have no aerial in the bedroom and wonder, therefore, if a Pix invisible aerial would do, as our house is surrounded with trees. Finally, can it be built without soldering, as I can't solder."—P. F. R. J. (Redhill).

THE Monitor should be quite suitable for your requirements, and good results should be obtained from an indoor aerial of the type mentioned. Headphones could be connected in place of the loudspeaker, but to avoid the difficulty of disconnecting the speaker each time a change-over switch could be employed, with a silencing switch on the speech coil of the speaker. The headphones in this case would be filter fed, the speaker transformer acting as a choke. If volume is too great on the headphones, you might find it worth while to include the 'phones in the anode circuit of the detector valve, a fixed condenser feeding the 'phones direct from the detector anode circuit, and the other side of the 'phones connected to earth. A simple on-off switch between 'phones and earth would enable you to switch out the 'phones when using the loudspeaker.

Replacing a Frame Aerial

"I have a four-valve S.G. receiver with M.C. speaker and have always had good results on both long and medium-waves. The set has an internal frame aerial, which of late has been fraying and breaking with the result that I cannot possibly repair it any more. In any case I want to dismantle it and work the set with an outside aerial and earth and have tried this but cannot get signals. What alterations are necessary to achieve this? I enclose a circuit of the receiver."—J. McE. (Glasgow, N.W.).

IT would appear from the diagram that the input circuit consists of a tuning coil to which is coupled a simple small aerial. If this is the case, it should only be necessary to connect a standard aerial to the point marked A and a standard earth to the point marked E. If, however, the diagram is only schematic, and the grid circuit consists of a standard frame aerial, it will be necessary to replace this by a standard dual-range broadcast coil, to which an aerial and earth should be joined in the usual way. In any case, as the present frame has broken, we suggest you remove the leads now joined to the fixed and moving vanes of the first tuning condenser and join these to the appropriate terminals on a modern coil. (The correct terminals will be shown on the maker's leaflet supplied with the coil.) If possible, you should get a coil similar to that now used between the H.F. and detector stages, but if this is not possible, it may be worth while replacing this also by a modern coil, obtaining a

Small P.A. Amplifier

"I should be grateful if you could supply me with constructional particulars of a D.C./A.C. amplifier for use with a gramophone pick-up and microphone. This should be of about 6 watts output and intended for use with an audience of approximately 100 persons.—H. A. N. (Yeovil).

THE only small P.A. amplifier designs we have capable of the output mentioned are designed only for A.C. mains operation. It might be possible to modify these in order to utilise the high-voltage mains valves with the standard arrangement of a rectifier for A.C. use, but we cannot supply instructions for so modifying our receiver designs. Our Universal Hall-Mark Four receiver (blueprint P.W.47) could, however, be used for the purpose indicated, the H.F. stage being left unused, or employed to pick up radio programmes when desired.

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 queriists.

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

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

The Coupon must be enclosed with every query.

Learning Morse

"I am anxious to learn the Morse Code both transmitting and receiving, and cannot yet understand the various stations which I pick up. What is the best method of obtaining proficiency in this branch of wireless, as I am anxious eventually to obtain a transmitting licence."—A. C. (Hove).

ALTHOUGH a simple buzzer may be used, better results will be obtained if you use a valve oscillator, in conjunction with headphones. The wearing of the latter enables you to concentrate more when beginning, and much better results will be obtained, and speed will be more quickly acquired if you can get a friend to help you. You can then take it in turns to send and receive. The sending key should be included in the filament circuit and the valve fed in the usual way. By the use of fixed condensers the note may be varied in order to prevent monotony and also to increase the practice which is obtained.

Short-Wave Noises

"I have planned a short-wave receiver with one or two novel features. The great point was to accommodate this receiver in a special cabinet which I already had and this resulted in a rather peculiar layout, the detector stage being on top of the chassis and the output valve immediately beneath it (the chassis is of aluminium). The condensers, both aerial and reaction, are operated by means of rods and bevel gears taken from the well-known constructional toy. The trouble is loud grating noises all the time the set is in action and nothing I have tried will stop it. Can you offer any suggestion as to cause and cure?"—G. T. (Cork).

THERE can be dozens of causes of the noise, but we think that the most probable in your case is the bevel drives for the condensers. The gear wheels are not precision cuttings, and you will find no doubt that there is a slight play in each setting. Although earthed, the movement of the teeth due to vibration or even due to the fact that H.F. currents are present in the metal, will result in the noise. To prove this you can obtain a piece of copper gauze and place this over one of the gears, turning the drive so that the gauze is wedged between the two wheels. You will then probably find that no noises are heard. Frictional contacts should always be avoided on the short waves, and a better idea, if you must use the drive at an angle, is to employ the Bowden cable arrangement which will avoid the frictional contact in such a vulnerable position.

Winding a Resistor

"I wish to wind one or two resistors for a power amplifier. The total current carried is about 1 amp., and I should like to know if there is a gauge of resistance wire which has some even value of resistance to facilitate the working out of my various items. What wire do you recommend, and what is the price?"—F. E. R. (Highbury).

ORDINARY nickel-chrome, 24 S.W.G. will carry 1.3 amps in a solenoid winding and has a resistance of approximately 4 ohms per yard. This should be quite suitable for your requirements. We do not know the purpose of the resistors but the fact that a simple solenoid of wire has inductance should not be overlooked by you, and you may find it desirable in most cases to double the required quantity of wire and wind the resistor with the doubled wire to annul the inductance. The wire in question, enamelled, will cost 4s. 6d. per ounce, and there are approximately 258 yards to the lb.

Simplified Construction.

"I am anxious to build a receiver of the superhet type, but I wish to go down to the short-waves. I know that multi-range coils are on the market, but I am rather afraid of the trimming and matching difficulties. Is it not possible to have this carried out by some firm so that it is accurately tuned. Also, can a ready calibrated dial be obtained for such a receiver."—G. T. (Edgware).

WHY not make use of one of the ready tuned and assembled units? These contain the tuning condenser and aerial and oscillator coils, together with valve-holders, and are ready ganged. A four-range tuning dial is also fitted. Such a unit needs only the addition of the I.F. and output stages, in which the trimming is very simple. Such a unit may be obtained from the Raymart Manufacturing Co. for £5 10s.

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

Practical and Amateur Wireless
BLUEPRINT SERVICE

These blueprints are full size. Copies of appropriate issues containing descriptions of these sets can in most cases be obtained as follows:—"Practical Wireless" at 4d., "Amateur Wireless" at 4d., "Practical Mechanics" at 7½d., and "Wireless Magazine" at 1/3d., post paid. Index letters "P.W." refer to "Practical Wireless" sets, "P.M." to "Practical Mechanics" sets, "A.W." refer to "Amateur Wireless" sets, and "W.M." to "Wireless Magazine" sets. Send (preferably) a postal order (stamps over sixpence unacceptable) to "Practical and Amateur Wireless" Blueprint Dept., Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.

PRACTICAL WIRELESS
STRAIGHT SETS. Battery Operated.

	Date of Issue.	No. of Blueprint
One-valve : Blueprint, 1s.		
All-wave Unipen (Pentode)	—	PW31A
Two-valve : Blueprint, 1s.		
Four-range Super Mag Two (D Pen)	11.8.34	PW36B
Three-valve : Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF (Trans))	—	PW10
Sixty-Shilling Three (D, 2 LF (RC & Trans))	2.12.33	PW34A
Leader Three (SG, D, Pow)	—	PW35
Summit Three (HF Pen, D, Pen)	8.8.34	PW37
All Pentode Three (HF Pen, D (Pen), Peh)	22.9.34	PW39
Hall-Mark Three (SG, D, Pow)	—	PW41
Hall-Mark Cadet (D, LF, Pen (RC))	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three)	13.4.35	PW49
Genet Midget (D, 2 LF (Trans))	*June* '35	PM2
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53
Battery All-Wave Three (D, 2 LF (RC))	31.8.35	PW55
The Monitor (HF Pen, D, Pen)	8.2.36	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P)	—	PW64
The Gladiator All-Wave Three	29.8.36	PW66
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	PW69
Four-valve : Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen)	—	PW11
Beta Universal Four (SG, D, LF, Cl. B)	15.4.33	PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-mark 4 (HF Pen, D, Push-Pull)	—	PW46
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36	PW67

Mains Operated.

Two-valve : Blueprints, 1s. each.		
A.C. Twin (D (Pen), Pen)	—	PW18
A.C.-D.C. Two (SG, Pow)	7.10.33	PW31
Selectone A.C. Radiogram Two (D, Pow)	—	PW19
Three-valve : Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, DDT, Pen)	10.6.33	PW23
D.C. Ace (SG, D, Pen)	15.7.33	PW25
A.C. Three (SG, D, Pen)	—	PW29
A.C. Leader (HF Pen, D, Pow)	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	18.8.34	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50
"All-Wave" A.C. Three (D, 2 LF (R.C))	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	31.8.35	PW56
Four-valve : Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	—	PW45
Universal Hall-Mark (HF, Pen, D, Push-Pull)	9.2.35	PW47

SUPERHETS.

Battery Sets : Blueprints, 1s. each.		
£5 Superhet (Three-valve)	—	PW40
F. J. Camm's 2-valve Superhet (Two-valve)	13.7.35	PW52
F. J. Camm's £4 Superhet	—	PW58
Mains Sets : Blueprints, 1s. each.		
A.C. £5 Superhet (Three-valve)	—	PW43
D.C. £5 Superhet (Three-valve)	1.12.34	PW42
Universal £5 Superhet (Three valve)	—	PW44
F. J. Camm's A.C. £4 Superhet 4	—	PW59
F. J. Camm's Universal £4 Superhet 4	11.1.36	PW60

SHORT-WAVE SETS.

Two-valve : Blueprint, 1s.		
Midget Short-Wave Two (D, Pen)	15.9.34	PW38A
Three-Valve : Blueprints, 1s. each.		
Experimenter's Short-Wave Three (SG, D, Pow)	—	PW30A
The Prefect 3 (D, 2 LF (RC and Trans))	8.2.36	PW63
The Bandspread S.W. Three (HF Pen, D (Pen), Pen)	29.8.36	PW68

PORTABLES.

Three-valve : Blueprint, 1s.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	16.5.36	PW65
Four-valve : Blueprint, 1s.		
Featherweight Portable Four (SG, D, LF, Cl. B)	—	PW12

MISCELLANEOUS.

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

AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.

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

STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.		
B.B.C. Special One-valver	—	AW387
Twenty-station Loud-speaker One-valver (Class B)	—	AW449
Two-valve : Blueprints, 1s. each.		
Melody Ranger Two (D, Trans)	—	AW388
Full-volume Two (SG det, Pen)	—	AW392
B.B.C. National Two with Lucerne Coil (D, Trans)	—	AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans)	—	AW338A
Lucerne Minor (D, Pen)	—	AW426
A Modern Two-valver	*July* '36	WM409
Three-valve : Blueprints, 1s. each.		
Class-B Three (D, Trans, Class B)	22.4.33	AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394
Home-Built Coil Three (SG, D, Trans)	—	AW404
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans)	2.12.33	AW412
1934 Ether Searcher: Baseboard Model (SG, D, Pen)	20.1.34	AW417
1934 Ether Searcher: Chassis Model (SG, D, Pen)	—	AW419
Lucerne Ranger (SG, D, Trans)	—	AW422
Cossor Melody Maker with Lucerne Coils	—	AW423
Mullard Master Three with Lucerne Coils	—	AW424
£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans)	—	AW437
All Britain Three (HF Pen, D, Pen)	—	AW448
"Wireless League" Three (HF Pen, D, Pen)	3.11.34	AW451
Transportable Three (SG, D, Pen)	—	WM271
£6 6s. Radiogram (D, RC, Trans)	—	WM318
Simple-tune Three (SG, D, Pen)	*June* '33	WM327
Economy-pentode Three (SG, D, Pen)	*Oct.* '33	WM337
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 3s. Three (SG, D, Trans)	*Mar.* '34	WM354
Iron-core Band-pass Three (SG, D, QP 21)	*June* '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen)	—	WM371
PTP Three (Pen, D, Pen)	*June* '35	WM389
Certainty Three (SG, D, Pen)	*Sept.* '35	WM393
Minitube Three (SG, D, Trans)	*Oct.* '35	WM396
All-wave Winning Three (SG, D, Pen)	*Dec.* '35	WM400
Four-valve : Blueprints, 1s. 6d. each.		
65/- Four (SG, D, RC, Trans)	—	AW370
"A.W." Ideal Four (2 SG, D, Pen)	16.9.33	AW402
2 H.F. Four (2 SG, D, Pen)	—	AW421
Crusaders' A.V.C. 4 (2 HF, D, QP 21)	18.8.34	AW445
(Pentode and Class-B Outputs for above: Blueprints, 6d. each)	25.8.34	AW445A
Self-contained Four (SG, D, LF, Class B)	*Aug.* '33	WM331
Lucerne Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, 2 LF)	*Feb.* '35	WM381
The H.K. Four (HF Pen, HF Pen, D, Pen)	*Mar.* '35	WM384
The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	*April* '36	WM404
Five-valve : Blueprints, 1s. 6d. each.		
Super-quality Five (2 HF, D, RC, Trans)	*May* '33	WM329
Class-B Quadradyne (2 SG, D, LF, Class B)	*Dec.* '33	WM344

Mains Operated.

Two-valve : Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.	23.9.33	AW403
Economy A.C. Two (D, Trans) A.C.	—	WM286
Unicorn A.C./D.C. Two (D, Pen)	*Sept.* '35	WM394
Three-valve : Blueprints, 1s. each.		
Home-Lover's New All-electric Three (SG, D, Trans) A.C.	—	AW383
Three-valve : Blueprints, 1s. each (*contd.*).		
S.G. Three (SG, D, Pen) A.C.	—	AW390
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW399
A.C. Pentaquester (HF Pen, D, Pen) A.C.	23.6.34	AW436
Mantovani A.C. Three (H.F, Pen, D, Pen) A.C.	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	*Jan.* '36	WM401
Four-valve : Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen)	*July* '33	WM326
Harris Jubilee Radiogram (HF Pen, D, LF, P)	*May* '35	WM386

SUPERHETS.

Battery Sets : Blueprints, 1s. 6d. each.		
Modern Super Senior	—	WM375
Varsity Four	*Oct.* '35	WM395
The Request All-Waver	*June* '36	WM407
1935 Super Five Battery (Superhet)	—	WM379
Mains Sets : Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C.	—	AW425
Heptode Super Three A.C.	*May* '34	WM359
"W.M." Radiogram Super A.C.	—	WM366
1935 A.C. Stenode	*Apl.* '35	WM385

PORTABLES.

Four-valve : Blueprints, 1s. 6d. each.		
Midget Class B Portable (SG, D, LF, Class B)	20.5.33	AW389
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
TWO H.F. Portable (2 SG, D, QP21)	*June* '34	WM363
Tyers Portable (SG, D, 2 Trans)	—	WM367
Five-valve : Blueprint, 1s. 6d.		
New Class-B Five (2 SG, D, LF, Class B)	*Nov.* '33	WM340

SHORT-WAVE SETS—Battery Operated.

One-valve : Blueprints, 1s. each.		
S.W. One-valve converter (Price 6d.)	—	AW329
S.W. One-valve for America	—	AW429
Roma Short-waver	—	AW452
Two-valve : Blueprints, 1s. each.		
Ultra-short Battery Two (SG det, Pen)	*Feb.* '36	WM402
Home-made Coil Two (D, Pen)	—	AW440
Three-valve : Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D, Trans. Super-regen)	30.6.34	AW438
Experimenter's Short-waver (SG, D, Pen)	*Jan.* 19,'35	AW463
The Carrier Short-waver (SG, D, P.)	*July* '35	WM390
Four-valve : Blueprints, 1s. 6d. each.		
A.W. Short-wave World Beater (H.F Pen, D, RC, Trans)	—	AW436
Empire Short-waver (SG, D, RC, Trans)	—	WM313
Standard Four-valver Short-waver (SG, D, LF, P)	*Mar.* '35	WM338
Superhet : Blueprint, 1s. 6d.		
Simplified Short-wave Super	*Nov.* '35	WM397

Mains Operated.

Two-valve : Blueprints, 1s. each.		
Two-valve Mains short-waver (D, Pen) A.C.	—	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.	—	WM368
"W.M." Long-wave Converter	—	WM380
Three-valve : Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C.	—	WM352
Four-valve : Blueprint, 1s. 6d.		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	*Aug.* '35	WM391

MISCELLANEOUS.

Enthusiast's Power Amplifier (1/6)	*June* '35	WM38
Listener's 5-watt A.C. Amplifier (1/6)	*Sept.* '35	WM392
Radio Unit (2v.) for WM392 (1s.)	*Nov.* '35	WM398
Harris Electrogram (battery amplifier) (1/-)	*Dec.* '35	WM399
De-Luxe Concert A.C. Electrogram	*Mar.* '36	WM403
New style Short-waver Adapter (1/-)	*June* '35	WM388
Trickle Charger (6d.)	*Jan.* 5, '35	AW462
Short-wave Adapter (1/-)	*Dec.* 1, '34	AW456
Superhet Converter (1/-)	*Dec.* 1, '34	AW457
B.L.D. L.C. Short-Wave Converter (1/-)	*May* '36	WM405
Wilson Tone Master (1/-)	*June* '36	WM406
The W.M. A.C. Short-Wave Converter (1/-)	*July* '36	WM408

Miscellaneous Advertisements

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Surplus, Clearance or Secondhand, etc.

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

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

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

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

VAUXHALL.—Colvern Ferrocart iron cored coils, 2-gang, 20/-; 3-gang, 30/-; straight or superhet.

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

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

VAUXHALL.—T.C.C. condensers, tubular, non-inductive, 0.1, 6d.; 50 mfd., 50v. working, 1/6; 50 mfd., 12v., 1/3; 0.05, 6d.; 0.002, 0.0002, 0.001, 0.0001, 4d. each.

VAUXHALL.—T.C.C. mica 0.002, 2,000 volt test, 1/-; 0.0001, 4d.; 0.001, 0.01, 1/-; 1 mfd. Mansbridge, 1/3; 2 mfd., 1/8.

VAUXHALL.—Resistances by well-known manufacturers, 1-watt type, 6d each; all values.

VAUXHALL.—Centre tapped iron cored I.F. transformers, bases, terminals, 110 k/c; 6/6 guaranteed.

VAUXHALL.—Set manufacturers' surplus, skeleton type Westinghouse rectifiers, H.T.8, 9/6; H.T.9, H.T.10, 10/-; complete with fixing brackets.

VAUXHALL.—Collaro 32 Model, 32/6; Universal model, 47/6; complete unit, A.C. 200-250v., first quality pick-ups and volume control, 48/-.

VAUXHALL.—Eddystone and Bulgin short-wave components, large range now available.

VAUXHALL.—Clix valve holders, terminals, 5-pin, 7d.; 9-pin, 9d.; baseboard mounting, 5-pin, 4½d.; 7-pin, 1/-.

VAUXHALL.—Pushback wire, four colours, 6 yds., 6d. 6BA screws or nuts, 4d. doz.

VAUXHALL.—Immediate delivery, carriage paid, lists free; cash with order, or c.o.d.—Vauxhall Utilities, 163a, Strand, W.C.2 (Temple Bar 9338).

WE BUY for cash, all types of Modern Second-hand Radio Sets, Accessories, etc. Unbeatable Part-exchange allowances for new goods. Bring, send or write.

UNIVERSITY RADIO LTD., 82, Hampstead Road, London, N.W.1. 'Phone: Euston 3810.

EXPERIMENTER'S OPPORTUNITY. Parcels containing Wireless Components 40/- value for 5/6. Carriage 1/-.—Taylors', Radio House, Macaulay Street, Huddersfield.

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RADIOGRAPHIC, Ltd. For all-wave Radios, Valves, Components, Professional Receivers, Kit Sets. Every type of American Tube. None to compare with RADIOGRAPHIC. Write for our FREE CATALOGUE. Remember our Guarantee—"ABSOLUTE SATISFACTION OR MONEY REFUNDED."—RADIOGRAPHIC, LTD., 66, OSBORNE STREET, GLASGOW, C.1.

MISCELLANEOUS

GRAMOPHONE attachments for Radio, electric motors, 25/-; pick-ups, 9/6; portable gramophones, 12/-; spring motors, 4/6, dozen 36/-, 100 £12/10/0, 1,000, £100; walnut pedestal Anexagram, £5; soundboxes, 1/6; tone-arms, 2/6; horns, 2/6; cabinets, 4/-; 1,000 needles, 1/3; gears, springs, accessories, cheapest. Trade discount. Thousands to clear. Liquidating stock bargains. Catalogue free.—Regentam, 120, Old Street, London, E.C.1.

FOR SALE.—W. B. Stentorian 36.s., 25/-. As new. —L. Norman, Tendring, Clacton-on-Sea, Essex.

HEADPHONES. Brown, G.E.C., B.T.H., Nesper, Sterling, Ericsson, Marconiphone, Telefunken, etc., from 2/6 pair. Postage 6d. List free. CRYSTAL SETS. Complete. Guaranteed. Burne-Jones, 5/6. Ditto, double circuit, 8/-. Large P.O. type, 10/-. Crystal detector. Complete parts, 1/-. Sensitive permanent detector, 1/6.—Post Radio, 183, Caledonian Road, London, N.1.

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

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4/- **SPECIAL** set of 3 S.W. coils, 14-150 metres, with circuit.

2/- **PREMIER** 3-band S.W. Coil, 11-25, 19-43, 38-86 metres. Simplifies S.W. receiver construction, suitable any type circuit.

1/- **COIL FORMERS,** in finest plastic material, 1¼in. low-loss ribbed, 4- or 6-pin.

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

4/6 **MAINS VALVES,** famous Europa 4 v. A.C. types, H.L., L., S.G., Var.-Mu-S.G., H.F. Pens., Var.-Mu-H.F. Pens., 1, 3 and 4-watt A.C. directly-heated output Pentodes. Full-wave rectifiers, 250 v. 60 m.a. A.C./D.C. types. 20-volt. .18 amp. S.G. Var-Mu-S.G., H., H.L., Power.

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

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

5/6 **AMERICAN VALVES.** Genuine American **HYTRON** first-grade Valves, 3 months' guarantee. All types. New Metal-glass Valves, all types, 6/6 each. Genuine American **DUOTRON** Valves, all types, 3/6 each.

VALVE HOLDERS for all above types, 6d. each. Octal Bases, 9d. each.

12/6 **SHORT-WAVE KIT** for 1-valve receiver or adaptor, complete with chassis, 4 coils, 14-150 metres, condensers, circuit and all parts, **VALVE GIVEN FREE! DE LUXE MODEL, 17/6. SUPERHET CONVERTER KIT, 13/6.**

19/6 **2-VALVE S.W. Kit. Valves given free!**

42/- **3-VALVE S.W. Kit. S.G. Det. 2 Pen. Valves given free!**

50/- **ALL-WAVE "ALL-WORLD RANGE"** 3-valve kit, 12-2,000 metres in 4 wavebands without coil changing, complete kit of parts with 3 valves, S.G.H.F., S.G. Det. and Pentode (2 volts). Q.P.P. Model, 6/6 extra.

12/6 **LISSEN ALL-WAVE COILS,** 12-2,000 metres, complete with switching and wiring diagram.

25/- **THE LOT. BAND-PASS TUNING PACK,** comprising set of Telsen 3-gang iron-cored coils with switching, mounted on steel chassis with 3-gang condenser, illuminated disc-drive and 4 valve-holders. All mains or Battery circuit. **FREE!**

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

SPECIAL OFFER! 12/6 P.M. Speaker, 35/- Transverse Current Mike, complete with transformer, and 7/6 Stand. If purchased with above kit, 25/- the lot.

£4:4:0 **7-WATT A.C./D.C. AMPLIFIER.** 3-stage, high-gain, push-pull output. Complete kit of parts with 5 specially matched valves.

SPECIAL OFFER! 21/- pair Matched Speakers, 35/- Transverse Current Mike, complete with transformer and 7/6 stand. If purchased with above kit, 35/- the lot.

£5:5:0 **10-WATT** 3-stage A.C. Amplifier Kit with 5-valves.

SPECIAL OFFER! 21/- pair Matched Speakers, 35/- Transverse Current Mike, complete with transformer and 7/6 stand. If purchased with above kit, 35/- the lot.

£8:8:0 **20-WATT** 3-stage A.C. Amplifier Kit with 5 valves.

SPECIAL OFFER! £6 pair P.M. Exponential Horn Speakers, 35/-. Transverse Current Mike with transformer and 7/6 stand. If purchased with above kit, £5 10s. the lot.

MAGNAVOX, Mains energised, '154,' 7in. cone, 2,500 ohms 4 watts, 12/6; '152,' 9in. cone, 2,500 ohms, 17/6; '152 Magna,' 9in. cone, 2,500 ohms, 6 watts, 37/6. Magnavox, P.M.'s—'154,' 7in. cone, 16/6; '252,' 9in. cone, 22/6. Reliable P.M.'s, 10/6; Cossor P.M.'s, 13/6.

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

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

POTENTIOMETERS by well-known makers. All values up to 1 meg., 2/-; with switch, 2/6.

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

PREMIER wire-end type with screened primaries, and tapped 200-250 v. Centre-tapped Filaments. Guaranteed one year. H.T. 8 & 9 or H.T. 10 with 4 v. 4 a. C.T. and 4 v. 1 a. C.T., 8/6. 250-250 v. 60 m.a., 4 v. 1 a., 4 v. 2 a. and 4v. 4 a., all C.T., 8/6. 350-350 v. 120 m.a., 4 v. 1 a., 4 v. 2 a. and 4 v. 4 a., all C.T., 10/6. Any of these transformers with engraved panel and N.P. terminals, 1/6 extra. 500-500 v. 150 m.a., 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 3-4 a., all C.T., 19/6. **AUTO TRANSFORMERS,** step up or down, 60 watts, 7/6; 100 watts, 10/-.

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

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

ELECTROLYTICS. U.S.A. 4, 8, or 12 mfd., 530 v. peak, 1/9 each. Dubilier, 4 or 8 mfd. 500 v., 3/-; 50 mfd. 50 v., 1/9; 12 mfd. 20 v., 6d.; 25 mfd. 25 v., 1/-; T.C.C. 4 or 8 mfd. 650 v., 4/-; 15 mfd. 50 or 100 v., 1/-; 50 mfd. 12 v., 1/-. Paper Condensers. W. E., 250 v. working 4 mfd., 2/-; 2 mfd., 1/-, 1 mfd. 6d.; 350 v. working 4 mfd., 2/6; 2 mfd., 1/6; Dubilier 500 v. working 4 mfd., 4/-; 800 v. 4 mfd., 6/-. Wego 450 v. working 1 mfd., 1/-, 2 mfd., 1/9, 4 mfd., 3/-; 700 v. working 2 mfd., 2/-, 4 mfd., 3/6.

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

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(Continued at top of column three)

(Continued from foot of column one)

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Announce 1937
SHORT-WAVE MANUAL

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MISCELLANEOUS

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RESISTANCES.—1 watt metallised. One dozen good sizes, 1/3. 2 mfd.'s 1,000 v. Helsby, 3 for 1/9. Postage 4d.—Fleming, 115, Ridley Road, E.8.

TELEVISION.—Newnes Television and Short-wave Handbook, by F. J. Camm, deals authoritatively with Scanning Systems (Drums, Mirror Screws, Discs, etc.), Neon Lamps, The Cathode-Ray Oscillograph, How to Build Short-wave and Ultra-short-wave Receivers. Fully illustrated. 3s. 6d. net. From your bookseller.—George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

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This coupon is available until November 14th, 1936, and must be attached to all letters containing queries.
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Practical and Amateur Wireless, November 14th, 1936.

ELIMINATING HUM—See Page 275

Practical and Amateur Wireless

3d EVERY WEDNESDAY

Edited by F. J. CAMM

A GEORGE NEWNES Publication

Vol. 9. No. 217. November 14th, 1936.

AND PRACTICAL TELEVISION

F. J. Camm's "RECORD" all-Wave 3

Final Details

ALL ABOUT BATTERIES — *See page 273*

Practical and Amateur Wireless
Edited by F. J. CAMM
Technical Staff:
W. J. Delaney, H. J Barton Chapple, Wh.Sch., B.Sc., A.M.I.E.E., Frank Preston.
VOL. IX. No. 217. November 14, 1936.

ROUND *the* WORLD *of* WIRELESS

Radio in Italy

AT the recent Radio Exhibition at Milan the tendency of modern design was towards five-valve receivers of simple design. In the luxury class superhets for all-wave use, with visual tuning indicators and other refinements, were featured.

Changes in Ireland

THE B.B.C. announces that Mr. G. F. Combe, previously an announcer at the North Ireland Regional, has been appointed Outside Broadcasts Assistant, for the Northern Ireland Region.

Would You Believe It?

A PRESS notice received from Italy says: "The furniture of these sets are of special material resistant against the devastations of insects and in such a way also the other organisms have been examined in order to resist against the African temperature."

Making a Motor-car

AN interesting programme has been prepared for the Midland Regional programme by the B.B.C. mobile unit. This has been recorded at one of the leading Midland motor works and will be a study in mass production.

From a Glider

WE have had broadcasts from practically every form of transport and to-day (November 14th) an account of a flight is to be broadcast from a glider. This will be a first-hand account of a novice's sensations in his first glide and should prove very entertaining.

Ultra-Short Dangers

THE effects of ultra-short-wave radiations have already been dealt with by us, and the curative effects have been mentioned in connection with modern surgery. We have now heard that in experiments abroad sausages have been cooked by U.S.W. radiations, and from Belgium we now hear that two medical students have been seriously injured owing to the explosion of some chemical which was subjected to these radiations.

Television on the Big Screen

ALTHOUGH the cathode-ray tube is regarded as the solution to high-definition pictures, there has been some comment regarding its limitations so far as size is concerned. Now from Germany we hear that experiments in magnifying the image have been completely successful and in conjunction with the famous lens manufacturers (Zeiss) projected images from the cathode-ray tube have been made possible.

More Invisible Rays

EXPERIMENTS in Germany regarding the use of invisible rays and their detection by television apparatus may lead to a complete conquest of the fog and darkness problem for ships and aircraft. These experiments do not appear to resemble the noctovision tests carried out many years ago by Baird, but full details are not yet available.

The Bound Volume of "Practical and Amateur Wireless" is uniform with the first volume, which is shown above. See paragraph on this page.

Larger Stations

CONCERN is expressed in some European countries regarding the steadily increasing number and power of transmitters. Soon even the superhet will appear to be inadequate to deal with the problem in certain localities and, no doubt, a general exodus from the present medium and long-wave bands will take place.

The Cardiff Musical Society

THE Cardiff Musical Society, conducted by John Morgan Lloyd, will broadcast their first concert of the season from the Park Hall, Cardiff, on November 15th. The work to be performed is Verdi's "Requiem" and the solo artists will be Isobel Baillie (soprano), Freda Townson (contralto), Heddle Nash (tenor) and William Parsons (bass).

Mr. V. A. M. Bulow's New Appointment

MR. V. A. M. BULOW left London a fortnight ago to take up an appointment in the Posts and Telegraphs Department, Government of Iraq, Baghdad, where his duties will be primarily in connection with the organisation and development of broadcasting. Mr. Bulow, who joined the B.B.C. in 1923, was responsible for the erection of the Bombay and Calcutta Stations in India in 1927, and has only recently returned from Madras, where he was Broadcasting Adviser to the Government of Madras.

B.B.C. Orchestras on the Screen

HORACE SHEPHERD, well-known composer and conductor, is putting the B.B.C. Light Orchestras on the screen. Cedric Sharpe and His Sextet, the Gershom Parkington Quintet, and Reginald King's Orchestra are among those that will be featured in a series of six two-reel subjects entitled "Light Orchestras of the B.B.C." which will be produced within the next few months.

Inspiration Films, the company controlled by Horace Shepherd, specialises in short films; among those it has made in the past few years are "Voices Immortal," which brought many well-known poems to the screen, and eight films featuring famous classical songs, entitled "Music Lovers."

Binding Cases for Vol. 8

BINDING cases and indexes for volume 8 of PRACTICAL AND AMATEUR WIRELESS are now available. The binding case, complete with title page and index, costs 3s. 6d., and the index alone 7d. by post.

THE PICK of the PROGRAMMES

Concert from Plymouth

ON November 12th, in the Western programme, a concert will be given by the Band of His Majesty's Royal Marines, Plymouth Division (by permission of Brigadier H. G. Grant, Commanding Royal Marines, Plymouth), conducted by F. J. Ricketts, Director of Music, Royal Marines. This concert will be broadcast from the Abbey Hall, Plymouth, and Glyn Eastman (baritone) will be the vocalist.

Variety from Exeter

ALSO in the Western programme, a number of variety acts will be broadcast from the stage of the Theatre Royal, Exeter, on November 12th.

Midland Symphony Concert

THIS Symphony Concert by the City of Birmingham Orchestra, conducted by Leslie Heward, will be heard on November 19th from the Town Hall, Birmingham. Beethoven's No. 5 will be the chief work in the first half of the programme, and Busoni's Pianoforte Concerto in the second. Professor Hely-Hutchinson in his interval talk, will describe the latter, which has only been performed three or four times in this country. Egon Petri, who was a pupil of Busoni, will be the pianist, and for the choral section in the last movement the singers will be the male chorus of Birmingham Festival Choral Society.

Organist from Ripon

AN organ recital by Charles H. Moody will be broadcast from Ripon Cathedral on November 17th, his programme including Tertius Noble's "Nachspiel," and a "Phantasie in A, Op. 188," by Rheinberger.

The Clifton Light Orchestra

A CONCERT by this popular orchestra, conducted by Reginald Redman, will be broadcast from the Western Regional on November 15th. Frederick Harvey (baritone) will be the vocalist.

Variety from Coventry

COVENTRY Hippodrome Theatre can usually be relied on to provide a strong bill to the series of variety Outside Broadcasts, and this one on November 17th will be no exception. David Gretton will be the commentator.

Birmingham Town Hall Concert

PART of a concert by Birmingham City Police Band and City Police Male Voice Choir, with Muriel Sotham, contralto, will be heard from the Birmingham Town Hall on November 13th. Richard Wassell will be the conductor. The Police Band is to play a selection from "Lilac Time" and other items, and the Choir will sing Sir Edward German's "O Peaceful Night" and Root's "There's Music in the Air."

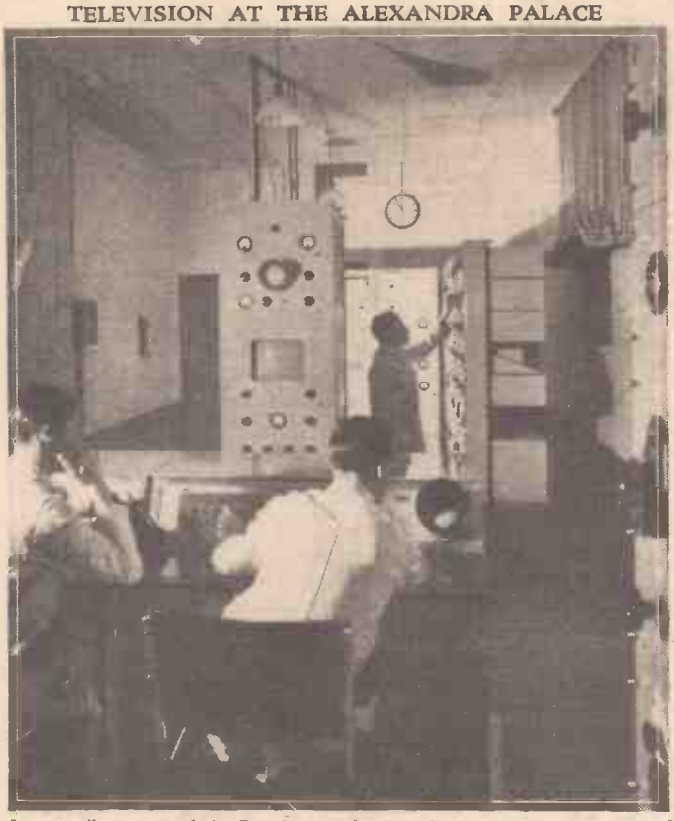
Black Dyke Band

THIS famous Yorkshire brass band will broadcast a special concert in the Regional programme on November 19th.

MAKE THESE DATES WITH YOUR RADIO

This will form part of a series of brass band feature concerts. Under the direction of Arthur O. Pearce, who has been with the band since 1912, they will play a programme of original compositions for brass (as opposed to orchestral transcriptions), including Rimmer's Scottish Rhapsody, "Lord of the Isles," Geehl's overture, "Oliver Cromwell," and the "Nocturne March" from the "Moorside Suite" of Holst.

TELEVISION AT THE ALEXANDRA PALACE



In this illustration of the Baird control room the vision monitoring panel is seen in the centre background. The amplifier racks are on the right, and the two operators in the foreground are seated at the control desk.

Organ Recital from Belfast

HAROLD RAMSAY, well known to thousands of listeners for his organ recitals from the Granada, Tooting, will broadcast again in the Northern Ireland programme on November 16th from the new Ritz Cinema, Belfast. The organ is similar to the new B.B.C. organ at St. George's Hall, and cost £10,000 to build. Harold Ramsay was one of the four organists who took part in the first broadcast of the B.B.C. Theatre Organ on October 20th. On November 16th in addition to his recital some excerpts will be given from the Variety show on the Ritz stage.

Concert from Torquay

ON November 17th, a concert by the Torquay Municipal Orchestra, conducted by Ernest W. Goss, will be broadcast from the Pavilion, Torquay. Redvers Llewellyn (baritone) will be the vocalist.

Variety from Carlisle

AN excerpt from the variety bill at Her Majesty's Theatre, Carlisle, will be broadcast to Northern listeners on November 18th.

The Bath Pump Room Orchestra

LISTENERS will remember that the opening concert by the Bath Pump Room Orchestra was broadcast in October, and on November 21st the second broadcast by this orchestra, conducted by Maurice Miles, will be heard from The Pavilion, Bath. The artist will be Bratza (violin).

Gliding Programme

THE B.B.C. Outside Broadcast Director Mr. Joly de Lotkinière, recently visited Dunstable Downs to test the entertainment possibilities of gliding. Although the day was unfavourable, he persuaded the authorities to take him up in a two-seater glider, and was duly impressed by the thrill obtained by an amateur on his first gliding flight. Mr. de Lotkinière will come to the microphone on November 14th and will describe to listeners of the National programme some of the sensations of a novice during his first gliding flight.

Midland Ballad Concert

THREE well-known artists are to appear in the ballad concert on November 15th. The tenor will be Parry Jones, who is to sing three solos, and duets with May Huxley, the soprano, who will also sing four solos. W. H. Squire, the composer and 'cellist, who is a native of Herefordshire, will play two groups of solos, including two of his own compositions.

Newcastle Dance Band

JOSEPH Q. ATKINSON and his five-piece dance band will broadcast from the Newcastle studios on November 21. Four of the players come from Newcastle; the fifth is a Manchester man.

SOLVE THIS!

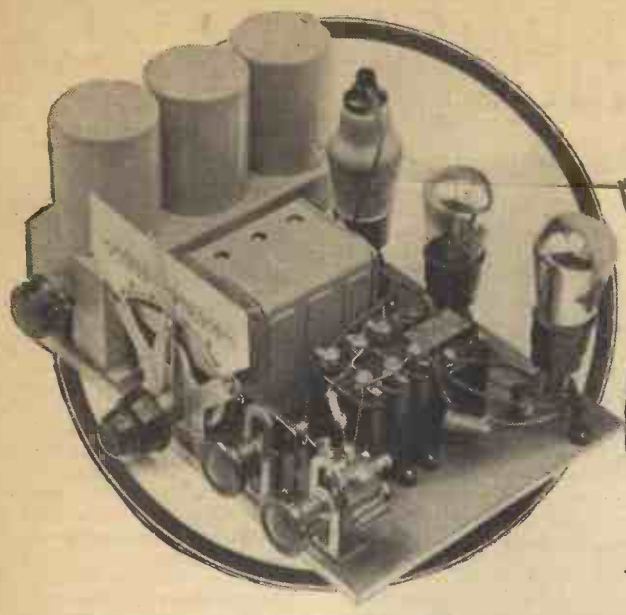
PROBLEM No. 217.

Young's A.C./D.C. receiver faded out during a programme and when tests were made it was found that there was no load across the mains when the set was switched on; an ohmmeter connected across the two pins of the mains plug of the receiver indicated infinity. What was the probable cause of the stoppage? Three books will be awarded for the first three correct solutions opened. Address your solutions to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 217 in the bottom left-hand corner, and must be posted to reach this office not later than the first post on Monday, November 16th, 1936.

Solution To Problem No. 216.

The lack of voltage at the detector anode was due to a short-circuit in the H.F. bypass condenser connected between detector anode and H.T.—

The following three readers successfully solved Problem No. 215, and books are accordingly being forwarded to them: B. R. Bennett, Warwick School, Warwick; L. Bennison, 28, Lynmouth Drive, Ruislip Manor, Middx.; T. J. Coles, 49, Lennox Road, N.4.



F.J.CAMM'S "Record" All-wave Three

Final Notes on the Installation and Operation of this New Battery Receiver

IT will be assumed that the receiver has been tested out of its cabinet in order to enable all parts to be readily accessible, and if all tests have been concluded satisfactorily it only remains now to install the receiver in the cabinet. A ready-drilled cabinet for this receiver is supplied by Messrs. Peto-Scott, and is illustrated on page 211 of our issue dated October 31st last. It will be found that the chassis of the receiver will slip neatly into place and the escutcheon supplied with the condenser drive should be first attached to the cabinet front. The speaker should be attached at the rear of the speaker opening, taking care not to use long screws or they will project through the front of the cabinet. The necessary batteries may be accommodated on the shelf inside the cabinet, and the lengths of battery lead mentioned last week will be found ample to enable this to be done. The receiver is then in its finished condition, and may be left without any further modification.

Times of Listening

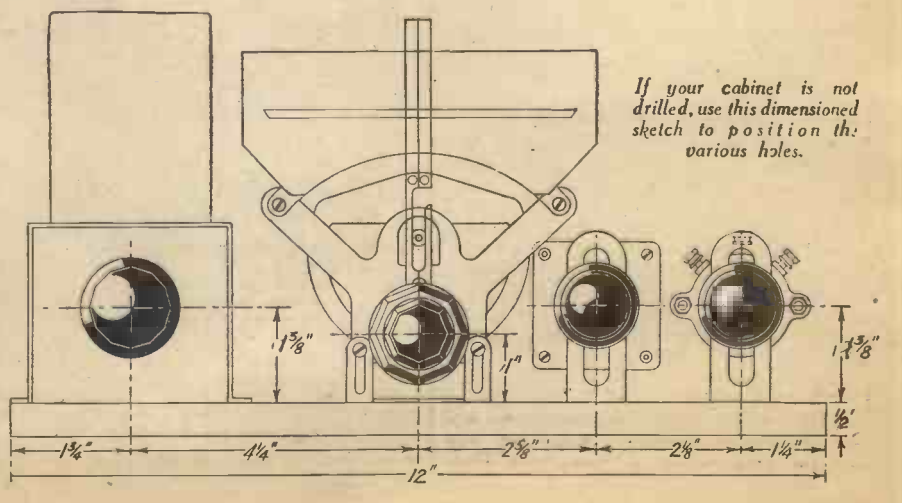
To anticipate any difficulty regarding short-wave reception it must be emphasised that it is essential that the correct times of listening are chosen when using the short-wave bands. These wavelengths are affected by the sun and darkness, and it will be found, for instance, that late at night the lower part of the lowest short-wave band may be quite dead and during the middle of the day the lower part of the second short-wave band may prove equally unproductive of signals. No set rules can, however, be laid down, as the short waves are notorious for their erratic and peculiar behaviour, but much waste of time and disappointment will be avoided if certain wavebands are selected according to the time of day or night, and some signals may then be assured. Thus, the lowest wave-range should be employed mainly for use from early morning until about three hours after sunset. From this time onwards the next part of this wave-range, or the lower part of the second short-wave band will prove more lively, and as the hours of darkness extend so the higher short-wave ranges will provide better results.

It must also be remembered that certain stations may be found to come in strongly one night, but the next night it may be found impossible to hear them, and, therefore, the circuit should not be tampered with if this is found to be the case, as on the following night the signals will probably be heard again. The same difficulty sometimes occurs during the course of one evening, a station coming in strongly one moment and then perhaps disappearing for minutes at a time.

The Earth Connection

Remember that the earth is an important part of the installation, and do not spare any pains in trying different arrangements in an endeavour to obtain the best possible arrangement. This may not be the best broadcast earth, and to ensure maximum results on all wavebands it is well worth the trouble of trying various combinations. The same remarks apply to the aerial, and obviously maximum results will be obtained if an all-wave aerial system is employed. Such an arrangement may be obtained from various firms who advertise in this journal.

For some of the weak short-wave stations headphones may be found preferable, and, naturally, many more stations will be heard by this means than through the loudspeaker. The 'phones may be connected in place of the loudspeaker.



If your cabinet is not drilled, use this dimensioned sketch to position the various holes.

Modern Cabinet Making

Cabinets of All Types in the Present-day Styles May be Easily and Cheaply Made at Home. Some Suggestions Concerning this Branch of Radio are Given in this Article.

By W. J. DELANEY

THE modern tendency in furnishing design is to avoid excessive embellishments and mouldings which at one time were so popular. To-day the styles followed are very similar to architectural designs, the general aspect being often called "severe." At any rate, plainness is one of the main features, and an endeavour to approach what is often called "streamline" outlines is made by many cabinet makers. The result of this trend in design is that the home carpenter will find it quite easy to build a cabinet, suitable either for a simple table model or for an elaborate radiogram, with the minimum of labour and at a minimum of cost. It is now unnecessary to possess an elaborate workshop, and the simplest of tools will enable a cabinet to be constructed which will bear comparison with a factory-made article. The work may be marred in the finishing, unless some special type of finish is adopted. but the many aids to the woodworker which are now obtainable should enable the handyman to follow practically any particular idea, and the following notes of some of the materials now available, and the methods of using them, will no doubt be found of great assistance. It might be mentioned that the writer has just completed the construction of a radiogram cabinet of modern design, the overall measurements being 3ft. wide by 2ft. deep and 2ft. 9in. in height. The carcase is constructed from 9-ply (¾in. material), and the top of the lid is in ⅜in. 7-ply. A large rectangular speaker

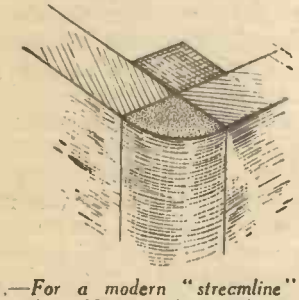


Fig. 1.—For a modern "streamline" cabinet this type of moulding may be used for the corners.

opening is employed for twin speakers, and contrasting strips of wood are halved into this opening. The total cost of materials including stain and french polish, was under 30s. This will give some idea of the cheapness of construction of these modern types of cabinet.

Materials

Apart from the various thicknesses of plywood which may now be obtained, and which are, of course, preferable to plain wood for the carcase, owing to the fact that they will keep dead flat, there are now obtainable from timber merchants various thicknesses of plywood which are faced with various fine woods, such as mahogany, burr walnut, sapele, oak, etc. The oak and walnut-faced ply may be obtained in ready-made panels in various sizes, ranging from those suitable for a small table model up to a large radiogram, with either plain or quartered faces. These panels are finished quite square and require no working whatsoever except for the finishing, and even then only a rub with a fine glasspaper is needed before polishing.

For those who are unable to use woodworking tools these panels are obtainable with speaker openings ready made, and, if required, with an opening for a radio-control panel, behind which a plywood or

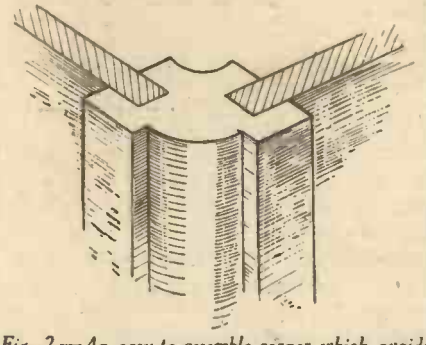


Fig. 2.—An easy to assemble corner which avoids difficult joints.

ebonite panel may be accommodated. As an indication of the price of this type of

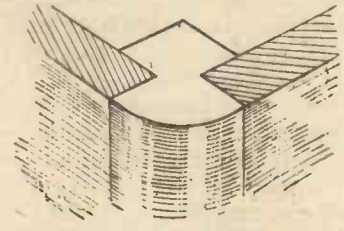


Fig. 3.—An alternative moulding to obtain an effect similar to Fig. 1.

material, a ⅜in. panel of quartered burr walnut, measuring 3ft. by 2ft., costs 6s.

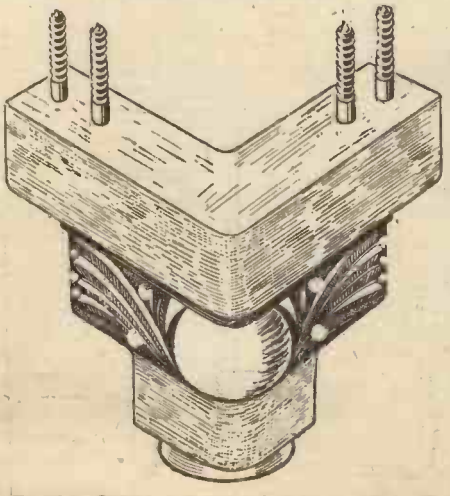


Fig. 5.—Ornamental feet of this type may be used for radiogram cabinets.

This would be adequate for the front of a radiogram, and panels for the sides, measuring 2ft. by 14in., cost 1s. 7d. in the same material.

Cabinet Edges

In place of the usual type of sharp or square edge to a cabinet, appearances are improved if a rounded edge is employed. Such an edge may be obtained in several different ways. In Fig. 1 the arrangement adopted is to glue and screw a thin batten against the edge of the front of the cabinet, and to attach the sides a short distance from the edge, but to the same batten. The intervening space is then filled by a length of quadrant (or quarter-round moulding), which may simply be attached by thin cabinet pins and glue. As the edges of the ply panel are cut dead clean, and as the quadrant is also machine cut, no gaps should show, and no risk of untidy edges will be present due to uneven working. An alternative scheme is to employ grooved corner mouldings, such as are shown in Figs. 2, 3 and 4. In the arrangement in Fig. 2 the moulding is grooved to accommodate the panel, and it may be obtained in various designs. In the Fig. 4 arrangement the two edges are butted inside the moulding, and a triangular fillet is glued or nailed inside to strengthen the corner. The corner shown in Fig 3 will finish the same as the Fig. 1 arrangement and will be quite

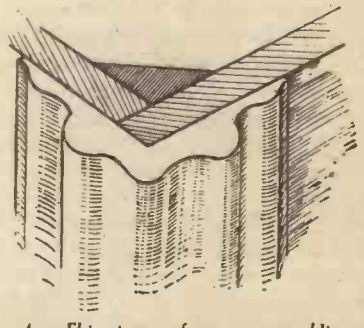


Fig. 4.—This type of corner moulding will cover up faulty workmanship.

flush. The same arrangements may be adopted for the lid of a radiogram and also for the edges of a speaker fret opening.

Chromium and Ebony

A very modern tendency is to employ chromium and ebony as contrasts in a cabinet, and such an arrangement may quite easily be employed by the home constructor. Wood may be obtained in varying widths, on which is a fine chromium overlay or plate. It is easily cut and may be attached to a cabinet front by glue, thus avoiding any marks on the chromium surface. To go with this type of inlay, chromium-domed control knobs may be obtained from Messrs. Bulgin, and they look very neat on a panel or cabinet front which is stained black and polished. If the cabinet is large and incorporates a large

(Continued on page 286)

MODERN METHODS OF RECEIVER INSTALLATION

Some Useful Ideas for Indoor Aerial Systems, and for Wiring the House for Extension Speakers.

By FRANK PRESTON

IT would not be quite true to say that methods of installing a set have altered as much as has the design of the receiver itself, but they certainly have changed considerably. Outdoor aerials are becoming less and less frequent, despite the growing number of sets in use. This might not be considered as a good sign technically, but it is in every other respect, for an outside aerial does not improve the appearance of the house and can be rather a nuisance in bad weather. Provided that reasonable care is taken in its erection, a good indoor aerial need be only slightly less efficient than an outside one, and it might even prove more satisfactory from the point of view of selectivity, and also when there is a fair amount of "local" electrical interference.

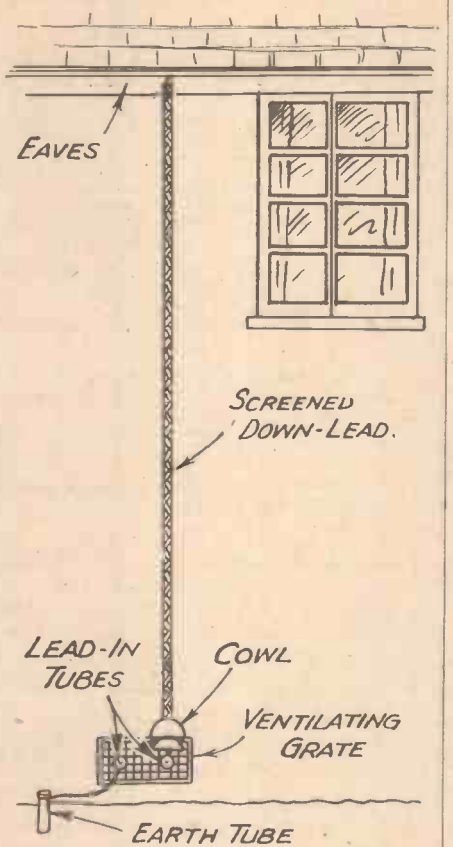
The present-day trend is to combine a good inside aerial with loudspeaker-extension leads running to every room in the house, and this form of installation is desirable in many respects. Before erecting the inside aerial, it is a good plan thoroughly to examine the loft and to see if there is a convenient hole or slit through which a lead-in can be taken fairly directly to the spot where the set is to be kept. In a bungalow with overhanging gable or eaves, it might be found that the lead can be taken through the comparatively thin boarding directly to the top corner of the window frame, where it is invisible from outside. A similar plan might be workable in a two-storey house, although in that case special precautions might have to be taken with the lead-in. Where this is but a few feet long, as in a bungalow, it can be of the same wire as the aerial proper—preferably fairly stout rubber-covered flex. But if the lead-in must be 20ft. or more it is usually desirable to support it on insulated brackets projecting from the wall of the house.

Screened Down-lead

Of course, it is not unusual to see an insulated lead-in of this kind running down against the wall, but this is not to be recommended for at least two reasons. One is that the capacity to earth might be sufficiently high to result in an appreciable loss of signal strength, especially on short waves, and another is that it might be so arranged that it runs parallel to an electric-supply lead or conduit pipe, so that interference from that source might be troublesome. A far better system is to use a screened down-lead, which can safely be fixed close against the wall without any ill-effects resulting. When new, the aluminium braid forming the screen might be considered too noticeable, but in that case it can be given a light coat of cellulose enamel to match the colour of the wall. The enamel should be applied before the aerial is put up, and can easily be done if the lead is stretched across the garden. Another idea is to take the screened lead behind a fallpipe from the gutter, so that it is completely hidden.

Impedance Matching

Provided that the screened lead does not exceed 20ft. in length the loss of signal strength due to the screen should not be great, but better results can be obtained by using the lead in conjunction with a pair of impedance-matching transformers, such as those of firms like Ward and Goldstone and Belling-Lee. These transformers are generally supplied in conjunction with the aerial kit; one of them is connected between the aerial and the lead-in, and the other between the lead-in and the set. The first transformer steps down the signal voltage and the second gives a step-up effect.



A convenient arrangement, where a screened down-lead is passed from the inside aerial beneath the eaves to a lead-in tube in the ventilating grate. An insulated lead is taken from there through the floorboards and to the set.

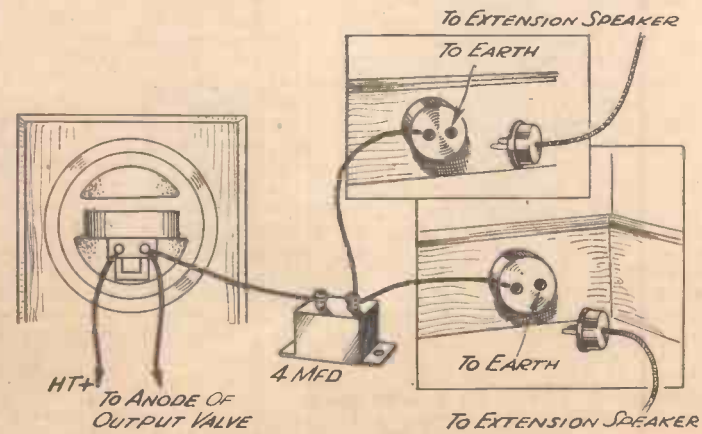
When using a screened lead-in it is preferable to have the aerial proper as long as possible, up to 50ft. or so, because the lead-in does not help in picking up any signals, as is the case with an unscreened lead. In the average house a sufficient length of aerial can be obtained by running the wire along three sides of the roof, but it is not often satisfactory to take it along the fourth side, for it is then inclined to act as a "closed loop," having peculiar directional properties. In every case, the aim should be to have the aerial as high as possible, and it can be fixed fairly high up the rafters by means of staples, or even by means of loops of string.

In many cases, of course, it is possible to obtain sufficiently-good signal pick-up by using a wire or special "tape aerial" running round the picture moulding of a ground floor room, but the elevated aerial is generally better when it can conveniently be arranged. As indoor aerials of the former type have frequently been dealt with before in these pages, there is no need to make further reference to them here.

Suggestions for the Earth

The earth lead is just as important as the aerial, but the lead-in should be much shorter. When the set is near to a window it is rarely difficult to take a wire through the frame to a plate, copper spike or chemical earth buried in the garden. The position is not as straightforward, however, when the receiver is on a corner at the opposite side of the room to the window. One method which can often be applied in a case such as this is to run the lead through a hole in the floorboards and through a ventilator in the wall between the floor level and ground level. If the position of the ventilating grate is first noted outside the house, it might be found that it is fairly near to the set. If that is so, its position on the inside can be found by measurement along the walls, so that a hole can be made opposite to it. After that it is necessary only to thread the earth lead through the hole in the floorboards and to "fish" it through the grate with a length of stiff, hooked wire. This is an idea which is probably new to most readers, but it has been used with success.

Very often the same system can be adopted with regard to the aerial lead-in. If this is passed through the gap beneath the eaves, or through the covering board when necessary, it can be taken down to the grate and either passed through this or attached to a lead-in tube wedged in



How a number of extension speakers can be fed by single wires.

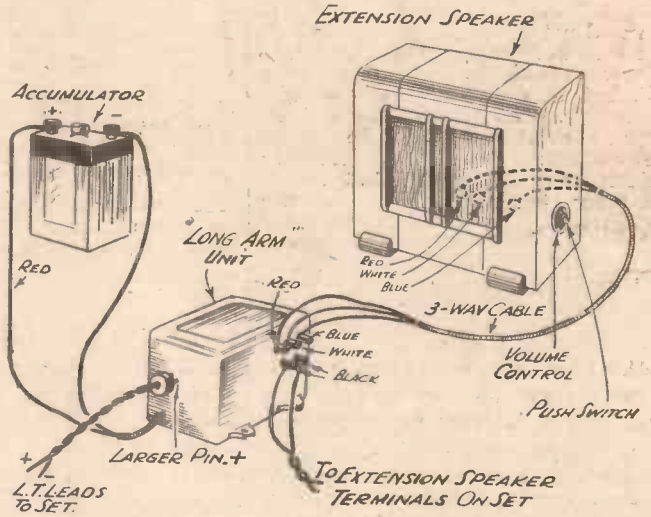
one of the holes. It is obviously impossible to give definite instructions, because the actual procedure is very largely dependent upon the particular design of house. Should the grate be removable, it might be thought worth while to mount an insulated terminal strip on it, so that this can be used to take both aerial and earth connections. If this method is adopted it is important that a cowl should be fitted over the end of the lead-in to keep rain off the terminals, for that would cause serious leakage.

Built-in Down-lead

When a new house is being built it is worth while to instruct the builder to run a length of screened lead-in from the loft to the position in which the set will be used, the lead-in being embedded in the plaster. Another idea is to have a length of electric conduit piping similarly placed, so that a lead can easily be run through it. Similar arrangements can be made for the earth lead, whilst the cable might be duplicated, or even triplicated, if the set will be used in different rooms. Using this arrangement more than one set can be used at the same time by employing the impedance-matching transformers mentioned above. Another idea is to have a normal aerial connected into one room by the method described, and to have a short-wave aerial connected to the other room. The short-wave-aerial lead-in might well consist of a twin shielded wire, when the aerial should consist of two lengths, about 15ft. (20ft. if possible) each, of wire arranged in a line, with one connected to each of the twin down-leads. If these are made to run diagonally across the part-rectangle of the broadcast aerial there should be no serious interference between the two. The short-wave aerial would, of course, be used as a doublet.

Extension Speakers

With regard to the extension speakers, there are several alternative methods of connection, which have previously been described in these pages. The simplest is to use the output transformer of the speaker in the set as an output choke, and to take a lead from that end joined to the anode of the output valve to one terminal of a 4-mfd. fixed condenser; single leads can be taken from the other terminal of the condenser to the various speaker points. One of these leads is joined to each speaker, the other speaker terminal being connected to a convenient "local" earthing point. Ordinary insulated flex can be used for speaker extensions up to 25ft. or so, but for greater distances it is better to use lead-covered cable, and to earth the lead casing. The lead can usually be run round the picture moulding or skirting board, and any convenient type of two-point socket can be mounted on the skirting board to take a corresponding plug attached to the speaker leads.



Connections for the W/B "Long-Arm" used in conjunction with a W/B extension speaker in order to obtain remote volume and on-off control. A battery set is assumed, but the device can be used with a mains receiver.

Remote Control

Proper extension speakers should be used so that correct matching can be obtained, and it is a valuable refinement to use a speaker fitted with a built-in volume control—the W/B is a well-known example. An additional refinement is to have a remote receiver on-off control, such as is provided by the W/B "Long-Arm" device. This is mounted near the set and is connected to the speaker by three leads, as shown in an accompanying illustration. The connections given assume the use of a W/B speaker with combined push switch and volume control, but this latter component can be bought separately and connected to an existing speaker. The "Long-Arm," incidentally, comprises a sensitive relay and a small internal battery for its operation; it acts as a remote-control switch, and can be used with either battery or mains receiver. The three-way cable required for its connection can be obtained from any good dealer. In using this modern and convenient system it becomes necessary to employ three-point wall sockets and plugs, but these are just as easily obtainable as those of the two-contact type.

ITEMS OF INTEREST

Mr. W. J. Brown's New Appointment

MR. W. J. BROWN, B.Sc., A.M.I.E.E., has recently resigned from Electrical and Musical Industries, Ltd., to take an appointment as Director of Engineering with Philco Radio and Television Corporation of Great Britain, Ltd. Mr. W. J. Brown is well known as a pioneer of radio broadcasting. After leaving Manchester University, where he took a 1st Class Honours degree, he spent a short time at the National Physical Laboratory and then joined the Research Department of the Metropolitan Vickers Electrical Co., Ltd. At the inception of broadcasting in England he assumed technical control of the Metropolitan Vickers broadcasting station 2ZY and later took charge of the company's radio research section.

In 1925 he established the first reception and re-transmission in England of short-wave transatlantic broadcasts from Westinghouse station KDKA on 100 metres. In 1926 he was engaged in further pioneer work in establishing methods of communication on a wavelength of 2 metres, and he originated numerous patents in this field.

Those who know Mr. Brown intimately have remarked upon his versatility as an engineer; at the same time as the 2-metre experiments he was engaged in the development and experimental construction of high-power steel tank mercury arc rectifiers, handling hundreds of kilowatts, for electric railway supply. (Prior to this he had also been engaged in the design and manufacture of radio receiving valves.)

In 1929 upon the entry of the Gramophone Co., Ltd., into the radio industry, he joined that Company and equipped its factories at Hayes and Dagenham with test equipment to ensure the manufacture of the highest grade of radio and electrical merchandise. Of recent years he has been well known as the Chief Designs Engineer of that company, in which capacity he has been responsible for the development of a great variety of successful designs, including, for instance, the well-known range of 4/5 valve superhet models, the 15-valve High Fidelity Radiogramophone and various all-wave models. He read a paper before the Institution of Electrical Engineers in May, 1935, on the High Fidelity Radiogramophone which attracted considerable interest, and incidentally gained the award of a special premium. He was recently invited to join the Wireless Section Committee of that Institution.

Mr. Brown has, at various stages of his career, travelled extensively in America and elsewhere, and he is known on both sides of the Atlantic as a leading authority on radio design and manufacture.

Cobb Lectures at the R.S.A.

