BRITAIN'S LEADING RADIO MAGAZINE

MODERN WIRELESS

1/-

VOL XV. N°54. JUNE 1931

THIS MONTH

THE "M.W." RADIO-GRAM

Also - HOW TO MAKE

A CABINET "INTER-AXIAL" LOUDSPEAKER

JUST A FEW OF THE MANY OTHER FINE ARTICLES

THE ADVANCE OF THE "EXTENSER"

COMPREHENSIVE REVIEWS OF THREE OF THE LEADING COMMERCIAL SETS

HOW TO BUILD THE "M.W." "PLUS-VOLT" UNIT

A Special 16-page Supplement: "THE WORLD'S PROGRAMMES"

RADIO CONSULTANT-IN-CHIEF CAPT. P.P. ECKERSLEY M.I.E.E

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MODERN WIRELESS

Vol. XV. No. 54. BRITAIN'S LEADING RADIO MAGAZINE JUNE, 1931

Watching the Programmes—The Brighton Experiment—Some Outstanding Designs—Getting Down to Short Waves.

Watching the Programmes

THE ingenuity of the proprietor of a Brighton radio relay exchange has been dealt with prominently in the daily press lately. Nearly ten thousand people listen to the programmes relayed by land-line from this particular exchange, and by a neat arrangement of a sensitive ammeter connected in the circuit of the master set at the exchange, and connected to an electrically operated "inker," the proprietor is able to keep a graph record of the variations in the "load" on the master relay set.

Consequently the results obtained are of definite value and interest, for the graph shows, during a varied evening's programme, peaks and depressions corresponding to the popularity or unpopularity of the items broadcast.

When the graph peak rises steeply it is a sure indication that the item then being relayed is popular and is being listened to by a big majority of the subscribers; when the peak gives way to a depression in the curve the evidence points to distinct unpopularity, and the fact that a big majority of the subscribers have switched off.

The Brighton Experiment

IF the exchange system of relaying broadcast programmes from a master set to subscribers via land-line continues to command more and more popularity, the day may soon be here when this system of recording popular taste will be invaluable.

Of course, the radio exchange system would have to be on a very big scale before the graph records could be taken as indicating a widespread and reliable record of *average* taste, but the Brighton experiment, although limited, in the sense that only about ten thousand listeners' taste in B.B.C. fare can be checked, does provide some indication of what is popular and what is not.

The Sunday lunch-time record broadcasts are proved by the graph results to be very popular—the ammeter showed a heavy load; but when a Church Cantata was broadcast the load fell by 25 per cent. A talk on psychology resulted in a drop of 60 per cent.

So far we have not heard of any item being relayed which resulted in the ammeter needle remaining at neutral, or the graph line remaining straight! But we are glad to hear the B.B.C. is showing a good deal of interest in this method of recording the likes and dislikes of listeners.

Ballots are no indication; and correspondence from listeners is usually unreliable.

But the tell-tale ammeter provides evidence which cannot be denied. It should be the B.B.C.'s endeavour to see that any graph records made by the inker should show a heavy proportion of peaks, and as few depressions as possible.

Some Outstanding Designs

WE are devoting several pages in this issue to a detailed constructional article on the "M.W." "Radio-Gram" Three. If you read the article and examine the layout we think you will agree that this is distinctly a worth-while set.

We have aimed at inexpensiveness, simplicity and attractiveness of appearance compatible with first-class results in operation—results which, by the way, can usually only be obtained with more valves and, generally, more expense than is involved in the making of the "Radio-Gram" Three.

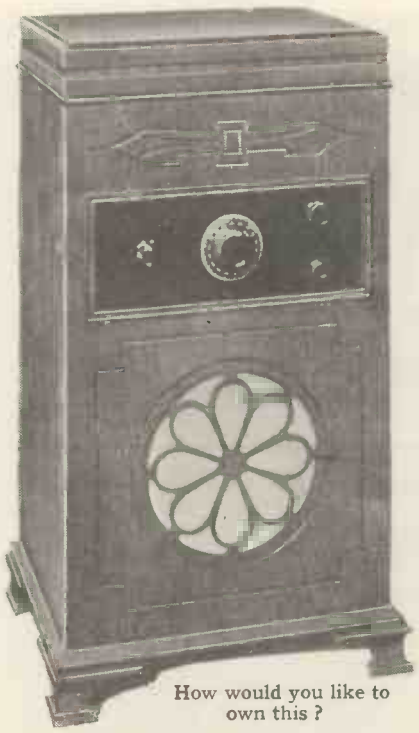
The set embodies, you will note, the new Extenser system, and also a new version of the popular and efficient "M.W." Inter-Axial loud speaker.

The latter also forms the subject of a separate constructional article in this issue.

Getting Down to Short Waves

THE "Superadaptor" is worthy of close attention, for with it you can transform any ordinary set into a short-wave super-het and thus pull in programmes from the four corners of the earth.

Lately we have had many requests from readers for details of a two S.G. amplifier. Full details are given in a special article on this unit in this issue. The unit has been designed as an adjunct to any ordinary set. It considerably increases power and selectivity—in fact, to an extraordinary degree. It is undoubtedly the most efficient H.F. unit you can build for the cash outlay involved, and we found its performance on test little short of amazing.



How would you like to own this ?

The "M.W."

This is one of the finest instruments of its kind which has ever been designed. Its remarkably attractive combination of inexpensiveness and simplicity is nothing short of astounding, especially when one remembers that it will give results equal to many 5-valve radio-gramophones.

BY THE RESEARCH AND CONSTRUCTION DEPT.

THERE are, no doubt, many constructors to whom complexity appeals—that is, at least, in the abstract—but when it comes to the actual building of a set there are few of us who are not eager to pay tribute to trouble- and money-saving qualities !

Only Three Valves

Nevertheless, we must make it very plain that you must not judge this radio-gram merely by valve numbers, the comparatively few parts it employs or its scanty roll-call of leads.

We should prefer you to accept its exceptional simplicity more as one of its incidental, but none the less important, advantages. There may be only three valves, but we do not think it possible to obtain a greater all-round return for any similar team of " tubes."

Every single item has been designed specifically with the object of pulling its fullest weight in this particular combination. For example, an " M.W." Inter-Axial loud-speaker chassis figures in the construction, and, by the way, you will find full details of this notable accessory in other pages in this issue.

In regard to the record side of this radio-gram, the simple change-over gives you the full