THREE lectures on Some Problems of Atmospheric Physics, by E. V. Appleton, M.A., LL.D., D.Sc., F.R.S., will be given at the Royal Society of Arts, John Street, Adelphi, London, W.C.2, on Monday evenings, November 16th, 23rd and 30th at 8 o'clock. The lectures will be illustrated by lantern slides.

Whiteley Electrical Working Overtime

WE understand that Whiteley Electrical Radio Co., Ltd., the makers of the popular Stentorian speakers, have been on night work at their factory since the second day of the Exhibition at Olympia and are just about catching up with orders in hand. They have had a record output during the last three weeks, and from this we gather that the days of the speaker manufacturer are not numbered yet.

On Your Wavelength

By THERMION

Lack of Skilled Labour

I MENTIONED the other week that one could not be surprised at unrest among artisans and craftsmen, whilst people without any musical education or training could command £1,000 a year by making weird noises on comic instruments. A reader asks me, what has this got to do with dance music? Everything. I have witnessed in my brief stay on this earth enormous changes in the public outlook. Before the War the apprenticeship system ensured that there was adequate supplies of skilled labour, but mass production has been responsible for the creation of machinery which has destroyed the hand which made it. To-day you cannot get skilled labour for money or the other stuff. The incentive for the youth of to-day to convert himself into a skilled man has gone. Most youths wallow about in blind alley jobs, hoping to be able to get a man's wage for boy's work. One of the causes of this lack of incentive has been the changes in public tastes in entertainment. Jazz music is now at a premium, and those who can write the merest doggerel can earn high salaries, and so-called instrumentalists can make easy money for a few hours' work a week. I say that such a state of affairs destroys perspective, and there is no wonder that people are refusing to go through the rigours of an apprenticeship of at least five years' duration in order to qualify for a salary of a few pounds per week.

The "Situations Vacant" columns of our daily papers are packed each day with requests for skilled labour. Firms cannot get it. When all the old craftsmen have died, craftsmanship may come back into its own and command the salary which the skilled deserve. The man who makes a saxophone can usually play it, but he does not get £1,000 a year.

The reader who inspired this paragraph questions my knowledge of this subject. He says that he is a leader of a dance band, and I therefore question his ability to question me. I suppose I must be a few years older than he. I have some musical attainments. I served an apprenticeship. I have knocked around in a variety of jobs, and I have never been sacked! At my ripe years if I have not mellow judgment, who has?

But the real point is that no word of mine is going to do an iota to further this fantastic state of affairs. Raving lunatics waggling a stick and calling themselves conductors and basking in public adulation are responsible in no small measure for destroying desire to study, and to learn. The world, I suppose, will become sane one day. The radio trade is a good example of an industry which has succeeded in spite of itself. There are very few skilled people in the radio trade, for most of them started in it as men and have learned while they earned. The trade finds it difficult to obtain apprentices, for the reasons already given. In this respect it has created an instrument which is operating against its own interests.

Dealers and Television

MONDAY, November 2nd, was an historic occasion, for on that day the official public television service was inaugurated after nearly three years of juggling about. History will start from that date, and we may expect progress to quicken now that the service is going out to the public. The transmissions are extraordinarily good, and reception is excellent; there is none of the flicker which we had come to regard as inseparable from television. The public may witness demonstrations at Waterloo, and several dealers have installed television receivers. An enterprising dealer at Edgware was one of the first to introduce television in the London suburbs, whilst Thomas Wallis and Co., of Holborn Circus, have also installed television equipment. Kennards, of Croydon, have bought a receiver, and are giving demonstrations daily. This is bound to result in public demand, and public demand must eventually mean cheaper television receivers.

It seems a far cry to the days when I regularly looked in on a 30-line cathode-ray tube receiver, but actually it is about two years ago. The new high-definition television, of whatever make, is in an advanced state, and I portend that it will change the entire technique of radio.

A Suggestion?

T. R. D., of County Antrim, writes:—

"Dear Thermion, — This effort should be addressed to the P.M.G., who most probably would never read it. No, I am not suffering from an inferiority complex, but happen to have had some correspondence with Government offices before. They have a nice little stock of postcards to acknowledge letters received. Something about 'receiving attention.' Then silence.

"The fact that I have to pay 10s. a year annoys me, especially when we hear there are so many millions of pirates sucking in the sweet music from the air and paying nowt to the G.P.O.

"Why not try (the Government, I mean) the same stunt as the gun licence? A man cannot buy a gun or ammunition without producing his licence. Ditto for a set or valves, say I. Oh, yes, he could build a crystal or magnetic detector set and so dodge the valve issue. I have not heard of any sportsman using bow and arrow to dodge the ammunition column.

"Now suppose the P.O. were closed, or in a remote part of town. In this case the trader could issue a temporary receipt for 10s., which

must be handed over to the P.O. next business day.

"The extra revenue could be used to hunt down crooners."

Component Shortage

WHAT is wrong with you radio dealers? There was a time when you flirted with, and even courted the home constructor. To-day when he calls upon you to buy a variable condenser, a set of coils, or a potentiometer, you shake your head sadly and imagine the poor fellow has gone wrong in the head. You wistfully cast a sideways glance at your large stocks of commercial receivers, and do your best to sell one of them. This is all wrong. Unfortunately the conditions are very little different when the constructor decides to buy direct. He is often kept waiting for weeks. I understand that there has been a shortage of coils for the Limit Receiver recently described in this journal. It really is too bad. I saw a letter of bitter complaint from a reader the other day who said that he had the receiver complete except for the coils, and the potentiometer. Neither of the firms specified could give a delivery date. Messrs. Peto-Scott Co., Ltd., could not supply because of this, and the reader had been kept waiting for over three weeks. Under the circumstances I can sympathise with his sentiments when he says that he proposes to patronise one of the junk shops; he may not obtain such good results, but he will have saved some cash and retained his temper. Perhaps some of the manufacturers can tell me the reasons for these persistent delays, after assuring designers that adequate stocks are available. If you are a fellow sufferer, write to your Uncle Thermion and tell him about it.

Spectacles for Television

THE disadvantage, if you call it a disadvantage, of the television receiver is its bulk, which would dwarf the average small sitting-room. Whilst we are using large tubes there is no satisfactory remedy, for even when the tube is disposed vertically, and the image viewed in a reflecting mirror in the lid, the apparatus is still large. I am interested, therefore, to see that an inventor has patented (No. 451980) a device which would enable a small tube to be used—one which, in fact, would have a screen only 2in. square. It could be held either in the hand or even fitted on the head like a pair of spectacles. A magnifying lens would be included in the eyepiece to increase the size of the picture; thus, the television receiver itself could be of very small proportions, for it would merely have to house the time-base and mains apparatus. Flexible leads would connect to these eyepieces. A pair of headphones would, of course, be used to provide the sound; hence, if stereoscopic television is developed, a pair of binocular type eyepieces could be used producing the solid effect. This strikes me as being a brainy wheeze and one which is not cranky, for it is practicable.

Modern L.F. Amplifiers

MOST of the 1937 superhets of the three and four valve popular-price type employ an L.F. amplifier which would have been considered ridiculous a few years ago. This employs a diode rectifier resistance-capacity coupled to the output valve. With the old type of triode or low-amplification pentode in use the output obtainable would be too low, but the use of a modern high-efficiency pentode ensures adequate volume for the average sized room. Harmonic distortion is to be expected with this arrangement, of course, but the absence of an L.F. transformer and the use of a very small number of L.F. components reduces component distortion to a minimum. It is, therefore, a circuit that should prove popular with the home constructor; an amplifier of this type is easy to assemble and provides good quality of reproduction, although not quite as good as that obtainable from a large triode or a push-pull arrangement, of course.

Tutor Three Fault

A READER submitted a Tutor Three to us for test last week, complaining that the reaction condenser would not function. The condenser was found to be in order, but when the ohmmeter was connected across the reaction winding a short-circuit was indicated. The coil unit was removed from the chassis and inspected, but no visible short-circuit could be found. The ohmmeter test was again applied, and the winding now registered the correct resistance of seven ohms. Immediately the coil unit was replaced and secured to the chassis the fault reappeared, however. Eventually it was found that the coil chassis was being slightly distorted when tightened to the receiver chassis and this caused the reaction winding tag of the coil to touch the coil chassis. Readers constructing this set should therefore ascertain that there is sufficient clearance between the tags and the coil chassis before securing the latter to the baseboard.

Limit All-wave Four Coils

SOME readers have queried the terminal marking on the Wearite coils supplied with the Limit Four kit of parts. They claim that their coils are not marked in the same way as those shown on the blueprint. After investigation, however, it has been found in all cases that the coils have been in order, but have been reversed on the spindle. The terminal letters do not, therefore, appear in the same position as shown on the blueprint. The remedy is to remove the spindle and reverse the coil.

Interference-free Aerials

I HAVE recently taken the opportunity of testing and comparing a number of the new types of anti-interference aerial systems. The results have been interesting and illuminating. All of the aerials I tested—both as inside and outside types—proved remarkably successful in eliminating interference of a "local" character. Contrary to expectations, I found that some of them actually gave increased signal strength, presumably due to the more accurate matching provided by the H.F. transformers incorporated. This suggested to me that in many cases the matching between the aerial-earth system and the input tuning circuit of the receiver is far from correct.

These special aerials should, and I think will, come into more general use, especially if the manufacturers can produce them rather more cheaply than at present. I am surprised that more listeners do not take advantage of these special aerials, even though legislation will eventually come into force to prohibit the use of electrical apparatus which radiates interference.

Television Queue in Kingsway

THE first television programme broadcast on Monday, November 2, was demonstrated by the G.E.C. at their offices in Kingsway, W.C.2. So many members of the public wished to see the demonstration that some time before 3 p.m., when the broadcast began, a large queue stretched down Kingsway. Public demonstrations are being given daily (at 3 and 9 p.m.) at the G.E.C. offices until further notice.

The Company tells me that it has already sold a number of sets and is able to offer immediate delivery.

A PAGE OF PRACTICAL HINTS

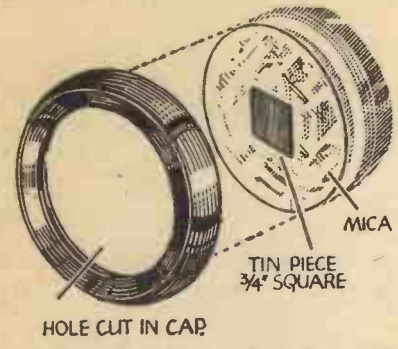
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Simple Microphone

THE following dodge might interest readers who have constructed a microphone from a telephone earpiece. Remove the stalloy diaphragm and in place of this, cut a circle of mica. Next cut out a



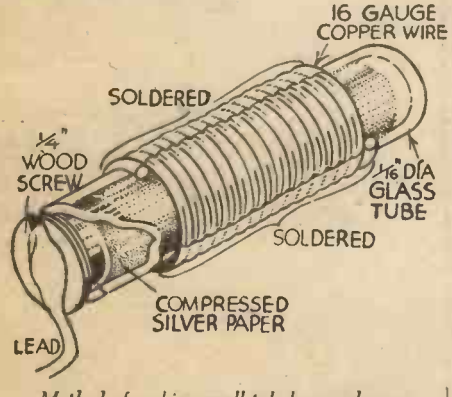
An improved microphone made from a telephone earpiece.

piece of tin or tinfoil (not aluminium), about ¾in. square, and glue this to the centre of the mica. The middle of the cap should be removed with a fretsaw to within ⅛in. from the flange. The mica diaphragm must then be replaced with the mica next to the magnets, as this gives a deeper and improved tone.—A. SMITH (St. Leonards-on-Sea).

Small Condenser Construction

WHILST experimenting with small condensers and resistances, I hit upon the idea illustrated. It will be seen that the only requirements for the construction of a number of condensers of different values are as follows:—

(1) A few short lengths of different gauge bare copper wire.



Method of making small tubular condensers.

(2) A length of glass tubing (internal diameter, ⅛ in. approx.).

(3) Some silver paper, and a few ¼in. wood screws.

When the silver paper has been compressed—by the aid of a nail or strand of 16-gauge wire—heat the tube and silver paper until red hot, care being taken to see that it does not bend or warp, allow it to cool and complete by winding the wire and soldering same—to short all the turns together. The screw constitutes one method of contacting with the solidified silver paper.

Great care should be exercised when compressing the paper to ensure that no cut fingers are sustained through slipping.—W. R. HOBBS (Ilford).

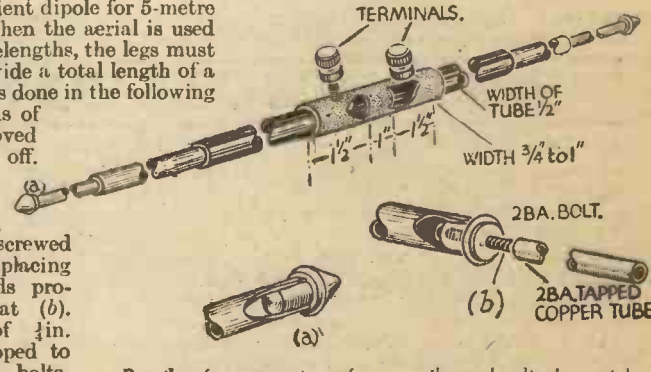
THAT DODGE OF YOURS!

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

A Telescopic Dipole Aerial

THE accompanying sketches give details of an efficient telescopic dipole aerial which I have recently constructed, and which should prove of interest to other ultra-short-wave enthusiasts. The aerial consists of two camera tripod legs fixed in opposite ends of an insulating rod. This rod is a 4in. length of ¾in. to 1in. fibre or ebonite. A hole ¼in. diam. and 1½in. deep is drilled in each end of it, and the sides of these holes are drilled and tapped to take two 4B.A. terminals which serve the double purpose of connectors and clamping screws for the legs, from the ends of which the paint must be removed.

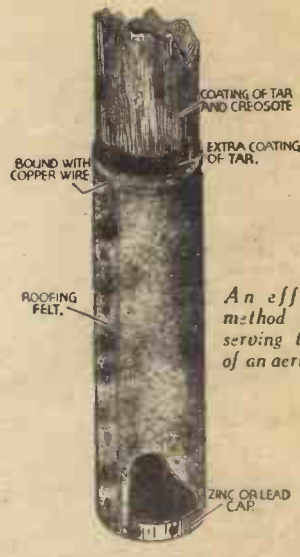
This makes an efficient dipole for 5-metre fieldwork, etc., but when the aerial is used for the television wavelengths, the legs must be lengthened, to provide a total length of a little over 10ft. This is done in the following way: The spiked ends of the legs (*a*) are removed and the spikes cut off. The remainder of the ends are drilled and tapped for 2B.A. bolts, which are screwed in so that on replacing the ends, the threads project, as indicated at (*b*). Suitable lengths of ¼in. copper tubing are tapped to screw on to the 2B.A. bolts, and the result is a dipole which has proved very efficient on the television sound transmissions. It has the advantages of portability and cheapness, and it can be tuned to any wavelength by adjusting its length.—A. D. HASTINGS (Highgate).



Details of construction of an easily-made dipole aerial.

Preserving an Aerial Mast

AN aerial mast embedded in concrete is, in a high wind, extremely likely to snap at the point where it meets the concrete, owing to there being no "give" to counteract the swaying of the mast. If, however, the mast is placed directly in the soil there is ample "give," but the base will soon rot unless it is adequately protected from moisture. My 30ft. mast has been up



An efficient method of preserving the base of an aerial mast.

for several years, and is still as good as new, owing to protecting it by the following method:—

The mast should be treated with at least two coats of tar and creosote—1 part tar to 3 parts creosote mixed together. The base should be given an extra coat of tar, and whilst the tar is still wet about a yard and a half of roofing felt should be wound around and tacked into place with the special galvanised nails supplied for use with roofing felt. Apply the tar thickly to the inside of the felt as it is wound. Finish off by tacking the edge and binding the top edge of felt with a few turns of copper wire to prevent rain running down between the felt and mast. The end of the mast should have a piece of zinc or lead tacked on to form a cap, as shown in the diagram.—R. G. HEDGES (Downend, Nr. Bristol).

Cosmocord Radiogram Units

Details of Some Useful Accessories for the Reproduction of Gramophone Records

MANY listeners already own a standard broadcast receiver in which no provision is made for the reproduction of gramophone records. It should be remembered that there is not the slightest difficulty in incorporating the pick-up in the standard wireless receiver, and it is not even necessary to alter the wiring of the receiver in order to do so. A simple adapter may be included merely by removing a valve from the valveholder, plugging the adapter into the valveholder and then replacing the valve in the adapter. Terminals on the latter device enable the pick-up to be connected, and to prevent the radio signals from being heard the set may simply be detuned. This is, of course, the cheapest and simplest modification, and to keep down the cost a simple, cheap portable gramophone of the acoustic type may be employed, with the ordinary soundbox replaced by a simple pick-up. A unit of this nature may be obtained for 5s. and is illustrated in Fig. 1. This Cosmocord pick-up is fitted with a tone-arm adapter with clamping screw, which enables it to be fitted to practically any standard tone arm, and a 24in. length of silk connecting-cord is fitted. The response curve of this little unit is remarkably good.

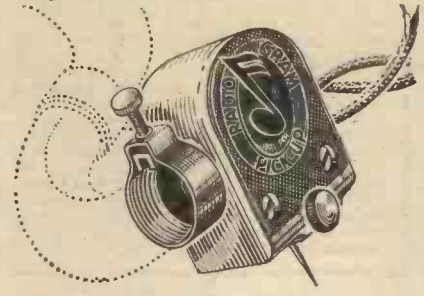


Fig. 1.—An inexpensive Pick-up from the Cosmocord range.

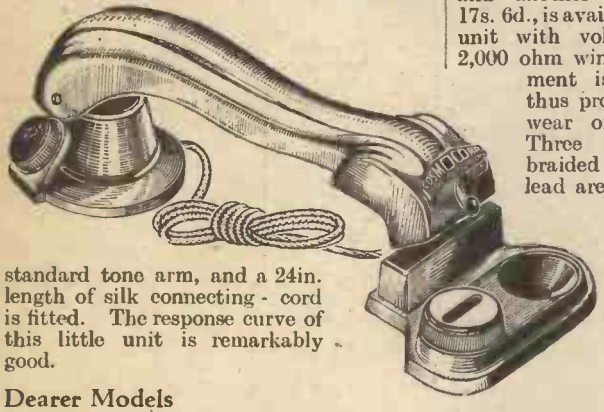


Fig. 2.—(left) The 25s. De Luxe Pick-up, and Fig. 3.—(right) The Ad-a-gram Playing Desk.

Dearer Models

Where an attempt is being made to erect a more substantial type of radiogram, a good electric motor should be obtained, and the receiver converted into the combined apparatus. Then a better type of pick-up, preferably one incorporating a volume control should be fitted, and there are four other models in the Cosmocord range. Two single pick-up heads, similar to Fig. 1, are obtainable at 10s. and 15s. 6d. and another model, No. 176, costing 17s. 6d., is available as a ready-built bakelite unit with volume control. This has a 2,000 ohm winding and the needle movement is very free, thus preventing undue wear on the record. Three feet of silk braided connecting-lead are provided, and the rear part of the pick-up carrier-arm is provided with a substantial base for attachment to the motor-board. In the De Luxe class there is the model shown in Fig. 2 which is sold at 25s., complete with a support upon which are mounted two needle cups. This particular model has a 6,000-ohm winding, and a unique method of reed suspension is employed. This dispenses with the usual type of rubber suspension system and provides a perfectly free movement for the armature in all directions other than up and down. This results in a more faithful reproduction and freedom from "chatter."

Playing Desk

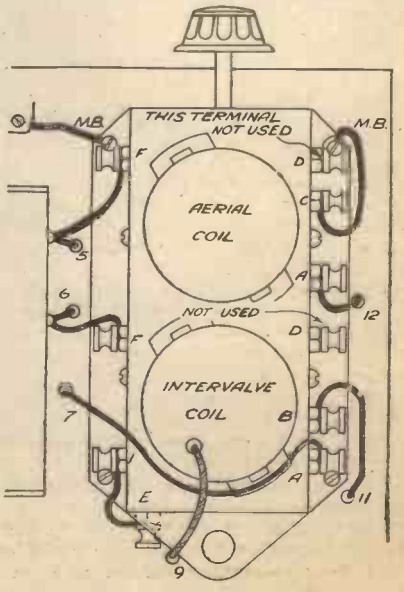
Where it is not desired to build a new cabinet or a standard table receiver is to be used for radio and gramophone reproduction, one of the neat Cosmocord playing desks may be used to solve the difficulty of accommodating the motor and pick-up. Model 84 is illustrated in Fig. 3, from which it will be seen that this consists of a neat shallow cabinet with drop front. When this is lowered the table carrying the motor is drawn forward to enable the record to be placed into position and the needle to be placed in the pick-up. The front may then be closed to exclude surface noise. The receiver may be stood upon this cabinet and will form a neat and compact radiogram, entirely self-contained. To accommodate the record-storage problem a further model is manufactured by the Cosmocord company, in which the lower part of the cabinet (which resembles the standard radiogram cabinet) is used as a storage cupboard, and the playing desk forms the upper portion, upon which the usual table model radio receiver may be placed.

THE LIMIT ALL-WAVE 4

IN our issue dated September 26th last we described the construction of a new battery all-wave receiver, and with that issue a free blueprint was presented. It appears that there is some difficulty in obtaining the coils which were specified for this receiver, and in order to assist those constructors who are ready to proceed with construction except for the coils, we have carried out some tests with a view to finding suitable coils as alternatives. As a result of these tests we have decided that the new Varley coils, type BP.114, will form excellent substitutes, and the arrangement of the terminals on this unit is just right for the Limit receiver without calling for the necessity of any alteration to the instructions which have already been given, or for the drilling of the chassis.

It will be noted that the earth connections from the ganged tuning condenser and from point C and point I are made to the metallised chassis surface.

The accompanying illustration shows the coil unit in position on the chassis of the Limit, and the reference numbers to the inter-wiring holes on the chassis are numbered as on the blueprint, and are also positioned exactly as in the original diagram. A separate terminal is, however, mounted on the base of the Varley unit and is marked E, signifying that it is an earthing terminal. This is in direct contact with the metal framework of the coil unit, and is internally connected to one end of certain of the coils inside. Thus, it is essential that a sound earth connection be made in order to maintain high efficiency in the tuning circuits via the chassis. The ends of the wires from these points should be well cleaned and turned beneath the flange of the coil unit before this is screwed tightly down. Finally, a separate wire may be joined between the earthing terminal on the coil unit and the earthing socket on the rear of the chassis.



Batteries: Their Design and Working Principles

The Exide "Hycap" accumulator ready for use and with the plates withdrawn.

A Drydex standard 120-volts H.T. battery.

A Practical Article for Beginners Dealing with the Fundamentals of Various Types of Primary and Secondary Batteries and Their Maintenance

ALTHOUGH a considerable amount has already been written on the subject of battery construction and maintenance, it is refreshing to one's memory to review facts and figures concerning the types in use to-day, and this, of course, necessitates an understanding of the fundamentals. One must therefore consider the earlier experiments in cell construction, and on these lines we will commence with primary cells.

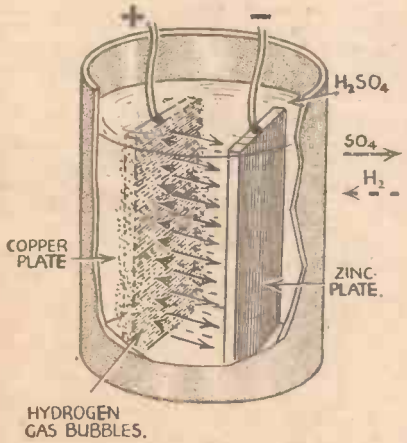


Fig. 1.—The common copper-zinc cell.

The Copper-zinc Cell

These cells constitute the simplest form of battery, and consist of two plates, copper and zinc, immersed in a dilute solution of sulphuric acid, the chemical formula for this being H_2SO_4.

It will be seen that on the immersion of the two plates, an action takes place which causes the electrolyte to be split up into two parts, namely H_2 and SO_4. The SO_4 radical travels to the zinc plate and, combining with this plate, forms zinc sulphate, which, however, dissolves in the electrolyte. The hydrogen gas, or H_2, travels to the copper plate, round which it forms bubbles: this action is clearly shown in Fig. 1, and on referring to this illustration it will be noticed that the current caused through this chemical action flows from the zinc to the copper, internally, whilst externally from copper to zinc. The copper plate then is positive and the other negative.

Owing to the screening of the copper plate by the hydrogen gas bubbles, depreciation in the strength of the current takes place, but, apart from the effective area of the copper plate being thus screened, a further detrimental effect is caused through a creative tendency on the part of the H_2 to cause a reversed polarity (opposite current) by acting with the copper, and in order to combat this deficiency, a depolariser is necessary, and this is attained by oxidisation of the gases; in other words, the H_2 and SO_4 gases were combined to form water—H_2O—and many substances in use to-day, acting as reagents, as they are technically termed, give rise to the great number of different types of cells on the market, since, as is often the case, the cells are designed to suit the active properties of the reagents. However, the average E.M.F. (electromotive force) of the copper-zinc cell is 1.08 volts.

The life and general characteristics of all cells is governed, not only by the size of the plates, but by the quality of the electrolyte, and this will be made more apparent later in this article.

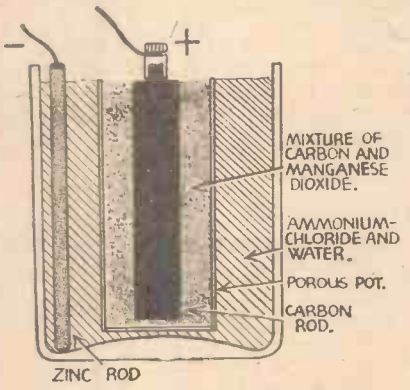


Fig. 2.—Section of a Leclanche cell.

Leclanche Cells

The next form of cell, and probably the commonest, is the "Leclanche," a diagrammatical representation of which is given in Fig. 2, a pictorial view of the type in use to-day being shown in Fig. 3.

As will be seen, this cell consists of a carbon rod centred in an unglazed porcelain pot, and packed with compounds of manganese-dioxide and powdered carbon, the reagent in this case being the manganese-dioxide. The other plate is usually in the form of a zinc rod, as illustrated, while the electrolyte consists of a solution of ammonium chloride crystals in water, the common name for the ammonium being sal-ammoniac.

Again there is a detrimental effect, and in this case it is due to the slow action of the depolariser owing to its being in solid form. Consequently, this type of cell is only suitable for small or intermittent current loads, and the average E.M.F. is just under 1.5 volts.

There are a number of different types of "Leclanche" cells, and these include the well-known dry version. The construction is clearly depicted in Fig. 4. The life of these cells, however, is somewhat small, and, as previously mentioned, is governed by the capacity and quality of the electrolyte. It will be noticed that in the case of Leclanche cells the carbon is positive and the zinc negative.

Another interesting point concerning these different types of Leclanche cell is with regard to the question of climatic conditions to which some batteries are subjected. In the tropics, for example, precautions are necessary against deterioration through stocking for long periods, which condition would arise with ordinary cells.

The "inert" type, therefore, was designed so that, when necessary, the simple expedient of adding water (see Fig. 5) assured a ready supply of current, since an "inert" cell is naturally not active unless the water is added.

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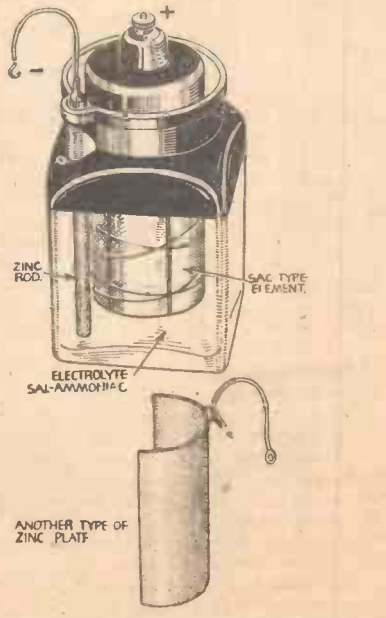


Fig. 3.—A popular type of Leclanche cell, and an alternative form of zinc plate.

BATTERIES: THEIR DESIGN AND WORKING PRINCIPLES

(*Continued from previous page*)

Secondary Cells

The next battery to be dealt with comes under the category of secondary cells, and this is the accumulator, which is the most widely used cell.

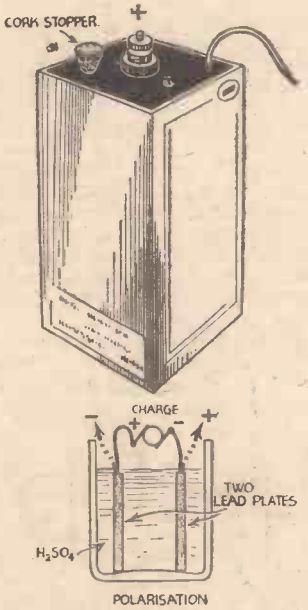
Before entering into a description of the accumulator in use to-day, it will be as well to review the earlier types of cell construction dealing firstly with the "Plante" type.

The Plante consisted of two lead plates immersed in a dilute solution of H_2SO_4 (see Fig. 6). Now in those early days it was discovered that when charged, a reversed current was registered, and this was due to the surface of the positive plate becoming changed to lead peroxide, and in this manner forming the active material with the obvious result. In this case the normal positive was that terminal connected with the positive pole of the charge, as shown.

The "Plante" was then superseded by the "Faure" cell, and a brief analysis will help the reader to grasp the fundamentals of the modern accumulator.

The Faure Cell

The plates of the Faure cell (Fig. 7) are constructed as grids, and usually made of an alloy called lead antimony, the strength and rigidity being attributed to the antimony, and, as there are varying degrees of proportions so far as the alloy is concerned, it will suffice to quote 96 per cent. lead to 4 per cent. antimony as the more usual proportions.



Figs. 5 and 6.—An "inert" cell, and a "Plante" cell.

The active material is applied to the grids in the form of a paste, and for the positive plate a compound of red lead oxide with sulphuric acid is used, and for the negative plate litharge and sulphuric acid. The reason for these combinations being that oxide of red lead has great oxygen properties, whilst the litharge is rich in lead, and is in fact a semi-vitrified protoxide of lead.

On charging the Faure cell the litharge becomes "spongy" lead while the red lead is changed to lead peroxide as in the case of the Plante cell, and, owing to the very much slower time taken to "form," the Faure cell complies more with manufacturing demands.

Charging Conditions

The chemical formula concerning the charging and discharging conditions of an accumulator is now, more or less, common knowledge, but for the benefit of readers who are unacquainted with it the equation is given below :—

$$\underset{\text{Plate}}{Pb} \mid \underset{\text{Electrolyte}}{+2H_2SO_4+} \mid \underset{\text{Plate}}{PbO_2} \underset{\text{Charged.}}{=} \underset{\text{Plate}}{PbSO_4} \mid \underset{\text{Electrolyte}}{+2HO_2+} \mid \underset{\text{Plate}}{PbSO_4} \quad (\text{Discharged.})$$

It will be seen that on discharging, the sulphuric acid H_2SO_4 becomes partially

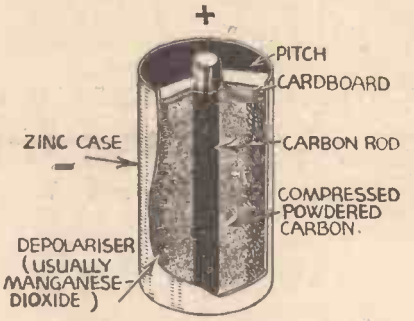


Fig. 4.—A dry Leclanche cell.

split up, as previously mentioned, and the active material on both plates is changed to lead sulphate. However, owing to the nature of this sulphate, it is easily converted back again to lead and lead peroxide on charging, and since the sulphate forms on the plates, it can readily be appreciated that should the cell be left in a discharged condition for a considerable length of time, the sulphation will become acute, and very difficult to remove owing to its hardness.

Assuming that we have an accumulator in this state—the sulphation appearing as a white deposit—owing to this deposit partially screening the active material of the plates, as in the case of the hydrogen gas in the primary cells, the capacity is naturally lowered, and had the cell been carefully watched and checked on discharge as well as charge (the voltage should never be allowed to drop below 1.8), this condition would never have arisen.

Maintenance

This brings us to some important features regarding accumulator maintenance and care, which should be noted by the serious amateur.

Firstly, the capacity which is referred to above is calculated by multiplying the current in amperes by the number of hours the accumulator gives this current, and this product is known as the ampere-hour capacity.

The above calculation is, however, governed by the number and area of the plates, the usual practice being to incorporate one extra positive in the number incorporated, since it has been proved that the outer negative plate is less liable to buckle than the positive outer plate.

At low rates of discharge the ampere-hour capacity (A.H.) becomes greater than when on rapid discharge, and is then governed by this discharge rate. In no way should an accumulator be over-charged or discharged; the specific rate is always quoted on a reliable manufactured product, and is calculated usually as one-tenth of the capacity.

A few important points concerning the care of these cells are as follows:

1. There should be no sediment in the sulphuric acid or water (distilled water).
2. See that the acid is up to proper level.
3. The specific gravity of the electrolyte must be consistent with that given by the manufacturers.
4. It is always advisable to incorporate a meter in the charging circuit, to ensure the correct rates of charge. The discharge rate should also be checked and the voltage never be allowed to fall below 1.8 per cell.
5. Avoid short-circuiting plates either externally or internally, due to sediment.
6. Give a charge at least once every two to three months, even though the accumulator is not in use.
7. Subdue sulphation by effecting slow charge and discharge.

Reference to the accompanying table will show the various voltages attained by different cell constructions, and it will be noticed that the accumulator has the highest E.M.F.

COMPARATIVE VOLTAGES

Cell.	Plate Combination.	Electrolyte.	approx. E.M.F.
Daniell	Zinc / Copper	Sulphuric acid H_2SO_4 (dilute)	1.08v
Leclanche	Zinc / Carbon	Ammonium Chloride (depolariser Manganese-Dioxide)	1.48v
Dry	Zinc / Carbon	H_2SO_4 (dilute)	1.7v
Grave	Zinc / Platinum	Sulphuric acid / Nitric acid	1.95v
Modern Accumulator	See text	H_2SO_4 (dilute)	2v

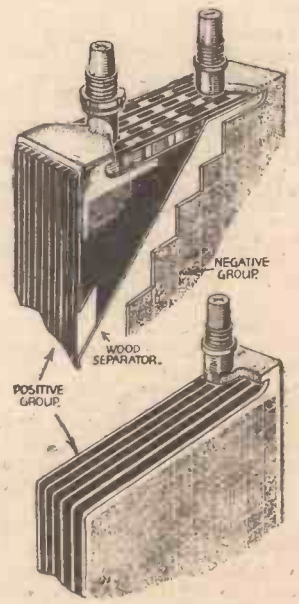


Fig. 7.—Showing the construction of the Faure cell.

In a recent article in PRACTICAL AND AMATEUR WIRELESS comment was made on the attention to the accumulator so far as external conditions are concerned, and it was suggested that vaseline should be smeared round the terminals. The importance of this cannot be overestimated, and there is no better method of preventing external corrosion and ultimately bad contact.

Another point to note is that an accumulator should be placed where it will not get kicked or knocked about since, apart from damage by spilt acid, the plates themselves will sustain damage or work loose in the pitch.

Eliminating Hum

Good Set Performance Will Always be Negatived by Hum. The Possible Causes and Cures are Carefully Explained in this Article

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

OF all the possible defects in receiver performance, none is more annoying than hum, and although all hum emanates from one source, the possible immediate causes are so numerous that tracking the seat of the trouble in any particular set is far from a simple task, particularly as it is likely that several factors will be found to be contributing to render the hum level higher than is desirable or necessary.

Hum, of course, is always derived in the first place from the electricity mains—even in a battery-operated receiver—but the immediate causes are many and varied and can be briefly classified under four main heads: first, faulty receiver design and layout; second, mal-adjustment of circuits or components; third, faulty components or internal wiring; and fourth, external causes. It is obvious that if the design and layout of any set and its attendant wiring is such that undesirable coupling between signal circuits and the mains is avoided, and, in the case of a mains set or receiver using a battery eliminator, if adequate smoothing and decoupling circuits have been provided and are in good order, the final hum level should be very low. Any tests, therefore, for discovering the seat of excessive hum must be directed to checking all the above points in logical sequence.

Looking for Clues

In the descriptions of the various tests to be applied, common errors in design and layout will be noted and, of course, the tests are calculated to reveal such errors as well as actual electrical and mechanical defects. However, when examining a receiver with the object of organising a hum

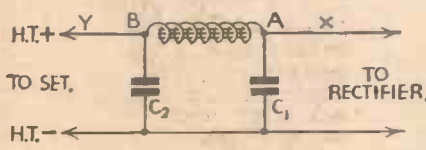


Fig. 2.—Short or partial short between A and B will result in hum. Also a disconnection or short circuit in C_1 or C_2. In the latter case current at X will be greater than at Y.

hunt; it is as well first to make a preliminary observation of the smoothing circuit and of the general layout of the components and wiring in order to gauge the general standard of the receiver, and possibly to discover a clue as to likely trouble spots.

The next point is to examine the adjustment of any device included for reducing hum, such as a potentiometer across the filament winding of the mains transformer, the slider of which determines the centre-tap from which the cathode line of the set is taken.

If these obvious tests fail to effect a cure, it is next necessary to discover whether the trouble is due to defects within the receiver itself or to external causes, and the possibility of the latter should be eliminated first. The route of the aerial and earth leads should be traced back to discover whether either of these wires passes close to or runs parallel with electric light wiring—a very fruitful cause of hum. It should be mentioned here that hum from this cause can occur in battery sets as well as mains sets, and if the receiver under examination is battery driven, coupling between aerial and/or earth leads and the electric light circuits should be at once suspected. This type of trouble is most likely to occur if the aerial and earth leads are long or their route is straggly; if the aerial itself is of the indoor type, fixed to the picture rail, under floor-boards or in the loft; or if a considerable amount of temporary wiring or flexible leads for lamps and

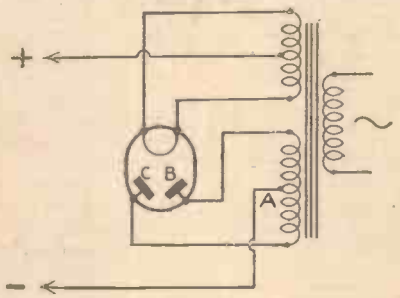


Fig. 1.—Any disconnection or poor contact between A and B or A and C will produce hum as the mains unit will be working as a half wave rectifier. Test voltages between A and B and A and C with an A.C. voltmeter. Readings should be the same.

domestic appliances is employed. Another point which should be watched is the flexible wire connecting the receiver or battery eliminator to the mains. This should be kept as far away as possible from the aerial and earth wires.

A Tunable Effect

A very large proportion of the hum due to external agencies in mains-operated sets is of the type known as "modulation hum" or "tunable hum," the latter name referring to the fact that its intensity is only serious when the set is tuned to certain definite wavelengths. It is due to the presence, in the mains supply, of certain radio frequencies which become modulated by the 50-cycle mains frequency. If the set is tuned to the radio frequencies present in the mains supply, only quite a small amount of coupling between the mains and the radio-frequency circuits of the receiver is needed to result in amplification and rectification of the hum-modulated, mains-borne radio-frequency signals and the reproduction of a very considerable amount of hum in the loud-speaker.

If tunable hum is discovered, one or another of the following schemes should effect a cure. A fixed condenser of from .0003 to .01 mfd. capacity may be connected either across the mains input to the receiver or from one side of the mains input to earth. By reversing the mains plug the correct side can be ascertained. The condenser employed should be of high quality, with mica insulation, and preferably of 1,000 volts test rating in order to avoid the slightest risk of a short circuit across the mains. In the case of D.C. mains, which are often very much worse than A.C. mains in respect of modulation hum, it may be necessary to include a high-frequency choke in each mains lead to the set, each choke being by-passed to earth by a condenser of, say, .01 mfd. It is very important that the insulation of these chokes and condensers be of a high order to withstand the mains voltage and, of course, the H.F. chokes must be capable of carrying the full load current of the receiver.

Inside the Set

Next for consideration are those causes of hum which are to be found in the receiver itself—in most cases definite faults in individual components or in portions of the wiring. In nearly every case the trouble will be found either in the mains circuits, that is to say, the power pack or battery eliminator, or in the low-frequency section of the receiver, and these two portions of the set should be tested in sequence, working backwards from the mains transformer.

Sometimes hum assumes serious proportions simply because the power unit, designed as a full-wave rectifier, is operating actually only as a half-wave rectifier, with the result that the normal smoothing, adequate for full-wave rectification, is now insufficient. Various faults could result in one half of the rectifier section becoming inoperative—for example, a disconnection in one half of the H.T. secondary winding, or a bad or broken connection at one of the rectifier anodes, either in the valve or on the holder or in its wiring—see Fig. 1. Another cause of excessive hum is an incorrect centre-tap on the H.T. secondary of the mains transformer. Any of these faults can be discovered by measuring the voltage between H.T. negative and each of the rectifier anodes with an A.C. voltmeter. The two readings should, of course, be practically identical. It should also be noted that abnormal hum may be due to the absence of an earth connection to the core of the transformer or of the smoothing choke, or to this connection making poor contact.

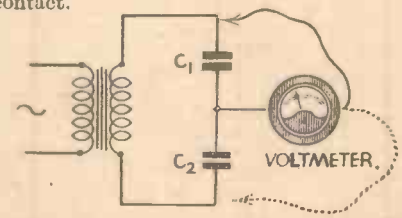


Fig. 3.—A rough test for the capacity of C_2 when C_1 is known. Measure volts across C_1 (V_1) and across C_2 (V_2). Then $C_2 = \frac{V_1}{V_2} \times C_1$.

The next section of the receiver which may be the seat of hum is the high-tension smoothing circuit. A complete or even partial short circuit in the smoothing choke may be the trouble and can usually be traced by measuring the D.C. resistance of the choke. This will immediately reveal a dead short (indicated by practically zero resistance) but unless the original resistance is known it is not always easy to discover whether a partial short exists,

(Continued overleaf)

ELIMINATING HUM

(*Continued from previous page*)

and substitution by a choke known to be intact is the best test.

Condenser Tests

Faults in the smoothing condensers can usually be discovered best by substitution, and for this purpose any 4 mfd. condenser of suitable test voltage rating may be connected first in parallel with each smoothing condenser in turn. A marked decrease in the amount of hum suggests an open circuit or low capacity in the condenser under test. If this test, applied in turn to each smoothing condenser, does not reveal the fault, it is possible that there is a leakage in one of the condensers, and each should be removed in turn and substituted by a known good condenser. (See Fig. 2.) A leaky condenser can also be detected by measuring the total rectified current in the lead between the rectifier cathode and the first smoothing condenser, and comparing it with the total H.T. current in the lead between the final smoothing choke and the receiver.

An individual test on a condenser can be applied easily by connecting an H.T. source momentarily to its terminals. After removing the H.T. source, the terminals of the condenser may be shorted by the blade of a screwdriver, when a substantial spark should occur, indicating that there is no leak in the condenser. A quantitative test on the capacity of a condenser is not so easy to arrange without special apparatus, but if an A.C. ammeter or milliammeter is available the following rough tests may be applied: A 4 mfd. condenser will pass approximately .25 amp. at 200 volts 50 cycles. Tests with other voltages, frequencies and capacities can be made, working on the formula that the current through a condenser is equal to 6.3 multiplied by the frequency, multiplied by the capacity and multiplied by the voltage. Another test is to connect the condenser under examination in series with another of known capacity, and the whole across an A.C. supply of known voltage, measuring then the voltage across each condenser, as indicated in Fig. 3. The capacity of the unknown condenser can be estimated roughly from the proportion of the total voltage appearing across it, according to the formula given in Fig. 3.

If the smoothing circuit appears to be in order so far as the quality of the components is concerned, it may be worth while to ascertain whether a sufficiently low hum level can be obtained by increasing the capacity of the smoothing condensers. In many old sets condensers of only 2 mfd. or 4 mfd. were used, but to-day 4 mfd. and 8 mfd. are common values. Increased capacity up to a total of 16 mfd. for each condenser may result in improvement in respect of hum, but it is of no practical value to use greater capacities.

Other Possible Sources

Here the trouble is most likely to be due to a disconnection in a grid bias by-pass condenser, or a grid decoupling condenser, although there are other parts which should be given attention. The best method is to test stage by stage from the output end of the receiver, by silencing all the previous stages. Commence operations by connecting the grid of the output valve to chassis via a condenser of from .01 to 1.0 mfd. capacity. This will ensure that no signal from any other part of the circuit will reach the valve. If the hum persists it probably arises from a breakdown in the bias by-pass condenser, or, of course, it may be due to insufficiently smoothed supply to the field of an energised moving-coil speaker. If, however, the hum ceases when the output valve grid is shorted to chassis in this way, the source of the hum must be sought further back in the set, by disconnecting the grid short-circuiting condenser and re-connecting it between the grid of the previous valve and chassis. If the hum continues, a faulty bias by-pass or decoupling condenser should be looked for, or a faulty anode decoupling condenser, or even a defective grid leak. Gradually, by working back in this way, the trouble will be isolated to one stage, and all likely spots in that region can be examined. In the detector stage, for example, an open circuit in a grid leak, direct pick-up from the heater circuit by grid leaks or diode detector wiring, can be suspected. If the hum is more noticeable on gramophone reproduction the layout of the pick-up leads should be examined to see whether there is undue risk of pick-up from mains leads, and screened pick-up leads provided with the screening properly earthed.

In this connection, all screened leads should be carefully examined at an early stage of the proceedings as a broken or poor earth connection to the screening is a prolific cause of hum. Other likely causes are a high-resistance earth, a high-resistance joint anywhere in the wiring, and bad earthing connections to condenser cases.

Another point which should be looked to is the condition of all indirectly-heated valves. Poor insulation between the heater and cathode may appear after a valve has been in service for a long period, and will inevitably result in excessive hum.

ITEMS OF INTEREST

The King to Broadcast

THE B.B.C. announces that the King will broadcast a message to the Nation at the time of the Coronation, as did His late Majesty King George V at his Jubilee. This will be the King's first act after the Coronation ceremony is over. The King will not broadcast a Christmas message this year.

The Burghead Transmitting Station

AS it is possible that some listeners in Scotland may find difficulty in receiving either the Scottish Regional or the new Burghead transmitters, the B.B.C. has published a pamphlet entitled "The Burghead Transmitting Station," which is intended to enable listeners to secure the best possible reception. The pamphlet, which contains information, suggestions, pictures and drawings, may be obtained post free by sending a postcard to Scottish Broadcasting House, 5, Queen Street, Edinburgh. Copies may also be obtained by personal call at the B.B.C.'s offices in Edinburgh, Glasgow, and Aberdeen. Those who write are asked to mark their postcards "MS." on the top left-hand corner.

New Studios for Glasgow

THE B.B.C. has placed a contract with Messrs. Thaw & Campbell, Ltd., of Glasgow, for building alterations and extensions to the new Glasgow studio premises at Queen Margaret College. The work will be started immediately and is expected to take a year to complete.

Queen Margaret College, which was purchased from the University of Glasgow and was the University's Medical School for Women, lies adjacent to the Botanic Garden in Great Western Road, and is within easy reach of the centre of the city. Glasgow's Broadcasting House will be thoroughly up-to-date in every respect. There will be eight studios, one sufficiently large to take the biggest possible broadcasting choir or orchestra, and general equipment will be of the latest design.

THE WESTINGHOUSE MAN

A striking "built-up poster" in which the "man" is made from standard Westinghouse rectifiers, the fingers being Westectors, and the remainder standard H.T. and L.T. units.

"Quaintesques" from Rusholme

THE "Quaintesques" concert party, well-known to Northern listeners for their broadcast from Rhyl during the summer season, are back at Leslie's Pavilion, Rusholme, Manchester. They will broadcast from there on November 20. The members of the "Quaintesques"—the original all-male concert party—include Billie Manders (female impersonator and comedian), Jimmy Wright, Billy Carlyle and Jack Brennan.

Celebrities of the West

STILES-ALLEN (soprano) will give a recital on November 20 in the series of programmes entitled "Celebrities of the West." This series is being given by artists whose nursery has been the West Country or whose associations with the West Country are strong enough to entitle them to be included in this series.

SHORT WAVE SECTION

USING A S.W. CONVERTER

Although there are Several Different Types of Converter, the Method of Using Them is More or Less Identical. Some Useful Information is Given in this Article

PRACTICALLY every listener is now aware that a standard broadcast receiver employing one or more H.F. stages may be used with a short-wave converter, and that the combination then becomes a short-wave superhet. We have published details of suitable converters, and a blueprint is available for the construction of such a unit which may be used for either battery or mains supplies. There are very few difficulties in the way of using this type of unit, and where any problems do arise it will be found that quite a simple arrangement may be adopted to solve them. Firstly, it is important to remember that the aerial lead must be removed from the broadcast set and transferred to the aerial terminal on the converter. The earth lead need not be removed, but the earth terminal on the converter and on the receiver must be joined together, and if this is not done the combination will not function satisfactorily. The arrangement for supplying the necessary L.T. and H.T. to the converter will depend upon the design, and separate leads may be employed, or a special adaptor may be used in conjunction with one of the valves in the broadcast receiver. The latter is not always satisfactory, as it does not give a great range of choice so far as the H.T. is concerned. The low-tension supply is bound to be in order, but it may sometimes be found that better results will be obtained with one valveholder than with another.

H.F. and L.F.

In most cases it may be taken for granted that such an adaptor should not be included on the L.F. side of the broadcast receiver, as this will probably result in L.F. instability or whistles due to the H.F. currents being fed into the low-frequency amplifying stages. If good results are not obtained when the H.F. or detector valveholders are employed, then a separate H.T. lead should be employed and tapped into the H.T. battery, or used with a variable tapping on the mains unit in order to find the best voltage. When using the simple autodyne circuit, as shown in Fig. 2, the H.T. should not be found critical, and generally, a value between 60 and 80 volts is adequate. If, however, a pentagrid or similar type of frequency changer is employed the balance between anode and screen voltages may not be so simple to find. Again, wandering leads will enable various adjustments to be tried, although a potentiometer could be used for the screening grid voltage, and the anode supplied with the maximum output from the mains section. To use a unit of the type shown in Fig. 3 the component marked I.F. coupler should be replaced by an ordinary intermediate-frequency transformer, and the ends of the secondary winding should be joined to the aerial and earth terminals on the receiver. The aerial coil usually employed should then be disconnected or removed from its socket.

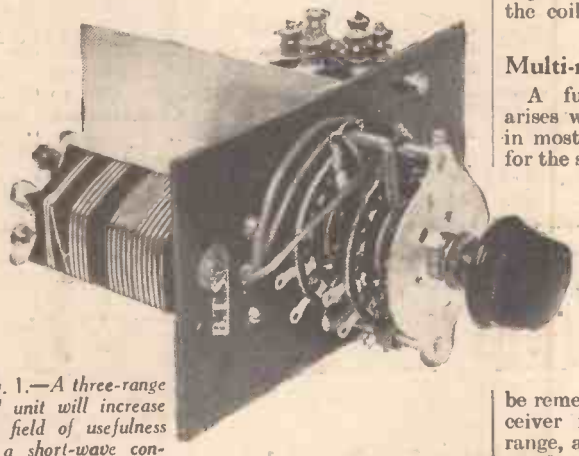


Fig. 1.—A three-range coil unit will increase the field of usefulness of a short-wave converter.

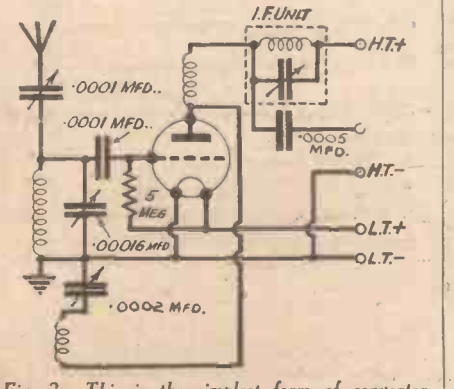


Fig. 2.—This is the simplest form of converter, and may be used as a one-valve set.

Double Tuning

Another point which sometimes causes difficulty to the beginner is that when using the simplest form of converter signals are tuned in at two or more points. These separate tuning points correspond to wavelengths which are separated by the frequency to which the original signal corresponds. Thus, a 30-metre signal would be tuned in at that wavelength and also at 60 metres. At similar frequency intervals the signal may also be heard if it is sufficiently strong. No trouble should be experienced if the wavelength covered by the coil is first kept in mind.

Multi-range Coils

A further problem which sometimes arises when employing a converter is that in most designs a plug-in coil is employed for the short-wave tuning. This means that coils have to be changed for various wavelengths. There are, however, now several coil units obtainable in which several short-wave ranges may be covered without coil changing, and one of these is shown in Fig. 1. This covered three separate wavebands and greatly increases the utility of a short-wave converter. It should be remembered also, that the broadcast receiver must be tuned to the long-wave range, and when once set, no adjustment is required in this part of the combination. If the condenser is adjusted, it will upset the frequency separation required on the converter unit, and stations may then be tuned in at some different point on the dial. To assist in station location, therefore, the most suitable tuning point on the long-wave range should first be found and a note made so that when using the converter the broadcast receiver may be set to the correct point.

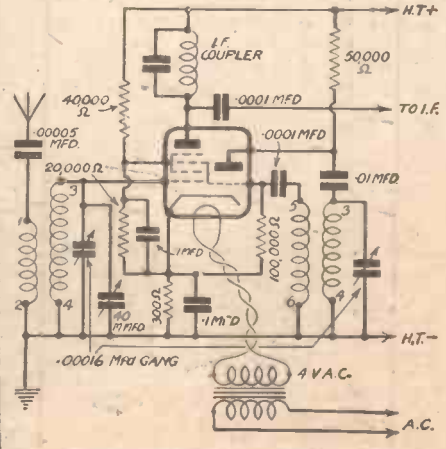


Fig. 3.—The triode-hexode frequency-changer is a more efficient arrangement, but requires some experiment to find the most suitable working voltages.

Leaves from a Short-wave Log

THE Fates have been, and are still, kind to the short-wave listener, as conditions during the past month have been very favourable for reception. On most days it has been possible to tune in without difficulty broadcasts on the 17, 19, 20, 25, and 31-metre bands in sequence throughout the day, capturing programmes at a readable strength from a very large number of transmitters. The question of the time of day is an important factor in respect to the different bands, and it is one the beginner should study closely if he wishes to avoid disappointment. Transmissions on channels between 16.86 m. (17,790 kc/s) and 19.52 m. (15,370 kc/s) are well heard in the early hours of the afternoon, and from tea-time onwards, when the more distant ones are inclined to fade, it is wise to turn to such broadcasts as those from W2XE, Wayne (N.J.), taking the Columbia programme on 19.65 m. (15,270 kc/s), or W8XK, Pittsburgh (Pa.), which offers you the KDKA N.B.C. entertainments on 19.72 m. (15,210 kc/s). In the 25-metre band, W8XK, on 25.27 m. (11,870 kc/s), and W2XE, Wayne (25.36 m. —11,830 kc/s), are strong signals from about G.M.T. 22.00, and, as a rule, can be held until fairly late in the night hours. Already at G.M.T. 22.00 the 30-31-metre band covering broadcasts from Spain, Portugal, Italy, Argentine Republic, Brazil, Cuba, Colombia, and so on provides more wireless entertainments than can be digested easily by the listener; the choice of broadcasts is a very large one, and it is no difficult matter to tune in some kind of wireless telephony or other by passing from one fraction of a degree of the condenser dial to another. In effect, signals are so plentiful that it is wise to devote some time to each small section of the band, as if tuning is not carried out very slowly and carefully many interesting broadcasts will be missed. Under the present prevailing conditions even the raw beginner should suffer no disappointment providing he takes the trouble to make sure when searching for a transmission that the station, according to its advertised schedule, is on the air.

It is this careful searching which on most evenings brings good results and enables one to compile a respectable log within a week or so. A casual round of the transmissions of which the dial readings have already been registered should be carried out almost nightly as it is mostly in the vicinity of these popular channels that new stations will be found; further, it will, as a rule, show from the start whether conditions are favourable or not for the reception of wanted transmitters. It should also be borne in mind that only certain portions of the wavebands are allotted to broadcast telephony, and in consequence searches for new stations are mostly confined to these limits.

Japan's High-power Stations

At least two of the new 50 kW Japanese short-wave broadcasting transmitters have now been brought into operation, but it is possible that they are still in an experimental stage. They are JZI, Tokio, on 31.46 m. (9,535 kc/s), and JZK, on 19.79 m. (15,160 kc/s). They have been heard testing between G.M.T. 19.00-20.00 on Tuesdays and Fridays. It is the same kind of programme as the one we have been receiving from JVM and JVH, but as the power is much higher so the signals are proportionately stronger. These transmissions must not be confused with those emanating from ZBW4, Hong Kong (China), on 19.75 m. (15,190 kc/s), 25 kW, and ZBW3, on 31.49 m. (9,525 kc/s), 26 kW, which have also been logged as experimental broadcasts between G.M.T. 13.00-14.00. If you have already registered the condenser readings of W2XAF, Schenectady, on 31.48 m. (9,530 kc/s), you will know roughly on what degree of the dial to start off. You will identify the station by the fact that rather out-of-date gramophone records are being used, and should pick up the announcer's: *This is Hong Kong calling.*

New Station at Batavia (N.E.I)

So far, from the Netherlands East Indies, PMN, Bandoeng, a 3-kilowatter on 29.24 m. (10,260 kc/s), has been the most favourable channel for these Javanese programmes. Now, however, the N.I.R.O.M. responsible for these transmissions has opened up on another wavelength—namely, 19.80 m. (15,150 kc/s), which, on more than one occasion, has broadcast the same entertainment simultaneously. It may be tuned in very slightly below DJL, Zeesen (19.85 m.—15,110 kc/s).

Practical Television

November 14th, 1936. Vol. 3. No. 24.

THE GHOSTS OF TELEVISION

ANY reader who has had an opportunity of looking in at the Alexandra Palace television transmission during the four-week period of test programmes, which ended on October 28th, will no doubt have been struck by certain peculiarities not familiar to the newcomer. One of the most noticeable is the double image or ghost effect. This is very apparent when lettered announcements are screened or when moving characters appear against a background of opposite colour, say, a woman in white walking across a black or grey screen. These ghosts take the form of a repetition of the subject a little to the right of the true image; that is, in the direction of line scan. Sometimes a positive or negative ghost is noticeable alone, but on other occasions two positive ghosts, with a negative ghost wedged in between, are plainly visible on the television reproducing screen. Various reasons have been given for these multiple image effects, but no definite decision has been arrived at as to their cause. It may result from some form of signal reflection from buildings in the immediate vicinity, this signal arriving sufficiently late for the travelling spot on the cathode-ray tube screen to be modulated and so show the ghost. Similar effects were common when the low-definition television transmissions were radiated from the London National station and received some distance from the source of origin. This was, quite rightly, attributed to a reflection of the electro-magnetic wave from the upper ionised layers of the air. Indeed, certain television experiments were undertaken through Professor Appleton in order to measure the distance in the direction of line scan between the original positive picture outline and the ghost (or ghosts), and this was used to determine the height of the Heaviside layer above the earth's surface. On a modern 12in. by 9in. picture the first ghost picture is seen about one inch from the true picture. This enables the time factor to be calculated very readily, for the spot of light traces a total distance of 240 by 25 by 9 inches in one second. The ghost signal, therefore, arrives 1/54,000th of a second behind the original one under these conditions.

A Record Distance?

Apart from building reflections, there may be some peculiar effect occurring in the transmitting or aerial circuits at the Alexandra Palace. On the other hand, contrary to early theory, it may be due to special forms of ionised layers in the upper atmosphere which do have the property of reflecting ultra-short waves, although up till quite recently this was not thought to be the case. Much of the early theory and practice has been based on experiments undertaken with relatively low radio transmitter powers. It is therefore conceivable that with the present high power of the B.B.C. station (60 kilowatts input to the aerial) new factors are coming into operation which may necessitate a revision of preconceived notions of the range of ultra-short waves.

As a direct bearing on this suggestion, attention can be drawn to the fact that an amateur radio enthusiast in Johannesburg, South Africa, has been picking up the Alexandra Palace transmissions with fair regularity. The accompanying sound on a carrier frequency of 41.5 megacycles is heard distinctly, and although the television note has been detected at fair strength this has not been resolved into a picture, since no receiver of the right type is available in that district. This is certainly an amazing result, and it is inconceivable that the signal has travelled over that distance as a ground wave. This only leaves the reflected wave to cover the huge distance of 6,500 miles. No doubt other cases of a similar nature will be recorded now that the television station is in operation, but this should not lead to the inference that a *service* can be expected over such an enormous area. The service area will no doubt be approximately forty to fifty miles; that is to say, anyone residing within this area can be expected to receive pictures and sound regularly, but outside those figures reception may be possible but not consistent. One feature does arise, however, and this is the question of station interference when the new stations are erected over the country. Careful planning with adequate frequency separation will be essential to ensure that in no district is it possible to receive two stations at once, otherwise the pictures will be ruined completely. In any case, the whole problem which has arisen will call for a considerable amount of research work on the question of receiving aerials. Apart from design problems associated with the elimination of interference in order to increase the signal-to-noise ratio, directional type receiving aerials should do much towards solving any difficulties consequent upon neighbouring station interference. The whole field of ultra-short-wave technique is an intriguing one, and home constructors and experimenters who turn their thoughts and efforts towards these ideas will be doing a yeoman service, quite apart from the absorbing interest which such work brings in its train.

Secret Tests

Anyone possessing a television receiver who has endeavoured to look in recently at times other than those announced for the experimental broadcasts will have been rewarded with signals which could be resolved into clear pictures. Apart from routine work contingent upon the preparation for a new service, it was noticed that the Baird Company were carrying out secret tests with a new scanner at the Alexandra Palace. This is the electron camera, and if the pictures seen so far are any criterion of the results to follow, then the device is of a most promising character. Like the Emitron camera, it is a direct system of television and suitable for both indoor and outdoor scenes and extremely portable. It will add considerably to the scope of the programmes that can be televised by the Baird Company's equipment, which already includes intermediate film, spotlight and telecine. A camera of an identical nature was first shown in operation at the Crystal Palace, and the accompanying illustration shows the arrangements made for employing the apparatus to televise a scene with Alma Taylor in that building several months ago.

A Training School

Realising that television broadcasting is something quite different from sound broadcasting in the B.B.C. studios, prospective artists are anxious to learn all they can concerning the work they must do. To this end a new Television School of Broadcasting has been opened in Leicester Square. It is organised under the jurisdiction of the man who produced the first thirty-line television programmes at Long Acre a few years ago. Expert advice on the type of make-up to be used will be given, while the small studios are equipped with both working and model scanners so that the artist can be prepared beforehand for any engagements in the B.B.C. television programmes.

Public Demonstration

The Radio Department of the Royal Arsenal Co-operative Society, Ltd., is now holding public exhibitions of television through the medium of a 23-valve G.E.C. High Definition Television Receiver. During the past week demonstrations have been held at the times of the Alexandra Palace transmissions at the society's departmental store, Tower House, Lewisham. Next week or the week after the set will be moved to another large store, Co-operative House, Rye Lane, Peckham, and thereafter demonstrations will probably be arranged at other large stores belonging to the society in various parts of South London.

The Electron Camera in use at the Crystal Palace last year.

ABC of the Modern Receiver—8

Connecting the Output Valve to the Speaker : Optimum Load : Choke Impedance : Transformer Ratio : Speaker Operation

WE have now traced the path of the signal from the aerial to the anode of the output valve in a simple H.F.-Det.-L.F. three-valve receiver. It remains to see how the output from the low-frequency valve is put to use. As in the case of the H.F. and detector valves, the prime requirement is that the highest possible voltage should be developed across a "load" in the anode circuit—between the anode and the high-tension supply. The impedance or resistance of the "load" should be at least twice the A.C. resistance of the valve. From this it is obvious that the actual figure must vary considerably, since different types of output valve have A.C. resistances between, say, 2,000 ohms and 20,000 ohms.

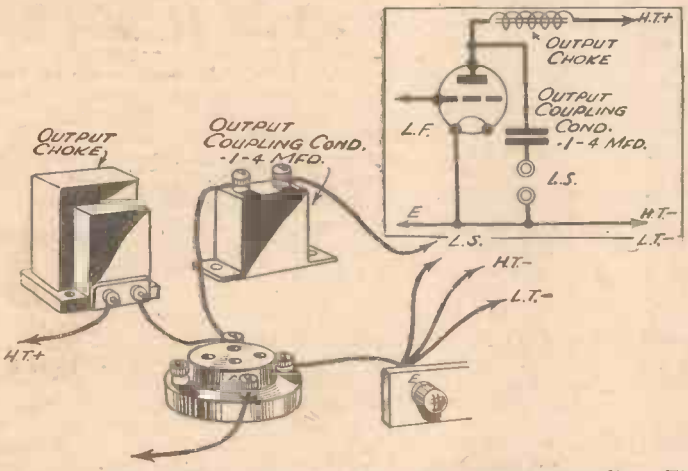


Fig. 1.—Connections for the speaker when using a choke-capacity output filter. The inductance of the choke must be found by calculation, using the optimum load of the valve.

The Output "Load"

A fixed resistance could, theoretically, be used as the "load," but its value would have to be such that an enormous voltage drop would take place across it, with the result that insufficient voltage would be applied to the valve unless the H.T. voltage were tremendously high. A low-frequency choke or the primary of an output transformer, on the other hand, provides a sufficiently high A.C. resistance whilst having a comparatively low resistance to the direct current forming the H.T. One of these components is almost invariably used in present-day receivers.

It is suggested above that the output coupling device can be chosen according to the A.C. resistance of the valve. It *can*, when the valve is a triode, but the same rules do not apply to a pentode. Consequently, it is better to employ a rule which is equally well applicable to any kind of valve. This rule is that the impedance or A.C. resistance should be equal to the *optimum load* of the output valve. For three-electrode valves this is approximately equal to twice the A.C. resistance, but for pentodes it might be quite different. In any case, no difficulty need arise, because valve makers state the optimum load for all types of output valve. As an example, the optimum load for the Cossor 220P is 9,000 ohms, for the Osram P2, 4,500 ohms, for the Hivac PX230, 4,000 ohms, for the Mullard PM 22A (pentode), 15,000 ohms, and for the Cossor 220HPT (pentode), 17,000 ohms. These are just a few examples taken at random to indicate the wide variations which occur.

Choke Calculations

The A.C. resistance of a choke is: $2\pi fL$, where π is 22/7, f is the frequency, and L is the inductance in henries. Thus, in order to find the correct value of choke in a circuit such as that in Fig. 1 we must decide on a frequency which is suitable for our requirements. It is generally satisfactory to take an average figure of 300 cycles per second, but when high-quality reproduction is the aim it might be better to work on 100 cycles per second. Assume that we adopt the latter figure and see how we can find the correct impedance for an output choke for the Cossor 220 HPT. All of the factors in the above equation are known with the exception of the inductance, so we can rewrite the formula to read: L (inductance) = Z (impedance) divided by 2π times the frequency. This gives us:

$$\text{Z (required impedance)} = \frac{17{,}000}{44/7 \times 100}, \text{ or } \frac{170}{1} \times \frac{7}{44}, \text{ which is approximately 27 henries.}$$

Impedance and D.C.

This means that for the valve mentioned, the most suitable output choke would have a value of 27 henries, although in practice we should use one rated at 25 or 30 henries. It is important to remember that the choke should have this value of inductance when carrying the anode current required by the output valve. In the case of the valve taken as an example, this is just under 10mA, and most chokes would carry this current without the inductance being much less than that when carrying no D.C. This little point will more readily be understood when it is mentioned that one typical choke is rated at 45 henries when not carrying any D.C. current, and at 25 henries when carrying 18mA D.C., whilst another is rated at 130 henries and 45 henries with no D.C. and with 40mA, respectively.

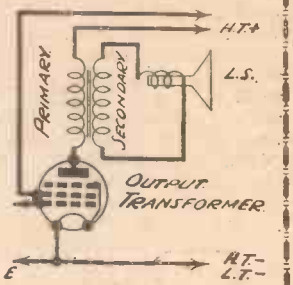


Fig. 2.—It is usual to employ transformer coupling between the output valve and the speaker, as shown here. The transformer has a step - down ratio—secondary fewer turns than the primary.

Transformer Coupling

Referring again to Fig. 1, it should be pointed out that the output coupling condenser may have a value between about .1 and 4 mfd. A usual value is 2 mfd., but it is sometimes interesting to observe the difference in reproduction when using alternative capacities within the range mentioned.

It is more usual to employ a transformer for coupling the valve to the moving-coil speaker, as shown in Fig. 2, and this component is generally built into the speaker itself. Very often the transformer is tapped to provide alternative impedances, but if not the type of output valve should be stated when ordering the speaker. It is not usual to rate transformers according to the impedance of

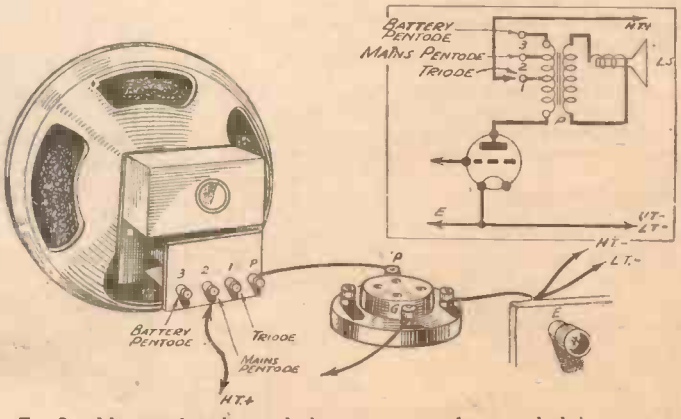


Fig. 3.—Most speakers have a built-in output transformer, which has a tapped primary winding to provide the correct impedance and ratio for different types of valve.

ABC OF THE MODERN RECEIVER

(Continued from previous page)

the primary winding, but according to the step-down ratio which they provide. This is because most speakers contain a transformer which has a tapped primary winding as shown in Fig. 3. This might have several tappings, but it is usual to provide only one or two. When terminal marked P in Fig. 3 is joined to the anode of the output valve, terminal 1 should be connected to H.T. for a triode valve, terminal 2 for a mains pentode and terminal 3 for a battery pentode. The transformer is wound and tapped so that the correct impedance for average valves of the types mentioned are given. Several speakers now made have transformers which provide as many as ten alternative ratios by the movement of a switch or by moving wander-plugs.

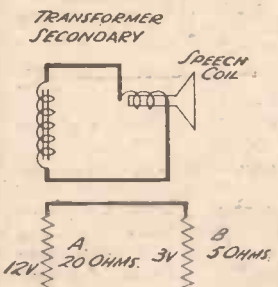


Fig. 4. — Comparable circuits which show the effect of having different relative resistances for the speech coil and the secondary winding of the transformer.

Finding the Ratio

The ratio of the transformer is another important consideration, because the purpose of this component is to connect a circuit with a high impedance to one with a very low one (the speech coil of the speaker). The latter generally has an impedance of about 5 ohms, and the ratio must be such that this provides a similar load to that required by the primary. The correct ratio can be found by taking the square root of the primary impedance divided by the speech-coil impedance. Taking as an example the Cossor 220HPT and a speech coil of 5 ohms, the calculation is as follows: Ratio $=\sqrt{\frac{17,000}{5}}$, which is rather less than 60 to 1.

The accurate design of an efficient transformer of this nature calls for a considerable amount of skill, since many important points are involved. One is that the D.C. resistance of the secondary winding must not be high in comparison with that of the speech coil; if it were, a good deal of the available output would be lost in the transformer. This can best be understood by referring to Fig. 4 which shows two resistances in series with each other and with a battery. Suppose A represents the resistance of the transformer and B the resistance of the speech coil. If A had a resistance of 20 ohms and B of 5 ohms, the battery being of 15 volts, the voltage dropped across A would be 12 volts and that across B 3 volts. This is because the resistance of A is four-fifths of the total resistance in circuit. If each resistance had a value of 5 ohms, 7½ volts would be dropped across each. In the parallel case, the output would be equally divided between the transformer and the speaker; this would be practically ideal.

IMPRESSIONS ON THE WAX

By T. Onearm

A New Caruso Record

ANOTHER successful re-creation of one of Caruso's favourites appears in the new H.M.V. List. It is "O Paradise" from Meyerbeer's "Opera L'Africana" coupled with the Neapolitan folk song, "Santa Lucia," on *H.M.V. DB*2991. A new orchestral accompaniment has been superimposed on the record, which is extremely good.

Also, Kirsten Flagstad, who starred at Covent Garden this year, appears on *H.M.V. DA*1512. She forsakes Wagner for two English songs, Landon Ronald's "O Lovely Night" and Cyril Scott's "Lullaby."

Orchestral Recordings

THE orchestral records in the new H.M.V. releases are very interesting. Bruno Walter conducts the Vienna Philharmonic Orchestra in the third Brahms Symphony (F major) a' deliberate performance bringing out all those points which appeal to the true Brahmsian. It is recorded on four records—*H.M.V. DB* 2933-6.

Ormandy leads the Minneapolis Symphony Orchestra through the intricacies of Sibelius' Symphony No. 1 in E minor. Although this fine work was cast in heroic vein it opens with a slow introduction, working up to a series of terrific climaxes. The admirable synopsis issued with the Album gives a very clear exposition of this work, with which one can soon become familiar on the gramophone—*H.M.V. DB*2709-13.

The Czech Philharmonic Orchestra, under Vaclav Talich, carry on with the Slavonic Dances of Dvořák, this time adding Nos. 10 and 12 to the collection. This is music that everyone will like. Lovely tunes and fascinating folk type rhythms. Its number is *H.M.V. C*2859.

Some Favourite Artists

FAVOURITE artists are well represented in the new H.M.V. releases. Peter Dawson sings "Son o' Mine" and "Jolly Roger," on *H.M.V. B*8489, and Derek Oldham "The Regimental Song" from "The White Eagle," coupled with "One Day"—*H.M.V. B*8465.

Webster Booth, the well-known radio star, records "Serenade in the Night," which bids fair to be one of the most popular song hits of the season, and "The Way You Look To-night," from the new Astaire-Rogers film "Swing Time," on *H.M.V. B*8498. There is some very good hill billy singing by Mac (Harry McClintock) with "In the Big Rock Candy Mountains," and by Vernon Dalhart in "The Chain Gang Song"—*H.M.V. BD*379.

Light orchestral records include "Entry of the Boyards" and "Jealousy," played by the Boston Promenade Orchestra, on *H.M.V. C*2861. Two of Coleridge-Taylor's tuneful characteristic valses are played by the New Light Symphony Orchestra on *H.M.V. B*8378, and there are records by Alfredo Campoli's and Robert Gaden's Orchestras. The Leslie Bridgewater Quintet contributes an arrangement of Chaminade's "Pierrette," and "Prunella" (one of his own compositions), on *H.M.V. BD*313.

In Lighter Vein

CONTINUING the series of Walt Disney Silly Symphonies, issued by H.M.V., in which the records have been made from the sound tracks of the actual films, "The Pied Piper" is now issued. This record brings back very vividly the mixture of extravagant nonsense and music which Disney has combined so skilfully to make his unique entertainment.

Drury Lane Show

ALSO on the lighter side are the first records from "Careless Rapture." Ivor Novello's new show at Drury Lane Theatre, with original artistes including Ivor Novello and Dorothy Dickson. The following have been recorded: "Studio Scene" (a bit of opera) and "Why is there ever Good-bye" on *H.M.V. C*2858, "Music in May" and "Love made the Song" on *H.M. B*8495, and the Drury Lane Theatre Orchestra plays a melodious selection on *H.M.V. C*2860. In addition there are two records of the fine Ballet music—"The Miracle of Nichaow" and "Bridge of Lovers" on *H.M.V. C*2862-3.

Of another type is a speech from the play "Murder in the Cathedral" by Robert Speight, who takes the part of Thomas à Becket in the production. It represents à Becket's last sermon and is tinged with the forebodings of the tragedy that was soon to follow. A very fine piece of English, perfectly spoken.—*H.M.V. B*8499.

Dancing Time

THERE are plenty of new dance tunes in the new H.M.V. List, of which I shall name just a few. Roy Fox and his Orchestra play "Serenade in the Night" and "Miracles Sometimes Happen" on *H.M.V. BD*5126, and Jack Hylton and his boys have recorded "Drop in next time yo're Passing," coupled with "Unbelievable" on *H.M.V. BD*5118.

"Fats" Waller and His Rhythm contribute "Bye Bye, Baby" and "The Curse of an Aching Heart." Both these titles have vocal refrains, and the piano solos are by Waller—*H.M.V. BD*5116.

AN IMPROMPTU TEA PARTY

Members of the D'oyly Carte Opera Company, including Derek Oldham, snapped at the "His Master's Voice" Recording Studios during an interval for tea. A complete recording of "THE MIKADO" is issued this month on the "H.M.V." list (DB 4038-48). This is the first completed recording of "The Mikado" issued by "His Master's Voice," and was made under the personal supervision of Rupert D'Oyly Carte.

Joe Loss and his Orchestra play "When the Poppies Bloom Again," coupled with "Raindrops," on *H.M.V. BD*5124.

Two tunes from "Careless Rapture" are played by George Elliot and his sweet music makers, "Music in May" and "Love Made the Song," on *H.M.V. BD*5121, whilst Henry Jacques and His Orchestra have recorded in correct dance tempo "Star Dust" and "Chinatown, My Chinatown," on *H.M.V. BD*5100.

The swing music section includes an interesting re-creation of a record by the original Dixieland Jazz Band. This was first issued in America in 1918 and contains "Ostrich Walk" and "Bluin' the Blues," on *H.M.V. B*8485.

OUR FREE CATALOGUE SERVICE

To save readers trouble we undertake to send on catalogues of any of our advertisers. Merely state, on a postcard, the names of the firms from whom you require catalogues, and address it to "Catalogue," PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., 3-11, Southampton St., Strand, London, W.C.2. Where advertisers make a charge, or require postage, this should be enclosed with applications for catalogues. No other correspondence whatsoever should be enclosed.

NEW EDISWAN BATTERY CATALOGUE.

A VERY comprehensive 56-page catalogue is now available to the trade, covering the exclusive range of Ediswan "Extralife" Accumulators for motor-cars and cycles, radio sets, commercial motors, electric trucks and vehicles, train lighting, etc. To those concerned with the supplying of replacement batteries for old and new types of car, it constitutes a handy book of reference. Prices of spare parts, replatals of other makes of battery, and a list of replacement accumulators for various well-known radio sets are also included. The sections of the catalogue dealing with car and radio batteries are being published separately for general distribution.

"HIS MASTER'S VOICE" RECORDS.

THE new complete catalogue of "His Master's Voice" records, which has just been issued, runs to 468 pages, and contains particulars of over 6,000 records. Although these cover every kind of music (as well as speech) it is interesting to see what an immense repertoire there now is of what, for want of a better term, one calls "high-class" music. Symphonies and Concertos form the "heavyside layer," with Opera, good songs and Ballet Music as a lighter relief.

This closely-packed volume is more than a catalogue, it is a compendium of recorded music. It is divided into three main sections. First, the General Alphabetical list, comprehensively cross-indexed so as to give several opportunities of tracing a work. This is followed by the now famous Connoisseur Catalogue, after which, comes the Historic Section, taking us back to the days of Patti, Santley, and Tamagno. There is a special section of illustrated biographies of many famous artistes, as well as a glossary of musical terms, and a pronunciation guide, which will enable the shyest enquirer to get away with such names as "Szostakowicz" and "Guszalewicz." These are really quite easy to say (with the aid of the book).

The majority of the records are, of course, made by modern processes, but it is well that some of the older records have been retained for the purpose of comparison and interest, particularly of National interest. Records by members of the Royal Family now occupy a whole page, and include H.M. The King's broadcast message to the Empire shortly after his Accession. You cannot hear what Gladstone said in 1872, but there is no mistake as to what Mr. Lloyd George said about his 1909 Budget. Shackleton, Peary and other explorers tell of their adventures, and you can still hear the late Earl of Meath describe the genesis of The Empire Day Movement.

EKCO RADIO.

THE complete range of Ekco receivers and radiograms is described in a number of folders and booklets we have received from E. K. Cole, Ltd. The latest model listed is a new auto-radiogram embodying several important features, including an automatic record-changer, "high-fidelity" reproduction, cathode-ray tuning, and "press-button" noise suppression. This luxury model is priced at 29 guineas. Other new receivers described include an A.C. nine-stage Superhet, and a seven-stage Superhet for A.C. or A.C./D.C. operation. The latter model incorporates full A.V.C. variable tone control, and is fitted with a panoramic "Edgeon" tuning scale. There is also a high-class superhet radiogram, priced at 22 guineas, and a superhet console at 13 guineas.

BOOKS RECEIVED

B.B.C. MUSIC PROGRAMME GUIDE

IN response to the widespread desire on the part of listeners to know as much as possible in advance about music to be broadcast, the B.B.C. have recently issued for the first time a Music Programme Guide in the form of a pamphlet, containing details of advance music programmes and general information regarding music to be broadcast during the season. The pamphlet, which can be obtained free, on application by post to the British Broadcasting Corporation, Publishing Department, 35, High Street, Marylebone, or by personal application to Broadcasting House, will be a guide to all the chief musical activities of the B.B.C., and will contain detailed programmes wherever possible, and the dates of some of the more important musical events to be broadcast on all wavelengths.

RADIO CLUBS AND SOCIETIES

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

The World Friendship Society of Radio Amateurs

THIS Society was founded by three Radio Amateurs in April, 1935, and celebrated its First Anniversary on April 22nd last.

It is a world-wide organisation run entirely on voluntary lines, and there are no fees or subscriptions. All that is necessary to become a member is to sign and honour a simple pledge. Certificates of Membership are supplied free to all accepted applicants.

Since its inception the Society has made considerable progress and is fast making friends. Radio G6AQ has now been officially appointed to act as Hon. Secretary for the recently-formed British Section, and he is desirous of placing the names of as many British Amateurs as possible on the Roll of Honour.

Further information will be gladly supplied on request, and any help or suggestions welcomed.

Applications should be addressed to: Mr. Arthur H. Bird (G6AQ), Hon. Secretary, World Friendship Society of Radio Amateurs, Experimental Radio Station, 35, Bellwood Road, Waverley Park, Nunhead, London, S.E.15.

Wirral Amateur Transmitting and Short-wave Club

THE usual meeting was held at the King's Square Café, Birkenhead, on October 28th, when the Secretary expressed his satisfaction with the excellent progress of the club and the record attendance.

Mr. Bramwell, G2RF, gave a lecture on 5-metre transmission and reception, and his talk was noteworthy for its clearness and intelligence. Mr. Bramwell went to considerable trouble to give details of low-loss construction, aerials, receivers, and transmitter design. The next meeting will be held on the last Wednesday in November when there will be a junk sale. Membership is still increasing but there is room for plenty more.

All details from the Hon. Sec., B. O'Brien, "Caldy," Irby Road, Heswall, Cheshire.

Short-wave Radio and Television Society (Thornton Heath)

THE weekly meeting of this Society was held on Tuesday, October 27, at St. Paul's Hall, Norfolk Road, Mr. R. E. G. Copp presided.

Mr. E. Cholot was again the lecturer, and on this occasion produced a number of Hi-Q components, the products of Messrs. Lissen, Ltd., in connection with short and ultra-short-wave reception. Mr. Cholot gave a detailed description of each component and explained its function in the receiver.

The Hon. Secretary is Mr. Jas. T. Webber of 368, Brigstock Road, Thornton Heath.

The Croydon Radio Society

THE Croydon Radio Society's first short-wave meeting of this session took place on Tuesday, October 20th, in St. Peter's Hall, Ledbury Road, S. Croydon, when Mr. B. R. Bettridge, of the Marconiphone Co., Ltd., spoke on "Valves and Recent Developments in Ultra-short-wave Work." Actually, he said, H.F. problems on short waves were the same as those *in situ* on medium waves. Such features as inter-electrode leakage capacities coil losses, and even the leads within the valve must be looked after. The H.F. pentode was preferred to the screen-grid valve for short-wave working, on account of its extra grid. Mr. Bettridge showed the society the acorn valve, no larger than a thimble, but having a perfectly normal "slope," being very suitable for ultra-short waves.

In wide-band transmission, such as for television, the tuning was different, band filters being used. He insisted that H.F. amplification was worth while on ultra-short waves, and went on to demonstrate the uses of the super-regenerative and super-heterodyne on these frequencies. Finally, a modern television receiver, having six straight H.F. stages, proved a particularly absorbing topic. Television problems were also dealt with at the meeting on Tuesday, November 10th, when the Mullard Wireless Service Co., Ltd., discussed "Cathode-ray Tubes, Their Construction and Use," with lantern slides.

Hon. Pub. Sec., E. L. Cumbers, Maycourt, Campden Road, S. Croydon.

Southend and District Radio and Scientific Society

AN interesting demonstration of Lissen short-wave receivers was given before this society on Friday, October 16th, at the new headquarters, Glendale College, Chalkwell Avenue, Westcliff-on-Sea. The circuits were described by means of lantern slides, and members later had an opportunity of testing the various instruments shown.

On Sunday, October 18th a very successful Field Day was held, the transmitter (using the call sign G5QKP) operating on a wavelength of 155.8 metres being concealed in a lane near Barling, Essex. Four of the eight parties which started were successful in locating the transmitter, and an enjoyable tea-party subsequently assembled at the Belfairs Tea Rooms, Leigh-on-Sea, Despite the wintry weather, it was unanimously agreed that a further Field Day should be held in the immediate future on similar lines.

Details of the society's activities may be obtained from the Hon. Secretary, F. S. Adams, "Chippenham," Eastern Avenue, Southend-on-Sea.

Newbury and District Short-wave Club

THIS club held another successful meeting on October 19th. The members, who are steadily increasing in number, spent a very pleasant evening, thanks to a local radio firm, who lent the club an all-wave receiver.

Newcomers will be welcomed to the club, so will prospective members please apply to L. B. King, Hon. Sec., 55, Mill Lane, Newbury.

Exeter and District Wireless Society

ON October 5th Mr. Cholot, of Messrs. Lissens, gave a demonstration of their "Hi-Q" short-wave components and also their receiver, model No. 8114, which is a very sensitive all-wave instrument priced at 17 guineas.

On October 12th Mr. Gibbs, of Messrs. Cossor, gave a talk and demonstration of their new all-wave models.

All meetings are held at the Y.W.C.A., 3, Dix's Field, Exeter, at 8 o'clock. A. T. Batten, 115, Clifton Street, Exeter. Devon.

REPLIES IN BRIEF

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

H. F. K. (Stourbridge). The subject is dealt with in this week's Leaves from a Short-wave Log.

L. M. H. R. (Canbridge). The arrangement would be of slight use in removing static, but the correct scheme is to be preferred and will give less signal loss.

J. S. (Bury). You cannot expect to obtain maximum results on each waveband unless the circuits are correctly ganged, and we think that this is your main trouble.

J. K. J. (Belfast N.1). We cannot give instructions for modifying commercial receivers, and suggest you get into touch with the makers of your set.

D. K. (Birkenhead). Write to the makers of your set or get into touch with the nearest local service agent. It would appear that there is a breakdown in one of the components.

W. J. R. (Southampton). If sufficient interest is displayed we shall describe a mains version at a later date. The hum may be stopped by earthing the turntable casing. If, however, there is a short or partial short from the mains lead to the chassis, then you will short circuit the mains and the fuse will blow. To avoid this, connect a condenser in this earth lead for testing out.

A. W. P. (Dagenham). We have no blue-print of a receiver of the type mentioned. A short-wave converter could be used in conjunction with your receiver, but we have not described such a converter which would tune as low as the range mentioned.

C. O'L. (Dublin). A 25-volt working test is needed for the condenser in question. If the meter is connected in the anode circuit of the I.F. valve it will only function if the A.V.C. circuit is fitted. Without this there is nowhere in this particular set where a tuning indicator could be fitted.

W. G. W. (Birmingham). The primary would carry 60 mA, but the inductance would not be more than about 20 henries at this figure. It should be suitable for the valves mentioned, as they are in push-pull and the question of D.C. saturation does not arise.

L. M. (Widnes). A Cossor Neon Stabiliser may be used to keep the output of the mains unit substantially constant with the valve in question.

R. W. M. (Derby). We have no details which we could give you concerning the transmitter.

L. K. (Westcliff-on-Sea). We regret that none of our blue-prints is suitable for using up the parts mentioned by you.

P. B. (Blackpool). We think you will find that Messrs. Bulgin make a suitable resistance for your needs.

J. H. R. (W.4). We suggest you try the effect of reversing the leads to terminals 1 and 3 on the B.P. 86 coil.

G. M. (Thorne). The coils are not home-made, but are obtainable from Messrs. B. T. S.

K. B. (Peterborough). There are two or three amplifiers in our blue-print list, but you do not state whether you require battery or mains apparatus.

W. R. (Belfast). We regret that we do not include station identification as part of our Query Service. However, station G6OS appears to be owned by J. W. Gill, of 37, Parkfield Drive, Hull, Yorks.

G. H. P. (Erith). The transfer of the aerial was made to the grid of the valve and thus would tend to indicate that the circuits are not correctly ganged.

G. T. (Bournemouth). It should be unnecessary to make the change. Are you certain that your battery supplies are quite in order? The symptoms point rather to lack of H.T.

B. R. E. (Cardiff). No trace of the name appears in our records. However, a good radio dealer should be able to trace out the connections, or you could do so with a good meter and a battery.

J. P. (York). Try shortening the leads from the mains unit to the mains plug. If this cannot be done, run the lead at a completely different angle from that now taken. It is most likely induction.

C. R. E. (Bracknell). Two additional coils would be required, and you will no doubt find that they cannot be accommodated in the restricted space which is available.

B. R. A. F. (Plymouth). The valve is obviously exhausted or broken down. The current should be at least 5 mA. with 100 volts H.T. and no G.B.

W. E. A. (Margate). Whilst we could not guarantee reception, there is every possibility of hearing the station in question. Search any evening between 6 p.m. and 10 p.m., and if possible use headphones in order to locate the station. It should be possible to put it on the speaker when located.

I. U. T. (E.C.2). The receiver is not one of our designs, and we hesitate to recommend modifications without the consent of the designer.

B. A. (Hove). Messrs. Dubilier can supply the component which will be wired in exactly the same way as the present one. The extra (centre-tap) terminal should be joined to the junction of mike and pick-up in the circuit you show on your letter.

B. O. S. (Largs). We cannot recommend the alteration. Instability is certain to result from such a change.

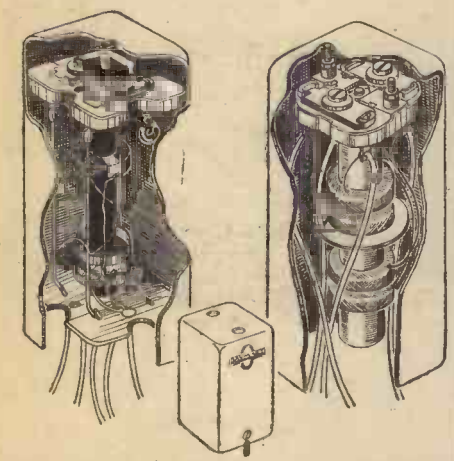
N. I. S. (Dudley). The transformer is not now on the market. The makers are no longer manufacturing wireless components, but the transformer may be used in a modern circuit although it cannot be expected to provide the high quality obtainable from a modern component.

Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

Variable Selectivity I.F. Kit

FROM the Raymart Manufacturing Company we have received an interesting kit of I.F. transformers. As has already been pointed out in our pages, in a superhet the degree of selectivity in the I.F. stages is governed by the separation of the primary and secondary windings of the I.F. transformers. Thus the selectivity may be modified in a superhet by altering the relation between the two windings, and in some modern components provision is made for this alteration by including some form of movable coil. In this new Raymart kit a different principle is adopted and the two transformers comprising the kit are shown in sectional form below. It will be



These illustrations show the internal construction of the Raymart variable selectivity I.F. kit components.

seen that one of these (that on the right) follows normal design, the primary and secondary windings being given normal spacing on a cylindrical former, and the two trimmers being mounted on a ceramic base. Flexible coloured leads are brought out for connection. In the second transformer in the kit an iron-cored assembly is employed and the primary and secondary are given an unusually wide separation. An additional winding is, however, overwound on the secondary, and this consists of a very few turns of wire, connected in series with the primary. One end of this winding is brought out in a coloured flexible lead, whilst the other end is anchored to one end of the primary, the junction point carrying also a connecting lead. The primary trimmer is joined permanently to the anode side of the primary (to which a connecting lead is attached), and the other side of the trimmer is brought out to a further connecting wire. Thus there are six connecting leads to this transformer, and a switch is used in conjunction with the leads attached to the primary and separate coil so that the latter may be included or excluded from the primary circuit.

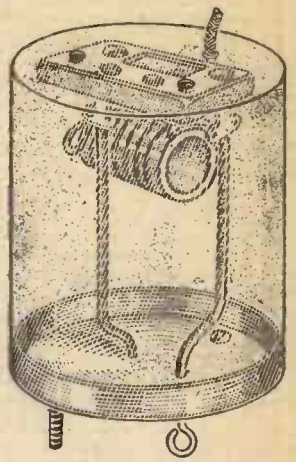
The result of this arrangement is that there are two separate degrees of selectivity available, the coupling in one case being exceptionally loose and in the other very tight. The result of this arrangement is that a switch only is required for varying selectivity, and the band-width afforded by the two arrangements is 9 kc/s and 2·kc/s. The coils are enclosed in rectangular aluminium screens to the lower edge of which short bolts are riveted. Holes in the top enable the trimmers to be adjusted. The price of the pair is 15s.

Oldham Super-plus Accumulators

THE new series of L.T. type accumulators to be marketed by Messrs. Oldham & Son, Ltd., will bear the name Super-plus. These are big type cells with interleaved plates and the capacity-indicating clock fitted on one side. The result of the new arrangement of plates is that many extra hours of useful life are available and the accumulator is designed in such a size that it may conveniently be incorporated inside most modern receivers. There are three models, type 0LG3 suitable for 3-valve receivers and costing 8s. 6d.; type ZLG3 for 4—5 valve receivers, costing 10s. 6d., and type SLG4 suitable for 6 and 7 valve receivers. The cost of this large cell is 12s. 6d.

Bulgin Television Coil

THERE are various circuit features suitable for inclusion in an ultra-short-wave superhet designed for the reception of the television programmes, and each has its merits. Some experts favour the transformer coupling, others the choke coupling, and yet others the simple tuned-anode arrangement. Components for each type of coupling are available, and the accompanying illustration shows a tuned-anode arrangement which is included in the Bulgin range of television components. This consists of a small coil tuned by a mica-dielectric trimmer, the two components being rigidly held together and suspended inside an aluminium screening can of standard design. The anode connection is attached direct to the trimmer condenser and brought out through a hole in the top of the can and a further lead is attached to the same point and brought out at the bottom of the screen, together with a lead from the other side of the coil, a red and green lead being employed for each point to identify the separate ends. These connecting points are mounted on a paxolin disc, and two mounting bolts are also attached to the lower end so that the component may be mounted on a metal or wooden chassis. These bolts are firmly attached and prevented from turning by means of shake-proof washers and lock-nuts, but undue force should not be used in tightening these because should they become loosened it will not be possible to make a rigid attachment to the chassis as the base is eyeletted to the upper part of the screen. With valves of the medium-impedance S.G. type (such as the Cossor MSG/LA valve) a stage gain of 10 may be obtained, and the frequency band covered



The new Bulgin Television I.F. coil unit.

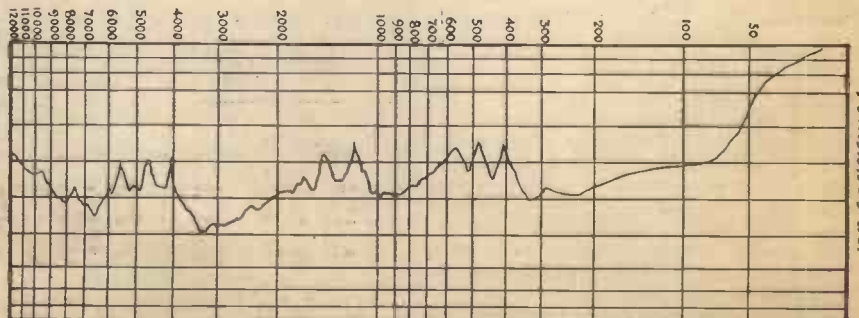
is of the order of 1 million cycles, thus preserving picture definition. The list number of this component is S.W.62 and the price is 5s. 9d.

MODERN CABINET MAKING.

(*continued from page 264*).

speaker opening, the chromium may be dispensed with and ordinary white wood used for banding, this being filled and polished with clear polish to maintain its light colour. Narrow strips across a rectangular speaker opening present a very neat appearance, and are to be preferred to the fretted scheme which was at one time so popular.

To relieve a light finished cabinet black banding may be obtained for inlay purposes in widths up to 1in., and is quite cheap. For the larger types of massive radiogram ornamental corner feet, such as those shown in Fig. 5, are also obtainable ready-made and fitted with screws for attachment. These may be modified by removing the top portion if they are too high. The standard size is 5in. high with 5¼in. by ¾in. sides, and they cost 4s. per pair, or 7s. 6d. per set of four.



The remarkably fine curve of the Goodman 12 in. high-fidelity twin-diaphragm Auditorium loudspeaker.

THE BRITISH LONG DISTANCE LISTENERS' CLUB

Too Many Stations

THE usual seasonal complaint is now making its appearance, due to the longer hours of darkness. There appears to be an immense increase in signal strength at this time of the year, and in many unselective receivers this results in great difficulty in separating stations, especially when it is desired to hear a really long-distance station. The remedy is obvious, but it is not always a simple matter to decide upon the best method of setting about the difficulty. Where a receiver is so satisfactory in all other directions that it is felt that any alteration may spoil things, an external wavetrap is undoubtedly the best arrangement to adopt. This may easily be placed in a small box and stood upon the receiver and by using a plug-and-socket aerial and earth connector, a quick change may be made (if desired) so as to exclude the trap.

Remember that although an ordinary simple plug-in coil of the old-fashioned type will suffice for a wave-trap coil, it is necessary, in order to get the best out of the device, to use a sharply-tuned circuit. Thus a modern iron-core coil is called for, and by using a dual-range coil it is possible to cover both medium and long wave ranges. Messrs. Wearite sell a neat small dual-range coil unit especially for the purpose and this may be made up, with a bakelite dielectric condenser for tuning, into quite a small and compact unit and results in a very economical arrangement.

CLUB REPORTS

Veri's from U.S.A.

A MEMBER, Mr. C. Mallanby (No. 3134), has received an interesting communication from W2IIQ, of New Jersey, in response to his report of 'phone signals on 57,600 kc/s. He says that W2IIQ will reply to every English short-wave listener who sends a report on the 56-megacycle transmissions.

He asks English listeners to listen for him on 5 metres, as he is at present erecting a 5-metre aerial system. His transmitter will consist of a modulated power amplifier with a master oscillator of 16 watts with a frequency doubler. This excites a push-pull power amplifier with a crystal microphone. The reception of the 56-megacycle signal was carried out at Pwllheli by Mr. Mallanby with a simple o-v-2 receiver with a separate reactor valve. The aerial is only 12ft. long and points S.W.-N.E.

Portsmouth and District Wireless and Television Society; Portsmouth Chapter of B.L.D.L.C.

MR. G. A. KINGSBURY (G6SS), demonstrated some modern all-wave receivers and adaptors to the member of the above Society last evening. After a brief discourse on short-wave receivers in general, the speaker went on to exhibit the chassis components of an all-wave set, together with a splendid 2-valve short-wave receiver-adaptor. The merits and demerits of all-wave sets as against short-wave receivers proper were lucidly expounded by the demonstrator. Lieut. W. Jackson occupied the chair. Meetings are held every fortnight and Morse class every Monday. B.L.D.L.C. report from Portsmouth.—H. LEIGH (2BBG) (20, King St., Southsea).

The North Manchester Radio Society

Northern Headquarters, British Long Distance Listeners' Club.

ON Wednesday, November 11th, 1936, the above society is holding a meeting and supper at the Mayfair Cinema Café, Bury Old Road, Whitefield, near Manchester, commencing at 7.30 p.m. The evening will commence with a short talk, then the remainder of the evening will be spent in an entertaining and sociable way. Ladies are also invited on this evening. The usual meetings of the society are held every other Friday at 8 p.m., at the British Legion, Elm Street, Bury New Road, Whitefield, near Manchester. Further particulars can be obtained from the Secretary, Mr. R. Lawton, 10, Dalton Avenue, Thatch Leach Lane, Whitefield, near Manchester.

A Correction

WE have received the following letter from Mr. F. P. Cawson:—

"In your paper dated October 24th, 1936, you published my letter giving details of the times of broadcasting of the Japanese stations. Instead of *JUH*, etc., the call signs should have read *JVH*, *JVN*, etc. I would be much obliged if you would bring this to the notice of readers."

LETTERS FROM READERS

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

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

Amateur Transmitting Circuits

SIR,—I have just been looking through some PRACTICAL AND AMATEUR WIRELESS issues of about a year ago, and I noticed a good many requests for articles on amateur transmitting circuits, etc. I also noticed that no articles have since appeared in response to these requests. I quite understand your unwillingness to publish such articles on account of them being of benefit to unlicensed amateurs, but what about those possessing Artificial Aerial licences, and those would-be A.A. men? In order to gain experience and knowledge on this subject, we can only look to those American publications which are so hard to understand when one compares with English components.—N. OWEN (Kettering).

Experimental Station W1XGT?

SIR,—It may be of general interest that an experimental station, W1XGT or W1XJT, is testing daily from approximately 16.00 to 19.00 G.M.T. on 31.6 megacycles, or 9.5 metres. He is, unfortunately, heterodyned most of the time by another experimental transmitter on the same frequency.—E. DE COLTIGNIES (Prittlewell, Essex).

A Reader's Thanks: An S.W. Log

SIR,—Many thanks for the "Wireless Constructor's Encyclopædia," which I recently received. I must say that it is a very fine consolation prize, and should be in the possession of everyone interested in wireless, as it offers very valuable information on all wireless subjects.

I have not seen in PRACTICAL AND AMATEUR WIRELESS a log of short-wave stations from this district, so I am enclosing mine, which is as follows:—

14 mc. C.W.: VK3MX, VK2NY, VK2PX, VK2DA, ZL4FK, ZL2GO, W6JMR, W5FNH, VK5WR, VK3WY, W5FRL, VK5EM, W5FSK, W5DNV, VK2SK, ZL3AB, VK2VQ, W7AEM, VK3WW, ZL2OQ, VK3DM, VK2FM, HC1FG, SU5NK, ZL4FW, ZL3AX, W5AKZ and VK2QR. NY2AE was received on 'phones, and all the above stations were logged during last month.

Altogether I have about 700 QSL cards from amateurs in all parts of the world, and have never yet sent a reply coupon for one. My motto is "A good detailed report deserves a card," and I think this holds good with a great number of amateurs.—F. G. SADLER (2ASA) (Stamford Hill, N.16.)

Back Numbers

SIR,—Please accept my thanks for inserting my request for back No. 168 of PRACTICAL AND AMATEUR WIRLESS in your valuable and esteemed paper. I have been interested in wireless, which has been my hobby for the past sixteen years, and have my PRACTICAL AND AMATEUR WIRELESS every week. This has been my first experience of requesting a back number. I have received over thirty copies, and wish to thank all readers who did not enclose name and address. I would suggest that in future readers who want back numbers request the Editor to insert their wants in PRACTICAL AND AMATEUR WIRELESS, but that no copies be sent. Readers could advise applicant by postcard where copies were available, then applicant could get in communication with one reader which would fulfil his needs. A mutual understanding could prevail among readers that all offers, though not acknowledged or accepted, would be none the less appreciated. In my case 80 per cent. were returnable, so you see it is rather an expensive business apart from the time spent in replying to readers, and also wrapping up copies.—J. B. LOTHIAN (Edinburgh).

Those QSL's!

SIR,—I have been very interested in the various letters from readers dealing with QSL's, black-listing, etc., which have appeared in recent issues of your fine journal. As regards the "black-listing," I have noted that SU1CH and SM5SX are given as examples by readers. I have QSL's from both these stations: SU1CH for 28.5.36-2.6.36 and SM5SX for 4.6.36. (both received some time ago).

I also believe that many S.W.L.'s are "short-winded" in waiting for QSL's—it needs patience at times. I waited nearly twelve months once for a reply from a European! Another point is the fact that many reports (good or bad) go astray owing to incorrect addresses, etc. I fill all my reports in on a B.L.D.L.C. form and give real information, not "hooch" as one reader put it.

While writing I venture to give a few of the S.W. stations received here recently: they are as follows:—EAJ43, COCH, EA1AZ, VQ7LO, VK3LR, VK2ME, JVH, SU1KG, VO1I, VO1J, K4SA, K4DDH, HI7G, NY2AE, CX1AA, PY2BA, and numerous Americans, but the outstanding station is W2XAD, which has been consistently R9 for some time. Does any listener in this area receive G stations on 20 metres? For the past two years I only received G6SR, 5NI, 5ML, 6GO, and 8AC, but early last month, at 11.00-12.00, the 20 m. band was more alive than I have ever known it—G2DI, G6HH, 6VH, 2JF, and 5NI, came in at fine strengths on 'phones.

My antenna is of the standard dipole type, and the receiver in use is a 1-v-2, battery operated.—C. T. FAIRCHILD (Brighton, Sussex).

CUT THIS OUT EACH WEEK.

Do you know

—THAT the band-width of a band-pass tuner may be modified by varying the capacity of the condenser used for coupling.

—THAT although a higher anode resistance will theoretically improve amplification in a resistance-capacity coupler, the resultant drop in anode volts may negative such increase.

—THAT the capacity of the condenser in a resistance-capacity coupler governs the low note response.

—THAT ebonite may be prevented from discoloration by keeping clean with an oily cloth.

—THAT a rubber mat placed beneath an accumulator may prevent damage due to spilt or splashed acid.

—THAT in a self-contained receiver the accumulator should not be placed immediately beneath any fine wire or copper component, without the intervention of some acid-proof material.

—THAT a step-down H.F. transformer is desirable to ensure stability, although a 1 to 1 ratio gives the highest amplification.

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

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

A Good Log from Londonderry

SIR,—Not having seen any DX reports in your paper from this city, I append a list of stations I have heard recently on an 0-v-1 receiver with headphones.

W1NR, W2FWK, W2GZZ, F8IN, W9KNH, SU1GH, W2CC, VE1CI, W8RL, FCEQ, W2ETI, W2HCE, W9CC, W2ATA, W9XCA, W9KNH, VK1CC, VK2OG, W2LHI, W3MO, VK3RA, ONV4K, ON4CH, SU1H.

I received these stations at R6-9 at 13.20 to 14.00 hours B.S.T. on Thursday, October 1st. They are all amateurs on the 14 mc. band.

The broadcast stations, received before 01.30 hours since the end of September on the same receiver, are as follows:—

W8XK (19, 25 and 49 metre channels), W2XE (19, 25 and 49 metre channels), PME, PMN, W2XAD, W2XAF, W1XAL (19 and 25 metres), CP5, CP7, TFL, VPD, CJRX, HJ4ABA, JVN, JVH, JVP, ZFD, CWA, W3XAU, VK3LR, VK3ME, W1XK, VUB, VUC, PRF5, COCO, COCH, CR6AA, EA8AB, VP3MR, YV2RC, YV3RC, VE9HX, W3XAL (16 and 49 metres), CRCX, VQ7LO, ZTJ, HP5B, ZHI, TG2X, ORX4D.

As will be seen from the call signs, practically all the world has been toured from an armchair.

According to some experts, Londonderry is a poor place for reception, but I certainly have not found it so. My receiver is the one described in PRACTICAL AND AMATEUR WIRELESS in September, 1935, but I have fitted Eddystone coils, instead of the one described, used in conjunction with a .0001 mfd. band-set condenser, and a .00004 mfd. band spreader. The choke is as described in the article, and the L.F. side is R.C. coupled to an ordinary small output valve.

The aerial is a piece of 12 s.w.g. enamelled wire, 66ft. long, 30ft. high at the far end and 25ft. at the lead-in end, which means that I have about 36ft. top and the remainder down the side of the house and to the set. There are no joins in it, the whole aerial consisting of one long piece of wire.—N. THOMAS (Londonderry).

Back Number Wanted

A READER urgently requires a copy of AMATEUR WIRELESS dated March 31st, 1934, and if any reader who has a copy of this particular issue to spare will send it on to this office it will be forwarded to the reader in question.

QUERIES and ENQUIRIES

Improving Smoothing

"I have an old commercial A.C. receiver which has never been really good. I have made various alterations from time to time and have gradually improved it, but there is one fault which still persists. This is undue hum. The wiring does not appear at fault, as I have modified the run of wires slightly without effect. Could I increase the values of any smoothing condensers to any advantage? What condensers should be so modified?"—V. F. M. (N.4).

YOU could connect various values of fixed condenser in parallel with the mains smoothing and grid-bias smoothing condensers to see if this has any effect. Naturally the additional capacity should be quite high in order to make a substantial improvement. On the mains side (each side of the H.T. smoothing choke) try 8 mfds, and a similar value for the bias smoothing. Eventually you may find it desirable to use extremely high capacities in the latter position, 25 mfds. or 50 mfds. being a suitable value. Electrolytics may be used permanently, but care must be taken regarding polarity when making the preliminary tests, if this type of condenser is employed.

A Selectivity Problem

"I should be glad to know if the Record All-wave 3 is really selective or does the local swamp the dial. Is it possible to cut out one valve on the Record 3 with a switch, or one or two valves on the Limit 4?"—W. W. (Rickmansworth).

THE circuit employed in the Record All-wave 3 provides a sufficient degree of selectivity to answer all normal requirements. At your locality you could not expect a simple three-valver of this type to enable you to receive Fécamp, for instance, clear of the London National. You should, however, be easily able to tune in the Midland Regional on the speaker without a background from either of the London stations. A superhet is required if you need the maximum selectivity, but in view of your last request concerning the elimination of valves from the Record or Limit we imagine you are concerned with economical running and therefore cannot use a superhet. We do not recommend the exclusion of valves from either of these circuits, and if you find that selectivity is not sufficient for your particular requirements, you should consider the modification of your aerial system, with, perhaps, the erection of a special non-directional aerial for the reception of distant stations.

Condenser Position

"I notice in some H.F. circuits that the condenser from the screen is taken to the cathode, while in other sets it goes from screen to earth. Is there any difference in this arrangement, and if so, which is correct for my set in which I use a VP4 with separate mains lead for screen voltage?"—R. O. (Whitefield).

THERE is very little difference in the two methods of connection. In both cases, the screen is connected to earth through a fixed condenser, as the cathode itself is always connected to earth through a condenser, no matter whether this is joined across a fixed bias resistor, or across the variable resistor used for H.F. volume control. Thus the cathode is at "earth potential" and therefore the connection of a condenser from screen to cathode is all that is required. In many receivers it will, in fact, be found best to connect this condenser direct from the screening grid socket on the valveholder direct to the cathode socket, and, of course, a non-inductive condenser must be used.

RULES

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

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

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

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

The Coupon must be enclosed with every query.

Speaker Experiments

"I have just finished a high-quality receiver, and am rather hesitant about the speaker for it. I am really going to experiment deeply concerning reproduction, and shall no doubt be changing the output circuit from time to time. I cannot examine all the speakers on the market, but I believe that most of them are difficult to take to pieces, and I particularly want to try out different cones. I shall fit a universal speaker transformer to the set if you think this is best, but should like you to recommend a speaker which will enable me to follow the most attractive lines of experiment."—R. A. R. (St. Albans).

THE Radio Development Company make a feature of replaceable diaphragms in their more expensive speakers, and these are fitted with various speech coils ranging from 1 to 2,550 ohms. These will enable you to obtain varying matching loads without modifying the output transformer, and in addition the diaphragms are available in different thicknesses and tonal qualities. Full details may be obtained on application to the Radio Development Company at Aldwych House, W.C.2.

Super 60

"I have a set of 4 superhet, all-wave coils as specified for the Super 60. As I am desirous of building this set could you tell me the issue number in which they were described?"—R. G. W. (Exeter).

THE receiver in question is now out of date, and we regret that both the blue print and the issues in which construction was described are out of print. The Oscillator coil is designed for use with a separate triode oscillator, and we have no details of a receiver now available of this type.

S.W. Converter for Superhet

"Would you please inform me if you have a blueprint of a Short Wave Converter for an all-mains Superhet, D.C."—E. D. (Merthyr Tydfil).

WE have several times mentioned the difficulty concerning the use of a superhet S.W. converter with a superhet receiver. If the latter is a straightforward circuit there should not be any difficulty, although under some conditions there may be two or three extra whistles caused by the radiation from the frequency changer. The greater problem arises, however, if the superhet already incorporates some aerial selectivity device which is fitted to prevent second-channel whistles, and it is then found that this sometimes is of such a nature that it prevents the converter from functioning. As we have no circuit details of your set we cannot say whether or not it is suitable, and therefore you should communicate with the makers and obtain their approval for the use of a converter. If it is in order, the unit which is the subject of our blueprint P.W. 48A will prove suitable, as this may be used for a battery or mains receiver.

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

Practical and Amateur Wireless
BLUEPRINT SERVICE

These blueprints are full size. Copies of appropriate issues containing descriptions of these sets can in most cases be obtained as follows:—"Practical Wireless" at 4d., "Amateur Wireless" at 4d., "Practical Mechanics" at 7½d., and "Wireless Magazine" at 1/3d., post paid. Index letters "P.W." refer to "Practical Wireless" sets, "P.M." to "Practical Mechanics" sets. "A.W." refer to "Amateur Wireless" sets, and "W.M." to "Wireless Magazine" sets. Send (preferably) a postal order (stamps over sixpence unacceptable) to "Practical and Amateur Wireless" Blueprint Dept., Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.

PRACTICAL WIRELESS STRAIGHT SETS. Battery Operated.

	Date of Issue.	No. of Blueprint
One-valve : Blueprint, 1s.		
All-wave Unipen (Pentode) ..	—	PW31A
Two-valve : Blueprint, 1s.		
Four-range Super Mag Two (D Pen)	11.8.34	PW36B
Three-valve : Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF (Trans))	—	PW10
Sixty-Shilling Three (D, 2 LF (RC & Trans)	2.12.33	PW34A
Leader Three (SG, D, Pow) ..	—	PW35
Summit Three (HF Pen, D, Pen)	8.8.34	PW37
All Pentode Three (HF Pen, D (Pen), Pen)	22.9.34	PW39
Hall-Mark Three (SG, D, Pow) ..	—	PW41
Hall-Mark Cadet (D, LF, Pen (RC))	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three)	13.4.35	PW49
Genet Midget (D, 2 LF (Trans)) ..	*June* '35	PM2
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53
Battery All-Wave Three (D, 2 LF (RC))	31.8.35	PW55
The Monitor (HF Pen, D, Pen)	8.2.36	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P) ..	—	PW64
The Gladiator All-Wave Three ..	29.8.36	PW66
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen) ..	31.10.36	PW69
Four-valve : Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen) ..	—	PW11
Beta Universal Four (SG, D, LF, Cl. B)	15.4.33	PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-mark 4 (HF Pen, D, Push-Pull)	—	PW46
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P) ..	26.9.36	PW67
Mains Operated.		
Two-valve : Blueprints, 1s. each.		
A.C. Twin (D (Pen), Pen) ..	—	PW18
A.C.-D.C. Two (SG, Pow) ..	7.10.33	PW31
Selectone A.C. Radiogram Two (D, Pow)	—	PW19
Three-valve : Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, DDT, Pen)	10.6.33	PW23
D.C. Ace (SG, D, Pen)	15.7.33	PW25
A.C. Three (SG, D, Pen)	—	PW29
A.C. Leader (HF Pen, D, Pow) ..	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen) ..	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	18.8.34	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50
"All-Wave" A.C. Three (D, 2 LF (R.C.))	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	31.8.35	PW56
Four-valve : Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	—	PW45
Universal Hall-Mark (HF, Pen, D, Push-Pull)	9.2.35	PW47
SUPERHETS.		
Battery Sets : Blueprints, 1s. each.		
£5 Superhet (Three-valve) ..	—	PW40
F. J. Camm's 2-valve Superhet (Two-valve)	13.7.35	PW52
F. J. Camm's £4 Superhet ..	—	PW58
Mains Sets : Blueprints, 1s. each.		
A.C. £5 Superhet (Three-valve) ..	—	PW43
D.C. £5 Superhet (Three-valve) ..	1.12.34	PW42
Universal £5 Superhet (Three valve)	—	PW44
F. J. Camm's A.C. £4 Superhet 4	—	PW59
F. J. Camm's Universal £4 Superhet 4	11.1.36	PW60
SHORT-WAVE SETS.		
Two-valve : Blueprints, 1s.		
Midget Short-Wave Two (D, Pen)	15.9.34	PW38A
Three-valve : Blueprints, 1s. each.		
Experimenter's Short-Wave Three (SG, D, Pow)	—	PW30A
The Prefect 3 (D, 2 LF (RC and Trans))	8.2.36	PW63
The Bandspread S.W. Three (HF Pen, D (Pen), Pen)	29.8.36	PW68

PORTABLES.

Three-valve : Blueprint, 1s.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) ..	16.5.36	PW65
Four-valve : Blueprint, 1s.		
Featherweight Portable Four (SG, D, LF, Cl. B)	—	PW12

MISCELLANEOUS.

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

AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.

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

STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.		
B.B.C. Special One-valver ..	—	AW387
Twenty-station Loud-speaker One-valver (Class B)	—	AW449
Two-valve : Blueprints, 1s. each.		
Melody Ranger Two (D, Trans) ..	—	AW388
Full-volume Two (SG det, Pen) ..	—	AW392
B.B.C. National Two with Lucerne Coil (D, Trans)	—	AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans) ..	—	AW338A
Lucerne Minor (D, Pen)	—	AW426
A Modern Two-valver	*July* '36	WM409
Three-valve : Blueprints, 1s. each.		
Class-B Three (D, Trans, Class B)	22.4.33	AW386
New Britain's Favourite Three D, Trans, Class B)	15.7.33	AW394
Home-built Coil Three (SG, D, Trans)	—	AW404
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans) ..	2.12.33	AW412
1934 Ether Searcher: Baseboard Model (SG, D, Pen)	20.1.34	AW417
1934 Ether Searcher: Chassis Model (SG, D, Pen)	—	AW419
Lucerne Ranger (SG, D, Trans) ..	—	AW422
Cossor Melody Maker with Lucerne Coils	—	AW423
Mullard Master Three with Lucerne Coils	—	AW424
£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans)	—	AW437
All Britain Three (HF Pen, D, Pen)	—	AW448
"Wireless League" Three (HF Pen, D, Pen)	3.11.34	AW451
Transportable Three (SG, D, Pen)	—	WM271
£6 6s. Radiogram (D, RC, Trans)	—	WM318
Simple-tune Three (SG, D, Pen)..	*June* '33	WM327
Economy-pentode Three (SG, D, Pen)	*Oct.* '33	WM337
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 3s. Three (SG, D, Trans) ..	*Mar.* '34	WM354
Iron-core Band-pass Three (SG, D, QP 21)	*June* '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen)	—	WM371
PTP Three (Pen, D, Pen)	*June* '35	WM389
Certainty Three (SG, D, Pen) ..	*Sept.* '35	WM393
Minitube Three (SG, D, Trans) ..	*Oct.* '35	WM396
All-wave Winning Three (SG, D, Pen)	*Dec.* '35	WM400
Four-valve : Blueprints, 1s. 6d. each.		
65s. Four (SG, D, RC, Trans) ..	—	AW370
"A.W." Ideal Four (2 SG, D, Pen)	16.9.33	AW402
2 H.F. Four (2 SG, D, Pen) ..	—	AW421
Crusaders' A.V.C. 4 (2 HF, D, QP 21)	18.8.34	AW445
(Pentode and Class-B Outputs for above: Blueprints, 6d. each) ..	25.8.34	AW445A
Self-contained Four (SG, D, LF Class B)	*Aug.* '33	WM331
Lucerne Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, 2 LF)	*Feb.* '35	WM381
The H.K. Four (HF Pen, HF Pen, D, Pen)	*Mar.* '35	WM384
The Auto Straight Four (HF, Pen, HF Pen, DDT, Pen)	*April* '36	WM404
Five-valve : Blueprints, 1s. 6d. each.		
Super-quality Five (2 HF, D, RC, Trans)	*May* '33	WM329
Class-B Quadradyne 2 SG, D, LF, Class B)	*Dec.* '33	WM344
Mains Operated.		
Two-valve : Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C. ..	23.9.33	AW403
Economy A.C. Two (D, Trans) A.C.	—	WM286
Unicorn A.C./D.C. Two (D, Pen)..	*Sept.* '35	WM394
Three-valve : Blueprints, 1s. each.		
Home-Lover's New All-electric Three (SG, D, Trans) A.C. ..	—	AW383
Three-valve : Blueprints, 1s. each (*contd.*).		
S.G. Three (SG, D, Pen) A.C. ..	—	AW390
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW399
A.C. Pentaquester (HF Pen, D, Pen) A.C.	23.6.34	AW436
Mantovani A.C. Three (HF, Pen, D, Pen) A.C.	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	*Jan.* '36	WM401
Four-valve : Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen) ..	*July* '33	WM326
Harris Jubilee Radiogram (HF Pen, D, LF, P)	*May* '35	WM386
SUPERHETS.		
Battery Sets : Blueprints, 1s. 6d. each.		
Modern Super Senior	—	WM375
Varsity Four	*Oct.* '35	WM395
The Request All-Waver	*June* '36	WM407
1935 Super Five Battery (Superhet)	—	WM379
Mains Sets : Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C. ..	—	AW425
Heptode Super Three A.C.	*May* '34	WM359
"W.M." Radiogram-Super A.C...	—	WM366
1935 A.C. Stenode..	*Apl.* '34	WM385
PORTABLES.		
Four-valve : Blueprints, 1s. 6d. each.		
Midget Class B Portable (SG, D, LF, Class B)	20.5.33	AW389
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
TWO H.F. Portable (2 SG, D, QP21)	*June* '34	WM363
Tyers Portable (SG, D, 2 Trans)..	—	WM367
Five-valve : Blueprint, 1s. 6d.		
New Class-B Five (2 SG, D, LF, Class B)	*Nov.* '33	WM340
SHORT-WAVE SETS—Battery Operated.		
One-valve: Blueprints, 1s. each.		
S.W. One-valve converter (Price 6d.)	—	AW329
S.W. One-valve for America ..	—	AW429
Rome Short-waver	—	AW452
Two-valve : Blueprints, 1s. each.		
Ultra-short Battery Two (SG det, Pen)	*Feb.* '36	WM402
Home-made Coil Two (D, Pen) ..	—	AW440
Three-valve : Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D, Trans. Super-regen)	30.6.34	AW438
Experimenter's Short-waver (SG, D, Pen)	*Jan.* 19, '35	AW463
The Carrier Short-waver (SG, D, P.)	*July* '35	WM390
Four-valve : Blueprints, 1s. 6d. each.		
A.W. Short-wave World Beater (H.F. Pen, D, RC, Trans) ..	—	AW436
Empire Short-waver (SG, D, RC, Trans)	—	WM313
Standard Four-valver Short-waver (SG, D, LF, P)	*Mar.* '35	WM338
Superhet : Blueprint, 1s. 6d.		
Simplified Short-wave Super ..	*Nov.* '35	WM397
Mains Operated.		
Two-valve : Blueprints, 1s. each.		
Two-valve Mains short-waver (D, Pen) A.C.	—	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.	—	WM368
"W.M." Long-wave Converter ..	—	WM380
Three-valve : Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C. ..	—	WM352
Four-valve : Blueprint, 1s. 6d.		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) ..	*Aug.* '35	WM391
MISCELLANEOUS.		
Enthusiast's Power Amplifier (1/6)	*June* '35	WM387
Listener's 5-watt A.C. Amplifier (1/6)	*Sept.* '35	WM392
Radio Unit (2v.) for WM392 (1s.)	*Nov.* '35	WM398
Harris Electrogram (battery amplifier) (1/-)	*Dec.* '35	WM399
De-Luxe Concert A.C. Electrogram	*Mar.* '36	WM403
New style Short-waver Adapter (1/-)	*June* '35	WM388
Trickle Charger (6d.)	*Jan.* 5, '35	AW420
Short-wave Adapter (1/-).. ..	*Dec.* 1, '34	AW456
Superhet Converter (1/-)	*Dec.* 1, '34	AW457
B.L.D.L.C. Short-Wave Converter (1/-)	*May* '36	WM405
Wilson Tone Master (1/-) ..	*June* '36	WM406
The W.M. A.C. Short-Wave Converter (1/-)	*July* '36	WM408

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2/- PREMIER 3-band S.W. Coil, 11-25, 19-43, 38-86 metres. Simplifies S.W. receiver construction, suitable any type circuit.

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4/6 MAINS VALVES, famous Europa 4 v. A.C. types, H.L., L., S.G., Var.-Mu-S.G., H.F. Pens., Var.-Mu-H.F. Pens., 1, 3 and 4-watt A.C. directly-heated output Pentodes. Full-wave rectifiers, 250v. 60 m.a. A.C./D.C. types. 20-volt .18 amp. S.G. Var.-Mu-S.G., H., H.L., Power.

5/6 FOLLOWING TYPES. Full-wave rectifiers, 350v. 120 m.a. and 500v. 120 m.a. 2½ watt indirectly-heated Pentodes. Frequency Changers, Octodes and Heptodes.

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5/6 AMERICAN VALVES. Genuine American HYTRON first-grade Valves, 3 months' guarantee. All types. New Metal-glass Valves, all types, 6/6 each. Genuine American DUOTRON Valves, all types, 3/6 each.

VALVE HOLDERS for all above types, 6d. each. Octal Bases, 9d. each.

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19/6 2-VALVE S.W. Kit. Valves given free!

42/- 3-VALVE S.W. Kit. S.G. Det. 2 Pen. Valves given free!

50/- ALL-WAVE "ALL-WORLD RANGE" 3-valve kit, 12-2,000 metres in 4 wavebands without coil changing, complete kit of parts with 3 valves, S.G.H.F., S.G. Det. and Pentode (2 volts). Q.P.P. Model, 6/6 extra.

12/6 LISSEN ALL-WAVE COILS, 12-2,000 metres complete with switching and wiring diagram.

25/- THE LOT. BAND-PASS TUNING PACK, comprising set of Telsen 3-gang iron-cored coils with switching, mounted on steel chassis with 3-gang condenser, illuminated disc-drive and 4 valveholders. All mains or Battery circuit. FREE!

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SPECIAL OFFER! 12/6 P.M. Speaker, 35/- Transverse Current Mike, complete with transformer, and 7/6 Stand. If purchased with above kit, 25/- the lot.

£4.4.0 7-WATT A.C./D.C. AMPLIFIER. 3-stage, high-gain, push-pull output. Complete kit of parts with 5 specially matched valves.

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£5.5.0 10-WATT 3-stage A.C. Amplifier Kit with 5 valves.

SPECIAL OFFER! 21/- pair Matched Speakers, 35/- Tranverse Current Mike, complete with transformer and 7/6 stand. If purchased with above kit, 35/- the lot.

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ROLA latest type P.M.'s, 18/6. K.B. 7in. mains energised, 1,500 or 2,500 ohms, 7/9. GOODMAN'S 8in. mains energised, 1,000 ohms field, 10/6 each.

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

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

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

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Announce 1937

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(Continued at top of column three)

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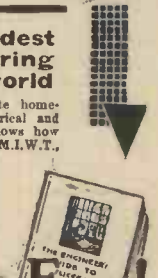

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(Continued from foot of column one)

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

MICROPHONES—Ace (P.O.) microphones, complete with transformer, ready for use with any receiver, 4/6 each; Ace concert microphone, complete on chromium stand with volume control, ready for use with any receiver and amplifier, 11/-.

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

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Practical and Amateur Wireless, November 21st, 1936.

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ERECTING DIPOLE AERIALS—See Page 311

Practical and Amateur Wireless

3d. EVERY WEDNESDAY

Edited by F. J. CAMM

A GEORGE NEWNES Publication

Vol. 9. No. 218. November 21st, 1936.

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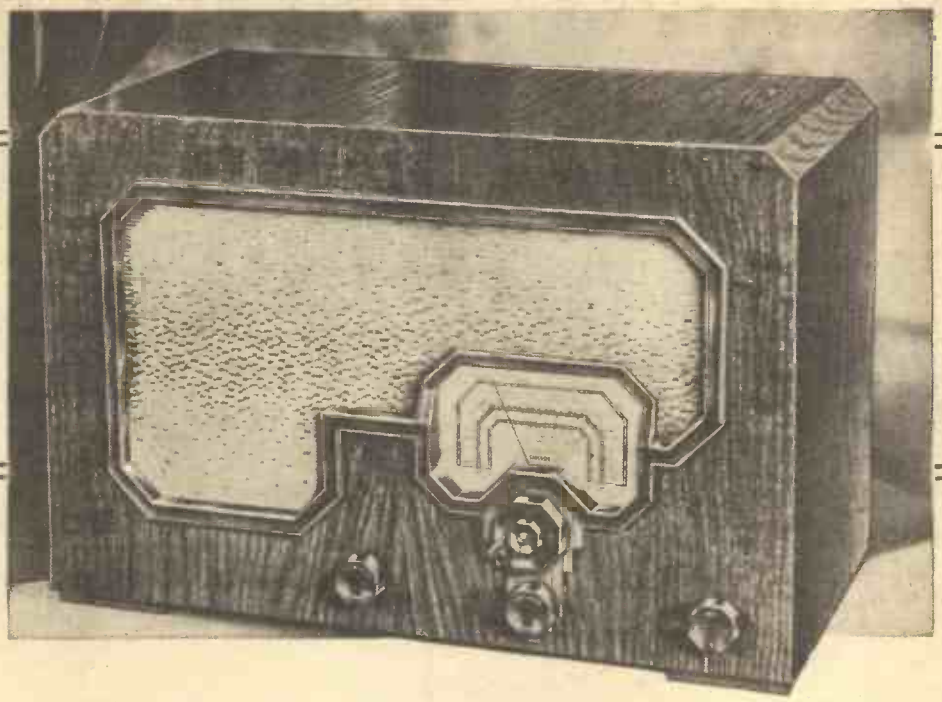

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THE LEADING WIRELESS WEEKLY!

Practical and Amateur Wireless

Edited by F. J. CAMM

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

VOL. IX. No. 218. November 21, 1936.

ROUND *the* WORLD *of* WIRELESS

Super P.A. Equipment

WHAT is claimed to be the loudest public address equipment ever installed was used recently in America at the motor race track at Mineola, Long Island. Nineteen loudspeakers were used, mounted at the top of a 100ft. tower. Twelve smaller speakers were arranged lower down to cover the grandstand area. The announcers' voices were heard clearly and understood above the noise of the cars over a mile away.

Radio Stars and New Shops

A POPULAR feature to-day seems to be the official opening of new radio stores at which well-known stars appear. The latest firm to carry out this feature is Smart's Radio, where, at the opening of a new branch at Romford recently, the well-known stars Elsie and Doris Waters attracted huge crowds.

A Spider-web Aerial

THE RADIO CORPORATION OF AMERICA have been developing an interesting all-wave aerial system, and the peculiar arrangement of the many wires has led to the name "spider's web aerial." It includes a long, horizontal aerial and numerous di-poles all hanging from it, capable of covering the entire range of broadcast frequencies from 140 to 23,000 kc/s.

Television Popularity

AN instance of the popularity of the present television programmes may be gained from the fact that the G.E.C. recently announced that demonstrations would be given at the headquarters in Kingsway, and the crowds were so large that additional accommodation had to be found. Luckily, production has proceeded to such an extent that there were sufficient receivers available to enable everyone to see the transmissions.

Lectures on the C.-R. Tube

AT the London Polytechnic a special course of eight lectures is to commence on November 23rd, from 8.30 to 9.30 p.m. The lectures will be continued on the following Mondays at the same time and the fee for the complete course is 10s. The lecturer is Mr. G. Parr, of the Edison Swan Electric Company. The entire subject of the cathode-ray tube and its applications will be covered.

Synthetic Bells

ANOTHER instance of the substitution of church bells by gramophone records was given recently when the new Lord Mayor of Manchester was rung into office by the pealing of the Town Hall bells. These are actually being re-cast for the Coronation ceremonies, and records of a Stockport church peal have therefore been made by Messrs. Holiday and Hemmerdinger to be used whilst the bells are away.

ON OTHER PAGES

Portable Efficiency

DURING the construction of a large bridge in America recently, the foreman used a portable transmitter in order to keep in touch with the gangs of workmen at each end of the structure. Portable receivers were carried by the overseers and the work of controlling the vast army of workmen was thus greatly simplified and speeded up.

Radio from the Past

IT is accepted that radio signals go on for ever, gradually getting weaker but never actually dying out. Attempts have been made in a Continental laboratory to endeavour to distinguish between present signals and those of the past, but so far without particular success. This raises the old television problem of the ghost images again, namely, are the ghosts reflected impulses, or the reception of a signal after it has once traversed the globe?

Harry Evans and His Band

LATE night dance music for Regional listeners will be supplied by Harry Evans and his Band from the Grand Hotel, Torquay, on November 18th. Listeners will remember that the band made their début in a programme of late night dance music in July; there are eight musicians who for the past five years have specialised in hotel entertainment. In addition to playing dance music, they also give performances as a straight orchestra.

Service for Home Constructors

THE Mullard Wireless Service Co., Ltd., are inviting home constructors to make the fullest use of their Technical Service Department. A postage-saving scheme is about to be launched, and a large number of dealers throughout the country will be co-operating.

Home constructors may approach these dealers—many of whom will be displaying a special poster—in connection with any problems appertaining to home constructed receivers, particularly in regard to valves.

Where dealers cannot provide the required information on the spot, they will pass the enquiry to Mullards who will supply the necessary data within twenty-four hours.

New Radio Actors

THE short play, "Linseed," which is to be broadcast from Manchester on November 25th, will be presented by a cast of seven male players, none of whom has broadcast before. The normal practice in the North Region is to try out new actors in relatively unimportant parts, where they are supported by experienced broadcasters. Latterly, however, Jan Bussell, the Regional dramatic producer, has been experimenting by putting on a number of short plays and sketches presented entirely by newcomers to the microphone. "Linseed" has been written by Edward Hay, and tells of a linseed importer in Manchester, who, unwittingly, bought a cargo in which was concealed large quantities of cocaine. Police and customs officials figure in the sketch, which is by way of being a "thriller."

THE PICK of the PROGRAMMES

"The Importance of Being Earnest"

A CAST of quite outstanding importance has been collected for the forthcoming production of Oscar Wilde's sparkling comedy, "The Importance of Being Earnest." The play, depending as it does upon verbal wit rather than complicated situations, is ideal for the microphone. Ronald Squire, whose intimate suavity has already stamped him as an ideal broadcaster, will play the part of Ernest; Mabel Terry Lewis will be heard as Lady Bracknell, Gladys Young as Miss Prism, and Austin Trevor as Algy. Gwendolen Evans and Jane Baxter will also be heard.

This broadcast will be given in the National programme on November 22nd.

"Variety in Miniature"

THE artists for this programme, to be given from the Midland Regional on November 27th, will probably include Godfrey Baseley and Doris Nichols in a sketch by Francis Durbridge; Leslie Evans with his dulcimer; Fred Lawton and his Band, from Shropshire, in their first broadcast; a marimba player, and two London artists.

Violin Recital

ARTHUR CATTERALL, who has long been a favourite with musical people in the Midlands, will give another recital on November 27th. This is his first broadcast recital from Birmingham since he relinquished his position as leader of the B.B.C. Symphony Orchestra.

The City of Bristol Orchestra

THIS popular West Country orchestra, which gave its first public performance in a broadcast concert from the Bristol Studios in May of this year, will broadcast from The Victoria Rooms, Bristol, on November 28th. On this occasion the orchestra will be led by Maurice Alexander and conducted by Reginald Redman. The vocalist will be Esmé Webb (contralto).

MAKE THESE DATES WITH YOUR RADIO

"Il Trovatore"

THE William Rees Concert Society is presenting a concert version of Verdi's opera "Il Trovatore" on November 28th, which is to be broadcast from the Milton Hall, Manchester. William Rees will conduct his own orchestra and the Manchester Philharmonic Choir. The soloists will be Lily Allen (soprano), Dora Blaney (mezzo-soprano), Hindley Taylor (tenor), Idris Daniels (baritone), and Thomas Duxbury (bass).

TELEVISION AT THE ALEXANDRA PALACE

The "Emitron" camera televising a close-up of a singer.

Dance Music from Blackpool

HORACE FINCH is to broadcast a programme of dance music from the organ of the Empress Ballroom, Blackpool, on November 28th. This programme will be broadcast during the mid-evening period. It will be remembered that Reginald Dixon contributed a similar programme some weeks ago.

Variety from Birkenhead

EXCERPTS from the variety bill at the Argyle Theatre, Birkenhead, will be broadcast in the Northern programme on November 25th.

"The Circus Has Come"

IN December, 1934, Cyril Wood produced "The Circus Has Come," by Ifan Kyrle Fletcher, and he is to present it again on November 23rd, in the Western Regional programme. "The Circus Has Come" illustrates almost every aspect of circus activity, and is a sort of reconstruction of what was probably the greatest circus of all time—that of Barnum. The programme presents a number of the outstanding personalities of circus life, and gives a faithful impression, not only of the style of entertainment, but also of the personalities connected with it. The programme is presented in the form of an actual circus performance, and the author has skilfully contrived to introduce that particular atmosphere of sawdust, and horses, and paraffin flares.

Organ Recital from Clifton College

IN the series of programmes entitled "Some Organs of the West," D. G. A. Fox will broadcast a recital from Clifton College on November 24th. Mr. Fox, who is an old Cliftonian, lost his right arm in 1917 while serving with the 2nd-4th Gloucesters, and it was owing to the advice and encouragement of Sir Hugh Allen that he was enabled to continue his career as a musician.

Hallé Concert

CONSTANT LAMBERT is to conduct the Hallé Orchestra on November 26th. Part of the concert, including the "Symphony No. 2 in D" by Sibelius, will be broadcast from the Free Trade Hall, Manchester.

"Theatres of Variety"

BOSCOMBE will be visited in the programme entitled "Theatres of Variety," on November 24th, when a broadcast of Robert Metcalfe's Revue, "Now and Then," will be heard from the Hippodrome.

Concert from Torquay

LAELIA FINNEBERG (soprano) will be the artist at the concert by The Torquay Municipal Orchestra, conducted by Ernest W. Goss, to be broadcast from The Pavilion, Torquay, on November 24th.

Dance Music Old and New

JACK McCORMICK and his Ambassadors are to broadcast old-time and modern dance music from the Rialto Ballroom, Liverpool, in the Northern programme, on November 25th.

Orchestral Concert from Plymouth

THE Plymouth Orchestral Society, conducted by Walter P. Weekes, will broadcast a concert from The Guild Hall, Plymouth, on November 25th. Laelia Finneberg (soprano) will be the soloist.

SOLVE THIS!

PROBLEM No. 218.

Edwards could not pick up any signals on his home-constructed short-wave straight receiver. All components were tested and found to be in order. When conducting tests the earth lead was accidentally removed. Edwards was surprised to find that signals were now received. What was the probable cause of the trouble? Three books will be awarded for the first three correct solutions opened. Address your solutions to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 218 in the bottom left-hand corner and must be posted to reach this office not later than the first post on Monday, November 23rd, 1936.

Solution to Problem No. 217.

The stoppage in Young's receiver was due to one of the valve heaters burning out; this produced a break in the heater circuit.

The following three readers successfully solved Problem No. 216, and books are accordingly being forwarded to them: J. Dawney, 39, Courtenay Gardens, Upminster, Essex; R. E. Lelliott, 34, Park Gate, Amberstone, Hailsham, Sussex; E. J. Hare, 11, Bower Lane, Eynsford, Dartford, Kent.

Resistor Faults and Remedies

Resistors are Used in Every Radio Set. This Article Explains Special Points Which Need to be Considered, and How to Avoid and Cure Faults

By H. BEAT HEAVYCHURCH

TO-DAY the general standard of reliability and design of resistors of of all types evinces very substantial improvement over a year or so ago. An enormous amount of experiment and research has resulted in the development of resistance compositions having constant characteristics; methods of manufacture have been improved to an extent which reduces the risk of breakdown under normal working conditions to a remote contingency; makers of resistors are now more liberal in their wattage ratings, and standard resistors have a good factor of safety so that they can usually withstand overloads of as much as 50 per cent. without risk of failure. Progress has also been made in the mechanical protection of the resistance element, and many entirely satisfactory types of variable resistor are now available.

It is not intended, in this article, to describe in detail the properties and characteristics of modern forms of resistors, fixed and variable, but to indicate in what ways failures, if they do occur, arise; the symptoms whereby such failures may be recognised, and the tests which may be applied either to individual resistors in order to ascertain whether they are of correct value and are serviceable in other respects, or to isolate a resistance fault if it is suspected.

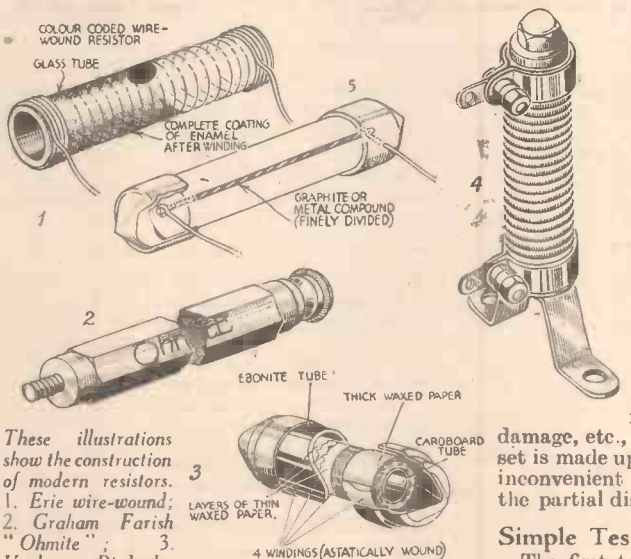
Causes of Breakdown

The risk of failure may arise from several possible causes quite unconnected with the design or manufacture of the component. One of the most common is overheating due to unworkmanlike soldering when wire-end resistors are being built into the set. Usually such resistors are included in the run of wiring, or attached to small unit strips or sub-panels on which a number of resistors and small condensers are concentrated. If soldering is carried out clumsily, the resistance element can be overheated, or the contact between the wire end and the element spoiled. The secret of success when soldering resistors into place is to use a good hot iron, to make the joint at least ½ in. from the body of the resistor, and to do the job quickly. In this connection it is advisable not to solder resistance ends to large pieces of metal such as the main chassis of the receiver, as so much heat is required to bring the point of contact up to soldering temperature that the resistor may become overheated in the meantime. Overheating may result in the destruction of the component, in the production of an intermittent or broken contact at the wire end, or a change in the actual ohmic value of the resistor.

Careful Treatment

In the case of variable resistors, a large number of faults, resulting in noisy operation or intermittent working are merely due to an accumulation of dirt between the resistance track and the slider, but only the most careful treatment must be given when removing this or the slider may be distorted and achieve a permanent "set," or the resistance track may be damaged. Occasionally an open circuit may be caused in a variable resistor due to the terminal being screwed down too tightly when connecting up. Avoid, if possible, variable resistors in which the terminal screw for the external connections also secures the end of the resistance element. Variables with soldering tags are really preferable, but here again a really hot iron should be used and the connections made as quickly as possible.

Nearly as many fixed resistors are ruined by overloading as are damaged by bad soldering or other mechanical damage, and this is always due to the fact that the set builder has either omitted to calculate the amount of power which the resistance will be called upon to dissipate as heat or, having calculated the power, has deliberately used a resistor of too low a wattage rating in an endeavour to save a few pence on the price. It is the simplest thing in the world to calculate the required wattage rating. All that has to be done is to multiply together the value of the resistance in ohms and the square of the current in amperes. For example, a resistance of 5 ohms passing 2 amperes must be rated for $5 \times 2 \times 2 = 20$ watts. As in radio work currents are usually expressed in milliamperes, the easiest method is to multiply the resistance in ohms by the square of the current in milliamperes and divide the result by one million. Thus, a resistance of 100,000 ohms passing 4 milliamperes would have to dissipate $100,000 \times 4 \times 4 \div 1,000,000 =$ 1.6 watts, and a component of 2-watt rating should be employed.



These illustrations show the construction of modern resistors. 1. Erie wire-wound; 2. Graham Farish "Ohmite"; 3. Varley Bi-duplex type; 4. Bulgin power type; 5. Dubilier metallised resistor.

Symptoms

The symptoms accompanying a faulty resistor are many and varied, but they can be briefly listed as: silence in the receiver; noise in the receiver; poor quality, either permanent or intermittent; and low volume, either permanent or intermittent. In the case where a receiver suddenly "goes dead" the fault, if it be in a resistor, is a complete disconnection in most cases, although there are circumstances where a complete short circuit will silence the set. Noisy operation is usually the sign of an intermittent contact somewhere, and this may possibly be in a resistor or the connection to a resistor, or a poor contact in a variable resistor.

Deterioration in quality may be due to a permanent change in the value of a resistor (such as may occur due to overloading or overheating), or, if the bad quality only appears at intervals, it my be due to an intermittent contact which, again, may be in a resistor or its connection. Exactly the same causes may produce changes in the volume, dependent, of course, on what purpose the faulty resistor serves in the receiver.

The usual stage-by-stage tests will enable the location of the fault to be ascertained, and may even permit the trouble to be traced to an individual component, but there are a number of specific tests which can be applied to resistors, not only for tracking down suspected faults but for ensuring that each resistance is of correct value and in perfect condition in all respects. It is well worth the while of every amateur constructor to test all resistors before they are incorporated into a receiver as thereby any troubles due to incorrect marking, mechanical damage, etc., can be detected before the set is made up, when such tests may be inconvenient and in any case involve the partial dismantling of the receiver.

Simple Tests

The first test is obviously that for the actual resistance of the component. Many radio testing instruments have an ohmmeter scale to permit this test to be made very simply, but if such an instrument is not available, it is an easy matter to hook up the necessary test. Such tests are, of course, based upon Ohm's Law, which states, among other things, that the resistance of a circuit is equal to the voltage drop across it divided by the current passing through it. Therefore, the reading of the voltmeter divided by the reading of the ammeter will give the resistance in ohms; or if the instrument reads in milliamperes,

(*Continued overleaf*)

RESISTOR FAULTS AND REMEDIES

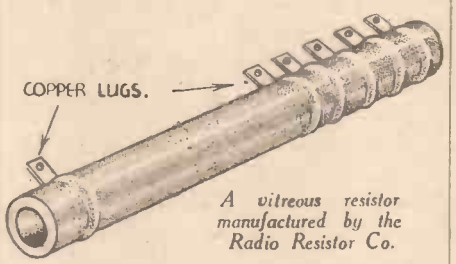
(*Continued from previous page*)

the result must be multiplied by 1,000 to give ohms. It is not, however, necessary to have both a milliammeter and a voltmeter for this test if only a fair approximation to accuracy is desired, for a grid bias battery gives a known voltage, and by using the 1½, 3, 4½, 6, or other tapping a wide range of resistance values may be checked. For very high values it may be necessary to use a high-tension battery, but care should be taken to make first a rough test on a low-voltage battery in order to make sure that the current passed is not in excess of the milliammeter range. Let us take a practical example: suppose a resistor under test is connected in series with a 4½ volt battery and a milliammeter, and the measured current is 3 milliamps. The value of the resistance will be $4.5 \times 1{,}000 \div 3 = 1{,}500$ ohms. This value is, of course, only an approximation, because the measured resistance includes that of a milliammeter and the voltage used will not be exactly 1.5 volts. But it will be near enough for all practical purposes, and at any rate will show whether the resistor is within a few per cent. of its rated value.

It is not, of course, possible to test whether a resistor is of the wattage rating stamped on it, but it is possible to check whether, in its position in the set, it is being overloaded. All that is necessary is to measure the current passing through it under service conditions, and multiply the square of this value by the resistance in ohms, dividing the result by 1,000,000 if the current is measured in milliamps. Another method is to measure the voltage drop across the resistor under service conditions, square this, and divide by the resistance. Either method will give the watts dissipated.

Intermittent Contacts

In order to test whether an intermittent contact exists in a resistor or its connections, current should be passed through it, either by switching the set on or by removing the resistor and connecting it across a battery of suitable voltage, a milliammeter of suitable range being connected in series. Adjust the voltage so that the current is approximately the normal working value, and then tap the resistor and nearby leads with a pencil. If there is an intermittent



A vitreous resistor manufactured by the Radio Resistor Co.

connection this will be revealed by sudden jerks in the deflection of the milliammeter. This test should be taken immediately the current is switched on, and again after the resistor has been in circuit for some little time and has warmed up, because sometimes bad connections only reveal themselves after expansion has occurred.

It is usually quite an easy matter to check for noisy operation in a variable resistor—manipulation of the knob while the set is "on" will produce sufficient noise in the speaker. If careful cleaning of the resistance track and the slider fail to make any improvement, it is usually better to scrap the component as it is seldom worth while attempting mechanical adjustments. In connection with volume controls it should be mentioned that these are often "graded"—that is to say, the change in resistance for a given amount of turning of the knob is greater at one end of the range than at the other. By this means a more even variation in volume control is achieved in many circuits. If, therefore, the volume control of a receiver is too "fierce," it may be that the control has been connected the wrong way round, and by reversing the outer connections the matter can be put right.

Two other points in connection with resistance testing should be mentioned. First, all resistance measurements should be made with the resistor cold and repeated when the resistor has attained working temperature, not only in order to reveal possible intermittent contacts, but also to ensure that the value of the resistance itself does not change with temperature. Next, when testing a resistor for continuity or the resistance value in a receiver, make sure that there are no other circuits in parallel with it which may act as shunts, giving a good continuity indication even when the resistor under test is faulty, or a value of ohmic resistance which is too low.

PROGRAMME NOTES

Cinema Organ Recital

AN organ recital from the Rialto, Coventry, will be broadcast for the first time on November 28th. Leslie James, who will give the recital, opened the organ there, and claims that his record of organ openings—fifty-four—is unequalled in this country.

Concert from Hereford

THE City of Birmingham Orchestra goes to the Shire Hall, Hereford, for a joint concert with Hereford Choral Society on November 24th. The conductor is Dr. Percy Hull, Organist and Master of Choristers at Hereford Cathedral, and Chairman of Midland Regional Music Advisory Committee. The chief works to be broadcast at this concert are Parry's "Ode on St. Cecilia's Day," with Joan Coxon (soprano), and Arthur Cranmer (baritone) as the principals; and Stanford's "Songs of the Fleet," with Arthur Cranmer as soloist.

Stars of Seaside Concert Parties

HARRY S. PEPPER, accompanied by Davy Burnaby, toured many seaside resorts during the summer, usually incognito, vetting seaside concert parties. For various reasons, all the talent he then discovered could not be used in the limited time available. Realising that much good material was being lost to the series "From the Seaside" he thereupon visualised a winter programme, starring the talent he then discovered. On December 2nd, in the Regional programme, John Watt and Harry Pepper will produce a variety programme featuring these concert-party artists. John Watts himself will introduce them to listeners, telling how and where they were discovered, and announcing their various numbers. This broadcast should occasion considerable interest, as it will be the first time that the new B.B.C. theatre organ will be used to accompany a variety programme.

Saturday Contrasts

THE Outside Broadcast Department has been pursuing for some time a policy of Saturday contrasts. On December 5th, descriptions of a "soccer" and a "rugger" match will be broadcast. The Rugby match commentary will come from the North, where Wigan are playing St. Helen's Recs. As the venue is Wigan, there is no doubt that some humorous local colour will be obtained, sufficient to maintain the distinctive characteristics associated with this famous town's name.

Orchestral Concert from Edinburgh

THE Rutland Square and New Victoria Orchestra, directed by Norman Austin, will broadcast from the New Victoria Cinema, Edinburgh, on November 20th. Included in the programme, which is definitely a popular one, are violin solos by Frank Moy.

Robert Heger at Liverpool

ROBERT HEGER will conduct the Liverpool Philharmonic Orchestra in a concert which will be broadcast from the Central Hall, Liverpool, on November 24th. The programme will include Raznicek's "Tragic History" (theme and variations), and works by Zador and Liszt.

B.B.C. Scottish Orchestra

THE B.B.C. Scottish Orchestra, led by J. Mouland Begbie, and conducted by Guy Warrack, will broadcast on November 23rd. The orchestra will play Overture, "Hans Heiling," by Marschner; Suite "La Cimarosiana," by Malipiero; Waltz, "Eugen Onegin," by Tchaikovsky; and "Undine," by Lortzing; while Ethel McLean (soprano) will sing with orchestra "O del mio dolce Ardor," from "Elena e Paride," by Gluck; and "Ritornerai fra poco," by Hasse; and as solos, "My Mother bids me bind my Hair," by Haydn; "Tell me lovely Shepherd," by Boyce; "It was a Lover and his Lass," by D. S. Adams; and "Strephon and Amaryllis," by Coates.

Violin Recital

KENNETH ANDERSON, leader of the Reid Symphony Orchestra, will include in his recital, on November 22nd, "Minuet in D," by Mozart; "Romance," by Rubinstein; "Polichinelle Serenade," by Kreisler; "Grenada," by Albeniz; and "Cornish Rigadoon," by Moffat. Mr. Anderson has given recitals in the big cities and is an Associate of the Royal College of Music and a Fellow of Trinity College of Music for solo playing. He is conductor of the St. Andrew Amateur Orchestral Society.

Inside Information

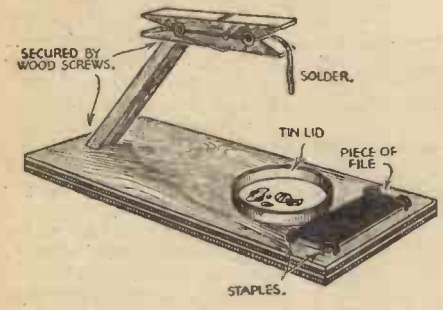
THE second programme in this series, on November 27th, has been given the rather teasing title of "Stationary Motion." This sounds a contradiction in terms, but no doubt Sydney Harrison, who is responsible for the programme, will show that "Stationary Motion" is quite possible. Those who listened to the first in the series, entitled "Unlimited Tick," will be prepared for surprises. This broadcast will be given in the Scottish Regional programme.

A PAGE OF PRACTICAL HINTS

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

For the Workbench

I FIND this simple device very useful when doing small soldering jobs. The dimensions are not very important, pro-

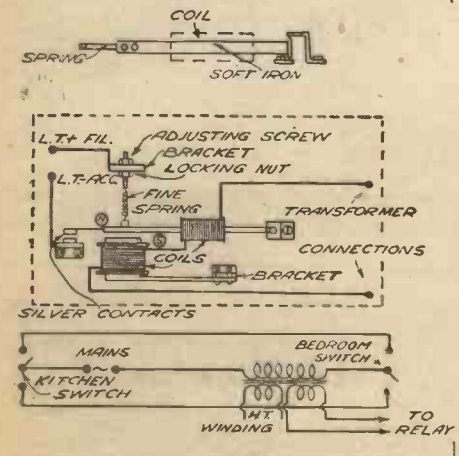


A handy device for use when soldering.

vided, of course, that the solder holder is in a suitable position. The peg and its arm are fixed to the baseboard by means of wood screws ; this applies also to the tin lid which is arranged to catch any surplus solder that may fall from the iron. The piece of an old file is used for cleaning the bit, and is held down by four staples, one at each corner.—D. CLAPP (Balham).

A Relay for A.C. Eliminators

USING an eliminator for H.T. and an accumulator for L.T. supply, I was desirous of fixing an extension speaker and remote control "on-off" switch in a bed-



A simple relay for use with an A.C. eliminator.

room. With the three-wire system, the H.T. was easily switched on or off in either kitchen or bedroom, and I then concentrated on the L.T. switching. All difficulties have been overcome by use of a relay which has the following advantages :—

(1) Has no separate batteries.

(2) Can be used any distance away from the receiver.

(3) Cost of working is about one penny per year when used three hours nightly.

THAT DODGE OF YOURS!

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

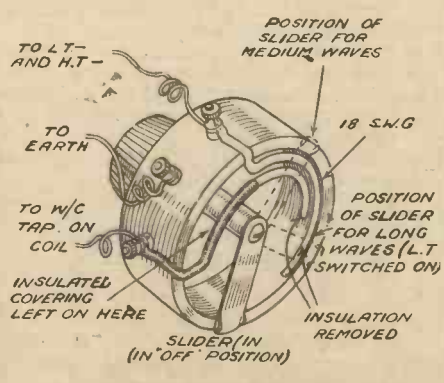
(4) Costs nothing to make, as all parts can be taken from scrap.

As in the novel supply for a pilot lamp illustrated in PRACTICAL AND AMATEUR WIRELESS some months ago, a separate winding (about sixty turns 28 D.S.C.) is added to the mains transformer. Across the ends of this winding are two electro-magnets (see accompanying sketch), the poles of which, at point marked on sketch, are respectively N and S at a given instant, thereby attracting each other and closing the L.T. switch contacts. On the next half cycle both magnets change polarity so that the L.T. is still made. The gap between the L.T. contacts is slightly smaller than the gap between pole face and armature, so that a really positive contact for L.T. is obtained. Any tendency for the relay to vibrate at mains frequency would normally cause the L.T. circuit to be broken at this frequency, but, due to the different gaps, the slight vibrations do not break the L.T. switch contacts. If the relay is mounted on a shock absorber, no vibrations, should they occur, will be transmitted to the receiver cabinet.

It will be seen, on referring to the sketch, that, as the mains supply is switched off, the coil spring automatically breaks the L.T. circuit.—THOMAS DEAN (Bicester).

A Dual-purpose Rotary Switch

THE accompanying sketch shows how a combined wave-change and "on-off" rotary switch can be made from an old volume control. First, remove the resistance winding and fit two connecting wires

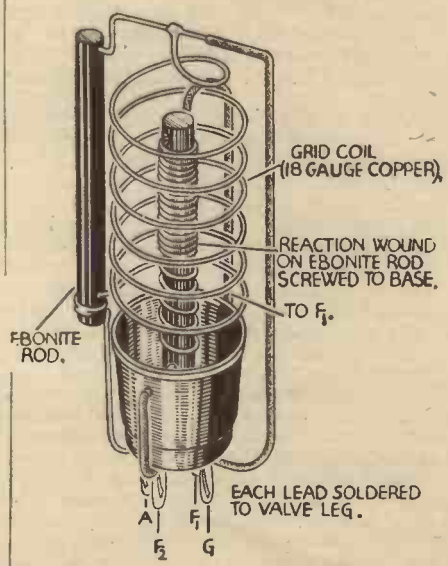


An easily-made dual-purpose rotary switch.

of No. 18 gauge insulated copper wire. Remove the insulation from the ends of these wires, and bend the ends to a semi-circular shape so that when the slider passes over them they will make good contact with the latter. The sketch clearly shows the connections to the L.T. supply, etc. I have had this switch in use in my set for some time, and have found it quite reliable.—R. GOLLEDGE (Midsomer Norton).

Efficient Short-wave Coils

THE illustration shows one of the special coils which I have made up and tested. These coils have proved more efficient than any others I have tried, and I now have a set of three to cover the ranges from 8 to 48 metres. I prefer to use separate coils with small condenser for this band, as I find it simplifies tuning. The coils are mounted on old valve bases, and the grid winding in each case consists of 18-gauge



A method of constructing efficient short-wave coils.

copper wire. The reaction winding is a solenoid on a three-eighths diameter ebonite rod, held in place by a screw through the hole taking the centre-pin on the base, or a separate hole may be drilled in a standard 4-pin base. The grid winding is held in position by 18 S.W.G. wire attached to the grid pin and anchored to a further length of ⅜in. ebonite rod, which is also anchored to the anode pin by similar wire. The diagram makes all features clear. The three coils are wound with four, six and twelve turns for grid (approximately 1¾in. in diameter), and the reaction windings are twenty, twenty-five, and thirty turns. The latter may, of course, be modified to suit the reaction condenser in use.—A TONGUE (Deal).

Ferguson All-wave Receivers

A Test Report of Models 378 A.C. and 378 Universal Superheterodynes

THE illustration shows the general appearance of two of the latest Ferguson receivers designed to cover all the popular short and broadcast wavelengths. These models are designed on similar lines, and the main circuit features are identical except in so far as concerns the mains supplies. In the 378 A.C. model the standard A.C. rectifier and input circuit is employed, whilst in the 378 Universal model two ballast valves and two half-wave rectifiers are employed. The two receivers may thus be considered together, especially as, on test, it was found that both gave identical results and are operated in the same manner.

The Circuit

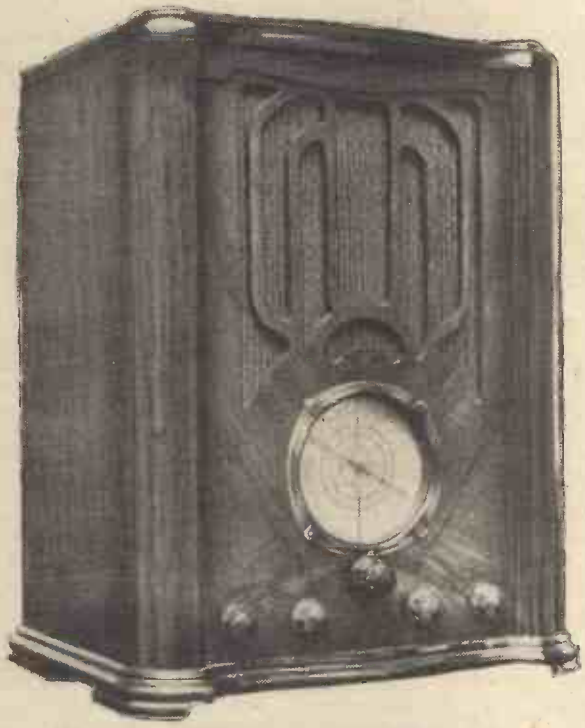
The modern type of superhet circuit is employed, in which the pentagrid converter is preceded by a variable-mu pentode. A single intermediate-frequency stage is employed, using a further variable-mu pentode, and this feeds a double-diode-triode. The output from this is taken via a power triode to a push-pull output stage in which two high-efficiency pentodes are employed. The intermediate frequency employed is 465 kc/s, and the double-diode-triode is employed for demodulation, A.V.C., and L.F. amplification. The circuit is thus more or less quite conventional, but in the incorporation of American valves and in the general circuit arrangement the receiver is unlike the ordinary table model receivers with which the English listener is familiar.

A substantial metal chassis forms the foundation of the receiver, and the coils and I.F. transformers are bolted to this in the ordinary way. The four valves operating at radio-frequency (the signal H.F. amplifier, the frequency changer, the I.F. amplifier, and the double-diode-triode) are inserted into sockets which are fitted into position together with a shallow metal cup. Fitting into these cups are split metal shields which fit tightly round the valves, and a metal cap then fits on top of the shields and thus totally encloses the valve except for a small slot through which the connecting lead to the thimble is taken. The ganged tuning condenser is not mounted rigidly on the chassis but is held in position by bolts through rubber supporting discs and thus is "floating." This latter feature is rendered more or less essential in this particular receiver, as in view of the phenomenal output volume there would be a risk of tuning variations due to vibration of the tuning condenser vanes.

The Controls

There are four controls in addition to the mains tuning unit, one for volume, one for sensitivity, one for wave-changing, and one combined on/off switch and tone control. The tuning scale is of the full vision or aeroplane type, with the four separate wavebands arranged in two concentric circles, the outer ring carrying, in addition to the long and medium wavelengths, the names of the more important European stations. A double-ended pointer travels round the scale, which is continually illuminated when the set is switched on. The only indication of the wave-range setting of the set is given by engraving on the wave-change control knob, and this is turned so that the desired range is uppermost on the knob.

At the rear of the chassis sockets are provided for gramophone pick-up, external loudspeaker, and mains voltage selection. A four-pin socket is also fitted to the rear of the chassis into which a four-pin plug is inserted to feed the speaker and connect the speaker field in circuit.



The complete Ferguson superhet, Model 378, for A.C. or universal mains operation.

Test Report

Both models were tested on our standard aerials and were found to give identical results. Hum is practically negligible, although as is generally found in a Universal model, when this was used on the A.C. supply, a reversal of the mains plug in the socket resulted in more hum being obtained one way round than the other. This point should therefore be watched when using this model. The sensitivity, with sensitivity control in the maximum position, is very high, and this particular control was found extremely useful in obtaining a setting which gave a distant station free from background noises. Selectivity is very good and very little difficulty was experienced in obtaining practically any desired station free from interference. It was found that in some cases a judicious balance of the tone and sensitivity controls enabled very weak stations to be heard clear of interference, and this was especially so in the case of some of the long-distance short-wave stations. The output was more than adequate for the home, and it appeared that the full 8 watts mentioned by the makers was obtained. At maximum output the tone was quite satisfactory with the tone control set to a midway position, and no troubles were experienced due to reverberation or vibration of any of the valves or other components. No doubt the exceedingly well-made cabinet contributes to this feature, and the large Rola speaker which is fitted, handles the volume very well indeed. All of the controls act in a satisfactory manner and are free from backlash or other defects.

On the shortest wave-band (from 12 to 30 metres) most of the American stations could be tuned in late in the afternoon at quite satisfactory volume, and the dual speed control knobs enabled tuning to be very accurately carried out. The receiver may, therefore, be considered as a very good example of modern design, and is good value at the price of 16½ guineas.

FERGUSON ALL-WAVE RECEIVERS SPECIFICATION

Receiver: All-wave Superhet.

Circuit: Signal H.F. stage, pentagrid frequency changer, H.F. pentode, I.F. stage, double-diode-triode second detector and A.V.C. stage, 1 phase reverser and two pentodes in push-pull. Energised loudspeaker, and provision for gramophone pick-up and external loudspeaker.

Tuning covers four wavebands, 12.5 to 30 metres, 28 to 62 metres, 200 to 550 metres, and 1,000 to 2,000 metres.

Controls: Five—volume control, wave-band selector, combined on-off switch and tone control, sensitivity control, and dual-ratio tuning control. The latter is in the form of two concentric knobs. Full vision airplane type tuning scale with station names engraved for medium and long waves.

Price: 16½ guineas for A.C. or for universal (A.C.-D.C.) mains.

Makers: Ferguson Radio Corporation, Ltd., Power Road North, Chiswick, London, W.4.

On Your Wavelength

BY THERMION

Silent Radio

I HAVE been reading details of the Dictograph Silent Radio, by means of which it is claimed that one can listen while others sleep, read, or talk, thanks to the Acousticon Magic Ear. It brings to the listener the opportunity to enjoy by himself, without headphones or anything that is worn, music or speech *via* the radio, while others in the same room need not be disturbed unless they wish to hear. The Magic Ear is a tiny tonal fork, tucked away beneath the pillow or on the back of an armchair. It enables even those who are hard of hearing to listen as well, claim the makers. I shall be interested to have further details of this.

A Question of Degree?

R. J. R. (Clapham) brings up a belated rearguard to the problem of baseboard *versus* chassis. He says :—

"Dear Thermion,—Once again I put down my soldering-iron and pick up my pen to write to you. I note that the old controvery of chassis *versus* baseboard is raging in your columns, and, with your permission, I propose to add my say.

"Surely this question is one of degree. The baseboard is eminently suitable for small sets, and particularly battery sets, but imagine a large mains set built in this manner. Apart from the question of the size of the baseboard that would be required, think of the danger of putting one's hand in the innards when the set is switched on to make some minor trimming adjustment and touching one of the numerous live spots there would be. I have a home-made 4-valve mains set on which it is impossible to touch a "hot" spot anywhere except underneath the chassis. ('What about the S.G. anodes?' says Mr. Smart. I use Yank 'toobs,' which have the grid brought out to the top cap.)

"Baseboards may be all right for those lucky enough to possess a 'den,' but I live in a flat, and my set has to act as a family set and a piece of furniture when the kitchen table is not available for experimenting.

"I have noticed several requests for back numbers in your pages recently. I have 124 copies of PRACTICAL AND AMATEUR WIRELESS, the complete series from March 24th, 1934, to August 1st, 1936 (except Nos. 99 and 130), complete, I believe, with blueprints as published, which I am prepared to dispose of for the sum of 5s. the lot. This sum would include carriage if the purchaser lived within a reasonable distance. I shall be glad if you will publish this offer, as I would rather they fell into the hands of an enthusiast instead of the local second-hand bookshop. I am sorry to have to part with them, but, as I said before, I live in a flat, and storage space is at a premium.

"All the best to you and PRACTICAL AND AMATEUR WIRELESS."

Hong Kong Short-wave Stations

ONE of my correspondents, G.A.K., of Shanghai, asks me to pass along some further news about the short-wave stations at Hong Kong. He also touches on a number of other subjects which have been the cause of controversy, and I therefore reproduce extracts from his letter :—

"Dear Thermion,—I have further news for you about the S.W. station at Hong Kong. It appears that they are trying out a new transmitter on several wavelengths, which are as follows : ZBW2, 49.26 metres ; ZBW3, 31.49 metres ; ZBW4, 19.75 metres ; ZBW5, 16.90 metres. There is no definite schedule yet. However, I might point out that ZBW3 has been tried out, and at present ZBW4 is being tested. The times are the same as those given in my last letter, or as shown in PRACTICAL AND AMATEUR WIRELESS, August 15th. The Nanking transmitter which was "crashing" the 31-metre band has now gone up to about 43 metres ; the tone is something terrible.

"Here is some more news about the cost of parts. The Chinese are now going mad about home construction of superhets. Four hundred and sixty-five kc/s transformers are being produced by the thousand at a cost of about 1s. 6d. Mains transformers are on the market for about 4s. The cost of five American 'toobs' for such a superhet is 9s. Five of them for 9s. ; no wonder English valves are not sold to any great extent here. An English pentagrid costs about the same as the whole five put together. Personally, I prefer to use English valves, not because they are cheaper, but because they are good. It is very difficult to get all types of valves here, whereas my suppliers always have any type you require. Only to-day I rang up the agents here and asked them if they had a double-diode-triode in stock, and I was informed that I was the first person in three years to ask for such a valve! It does not pay them to bring out valves like that as the public will buy the American 'toob' anyway.

"I wish I could have been at the Exhibition. We had a kind of Exhibition here two years ago, and I am telling you the truth when I say that I have never been to a deader thing than that Exhibition. The place was practically empty between 6 and 7 o'clock in the evening when I went. Of parts there was very little to be seen. This was before the Chinese and the Japs were on the market. One Chinese firm here which is turning out scores of parts knows how to charge, and the majority of their stuff is just junk. The Japanese are far better, and their parts are very reliable, but I don't think that the Chinese will ever reach the stage where they can compete in quality with the Japanese. The Japanese have even got a better idea of how to make a mains transformer than the Yanks have, and that's saying something.

"Television is out of the question in China at the moment. They haven't got the sound part anywhere near perfect yet, without starting to "look in."

"It has struck me with regard to your friends (?) the crooners that while the Eastern races are doing their best to ape the Westerners, Europeans are doing their utmost to do the reverse as far as some singing goes. To me, a crooner is similar to a Chinese professional wailer at a funeral procession. What it will be like to see a crooner as well as hear him, I don't know. The twisting of the mouth muscles must look terrible. Under your column I have noticed that you do not like the names of some of the dance band leaders. We had one in Shanghai who went by the name of Al Uhles.

"PRACTICAL AND AMATEUR WIRELESS dated October 3rd has just arrived, and I am surprised at the attitude some of your correspondents take with regard to baseboard sets and chassis sets. I have never seen anything more unpresentable than a baseboard set. I suppose you remember the terrible long wires that had to be trailed all round the set in order that somewhere or other they might be taken to earth. How much simpler is the metallised chassis. Constructors out here don't look at baseboards; the Chinese make all sets on chassis. Of course, if some people will put the components in such a position under the chassis that they cannot get at them when things go wrong, that's their fault, not the fault of the chassis.

"I have an idea which may interest you, regarding the life of valves. Many people think of the life of a valve in terms of months or years. I think in terms of hours. For those who would like to take the trouble the idea is this: A small book is kept into which is entered daily the exact number of hours that the set has been in use. Mine is exact within a minute. If a valve is taken out for an hour while another is being tried out in its place, naturally this hour will have to be subtracted from the total number of hours that the set has been used. These daily figures are added up and another small book is used which has a page for each valve, and the month's figure for each valve is entered here. When a valve is in the 1,000 hour region there can be no doubt or guesswork on the listener's part that the valve is getting old. With this method I can give you some rather interesting figures. I rejected a screen-grid valve as being not up to top notch when it had done 2,116 hours! Similarly, a triode, 1,650 hours, another triode, 1,569 hours, and a pentode, 2,000 odd hours! The existing rectifier in the power supply has done about 1,100 hours. The daily average can also be worked out from the figures supplied from the first book. At the end of each month I have great fun in entering up all these figures!"

Multiple Switches

MULTIPLE switches and potentiometers have given radio manufacturers more trouble in the past than any other component. Numerous types of switches have been tried, but it would seem that the rotary type (the one most commonly used to-day) has come to stay. This consists of one or more circular plates mounted on a common spindle. Each plate can be made to effect the necessary switching in one stage, sufficient distance being provided between the plates to prevent interaction between the leads and switch tags associated with each stage. In commercial receivers this spacing of the leads is carefully attended to before the receiver leaves the factory. But in the home-constructed receiver the constructor has to attend to this, and we have found that the instability experienced in home-made all-wave sets is often due to lack of attention to this detail. A number of the designs recently published in PRACTICAL AND AMATEUR WIRELESS *have incorporated the rotary type of switch and, therefore, constructors are warned to take particular care with the disposition of the leads joining the coils and gang-condenser sections to the switch plates.*

Valve Screening

VALVE screening is generally effected in this country by coating the outside surface of the glass with a special metallic surface. This proves quite effective in most cases, but it is often found that the metallised coating is not making good contact with its associated valve pin. In some cases no contact takes place between pin and coating, and in others resistance between the two is so high that the screening becomes ineffective. This results in instability, of course, and if a set is noticed to be unstable after a new valve has been fitted this fault should be looked for. American manufacturers use a separate valve screen in place of the metallic coating, and this is undoubtedly a more effective method of screening provided that the screening can is connected to earth and is of the correct metal—copper and aluminium are suitable metals for this purpose.

H.F. Lead Screening

ALTHOUGH it is often found necessary to screen the leads to the grid and anode of the H.F. and I.F. valves, excessive screening can cause poor results. The leads must be kept as short as possible, otherwise the high capacity between the lead and its screening cover will upset the ganging of the tuned circuits.

Correspondence Closed

HERE is the last letter I shall publish on the subject of baseboards and chassis. Everything worth saying has been said, and readers should please note that this correspondence is now closed. This letter comes from H. D., of Tongham:—

"Dear Thermion,—I have been studying your pages for the last few weeks and there are one or two comments I should like to make. Firstly, I notice you don't like jazz music. Well, I and a few of my friends have a small band, and I can say I would prefer listening to a programme of jazz any time than I would to classical music, which gives me a pain in the neck. Secondly, concerning baseboards *v.* chassis, I prefer chassis. Baseboards were out of date years ago. My job is assistant radio engineer, and my experience has been solely with chassis. Also H. D. (Notts) remarks that he prefers baseboards for short waves. I think nothing can touch a circuit built on a metal chassis correctly matched and screened. I may be wrong, as I am only eighteen years old, but I have worked for three years with a highly-experienced amateur.

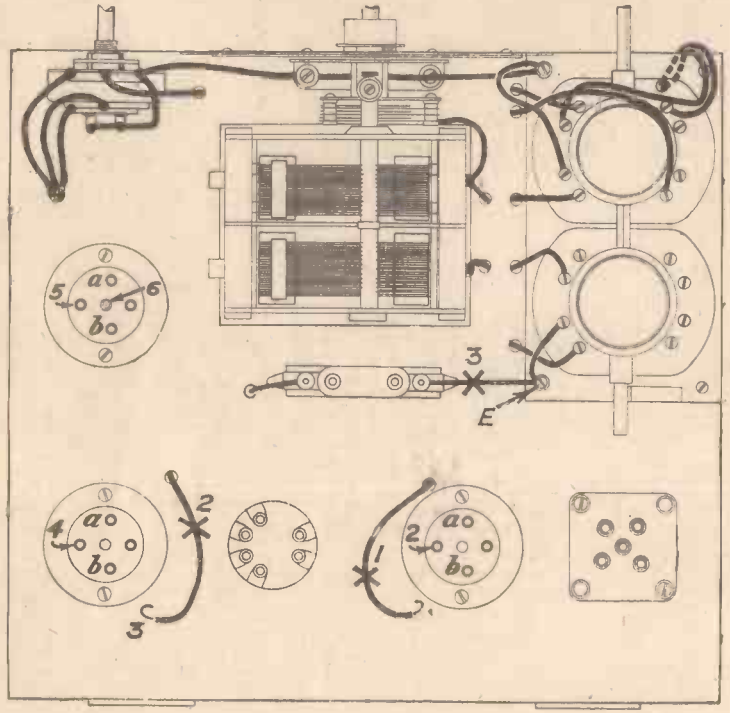
"Any readers requiring back numbers of PRACTICAL AND AMATEUR WIRELESS, particularly those between March, 1934, and the present day, are invited to apply for copies through the Editor."

The First Woman Announcer

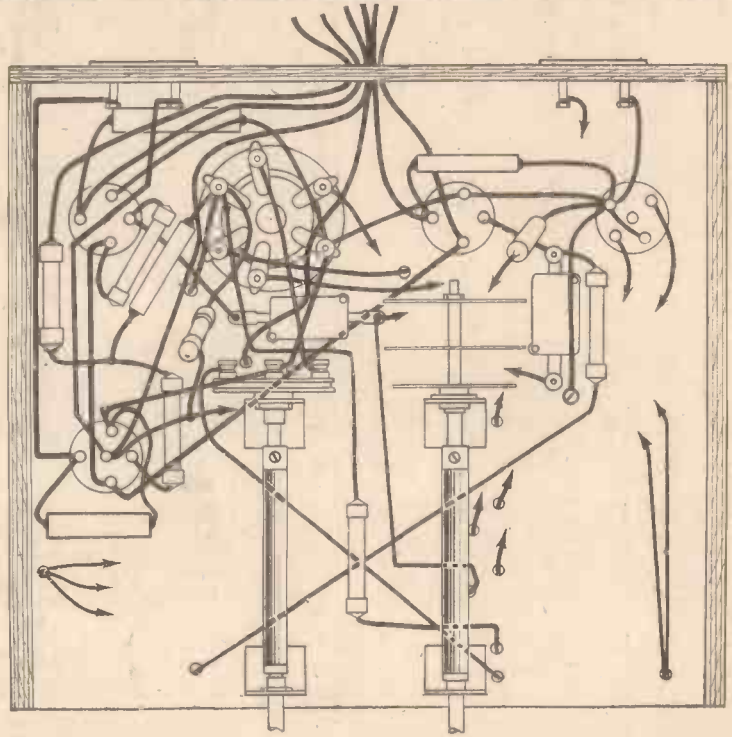
MRS. DE A. DONISTHORPE, the wife of Captain Donisthorpe, so well known in the trade for his association with Osram Valves, took part in the first of the "Picture Page" Television programmes. The broadcast took the form of an interview between Mrs. Donisthorpe, as the first woman announcer in radio broadcast service (Captain and Mrs. Donisthorpe inaugurated such a service for troops at Worcester in 1917), and Miss Elizabeth Cowell, the first B.B.C. woman television announcer.

Mrs. Donisthorpe related her experiences at Worcester and showed the early microphone and valve used on that occasion.

Practical and Amateur Wireless SERVICE DATA SHEET No. 26 FOR THE GLADIATOR ALL-WAVE THREE



Top of Chassis View



Underside of Chassis

Approximate Voltage Readings

Voltmeter — to E

" + to 1 = 120 volts.

" + to 2 = 60 volts.

" + to 3 = 45 volts.

" + to 4 = 24-36 volts.

" + to 5 = 115 volts.

" + to 6 = 120 volts.

" to a and b = 2 volts.

Approximate Current Readings

Milliammeter Connected at x1 = 2½ mA.

" " at x2 = ¾ mA.

" " at x3 = 10 mA.

Approximate Resistance Readings

COILS-

Ohmmeter Connected across 1 and 2 = 1 ohm (M.W.)

" " " 1 and 2 = 8½ ohms (L.W.)

" " " 3 and 4 = 1½ ohms (M.W.)

" " " 3 and 4 = 6 ohms (L.W.)

" " " 7 and 8 = 3 ohms

ABC of the Modern Receiver—9

In This Article We Conclude Our Examination of the Standard Circuit and Proceed to a Study of the Modern Superhet

THE facts enumerated last week in connection with the relative resistance of the loud-speaker speech coil and the transformer secondary lead us to an important practical point which must be considered when using a separate transformer, and when the speaker is used at a distance from the receiver. If the transformer were mounted in the set and leads taken from the secondary winding to the speech coil, there would be an important loss of signal strength. But if the transformer were on the speaker, so that the extension leads were in the primary circuit, the loss would be negligible. This is shown in Fig. 1.

From Current to Sound

We now come to the speaker itself, the purpose of which is to "translate" the fluctuating electrical voltage comprising the signal into sound. Fig. 2 shows a section through a permanent-magnet moving-coil speaker, from which it can be seen that the speech coil consists of a few turns of wire on a former attached to the cone. This coil fits over the end of a bar magnet and inside a circular magnet; it does not touch either of these but is set as close as possible to them. When a current is passed through the coil it becomes a small electro-magnet with a north and south pole, one at each end. If the end of the permanent magnet is a north pole and the end of the coil nearest to it is also north the two tend to repel each other, the coil being pushed away from the magnet. If the current through the coil is reversed in direction, its polarity is reversed and the coil is pulled along the magnet. Thus it can be understood that if the current is constantly fluctuating, changing in potential and in intensity, the result must be that the coil is

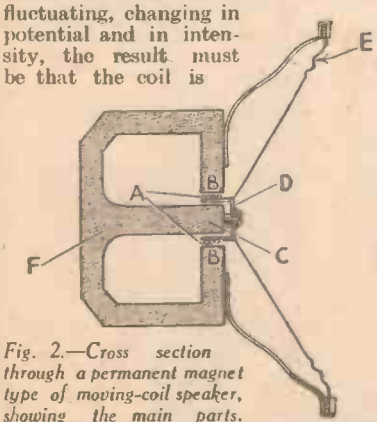


Fig. 2.—Cross section through a permanent magnet type of moving-coil speaker, showing the main parts. A is the speech coil, B is the magnet gap and C the magnet pole piece. D is the centralising spider, E the cone surround, and F the magnet.

caused to move backward and forward. And as it is attached to the cone, that also must move. In moving, it sets the air round it into motion, and that gives the impression of sound, for it causes the ear drums to vibrate in sympathy.

In the case of an energised moving-coil speaker, the action is just the same, although the permanent magnet is replaced by a soft iron bar and ring, these being magnetised only when current is passed through a winding wound round them. This current can be obtained from a battery, from the D.C. mains, or from the H.T. supply in the case of an A.C.-mains receiver.

The Superhet

Now that the main principles of a simple type of "straight" receiver have been explained and, it is hoped, understood, we can proceed to a consideration of the superhet. In this respect it will be found very helpful to appreciate that a superhet, or supersonic heterodyne to give it its full name, consists of two main parts. One of these is identical in its main features with the simple type of H.F.-Det.-L.F. receiver which has been dealt with at fair length in the previous articles; the other performs a different function, and is known as the frequency-changer. This is shown diagrammatically in Fig. 3.

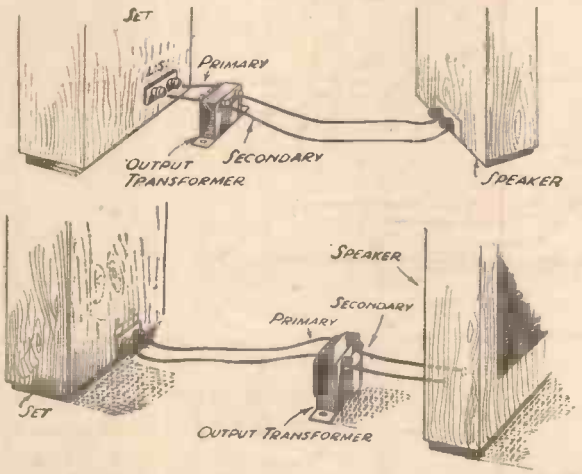


Fig. 1.—When using the arrangement shown in the upper illustration, a loss of signal strength occurs, due to the resistance of the long leads in the transformer secondary circuit. This loss is obviated by using the system shown in the lower illustration.

Changing the Wavelength

It was seen in studying the "straight" circuit that the signal is amplified at high frequency before detection, and that the wavelength remains unaltered throughout. The feature of the superhet, on the other hand, is that it serves not only to receive the signal at its transmitted wavelength, but also to change the wavelength prior to the demodulator (commonly called the detector) stage. There are several advantages in this, one being that by changing the wavelength of all signals to one fixed wavelength a more efficient amplifier can be easily designed. The reason for this is that a normal variable tuning circuit must be a compromise, due to the fact that the *constants* of the circuit have to be altered to receive different stations; thus, the tuning circuits are made to operate as satisfactorily as possible over a range of wavelengths.

The frequency-changer consists of a normal tuned circuit into which the signals are fed from the aerial, a form of detector valve—called the first detector—an oscillator valve which is tuned at a frequency or wavelength different from that to which the aerial is tuned, and a fixed-tune output circuit, as shown in Fig. 4. Actually, a single valve is used in most modern circuits to combine the functions of first detector and oscillator. Probably the most commonly used frequency-changing valve is the pentagrid or heptode, so called because it has five grids, or seven electrodes in all.

Two Valves in One

A valve of this type is shown diagrammatically in Fig. 5, from which it can be seen that it consists of a high-frequency pentode and a triode, despite the fact that the triode anode takes the mechanical form of a grid. It is not difficult to see that the pentode portion can act in a similar manner to an H.F. amplifier or as a form of detector, since its tuning circuit feeds into the control grid, whilst the output is taken from the anode. The triode portion is like a three-electrode detector with reaction, this being so closely coupled that the valve section is caused to oscillate continuously. When it does this, it acts as a miniature transmitter.

(Continued overleaf)

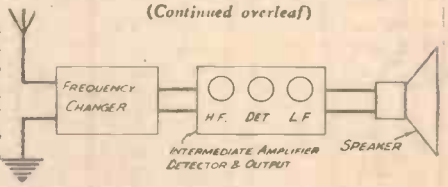


Fig 3.—A superhet can be considered as a normal "straight" receiver with the addition of a frequency-changer, as shown.

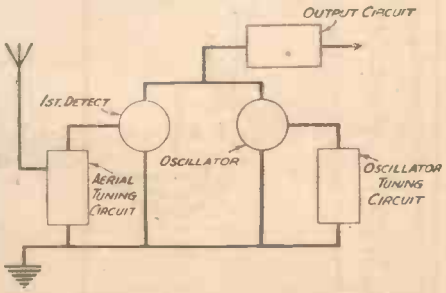


Fig. 4.—This diagram shows in simple form the elements of the frequency-changer stage.

A B C OF THE MODERN RECEIVER

(*Continued from previous page*)

And since the electrodes of the triode are between the cathode or filament (which is common to both sections) and the control grid and anode of the pentode portion, the H.T.-current stream from the filament has to pass through them. Now it is a well-known fact that when two different frequencies are mixed together, the resultant frequency is equal to the difference between the two. An instance of this in terms of ordinary sound is to be noticed when travelling in a car when another car or a bus is being passed. First the occupants of the car can hear a "purring" or "buzzing" sound from the engine, and then as the car and bus come alongside the "buzzing," of different pitch, of the bus is heard, after which it is usually possible to hear a periodic "thumping" noise. If it were measured, it would be found that the frequency or periodicity of the "thumping" were equal to the difference in pitch between the two original sounds.

Oscillator Tuning

The oscillator valve is tuned by means of a coil and variable condenser in the grid circuit, and this tuning is so arranged that the frequency of oscillation is always different from that of the received signal by a definite amount. Thus, suppose a signal were being received on 300 metres (1,000 kilocycles) and the oscillator were tuned to 1,200 kilocycles, the difference would be 200 kilocycles; this would be the frequency of the resulting signal. In practice it is customary to use a frequency difference of 110, 150 or 465 kilocycles, corresponding to wavelengths of approximately 2,700, 2,000 and 650 metres. This could be done by having a separate tuning condenser for the oscillator circuit, or by using an oscillator coil of different size from that used for tuning the aerial circuit in conjunction with a condenser having specially-shaped vanes. It is the latter method which is most often employed, so that single-knob tuning can be obtained in conjunction with a gang condenser.

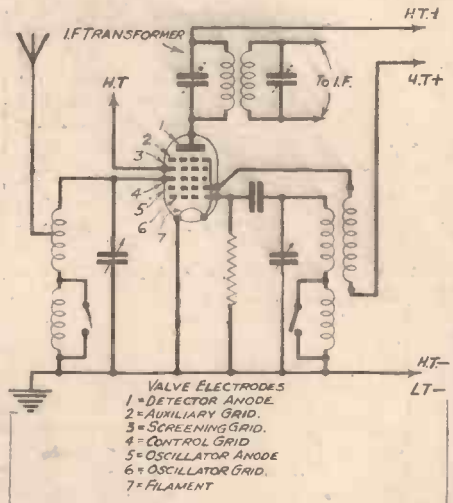


Fig. 5.—A theoretical circuit of a pentagrid frequency changer, showing the arrangement of the valve electrodes.

The I.F. Transformer

The condenser must, of course, be specially designed for the particular frequency difference required, as must also the coil. It can be seen that a tuned-transformer circuit is used in the anode lead from the frequency-changer valve—sometimes called the mixer, for obvious reasons—but instead of tuning only the primary or the secondary, both are tuned, but tuning is by means of preset condensers, not by ordinary variable condensers; once these have been set they do not require any further adjustment. This double tuned circuit is called an intermediate-frequency transformer because it must be tuned to the intermediate frequency, in other words to the difference in frequency between the received signal and the oscillator.

It can be seen that the output signal voltage from the double-purpose valve is developed across this transformer, and that it is necessary only to feed this output into a high-frequency valve to obtain the same general effect as when that valve is connected to a tuned aerial circuit. Since the valve operates at the intermediate frequency, however, it is referred to as the intermediate-frequency valve. The valve used is generally of the variable-mu type, whilst the H.F.-pentode portion of the mixer also has variable-mu characteristics.

(*To be continued.*)

ITEMS OF INTEREST

The Mask Theatre

MASKS, grave and gay, offer a wide field for interesting experiments in television production. Some of their possibilities will be revealed to televiewers on November 19th, when Pamela Watson, Yolande Proctor, and Alex Passavant—players from the Mask Theatre, Linden Gardens—will perform a number of mimes to music by the Television Orchestra.

"Fantastic Monkey," "Nippon Rouge," and "Abstraction" are three of the titles, these mimes being performed to music by Stravinsky. A fourth, "The Locust," will be enacted to a Maori folk song.

Elise Passavant, who constructs the masks from papier-maché, uses a wide range of colours for her creations, some of which, in their "natural" state, defy the television camera and require more than a touch of make-up. Seeking ideas everywhere, Madame Passavant uses everyday objects as the basis for some of her most interesting and bizarre designs; one of the masks to be used in the television production owes its origin to a glimpse of a City policeman's helmet from a 'bus top.

Dallas Bower is producing the Mask Theatre feature, which will be seen in both the afternoon and evening transmissions.

Orchestral Concert from Edinburgh

THE Rutland Square and New Victoria Orchestra, directed by Norman Austin, will broadcast on November 27th from the New Victoria Cinema, Edinburgh. The programme includes a Hunting Overture, "Tally Ho," by Ansell; Valse, "Tonight I live again for you," by Frank Moy; Selection, "Dance Memories," arranged Finck (Tunes the world has danced to); a Yorkshire Rhapsody, "Barnsley Fair," by Arthur Wood; Xylophone Solo, "Triplets," by Green (Soloist, Percy Scott); the Second New Sullivan Selection, arranged Higgs; Piano Novelty, "The Knave of Diamonds," by Henry Steele; Selection, "More Tunes from the Talkies," arranged Bowsher; and Scottish Rhapsody, "Auld Reekie," by Frank Moy.

DEMONSTRATION ON A PYE "TELECEIVER"

A television demonstration at Messrs. John Barnes, Finchley Road, N.W., in connection with the inauguration of the television service. The Pye "Teleceiver" gave excellent pictures with a clear black and white image.

The Value of Home Construction

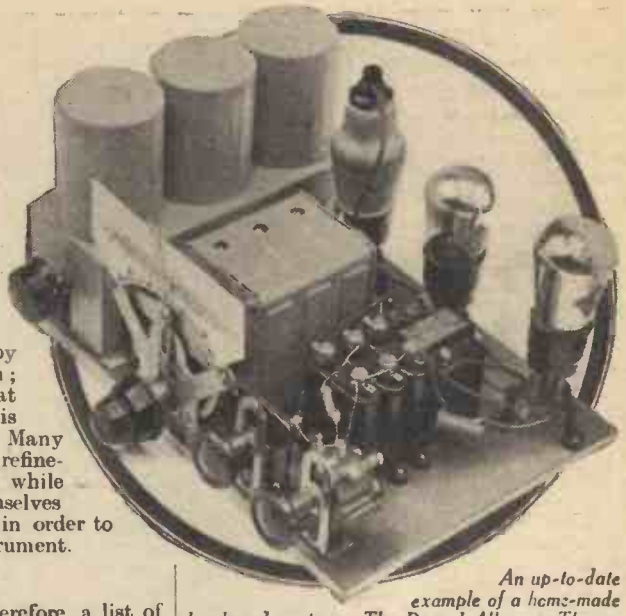
An Article Setting Out Clearly the Advantages of Home Construction

By RADIO ENGINEER

IT is sometimes said that the main attraction of building one's own set is the thrill of achievement when the receiver is first switched on and works, and it is suggested that this thrill eventually palls. Thrill there certainly is; that it ever palls is very much open to doubt; but even if it does, thrill is far from being the main factor in the popularity of home construction.

Then there is the suggestion that a large proportion of amateur set-makers are instigated only by the desire to save money, a home-built set being, it is stated, somewhat cheaper than the commercial article. This may be true in some instances, but it does not account for more than a very small proportion of the total amateur output of receivers. Indeed, there is a very substantial number of amateurs whose home-made sets actually cost more than a professionally made model of similar specification. No, the urge to build sets must be explained otherwise than by novelty or economy.

Let us set down a few of the points on which the home constructor scores, without in any way attempting to treat the subject exhaustively. In order to do so, it is only necessary to ask what features in the performance of a radio set are considered the most vital, in order of importance, by the listener. If this question were put to a hundred listeners, at least a dozen different answers would be obtained. Some would vote solidly for long range and high selectivity; others for exceptionally faithful reproduction from only a few stations. Some lay great store by simplicity of operation; complete reliability, even at the expense of range, is another's requirement. Many want the latest circuit refinements, regardless of cost, while others again content themselves with the simpler circuits in order to obtain an inexpensive instrument.

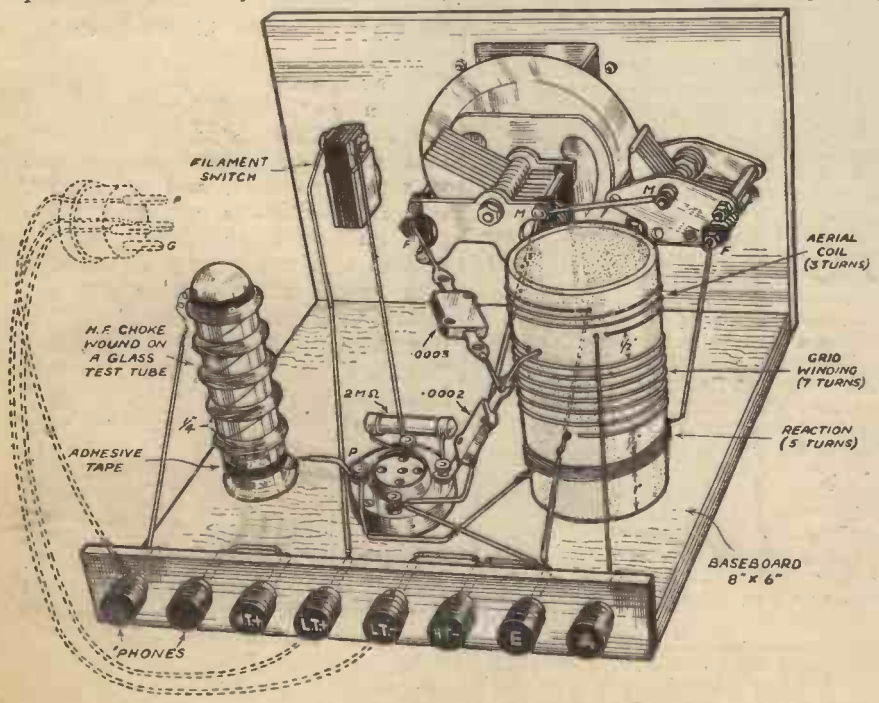


An up-to-date example of a home-made baseboard receiver—The Record All-wave Three.

Varied Requirements

In nearly every case, therefore, a list of desired features in order of urgency, in respect of performance, operation, appearance, cost and so forth would be submitted, and would seldom, if ever, conform in every detail with the specification of a single commercial model. There is, of course, no difficulty at all in designing and building a set to meet the individual requirements of even the most particular of listeners. Individual requirements being, however, so varied, commercial manufacturers must effect some kind of compromise, and produce a range of sets which shall meet approximately the average requirements of the majority. Not so the amateur constructor, however. He can indulge in his own fancy to the full and make his set as cheap or as costly, as simple or as complex, as sensitive or as modest in its performance as he desires. Here, then, is the first point on which the home constructor scores—a set of individuality, built to satisfy his personal needs.

As has already been suggested, cost is seldom the chief factor in selecting a set, either commercial or home-built. But where cost is a consideration, the home constructor is at an advantage. For, generally speaking, the only means whereby the factory can reduce prices are, first, the manufacture of standardised sets on a mass production basis; second, the limitation of performance capacity; and third, by reducing the "factor of safety," that is to say, by introducing components or methods of construction which leave but little margin for unexpected happenings. The home constructor, on the other hand, can economise without risk. He can, for example, build a simple but entirely reliable set at low cost, and add to it from time to time as his means allow. Or he can, if he is handy and knowledgeable, make for himself many of the components—wind his own coils and transformers; contrive switches and other small parts from scrap material and employ components taken from some previous set, thus saving money without risking an element of unreliability.



Here is an example of a home-made receiver in which coil and choke are also constructed at hom

The Specialist

Another point, very much bound up with the question of cost, is the risk of obsolescence. Nothing is more vexatious—and it has happened so often to so many listeners—than to spend a very considerable sum of money on a new receiver, only to find a few months later that some new development has taken place which, if not rendering the set obsolescent, dates its performance. The home set-builder, however, can at any time dismantle or partly dismantle his set in order to modify the design to include the latest developments, an undertaking which is almost impossible in the commercially produced set.

Next we must consider what may be termed the "specialist listener," who may be a quality enthusiast, a DX fan, or a short-wave expert. For such, the ordinary general purpose commercial receiver is of very little use. If it is sufficiently advanced or complex in design to meet his requirements in his own line of specialisation, it will probably be too expensive for him, and in any case he will be paying heavily for some features for which he has little, if any use. Take, for example, the quality lover, requiring high fidelity reproduction of half a dozen of the best programmes at the most. This he can obtain with a comparatively

(Continued overleaf)

THE VALUE OF HOME CONSTRUCTION

(Continued from previous page)

simple home-built set in conjunction with a high-grade speaker. To obtain comparable quality in a commercial receiver he will have to pay quite as much, and probably more; the set would also be capable of receiving scores of weak transmissions at very ordinary quality, and even on the first grade programmes the "quality" will probably be of the synthetic variety, largely composed of carefully selected resonances, and immediately detectable by a real connoisseur.

Then the long-distance enthusiast. For a reasonable price he can only obtain from the factory a set calculated to satisfy the ether-roving tendencies of the multitude. But those who have made only a modest study of radio technique or have had only a few months' experience of experimental work, know that there are a hundred and one ways in which a set of conventional design can be "lined up" to give a far superior performance on distance to that of the average factory-made set, and also that there are many special circuits and devices which increase sensitivity and range to an extent which is impossible of achievement in a mass-produced set manufactured for normal family use.

Short Waves

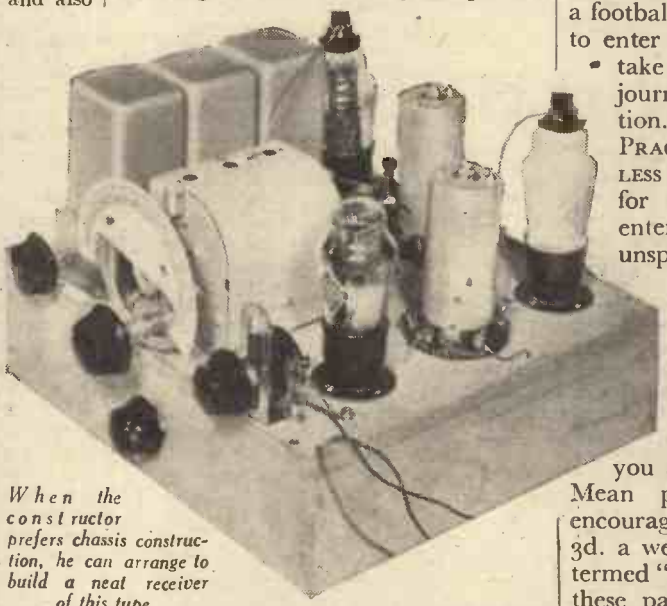
Probably in no other respect than short-wave performance does the home-constructed set show to greater advantage. During the past two seasons, it is true, "all-wave" sets have appeared in large numbers on the market. But the average all-wave set consists merely of one, or at most two or three short-wave ranges tacked on to a conventional circuit. It is admitted that certain steps have usually been taken to adapt the circuit to the special requirements of short-wave technique, as witness the use of the triode-hexode frequency changer in this year's models. But these adaptations have proceeded, in the main, only just so far as to render the sets capable of giving a reasonable entertainment value on the short waves. Usually, all the listener can hope for is to receive some useful short-wave stations—admittedly often a great number—but the crowding of the available short-wave band on a single scale renders the consistent and certain reception of any individual transmission problematic. The all-waver of to-day does not pretend to achieve anything like the maximum possible efficiency on its short-wave band.

Multiple Coils

But the amateur need have no difficulty in constructing a short-wave receiver, either as a complete set or as an adaptor or converter unit, which shall have a far higher efficiency than the short-wave section of any ordinary all-waver. Moreover, he will not be limited to the wavebands arbitrarily selected by the set manufacturer; neither need he crowd the whole of his frequency range into a scale corresponding to a single complete operation of the tuning condenser. By means of multiple coils he can divide the short-wave range into as many bands or sections as he desires; and by the use of an additional condenser in a band-spreading arrangement the frequency range of each coil can be further sub-divided, giving that accuracy of tuning which is essential to the reception and identification of the almost unlimited number of stations receivable.

Another important point in favour of home construction is the fact that, except for visual tuning indicators, the commercial set makes no provision for permitting the knowledgeable man to discover how the set is behaving, his information on this point being obtained only by ear. But the interested amateur can introduce into his home-built set milliammeters—or jacks for inserting them into the various circuits—and other instruments for checking and determining the technical performance.

Other instances of the way in which home construction permits individual requirements to be met perfectly, and with greater efficiency than in a general purpose shop set could be multiplied almost indefinitely, but space forbids. But one other very valuable point must be mentioned in conclusion. It is that, by home construction, and only by home construction, can the amateur attain that familiar and intimate knowledge of both the theory and practice of radio which is, at one time, so fascinating and useful. The conscientious and keen amateur is, of course, anxious to know the "whys" and "hows" and although much may be learned from books and articles, there is nothing like practical work to impress it on the mind. But, apart from this, it must be remembered that the radio industry is a large and ever growing one, in which there is always room for good, keen men, in factory, on the test bench, in repair shops and laboratory, as well as on the commercial side.



When the constructor prefers chassis construction, he can arrange to build a neat receiver of this type.

It must also be remembered that the development of radio itself was largely the result of the experiments and researches of amateurs; that in the early days of broadcasting the industry was mainly recruited from the ranks of amateurs and that even to-day, other things being equal, the man who has, through experiment and home construction, become intimate with principles and practice, the use of his tools and instruments and skilled in detecting and repairing faults, has a better chance of obtaining a post in radio engineering than a mere novice.

"Passing It On"

MANY readers, anxious to please the Editor, will often express their appreciation of the journal and end by saying that they always pass their copy along to another constructor. Ungracious though it may sound, this does not always operate to the best interests of a journal. Some journals have been killed by their own popularity; they have an enormous reading public, yet do not attain to Olympian figures in circulation. The reason is, in the case of, say, a boys' paper, that one copy is purchased in a form and passed round. When you buy a ticket for the cinema, or the theatre, or a boxing match, or a football match, it entitles per person to enter; it does not enable you to take your friends in *ad lib.* A journal is in much the same position. When you pay your 3d. for PRACTICAL AND AMATEUR WIRELESS you have purchased a ticket for three pennyworth of radio entertainment, and it is rather unsporting of other people to expect you to give it to them free of charge. If you feel so appreciative you should persuade your friends to purchase copies, not to enjoy the journal at your expense. By giving your copies away you are destroying possible sales. Mean people ought not to be encouraged. If they cannot afford 3d. a week they have no right to be termed "readers." Quite a number of these parsimonious people have the unbounded cheek to use the coupons of journals which have been presented to them in order to take advantage of the Free Advice Bureau. Readers must note that this service is available to regular readers, and by readers who are purchasers, not the "snappers up" of mean advantages. If readers wish to dispose of their copies they might at least tear out the Query Coupon. A letter the other day from one of these so-called "readers" frankly informed us that he never bought the paper, but had it given to him every week. He proceeded to ask at least a dozen technical questions, and ended by asking us to send him, under our free Catalogue Service, all of the catalogues issued by the component industry. Quite obviously he thought we were a philanthropic institution, for he omitted the various small sums which some advertisers charge for their catalogues. I hope these "ghost readers" will take this hint.—*Thermion.*

NEW VARLEY COILS

Some Recommended Circuits

THE new combinations of coils produced by Messrs. Varley lend themselves admirably to circuits of modern design, and the makers are issuing interesting details of receiver designs which may be built up to incorporate these coils. On this page four such circuits are reproduced, and these incorporate each of the four new types of coil, BP. 111, BP. 112, BP. 113, and BP. 114. The first circuit, shown above, embraces the BP. 114 unit, and this consists, as may be seen, of an aerial and inter-valve coil suitable for "straight" circuits, or those incorporating a simple H.F. stage. The aerial coil unit consists of an aerial and grid coil, with wave-change switching arranged on each section, whilst the inter-valve unit consists also of a primary and secondary with the addition of a reaction winding. This is split and provides maximum coupling on both medium and long-wave sections of the secondary coil, thus ensuring that reaction will be smooth and adequate on the full range of the coils. The wave-change switching in this unit is across the secondary only, but the windings have been so designed that maximum results are obtained on the two ranges. It will be noted that the screens are interconnected to the coil and thus the addition of the earth lead effectively earths the secondary as well as the screens and ensures stable working.

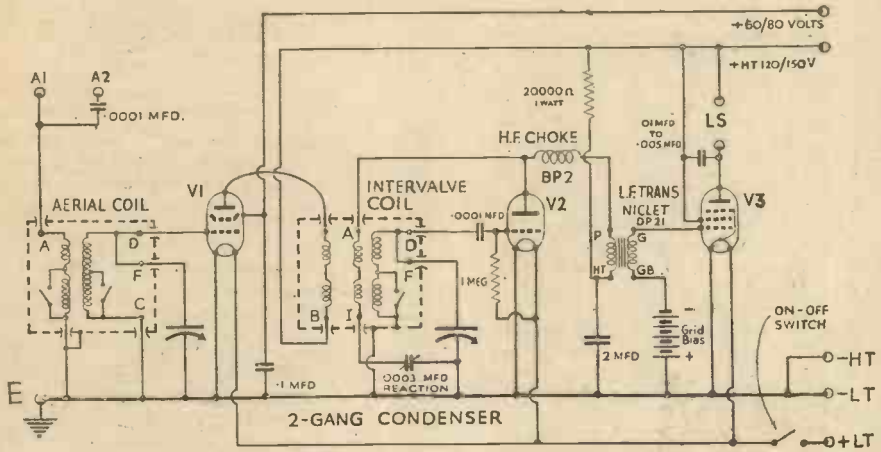
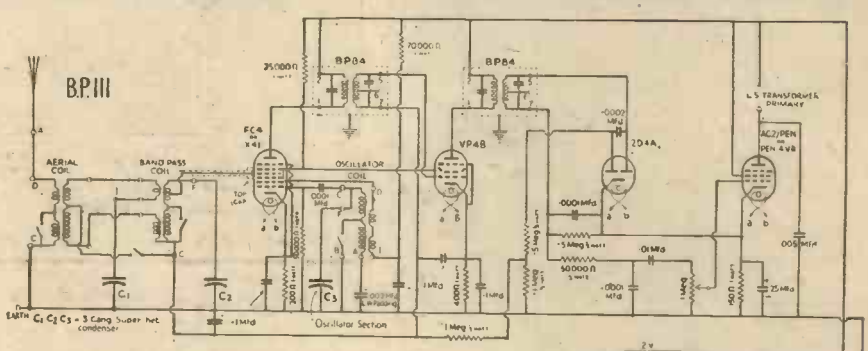


Fig. 1.—A simple but efficient circuit using the BP. 114 coil combination.



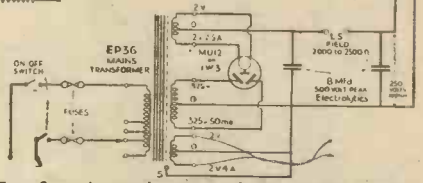


Fig. 2.—A superhet circuit for mains use employing the 3-gang assembly, BP.111.

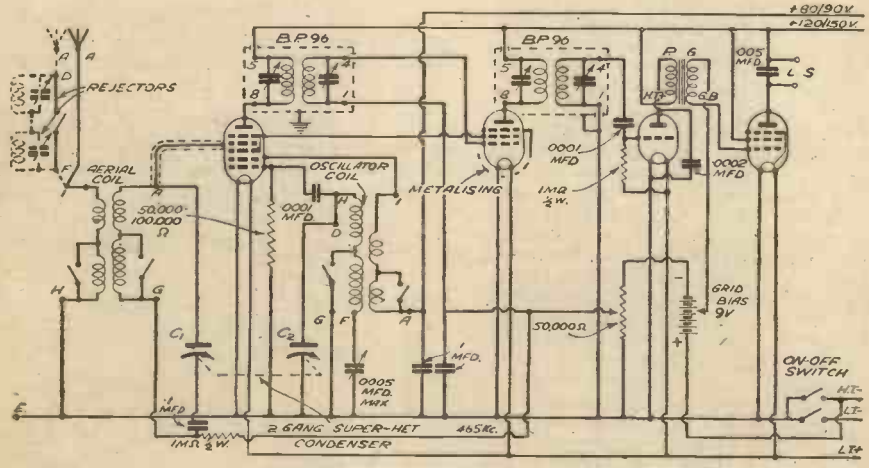


Fig. 3.—In this battery circuit the BP. 112 coil combination is employed.

Type B.P. 113

The diagram at the foot of this page shows a coil unit designed for a similar type of circuit, but with the addition of a further coil to convert the input arrangement to the popular band-pass circuit. This naturally provides a much higher degree of selectivity, and the coils incorporate inductive coupling between the separate band-pass coils. Again, the windings have been very well selected and the maximum performance may be expected over the entire tuning range.

The two band-pass coils, with the addition of an oscillator in place of the inter-valve coil, forms the unit Type BP. 111, and the oscillator coil has been designed for use with the modern pentagrid or octode type of frequency-changer stage. The full details of the coil may be seen in the diagram. Where the selectivity provided by the band-pass circuit is not required, the oscillator coil may be obtained with a single aerial coil, and a suitable circuit to incorporate this pair of coils (type BP. 112) is shown in Fig. 3.

The two two-gang units cost 13s. 6d. each and the three-gang units £1 1s. each. Blueprints of receivers employing these circuits may be obtained direct from Messrs. Varley for 6d. in the case of types BP. 111, 112 and 113, and for 3d. in the case of the BP. 114 unit. The address is Bloomfield Road, Woolwich, S.E.18.

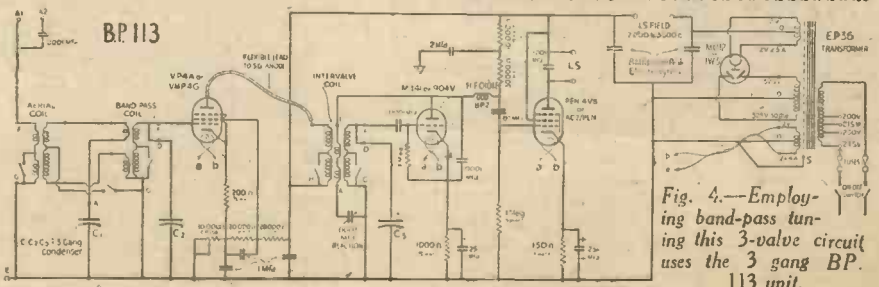


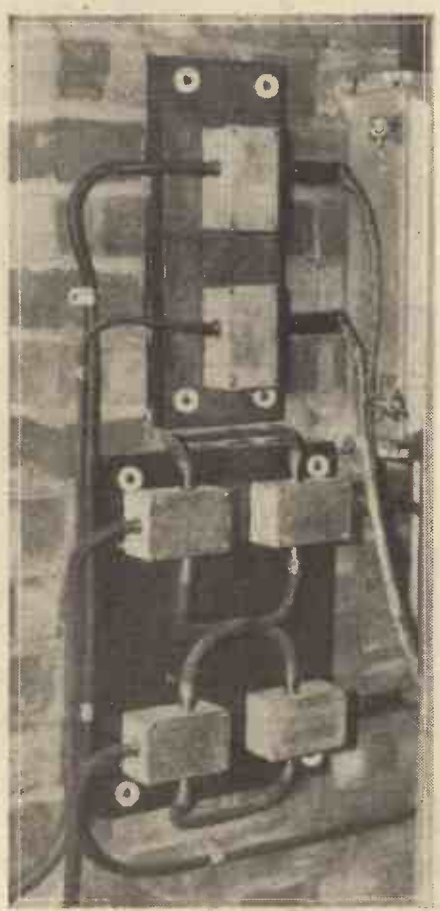
Fig. 4.—Employing band-pass tuning this 3-valve circuit uses the 3 gang BP. 113 unit.

PRACTICAL

November 21st, 1936

An Ingenious Hou For

THE accompanying illustrations show some of the main features of a radio house-wiring system which has been installed by the Marconi-E.M.I. Service Company in a block of flats in the West End of London. At a demonstration which we attended last week we saw a complete television programme of one hour's duration during the daytime, and complete freedom from interference was demonstrated. It is well known that electrical apparatus such as fans, lifts, etc. can play havoc with the television picture, as well as with ordinary radio reception, and in a large block of modern flats such as we visited, there are lifts and all the other interfering equipment which normally would be the cause of considerable annoyance to the listener, but the installation which the Marconi-E.M.I. company have designed and fitted enables every occupier to have both a standard broadcast receiver and a television receiver working during the day or night with complete freedom from interference and with a power input such as could not normally be obtained. The installation is so novel and up to date that we are sure readers will be interested in the technical details, and a description

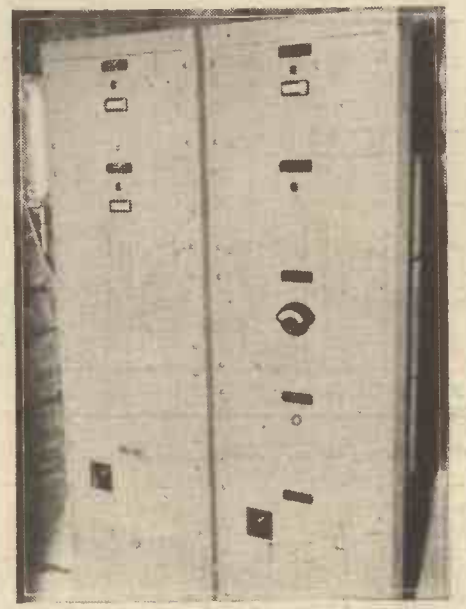


The output from each panel is fed to the single feeder through these distributor boxes.

of the methods adopted for providing this service.

H.F. Booster

The main part of the installation consists of what might be termed an "H.F. booster." Briefly, this consists of a flatly-tuned amplifier connected between the aerial system and each listener's receiver, and the first and foremost advantage of this scheme is that it enables the owners of the building to have erected at the highest



These are the two amplifier panels, the left one for broadcast and the right for television. At the bottom of each panel may be seen the time-control clock.

point on the roof a most efficient aerial system. For broadcast reception this consists of a standard horizontal wire slung between masts, and for television reception a special dipole is employed. The feeders from these two aerial systems are taken into a small out-building in which is housed the amplifier and distribution boxes.

The amplifiers are in separate racks, and are time operated. The Broadcast amplifier employs a flatly-tuned circuit covering a band extending roughly from 200 to 2,000 metres, and the output from this is conveyed to one of the distributor boxes. The television amplifier is flatly tuned over two separate channels, one for sound and a much

The television and broadcas as shown

corollary is that in due course prices will be reduced and the number of viewers thereby increased.

Televisio

A Surprise Item

THE inaugural ceremony arranged for the official opening of the B.B.C. television service on November 2nd at Alexandra Palace, went off without a hitch. Both the Baird and Marconi-E.M.I. systems televised the programme in turn, and this enabled viewers to make a direct comparison between the two systems. Each showed their advantages and disadvantages, and the general concensus of opinion among those who were able to watch the televised pictures was to the effect that there was little to choose between the results observed, and a "draw" seemed a very fitting result to a ceremony of such a nature. The remarks of Lord Selsdon were of great importance, for he indicated that after a suitable test period the advisory committee over which he presided would make certain recommendations concerning such standards as the degree of definition, pictures per second, ratio of picture height to width, and the proportion of modulation allotted to the video and synchronising signals. When this is done, television receiving sets will be simplified in construction, and development will be even more rapid. Furthermore, he assured those who bought or built receiving sets now that no radical alteration would be made for at least two years. Present-day sets will therefore be able to receive the Alexandra Palace transmissions for at least that period, and this fact alone should serve to stimulate the efforts of both set and component part manufacturers who up to the present have hesitated to make any large scale production plans. The natural

Operating the Baird intermediate-film equipment which was employed for the opening ceremony at the Alexandra Palace on November 2.

TELEVISION

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use-wiring System Radio

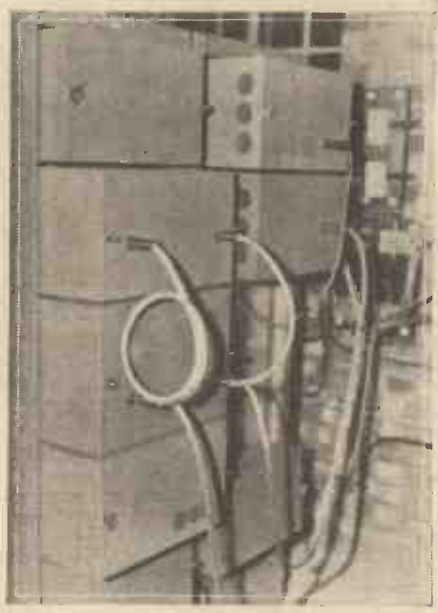
ider one (approximately 4 megacycles) for vision. The output from this is also conveyed to a distributor box.

Screened Co-axial Feed

The most interesting feature now follows. The outputs from the two separate amplifiers are now conveyed to a single cable, which is of the H.F. co-axial type, and this single cable is taken down through the building and is fed to each of the seventy-three flats in the building. Special attenuation circuits are provided at each junction to render each point quite distinct and prevent losses and interaction. In each of the flats a small panel is mounted near the wainscoting, and on this panel are three sockets, one for television and one for aerial and earth for broadcasting. All the occupier of the flat has to do is to purchase any standard broadcast or television receiver, and, in the former case, plug his aerial and earth leads into the aerial and earth sockets on the panel, when he is immediately provided with the most efficient aerial system possible. Similarly, the television receiver is plugged into the other socket by means of a special two-way plug, and he is again provided with a much amplified and interference-free signal

The screened feeder completely cuts out the interference; he has no aerial or earth to worry about; he obtains the advantage of the H.F. amplifier fitted on the roof, and he is insured against interference from apparatus in neighbouring flats.

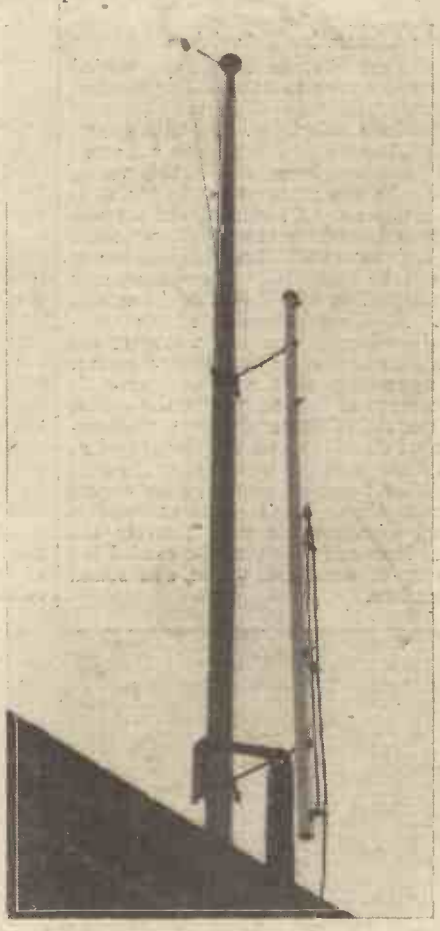
st receivers are plugged in n here.



This shows the rear of the special amplifier panels, and shows the screened output leads.

Guarding Against Breakdown

The two amplifiers are switched on and off automatically through the medium of time switches, which are clockwork controlled to avoid stoppage due to a temporary interruption of the mains supply. The broadcast amplifier is switched on at 8 a.m., and off at midnight, whilst the television amplifier is switched on about half an hour before the television transmissions commence, and shortly after they end the amplifier is switched off. An ingenious relay system signals any defect to the head-porter's office.



The two aerials are mounted on the highest part of the building. Note the television dipole.

This is the first building in the world to be fitted with such an ingenious and comprehensive relay system, and we congratulate the Marconi-E.M.I. Service Company on the enterprise shown in arranging for such an equipment in this country.

n Notes

In the evening programme of the opening day a surprise item was included, this being a repetition of Lord Selsdon's speech, together with his accompanying picture. This course was only made possible by the fact that his efforts in the afternoon were televised by the Baird intermediate-film equipment. This apparatus is shown in the accompanying illustration and has outstanding advantages where repeat programmes are desirable for one reason or another. The intermittent type camera, with its turret of lenses and film chamber, is visible on the left, and below the panning table is the sound recording unit. After passing through the processing tanks, the film is scanned wet, some thirty to forty seconds after the original film pictures were photographed. The sound-reproducing head and arc lamp are also shown, and under exacting conditions of service the apparatus has proved capable of giving very satisfactory results. The film used is 17.5 mm. derived by splitting standard 35 mm. film down the centre. The sprocket hole drive is therefore on one side only, but film costs are reduced by one-quarter in this way, for four complete pictures are obtained in the area normally occupied by one standard film frame.

Dummy in front of hut on roof at Long Acre for daylight television experiments. This head is now housed in the Science Museum, South Kensington.

Using a Dummy

WHEN carrying out television tests either by radio or in short circuit it is always necessary to have a "subject" to televise. This is sometimes awkward to arrange, especially if a number of experiments on lighting and focusing, or even make-up, have to be undertaken. The B.B.C. have met this question by using a dummy, something like an ordinary shop window model, dressed as a woman, and al-

(Continued on next page)

TELEVISION NOTES

(Continued from previous page)

ready nicknamed "Television Tilly." Owing to the heat of the arc lamps the dummy is not made of wax. No doubt this dummy will become as famous as Mr. Baird's original "Stookie," which was the head of a ventriloquist's doll, and is shown in the accompanying illustration mounted on a tripod for daylight television experiments on the roof at Long Acre. Sometimes an ordinary enlarged photograph was substituted for the dummy, and in the early thirty-line definition days the Prince of Wales was the subject of the popular picture seen so often by lookers-in. When the Emitron camera is being tested at Alexandra Palace a rather weird animal's head, specially drawn on a flat board for the purpose, is featured. It is not intended to represent a real animal head, the markings being of such a character that any defects which may arise in the transmission are detected immediately. For the Baird telecine scanner an endless loop showing the head and shoulders of Madeleine Carroll from the film, "I Was a Spy," is radiated. The detail in the hair and jumper of distinct squares enables the looker-in to see at once whether his receiver is reproducing the frequency band-width necessary to show all the character of the short length of film.

Weather Charts by Television

IN Berlin experiments have been carried out with a view to transmitting weather charts to pilots of aeroplanes by means of high-definition television. If this proves successful, the visual information conveyed to the pilot will be of inestimable value, and may be the means of reducing accidents in the air. An idea of the amount of information which can be disseminated in the form of a television picture weather chart can be gauged by the system now being adopted by the B.B.C. at Alexandra Palace. At the termination of the afternoon's television programme a map of the British Isles is seen on the receiver screen. Then, by means of the special symbols used in maps of this character, the extent of the clouds in different districts, temperature, wind direction and velocity, together with a forecast of the weather for the next twenty-four hours is given by an expert on these matters. The idea is an admirable one and demonstrates very forcibly the scope of the work which can be carried out by means of combined vision and sound transmissions.

Mr. Alfred Clark, Chairman of E.M.I. and "His Master's Voice," speaking at the opening programme of the London Television Service, on November 2nd. Other gentlemen who made speeches are (left to right): Lord Selsdon, Chairman Television Committee; Major G. C. Tryon, Postmaster-General; Mr. R. C. Norman, Chairman B.B.C. Note the two Emitron cameras which enabled long shots and close-up views of the speakers to be transmitted without any delay.

Demonstrations

ALTHOUGH the B.B.C. abandoned their original idea of setting up special television demonstration rooms in selected parts of London, it is now quite an easy matter for any interested member of the public to see pictures on television receivers during the Alexandra Palace service programme periods. The manufacturers of complete receivers have all fitted up offices or rooms complete with one or more sets, and either casual callers or people by appointment can view the results on standard sets. Then, again, all the leading radio dealers and large London stores are featuring daily demonstrations, together with certain hotels and cinemas. Finally, at Waterloo Station and the Science Museum, South Kensington, there are sets in operation. This method of showing the results of the new service to interested members of the public is an admirable one, and will enable the Television Advisory Committee to reach definite conclusions as to public needs for an extended or modified service. The question of Sunday television programmes has been raised already, and although this is not likely to be an immediate development, such a contingency has not been lost sight of.

Spot Size

IN discussing the suitability or otherwise of a cathode-ray tube for the portrayal of television pictures on its fluorescent screen, one factor is very frequently overlooked, namely, the size of the spot of light made visible on the screen as a result of the high velocity with which the electrons constituting the beam inside the tube strike the screen material. The brightness of the spot is a factor dependent on the magnitude of the positive voltage applied to the orificed anode, but the spot area of fluorescence is governed by several factors which have to be studied carefully if the best results are required. With low-definition television, spot size was not an important factor, for the picture width was only divided into thirty strips, the degree of definition then existing in the radiated picture. In the case of high-definition television, however, with a *minimum* of 240 lines occupying the picture height, quite a different situation has to be met. Assuming that the edges of each line traced touch their immediate neighbours, then for a picture 9in. high the spot size will be 3/80in. Any size greater than this will result in overlap and bring about a loss of picture detail and sharpness. If made smaller than this there will be unmodulated spaces between the lines, but this effect is to be preferred to the former, and is soon lost on the observer when he views the picture from a distance of 3 or 4ft. The 9in. picture depth is derived from a tube with a 15in. diameter screen, and on the score of expense it is anticipated that many home sets will use tubes much smaller in diameter, although then spot size becomes extremely important.

A family group looking-in with a G.E.C. television receiver.

SHORT WAVE SECTION

ERECTING DIPOLE AERIALS

Practical Constructional Details of Various Types of Short and Ultra-short-wave Aerials. By W. J. DELANEY

WITH many types of receiver the constructor has no doubt noticed that the type of aerial in use has a vast effect upon the performance of the receiver. Variations in height and direction affect the strength of signals from different stations, and although very little is usually done on the broadcast bands to make the best of the aerial system, when going down to the short or ultra-short wavelengths it is most important to use a really efficient aerial arrangement. This is not only to obtain the maximum performance so far as

Fig. 1.—Ordinary batten fitted with simple stand-off insulators forms the basis of this dipole aerial arrangement.

signal strength is concerned, but also to eliminate much of the incidental electrical noises which are often picked up by the aerial system, and which are of such a frequency that they do not trouble the ordinary broadcast listener. In the usual type of aerial a horizontal wire is erected as high as possible, and a long lead is taken down to the receiver. As height is important, this means that the lead-in is generally from 20 to 30ft. in length. It has been found that on the short waves the aerial may be made to resonate at the frequency of the desired station (or at a harmonic thereof), and then by a suitable arrangement the lead-in may be ignored as part of the direct pick-up. The general term given to this type of aerial equipment is a "dipole and feeder," and there are various forms of both of these which the constructor may care to try out.

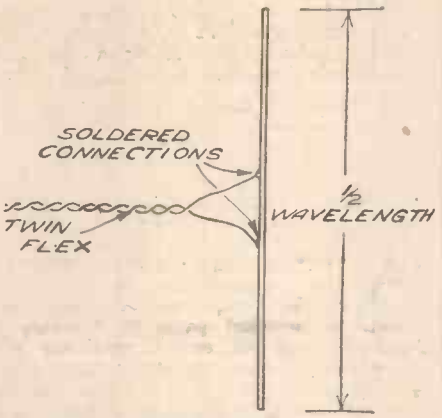


Fig. 2.—Here a single length of rod or wire is used for the aerial, and the feeder ends are joined at a distance of about 10ins. in the centre.

The Dipole Aerial

The relation which has been found of greatest use is one-half of the wavelength of the desired station, or the band of frequencies which are to be received. Obviously, therefore, in the case of a receiving equipment arranged for the reception of the present television transmissions, an aerial totalling one-half of 7 metres would be used. Now 1 metre is equal to 3.28ft., and, therefore, the aerial for the 7-metre band would have to be one-half of seven times 3.28ft. in length, or, approximately, 11ft. Whilst it is quite possible to erect an 11ft. length of heavy gauge wire and take the lead from the lower end, this is not the best method of arranging things, and it is found better to divide the aerial into two and take the lead from the centre. It is in this respect that the greatest scope for experiment arises, as there are dozens of different schemes which may be adopted.

The simplest arrangement is to connect the ends of a twin feeder or lead-in to a point in the centre of the vertical wire or rod. An alternative is to break the aerial at the centre and join the ends of the feeder to the ends of the aerial. Yet another arrangement consists of a screened single feeder, with screening joined to one half of the aerial and lead joined to the other. The following details will therefore be given so that each listener can try out for himself the best arrangement for his own particular local conditions.

Aerial Construction

For the aerial either wire or rod may be used, but it should be made a point that the largest possible area of metal should be used, and, therefore, heavy copper rod or tube is desirable. Above a certain thickness it will be found that there is little

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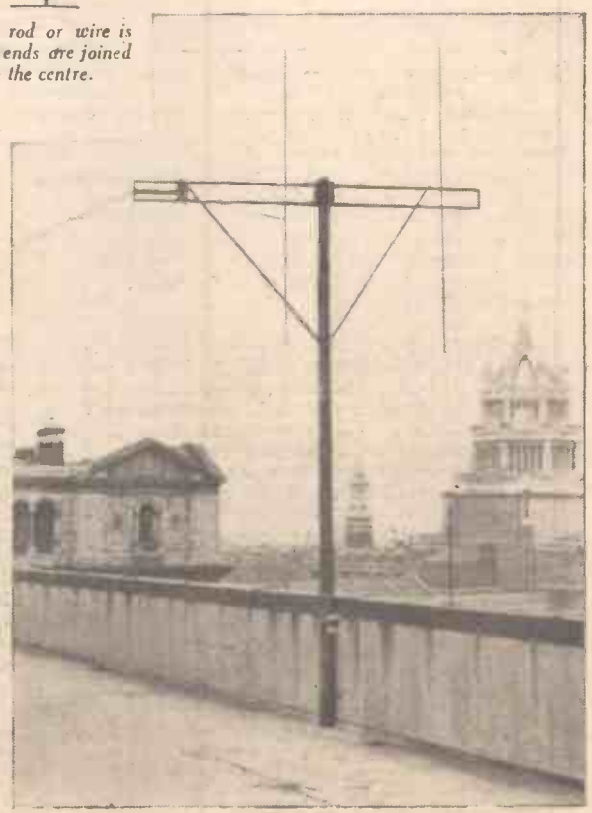


Fig. 3.—The method of leading off the feeder may be seen in this illustration of the aerial system used at the Science Museum, South Kensington.

SHORT-WAVE SECTION

(*Continued from previous page*)

improvement in signal strength except when going below 5 metres, and even then the additional surface will introduce other factors which will offset the advantages gained. Half-inch copper tubing, or 10 or 12 S.W.G. copper wire may be considered the most satisfactory, the latter affording the simplest constructional details and being cheaper. The standard type of stand-off insulator will accommodate this gauge of wire, and to hold it rigid, clear of walls, etc., a wooden extension must be fitted. Again, each constructor will have to try for himself the best arrangement, and where a short chimney stack is within easy reach the aerial may be held to this. The wire must be stretched tightly so that there is no sway or whip in the wind, and a support top and bottom will be adequate. With the copper tube, more supports will be needed to avoid collapse of the tube in a gale, unless very heavy gauge tubing is obtained. The expense of this is not justified.

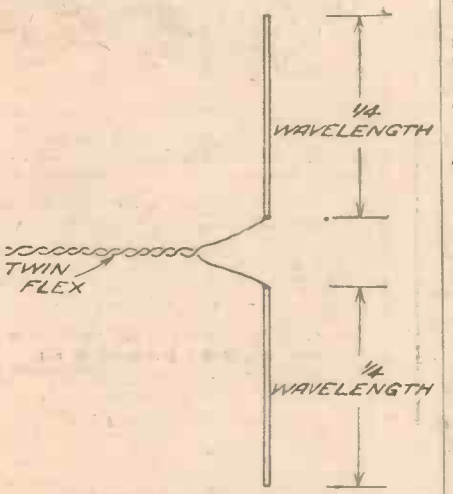


Fig. 4.—In this scheme the aerial is split into two separate quarter-wavelength sections.

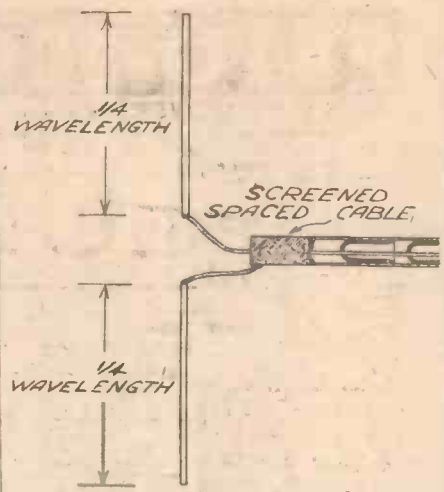


Fig. 5.—A screened feeder may be used as shown in this diagram.

Feeder Arrangements

The feeder should be connected by soldering, and the joint should be painted to prevent corrosion. Ordinary lighting flex (14/36) may be used, or similar gauge of wire obtained as a single lead and twisted throughout its length by the use of the standard Crossfeeder or similar components. With the latter arrangement it is important to try and arrange the run of the feeder so that the whole arrangement does not twist upon itself. That is, it should run from aerial to receiver exactly as shown in Fig. 3, and it will be found that this can be done by stretching the wire from the aerial as the separators are placed into position, and anchoring the lower one to a window frame by means of rope and ordinary egg insulators.

In Fig. 2 the twin flex is shown connected to the centre of the single aerial, and the distance separating the ends should not be less than 6in., nor greater than 1ft. Furthermore, each half must be identical in length to get the best from this arrangement. In Fig. 4 the intervening space has been removed, but it should be noted that the two separate halves should be equal to one half of the wavelength, the intervening space being ignored. This is not of great importance above 6 metres, but below this wavelength it may prove very critical. In Fig. 5 the special spaced screened lead is employed, where the inner wire is held rigid in the centre of a screened cable. This is sold by Messrs. Ward and Goldstone, under the trade name of "Metocel," and in this particular arrangement, the screening is joined to the lower half of the aerial and the lead to the upper half. In each of these arrangements it is essential that the feeder be taken away at right angles to the aerial, and it should not run in the same plane within a considerable distance if it is to function properly.

Other arrangements may suggest themselves to the experimenter, based upon these fundamental schemes, and it will be found that the results on the lower wavelengths may be considerably improved by the use of these special aerial arrays.

The illustration on page 311 shows very clearly the arrangement adopted in the case of a modern aerial array, and this utilises the batten method of support, with the simple stand-off insulator screwed to it. It will be noted in this picture that the screened lead is taken away at right angles for a short distance, as mentioned above.

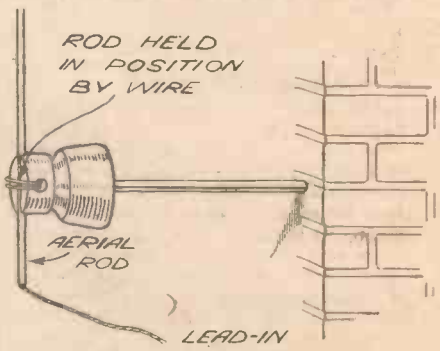


Fig. 6.—This type of insulator enables a rigid aerial to be erected on the side of the house.

Leaves from a Short-wave Log

More About Japan's Short Wavers

FOR the broadcast of radio entertainments on short waves the Japanese Broadcasting Corporation has installed several new 50 kilowatt stations. The channels allotted to these transmitters are: 13.94 m. (21,520 kc/s), JZM; 16.87 m. (17,785 kc/s), JZL; 19.79 m. (15,160 kc/s), JZK; 25.42 m. (11,800 kc/s), JZJ; 31.46 m. (9,535 kc/s), JZI; and 49.22 m. (6,095 kc/s), JZH. As already reported in these columns, several of these stations have already been heard testing by British listeners, and will be brought into operation before the end of the year. The power of the broadcasts should make them available to a large number of short-wave "fans" in the British Isles.

And the Argentine

LSX, Hurlingham (28.98 m.—10,350 kc/s), which was one of the first short-wave stations in the Argentine Republic to give us a broadcast from Buenos Aires and which, for some months, ceased to transmit wireless programmes, has now resumed its nightly entertainments for listeners abroad. Tune in towards G.M.T. 22.00; later, towards 22.30, following the Argentinian National Anthem, you will hear an English talk. On most evenings, LSX for its programmes relies on a relay from a Buenos Aires medium-wave station. The call is *Ell-ess-aykiss, Trans-radio Internaçional, The Voice of the Argentine.*

LRU, Buenos Aires, on 19.62 m. (15,290 kc/s), and LRX, on 31.06 m. (9,660 kc/s), take the programme of LR1 *Radio el Mundo* (Buenos Aires) daily, the former from G.M.T. 12.00-21.45, the latter from 22.00-04.00 or later. You should recognise this station by its interval signal of notes on a vibraphone.

PRF5, Rio, is Multi-lingual

Rio de Janeiro (Brazil), through PRF5, is on the air nightly from G.M.T. 21.45-23.00 on 31.58 m. (9,500 kc/s). For the first forty-five minutes of the broadcast the language used is Portuguese, but during the last fifteen minutes you will pick up talks in English (Monday), Esperanto (Tuesday), German (Wednesday), Italian (Thursday), Spanish (Friday), and in French (Saturday). This talk in a foreign language is called the *Brazilian Hour.*

Those "Unlisted" U.S.A. Broadcasts

Frequently when searching the short-wave band you may come across transmissions of U.S.A. programmes which are not taking place on the frequencies of regular broadcasting stations, such as W2XAD, W2XE, W3XAU W8XK,, and so on. If the broadcast is held for some time it will be found that they emanate from the Rocky Point (N.Y.) or Lawrenceville (N.J.) commercial telephony stations, which relay the radio entertainments either for testing purposes, prior to a special programme for transmission abroad, or are actually the channels through which these broadcasts are being made. The stations most frequently used for this purpose are WEZ, WCG, WQP, WLL and WQB, Rocky Point, on 37.15 m. (8,075 kc/s), 28.9 m. (10,380 kc/s), 21.58 m. (13,900 kc/s), 16.74 m. (17,900 kc/s), and 16.72 m. (17,940 kc/s). Also WOF, WON, WMA, WMN, Lawrenceville, on 30.77 m. (9,750 kc/s), 30.4 m. (9,870 kc/s), 22.4 m. (13,390 kc/s), and 20.56 m, (14,590 kc/s) respectively. Most of the above are brought into operation for transmission to European countries, but occasionally you may also log WLK and WOK, Lawrenceville.

Misleading Call-letters

Although 31.65 m. (9,480 kc/s) is the channel allotted to EDZ-EAH, Madrid-Vallecas (Spain), if you listen to the war news you will be given by the announcer the call-letters *UGT*, which are those adopted for this transmitter by the present Madrid authorities. The broadcasts of war news bulletins are not made strictly to a time schedule, but usually take place towards midday, and again at about G.M.T. 20.15.

Ever Heard Siamese Music?

HS8PJ, Bangkok (Siam), is testing out three channels on which broadcasts are being very well received in the British Isles. Try for 32.09 m. (9,350 kc/s), HSG2, 19.32 m. (15,530 kc/s), or HSE2, 15.78 m. (19.016 kc/s) between G.M.T. 13.00-15.00. Announcements are made in Siamese, French and English; the interval signal consists of three chimes (G, C, E or C, F, A) and a news bulletin in English is usually timed to start at G.M.T. 14.15. The difference in time is seven hours—namely, it is 8.0 p.m. in Bangkok when the station opens at G.M.T. 13.00 (1.0 p.m.). In the course of a mixed programme you will recognise gramophone records of dance and other music and also a concert of string music performed by native players. As the broadcast concludes towards G.M.T. 15.00 (22.00 or 10.0 p.m.) in Bangkok, the announcer bids you "a very good night from Siam."

U.S.S.R. Time Signals

On 28.14 m. (10,660 kc/s) you may happen to pick up a series of dashes and dots which emanate from the Moscow RKD station relaying a time signal from the Observatory. These signals are given out four times daily, namely, at G.M.T. 03.56 05.56, 11.56 and 13.56, terminating with three sets of six-dot-seconds similar to the Greenwich "pips," the last dot indicating the completion of the full minute. The time indicated, in consequence, is respectively G.M.T. 04.00, 06.00, 12 (noon) and 14.00.

In a similar way, RIM, Tachkent, on 39.34 m. (7,626 kc/s) gives a time signal at G.M.T. 17.00. Mention has been made of these transmissions as some readers have been puzzled by the dashes and dots heard, and have been misled into believing that they constituted a television broadcast or a radiotelegraphic transmission of pictures.

Changes in Colombia

HJ1ABE, Cartagena, *La Voz de los Laboratorios Fuentes*, which had closed down pending the installation of a new transmitter, would now appear to be on the ether again on 31.58 m. (9,500 kc/s) with a much more powerful plant. In the call you will notice that frequent references to El Progreso Cartagenero are made, which would seem to be the name of the newspaper sponsoring the programmes. The interval signal consists of a gong struck several times and also, now and then, the sound of a bugle. Do not misread the call for HJ1AVE, a new transmitter at Sincelejo, at no great distance from Cartagena, and which operates on 41.67 m. (7,200 kc/s); it is on the air daily from G.M.T. 23.30-01.00. HJ4ABD, Medellin, is another station of which the signals may be logged almost nightly. The wavelength is 48.9 m. (6,135 kc/s). Following the call-letters the announcer usually gives out the slogan—a lengthy one—*La Voz catra desde el Valle de la Burra*. As a rule the studio closes down at G.M.T. 03.30 with the playing of the *William Tell Overture*. HJ4ABC, Pereira, which shared the same channel, must have closed down,

Random Jottings

By JACE.

Car Radio for Motor Cycles

THE increasingly popular car radio has now invaded motor cycling, and the first radio-equipped side-car outfit was exhibited on the stand of a leading maker of luxury machines at the recent Motor Cycle and Cycle Show at Olympia. The manufacturers of this machine, the Vincent H. R. D. Co., Ltd., of Stevenage, Herts, feel that with the increasing demand for high-class motor cycles there are many who will welcome the innovation.

As a result of their collaboration with Philco Radio they included in their exhibits one of their Comet models with a Swallow side-car, fitted with a Philco car radio. Visitors to the show took such a keen interest in this machine that a minor boom in radio-equipped motor cycles is anticipated.

American Praise for British Radio

PRAISE for British radio set design as being the most advanced and efficient in the world is forthcoming in the current issue of one of the leading American radio magazines, published recently Contradicting the popular opinion held in this country that British set designers follow American tendencies, the magazine states that this year's Radiolympia revealed novelties in English sets which are of great interest to American set makers as indicating possible future trends in their own designs.

"Two features deserve special mention — the new sets with a single knob," stated this American authority, "and the models with movable dials which can be swung into vertical or horizontal position, so that the dial can be tuned from the front or top without stooping."

The British sets which received special praise in this transatlantic commentary are the Philips receivers, which incorporate the two features named above, and it is suggested that American listeners in a year or two's time may be able to have receivers equal to those now on the British market.

The Late Sir Newton Moore

WE regret to announce the death, which took place in a nursing home in London after an operation, on October 28th, of Major-General the Hon. Sir Newton Moore, at the age of sixty-six.

Sir Newton Moore, for many years a director of the General Electric Co., Ltd., was born at Bunbury, Western Australia, and was throughout his life an ardent Australian imperialist. Educated at Adelaide, he took up the profession of a surveyor and civil engineer, but early in life engaged in active politics. He was only thirty-five when he joined the Western Australian Cabinet, and thirty-six when he formed a ministry of his own. In 1906 he was elected Premier, and his services to his State and to the Empire were recognised by a C.M.G. being conferred upon him in 1908, with promotion two years later to K.C.M.G.

He came to London as first Agent-General for Western Australia in 1911, a post he held until 1918. From 1915 to 1917, during the war period, he occupied the exacting position of General Officer Commanding the Australian Imperial Forces in Great Britain.

Following his retirement from the Agent-Generalship he continued to live in this country, and in 1918 was elected Unionist M.P. for St. George's, Hanover Square, and later for North Islington. In 1924 he was returned for Richmond, Surrey, and sat until February, 1932.

On giving up active politics, he devoted himself to business interests, and his wide experience and knowledge proved to be of very real service wherever he applied them. His genial personality and open-handed hospitality endeared him to many people. All who knew him extend to Lady Moore and his family the deepest sympathy in their bereavement.

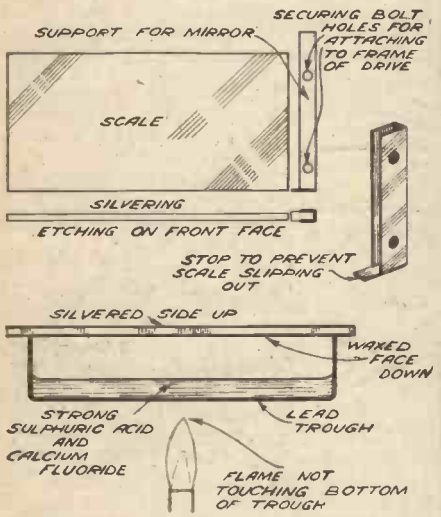
Jack Hylton listening to a test pressing of one of his new H.M.V. recordings on the H.M.V. 36-guinea All-wave Autoradiogram.

A Non-Parallax Tuning Scale

MOST modern condenser drives have celluloid scales, held in position on the drive by four bolts, while the pointer moves across in front of the scale. There is inevitably a parallax error with this type of scale, and to avoid this it will be found very convenient to replace the celluloid scale with a mirror, carrying the wavelengths and names on it.

Either a steel or glass mirror may be used, but the latter method has several advantages, in that it can be adapted for illumination by one of the methods described in the issue of this journal dated May 9th last, and it is much easier to work.

If a steel mirror is used, first cut it to size and drill it to correspond with the fixing bolts used for the celluloid scale, which may be used as a pattern. Now prepare a template from a piece of thin card, such as a postcard. This template should be cut so that a needle can move round in the slots to cut a waxed surface beneath. Then cover the plate with a thin coating of wax (candle-wax will do),



The method of etching the scale and other features is shown in the above diagram.

and lay the template on it. With a sharp needle, cut the wax underneath. Now paint over the wax, and in the slots formed, with a paint such as the new "bakelite" kind. When this has thoroughly dried, remove the wax by placing the scale in hot water and washing. The letters and wavelength will be left in the scale in very fine lines. The scale is now fixed to the drive in place of the celluloid scale. It has the advantage of being stronger than glass.

Using a Mirror

With a glass mirror, prepare a cardboard template in the same way, and wax the front of the glass. Now construct a leaden trough, or dish, a shade smaller than the glass which has to rest on it (the glass is not yet cut to size). Lead must be used, as only this metal, chromium, and the rare metals are resistant to the acid. Alternatively, a chromium plated trough may be used, but this is much more expensive. Into this bath place about ½oz. of calcium fluoride, obtainable at most chemists, and cover to about ¼in. with pure *concentrated* sulphuric acid. To find approximately how many ounces of acid are required, multiply the length in cms. by the breadth in cms., and by the height, approx. 1 cm. Then double this result as the acid is nearly twice as dense as water 1 cc. of which weighs 1 gramme (1oz. is, approximately 28 gms.).

Gently warm the acid and calcium fluoride by a candle or a Bunsen burner, as shown in the sketch. Hydrofluoric acid will be evolved and calcium sulphate (gypsum) will be left after the action. Hydrofluoric acid will attack glass readily, but not wax, so the exposed part of the glass will be eaten away, the depth of the etching being determined by the length of exposure. Be careful not to breathe any of the poisonous fumes, and wash the hands well after the etching has been completed. Remove the wax as before, and cut the scale to size carefully.

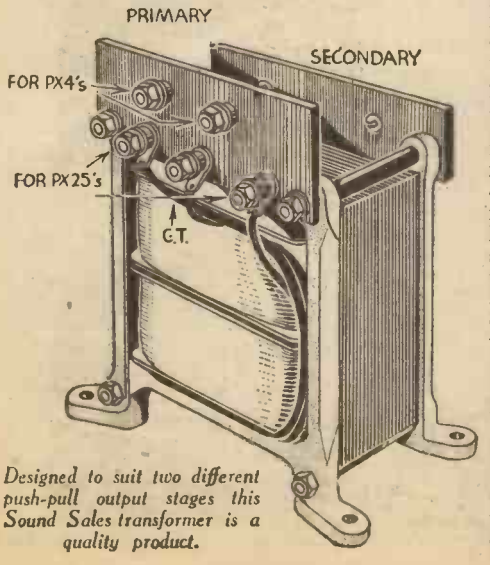
Two supports will be required, as indicated in the sketches, and they may be constructed from tin-plate as glass cannot easily be drilled.—A. M. WILDING (Wallasey).

Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY.

Sound Sales Push-Pull Transformer

THE output transformer is one of the most vital components in a receiver, and when much care has been devoted to the design of a receiver it is essential that the method of connecting the receiver to the loudspeaker should be studied just as carefully. A component designed for this purpose is illustrated below and is a Sound Sales product. It is a push-pull output transformer, but has a tapped primary to enable two different types of valve to be employed whilst maintaining the correct ratio for feeding a 15-ohm speech coil. The impedance provided at the two primary terminals is 6,000 or 10,000 ohms, and thus the transformer may be used to connect a 15-ohm speaker to a pair of PX4's or a pair of PX25's working in push-pull. This transformer has a very high primary inductance, the rating being over 70 henries. The method of winding the transformer and the general features of design have resulted in a very remarkable characteristic being obtained with this particular component, and the variation from 20 to 20,000 cps. is not greater than .5 db. (plus or minus). This is an unusually good performance for a component of this type, and thus it may confidently be recommended for use in quality receivers. The price is 35s., and it may be obtained with various windings to suit different speakers and valves, and the reference number is SS.036. The makers are Sound Sales, Ltd., Marlborough Road, N.19.



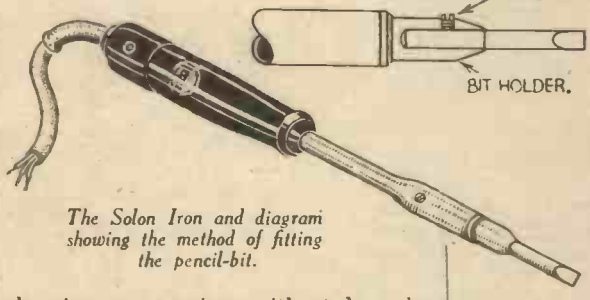
Designed to suit two different push-pull output stages this Sound Sales transformer is a quality product.

Erie Wirewound Resistors

IN some parts of a receiver it is quite permissible to employ a resistor which is not non-inductive. It will generally be found that such resistors are of the type carrying large currents, and consequently they require to be well designed to avoid troubles due to the resultant heat which may be generated. Such components may be found in the Erie range, and are of the type illustrated on this page. The element is of the nickel-chrome alloy type, and is space wound on a heat-resisting porcelain tube. When the correct resistance is wound the entire unit is coated with an insulating cement so that no possible external variation can take place, and tinned-copper soldering lugs are riveted to the tube and similarly insulated. The general appearance is well shown by the illustration. The complete resistor will withstand temperatures up to 1,000 degrees centigrade, and it may be obtained in seven different ratings, ranging from 5 to 100 watt dissipation. The smaller models measure just over 1¼in. long and ⅞in. in diameter, and are available in resistances from .2 to 2,000 ohms. The price is 2s. 6d. The largest models are 6in. long and 1¾in. in diameter, and may be obtained in all values up to 60,000 ohms, and cost 9s. The intermediate sizes are proportional in cost. The makers are Radio Resistor Co., 1, Golden Square, W.1.

Solon Pencil-bit Soldering-iron

IN many modern receivers the amount of space available is very limited, and it sometimes becomes difficult to replace a broken lead, or even to connect a lead in

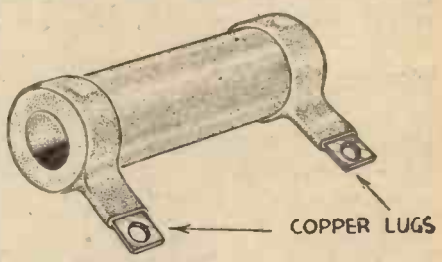


The Solon Iron and diagram showing the method of fitting the pencil-bit.

place in a new receiver, without damaging some component owing to the heat of the ordinary type of soldering-iron. For such cases the new Solon iron will be found indispensable, as its main feature is an exceedingly thin copper bit sufficiently long to enable it to be inserted into the ordinary receiver without risk of damage. The main part of the assembly is more or less identical with the standard 65 W. industrial model, but the bit holder is designed with a stainless steel grub screw to accommodate a bit of only ⅛in. diameter. This is inserted into the holder and leaves a total length of 1¾in. projecting. The handle is of insulating material with a bakelite connecting box into which the three-way rubber-covered cable is inserted, and the body of the iron is connected to one of the inner leads to enable it to be earthed in the standard manner by the use of a three-pin mains plug. The bit is removable, and replacements may be obtained when one is worn out for 6d. The cost of the complete iron is 10s. 6d. The makers are Henley's W.T. Telegraph Works Co., Ltd., 11, Holborn Viaduct, E.C.1.

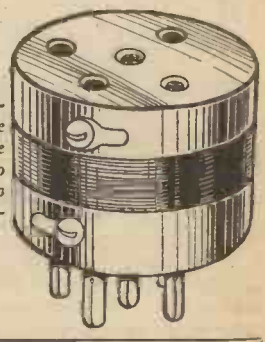
Bulgin Suppressor Adaptor

THE removal of interference caused in the vicinity of the powerful television transmitter is a simple matter if one of the special Bulgin suppressors is fitted. This consists of a simple five-pin plug in adaptor with split grid socket, and the centre of the adaptor is turned down and a small choke winding placed on it, connected at one end to the grid pin and at the other to the grid socket. Thus, by removing a valve from the existing valveholder and inserting the adaptor in its place, afterwards inserting the valve into the adaptor, the choke becomes automatically connected in the grid circuit. It must be emphasised that this device is intended for use in the detector grid circuit, and in view of some misapprehension which



A useful wirewound resistor from the Erie range.

appears to exist in the article on Breakthrough which was published in our issue dated October 31st, we would reaffirm that this type of suppressor is perfectly effective when used in a standard detector circuit. The makers point out, however, that in the event of severe breakthrough on the medium-wave range, it may be found necessary, in addition to fitting this type of suppressor, also to screen the detector valve. A simple metal can, such as is used for coil screening, may be employed for this purpose, but a metallised valve should be just as effective, provided that the detector valve is not of the S.G. type with exposed cap. In ninety-nine cases out of a hundred, however, the mere inclusion of the choke in the grid circuit will effectively prevent the breakthrough of the television signal. The reference number of this device is H.F.25 and the price is 2s. It is fitted with five pins and sockets, but if a 4-pin valve is in use the centre pin and socket may be removed simply by unscrewing the pin. The makers are Messrs. Bulgin and Co., Ltd., Abbey Road, Barking, Essex.



The Bulgin Television Interference Suppressor will be found invaluable to those living close to the powerful television transmitter.

THE BRITISH LONG DISTANCE LISTENERS' CLUB

QSL Card Controversy

MR. E. DE COTTIGNIES takes up the challenge again and writes: "May I, too, be allowed to encroach again on your space, in order to reply to the protest and challenge by Mr. Everard in PRACTICAL AND AMATEUR WIRELESS? That worthy gentleman seems, to a certain extent, to be 'barking up the wrong tree' (apologies to 2AFO). He, himself a *bona-fide* S.W. worker, reaping the ample rewards thereof, does not seem to appreciate that there *are* people about who are *not* S.W. or DX fans, but are simply seized with a mania for collecting QSL cards. I've met some in my own town, and don't I know! The extent of my own collection hardly enters into the question, but, for Mr. Everard's satisfaction, I may well say that, after a period of listening and reporting extending just over two months, I received eighty cards and numerous letters from 'hams,' station-managers, ships' operators, etc., from all continents; this being but a fraction of the number I could have had if I had written to every one I had heard!

"Granted that 'G' cards have no DX value, but they *are* tokens of appreciation in return for reports which were evidently of some value to the 'hams' in question.

"I, too, have been a S.W. listener and constructor since 1929, but have not bothered about QSL's till quite recently, mainly because I hope to be 'on the air' myself soon. My aim in collecting, as a BRS. is the 'Verified All Continents' Certificate. Finally, Mr. Everard says that 'FB' reports should be worth a QSL. Did I not say in my letter (on the 17th) that 'FB' reports *always* produced one?"

Mr. Dennis, however, enters the lists and gives us some details of his methods. He says:

"It is with great interest that I have read the articles by your readers on the subject of QSL cards. Perhaps my own methods and experiences may be of interest to others. When reporting on a transmission, I state time of reception (E.S.T. and G.M.T.) and date, wavelength, details of programme received, description of my receiver and antenna, weather conditions for the day transmission was received and also the 'QSA,' 'R,' 'T' and 'QRM.' With every report I send I enclose a reply coupon (which in many cases has been returned to me with a card). In your issue of November 7, 1936, Mr. J. W. Ismay (G6JI) states: 'If the Q.S.L. card was plain and not a work of art, the situation would never have arisen.' Admittedly, this applies to the collector who sends in a report as follows: 'I heard you on such and such a date, QSA5, R8-9,' and then wonders why he does not receive the 'pretty card,' which he had hoped to flaunt amongst his equally inexperienced friends. I can assure Mr. Ismay that my interest does not lay in the pictorial design of the card alone—in fact, some of my best bags are quite plain—and I maintain that a good report is well worthy of a card, providing a reply coupon is enclosed to defray postage expense. To boil matters down, I am of the opinion that a good percentage of the trouble lies in the fact that many would-be reporters are ignorant of the correct way of making out a report, and I think that if you published a sample report in your excellent paper, showing listeners exactly how a report should be made out, and stressing the importance of the reply coupon, much would be done to enlighten the would-be short-wave reporter, who, in his ignorance, is creating an important stir in the short-wave world. In conclusion might I add that I am open to correction and suggestions from any of your readers."

A Log from No. 1

SIR—As I have not seen a log of short-wave stations from this part of the country, here are mine: W2XAF, W2XAD, HJ1ABB, YV4RC, W9XF, W1XK, VK2ME, VK3ME, VK3IR, and dozens of others; my amateur log stands at forty verified, the best of these being VE2CA, VE1CN, VE1GP, VP6YB, W2HAY, SM5SX, PY1CK, ON4MJ, and my only Australian fone, VK2MH, of Sydney. I have sent reports and International Reply Coupons to the following amateurs, but have had no reply: SU1RK, VP3BG, K4DDH. The following log may interest readers; the amateur stations were all on fone and none below R7. Canadian, VE1JA, VE2BG; American, W3MD, W6CIN; Havana, CO2KL, CO7CX; South American, CE2DW, YV5AN, LU2AD, PY2CK, HI7G and YU7DX, of Yugoslavia. Owing to the great number of American amateurs I have only included two of the best ones received here. My receiver is a 4-valve with a 66ft. Zepp running north to south.—A. T. BOWER, Member B.L.D.L.C. No. 1.

BOOKS RECEIVED

OFFICIAL RADIO SERVICE HANDBOOK. By J. T. Bernsley. 1,008 pp. Over 350 illustrations. Published by Gernsback Publications, Inc., New York.

ALTHOUGH this is an American publication, the essentials of radio servicing which are given will prove of great value to the English service engineer. It deals with the practical side of radio and covers circuit theory such as circuit fundamentals, intricate tuning circuits and aligning data, volume controls, tone controls and so on. Loud-speakers, pick-ups and allied apparatus are dealt with, and a complete description of the various apparatus which must be used in practical servicing is given. This includes all the various meters, cathode-ray equipment, and instructions for using them. The book concludes with operating notes of the principal American and Canadian receivers, and detailed tables of valve replacements, condenser and resistor values for various commercial sets, resistance wire tables, etc.

TESTING RADIO SETS. By J. H. Reyner, B.Sc., A.C.G.I., D,I.C., A.M.I.E.E., M.Inst. R.E. 239 pages, 115 illustrations. Published by Messrs. Chapman and Hall. Price 10s. 6d.

IN the Third Edition of this book just issued, Mr. Reyner deals fully with the practice of radio servicing. There are twenty-five chapters in the book dealing with general testing methods, L.F. tests, tuning tests, H.F. tests, mains apparatus, S.W. and superhet receivers, curious faults, laboratory testing, the cathode-ray oscillograph, etc. Every part of the testing is dealt with systematically, and it is possible for the reader to pick out any one section of the book for special use and find therein everything for his requirements. This book can be recommended for all who are interested in modern receiver servicing.

Our Free Catalogue Service

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WESTINGHOUSE METAL RECTIFIERS

IN the 1937 edition of "The All-Metal Way," full particulars of the complete range of Westinghouse metal rectifiers and Westectors are given, together with several circuit diagrams and graphs which should be particularly useful to the set designer and constructor. Useful information on such subjects as smoothing, voltage dropping, and decoupling, automatic loud-speaker field excitation, battery eliminator problems, battery charging, and automatic volume control, are included in the booklet. Metal rectifiers for cathode ray, television and high voltage purposes are also listed.

A companion booklet, entitled "At the Correct Rate," contains particulars of the Westinghouse range of battery chargers, including a new charging set—Model R.G.C.12—for charging car batteries at 8 amps. Particulars are also given in this booklet of the "Westric" trickle charger which enables car owners to charge their car batteries in their own garages.

RAYMART COMPONENTS

A WIDE range of short- and ultra-short-wave components is listed in the latest edition of the Raymart Manual, a well-illustrated handbook running to 44 pages. Great care should, of course, be exercised in the selection of components and equipment for all short-wave work, and all Raymart components bear the stamp of quality and durability resulting from years of experience. The prices, moreover, are extremely moderate for high-class work. The range includes I.F. transformers, chokes, condensers, coils, stand-off insulators, transposition blocks, transformers, and valves of English and American types for battery and mains. There are several circuit diagrams with descriptive matter particularly useful to the amateur, and also included are particulars of several American seven- to ten-valve superhet receivers. Copies of this useful manual can be obtained for 6d., or by post for 7½d.

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.

L. S. (Dublin). The trouble is undoubtedly due to a loose connection and we advise you to have the set examined by a local service agent of the makers.

G. E. A. (Ross). The H.T. should not exceed 250 volts. At this figure the valve will be working "all out" and the G.B. will have to be increased above the value shown. Follow the valve makers' instructions regarding both H.T. and G.B.

W. R. (Folkestone). The meter may be giving a false reading owing to the current taken by it. Alternatively, the rectifier is faulty, but we doubt this in view of the difference in the readings.

J. H. (Newtownards). We cannot give transformer winding data in the form of a reply. Furthermore, full details are not given by you concerning the output required.

R. P. (Tunbridge). We regret that we have no blueprint which will suit your requirements. The parts are now out of date.

G. R. C. (South Woodford). We do not recommend a mains set if you have had no experience. The Record Three would undoubtedly be a very suitable receiver to commence with. You would find this simple to construct and easy to operate.

W. M. (Horning). We have no details of your set, and are not familiar with the service difficulties of commercial receivers. We regret that we cannot assist you in this particular case.

A. H. H. (Dagenham). The values are more or less correct, but the anode resistance in the first stage is really too low to give any appreciable amplification. With an S.G. valve a minimum of 50,000 should be considered necessary. Preferably 100,000 ohms should be used. This would, of course, result in a rather large drop in the H.T. voltage, but you should endeavour to use a higher value than that shown. A variable-mu valve could not be used in this stage.

C. P. D. (Chislehurst). A pick-up or mike may be used on practically any receiver. It is joined between the grid and a tapping on the grid-bias battery, adjusted according to the particular valve and H.T. in use. The mike generally has to be connected through a transformer (unless one is already included in the base of the instrument), and the ratio has to be selected according to the particular instrument.

E. K. (West Bromwich). The noise would indicate that there is a faulty component or faulty connection. A stage-by-stage test is indicated in order to find the source of the noise.

H. G. (Bath). As the set works satisfactorily on most wavebands it is probable that you are listening at the wrong time or that the aerial you are using is not ideal for this particular short-wave band. Follow the notes regarding times of listening given in the recent operating notes for the Record Three.

D. M. (Liverpool 9). There may be something wrong in your wiring, and we suggest you let us have a sketch of the set in order that we can try to trace your trouble.

R. B. (Carshalton). We regret that the blueprint of the receiver in question is no longer available.

T. C. E. W. (Bransgore). You could use a generator, but there is no other alternative. The recently-introduced H.T. from L.T. unit may prove of value, and full details may be obtained from Messrs. Bulgin. There is no definite answer to your second query, as the term long-distance is only comparative, and you could use 5 watts in the aerial on a wavelength of 5 cm.

H. C. R. (Winchmore Hill). We have no blueprint using exactly the parts set out in your letter. Furthermore, we must remind you that we cannot guarantee our receivers unless they are built from the parts specified by us.

R. E. S. (Lewisham). A transformer should be the only requirement, and special components for this purpose are obtainable from Messrs. Heayberd. Fuller details of the circuit would be required, however, in order to select a suitable model. Thank you for your notes on the Ecuador and other transmitter.

J. R. (Twickenham). Messrs. Stratton and Co. can supply the coil.

W. E. W. (Upminster). We suggest you get into touch with L. O. Sparkes, 9, Phœbeth Road, Brockley, S.E.4.

L. M. H. (Gt. Bookham). We have no blueprint of a suitable circuit.

J. M. (Sparkhill). If sufficient interest is displayed by readers we shall publish a mains version.

R. H (Dartford). The apparatus would not be suitable for a transmitter.

L. W. H. (Coventry). We certainly think the earth is responsible, although it may be worth while modifying the H.T. feed to each stage, taking them from a different point on the eliminator.

A. H. (Lerwick). We regret that we have no data concerning the cell mentioned, but we are looking into the matter. The 6D6 is the better valve from your data, although the total H.T. consumption is 1.5 mA. more. The mutual condenser is often referred to as the "Goodness factor."

R. O. (Christchurch). We do not advise the modification of the transformer. A separate heater transformer may be obtained from Messrs. Heayberd, and would overcome your difficulty.

C. W. (Leicester), R. J. G. (Portsmouth), F. B. C. (Oakengates). The additional notes will be given very shortly.

RADIO CLUBS AND SOCIETIES

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

Wellingborough and District Radio and Television Society

THE fortnightly meeting of the above society was held at the Midland Hotel, Wellingborough, on Tuesday, October 20th, when a lecture was given by Mr. K. Stevens, of London, on the Theory and Operation of the Metal Rectifier.

Mr. Stevens explained that the exact theory of the rectifying properties of the Westinghouse unit was still practically an unsolved mystery, but he went on to show that although so little was really known on the subject, it was possible to utilise this property in a number of different ways.

With the aid of lantern slides, Mr. Stevens described the various methods and purposes to which the use of the metal rectifier had been put, and went on to say that every time an automatic telephone is used, at least one and sometimes as many as half a dozen metal rectifiers were at work for the Post Office on your behalf, as the metal rectifier was used universally in up-to-date telephone circuits.

The metal rectifier was to be found in widely divergent places, such as in a colliery for the purpose of charging the miners' electric lamps, and in the cycle factory for use in conjunction with the plant for nickel and chromium plating cycle frames and parts.

The meeting was excellently attended by members and friends, under the chairmanship of Mr. A. E. Fletcher, supported by the Secretary, Mr. L. F. Parker.

British Short-wave League

SINCE its inauguration in March of this year, the British Short Wave League, primarily a *listeners'* organisation, has made remarkable progress, having a total of some 375 members situated in Great Britain, France, I.F.S., U.S.A., Canada, Palestine, South Africa, Australia and Egypt.

Features of the League's "Review" are the technical articles by G6LX and G6PD; amateur station section, conducted by R. D. Everard; lists of members' "captures"; the "black list"—a most controversial subject; S.W. broadcast station news; news of the latest QSL cards; photos of members, and many other fine features.

Although, as stated previously, the League is primarily a listeners' organisation, it has been realised that the demand for practical articles on transmitting is becoming very great, and so the November issue of the League's publication will contain instructions on the building and operating of a low-powered artificial aerial transmitter.

From November 1st to the end of January, 1937, a membership contest is being held with several valuable prizes.

The League welcomes to membership anyone, anywhere, who possesses an interest in short-wave reception and transmission, and membership application forms may be had from F. A. Beane, British Short-wave League, Ridgewell, Halstead, Essex. A specimen copy of the "Review" will be sent on receipt of a 2d. stamp.

Radio, Physical and Television Society

THE third meeting of the season was held recently at the society's headquarters, 72a, North End Road, West Kensington, when Mr. Dedman, of the Quartz Crystal Co., Ltd., lectured to members on the properties and production processes of quartz crystals.

Touching briefly on the sources of supply and the methods used in the recovery of quartz from mother earth, the lecturer described his early experiments to find the best methods of cutting this substance.

The talk was illustrated with actual crystals in various stages of production. The lecture concluded with a description of the apparatus used for checking the finished article to within one part in five millions.

An interesting series of weekly lectures has been arranged to take place on Friday evenings at 8 o'clock at the society's headquarters, and the committee hope to welcome more readers of this journal. Further details can be had from the Hon. Sec., Mr. M. E. Arnold, 12, Nassau Road, S.W.13.

Harco Radio Club (Greenwich)

THIS club has now been formed, and meetings are held every Tuesday at 7.30 p.m. in the Canteen Lounge of G. A. Harvey and Co., Ltd., Woolwich Road, Charlton, S.E.7. The club has its own clubroom, and incidentally a refreshment bar and free car park. Trams Nos. 36, 38, and 40, and buses Nos. 53, 153, and 108 pass within a few yards. Morse instruction is given every evening and arrangements are being made for the club to possess its own transmitter and receiver. All inquiries should be addressed to the Secretary, C. W. Kemp, Dept. HRC, 124, River Way, Greenwich, London, S.E.10.

LETTERS FROM READERS

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

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

Baseboards: A DX Log

SIR,—I am glad to see that baseboards are coming into their own again. I have been a reader for nearly a year now and like the paper very much, particularly Readers' Wrinkles, S.W. section, and Letters from Readers.

I enclose my DX log of stations heard here in Douglas between 07-23 hours.

COCH, VK2ME, VUB, SUZ, JVH, JVM, PMN, PRF5, TFJ, and GBTT (*Normandie*).

On 14 m/c phone: HI7G, SU1SG, KG, CH, LY1J, CO2KY, PK4AU, and URAD (Eclipse Expedition). An 0-v-2 receiver with phones was used. I would very much like to correspond with any reader, preferably in French.—L. SPALTON (Hilary Mount, Poplar Road, Douglas, I. of M.).

COCX (Cuba)

SIR,—Mr. Lillywhite who, in your October 31st issue, mentions reception of that Cuban mystery, COCX, may be interested to hear that this station is again enjoying a good reception period.

I last heard it on the mornings of September 24th and 25th, between 00.05 and 00.07, but it now has an evening schedule, since I logged a ragged but unmistakable signal at 22.00 G.M.T. on October 30th.

By the way, I can't find station CSW listed, so I presume it's a new one. It works 30.21 m. with 5 kW between 9 p.m. and midnight. Address given as "National Broadcasting Co., Lisbon, Portugal." It relays the National programme. Has anyone else logged this station?—S. L. BIRCHBY (Highams Park).

A Good Log from Letchworth

SIR,—I enclose my short-wave log for the last few months which may be of interest to other S.W.L.'s.

Commercial: W2XAD, W2XAF, W8XK, W1XK, W1XAL, W2XE, W3XAL, W3XAU, WQV, PRF5, LRX, JVM, VUB, Rome, Moscow, Daventry, Zeesen, etc.

Amateurs on 40 m.: 85 English, also PA0EO, PA0JO, PA0AU, PA0AT, F3DI, F3FN, F8DW, EI8G, ON4SWD, and numerous Spanish stations broadcasting war news.

Amateurs on 20 m.: 81 U.S.A, VE1BR, VE1CN, VE1HK, VE2BG, VE2ER, VE2DC, VE2CA, VE3SM, VE3EO, VO4Y, PY2EJ, LU1EW, CO2HY, CO2KY, HI4F, SU1KG, LA1G, LA2Y, F8MJ, F8VM, G5ZJ, G2HK, G6BM, G2YZ, G5DK, G6WD, and F8UP.

My receiver is a simple home-constructed two-valver made almost entirely from "junk." The aerial is a horizontal one, 35ft. long, 12ft. high, lying roughly NNW.

I am only fourteen years old and first started on the short-waves less than six months ago with a 0-v-0. I greatly appreciate the short and ultra-short-wave articles in PRACTICAL AND AMATEUR WIRELESS, and wish for the continued success of the paper.—L. KNIGHT (Letchworth).

QSL Cards and Reports

SIR,—I wish to most strongly deny the statements made by W. T. Cooper (G8BS) and J. W. Ismay (G6JI) that QSL card collecting has got to a stage similar to collecting cigarette pictures. I have always made a practice myself (and have also asked the 350 odd members of my club, the British Short-Wave League) to send in really detailed reports and *only* to stations at least outside of Europe. I know that I and most other DXers value our QSL's highly as rewards for interesting and useful reception reports. I suppose Messrs. Cooper, Ismay and Co. would sneer at the following QSL's. Well, I don't! HI7G's QSL stated I was his first European 'phone report, and when he only used 20 watts; also VU2BU, Assam, who only uses 10 watts. Other QSL's I possess stating I was the first British or European 'phone report are: W9BPK, W6FQY, W7DAA, —7VS, 6HAR, VE5JB, VE5BY, 4CW, 4SF, W7DNB, VE4BF, K6CIB, W6JZE, W9NNO, —9FGE, 9BOZ, and over 100 others. Other interesting 'phone QSL's I possess include VK2JA (25 watts), VK2RH (25watts), 2BW,—2AP, 2UD, etc, 3MR, 3KX, 3OC, K6KKP, —6CMC, 50W6's, 20W7's, 8VE5's, 17VE4's, 160 W8's, 150 W9's, 38 W5's: LU4-8, CP7 (19m), 3 of VPD, Fiji (22 m.), 4 of VK3ME, VK3XX, VUC, Calcutta, HSP, Siam, FZS, Indo China, ZSS, Capetown (4), OPL, B. Congo, SU1-8, EA8-9, FT4, CN8, RIO, Baku, URAD, Siberia, W1OXD and 3XL.

Finally, *I have* logged G8BS on 160 metres, but have not *bothered* to send him a report as he is *not* DX. I have had some experience of G stations, as when I first started S.W.L. I sent out very good and detailed reports with specially drawn S.W.L. cards, and return postage, *each* to over thirty G stations ('phones) and every station was at least 150 miles away. All the QSL's I got back was six! Anyway, G stations do not interest me at all.

Wishing your fine paper all success.—R. EVERARD (Sawbridgeworth).

Our All-wave Battery Sets: Mains Version

SIR,—I agree with R. Stagg's suggestion *re* all-wave sets (mains version). I am waiting to build same when published. I prefer the "Record," with Westinghouse rectifier.—S. J. PORTER (Enfield).

Our Single-valve Short-wave Set

SIR,—In the issue of the PRACTICAL AND AMATEUR WIRELESS dated March 21st, 1936, you published a design for a one-valve short-wave set. I made this set from the particulars given, and was amazed at the results. My aerial is 50ft. long and 10ft. high.

During the last few months I have logged, in addition to several G stations on 40m. (phone), the following American amateurs: W2BSD, W3BBB, W1CKC, W2BTP, W3CP, W2CFU, W1CRW, W2EOY, W1AQM, W2ELO, W1IFD, and U4CDS. Commercial stations: W2XAF, W1XK, W2XE, W3XAL, W8XK, 2RO, TPA3, JVM, LKJ1, VUB, DJN, DJA, and EAQ.—ANTHONY PARKER (Letchworth.)

QUERIES and ENQUIRIES

All-wave Aerial Kit

"In a back number I remember reading about an Overseas All-wave Aerial Kit. Could you supply any further details about this and its price? Who are the makers?"—F. A. (Watford).

THE aerial kit referred to is a Ward & Goldstone product, and is sold complete at 17s. 6d. It consists of two 30ft. horizontal aerials, a 50ft. length of twin feeder downlead, together with the aerial separator and insulators. A special receiver coupler with a 3-position tapping switch is also included and the necessary staples for erection. If a longer feeder cable is required, such as would arise when the aerial has to be erected a long way from the receiver site in order to avoid interference, a 100ft. length of cable may be obtained with the kit, and the price then is increased to 25s. The aerial is effective from 15 to 2,100 metres and thus is admirably suited for an all-wave receiver.

Fitting a Tweeter

"I am thinking of adding a tweeter loudspeaker to my present equipment, but have been told that there are many extra components needed, and that it is not a simple matter to add this type of speaker to an existing set. Will you please confirm or contradict this statement, and let me have any data concerning the subject which will be of assistance to me?"—R. E. (N.W.5).

IT is true that one or two extra parts are needed, but they are not expensive. To obtain the very best from this type of speaker you would require two 1 mfd. fixed condensers, a small capacity condenser and a volume control of the potentiometer type. One side of the tweeter is joined to one side of the volume control and the other side of this is joined to one side of the fixed condenser. A value of .05 mfd. may be used for preliminary tests. The other side of this condenser is joined to the other side of the tweeter and also to one side of a 1 mfd. condenser. The arm of the potentiometer is joined to one side of the other 1 mfd. condenser, and these two condensers are used to couple the circuit to the present speaker (transformer primary). Subsequent tests may enable you to modify the value of the fixed condenser.

Anti-mobo Unit

"I have an old component at home called an Anti-Mobo, but I cannot find this in any catalogue and do not know what it is intended for. Could you please help me to know the meanings of the terminals on it marked H.T., R.1, R.3, H.T.—and X? I also have a coil type 483, but cannot trace the connections or circuit. Can you also help me in this case?"—P. S. (New Mill).

THE component referred to is simply a decoupling unit consisting of a condenser and tapped resistor. This provides two different resistance values which may be selected according to the circuit in use, and the component may be added to any existing receiver between the H.T. positive lead and the anode component now in use. We cannot give coil connections as we have no trace of the reference number. The makers are no longer in business.

D.C. Mains Supply

"I have a direct current supply of 120 volts and I wish to use this for my H.T. supply. Would I be able to do this without damaging the valves, which are standard Mullard battery valves? I have no milliammeter and so I do not know how much current they use, but I have seventy volts on the detector and 120 volts on the power. What dropping resistances would be necessary for two H.T. tappings, 70 & 120 volts?"—A. R. (Cheltenham).

WE presume that the supply in question is obtained from a house-lighting plant and therefore it should be suitable for H.T. purposes. Without knowing how the supply is obtained we cannot say whether or not it is sufficiently smooth to avoid hum or ripple difficulties. The capacity of the supply is immaterial and the valves will only take as much current as they require. If a rectifier is used, however, there may be a voltage rise if the current taken is much below the rated output. The value of dropping resistors can only be ascertained when the current taken in each stage is known. You should be able to ascertain this from the valve maker's characteristics as you have no meter.

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 queriists.

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

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

The Coupon must be enclosed with every query.

Coil-winding Data

"I have the blueprints for the 150 mile Crystal set and the B.B.C. Official One-Valver. I should like to know the gauge and kind of wire for the coils of these two sets, as the blueprint only shows the size of the coil former and the number of turns."—F. G. N. (Aldershot).

THE coil in the crystal set is wound with 28 S.W.G. enamelled wire, whilst the B.B.C. Official One-valver has a coil wound with 26 S.W.G. double-silk-covered wire. A 4-oz. reel is required for the latter receiver.

Eliminating Variable-mu Valve

"I am building the £4 Superhet 3, and would like your advice on the following point. I have a nearly new ordinary H.F. pentode valve and should like to use this for the time being in place of the variable-mu I.F. valve. Am I correct in omitting the .5 megohm resistor R2 and the .01 mfd. condenser C8 and joining the G.B. lead from the I.F. transformer to the earth line? I appreciate that the control of volume range will not be so great, but I am using a poor indoor aerial so overloading is not very likely to occur."—G. R. C. (Peterboro').

THE resistor R2 must not be omitted, as this forms the feed to the first valve. If you omit this, when the volume control potentiometer is set to the maximum volume position you will have the grid of the first valve connected direct to earth and thus may obtain no signals. Therefore, this resistor must be left in position. Condenser C8 may, however, be omitted, although it acts as an H.F. by-pass from the arm of the volume control to earth and is a refinement well worth retaining. Therefore, the only change worth making in the valve modification suggested, is to join the G.B. lead from the first I.F. transformer direct to earth. Condenser C8 should be joined direct to the arm of the volume control.

The Record All-wave Three

"Could A.V.C. be fitted to this receiver, using the well-known A.V.C. unit which was at one time on the market, and which I now have by me? Also, has the set good range and output volume? Could it be fitted for radiogram use and what modifications would have to be made?"—R. S. (Chesterfield).

ALTHOUGH the unit in question could be incorporated to provide an A.V.C. action on the broadcast wavelengths, we do not think it would prove very effective on the short waves owing to the fact that much of the fading here is of the high-speed type, and the simple A.V.C. circuit is not responsive to such fading. The range of the receiver should be adequate for all normal requirements, and the output provided should be sufficient for normal domestic needs. To use the receiver as a radiogram it is only necessary to include a pick-up between the grid of the detector valve and a tapping on the grid bias battery, a value of 1.5 volts being found suitable.

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

Practical and Amateur Wireless
BLUEPRINT SERVICE

These blueprints are full size. Copies of appropriate issues containing descriptions of these sets can in most cases be obtained as follows:—"Practical Wireless," at 4d., "Amateur Wireless" at 4d., "Practical Mechanics" at 7½d., and "Wireless Magazine" at 1/3d., post paid. Index letters "P.W." refer to "Practical Wireless" sets, "P.M." to "Practical Mechanics" sets, "A.W." refer to "Amateur Wireless" sets, and "W.M." to "Wireless Magazine" sets. Send (preferably) a postal order (stamps over sixpence unacceptable) to "Practical and Amateur Wireless" Blueprint Dept., Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.

PRACTICAL WIRELESS

STRAIGHT SETS. Battery Operated.

	Date of Issue.	No. of Blueprint
One-Valve : Blueprint, 1s.		
All-wave Unipen (Pentode)	—	PW31A
Two-valve : Blueprint, 1s.		
Four-range Super Mag Two (D Pen)	11.8.34	PW36B
Three-valve : Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF (Trans))	—	PW10
Sixty-Shilling Three (D, 2 LF (RC & Trans))	2.12.33	PW34A
Leader Three (SG, D, Pow)	—	PW35
Summit Three (HF Pen, D, Pen)	8.8.34	PW37
All Pentode Three (HF Pen), D (Pen), Pen)	22.9.34	PW39
Hall-Mark Three (SG, D, Pow)	—	PW41
Hall-Mark Cadet (D, LF, Pen (RC))	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three)	13.4.35	PW49
Genet Midget (D, 2 LF (Trans))	*June* '35	PM2
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53
Battery All-Wave Three (D, 2 LF (RC))	31.8.35	PW55
The Monitor (HF Pen, D, Pen)	8.2.36	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P)	—	PW64
The Gladiator All-Wave Three	29.8.36	PW66
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	PW69
Four-valve : Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen)	—	PW11
Beta Universal Four (SG, D, LF, Cl. B)	15.4.33	PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-mark 4 (HF Pen, D, Push-Pull)	—	PW46
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36	PW67

Mains Operated.

Two-valve : Blueprints, 1s. each.		
A.C. Twin (D (Pen), Pen)	—	PW18
A.C.-D.C. Two (SG, Pow)	7.10.33	PW31
Selectone A.C. Radiogram Two (D, Pow)	—	PW19
Three-valve : Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, DDT, Pen)	10.6.33	PW23
D.C. Ace (SG, D, Pen)	15.7.33	PW25
A.C. Three (SG, D, Pen)	—	PW29
A.C. Leader (HF Pen, D, Pow)	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	18.8.34	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50
"All-Wave" A.C. Three (D, 2 LF (R.C.))	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	31.8.35	PW56
Four-valve : Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	—	PW45
Universal Hall-Mark (HF, Pen, D, Push-Pull)	9.2.35	PW47

SUPERHETS.

Battery Sets : Blueprints, 1s. each.		
£5 Superhet (Three-valve)	—	PW40
F. J. Camm's 2-valve Superhet (Two-valve)	13.7.35	PW52
F. J. Camm's £4 Superhet	—	PW58
Mains Sets : Blueprints, 1s. each.		
A.C. £5 Superhet (Three-valve)	—	PW43
D.C. £5 Superhet (Three-valve)	1.2.34	PW42
Universal £5 Superhet (Three valve)	—	PW44
F. J. Camm's A.C. £4 Superhet 4	—	PW59
F. J. Camm's Universal £4 Superhet 4	11.1.36	PW60

SHORT-WAVE SETS.

Two-valve : Blueprint, 1s.		
Midget Short-Wave Two (D, Pen)	15.9.34	PW38A
Three-valve : Blueprint, 1s. each.		
Experimenter's Short-Wave Three (SG, D, Pow)	—	PW30A
The Prefect 3 (D, 2 LF (RC and Trans))	8.2.36	PW63
The Bandspread S.W. Three (HF Pen, D (Pen), Pen)	29.8.36	PW68

PORTABLES.

Three-valve : Blueprint, 1s.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	16.5.36	PW65
Four-valve : Blueprint, 1s.		
Featherweight Portable Four (SG, D, LF, Cl. B)	—	PW12

MISCELLANEOUS.

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

AMATEUR WIRELESS AND WIRELESS MAGAZINE

CRYSTAL SETS.

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

STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.		
B.B.C. Special One-valver	—	AW387
Twenty-station Loud-speaker One-valver (Class B)	—	AW449
Two-valve : Blueprints, 1s. each.		
Melody Ranger Two (D, Trans)	—	AW388
Full-volume Two (SG det, Pen)	—	AW392
B.B.C. National Two with Lucerne Coil (D, Trans)	—	AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans)	—	AW338A
Lucerne Minor (D, Pen)	—	AW426
A Modern Two-valver	*July* '36	WM409
Three-valve : Blueprints, 1s. each.		
Class-B Three (D, Trans, Class B)	22.4.33	AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394
Home-built Coil Three (SG, D, Trans)	—	AW404
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans)	2.12.33	AW412
1934 Ether Searcher: Baseboard Model (SG, D, Pen)	20.1.34	AW417
1934 Ether Searcher: Chassis Model (SG, D, Pen)	—	AW419
Lucerne Ranger (SG, D, Trans)	—	AW422
Cossor Melody Maker with Lucerne Coils	—	AW423
Mullard Master Three with Lucerne Coils	—	AW424
£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans)	—	AW437
All Britain Three (HF Pen, D, Pen)	—	AW448
"Wireless League" Three (HF Pen, D, Pen)	3.11.34	AW451
Transportable Three (SG, D, Pen)	—	WM271
£6 6s. Radiogram (D, RC, Trans)	—	WM318
Simple-tune Three (SG, D, Pen)	*June* '33	WM327
Economy-pentode Three (SG, D, Pen)	*Oct.* '33	WM337
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 3s. Three (SG, D, Trans)	*Mar.* '34	WM354
Iron-core Band-pass Three (SG, D, QP 21)	*June* '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen)	—	WM371
PTP Three (Pen, D, Pen)	*June* '35	WM389
Certainty Three (SG, D, Pen)	*Sept.* '35	WM393
Minitube Three (SG, D, Trans)	*Oct.* '35	WM396
All-wave Winning Three (SG, D, Pen)	*Dec.* '35	WM400
Four-valve : Blueprints, 1s. 6d. each.		
65s. Four (SG, D, RC, Trans)	—	AW370
"A.W." Ideal Four (2 SG, D, Pen)	16.9.33	AW402
2 H.F. Four (2 SG, D, Pen)	—	AW421
Crusaders A.V.C. 4 (2 HF, D, QP 21)	18.8.34	AW445
(Pentode and Class-B Outputs for above: Blueprints, 6d. each)	25.8.34	AW445A
Self-contained Four (SG, D, LF, Class B)	*Aug.* '33	WM331
Lucerne Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, 2 LF)	*Feb.* '35	WM381
The H.K. Four (HF Pen, HF Pen, D, Pen)	*Mar.* '35	WM384
The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	*April* '36	WM404
Five-valve : Blueprints, 1s. 6d. each.		
Super-quality Five (2 HF, D, RC, Trans)	*May* '33	WM329
Class-B Quadradyne 2 SG, D, LF, Class B)	*Dec.* '33	WM344

Mains Operated.

Two-valve : Blueprints, 1s. each.		
Consolectric Two (D, Pen) A.C.	23.9.33	AW403
Economy A.C. Two (D, Trans) A.C.	—	WM286
Unicorn A.C./D.C. Two (D, Pen)	*Sept.* '35	WM394
Three-valve : Blueprints, 1s. each.		
Home-Lover's New All-electric Three (SG, D, Trans) A.C.	—	AW383
Three-valve : Blueprints, 1s. each (*contd.*).		
S.G. Three (SG, D, Pen) A.C.	—	AW390
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW399
A.C. Pentaquester (HF, Pen, D, Pen) A.C.	23.6.34	AW436
Mantovani A.C. Three (HF, Pen, D, Pen) A.C.	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	*Jan.* '36	WM401
Four-valve : Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen)	*July* '33	WM326
Harris Jubilee Radiogram (HF Pen, D, LF, P)	*May* '35	WM386

SUPERHETS.

Battery Sets : Blueprints, 1s. 6d. each.		
Modern Super Senior	—	WM375
Varsity Four	*Oct.* '35	WM395
The Request All-Waver	*June* '36	WM407
1935 Super Five Battery (Superhet)	—	WM379
Mains Sets : Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C.	—	AW425
Heptode Super Three A.C.	*May* '34	WM359
"W.M." Radiogram Super A.C.	—	WM366
1935 A.C. Stenode	*Apl.* '35	WM385

PORTABLES.

Four-valve : Blueprints, 1s. 6d. each.		
Midget Class B Portable (SG, D, LF, Class B)	20.5.33	AW389
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
Two H.F. Portable (2 SG, D, QP21)	*June* '34	WM363
Tyers Portable (SG, D, 2 Trans)	—	WM367
Five-valve : Blueprint, 1s. 6d.		
New Class-B Five (2 SG, D, LF, Class B)	*Nov.* '33	WM340

SHORT-WAVE SETS—Battery Operated.

One-valve : Blueprints, 1s. each.		
S.W. One-valve converter (Price 6d.)	—	AW329
S.W. One-valve for America	—	AW429
Rome Short-waver	—	AW452
Two-valve : Blueprints, 1s. each.		
Ultra-short Battery Two (SG det. Pen)	*Feb.* '36	WM402
Home-made Coil Two (D, Pen)	—	AW440
Three-valve : Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D, Trans. Super-regen)	30.6.34	AW438
Experimenter's Short-waver (SG, D, Pen)	*Jan.* 19, '35	AW463
The Carrier Short-waver (SG, D, P.)	*July* '35	WM390
Four-valve : Blueprints, 1s. 6d. each.		
A.W. Short-wave World Beater (H.F. Pen, D, RC, Trans)	—	AW436
Empire Short-waver (SG, D, RC, Trans)	—	WM313
Standard Four-valver Short-waver (SG, D, LF, P)	*Mar.* '35	WM338
Superhet : Blueprint, 1s. 6d.		
Simplified Short-wave Super	*Nov.* '35	WM397

Mains Operated.

Two-valve : Blueprints, 1s. each.		
Two-valve Mains short-waver (D, Pen) A.C.	—	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.	—	WM368
"W.M." Long-wave Converter	—	WM380
Three-valve : Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C.	—	WM352
Four-valve : Blueprint, 1s. 6d.		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	*Aug.* '35	WM391

MISCELLANEOUS.

Enthusiast's Power Amplifier (1/6)	*June* '35	WM337
Listener's 5-watt A.C. Amplifier (1/6)	*Sept.* '35	WM392
Radio Unit (2v.) for WM392 (1/-)	*Nov.* '35	WM398
Harris Electrogram (battery amplifier) (1/-)	*Dec.* '35	WM399
De-Luxe Concert A.C. Electrogram	*Mar.* '36	WM403
New Style Short-waver Adapter (1/-)	*June* '35	WM388
Trickle Charger (6d.)	*Jan.* 5, '35	AW426
Short-wave Adapter (1/-)	*Dec.* 1, '34	AW456
Superhet Converter (1/-)	*Dec.* 1, '34	AW457
B.L.D.L.C. Short-Wave Converter (1/-)	*May* '36	WM405
Wilson Tone Master (1/-)	*June* '36	WM406
The W.M. A.C. Short-Wave Converter (1/-)	*July* '36	WM408

Miscellaneous Advertisements

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RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance or Secondhand, etc.

PREMIER SUPPLY STORES

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

1/9 SHORT-WAVE COILS, 4- and 6-pin types, 13-26, 22-47, 41-94, 78-170 metres, with circuit.

4/- SPECIAL set of 3 S.W. coils, 14-150 metres, with circuit.

2/- PREMIER 3-band S.W. Coil, 11-25, 19-43, 38-86 metres. Simplifies S.W. receiver construction, suitable any type circuit.

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

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

BRITISH RADIOPHONE 2-gang Condensers (2x .0005), Screened with full vision dial and uni-knob trimmer, 7/6. British Radiophone 2-gang Condenser (2x .0005), screened, with disc drive and top trimmers, 5/6.

4/6 MAINS VALVES, famous Europa 4 v. A.C. types, H.L., L., S.G., Var.-Mu-S.G., H.F. Pens., Var.-Mu-H.F. Pens., 1-, 3- and 4-watt A.C. directly-heated output Pentodes. Full-wave rectifiers, 250v. 60 m.a. A.C./D.C. types. 20-volt .18 amp. S.G. Var.-Mu-S.G., H., H.L., Power.

5/6 FOLLOWING TYPES. Full-wave rectifiers, 350v. 120 m.a. and 500 v. 120 m.a. 2½ watt indirectly-heated Pentodes. Frequency Changers, Octodes and Heptodes.

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

5/6 AMERICAN VALVES. Genuine American HYTRON first-grade Valves, 3 months' guarantee. All types. New Metal-glass Valves, all types, 6/6 each. Genuine American DUOTRON Valves, all types, 3/6 each.

VALVE HOLDERS for all above types, 6d. each. Octal Bases, 9d. each.

12/6 SHORT-WAVE KIT for 1-valve receiver or adaptor, complete with chassis, 4 coils, 14-150 metres, condensers, circuit and all parts, VALVE GIVEN FREE! DE LUXE MODEL, 17/6. SUPERHET CONVERTER KIT, 13/6.

19/6 2-VALVE S.W. Kit. Valves given free!

42/- 3-VALVE S.W. Kit. S.G. Det. 2 Pen. Valves given free!

50/- ALL-WAVE "ALL-WORLD RANGE" 3-valve kit, 12-2,000 metres in 4 wavebands without coil changing, complete kit of parts with 3 valves, S.G.H.F., S.G. Det. and Pentode (2 volts). Q.P.P. Model, 6/6 extra.

12/6 LISSEN ALL-WAVE COILS, 12-2,000 metres complete with switching and wiring diagram.

25/- THE LOT. BAND-PASS TUNING PACK, comprising set of Telsen 3-gang iron-cored coils with switching, mounted on steel chassis with 3-gang condenser, Illuminated disc-drive and 4 valve holders. All mains or Battery circuit. FREE!

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

SPECIAL OFFER! 12/6 P.M. Speaker, 35/- Transverse Current Mike, complete with transformer, and 7/6 Stand. If purchased with above kit, 25/- the lot.

£4.4.0 7-WATT A.C./D.C. AMPLIFIER. 3-stage, high-gain, push-pull output. Complete kit of parts with 5 specially matched valves.

SPECIAL OFFER! 21/- pair Matched Speakers, 35/-. Transverse Current Mike, complete with transformer and 7/6 stand. If purchased with above kit, 35/- the lot.

£5.5.0 10-WATT 3-stage A.C. Amplifier Kit with 5 valves.

SPECIAL OFFER! 21/- pair Matched Speakers, 35/- Transverse Current Mike, complete with transformer and 7/6 stand. If purchased with above kit, 35/- the lot.

£8.8.0 20-WATT 3-stage A.C. Amplifier Kit with 5 valves.

SPECIAL OFFER! £6 pair P.M. Exponential Horn Speakers, 35/-. Transverse Current Mike with transformer and 7/6 stand. If purchased with above kit, £5 10s. the lot.

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

(*Continued at top of column three*)

3 BRAND NEW BARGAINS

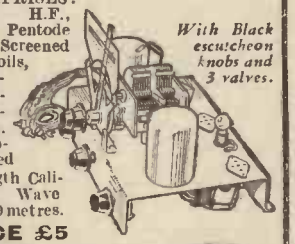
New Times Sales Co

Two Guinea S.G.3 CHASSIS

Including 3 British Valves with TWO YEARS guaranteed life.

Each chassis brand new and tested on British and Foreign Broadcasts before dispatched to you.

CIRCUIT COMPRISES: Screened-Grid H.F., Detector and Pentode Output Valves Screened wave-wound coils, 2-Gang Air Dielectric Condenser. Metal Chassis. Only 9 m.a. H.T. consumption. Illuminated and Wavelength Calibrated Dial. Wave range 200-2,100 metres.



With Black escutcheon knobs and 3 valves.

LIST PRICE £5

BARGAIN 42/-

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

2/6 DOWN

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

Walnut finished Consolette Cabinet, 10/-

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

A.C. BANDPASS S.G.4

INCLUDES 4 BRITISH VALVES WITH TWO YEARS GUARANTEED LIFE

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

Four Matched British Valves, Screened Bandpass Tuning Coils. Moving-Coil Speaker. Slow motion tuning by single knob. Illuminated airplane dial, wavelength calibrated. Latest triple gang wavechange and radiogram switch. Volume control with on-off switch. Selectivity device. Gramo pick-up sockets, 3 watts output. Wavelengths 200-550 and 900-2100 metres. A.C. mains 200-250 volts, 40-100 cycles. In beautiful walnut-veneered cabinet as illustrated. Aerial equipment.

LIST PRICE £8:12:6

BARGAIN £5:12:6

5/- DOWN

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

BATTERY CLASS B4

INCLUDES 4 BRITISH VALVES WITH TWO YEARS GUARANTEED LIFE

Amazing purity of tone and volume rivalling that of powerful all-mains models. Wide choice of foreign stations. The perfect mains quality battery receiver.

Four matched British valves of guaranteed life. Moving-Coil Speaker. Single knob slow motion tuning, bronzed escutcheon, illuminated circular aeroplane dial. New type switch. Combined volume control and on-off switch. Sensitivity and graded volume control. Wavelengths 200-550 and 900-2100 metres. Oldham Long-life 120-volt H.T. and 2-volt L.T. Accumulator and G.B. Batteries. Output 1½ watts at 120 volts. Exquisite Walnut Veneered Cabinet illustrated above. Absolutely complete with aerial equipment, ready to play.

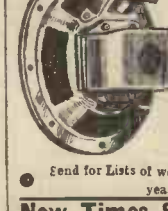
5/- DOWN

List Price £8 : 8 : 0

BARGAIN £4:19:6

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

N.T.S. Moving Coil SPEAKERS



LIST PRICE 27/6

BARGAIN PRICE 10/-

2/6 DOWN

High fidelity permanent magnet Moving Coil speakers, slightly shop soiled only. Models suitable for Power, Super Power or Pentode. (State which when ordering.) Cash or C.O.D. Carriage Paid 10/- or 2/6 down and 4 monthly payments of 2/6.

Send for Lists of well-known manufacturers' speakers (last year's models) at half price.

New Times Sales Co. 56 (P.R.W.1.) Ludgate Hill, London, E.C.4. Est. 1924

(*Continued from foot of column one*)

16/6; '252,' 9in. cone, 22/6. Reliable P.M.'s, 10/6; Cossor P.M.'s, 13/6. Magnavox, P.M. Speakers, complete with output transformer, specially suitable Battery Sets, 8/9.

ROLA latest type P.M.'s, 18/6. K.B. 7in. mains energised, 1,500 or 2,500 ohms, 7/9. GOODMAN'S 8in. mains energised, 1,000 ohms field, 10/6 each.

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

POTENTIOMETERS by well-known makers. All values up to 1 meg., 2/-; with switch, 2/6.

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

PREMIER wire-end type with screened primaries, and tapped 200-250v. Centre-tapped Filaments. Guaranteed one year. H.T. 8 and 9 or H.T. 10 with 4v. 4a. C.T. and 4v. 1a. C.T., 8/6. 250-250v. 60 m.a., 4v. 1a., 4v. 2a. and 4v. 1a., all C.T., 8/6. 350-350v. 120 m.a., 4v. 1a., 4v. 2a. and 4v. 4a., all C.T., 10/6. Any of these transformers with engraved panel and N.P. terminals, 1/6 extra. 500-500v. 150 m.a., 4v. 2-3a., 4v. 2-3a., 4v. 2-3a., 4v. 3-4a., all C.T., 19/6. AUTO TRANSFORMERS, step up or down, 60 watts, 7/6; 100 watts, 10/-.

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

5/9 MILLIAMMETERS, moving-iron, flush, 2½in., all ranges from 0-10. Visual tuning, 6 or 12 m.a., 5/9; Moving-coil meters, 2½in. 0-1 m.a., 18/6; 3¼in. 0-1 m.a., 22/6. Multipliers, 1/- each.

ELECTROLYTICS. U.S.A. 4, 8, or 12 mfd., 530 v. peak, 1/9 each. Dubilier, 4 or 8 mfd. 500v., 3/-; 50 mfd. 50v., 1/9; 12 mfd. 20v., 6d.; 25 mfd. 25v., 1/-; T.C.C. 4 or 8 mfd. 650v., 4/-; 15 mfd. 50 or 100v., 1/-; 50 mfd. 12v., 1/-. Paper Condensers. W.E., 250 v. working 4 mfd., 2/-; 2 mfd., 1/-; 1 mfd. 6d.; 350 v. working 4 mfd., 2/6; 2 mfd., 1/6; Dubilier 500v. working 4 mfd., 4/-; 800v. 4 mfd., 6/-. Wego 450 v. working 1 mfd., 1/-, 2 mfd., 1/9, 4 mfd., 3/-; 700v. working 2 mfd., 2/-, 4 mfd., 3/6.

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

TELSEN "Class B" Driver Transformers, 2/9, "Class B" Multi-Ratio Output Transformers, 2/9, "Class B" Multi-Ratio Output Chokes, 2/9.

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

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

TELSEN iron-cored screened coils, W.349, 4/- each. Electric SOLDERING IRONS, 200-250v., A.C./D.C., 2/3.

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

COSMOCORD Pick-up with Tonearm and Vol. Control. 10/6. Pick-up head only, 4/6.

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

WIRE-END RESISTORS, any value, 1 watt, 6d.; 4 watts, 1/-; 8 watts, 1/6; 15 watts, 2/-; 25 watts, 2/6 each.

2/- RELIABLE MORSE KEYS with Morse Code engraved on bakelite base.

"PREMIER" BUZZERS, 1/6; "Loud-tone," 2/6 each.

3/9 SUPER QUALITY lightweight HEADPHONES, pair.

69/6 RECEIVERS, G.E.C., A.C./D.C. mains, 3-valve sets, complete with 3 Osram valves, in exquisite bakelite cabinet with Osram M.C. speaker, ready to plug in to any mains, brand new, in sealed cartons, fully guaranteed (list £7 15s.). Carriage paid.

50/- G.E.C. Compact 3-valve Battery Sets complete with 3 Osram valves, moving coil P.M. Speaker in attractive bakelite cabinet, makers' 1936 series in original sealed carton (list £5/10/0). Batteries, 7/6 extra.

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

PREMIER SUPPLY STORES

ALL Post Orders to Jubilee Works, 167, Lower Clapton Road, London, E.5. Callers, as usual, to 20-22, High St., Clapham, S.W.4 (Macaulay 2381). 'Phone: Amherst 4723. And 165 and 165a, Fleet St., E.C.4 (next door to Anderton's Hotel). Central 2833. Have you had our latest Giant Illustrated Catalogue and Valve List? If not send 4d. in stamps for this amazing list of bargains!

SHORT WAVES

SHORT WAVE on a crystal set. Full building instruction and crystal, 1/2 post paid.—Radiomail, Tanworth-in-Arden, Warwickshire.

RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance or Secondhand, etc.

RADIOMART

SHORT-WAVE SPECIALISTS

Announce 1937

SHORT-WAVE MANUAL

Packed with short-wave information and circuits of mains and battery receivers, including straight, superhet and 5-metre transmitters, modulators, etc.

Information on transmitting licences, aerials, Class B amplification, neutralization, superhet alignment, etc.

The most comprehensive manual published, written by practical engineers, price 6d., post free 7½d., including catalogue.

1937 Catalogue only (3 times enlarged) price 1½d. post free.

TELSEN screened dual range coils, 2/6. Pair, 4/6. Milliammeters, 25 ma. upwards, 5/9. Super, 6/9.

AMERICAN mains transformers 230v. fully shrouded, 350/350. 6.3v., 5v., 6/11. Majestic 250/250. 2.5v., 5v., 4/11.

HEAVY DUTY mains transformer worth 35/-, 350/350. 150 ma.; 4v. 2.5ACT., 4v. 6ACT., 12/6.

465 KC/S., IF transformers, 2/11. Telsen Ace, 1/11. RG4, Radio grands, 2/9. 2mf. 300v., 9d.

UTILITY straight line wavelength dials, 3/11. Telsen H.F. chokes, 1/11.

UTILITY 2-gang uniknob and dial, 3/11; 1,500-volt tubular condensers, all sizes, 6d.

ELECTROLYTICS 500-volt 8mf., 1/6; 4mf., 1/6; 4 x 4, 1/11; 8 x 8, 3/6; 25 mf. 25v., 1/-, etc.

SMOOTHING chokes, 20 hy. 120 ma., 3/11; 100 ma., 2/11; 40 ma., 1/11.

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Branches: 19, John Bright St., 44, Dale End. Mail Orders, 44, Holloway Head, Birmingham. Telephone, MID 3254.

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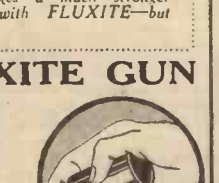

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VAUXHALL.—Clix valve holders, terminals, 5-pin, 7d.; 9-pin, 9d.; baseboard mounting, 5-pin, 4½d.; 7-pin, 1/-.

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MODEL S.B.21. 3-VALVE BATTERY SUPERHET, 4 Stages, listed 9 gns. complete with Valves, aerial-tested, **£3/12/6.**

LISSEN 100 STATION SET, B.A. Speaker complete with 3 Valves, S.G. Detector, Pentode. Slightly Shop-soiled, **30/-.**

AS ABOVE, with P.M. Moving Coil Speaker, **35/-.**

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All these valves carry a 90-day guarantee, and free replacement, provided that the filament or heater is intact and the glass is not broken when returned to us.

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50 mfd. 12 volt working CONDENSERS. Well-known manufacture, **1/-.**

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25 mfd. 50 volt working CONDENSERS. Well-known manufacture, **1/-.**

8+8+4 ELECTROLYTIC CARDBOARD CONDENSERS. Wire ends, 450 volt working, **3/11.**

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(Continued at top of column three)

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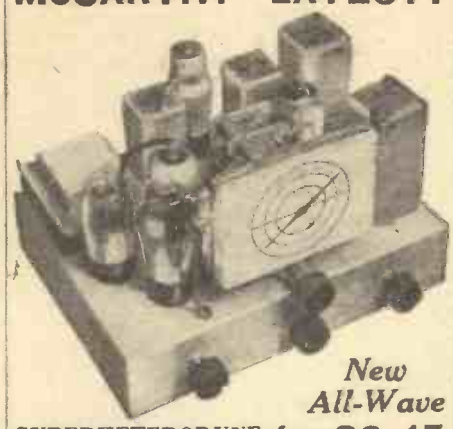

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SUPERHETERODYNE for £6.15

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Though employing only 5 valves, the performance of this receiver is comparable with that of many larger receivers at considerably higher prices.

Illuminated "Airplane" dial with principal station names. Wave ranges covered: 17-50, 200-550, 800-2,000 metres. Built on heavy cadmium-plated steel chassis. Employs Varley iron-cored I.F. coils. Circuit comprises: Pre-selector circuit, triode-hexode frequency changer, high efficiency H.F. pentode I.F. amplifier, I.F. transformer coupled to double diode-triode detector (D.A.V.C. applied to preceding valves). Steep-slope output pentode giving approximately 3 watts. Volume control and variable tone control operate on radio and gramophone (connected by position on switch).

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(Continued from foot of column one)

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Enquiries, 1½d. stamp if reply expected.

Hours of Business, 9 a.m. to 7 p.m. Saturdays, 9 a.m. to 1 p.m.

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SOME UNUSUAL CIRCUITS—See Page 327

Practical and Amateur Wireless

AND PRACTICAL TELEVISION

3d EVERY WEDNESDAY

Edited by F. J. CAMM

A GEORGE NEWNES Publication

Vol. 9. No. 219. November 28th, 1936.

AMATEUR TRANSMITTING

New SERIES

TUNED AERIAL SYSTEMS

SEE PAGE 340

ROUND *the* WORLD *of* WIRELESS

Amateur Success

FURTHER evidence regarding the peculiar behaviour of the short-wave transmissions has now come to hand. A South African experimenter has successfully received a signal from America on a wavelength of 5 metres. The total distance worked was 7,000 miles, the previous record being 200 miles for this particular wavelength. As the amateur in question had no transmitter available for this particular wavelength he was unable to reply, but he successfully received the entire message sent out by the American.

Miniature Transmitter

THE N.B.C. of America have now perfected a miniature transmitter for use in relaying outdoor events. The entire transmitter is contained in a three-inch cube and two ten-inch rods are used for the aerial. Acorn valves are used, and it weighs less than one pound. Successful relays have been carried out over distances of four miles.

Valves Withstand Typhoon

DURING the typhoon which recently struck Hong Kong the China Navigation Company's steamer *Sunning* was driven ashore and was torn almost in two against the rocks. Throughout the terrific buffeting the vessel was sending out S O S calls from its radio equipment and the two Osram L21 valves used in this apparatus were found still capable of functioning twenty hours after the *Sunning* had been hurled ashore.

Novel Tuning Dials

THE General Electric Company of America have just introduced a novel receiver in which the tuning dial changes colour according to the setting of the wavelength. When the dial is not tuned exactly to a station the dial is red, but when the set is accurately tuned the dial turns green, and at the same time the call letters of the station are illuminated on the dial.

Mysterious Signals

SOME of the older experimenters will remember the stir created some years ago by the reception of so-called signals from Mars. Peculiar groups of dashes and dots were received on a long wavelength and the source was declared unknown. Similar signals have recently been reported, some from Europe and others from the Mojave Desert. The European signals have been declared by experts to emanate from German air radio beacons, whilst the Mojave Desert signals are thought to be due to emanations from the Milky Way.

Entirely Automatic

THE automatic radiogram still suffers from the defect (if such it can be called) that needles have to be changed periodically. An inventor in France has, however, succeeded in designing and building an automatic needle changer, in which the needles are fed up from below the motor-board in a belt, and as the pick-up returns to the starting position a needle is driven up into a self-gripping chuck, whilst the old needle falls out.

U.S.A. Television Transmitters

AMERICA is now taking up the television challenge and it was recently announced that four transmitters are to be ready next year to provide a public service. It is so far announced that a definition of 441 lines is to be aimed at. It will be remembered that the British systems employ 240 lines (Baird) and 405 lines (Marconi-E.M.I. interlaced system).

Controlling Wireless Traffic

THE station recently described by the Postmaster-General as the "policeman of the ether" is engaged regularly in measuring the frequency of broadcasting stations and its duty is to inform a transmitter when he wanders from his allotted frequency. As some readers may wonder why the postal authorities attend to this work, it may be mentioned that under the International Regulations the General Post Office is responsible for all British stations, and this traffic station is known all over the world for the good work which it carries out.

Televising "Coronation Procession"

ALTHOUGH no plans have yet been made to televise the Coronation procession in May next, an interesting "pre-view" will be picked up by television receivers on November 28th, when a working model of the procession will be transmitted in "close-up," so as to provide a life-size impression of the Coronation coach and the troops on the march. Constructed by two brothers, Messrs. Edward and Frank Offord, the model is 13ft. in length and nearly 3ft. high. When it is set in operation a 150yd. section of Westminster is shown, with soldiers lining the pavement and dense crowds behind. In a few moments, to the accompaniment of martial music, the procession comes into view—bands, infantry, Life Guards, and, finally, the Royal coach, with the King's Watermen bringing up the rear.

B.B.C. Pianos

FOLLOWING the exhaustive piano tests recently carried out by a panel of expert judges, the B.B.C. has decided to use, as a general rule, the following pianos for broadcasting purposes :—

Pianos, 9ft. long and over—Bosendorfer.

Those less than 9ft. but over 7ft. 6in —Steinway and Challen.

Those under 7ft. 6in. and over 6ft.—Bosendorfer.

These three classes correspond to the needs of broadcasting studios, and most of the pianos in use are in the second class.

THE PICK of the PROGRAMMES

Chamber Music from Totnes

A CHAMBER Music Concert, in which Alice Ehlers (harpsichord) and Eva Heinitz (viola da gamba) will be the artists, will be broadcast from Dartington Hall, Totnes, on December 5th, in the Western programme.

Flute Recital

EDITH PENVILLE, who is one of the most accomplished flautists of the day, is to give a recital in the Midland programme on November 30th. She toured as soloist with Mme. Tetrazzini, has appeared at the Proms., and was congratulated by the late Hans Richter for her performance of a work by his friend Doppler, the Hungarian composer. The first piece in her programme is the Sonata in B flat by Quantz, who instructed Frederick the Great in flute-playing.

Concert from Torquay

JOHN McKENNA (tenor) will be the soloist in the concert by the Torquay Municipal Orchestra, conducted by Ernest W. Goss, to be broadcast from the Pavilion, Torquay, on December 1st.

MAKE THESE DATES WITH YOUR RADIO

ham Orchestra, at the Birmingham Town Hall concert. Leslie Heward will conduct.

Midland Song Recital

THREE songs by Quilter and two by Bridge have been chosen by Roy Henderson, the well-known baritone, for a song recital on December 5th. Mr. Henderson spent several years in Nottingham and while there trained the Harmonic Society for its concerts with the Hallé.

"CALLING ALL STARS."

Mantovani and his Tipica Orchestra, well known to listeners, is here seen with Lu Anne Meredith and the Sherman Fisher Girls in a scene from "Calling All Stars," the latest Joe Rock production, under the direction of Redd Davis.

Tango Programme

ON November 29th Midland listeners will hear Harry Engleman's Quintet with Thomas O'Hara (piano-accordion) in a tango programme. A Tango Serenade by O'Hara, and a medley for two pianos arranged by Engleman, are included. Both are well-known broadcasters.

Music Items

MEMORIES of the Diaghileff Russian Ballet will be revived on November 27th (Regional), when Constant Lambert will conduct a programme of Russian Ballet Music, consisting of Balakirev's "Thamar" and the Polovtsian Dances from "Prince Igor."

On the following day (Regional), Rimsky-Korsakov's Symphony, Antar, will be played by the British Women's Symphony Orchestra under the direction of Boyd Neel. This will be their first broadcast under their newly-appointed conductor.

"It Has Been Announced"

THIS is the title of an interesting series of news reviews which seek to give a short account of some of the more outstanding events in the West Country, the first number of which was heard on October 25th. The second number will be broadcast on November 27th.

A Tchaikovsky Concert

ON December 5th Leslie England will be the solo pianist for the Concerto in B flat minor, given by the City of Birming-

The Blue Star Players

THIS Oxford band, led by Leslie Hewson, has its first Midland broadcast on December 4th. It was formed in 1932 by players from three local bands which had been competing in a contest, and it is run on co-operative lines. In its first two seasons it had a record of seven wins for seven contests. It has recently concluded a two years contract at the Wentworth Club, Virginia Water. Twice it was relief band to that of Jack Hylton, and it was the first local band selected to play at Oxford University Commemoration Ball.

Military Band Concert

THE Adamson Military Band, winners of the Military Band Contest held at Belle Vue, Manchester, on October 10th last, are to broadcast a concert from the Manchester studios on November 29th. The band, which has its headquarters at Dukinfield, near Manchester, is named after Daniel Adamson, the promoter of the Manchester Ship Canal scheme. The broadcast concert will be conducted by W. Fletcher.

"A Ship is Built"

ON December 2nd, from the Northern Regional, a special feature programme will be broadcast describing the whole process of building a great liner. The title of the programme will be "A Ship is Built" and it is being presented with the help of electrical recordings made in Messrs. Armstrong's Naval Construction Works at Barrow-in-Furness. The programme is being arranged by Victor Smythe.

Variety from Bolton

VARIETY will be broadcast from the Grand Theatre, Bolton, on December 2nd. It is not yet possible to give specific details, but the bill from which excerpts will be taken includes Archie Pitt and Co.; Freddie Bamberger; Pat Kirkwood; Holt and Maurice; and Neller and Clare.

Hallé Concert from Manchester

SIR THOMAS BEECHAM is to conduct the Hallé concert to be broadcast from the Free Trade Hall, Manchester, on December 3rd. The programme will include Elgar's Overture, "Cockaigne"; and Mozart's "Jupiter" Symphony No. 41 in C.

The Arcadian Follies

THIS well-known concert party, which is especially popular with visitors to Blackpool, is to give an entertainment from the Empire Theatre, Peterborough, on December 1st. Ernest Binns will present the Arcadian Follies, who are a well-balanced company of singers, dancers, and entertainers, with Harry Korris as comedian-in-chief. The Empire, Peterborough, is an independent theatre which provides variety for a large clientele in the East Midlands.

SOLVE THIS!

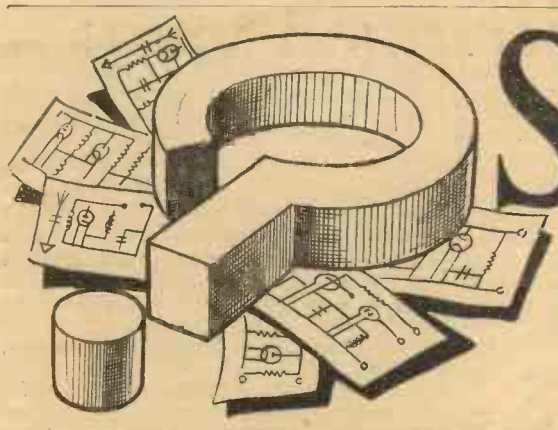
Problem No. 219.

Wyndham's A.C. mains receiver broke down and when tests were made it was found that the L.F. valve was not passing anode current. The voltage on the anode was found to be adequate, however, and the valve was in order. What was the fault? Three books will be awarded for the first three correct solutions opened. Address your solutions to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 219 in the bottom left-hand corner and must be posted to reach this office not later than the first post on Monday, November 30th, 1936.

Solution to Problem No. 218.

The lack of signals was due to the use of an excessively long aerial. When the earth plug was removed the damping effect of the aerial-earth system was considerably reduced. Detector oscillation was thereby produced and signals became audible.

The following three readers successfully solved Problem No. 217, and books are accordingly being forwarded to them: W. J. Tonkin, 90, Windmill Road, Gillingham, Kent; A. Goodwin, 122, Shenley Fields Road, Wealey Hill, Birmingham; J. M. Shirlaw, 39, Marylaud Drive, Glasgow, S.W.2.



Some Unusual Circuits

The Experimenter will find in this Article Some Interesting Developments, which have Arisen as a Result of the Production of New Valve Types - - - - - By W. J. DELANEY

ALTHOUGH tried and tested circuits are always to be preferred for reliable and consistent results, there is much to be gained from a trial with a novel circuit. By novel, I refer to unorthodox arrangements, and for those to whom this type of circuit is not familiar reference may be made to the circuits which we have already published under this title. An instance is the adoption of the two elements of a Class B valve as a separate detector and amplifier, or the combined Class B and driver valve to make up a three-valve circuit with reflex working.

The experimenter is always trying out new arrangements, and no doubt many novel schemes are invented from time to time. The super-regenerative circuit is one which has always been a favourite, especially with the short-wave listener, and the merits of this circuit are already well known. A version of this circuit which has been developed in Australia is shown in Fig. 1, where it will be seen that the modern triode-hexode valve (used for frequency-changing in the superhet) is pressed into service for a single-valve receiver.

Super-Regeneration

In this valve the various elements are used in such a manner that they function as two separate valves. The normal rectification is carried out by means of the pentode section of the valve, whilst the triode portion is employed for the quenching oscillator. The standard coils may be employed for tuning, reaction, and quench coils. These may be home-made, or the standard commercial coil units. The H.T. applied to the oscillator section may be found critical, and a suggestion is made to use an entirely separate battery for the purpose. In this case the two negative terminals should be joined together and to earth. Obviously, the circuit is an experimental design with which considerable latitude is possible, and some adjustments may be found very critical.

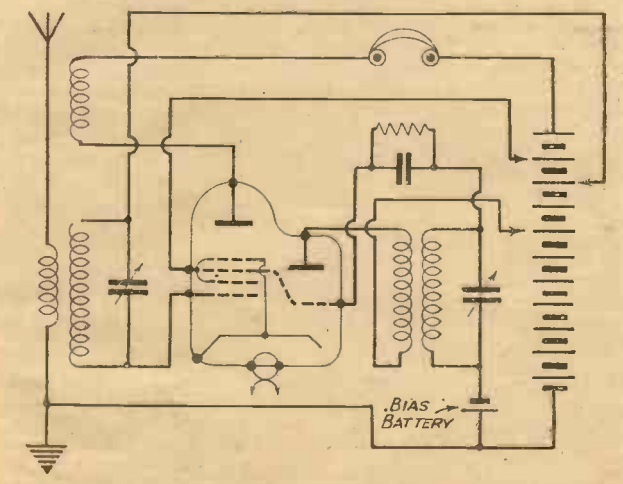


Fig. 1.—A suggested form of super-regenerative receiver employing a triode-hexode valve.

Volume Expansion

A circuit which is receiving much attention on the other side of the Atlantic is known as automatic volume expansion, and this aims at restoring the correct level or balance of volume. It does not appear to be popular in this country, and some valves which were formerly developed especially for the purpose in England have now been withdrawn by the manufacturers on this account. In America, however, a new valve has been introduced recently, and takes the form of an hexode valve. With the aid of this valve several interesting circuits are possible, and two suggestions are given in Figs. 2 and 3. In Fig. 3 two additional valves are required for the complete circuit, which is the design incorporated in certain Radio Corporation of America receivers. All values recommended by this company are shown on the diagram, and it will be noted that in addition to the volume control a separate control for the degree of volume expansion is included.

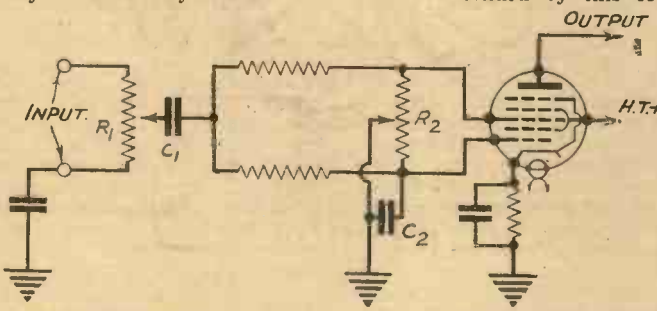


Fig. 2.—Another American circuit, known as a programme expander. The arrangement is shown diagrammatically in Fig. 4 overleaf

The input is fed to both the control grid of the special valve mentioned as well as to the triode valve, the grid of the latter being joined to the arm of the expansion control. Thus any desired degree of input

(Continued overleaf)

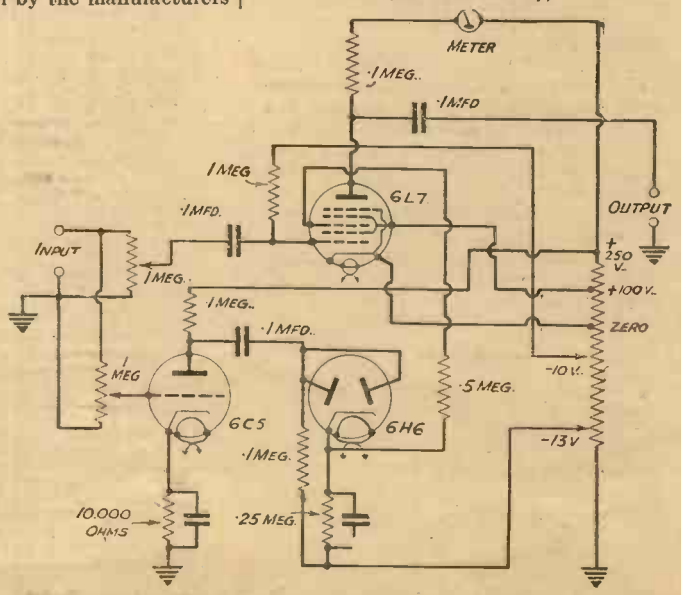


Fig. 3.—A novel circuit used for volume expansion. This arrangement is now being incorporated in certain American receivers.

SOME UNUSUAL CIRCUITS

(*Continued from previous page*)

voltage may be fed into this valve. Standard resistance-capacity coupling is used between this triode and a double diode, or full-wave rectifier, the output of which is fed back into the special L.F. pentagrid. Here it mixes with the normal signal in a rather peculiar manner. The rectifier is so connected as to feed a positive voltage to the 6L7 valve, and a very large initial negative grid bias is already applied to this. The positive input reduces this bias so that a low volume input will be very slightly effected, but a large volume will be greatly amplified, and thus the quiet passages are rendered very subdued whereas the loud passages are increased in strength, and thus the arrangement is referred to as "volume expansion." The control P must be adjusted for the particular characteristics of the 6L7 valve in use, and the makers recommend that it be set to provide an anode current of about .15 mA with no signal.

An Alternative Scheme

Utilising the same valve, the makers of the Midwest receivers have evolved a different circuit with a similar result. Here, however, the lower musical frequencies are amplified separately and are then combined with the remainder of the musical scale, and the makers have christened this scheme "The Dual Channel Audio Fidel-A-Stat Program Expander." The theoretical arrangement is given in Fig. 2, from which it will be seen that a push-pull effect is obtained, the input being developed across a standard volume control, and the arm of this being fed through a condenser to a pair of resistors. These feed two grids in the 6L7 valve, but a potentiometer is connected across these grids with the arm earthed. The selection of the grids is made so that one portion has a greater amplification factor than the other, and the scheme may be re-drawn as shown in Fig. 4. The condenser C2 serves to by-pass the low-frequencies from that part of the circuit and thus leaves only the higher frequencies for treatment by that part of the valve whilst the setting of the potentiometer R2 governs the proportion of the two signals which is fed into the valve. It will be noted that the great advantage of this scheme is that the arm of the control potentiometer R2 may be so set that one portion of the valve becomes inoperative; that is, the grid will be directly earthed, and this leaves the circuit in quite a standard form, giving normal reproduction. As this control is turned, the lower frequencies are fed into that part of the valve and consequently appear in the output circuit in an increased proportion, due to the added amplification. As the control is adjusted to reduce the higher frequencies, the amplification is automatically increased to compensate for the apparent decrease in amplification, and thus a very wide range of reproduction effects is possible.

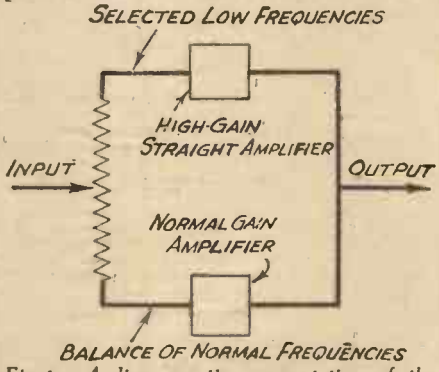


Fig. 4.—A diagrammatic representation of the circuit arrangement shown in Fig. 2

The valve mentioned in this article, type 6L7, is on sale in this country, and may be obtained from advertisers in this paper.

Points About R.-C. Coupling

THE relative merits of transformer and resistance-capacity coupling are still matters of serious controversy. Some few years back R.-C. coupling was unquestionably superior, but the very great improvement in transformer design in recent years leaves little to choose between the two. Nevertheless, a properly designed R.-C. circuit usually scores inasmuch as the response curve is practically straight, apart from the inevitable tailing off in the extreme bass and treble. There are certainly no resonances which, however slight, are inseparable from even a first-class transformer. The chief requirements of any L.F. stage are good amplification and a faithful reproduction of the original signal.

No Step-up

With an R.-C. stage we must remember that there is no transformer step-up; consequently, the theoretical voltage magnification can never exceed the amplification factor of the preceding valve, and in practice it is, of course, very much less.

Fig. 1 shows the basic circuit where V.1 is the detector valve and V.2 the first L.F. In order to obtain the maximum voltage step-up, the anode load R.1 must be as high as possible, and theoretically an infinite resistance would give the maximum step-up equal to the valve amplification factor. In practice it is unwise, from a quality standpoint, to exceed 25,000 ohms, even though this may mean a loss. The self-capacity of the resistance together with the associated wiring may be considered as a condenser in parallel with it, and if we use a high value of resistance, the reactance of the capacity in the extreme treble may be comparable with the resistance itself. The anode load is thus reduced, and the amplification of the higher audio-frequencies suffers. If, however, we keep the coupling resistance low, the by-passing effect of a small capacity is unimportant, and is only noticeable at a point well outside the audio-spectrum. Similarly, one should never choose a value of coupling condenser which necessitates a high-resistance grid-leak.

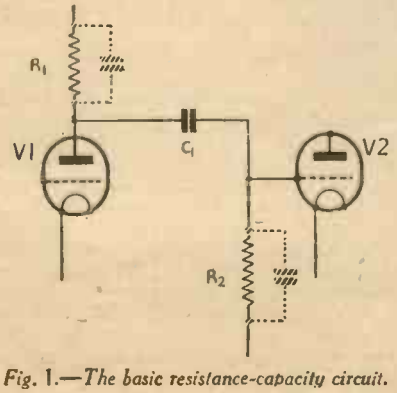


Fig. 1.—The basic resistance-capacity circuit.

Signal Loss

Unfortunately, only part of the signal appears at the grid of the following valve. The coupling condenser and grid-leak form a potentiometer, and only the voltage developed across the resistance is accepted by the L.F. valve. At low frequencies the reactance of the coupling condenser increases, which in effect means a lower voltage developed across R.2. In order that amplification shall not suffer in the bass, therefore, the grid-leak should be as high as possible and the coupling condenser large, but there are two important reservations. As pointed out above, R.2 must be kept reasonably low to avoid high-note loss. The second reservation needs more investigation.

After each successive wave-train the grid potential of the L.F. valve must return to its normal value, i.e., as determined by its normal negative bias. One of the functions of R.2 is to allow the charge to leak away sufficiently quickly to attain this desirable state. Unfortunately, the condenser takes a very definite time to discharge, which is determined by its own capacity in microfarads multiplied by the leak resistance in megohms. The result, the "time-constant," is in seconds, and indicates the required interval for the condenser charge to fall to 37 per cent. of its initial value. The discharge curve is as shown in Fig. 2.

Avoiding Distortion

In order to avoid the distortion known as "grid-blocking," indicated by a strangling effect, it is important that the time-constant shall be short compared with the shortest interval likely to be experienced between two successive oscillations. As modern amplifiers and speakers often show a good response as high as 12,000 cycles, the problem is not an easy one.

In practice it is customary to tolerate a little grid-blocking in order to preserve the lower frequencies; furthermore, this trouble is rarely noticeable unless the signal is loud and the time-constant very high. A good rule is to choose a value of leak and condenser which will give 90 per cent. of the theoretical amplification at 50 cycles. Such a combination will have a time-constant of approximately .0066, and any values of leak and condenser may be chosen to give this product, with the reservation as to too high a resistance.

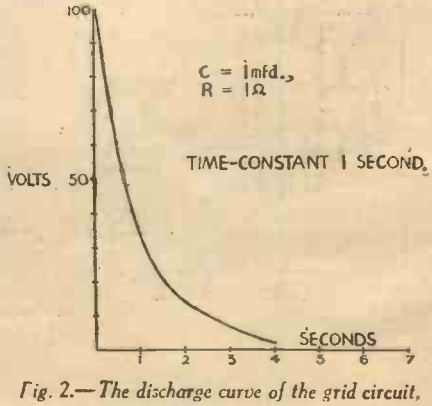


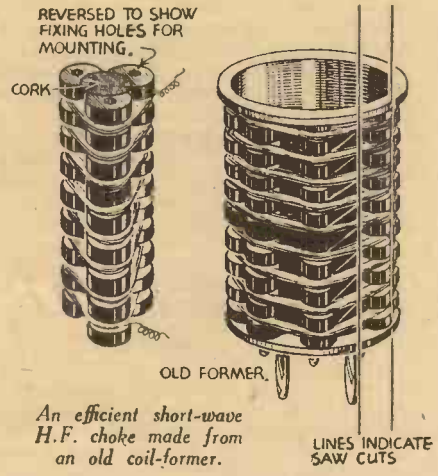
Fig. 2.—The discharge curve of the grid circuit.

A PAGE OF PRACTICAL HINTS

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

A Short-wave Choke and Former

THE accompanying sketch shows how I made an efficient short-wave H.F. choke and former. The former is made out of an old coil-former of the six-pin type which most readers, no doubt, have in

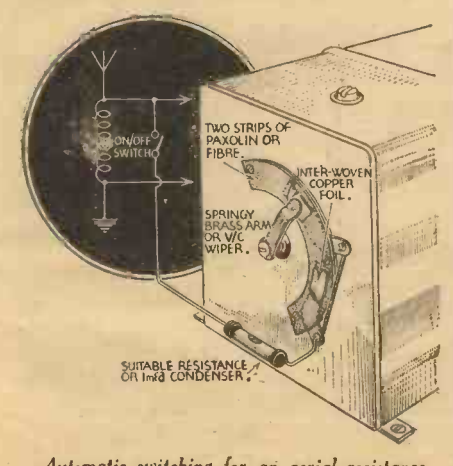


An efficient short-wave H.F. choke made from an old coil-former.

their junk box. It will be seen from the sketch that three portions are cut from the old coil former by means of a hacksaw, and then placed together. A small cork placed in the middle will assist in holding the parts together while the choke is wound. The winding of the choke consists of 120 turns wound in eight sections of fifteen turns each. The wire can be anchored at each end in the usual way.—LEWIS JONES (Holyhead).

Automatic Switching

THE following idea may be of interest to those with straight receivers not fitted with A.V.C., such as Det. and 2LF; H.F., Det., Pen., etc. It consists of a couple of automatic switches, cut out of circuit at will, which insert a parallel resistance across aerial and earth when the dial is moved to either London National or



Automatic switching for an aerial resistance.

THAT DODGE OF YOURS!

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

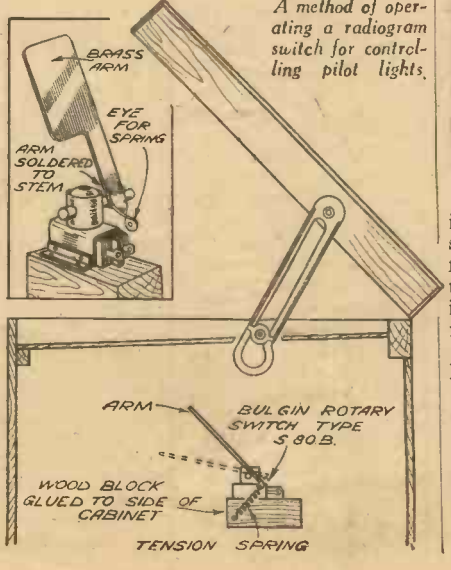
London Regional. This is useful when tuning in foreigners, with a consequent full setting of the reaction control, as it prevents the terrific volume of locals when tuned in and out.

The accompanying sketch will make the principle clear. The contacts each consist of soft copper foil woven through the *top* layer only of two layers of thin paxolin or fibre screened to the wall of the condenser assembly. Before fitting these contacts, it is best to fix the layers and the wiper arm first and note the positions of the latter when the locals are tuned in.

The foil is brought out between the layers and the wires are soldered to them. The damping across the aerial and earth may consist of a resistance or condenser, the values of which are best fixed by trial, any damping which will reduce the locals to the level of the foreigners or cut them right out if required.—L. M. HALE (W. Ealing).

Automatic Switch for Radiogram Pilot Lights

THE accompanying sketch shows a reliable method of operating a switch by the opening and closing of the lid of a radio cabinet. I considered that the more obvious way of arranging a rubbing contact was neither reliable enough or suitable, for operating at mains voltage. As shown,

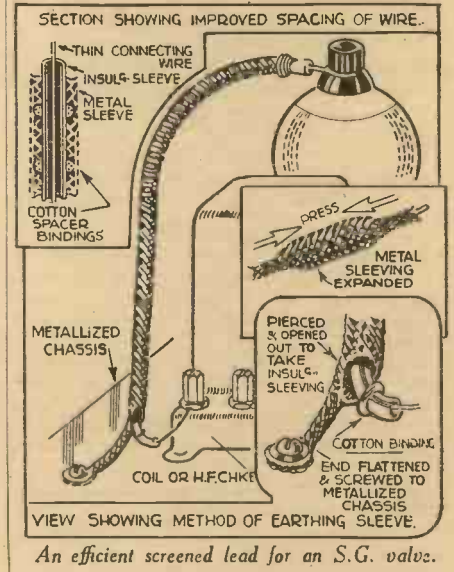


A method of operating a radiogram switch for controlling pilot lights.

a Bulgin rotary Q.M.B. switch is screwed to a block firmly glued to the side of the cabinet. It is necessary to study the line traced by the quadrant in order to ascertain the correct position of the switch. A paddle-shaped arm cut from heavy-gauge brass, is soldered to a 5/32in. shaft on the switch, while 1in. is allowed to extend to the opposite side. This part of the arm is given a half twist, and is drilled, to hold the spring which causes the switch to resume its normal position when the lid is opened. In my case, I used the switch to work the dial-light, a 15-watt 220-volt bulb, and two 15-watt bulbs concealed in the two front corners of the fascia board. When it is necessary to operate the set, immediately the lid is opened a suffused glow of light spreads over the fascia board and the dial lights up; when the station is tuned in the lid is closed and the lights go out.—JOHN H. MORGAN (Dublin).

S.G. Valve Screened Lead Improvement

THE accompanying sketch illustrates an efficient screened lead, which can be made up quite simply, and has the advantage that the actual connecting wire



An efficient screened lead for an S.G. valve.

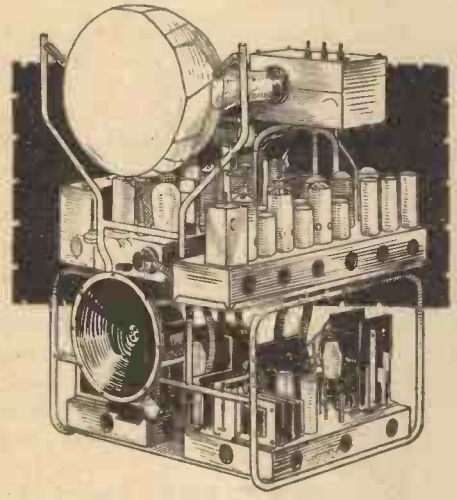
is well spaced from the metal screening surrounding it. The meshed wire covering from ordinary screened flex is utilised, but the actual diameter of the meshing is increased by the simple process of pressing inwardly (as shown by arrows in sketch). As this tends to shorten the meshing, a length twice to three times that actually required should be taken, and the mesh opened out sufficiently to take a length of insulating sleeving. This is cut about ½in. longer than the sleeving and is bound at intervals to act as spacers. A length of thin gauge silk or cotton covered wire is used for connecting purposes.—R. L. GRAPER (Gillingham).

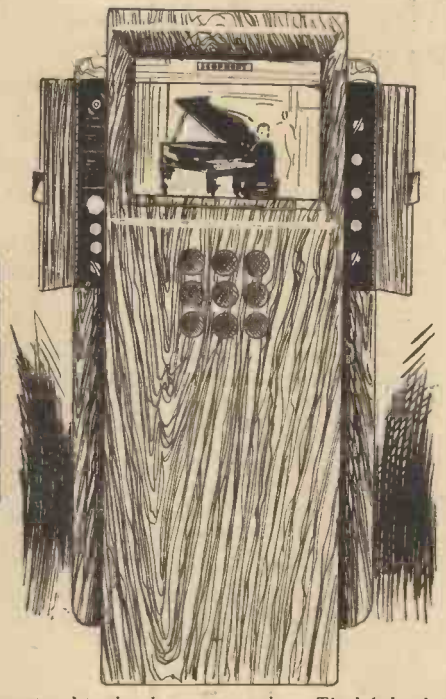
Practical Television

November 28th, 1936. Vol. 3½ No. 26.

Mechanical Systems

QUITE a number of people are still pinning their faith to mechanical systems for the reproduction of high-definition pictures on home receiver screens. No modification of disc scanners is capable of giving the results desired, but the application of mirror drum scanners is being pursued by inventors who see in this method a way to produce projected pictures. The bare principles seem to be based on two rotating members with the required number of reflecting facets. One of these corresponds to the line frequency and the other to the frame or picture frequency. Sometimes an echelon or staggered formation of reflecting mirrors is included to reduce the number of actual rotating facets. The modulated light source is an improved form of Kerr cell which proved so popular in the days of low-definition television. One of the greatest drawbacks to any mechanical form of receiver is the existence of two standards of picture transmission, and some designers have already stated that sets of this type will not be marketed until the Television Advisory Committee have made their promised recommendations for a single picture standard, a point alluded to by Lord Selsdon in his speech at the opening ceremony.





Here are two examples of the different systems as mentioned in the above paragraph. The left-hand illustration shows a cathode-ray receiver, and the right-hand illustration is a mechanical receiver, no details of which, have, however, been released by the makers.

Television Rediffusion in Miniature

For the purpose of the television demonstrations at Radiolympia this year, the E.M.I. Service Company tried out a scheme which proved very satisfactory. For receiving the signals radiated from the Alexandra Palace a single half-wave dipole type aerial reflector was located at the top of a tall mast on the roof of the building, and the eight separate booths in which were installed the television receivers were fed via short lengths of feeder cable from a central distribution amplifier. It was this amplifier which was the subject of the supposed sabotage two or three days prior to Olympia's opening, and since this coincided with the temporary breakdown of the ultra-short-wave radio transmitter on the occasion of the Press visit for a preview, the opinions then expressed were not as favourable as they should have been. During the whole of the Exhibition period, however, this miniature rediffusion scheme worked quite well, and a few days ago a direct development of this arrangement manifested itself in a block of Mayfair flats, the full details of which were given in last week's issue.

A New Outlook

A close study of the activities of the cinema industry shows quite clearly that they are very much alive to the development of television, and are taking steps to see that where possible the advantages of the new science are incorporated in their own cinema designs. For example, all new cinemas now being erected or contemplated are having much larger projection boxes than before. This is for the purpose of installing big-screen television projectors, it being felt, although no concrete plans have been formulated, that the equipment essential for this purpose will be of the front projection type and can be accommodated side by side with the standard film machines. At the moment the development of the intermediate-film projection receiver seems to be the most likely to fit in with this scheme, and it is already being asked whether equipment of this nature will be available in time for cinema patrons to see the proposed televising of next year's Coronation. Another way in which the so-called "challenge" of television is to be met is to give added importance to the degree of comfort, luxury, and attractive appearance as far as the actual cinema building itself is concerned. In this way the architect feels he will be able to offset the temptation of people to stay at home by the comfort of their own fireside.

Public Television Shows

The publicising of television shows by the installation of sets in restaurants, cinemas, stations, etc., is proceeding along normal lines, but it is now learned that the Performing Right Society is endeavouring to claim fees for this. They maintain that any place where television is used to attract the public should be compelled to pay the society a fee for the privilege. The enforcement of such a rule would make a very material difference to the featuring of television in certain places. It only applies, however, where the public pay either directly or indirectly to be entertained, so that stores and free exhibitions should be exempt.

A corner of one of the photographic rooms at the Crystal Palace where research work is undertaken in connection with television.

On Your Wavelength

By THERMION

The Component Shortage

SOME chance remarks of mine in a previous issue on the shortage of components, or rather the difficulty which constructors experience in purchasing locally, have elicited a lengthy letter from a wireless dealer who, being in the business, thinks that he is able to discern the wood from the trees. I imagine that he must be a somewhat disgruntled dealer who has been unable to persuade his customers that "something just as good" will suit a particular circuit in place of the specified components. He thinks that an artificial shortage is deliberately created by the set designer and the suppliers. He thinks that designers barter their specifications in exchange for advertisements. This is such a common supposition that I propose to deal with it in some detail. It is a libel on journalism to make such a wild suggestion. This journal specifies only the parts used by the designer. We do not say that no other parts will work. We know that with the specified parts the receiver will do all that we claim for it, and that is why the Editor is able to guarantee the performance. He could not do so if he told his readers to go round to any junk store, buy any old parts, sling them together, ignore the design of construction, and generally allow himself to be "stung" by the many unscrupulous dealers who do not understand the first thing about wireless but are permitted to stock wireless parts. You can see why some of these so-called dealers get annoyed when they open their copies of wireless journals, and find that a range of components is specified which they do not stock. They think that any old thing will do, and never hesitating to display their ignorance, rushing where angels fear to tread, give further exhibitions of their lack of knowledge and intelligence.

The Dealer and Home Construction

THE dealer to-day does not seem to care two hoots about home construction; he wants the parts to be ordered and he will take about a fortnight to get them for you. Quite often his wholesaler is reluctant to supply owing to an outstanding account. The dealer will tell the constructor that the makers cannot supply. Any dealer worthy of the name should stock his shelves with the well-known components and thus take an ordinary business risk, rather than sitting back trying to back the winner.

There is another aspect of this dealer question. Many of them get a little bit more discount on some of the parts which they think are as good as any other. No one knows why they should think so. Examine their equipment and in many cases you will find that it merely consists of a cheap voltmeter of foreign manufacture. Ask them to back their opinion that one component is as good as another by demonstrating it to you. Not only could they not do so because of lack of knowledge, but also because they lack the necessary instruments. When a set is planned it is part of the duty of a technical paper to satisfy itself that stocks are available. An advertiser whose business after all depends chiefly upon advertisements will naturally book space in order to emphasise the importance of the specification. Where a large demand exists for a particular circuit, quite often the supply runs short. Readers who are unable to obtain parts locally adopt the parochial outlook of thinking that their district constitutes the whole country. You cannot expect a manufacturer to continue to waste the time of his travellers by calling upon unresponsive dealers, who expect to sit back and take orders. Everyone can be in business on those lines. You merely open a shop, stock a few junk bits, and tell your customers that you are temporarily out of stock but will obtain the part in a few days. You will not remain in business very long, however.

Old-timers

TO return to the letter I have received from a dealer, he says: "Designers should remember that most of the people who to-day construct their own sets are old-timers, and it is almost an insult to their intelligence to tell them, in effect, that although in last week's issue only 'X' condensers are permissible if the set is to work, this week 'Y' must be used." Sheer nonsense; how could we guarantee any receiver if a reader elects to take the advice of a dealer? If the set fails to work, he would promptly send the set to us. We should find the defect, and refer the matter back to the dealer. It is thus in the latter's best interests that we should insist upon specified parts, for the responsibility is then ours and not his. There are not so many makes of wireless components that a range of each could not be stocked. When made according to the specification we have a standard of performance and are able to assist readers from a description of any trouble they may experience. With any old parts we should be unable to tell them what was the cause of the trouble. This dealer obviously expects the technical press to operate in such a way that he can sell his customers anything he chooses.

Specified Values of Components

AS far as this journal is concerned, he is going to sell them what we choose, or lose a customer. I do, of course, sympathise with the genuine dealer such as my correspondent undoubtedly is. He thinks that all designers should get together and agree merely to specify values of components, leaving the reader and/or the dealer to sort them out. The inevitable result of such a system

would be that we should be inundated with letters from dealers who know nothing of the subject asking us to specify makes. In naming makes we save the dealer this trouble. One other point—if all constructors are old-timers, they should know sufficient of the subject by this time to know when and where to substitute. If he is an old-timer a customer does not need to be told by the dealer what to buy, nor does the customer insist upon the specified parts if he knows all there is to know about wireless. In fact, he would design his own sets, and construct to his own specifications. I admit that some dealers have had a raw deal at the hands of the manufacturers, but you must also remember that all manufacturers have had a raw deal at the hands of some dealers. They are naturally cautious. When a customer complains the dealer merely refers him to the makers, and the poor constructor takes the part of a shuttlecock between dealer and maker. The very shortage of components and the difficulty in obtaining them has been created by the dealer himself, and there is little wonder that mail order houses with business acumen and foresight have stepped into the breach and undertaken to supply by return of post what a dealer often cannot supply in a month. If this dealer intends seriously to cater for the home-constructor market, I personally will undertake to see that all of the supplies he requires are readily forthcoming. If he merely wishes to await the publication of a circuit and the arrival of customers before he orders, I can do nothing for him. I make my offer ; will he accept it ? There is an acid test.

All of the blame, as I have said, does not attach to the dealer. Many manufacturers are negligent ; they do not get down to the job soon enough, and then find that they are inundated with orders which they cannot fulfil without delay.

Skilled Craftsmen

S. J., of Eccles, gives me an example where he ordered a coil from a manufacturer ; he waited two weeks and then wrote. He received a reply but no coil. He waited a further week and wrote again ; and then another week, and then another letter. By this time the 5s. coil had cost him 6s. 2½d. with the various postages. This reader tells me apropos my recent note about skilled craftsmen that he is a press toolmaker ; he can work a lathe, and work to close limits. He is expected to work for 47 hours for the munificent sum of £3 2s. 6d. He agrees that the scale of values is upside-down. His sight has failed, he is out of a job, but because he has a daughter who is a schoolteacher, he gets nothing. I am much obliged to this reader for the kind remarks he has to make about my feature. I hope his luck will change. He certainly deserves it.

The Gladiator Three

NUMEROUS satisfactory reports have been received concerning the performance of the Gladiator, but some constructors have complained that they cannot quite tune down to 19 metres. This set should tune lower than this, but it is emphasised that the minimum wavelength is governed to a great extent, especially below 30 metres, by the stray capacity across the tuned circuits. This stray capacity may be due to the use of excessive trimmer capacity, and, to a lesser extent, by the use of excessively long connecting leads passing very near the metallised surface of the chassis. When building an all-wave set constructors should keep the tuned-circuit leads as short as possible, and the trimmer condensers as near as possible to their minimum setting. The minimum wavelength can also be reduced by reducing the coil inductance, of course. This is done by removing one or two turns from the top end of the tuned winding of each coil.

H.F. Stage on S.W. Supers

MOST of this season's all-wave superhets are of the four-valve type, with the frequency changer acting as first valve. The more ambitious type of set, of the £15 to £20 class, has five valves, however. The first of these is an H.F. pentode used as an H.F. amplifier preceding the frequency changer. The use of an H.F. stage definitely improves the short-wave performance by slightly improving the sensitivity, eliminating double tuning, and second channel interference. It is not a difficult matter to add an H.F. valve to a normal four-valver of the first-mentioned type, however. This can be battery-operated if it is not desired to upset the receiver in any way. The earth terminal of the H.F. unit should be connected to the earth terminal of the set, the aerial lead to the aerial terminal of the unit, and the output lead of the unit to the aerial terminal of the set. If the extra unit is to be mains-operated the anode current can be taken from the mains unit of the set by connecting the anode supply lead to the common anode supply lead of the frequency changer and I.F. valves in the set. It is advisable to use a separate L.T. supply, however. L.T. transformers are available for this purpose.

Crooners Again

"SCHOOLBOY," of Rochford, writes : "May I wish you the best of luck in your anti-crooner campaign ? These arch-nuisances should be painfully exterminated, or at least put away under medical supervision. I live in an institution where one must bow to public opinion, however perverted (let me hasten to assure pro-crooners that the said institution is a school), and I suffer very much from this form of mental torture. However, let me make a confession. I have a distinct weakness (may the hand wither that writes this) for the trumpeting (and even the singing) of such artists as Nat Gonella, Louis Armstrong, and often listen to the same with great relish, but the sentimental tripe (and this is you may be surprised to hear the opinion of an adolescent) poured forth by the majority of crooners ought to be suppressed."

I know, *I know !*

F. H., of Copnor, also supports my campaign against crooners. They shatter his G-string, and cause his epiglottis to miss on all cylinders. They even cause violent reaction in his cat, who, when he hears a crooner open the throttle immediately goes outside and gives the jolly old welkin what-for just to get his own back. He thinks all crooners should be inoculated with a 28lb. hammer on the hair parting. This, he thinks, should be done in the cause of humanity, and would do a great deal towards bringing about that world peace one hears so much about.

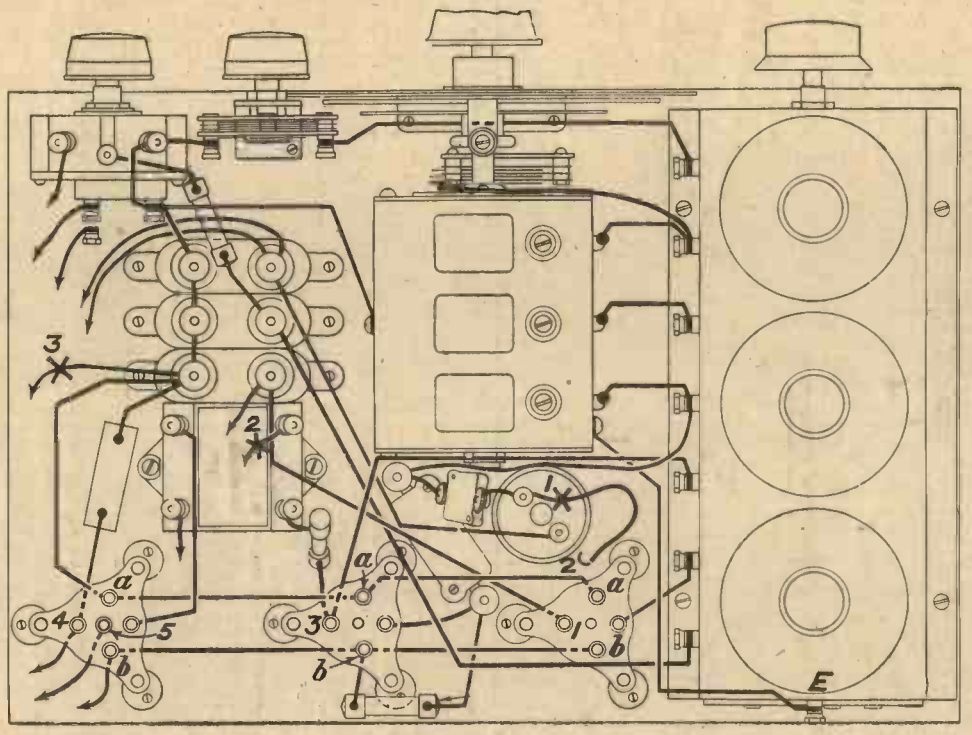
Quick Strides

I WAS present the other day at a demonstration staged by Marconi-E.M.I. in which a block of flats in the centre of London was installed with a series of television receivers in a number of rooms, all fed from a central aerial. The pictures were extraordinarily steady and clear, and give rise to the thought that the progress of television will be more rapid than was the case with radio. It only now requires a few component manufacturers with commercial pluck and vision to make the parts for the home-constructor to be in on the ground floor. The designs are ready.

Practical and Amateur Wireless

SERVICE DATA SHEET No. 27

FOR THE RECORD ALL-WAVE THREE



DATA SHEETS ALREADY PUBLISHED

1—£5 3-valve battery superhet, 14th September, 1935.
2—A.C. £5 Superhet Three, 21st September, 1935.
3—Universal Three Valve Superhet, 28th September, 1935.
4—Hall Mark Three, 5th October, 1935
5—Battery Hall Mark Four, 12th October, 1935
6—A.C. Leader, 19th October, 1935.
7—Universal Hall Mark, 26th October, 1935.
8—Summit Three, 2nd November, 1935.
9—Hall Mark Cadet, 9th November, 1935.
10—A.C. Silver Souvenir, 23rd November, 1935.
11—Battery Silver Souvenir, 30th November, 1935.
12—1936 Sonotone Three-four, 14th December, 1935.
13—Cameo Midget Three, 21st December, 1935.
14—A.C. Hall Mark, 28th December, 1935.
15—Mr. F. J. Camm's Superformer, 11th January, 1936.
16—A.C. 1936 Sonotone, 18th January, 1936.
17—All-wave Three, 15th February, 1936.
18—The Monitor Three, 22nd February, 1936.
19—£4 Superhet Four, 4th April, 1936.
20—F. J. Camm's Tutor Three, 25th April, 1936.
21—A.C. £4 Superhet Four, 16th May, 1936.
22—Elf Portable Three, 6th June, 1936.
23—Invincible, 20th June, 1936.
24—"Signet" Two, 24th October, 1936.
25—Bandspread Three, 31st October, 1936.
26—Gladiator All-wave Three, 21st November, 1936.

Approximate Voltage Readings

Voltmeter — to E
" + to 1 = 60 volts.
" + to 2 = 120 volts.
" + to 3 = 60 volts.
" + to 4 = 115 volts.
" + to 5 = 120 volts.
" to a and b = 2 volts.

Approximate Current Readings

Milliammeter Connected at x1 = 2½ mA.
" " at x2 = 1½ mA.
" " at x3 = 10 mA.

Approximate Resistance Readings

L.F. Transformer
Ohmmeter Connected across G and GB = 4,000 ohms
" " " P and HT = 750 ohms

ABC of the Modern Receiver—10

Further Details of the Frequency-changer and Intermediate-frequency Amplifier, with Reference to A.V.C. and Second Detection

By FRANK PRESTON

THE main principles of the superheterodyne frequency-changer were described in the last article of this series, so we may now turn to the more practical aspects. There are, of course, a few different types of frequency-changer valve—pentagrid or heptode, hexode, triode-pentode, and triode-hexode—but we will take the pentagrid as a typical example, since this is most widely used. The basic circuit was given before, but a more complete one is given in Fig. 1, where both the frequency-changer and the intermediate-frequency valves are included.

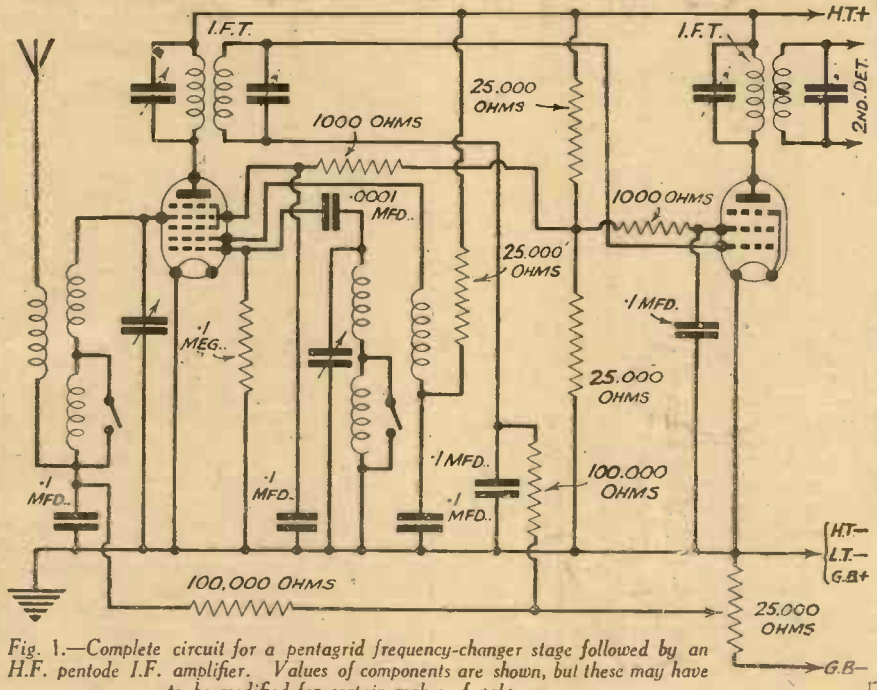


Fig. 1.—Complete circuit for a pentagrid frequency-changer stage followed by an H.F. pentode I.F. amplifier. Values of components are shown, but these may have to be modified for certain makes of valves.

Variable Grid Bias

It may be seen that provision is made for applying variable grid bias to both of these valves, the control taking the form of a potentiometer. This is a very simple and satisfactory arrangement, for the double control has a very pronounced effect, and permits of a very wide range of input to the second detector. In connection with the V.M. volume control, it should be noted that each valve is decoupled by means of a .1 megohm resistance, and that the feed is through the first tuning coil and the secondary winding of the I.F. transformer; a .1-mfd. non-inductive condenser is used in each case to provide an H.F. by-pass across the resistances. It should also be added that in most modern superhets this manual (potentiometer) volume control is replaced by an A.V.C. feed, but this will be dealt with later.

Oscillator Grid Circuit

The tuning circuits were dealt with before, but no reference was made to the condenser and leak in the grid circuit of the oscillator portion. Theoretically, these are not necessary, and it is actually possible to obtain results without them. They do, however, assist in ensuring steady oscillation over the tuning range by causing the triode oscillator section to operate at the most suitable point on its characteristic curve. To enter into this matter in detail would lead to complication, so readers are asked to accept the fact as given. Most suitable values for the condenser and leak depend largely upon the particular valve employed, but .0001-mfd. and 100,000 ohms (or .1 megohm) are nearly always satisfactory figures.

H.T. Supply

The two screening grids of the pentagrid are joined together inside the valve and brought out to the same pin, as shown in Fig. 4, and require an H.T. voltage of rather less than half the voltage applied to the main anode. It so happens that a similar voltage is required by the screening grid of the H.F. pentode used as intermediate-frequency amplifier, and for this reason it is usual to employ a common supply line. One method of feed is to join the screening grids together and to a wander plug which can be inserted into a suitable socket on the H.T. battery. This is not the best arrangement, however, because there is no decoupling, and because an extra H.T. lead is required. It is better in every respect to use a potentiometer system, as shown in Fig. 1, taking the leads to the two valves from this through a pair of 1,000-ohm resistances. The potentiometer is fixed and might well consist of two fixed resistances in series. As an alternative, the potentiometer can often be successfully replaced by a single 50,000-ohm resistance, as shown in the simplified circuit in Fig. 5.

The connections shown in Fig. 1 are better, especially when the two .1-mfd. screening-grid by-pass condensers are mounted as close as possible to the screening-grid terminals of the respective

(*Continued overleaf*)

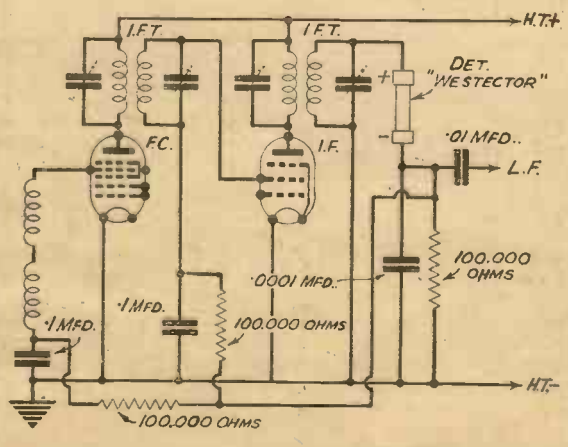
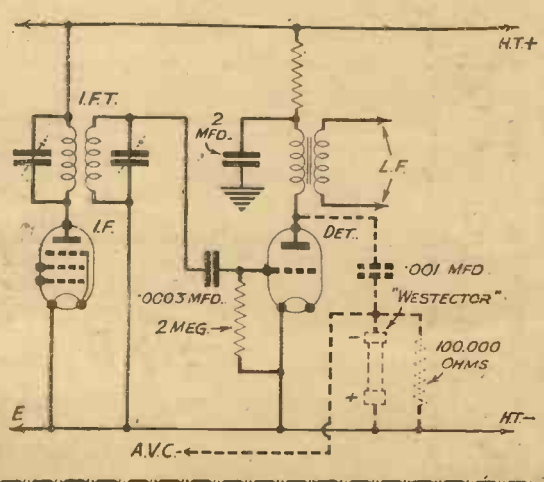


Fig. 2 (left).—Here a "Westector" is shown as second detector and A.V.C. device.

Fig. 3 (right).—Three-electrode second detector, with A.V.C. unit shown in broken lines.



ABC OF THE MODERN RECEIVER

(*Continued from previous page*)

valveholders. The anode of the oscillator section generally requires a voltage equal to about two-thirds of that applied to the main anode. For this reason, a fixed resistance is connected in series with one end of the "reaction" winding of the oscillator coil and H.T.+. The value of this is not usually critical, but 25,000 ohms suits most valves of this type. This resistance also is by-passed by means of a .1-mfd. non-inductive condenser, so that any "stray" high-frequency currents are led away to earth, where they cannot interfere with the operation of the rest of the receiver. The idea of all

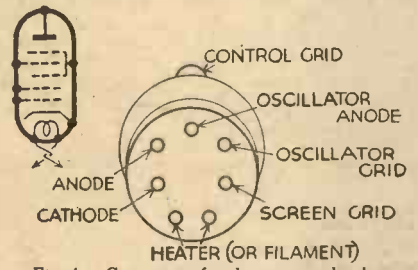


Fig. 4.—Connection for the pentagrid valve.

this decoupling is very similar to that of the detector decoupling circuit, which was fully dealt with in an earlier article.

The Second Detector

There is little more that need be said concerning the elementary aspects of the frequency-changer and I.F. valves, so we can proceed to the second detector. It is this stage which separates the audio-frequencies from the (intermediate-frequency) carrier wave, and it acts in the same manner as the detector in a "straight" circuit. Thus, the simplest form of detector is a three-electrode valve, as shown in Fig. 4. This is not used to any great extent, however, since it does not provide any very convenient means of obtaining automatic volume control. It can be used for this purpose by including in its anode circuit an A.V.C. unit. This consists of a "Westector," "stopping" condenser, and a "load" resistance, as shown in broken lines in Fig. 3. The idea of this network is that a portion of the audio-frequency voltage appearing in the anode circuit of the detector valve is "side-tracked," passes through the .001-mfd. fixed condenser and "Westector" to earth.

A.V.C.—How it Works

The "Westector" is a rectifier, and so changes the alternating or low-frequency current into D.C., so that there is a certain voltage developed across this rectifier and the 100,000-ohm "load" resistance. And as the positive terminal of the rectifier is connected to earth, the other end is at a negative potential (or voltage) in respect of earth. Thus, if a connection is taken from the negative end of the rectifier, that connection can be used to provide negative bias to the grid of a preceding valve. In practice, this lead is joined to the ends of the two bias decoupling resistances shown in Fig. 1, so that the potentiometer can be removed.

It might not yet be clear how this system of connections can provide automatic volume control. The chief point is that the voltage developed across the "Westector" load resistance is proportional to the signal voltage forming the output of the detector. Thus, as the output increases, the voltage employed as grid bias increases. And as the sensitivity of variable-mu valves is reduced by increasing the grid-bias voltage, their sensitivity is made less as the output from the detector is raised—and *vice versa*. In consequence, when a powerful signal is tuned in a greater value of G.B. voltage is applied to the "controlled" valve or valves, and sensitivity or amplification is reduced. The final result of this is, theoretically, that the output from the detector, and so from the speaker, is caused to remain constant regardless of the strength of the incoming signal. In practice, this ideal state of affairs is never quite achieved, but by using three or more "controlled" variable-mu valves the result is near enough to the ideal. Even when using two "controlled" valves it is possible to obtain a degree of A.V.C. which is adequate for most requirements.

Preventing Fading

What is the advantage of A.V.C.? might seem to be a reasonable question. One advantage is that the receiver is prevented from overloading on signals from nearby transmitters, another is that the ears do not receive a shock due to a terrifically-loud signal as the tuning control is operated, and another is that fading is eliminated, or considerably reduced in effect. The reason for the latter is that the receiver is made more sensitive when the signal is weak (after fading), and less sensitive as signal strength increases. Thus, the sound from the speaker remains sensibly constant irrespective of fluctuations in the strength of the signal picked-up by the aerial. Those who make a habit of listening to foreign and distant stations with a non-A.V.C. receiver will appreciate that this is a very important point.

"Westector" Second Detection

As mentioned above, this method of second detection and A.V.C. is not widely used. This is not because it is unsatisfactory, but because the same result can be obtained more easily by other methods. The simplest of all these is by using a "Westector" in place of both the second detector valve and the A.V.C. unit. Typical connections are shown in Fig. 5, where the I.F. and frequency-changer

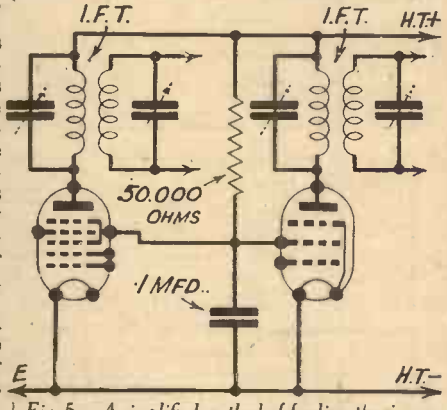


Fig. 5.—A simplified method of feeding the screening grids of the frequency-changer and I.F. valves. This is not as good, theoretically, as the method shown in Fig. 1, but can often be used successfully.

valves are also shown to make the A.V.C. connections more readily understood. The secondary of the second I.F. transformer is connected directly to the positive terminal of the rectifier and to earth, whilst leads are taken from the negative end to the L.F. amplifier and to the grid-bias circuits of the "controlled" valves. The rectified output from the "Westector" is "split," so that one portion is applied to the low-frequency amplifier, the other being used for grid bias. A 100,000-ohm "load" resistance is used again, and it is across this that the A.V.C. grid voltage is developed. It will also be seen that a .0001-mfd. fixed condenser is connected in parallel with this resistance to act as a by-pass to any H.F. currents which find their way past the rectifier.

The lead marked as going to the L.F. amplifier can be taken either to the grid of the low-frequency valve (to obtain resistance-capacity coupling) or to the primary circuit of an L.F. transformer (for resistance-fed transformer coupling).

The use of special "A.V.C." or double-diode second-detector valves will be dealt with in the next article of this series.

(*To be continued*)

PROGRAMME NOTES

Music of the Hours

ON November 30th, in the second of his Midland series of talks on chime tunes, Walter Pitchford will deal with those of Gloucester Cathedral. Records of four of these chime tunes have been specially made by the B.B.C. Mobile Unit and will be used to illustrate the talk. The age of the tunes, which are played by chime barrels, ranges from 150 to 250 years.

Dance Cabaret from Bristol

ON DECEMBER 4th, Western listeners will hear a dance cabaret programme which will be broadcast from the Coliseum, Bristol.

Tommy Finnigan and His Band

THIS dance band will broadcast again in the Midland Regional programme on December 3rd. The chief vocalist, Ted Butler, known as "The Top Hat Troubadour," was discovered by Tommy Finnigan on his American tour. The leader himself was drummer to the Liverpool Municipal Orchestra at fourteen, and had his own band before he was twenty.

"Soft Lights and Sweet Music"

DURING Austen Croom-Johnson's absence in America, Carroll Gibbons, conductor of the Savoy Hotel Orpheans, is keeping alive the popular "Soft Lights and Sweet Music" which was the creation of Austen Croom-Johnson. On November 25th in the Regional programme, he will give another session of this feature. James Dyrenforth, who wrote the books of "Puritan Lullaby" and "Old Words to New Music," will compère for Carroll Gibbons.

The Cossor A.C. Mains Superhet (Model 375)

A New Five-valve Receiver Covering the Medium and Long Wavebands

THE New Cossor Superhet Model 375 is a brilliant example of what refinement of detail can do towards making the orthodox superhet into a receiver of outstanding merit. Admittedly there have been no basic developments during the last year, or even any noteworthy improvement of a tangible nature; but great firms like Cossor, spending vast sums in continuous research, have greatly improved such obscure factors as the iron in iron-cored coils, have perfected methods of coupling that are really linear over *all* of both wavebands, and a dozen and one other often overlooked but nevertheless vital details.

The Circuit

Describing the circuit in logical sequence, attention is first of all directed to the aerial circuit, which is an inductively coupled band-pass arrangement with a specially designed bucking coil to avoid second channel interference; as would be expected, the first valve is a pentagrid frequency changer, Cossor 41 MPG, coupled by means of a well-designed iron-cored transformer to the I.F. amplifier, a variable-mu screened pentode, which in turn is coupled to the second detector by a high gain I.F. transformer. It is interesting to note in passing that the primary of the I.F. transformer is shorted when the set is switched to the gramophone position to prevent "break through."

SPECIFICATION

COSSOR A.C. MAINS SUPERHET, with fully delayed A.V.C., including:—

Five Cossor valves, viz.: 41 M.P.G., M.V.S. Pen., D.D.T., PT41, and 442 B.U. Illuminated scale, combined gramophone and radio volume control, tone adjustment, provision for pick-up and extension speaker. 8-in. moving coil loudspeaker. Walnut cabinet 19¾in. high, 14¼in. wide, 11½in. deep, for A.C. mains only. 200-250 volts, adjustable 40-100 cycles. Price 9½ guineas, or on Hire Purchase Terms.

The second detector is a double-diode triode controlling a very carefully designed A.V.C. system that controls the gain on both the pentagrid and variable-mu pentode. The signal half of the diode is, of course, coupled to its triode section by the usual resistance, which is arranged with its mid-point earthed so that the volume control increases volume on radio and gramophone by rotation in opposite directions.

The triode section of the second detector is resistance coupled to the output valve, which is a power pentode working into a load designed to be purely resistive, taking the form of an 8in. moving-coil loud-speaker shunted with a resistance of optimum value.

The power pack is built around a Cossor 442 B.U., a double wave rectifier capable of an output considerably larger than that required by the receiver. The mains transformer is of heavy design, as also are the smoothing arrangements.

Tuning Scale and Controls

The general appearance of Model 375 can be seen from the accompanying illustration; the walnut veneered cabinet is particularly well finished, and is rich in colour and not too dark. The tuning escutcheon and "speaker frame" are a single die-casting sprayed brown; the whole appearance is very restrained and dignified.

This illustration of the new Cossor A.C. Mains Superhet—Model 375—shows the neat appearance of the cabinet and simple controls.

The scale is calibrated in both metres and station names and is illuminated, the deep coffee colour preventing the glare that is so unpleasantly obvious in many receivers. In addition to the simple controls on the front, there is a tone control at the rear intended to be treated as a preset adjustment.

Performance

Selectivity is of a very high order, permitting almost all European stations of any consequence to be readily tuned in, a procedure that is greatly facilitated by the very high over-all gain of the receiver. The amplification is, in fact, remarkable, allowing quite weak stations to be pulled in on a very short aerial; combined with such high selectivity this sensitivity is exceptional.

Quality is also very good and side-bands—and consequently brilliance of reproduction—are well preserved, particularly when the limitations imposed by high selectivity are taken into account; the complete absence of accentuated frequencies shows that the output circuit has sensibly similar impedance over the whole musical scale.

The signal-to-noise ratio is very high, and even on relatively weak stations the background is favourably low. The automatic volume control arrangements were found to be very satisfactory, and here alone the high over-all gain proved its use. The efficiency of any A.V.C. system is, of course, limited by the maximum amplification of which the set is capable.

Gramophone reproduction reached a similar high standard. The tone adjustment, when adjusted to suit the average ear on radio, effected a reasonable needle scratch-cut on records; the volume control was smooth, and the ability to reproduce music at low volume without deadness was manifest.

The Cossor A.C. mains superhet Model 375 is suitable for A.C. 200-250 volts (adjustable by three tappings) 40-100 cycles and consumes approximately 65 watts. Provision for gramophone pickup takes the form of a pair of sockets, similar arrangements being made for an extension loudspeaker.

The price is 9½ guineas, or it may be had for a deposit of 17s. 6d., and twelve monthly payments of 17s. 3d., or a deposit of 17s. 6d., and eighteen monthly payments of 12s. 6d.

HOWEVER keen a wireless constructor may be on receiving and logging wireless transmissions, there comes a time when he has a great desire to be able to reverse the procedure, and take part in the ever-increasing activities of the many thousands of amateur transmitters. The desire is generally created—in genuine wireless enthusiasts—if any time is spent on the short waves, listening to amateur transmitters working other stations over distances varying between a few miles and several thousands.

One cannot help being impressed by the spirit of friendship which exists between all transmitters, irrespective of nationality and tongue, and the feeling that the station owners are getting ninety-nine per cent. out of wireless, enjoying it to the full, apart from contributing—to a very great extent—to the development and progress of the science.

The amateur who intends to take up transmitting, however, often finds that it is not too easy to secure all the necessary details. The object of this series of articles, therefore, is to put the whole matter quite clearly before those interested, and to describe, from the fundamental stages upwards, the design and construction of transmitters suitable for amateur use, but it must be fully appreciated that such equipment must not be operated until the licence requirements have been fully satisfied.

This is not only for the sake of conforming to regulations, it is also to protect the facilities already granted to amateur transmitters as a whole, and it is up to everyone who is at all interested in the subject to see that their actions do not endanger—by illegal use of such equipment or the abuse of the licence—the privileges so vital to the welfare of the work.

To avoid any misunderstanding, I would like to make it quite clear that, unless the would-be amateur transmitter is prepared to devote a reasonable amount of time and study to the subject, to enable him to overcome the preliminary details, then he may as well scrap the idea of ever becoming the proud owner of a transmitting station.

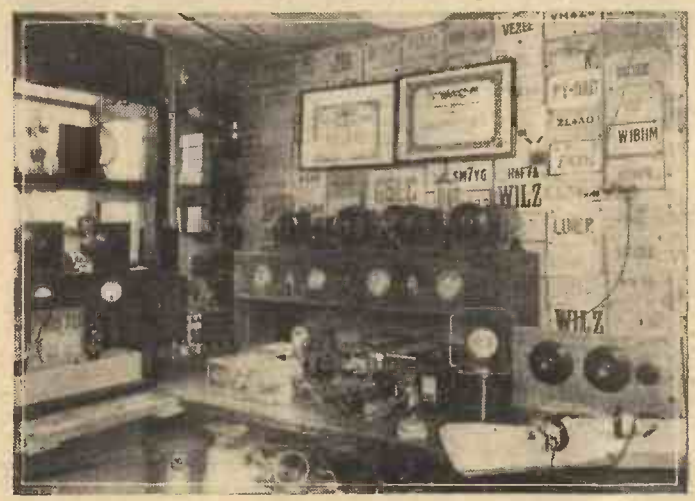


Fig. 2.—A corner of the amateur transmitting station, G5LC, operated by Mr. Leslie Cooper, of East Molesey, Surrey.

Preliminary and Essential Details

However anxious you are to reach the transmitting stage, it is useless for you to attempt to skip the preliminary details, even if they are dry and uninteresting. The quicker the groundwork is done, the quicker the licence application can be made.

The first thing to consider is the Morse Code, as it is not the slightest use proceeding with the theory and construction of transmitters until a determined start has been made towards mastering the code.

It will take, at least, two to three months of diligent practice to become reasonably proficient, therefore, as a sound knowledge of Morse is essential for the licencing tests, no time should be lost in making up the simple L.F. oscillator (Fig. 1) and getting down to practice.

The complete international Morse Code is set out on this page, and it will be seen that the letters of the alphabet, numbers, punctuations and abbreviations are formed by various arrangements of "dots" and "dashes."

Various articles have appeared, in past issues, explaining how to learn the code, therefore, it is only necessary to emphasise one or two points.

Always think of a "dot" as "dit," and a "dash" as "dah," and get in the habit of saying "dit dah" for A; "dah dit dit dit" for B and so on, and you will, eventually, recognise letters by their resultant sound, and not so much by so many "dots or dashes."

Note that several letters consist only of "dots," while others are formed by "dashes," for example, E, I, S and H use only "dots," and T, M and O "dashes."

There are several letters which have opposites. A is the reverse of N, B the reverse of V, and so forth, and it will be found that such little aids to the memory all help in mastering the complete code.

Pay particular attention to the length of "dits," "dahs" and the time between each letter and word. A "dah" is equal to three "dits"; the time between each letter should be the same as that taken by one "dit," while five "dits" represents the space between each word.

Don't on any account adopt a sloppy or careless style of sending, as you will find it very difficult to get out of the habit when you reach the transmitting stage, and other amateurs will report that your signals are not readable.

Practice, practice and then more practice, is the only way to master the whole thing. Don't lose heart, as you will find that it will suddenly become quite clear, and you will be able to read Morse transmissions without undue concentration. Don't worry about speed, get letter perfect first.

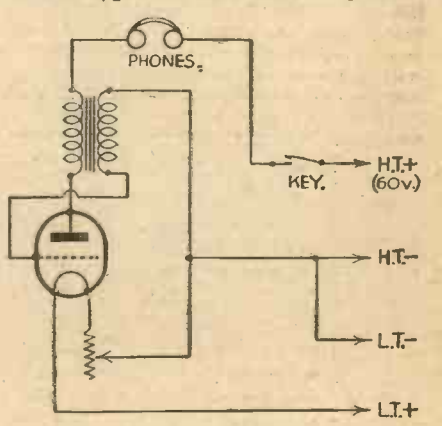


Fig. 1.—A simple Morse practice circuit employing a valve oscillator.

THE MORSE CODE.

A	· —	N	— ·	1	· — — — —
B	— · · ·	O	— — —	2	· · — — —
C	— · — ·	P	· — — ·	3	· · · — —
D	— · ·	Q	— — · —	4	· · · · —
E	·	R	· — ·	5	· · · · ·
F	· · — ·	S	· · ·	6	— · · · ·
G	— — ·	T	—	7	— — · · ·
H	· · · ·	U	· · —	8	— — — · ·
I	· ·	V	· · · —	9	— — — — ·
J	· — — —	W	· — —	10	— — — — —
K	— · —	X	— · · —		
L	· — · ·	Y	— · — —		
M	— —	Z	— — · ·		

Note of Interrogation	· · — — · ·
Note of Exclamation	— — · — · — —
Apostrophe	· — — — — ·
Hyphen	— · · · · —
Fractional Bar	— · · — ·
Brackets	— · — — · —
Inverted Commas	· — · · — ·
Underline	· · — — · —
Preliminary Call	— · — · —
Break sign	— · · · —
End of Message	· — · — ·
Error	· · · · · · · ·

Amateur Transmitting

No. 1 of An Interesting New Constructor Feature

Preliminary Details Concerning Morse Practice, Licences, Artificial Aerials and Power are Dealt with in this First Article of a Series. By L. ORMOND SPARKS

Licences

When the Morse Code has been mastered, and a fair amount of time has been spent on short-wave reception, it is feasible to think about applying for a transmitting licence. It is not necessary to have the transmitter assembled before doing this, as it is highly possible that some little time will elapse between the time of application, and the granting of the official licence.

There are two forms of licence, the A. A. or artificial aerial, and the full licence.

Artificial Aerial

The licence granted under this heading covers the use of transmitting apparatus which is not coupled to an outside or radiating aerial. A dummy or artificial aerial has to be used, and the whole equipment so designed that it will not radiate signals outside the premises in which it is being used. A great number of constructors have the opinion that such facilities are of little use. That is not so in fact. I would advise every constructor who wishes to become a full licence holder to commence his activities by securing an A.A. licence, as most valuable information and experience can be obtained by the intelligent use of apparatus which comes within the scope of the licence. It must be appreciated that, apart from the artificial aerial, the equipment is identical with a proper transmitter, and that every form of test can be made as regards modulation, circuit design and characteristics.

The cost of an A.A. licence is 10s. per annum. No tests have to be passed, but it is necessary that certain technical details are completed on the application form, which can be obtained from the Engineer-in-Chief, Radio Section, G.P.O., Armour House, London, E.C.1. It usually takes about three weeks for the licence to be granted.

Fig. 4.—A mobile transmitter in use by a radio society on one of their field days.

Full Licence

When an application is made for a full licence, it is necessary to convince the authorities that genuine experiments of a definite nature are to be carried out, and that such experiments cannot be made with an A.A. licence.

An application form, obtainable from the same address as the A.A. licence, will have to be completed, answering certain questions relating to technical qualifications, nationality and character.

If the application is favourably considered, a Morse test has to be passed, when the applicant has to transmit and receive twelve words per minute for a period of five minutes.

A full licence costs 30s. for the first year, and £1 for every succeeding year; that is, an initial fee of 10s. for the licensing and an annual fee of £1, payable in advance. These charges only cover stations operating on a power up to 10 watts, which is the maximum power for new transmitters in the amateur class. There are certain specifications governing the apparatus, its type and operation, but these will be dealt with in future articles when designs are being considered.

Cost

Transmitting apparatus can cost anything from a few pounds to sums far beyond the average constructor's wildest dreams, but it need not be half so costly as many people think; in fact, it is possible to reckon the cost of a simple low-power transmitter in shillings, so there is no need to fear that expenditure will be too high to allow the necessary gear to be made or secured.

Quite a number of enthusiasts have been under the impression that "mains" operation is essential, and, as they have not had an electricity supply in their district, they had dropped all idea of transmitting. I would like to add, therefore, that I intend covering battery- as well as mains-operated apparatus, as quite a good range can be obtained without excessive H.T. consumption. Next week I will deal with some of the vital fundamental principles, so, until then, get busy with the Morse practice.

Fig. 3.—A group of QSL cards.

SHORT WAVE SECTION

TUNING THE AERIAL

Various Methods of Improving Short-wave Reception are Dealt With in this Article. By A. W. MANN

WHILST the majority of short-wave enthusiasts follow with interest and appreciate the rapid strides which are being made in the design and development of short-wave receivers and circuits, many cannot afford to take advantage of them in the practical sense, and must perforce remain satisfied with the equipment to hand.

Fortunately, modifications and improvements can be carried out at low cost. For example, in some instances a set of coils are to hand which enable the experimenter to use his short-wave T.R.F. or regenerative detector and L.F. stage receiver for medium-wave broadcast reception.

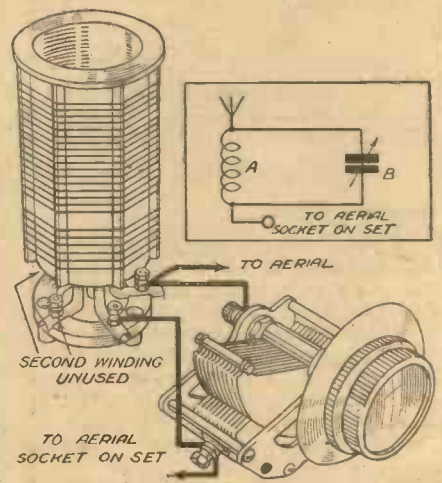


Fig. 2.—This is the method of building up an aerial tuner as described in this article.

As explained in a previous article, selectivity is of a very low order, due to the high ratio of inductance to capacity. In these circumstances, the enthusiast requires some means or other whereby the selectivity may be improved on medium waves which will not introduce complications, or prove detrimental with respect to the overall efficiency of the receiver when used for short-wave reception.

Selectivity Problems

Before going further, let us take into consideration the common defects associated with the straight regenerative short-wave receiver, and the tuned radio frequency type. Selectivity is mediocre in both instances compared with that of the superheterodyne. I do not mean to infer that short-wave receivers other than the superhet are useless, because the degree of selectivity obtainable when using either a regenerative detector or T.R.F. receiver depends upon its general design, lay out, wiring, and efficiency, or otherwise, of the tuning coils used. Nor must we overlook the importance of the aerial and earth system used in conjunction with it; also aerial coupling arrangements.

This brings us to a very important point often ignored when discussing short and medium-wave selectivity problems. It is that, in many instances, poor selectivity is the price paid for simplicity of control. Take for example single and two H.F. stage T.R.F. type receivers. The aerial circuit is usually made aperiodic, and thus receives all signals at equal strength.

Fig. 1.—This is a complete wave-trap coil for medium and long waves, and is a Wearite component.

Thus we have the desired and undesired signals picked up and passed on to the first H.F. valve and amplified, causing cross modulation when band-pass or variable-mu are not features of design.

Using a Wave-trap

This state of affairs, however, may be overcome in a very simple manner. Fig. 1 shows in theoretical form a rejector wave-trap fitted in series with the aerial. All that is required is a .0003 mfd. variable condenser, a coil mounting, a medium-wave coil, and three or four single-winding short-wave coils, which may be of the now obsolete two-pin type.

The idea is an old one, but, when used in conjunction with short-wave receivers, serves a number of different purposes. It can, of course, be used as a wave-trap on all bands, and will prove worth while.

When inter-station interference is experienced, the unwanted signal may be tuned in at full volume on the receiver, and then reduced to the minimum, or completely cut out with the trap circuit, after which the set should be re-tuned to the desired signal.

The writer has always been, and still is, a strong advocate of tuned aerial systems. Quite apart from man-made static and integral receiver noises, we experience natural static or background noise.

Background noises are experienced by everyone to a greater or lesser degree, and the same applies to integral receiver noise, but man-made static is not universally experienced.

Reducing Interference

If man-made static is experienced, there are special aerial systems which may be used in order to reduce such interference, but there is no system available which will totally eliminate it, and one must be prepared to sacrifice a reduction in signal volume to some degree and view the subject from the point of clearer signals due to the reduction of interference of the man-made variety originating close to the lead in. Should such interference be a quarter of a mile away, things are pretty hopeless.

Natural static or background noise external to the set is, however, a different proposition altogether, and not only can it be considerably reduced, and completely eliminated in certain instances, but so also can signal volume be increased at one and the same time.

For example, whilst it may appear paradoxical, natural static may be experienced on a particular frequency, which in itself is free from interference, such interference being spread over from adjacent frequencies. Our receivers discriminate between wanted and unwanted signals, therefore we must arrange matters so that the aerial system will discriminate between wanted signals and unwanted interference.

Providing that we can accomplish this most desirable state of affairs, sufficient voltage will be obtained to totally override noise, and by tuning the aerial system to resonance we can achieve our objective This is not high sounding theory, but a fact all too little appreciated.

(*Continued on opposite page*)

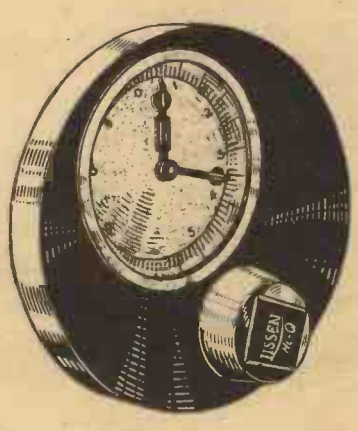


Fig. 3.—To simplify tuning, a super slow-motion dial such as this type will be found invaluable.

LEAVES FROM A SHORT-WAVE LOG

THE interchange of programmes between Europe and the U.S.A. is gradually assuming larger proportions and when searching for a wanted broadcast a transmission may occasionally be found on a channel which does not tally with any of the regular and better known short-wavers. Germany, in this respect, is peculiarly active, and in addition to the ordinary stations in use at Zeesen, which broadcast the overseas programmes, frequently brings into action her special point-to-point transmitters for relays to a foreign country. The following are those mostly used: Zeesen, DZG, 19.53 m. (15,360 kc/s); DZH, 20.75 m. (14,460 kc/s); DZE, 24.73 m. (12.130 kc/s); DJB, 25.31m. (11,855 kc/s); DJO, 25.43 m. (11,795 kc/s); DZB, 29.87 m. (10,042 kc/s); DZA, 31.01 m. (9,675 kc/s); and DJM, 49.35 m. (6,079 kc/s). The League of Nations transmitter at Prangins (Switzerland), in addition to its official work, is also sometimes called upon to act as the short-wave "ether" link of a neighbouring country such as Austria, Hungary, Yugoslavia, and so on.

Listen to Haiti

Possibly due to the weather conditions which during the past week have doubtless

(*Continued in next column*)

SHORT-WAVE SECTION

(*Continued from opposite page*)

Aerial Resonances

There are various methods, complicated and otherwise, from which to choose. Using the coil and tuning condenser arrangement described is the most simple, and does not make for tricky operation. For example, suppose we tune the set to 31.28 metres with aerial tuner unit condenser at zero and get our signal up to maximum volume. Now follow by tuning the aerial tuner unit. It will be noted that as the aerial system is brought into resonance, volume definitely increases until a point is reached where the signal is cut out, and then as we continue aerial tuning, comes in again.

The point of maximum sensitivity falls a fraction below resonance, therefore we must tune carefully for maximum signal volume which denotes that point by adjusting the aerial tuner unit and slightly correcting the receiver tuning and reaction condensers. By following this procedure we not only obtain maximum volume, but over-ride noises which spread over from adjacent frequencies.

An important feature to note is that this tuner or trap arrangement enables one to reduce the input to the H.F. stage, and is especially useful in this respect when screen voltage is controlled by a potentiometer acting as a pre-detector volume control. In some measure this allows maximum sensitivity to be obtained or decreased at will, avoiding excessive noise on the one hand, together with freedom from what may be described as knock reaction effects on the other.

In conclusion, it should be understood that a unit of this type will prove to be an asset when used with either straight regenerators or T.R.F. receivers, although in the latter instance, when pre-detector volume is used, it is possible to obtain some further advantage relative to sensitivity and selectivity because it is possible to reduce the input by cutting down screen voltage, adjusting the aerial tuner, or conning both, according to requirements.

been greatly enjoyed by radio fans, it has been possible to tune in a number of broadcasts from distant and relatively weak stations. Amongst these, excellent loudspeaker reception has been secured of HH2W, Port au Prince (Haiti), on 48.90 m. (6,135 kc/s), which is rated at a mere 30 watts. All announcements were made in the French language, and the call HH2W (Phon: *ash - ash - deux - dooble - vay*) was coupled to that of the medium-waver HHW from which the short-waver relays its regular programmes. From G.M.T. 22.00, the broadcasts were held for more than two hours, and during the entire period the signals were clear. Most of the transmission consisted of advertisements for local and American stores or products, and the music was composed mainly of rumbas and similar Cuban or other South American dances. Another station also situated at Port-au-Prince which was picked up turned out to be HH2R, on 31.44 m. (9,545 kc/s), but in this instance announcements were heard in French, Spanish, and English.

La Voz de L'Atlantida

When a recent search was made for HIN, Trujillo City (Dominican Republic), on 48.5 m. (6,185 kc/s), the writer picked up the above call and, later, was able to log the broadcast as emanating from HRD, La Ceiba (Republic of Honduras). The channel was found to be 48.11 m. (6.235 kc/s), according to announcements, the power being given as 250 watts. This studio is on the air daily from G.M.T. 01.00-04.00, with a special and extra transmission on Sundays between G.M.T. 21.00-23.00.

Although a full address was not supplied, it is understood that reports of reception should be forwarded to Dr. Tulio Castaneda, Emisora HRD, La Voz de l'Atlantida, La Ceiba (Honduras).

IMPRESSIONS ON THE WAX

By T. Onearm

Bird Songs

MUSIC written to illustrate varied aspects of bird life is to be found in the works of many composers, but a complete composition created to represent the song of many birds is rare indeed. The most notable example is the "Bird" Quartet of Haydn, Op. 33, No. 3, which deals with bird life as exemplified in the reproduction of the nightingale, the cuckoo, and a number of other birds.

The finale is supposed to be a bird concert, in which the cuckoo undoubtedly holds his own. The Roth String Quartet have recorded this fine composition on three records, *Columbia LX* 538/40.

In the past, recorded music from a harpsichord has been on a seventeenth-century basis. Yella Pessl, however, has recorded a number of extremely fine harpsichord solos on *Columbia DX* 752. They are Handel's Fantasia in C and Capriccio in G minor, and Purcell's Prelude, "The Queens Dolour," and a Hornpipe.

Girl-School Humour

BY his girl-school impressions Arthur Marshall has not only established himself as a wireless favourite but has created a unique brand of humour which is highly appreciated. His first record for the Columbia Company—"A School Girl's Story" and "The Head Mistress" was refreshingly original.

He has now made a recording of "The Hostess" coupled with "A Nature Walk," on *Columbia DB* 1657. They are clever impressions of a smug, talkative "Schoolmarm" that are extremely humorous.

Tommy Handley's "Chicken" Song

TOMMY HANDLEY'S "Chicken Song" (Have You Seen My Chickens?), which he put over on the "air," appears in the new Columbia releases sung by Handley himself, assisted by his wife, Jean Alliston. They sing this quickfire song with great gusto, peppering it with humorous "cluckings" and it is as nice a piece of catty social gossip as you could wish. On the reverse side is their famous rustic duet "Oh Sarah! Oh 'Enery!" with plenty of shy "Oo-oos" from this lovesick pair. It's rather a catchy song, too. The number is *Columbia FB* 1519.

A Business Course

HARRY TATE has broken out in a new phase. After educating motorists with his classic sketch "Motoring," he has revived one of his most successful wartime sketches, which he claims can be regarded as a complete course of business training. "Running an Office" is the title of the sketch which appears on *Columbia DX* 753. The record is on the usual hilarious Tate lines, and the engagement of an office boy, the equipment of the office, and the reception and interview of a mysterious inventor make up a sketch that may easily surpass in popularity the never-to-be-forgotten "Motoring."

Request Titles

AS A COMPLIMENT to his innumerable admirers, Turner Layton has just recorded a batch of "request" titles in the new Columbia list. They are a two-part selection of "Poor Little Rich Girl"—*Columbia FB* 1514, "Until the real thing Comes Along" and "Is it True What They Say about Dixie?"—*Columbia FB* 1515, and "South Sea Island Magic," coupled with "Me and the Moon—with, of course," his own piano accompaniment.

The Ink Spots, an American coloured combination, make their first recording on a Columbia record this month. The outfit consists of four boys, three of whom sing and play guitars, and one bass vocalist. The solo guitar comes out clear and strong in the two titles they have chosen—"Stompin' at the Savoy" and "Keep Away from my Doorstep"—*Columbia FB* 1513.

Our illustration shows Ivor Novello, Dorothy Dickson, and Olive Gilbert recording excerpts from "Careless Rapture," the show which is enjoying a successful run at the Drury Lane Theatre, London.

New Organ Style

QUENTIN MACLEAN, on the organ of the Trocadero Cinema, London, has sprung a surprise in his latest record. He plays "Free," the song from the Palladium show "O-Kay for Sound," not as a dance-band version, but in a straightened-out interpretation so unusual that it might almost be called an organ curiosity. The result is very fascinating and a further tribute to Maclean's versatility. It is coupled with "Night Must Fall"—*Columbia FB* 1525.

"Transatlantic Rhythm" Hits

IT is noteworthy that the much-publicised London show, "Transatlantic Rhythm" has produced a couple of records by artists connected with the production. First, the composers—Irving Cæsar and Ray Henderson—who play on two pianos a selection of some half-dozen of their hits from the show on *Columbia FB* 1518, and secondly, Buck and Bubbles, the vocal and instrumental pair, who sing "Breakfast in Harlem" and "Lady be Good." Buck is recognised as one of the greatest of swing pianists, while his partner is well known for his singing and drumming. They are assisted by Dave Raksin, the famous clarinettist. The number of the record is *Columbia FB* 1524.

Variety

ON Columbia this month, in the 1s. 6d. variety series, appear a fine selection of records that would make an interesting "variety hour." First we have a "Yeomen of the Guard" selection by Debroy Somers, on *Columbia FB* 1509, followed by Albert Sandler and his Orchestra playing "A Little Love, a Little Kiss" and "Because" on *Columbia FB* 1510. Nobody can play the Hawaiian guitar better than Len Fillis, who, on *Columbia FB* 1526, provides two lovely solos—"Swanee Moon" and "An Old Hawaiian Guitar." The xylophone is so rarely recorded that Harry Robins's solos on *Columbia FB* 1508 will be welcomed, And, of course, we must have a laugh, so Norman Long is there, cheerfully funny, as usual, with his cockney songs, "Marrers" and "I've Brought you some Narcissus Cis" on *Columbia FB* 1511.

Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

New Belling-Lee Supressor

A NEW suppressor for use in a flex lead has been submitted for test by Messrs. Belling & Lee. This consists of a barrel-shaped bakelite casing divided into two parts and held together with two locking screws. At the end of the main portion two insulating straps are fitted, and are intended to anchor the leads. The main assembly consists of a 2,000-μH choke (D.C. resistance 3.35 ohms) and two fixed condensers, one having a capacity of .01 and one of .1 mfd. At the end three connecting terminals are fitted and are marked E. N and L to indicate earth, neutral and live mains leads respectively. The leads to any electrical apparatus such as vacuum cleaners, fans, etc., are cut and the suppressor inserted as shown in the theoretical diagram below. The complete unit is neat and weighs only 4½ozs. There is no risk of shock as all metallic parts are covered and the ends of the leads are completely encased when the two parts of

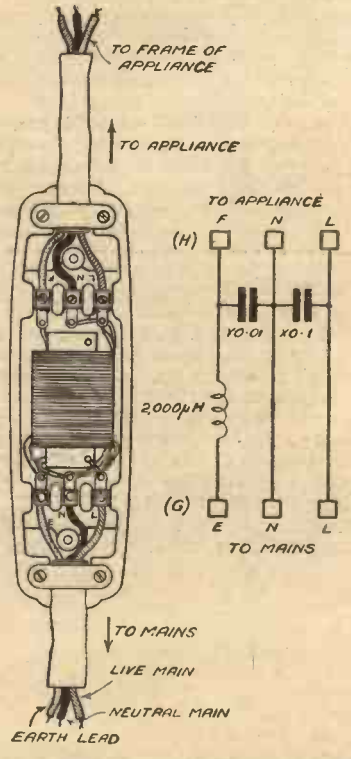


Diagram showing the method of construction employed in the Belling-Lee 3-core suppressor, and the electrical circuit.

the device are screwed together. The makers recommend that it be fitted as near to the appliance as possible, in which case it will be quite out of the way and free from risk of damage. The component parts of this particular device are rated at ample test voltage to withstand all normal requirements, and two non-replaceable 7.5 amp. fuses are fitted. Naturally, therefore, the appliance must be of the type designed for use on circuits fused at not more than 5 amps. The price is 7s. 6d., and the makers, Messrs. Belling & Lee, Ltd., Cambridge Arterial Road, Enfield, Middlesex.

Pye Mains Transformer

THE home-constructor will be interested in the news that Pye Radio, Ltd., are now able to supply a mains transformer of interesting design suitable for incorporation in any type of receiver or amplifier rated to deliver an output up to 3 watts. This particular component is wound with a primary suitable for voltages from 100 to 150 and 200 to 250 volts at 40 to 100 cycles. The voltage selection plate has a special safety device to ensure that the correct range is chosen, and a flex and mains plug are provided for connecting purposes. There are four secondary windings, the H.T. providing for 250 or 350 volts at 60 mA whilst for L.T. purposes there are three centre-tapped 4-volt windings, rated for 2, 3 and 4 amps. each. A static screen is placed between the primary and secondary windings, and stray magnetic fields have been reduced to a minimum. Terminals are provided for the secondary connections, and soldering tags are part of the terminal mount for those who prefer to adopt this method of connection. The price is 21s.

New G.E.C. Loudspeaker

THE General Electric Company has now added a high-impedance extension speaker to its range. This is designed specially for use with G.E.C. or similar receivers which are fitted with high-impedance extension speaker sockets. It is a permanent magnet model, with a nickel aluminium magnet of high permeability, giving a large flux density, and is of high sensitivity. Three tappings are provided, namely, 3,000, 6,000 and 9,000 ohms. The chassis is mounted in a handsome cabinet of walnut with chromium relief, and the price is 52s. 6d.

Westinghouse Price Reductions

THE Westinghouse Company announce that the price of the H.T.9 unit is now reduced from 21s. to 18s. 6d., bringing it into line with the H.T.8. It may be used in place of the H.T.8 unit, using the same input voltage and current, but the smoothed output will then be 240 volts 60 mA, instead of 250 volts; in other words, 10 volts less. The full output as for the H.T.9 may be obtained by applying the normal input.

Aintree Microphones

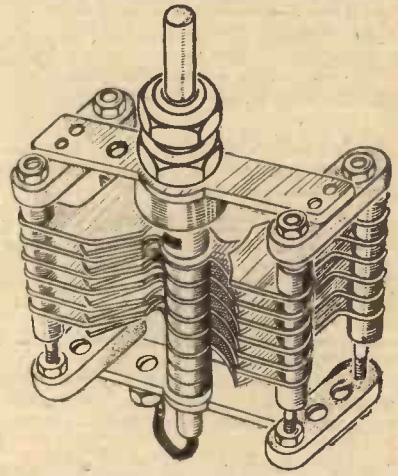
AN interesting range of microphones is announced by the Aintree Production Company, of 9, Phoebeth Road, Brockley, S.E.4. These include a neat lapel model, a standard midget, and a high-class quality model. The latter is made up in a laminated case consisting of aluminium and ebonite, thereby eliminating case resonance. The microphone plate is impervious to moisture, and a novel anti-packing device is incorporated to prevent the defects usually associated with this type of instrument. The frequency response is claimed to be amazingly level between 60 and 6,500 cycles, whilst adequate output is obtained over the remainder of the usual frequency range. The average output is .45 volts R.M.S., and the energising current 5 to 6 mA at 2 volts. The overall diameter is 4in., and the price 37s. 6d. A special matching transformer costs 10s.

The lapel model costs 21s., and the transformer for this model is 7s. 6d. It is just over 1½in. in diameter, and is .4in. thick. The weight is half an ounce and the average output .56 volts R.M.S. It is supplied complete with 5ft. of twin silk flex and miniature two-pin plug.

The standard midget is a transverse current model mounted in the usual type of supporting ring by anti-vibration supports. The whole is mounted on a neat polished base, with baize underlay to avoid scratching any polished surface upon which the instrument may be placed. This model is fitted with a mica diaphragm and costs 10s. 6d. A suitable transformer costs 3s. 6d.

Eddystone Split Stator Condenser

A NEW condenser has just been introduced by Messrs. Stratton and Co. and is shown in the accompanying illustration. This is a solidly-built component with heavy brass vanes with polished edges, all metallic connections being soldered to ensure the minimum of losses and a reduction in H.F. resistance. The bearings are adequately insulated and a screened non-inductive pigtail is employed to the moving section. The minimum capacity formed by



A new split stator condenser from the Eddystone range.

the rotor and one side is 5 m.mfd., and the maximum capacity 40 m.mfd. With the two sides in parallel the minimum is 10 m.mfd., and the maximum 80 m.mfd. When used as a series gap component the minimum capacity is 3 m.mfd., and the maximum 20 m.mfd. The price is 12s. 6d.

New Tungsram Valve

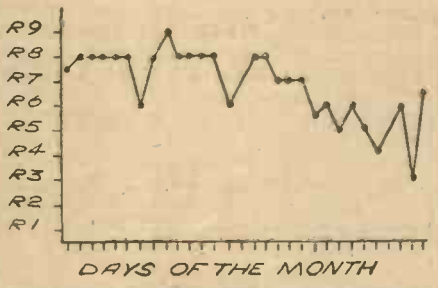
A SPECIAL valve which has been developed by the Tungsram company for the Post Office is now made available to the public. This is the type APP4g, and is a triple-grid output valve with an indirectly-heated cathode rated at 4 volts 2 amps. The maximum anode volts are given as 250 and a similar value is specified for the screen. The normal anode current is 35 mA. and the normal screen current 5 mA. This valve is ideal for television receivers and similar apparatus where a wide frequency band has to be handled, and the suppressor grid is brought out to a separate connecting point instead of being internally connected as is usual. When used as a Class A output valve the undistorted output is 4.3 watts, the anode load being given as 5,500 ohms. The price is 16s. 6d.

THE BRITISH LONG DISTANCE LISTENERS' CLUB

W2XE Signal Strength

WE have now received from Mr. Barrs his chart of the above station for September. He says that as he did not receive enough data on W1CCZ (14 m.), he has not sent any report in of this. Here is his letter:

First of all, you will notice in the graph that W2XE was very powerful during the early part of September. I believe they increased power about this time, and I think it was due to conditions that W2XE became weaker during the last few days of the month. The aerials used were the same as for W8XK, i.e., inverted "L" type on the average. The average signal strength in N., S., E. and W. were as follows: N., R3-R7; S., R5-R8; E., R3-R7; W., R5-R7.



The graph of W2XE prepared by Mr. Barrs for for the peak period 21.00 to 22.00 B.S.T. for September.

The graph shows the average strength of W2XE (19.65 m.) in Great Britain for the month of September, 1936, the time is the peak period daily, i.e., 21.00 B.S.T.—22.00 B.S.T. That finishes the data for W2XE.

Now for the next test I would appreciate reports of LRU (19.62 m.), for the month of November, 1936, and W3MD (14 m/cs) for the month of December, 1936, reports of both stations to be at my address, 4, King's Road, Enham, Andover, Hants, by January 9th, 1937.

Local Branches

SEVERAL readers are anxious to form local branches of the B.L.D.L.C., and perhaps members living in the East Sheen district and in the Stanford-le-Hope district of Essex who are interested would get into touch with Mr. D. Jones, of "The Retreat," Temple Sheen, East Sheen, S.W.14, and Mr. J. F. West, of "St. Austill," St. James Avenue West, Stanford-le-Hope, concerning the proposed branches. A weekly or monthly meeting and a comparison of notes and exchange of ideas is, of course, one of the best ways of increasing knowledge and increasing the interest which may be gained from your hobby.

The Radio Club of Tenerife

MR. JONES has received a copy of the programme data from this station with a verification which they sent to him, and as this information may be of interest to other members, we give at the top of next column a translation of the information. This is station EAJ43, and reports from other readers indicate that this station is now a very good signal on 28.90 metres. The times of transmission should be particularly noted.

RADIO CLUB TENERIFE,

Apartado 91 (P.O. Box 91),
Santo Cruz de Tenerife,
Canary Islands.

There are three transmissions per day all on 28.90 metres. The first and second are devoted to European countries and news and announcements are given out in German, English, French and Portuguese, the times of transmission being as follows:

First Transmission

19.15 hrs. Announcements and news in Spanish.
20.10 hrs. Ditto in German.
20.20 hrs. Ditto in English.
20.30 hrs. Ditto in French.
20.40 hrs. Ditto in Portuguese.
20.50 hrs. European National Anthems and close of transmission.

Second transmission

23.00 hrs. Announcements in Spanish.
23.20 hrs. Ditto in German.
23.30 hrs. Ditto in English.
23.40 hrs. Ditto in French.
23.50 hrs. Ditto in Portuguese.
24.00 hrs. European national anthems.

Third transmission. (Especially arranged for the districts of Central America.)

0.10 hrs. Talks and musical items.
0.45 hrs. Announcements in Spanish.
1.00 hrs. National anthems of the American States, and close of the transmission.

A Correction

MR. C. MELLANBY, of Pwllheli, asks us to point out that his name was wrongly spelt in our issue dated November 14th, and sends the following correction concerning the call sign of the American amateur referred to in that issue:—

This should be: W2JCY and not W2IIQ, as the latter uses 70w SB Mike—57-56-45's-46\ Class B XMTR: XTAL 6L6-6L6-46/ P.P. 801's. W2JCY is the ham who is putting up a special 5M antenna and would like it "noised" around in this country that he is carrying out tests at 10.30 E.S.T. (15.30 G.M.T.) on Saturdays and some days at 11.30 E.S.T. (04.30 G.M.T.) Sunday morning. His freq. is very close to 58 mcs. He should be received over here very well as I have had him confirm further reports I have sent him. He will QSL 100 per cent. G reports as will W2IIQ.

By the way, W2JCY is increasing his wattage to 70 from 60.

Station Checking

WITH regard to the scheme recently proposed and put into working by Mr. Barrs, another member has suggested that two stations be taken for checking purposes. He says:—

"I think it would be a good idea to name two stations, one that is fairly well received in this country, and one that isn't, thus providing for two types of listeners, one who doesn't bother about chasing after elusive stations, and the other who's never content unless he's digging up something anyone else has never heard of."

RADIO CLUBS AND SOCIETIES

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

The Croydon Radio Society

THE Croydon Radio Society's Gramophone Pick-up night is a well-established and popular feature among the programmes and there was no exception on Tuesday, October 27th, in St. Peter's Hall, Ledbury Road, S. Croydon. The technical adviser was in charge of the comparisons, and a record of a heavy passage of an orchestra showed that no pick-up was going to have an easy time. An even sterner test than music was available, as the output voltages were measured at varying frequencies on a frequency record, and toward the end of the evening each curve was put on the blackboard and critically examined. For instance, Mr. Mason's crystal pickup, after a slight peak at 200 cycles remained level to 2,000 cycles, then rose at higher frequencies. The technical adviser's Magnetic model peaked at 200 and 4,000 cycles, and Mr. Roland's had a very level response, if rather low.

Another short-wave evening took place at the Croydon Radio Society's meeting on Tuesday, November 3rd, in St. Peter's Hall, Ledbury Road, S. Croydon. Mr. H. L. Pulman's lecture-demonstration on: "My Experiences in Short-wave Reception," was given by Mr. R. P. Jonas, hon. librarian, as Mr. Pulman could not be present.

After admitting some short-wave disabilities, he stressed the romance of them in exploring the world, and went on to mention the various bands allotted to broadcasting and amateur transmitters. Mr. Pulman ventured to think that a separate receiver was best for short waves, and we spent a happy time discussing his early sets, leading up to his latest, a five-valve superheterodyne. Most members had long spells at the controls, and even on the strange aerial and earth, many stations were heard. The chairman, in thanking Mr. Pulman, said that his lecture, brimful of practical experience, was yet another example of good work having been done by an amateur. [On Tuesday, November 24th there was a lecture by "Amphion," of *The Croydon Advertiser*, on "The Emotional in Music."—Hon. Pub. Sec., E. L. Cumbers, Maycourt, Campden Road, S. Croydon.

Exeter and District Wireless Society

HAND capacity with short-wave receivers was the subject of discussion on Monday, November 2nd. Mr. A. T. Batten demonstrated his receiver (untuned H.F., det., and L.F., built on a baseboard), and explained how he had, by careful thought and experiment, made it free of hand-capacity effects. The results were certainly excellent.

Mr. C. L. Wood (G5WY) also spoke and stressed the need for a good earth, and the control of H.F. He gave many valuable tips.

On November 23rd, Mr. Stanley Brown, A.M.I.W.T., of the Chloride Chemical Co., Ltd., lectured on "Modern Radio Batteries and their Operation." All interested are invited to attend our meetings, which are held every Monday at the Y.W.C.A., Dix's Field, Southernhay, at 8 p.m.

Hon. Sec., Mr. W. J. Ching, 9, Sivell Place, Heavitree.

The Cardiff and District Short-wave Club

AT the last meeting of the above Club, held on November 5th, G8AM gave a description of his transmitter which was on view at the clubroom. The talk was thoroughly enjoyed by all present, and gave one a good idea what can really be done on low power, as G8AM used only 4.75 watts to work HB9AE one evening. Morse practices were again continued, and it was noted with interest that several persons were able to send and receive at speeds varying from twelve to twenty words per minute. These practices are being continued at all meetings, with sections for the beginner.

At the next meeting a talk will be given by the secretary, 2BQB, on "Artificial Aerials," and this will be followed at weekly intervals with other lectures, and demonstrations.

The club is now awaiting an artificial aerial licence, so in future demonstrations of transmitters may be eagerly looked forward to.

H. H. Phillips, 132, Clare Road, Cardiff, s the Secretary.

International Short-wave Club (London)

THERE was an interesting demonstration of television reception at the London Chapter of this organisation on Friday, November 20, at 8.15 p.m., held in the R. A. C. S. Hall, Cavendish Grove, Wandsworth Road, S.W.8.

A copy of the "News Letter," a booklet published by this Club at 2d. per copy, and containing interesting information for the short-wave listener, will be forwarded to any reader enclosing a 1d. stamp.

Arthur E. Bear, 100, Adams Gardens Estate, London, S.E.16.

BOOKS RECEIVED

TELEVISION, A GUIDE FOR THE AMATEUR. By Sydney A. Moseley and Herbert McKay. 144 pp., 50 line drawings and 31 plates. Price 5s. Published by Oxford University Press, London.

THE principles of television, from the simple mechanical scanning system up to the modern electron-image camera, are fully and simply explained in this interesting publication. In addition to the main features, specialised details are given of the modern Baird and Marconi-E.M.I. transmitters, and details of the modern cathode-ray receiver and problems of light control are dealt with. The book is up to date and includes photographs of rehearsals in progress at the Alexandra Palace, and concludes with a short glossary of television terms.

WIRELESS ENGINEERING. By L. S. Palmer, D.Sc., Ph.D., F.Inst.P., M.I.E.E., 544 pp., 353 illustrations. Published by Longmans, Green and Co., London. Price 21s.

THIS book is intended, firstly, to meet the requirements of electrical engineers who wish to become conversant with wireless practice, and secondly to cover the ground required by students who are preparing for university degrees and other wireless examinations held under the auspices of the City and Guilds Institute. It starts from the very beginning of the theory of radio communication explaining the principle of wave motion and proceeds steadily through the entire art, all the details of working of special components, such as valves and high-frequency generators, being fully explained.

ACCUMULATOR CHARGING, MAINTENANCE AND REPAIR. By W. B. Ibbetson, B.Sc., A.M.I.E.E., M.I.Mar.E., 151 pp., 41 illustrations. Published by Sir Isaac Pitman and Sons, Ltd. Price 3s. 6d.

THIS is intended for the use of all interested in the charging and upkeep of accumulators, and thus includes the wireless man as well as the user of a motor-car, or those interested in country house lighting and emergency plants. In order to make the book still more useful as a text-book parts of the City and Guilds Institute syllabus relating to battery working, together with the questions set at a recent examination, have been included. Every branch of accumulator work is dealt with fully and no listener should be without a copy of this book if he intended to charge his own batteries.

A FIRST COURSE IN WIRELESS. By "Decibel." 215 pp., 93 illustrations. Published by Sir Isaac Pitman and Sons, Ltd. Price 4s.

THIS book incorporates a series of articles which were originally published in *World-Radio*, with the object of explaining the theory and practice of wireless to those who possess no technical knowledge. In clearness and simplicity it marks an advance in elementary wireless books, and forms an excellent introduction to more technical books on the subject. It commences with an explanation of electricity and thereafter describes the various features of standard circuits from the simplest one-valver to the modern superhet and modern circuit features such as A.V.C., etc. It is an ideal introductory book.

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"HIS MASTER'S VOICE" RECEIVERS AND RADIOGRAMS

WITH over thirty-eight years' experience in the design of sound-reproducing instruments behind them, "H.M.V." receivers and radiogramophones deservedly enjoy a world-wide reputation for fidelity of reproduction. Many of the new season's models are of the all-wave type, and some in this range are capable of receiving the television sound transmissions, and amateur broadcasts on the 10-metre band. A fine range of these instruments, together with the new auto-radiograms, is given in an attractive catalogue recently issued by the "H.M.V." people. The most striking model in the list is, of course, the All-wave "High-Fidelity" Auto-radiogram which will at once appeal to the connoisseur and the lover of fine craftsmanship. It is undoubtedly the last word in radiograms. Other high-class models listed are the All-wave "Concert" Auto-radiogram; another all-wave model with a five-waveband chassis; and superhet radiograms. All these instruments incorporate the latest refinements in radiogram practice. Amongst the receivers listed are six-valve all-wave A.C. models, all-wave superhets, and battery-operated receivers. A few accessories are also listed, including separate loudspeakers in cabinets, beautifully finished, an "H.M.V." pick-up unit, a record-filing cabinet, and an all-wave anti-static aerial outfit. At the end of the catalogue the techulcal specifications of all the models listed are tabulated for easy reference.

ELECTRADIX RADIOS

A COPY of the Electradix Sale List, which has just come to hand, contains a wide range of components at greatly reduced prices. Almost every component the constructor is likely to need is listed, from aerials, lead-in tubes and insulators, to chokes, condensers and loudspeakers. There are also sections dealing with dynamos and motors; electrically-operated tools and appliances; photo-cells, public address and talkie gear; microphones; measuring instruments; telephones; and switchgear. A leaflet enclosed with the sale list gives particulars and prices of a useful range of morse-transmitting keys.

SERVICE AND PUBLIC ADDRESS.

A HANDY booklet issued by Holiday and Hemmerdinger, Holmer Works, Dolefield, Manchester, 3, gives particulars of their unique servicing activities in addition to their public address equipment. Their servicing department is fitted with moderu testing equipment, and there is also a library of 10,000 circuit diagrams of English and foreign sets. Amplifiers, speakers, and microphones for public address work, and gramophone recording units and accessories are listed, together with mains transformers, chokes, and auto-transformers. A list of American valves is also included in the booklet.

REPLIES IN BRIEF

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

H. T. B. (Northampton). The adaptor in question may certainly be used with a battery valve. The sketch in your letter is correct. You may find it impossible to pick up the television programme at your address.

H. G. (Bath). If your tests are quite in order the coils must be responsible for the trouble. We presume you are quite certain of the switch connections.

J. H. P. Messrs. Mullard can supply you with the information and now make a special feature of this service as you will see from a recent issue of this paper.

T. G. D. (Catterick Camp). We have not tried out the circuit shown by you, but you will see a similar arrangement in this issue in the article "Unusual Circuits." The arrangement may work well, and reports from the country of origin show that the scheme is preferable to the standard one-valve arrangement. The reason for the improved signal strength in your other problem may be that instability arose when the earth was removed and this boosted the signal.

H. G. (Earlswood). The energising current should be adequate, but perhaps it would be worth while communicating with the makers of the speaker and receiving their approval of the scheme.

A. B. (Neasden). Resistance R10 should be 20,000 ohms and R9 is 2,000 ohms. R6 is 100,000 ohms. R17 should, of course, be R7. The arm of the volume control is connected to the Input terminal, not the metallised surface. We regret the errors, but, of course, the theoretical diagram should make it quite clear.

A. C. S. (Derby). We regret that we cannot insert requests for back numbers.

N. H. (Madras). We cannot supply designs for individual requirements, and we have no blueprint of a unit of the type mentioned. We cannot recommend the operation of this receiver from the type of mains mentioned and suggest you wait for a design of a mains receiver which would be more suitable.

S. H. (Gorton). We are not clear from your letter whether the trouble has always existed or has recently arisen. In any case, it appears to be due to the mains unit, and we suggest you try the set with ordinary dry batteries for the H.T. supply.

L. McC. (New Malden). We cannot advertise for the parts as mentioned in your letter. If you require these you should insert a small advertisement in our advertisement columns, but we do not think that you would now be able to obtain the parts.

L. A. C. (Southminster). We regret that we cannot trace the address of the firm in question nor the English Agents. The firm is, of course, of German origin.

W. C. (Airdrie). We do not know which mains unit you are using, and therefore cannot advise definitely. You may, however, be over-running it as the current from the push-pull stage is on the high side and this, plus the remaining valves, may be more than the unit is rated to give.

E. T. M. (Kilmainham). There should be no delay in obtaining the parts and Messrs. Peto Scott can supply direct if you experience any further difficulty.

V. D. (Coventry). We cannot recommend any particular unit and cannot give instructions for building one. There may be difficulty with hum when using the short-wave ranges unless a special unit is employed and this may mean that the circuit will require modification.

H. H. (Swanscombe). Our blueprint P.W.48A should prove suitable, but the issue describing the construction is now out of print.

J. W. H. (Bingley). Special arrangements are necessary when using a small H.T. unit with a Class B amplifier. A Neon stabiliser should be used, and the peak current of the amplifier should not exceed that which the unit will deliver.

E. G. P. (Liverpool). You could use the valve in a circuit of the type mentioned, but owing to the small amount of H.F. amplification there would be a very poor A.V.C. action. You could use the valve as a detector and then the present detector could be used as an additional L.F. stage. This will give louder signals and probably better quality due to the diode rectifier.

G. J. (Loughborough). The firm in question is no longer active and we cannot assist you to obtain a blueprint. We could not recommend any of our blueprints in which to incorporate the parts.

B. S. M. (Skipton). We are not familiar with the servicing difficulties of commercial receivers and we suggest you communicate direct with the makers. There may have been a defect in the set originally, and perhaps the screen was shorting one of the connecting leads.

M. D. (Upton Park). You could add a further H.F. or L.F. stage, but there may be some difficulty due to the modified layout or from overloading. In such a case, we do not favour the modification.

A. J. K. (Clacton on Sea). Perhaps you could give some indication of the type of interference you experience in order that we may recommend a suitable suppressor or other device.

R. J. W. (Chatham). Our P.W.48A describes a unit which may be suitable, but you should enquire of the makers of your receiver whether a standard short-wave converter will function satisfactorily as there may be some whistle suppressor or other device which will prevent satisfactory operation of a converter.

LETTERS FROM READERS

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

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

Our All-wave Battery Sets : Mains Version

SIR,—Referring to R. Stagg's letter *re* all-wave battery sets, I, too, would greatly welcome a mains version.—A. V. GRAVES (Hounslow).

SIR,—I should very much like to endorse Mr. Stagg's suggestion. What we want is a good all-wave set for A.C. mains, with all the up-to-date refinements, and an output of about 4 watts. What about a "Super Record All-wave A.C." ?—BERNARD T. P. WIGG (Streatham).

SIR,—*Re* R. Stagg's letter in PRACTICAL AND AMATEUR WIRELESS, I, for one, would like to have mains editions of your all-wave sets.

I would suggest A.C./D.C., as such would be useful to every mains user, and also in view of the fact that there are still a very large number of districts still on D.C.; as in this district, for instance.—F. THOMAS (Ballards Lane, N.3).

Logged on our Two-valve Short-waver

SIR,—During the last few weeks I have seen two logs sent in by readers who have constructed the simple two-valver described in the issue for July 18th. I also made up this set, and I must report wonderful results. I am using the pentode output, and my home-made coils are 4-pin. The aerial is just an ordinary inverted-L, 50ft. long and 30ft. high.

My log is as follows: W2XE (13 m., 16 m., 19 m., 25 m., and 49 m.), W8XK (13 m., 19 m., 25 m., and 48 m.), W3XAL (16 m. and 49 m.), W3XAU (31 m. and 49 m.), W1XAL (25 m. and 49 m.), W2XAD (15.00 G.M.T), W2XAF, W1XK, PRF5, HJ1ABP, YNLF, and HJU. Twenty metres (amateurs): VE2DC (12.30 G.M.T.), W1s—1RO, AJA, GJX, GED, W2s—GJJ, HBI, AOU, HVM, ZG, W3s—APQ, IC, W5s—PQI (Texas), AWG (Oklahoma), PC, PL, W6s—LSQ, JP (San Francisco), W8s—GLY, OBX, LFE, W9s—VHM (Ill.), LCE, VUB, VXC, VO1I, OLR (19 m., 25 m., and 49 m.), RW96, RNE, RAN, RW59, and RK1. Local Europeans too numerous to mention, and also many G stations.—W. R. BURTON (Abercarn, Mon.).

Articles on Amateur Transmitting

SIR,—With regard to the letter of Mr. N. Owen in your November 14th issue, may I add my support to his view, and ask you to give articles and circuits for A.A. licence-holders and intending holders? I have wanted, for some time, to start amateur transmitting, but have been unable to obtain the necessary knowledge of the circuits and their working.—F. P. CAWSON (Southport).

[*Our new series of articles on "Wireless Transmission for the Amateur," which commences in this issue, will give you all the particulars you require.*—ED.]

From An American Reader

SIR,—First of all, I wish to congratulate you on your very fine publication, PRACTICAL AND AMATEUR WIRELESS. I find the entire magazine useful and very interesting from cover to cover. I am particularly interested in reading what other SWL's and amateurs have to say in regard to QSL cards. I should like to make a few observations on this matter. In the past two and a half months I have sent out sixty-one reports to amateur radio stations and received thirty-five cards in return (about 57 per cent. returns). Each report was complete, and here is where I cannot fully agree with Mr. E. de Goltignies, of Prittlewell, because in my reports I list the following: Time of receptions, location (in latitude and longitude), elevation, make of receiver, type of aerial, giving its length, direction, type of feed in, and its length, weather conditions, signal strength, quality of signal, if any QSB, QRM or QRN, the approximate QRG, and if 'phone or CW. In each report return postage is enclosed. I also report if he is heard frequently by me, who he was talking to, and about what. Also, if there is fading, the strength of each transmission.

In my opinion, the reason so many SWL's do not receive veri cards is the transmitter reads the report and puts it away and forgets about it until some time when he is not at home.

The popular receiver here is a 5-tube (or valve, as you choose to call them) superheterodyne with A.V.C. and B.F.O. By a switch I can go from 16.5 megs. to 545 kc/s, and can work with either 'phone or speaker. I am using an inside aerial in an east and west direction. In the past two and a half months I have logged seventeen different countries, all in the daytime.

What I am trying to do is this: to get a QSL card from each state in the U.S., including one from the capital district, Washington, D.C., also one from each of the eight districts in Canada, and the three in Mexico, on the 20-metre band. So far, out of a possible sixty, I have twenty-one returns, with fourteen more that have not yet sent a veri. This brings my total up to thirty-five.

If there are any SWL's amongst your readers who do not have the QRA of American hams, and they care to send me their report, I will see that the report reaches the proper place.

I would appreciate it very much if any of your readers would drop me a line, as I would be glad to correspond with anyone anywhere throughout the English-speaking world.

Congratulations again on a very fine publication.—JOHN H. ZASS (2,179 North 72nd Street, Wauwatosa, Wisconsin, U.S.A.).

Simple Three-valve Battery Set Wanted

SIR,—I do not wish to discourage R. Stagg (Wood Green), but may I point out that there are hundreds of small crofts in Scotland where a simple-to-construct economical three-valve battery set would be welcome—not complicated, mind you. Such a set would, I think, be a winner.—W. SPENCE (Aberdeen, Scotland).

[*Such a set will be described shortly.*—ED.]

Back Numbers Wanted

A READER is anxious to obtain copies of PRACTICAL AND AMATEUR WIRELESS dated December 7th and 14th, 1935, containing particulars of the A.C. £4 Superhet Four. If any reader has these copies to spare and will send them on to this office they will be forwarded to the reader in question.

Reports and Postage

SIR,—Since Mr. Ismay's reply to my letter I have received two more "scalps," as he so kindly puts it. One was from W4DSY, Charlotte, North Carolina, who wrote, "Thanks for your nice letter. Any time you hear me I would appreciate you dropping me a line."

The other was from PY2EJ, of Brazil, who writes, "Many thanks for your report and the most useful information you gave me."

If this does not prove that SWL's reports are appreciated, what does?—E. R. CRANE (London, W.).

An All-wave Superhet Converter!

SIR,—I was interested to read in the October 10th issue details of the Add-on Superhet unit. This brings to mind a suggestion I have harboured for some time. There are probably thousands of sponsored and commercial receivers in use of the tuned radio-frequency type which, so far as selectivity is concerned, are comparatively poor, but so far as reproduction is concerned are satisfactory. Such receivers are owned by people who build or buy one because they cannot afford to do otherwise, and I think that an all-wave superhet converter would be much appreciated. This could be of a type which, in addition to medium and long waves, would tune from 16 metres to above 80 metres on the short waves. I offer the suggestion for what it is worth. There are, I know, difficulties, but think they could be overcome. I suggest mains and battery-operated types, and I think that a unit of this type, if covering up to 160 m., would also attract the amateur fraternity.—A. W. MANN (Middlesbrough).

CUT THIS OUT EACH WEEK.

Do you know

—THAT ordinary wire-netting may be used as a high-frequency screen.
—THAT the performance of a receiver may be adversely affected by the presence of an iron or steel screw in a wooden chassis.
—THAT the heaters in a D.C. receiver should be arranged in a definite order and not simply connected haphazard.
—THAT generally the detector valve should be on the "earth" side of the heater circuit to reduce hum problems.
—THAT the latest high-voltage rectifying valves suitable for television apparatus have the anode brought out to a top cap and are of the half-wave type.
—THAT modern volume controls are obtainable with different types of graduation to the element, each following a definite law.

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

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

QUERIES and ENQUIRIES

Connecting Dipole Aerial

"I am going to use a dipole aerial but am not certain how to join the two ends of the feeder lead. Are these to be connected to the two aerial terminals on my set, or do I have to use a special connector?"—G. T. A. (Belfast).

THERE are special connectors for the purpose, but the only requirement for this type of aerial is that the ends of the feeder are coupled to the grid coil. If your circuit employs an aerial coil coupled to the grid coil, then the ends of the feeder may be joined to the two ends of the aerial coil, in other words, to aerial and earth terminals. If no aerial coil is in circuit, and the aerial and earth are joined direct to the ends of the coil, a small coupling coil should be wound and suspended either outside or inside the coil former to provide the required coupling.

A Dual-range Coil

"I wish to wind a Dual-range coil. I have two bakelite formers 5in. long by 1½in. diameter across the ribs. Will you please let me know how many turns to put on and also gauge of wire for this purpose?"—D. E. W. (Ashton).

IT is difficult to give exact coil winding data in view of the fact that you do not state the type of coil you require. For a normal circuit we suggest you wind the medium-wave coil by winding eighty-two turns of 30 D.S.C. wire, and cut four slots at one end in which to wind the long-wave loading coil. This may consist of forty-five turns of 36 D.S.C. in each slot. These turns must be continuous and should be in series with the medium-wave winding. For reaction purposes a slot should be cut between these two sections and wound with sixty-five turns of 36 D.S.C. These turns are only approximate and you may find it desirable to modify them when trying the coil in your particular circuit.

Winding Frame Aerial

"Could you let me know the measurements of the frame for the long- and short-wave windings for the blueprint H.17, as I am making my own cabinet and no mention of size is given on the blueprint?"—A. R. (Hounslow).

IT is not essential to build the frame to any particular dimensions, and as you are building your own cabinet you can make the frame to suit. It should, however, be made with sides 12in. or more in length to obtain efficient working, and for the medium-wave winding 75ft. of wire should be used. For the long waves a total of 250ft. are needed, the additional 175ft. of wire being wound as a separate section spaced about ¼in. from the end of the former winding. Generally the medium-wave section is wound with 22 or 24 gauge D.C.C. wire and the remainder with a finer gauge. A reaction winding may be wound in the intervening space, the position of this winding being found by experiment, as one quantity of wire has to serve both bands. Thirty feet of wire may be used and it may be slid about on the former to find the best position. It should be closer to the long-wave winding.

RULES

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

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

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

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

The Coupon must be enclosed with every query.

Megacycles and Kilocycles

"I have noticed in your Short-Wave Log recently a reference to mc. which I am told by a friend stands for megacycles. I am not clear regarding this term and should like to know whether it is in any relation to kilocycles, and why the latter is nearly always written in your paper as kc/s, whereas in catalogues and other papers I see it only written kc. Perhaps you can clear up this difficulty for a beginner?"—D. E. B. (Dulwich).

THE terms referred to are the frequencies of the various stations referred to. As you probably know, the carrier-wave of the station consists of an oscillation, superimposed upon which are the speech or music oscillations. Thus, to tune to a station, the tuning circuit in your receiver must be adjusted to the same period of oscillation. There are two ways of measuring this oscillation, one by measuring from the top of one crest to the top of the next, and the other by counting the number of waves in a second. The former measurement gives the wavelength and the latter the frequency, and you will see that the time factor must be taken into account in this measurement, as otherwise the frequency does not mean anything. Consequently, a wavelength of 30 metres is equivalent to a frequency of 10,000 kilocycles per second, or 10 megacycles per second. One kilocycle equals 1,000 cycles and 1 megacycle equals 1,000 kilocycles. The abbreviation for per second is "/s," and thus the correct designation of a 30-metre wavelength is either 10 mc/s or 10,000 kc/s.

Variable I.F. Transformers

"I have an old pair of I.F. transformers in which the primary and secondary coils are wound on ebonite bobbins mounted on a pillar and they can be moved in relation to one another. At the bottom of these transformers there is a lever on each side for adjusting the trimmer condensers. Can you tell me the correct position for the coils and how the levers work?"—J. MacG. (Belfast).

THE upper coil of the two referred to may be placed close against the lower one or taken right to the top of the supporting pillar. In the latter position selectivity will be highest, but naturally signal strength will be very weak due to the poor coupling. On the other hand, when the coils are close together the coupling is tightest and selectivity is thus poorest, but it is not necessary that this will give the greatest signal strength. The two levers will increase the capacity of the trimmer when pulled in a clockwise direction looking down on the transformer. A position roughly in the centre should be taken and the levers then adjusted on either side in order to balance the various circuits.

Failing Valve

"I have had my mains set now for eighteen months, and I have now noted that volume has fallen off since it was first installed. What now happens when I switch on is that there is a slight hum for a few seconds and then a ringing and sort of tearing noise for a time before volume comes up. Then generally as soon as it is nearly loud enough it dies away again for a second or so and then comes back not quite so loud as at first. Can you tell from this what is wrong and how to remedy it?"—E. D. (Hampstead).

THE trouble will almost definitely be found to be a failing rectifier valve in the mains section. If you listen near this whilst the set is heating up you will no doubt find that the ringing and tearing noise mentioned may be actually heard near the glass bulb.

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

Practical and Amateur Wireless
BLUEPRINT SERVICE

These blueprints are full size. Copies of appropriate issues containing descriptions of these sets can in most cases be obtained as follows:—"Practical Wireless," at 4d., "Amateur Wireless" at 4d., "Practical Mechanics" at 7½d., and "Wireless Magazine" at 1/3d., post paid. Index letters "P.W." refer to "Practical Wireless" sets, "P.M." to "Practical Mechanics" sets, "A.W." refer to "Amateur Wireless" sets, and "W.M." to "Wireless Magazine" sets. Send (preferably) a postal order (stamps over sixpence unacceptable) to "Practical and Amateur Wireless" Blueprint Dept., Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.

PRACTICAL WIRELESS

STRAIGHT SETS. Battery Operated.

	Date of Issue.	No. of Blueprint
One-Valve : Blueprint, 1s.		
All-wave Unipen (Pentode)	—	PW31A
Two-valve : Blueprint, 1s.		
Four-range Super Mag Two (D Pen)	11.8.34	PW36B
Three-valve : Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF (Trans))	—	PW10
Sixty-Shilling Three (D, 2 LF (RC & Trans))	2.12.33	PW34A
Leader Three (SG, D, Pow)	—	PW35
Summit Three (HF Pen. D. Pen)	8.8.34	PW37
All Pentode Three (HF Pen, D (Pen), Pen)	22.9.34	PW39
Hall-Mark Three (SG, D, Pow)	—	PW41
Hall-Mark Cadet (D, LF, Pen (RC))	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three)	13.4.35	PW49
Genet Midget (D, 2 LF (Trans))	*June* '35	PM2
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53
Battery All-Wave Three (D, 2 LF (RC))	31.8.35	PW55
The Monitor (HF Pen, D. Pen)	8.2.36	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P)	—	PW64
The Gladiator All-Wave Three	29.8.36	PW66
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	PW69
Four-valve : Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen)	—	PW11
Beta Universal Four (SG, D, LF, Cl. B)	15.4.33	PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-mark 4 (HF Pen, D, Push-Pull)	—	PW46
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36	PW67

Mains Operated.

Two-valve : Blueprints, 1s. each.		
A. C. Twin (D (Pen), Pen)	—	PW18
A.C.-D.C. Two (SG, Pow)	7.10.33	PW31
Selectone A.C. Radiogram Two (D, Pow)	—	PW19
Three-valve : Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, DDT, Pen)	10.6.33	PW23
D.C. Ace (SG, D, Pen)	15.7.33	PW25
A.C. Three (SG, D, Pen)	—	PW29
A.C. Leader (HF Pen, D, Pow)	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	18.8.34	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50
"All-Wave" A.C. Three (D, 2 LF (R.C.))	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	31.8.35	PW56
Four-valve : Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	—	PW45
Universal Hall-Mark (HF, Pen, D, Push-Pull)	9.2.35	PW47

SUPERHETS.

Battery Sets : Blueprints, 1s. each.		
£5 Superhet (Three-valve)	—	PW40
F. J. Camm's 2-valve Superhet (Two-valve)	13.7.35	PW52
F. J. Camm's £4 Superhet	—	PW58
Mains Sets : Blueprints, 1s. each.		
A.C. £5 Superhet (Three-valve)	—	PW43
D.C. £5 Superhet (Three-valve)	1.12.34	PW42
Universal £5 Superhet (Three-valve)	—	PW44
F. J. Camm's A.C. £4 Superhet 4	—	PW59
F. J. Camm's Universal £4 Superhet 4	11.1.36	PW60

SHORT-WAVE SETS.

Two-valve : Blueprint, 1s.		
Midget Short-Wave Two (D, Pen)	15.9.34	PW38A
Three-valve : Blueprints, 1s. each.		
Experimenter's Short-Wave Three (SG, D. Pow)	—	PW30A
The Prefect 3 (D, 2 LF (RC and Trans))	8.2.36	PW63
The Bandspread S.W. Three (HF Pen, D (Pen), Pen)	29.8.36	PW68

PORTABLES.

Three-valve : Blueprint, 1s.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	16.5.36	PW65
Four-valve : Blueprint, 1s.		
Featherweight Portable Four (SG, D, LF, Cl. B)	—	AW12

MISCELLANEOUS.

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

AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.

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

STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.		
B.B.C. Special One-valver	—	AW387
Twenty-station Loudspeaker One-valver (Class B)	—	AW449
Two-valve : Blueprints, 1s. each.		
Melody Ranger Two (D, Trans)	—	AW388
Full-volume Two (SG det, Pen)	—	AW392
B.B.C. National Two with Lucerne Coil (D, Trans)	—	AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans)	—	AW338A
Lucerne Minor (D, Pen)	—	AW426
A Modern Two-valver	*July* '36	WM409
Three-valve : Blueprints, 1s. each.		
Class-B Three (D, Trans, Class B)	22.4.33	AW386
New Britain's Favourite Three D, Trans, Class B)	15.7.33	AW394
Home-built Coil Three (SG, D, Trans)	—	AW404
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans)	2.12.33	AW412
1934 Ether Searcher: Baseboard Model (SG, D, Pen)	20.1.34	AW417
1934 Ether Searcher: Chassis Model (SG, D, Pen)	—	AW419
Lucerne Ranger (SG, D, Trans)	—	AW422
Cossor Melody Maker with Lucerne Coils	—	AW423
Mullard Master Three with Lucerne Coils	—	AW424
£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans)	—	AW437
All Britain Three (HF Pen, D, Pen)	—	AW448
"Wireless League" Three (HF Pen, D, Pen)	3.11.34	AW451
Transportable Three (SG, D, Pen)	—	WM271
£6 6s. Radiogram (D, RC, Trans)	—	WM318
Simple-tune Three (SG, D, Pen)	*June* '33	WM327
Economy-pentode Three (SG, D, Pen)	*Oct.* '33	WM337
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 3s. Three (SG, D, Trans)	*Mar.* '34	WM354
Iron-core Band-pass Three (SG, D, QP 21)	*June* '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen)	—	WM371
PTP Three (Pen, D, Pen)	*June* '35	WM389
Certainty Three (SG, D, Pen)	*Sept.* '35	WM393
Minitube Three (SG, D, Trans)	*Oct.* '35	WM396
All-wave Winning Three (SG, D, Pen)	*Dec.* '35	WM400
Four-valve : Blueprints, 1s. 6d. each.		
65s. Four (SG, D, RC, Trans)	—	AW370
"A.W." Ideal Four (2 SG, D, Pen)	16.9.33	AW402
2 H.F. Four (2 SG, D, Pen)	—	AW421
Crusaders' A.V.C. 4 (2 HF, D, QP 21)	18.8.34	AW445
(Pentode and Class-B Outputs for above: Blueprints, 6d. each)	25.8.34	AW445A
Self-contained Four (SG, D, LF, Class B)	*Aug.* '33	WM331
Lucerne Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, 2 LF)	*Feb.* '35	WM381
The H.K. Four (HF Pen, HF Pen, D, Pen)	*Mar.* '35	WM384
The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	*April* '36	WM404
Five-valve : Blueprints, 1s. 6d. each.		
Super-quality Five (2 HF, D, RC, Trans)	*May* '33	WM320
Class-B Quadradyne (2 SG, D, LF, Class B)	*Dec.* '33	WM344

Mains Operated.

Two-valve : Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.	23.9.33	AW403
Economy A.C. Two (D, Trans) A.C.	—	WM286
Unicorn A.C./D.C. Two (D, Pen)	*Sept.* '35	WM394
Three-valve : Blueprints, 1s. each.		
Home-Lover's New All-electric Three (SG, D, Trans)	—	AW383
Three-valve : Blueprints, 1s. each (*contd.*).		
S.G. Three (SG, D, Pen) A.C.	—	AW390
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW309
A.C. Pentaquester (HF Pen, D, Pen) A.C.	23.6.34	AW436
Mantovani A.C. Three (HF Pen, D, Pen) A.C.	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	*Jan.* '36	WM401
Four-valve : Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen)	*July* '33	WM326
Harris Jubilee Radiogram (HF Pen, D, LF, P)	*May* '35	WM386

SUPERHETS.

Battery Sets : Blueprints, 1s. 6d. each.		
Modern Super Senior	—	WM375
Varsity Four	*Oct.* '35	WM395
The Request All-Waver	*June* '36	WM407
1935 Super Five Battery (Superhet)	—	WM379
Mains Sets : Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C.	—	AW425
Heptode Super Three A.C.	*May* '34	WM359
"W.M." Radiogram Super A.C.	—	WM366
1935 A.C. Stenode	*Apl.* '34	WM385

PORTABLES.

Four-valve : Blueprints, 1s. 6d. each.		
Midget Class B Portable (SG, D, LF, Class B)	20.5.33	AW380
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
Two H.F. Portable (2 SG, D, QP21)	*June* '34	WM363
Tyers Portable (SG, D, 2 Trans)	—	WM367
Five-valve : Blueprints, 1s. 6d.		
New Class-B Five (2 SG, D, LF, Class B)	*Nov.* '33	WM340

SHORT-WAVE SETS—Battery Operated.

One-valve : Blueprints, 1s. each.		
S.W. One-valve converter (Price 6d.)	—	AW329
S.W. One-valve for America	—	AW429
Rome Short-waver	—	AW452
Two-valve : Blueprints, 1s. each.		
Ultra-short Battery Two (SG det, Pen)	*Feb.* '36	WM402
Home-made Coil Two (D, Pen)	—	AW440
Three-valve : Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-waver (SG, D, Pen)	*Jan.* 19, '35	AW463
The Carrier Short-waver (SG, D, P.)	*July* '35	WM390
Four-valve : Blueprints, 1s. 6d. each.		
A.W. Short-wave World Beater (H.F. Pen, D, RC, Trans)	—	AW436
Empire Short-waver (SG, D, RC, Trans)	—	WM313
Standard Four-valver Short-waver (SG, D, LF, P)	*Mar.* '35	WM338
Superhet : Blueprint, 1s. 6d.		
Simplified Short-wave Super	*Nov.* '35	WM397

Mains Operated.

Two-valve : Blueprints, 1s. each.		
Two-valve Mains short-waver (D, Pen) A.C.	—	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.	—	WM368
"W.M." Long-wave Converter	—	WM380
Three-valve : Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C.	—	WM352
Four-valve : Blueprint, 1s. 6d.		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	*Aug.* '35	WM391

MISCELLANEOUS.

Enthusiast's Power Amplifier (1/6)	*June* '35	WM387
Listener's 5-watt A.C. Amplifier (1/6)	*Sept.* '35	WM392
Radio Unit (2v.) for WM392 (1/-)	*Nov.* '35	WM398
Harris Electrogram (battery amplifier) (1/-)	*Dec.* '35	WM399
De-Luxe Concert A.C. Electrogram	*Mar.* '36	WM403
New Style Short-wave Adapter (1/-)	*June* '35	WM388
Trickle Charger (6d.)	*Jan.* 5, '35	AW426
Short-wave Adapter (1/-)	*Dec.* 1, '34	AW456
Superhet Converter (1/-)	*Dec.* 1, '34	AW457
B.L.D.L.C. Short-Wave Converter (1/-)	*May* '36	WM405
Wilson Tone Master (1/-)	*June* '36	WM406
The W.M. A.C. Short-Wave Converter (1/-)	*July* '36	WM408

Miscellaneous Advertisements

Advertisements are accepted for these columns at the rate of 3d. per word. Words in black face and/or capitals are charged double this rate (minimum charge 3/- per paragraph). Display lines are charged at 6/- per line. All advertisements must be prepaid. All communications should be addressed to the Advertisement Manager, "Practical and Amateur Wireless," 8, Southampton Street, Strand, London.

RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance or Secondhand, etc.

PREMIER SUPPLY STORES

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

1/9 SHORT-WAVE COILS, 4- and 6-pin types, 13-26, 22-47, 41-94, 78-170 metres, with circuit.

4/- SPECIAL set of 3 S.W. coils, 14-150 metres, with circuit.

2/6 PREMIER 3-band S.W. Coil, 11-25, 19-43, 38-86 metres. Simplifies S.W. receiver construction, suitable any type circuit.

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

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BRITISH RADIOPHONE 2-gang Condensers (2 x .0005), Screened with uniknob trimmers, 5/6.

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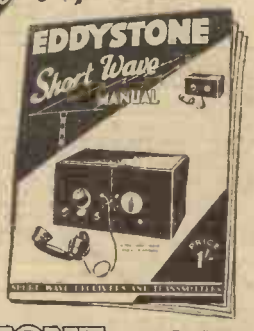

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(Continued at top of column three).

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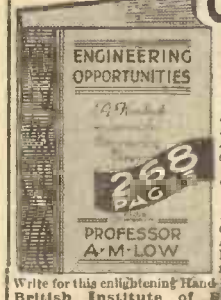

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(Continued from foot of column one)

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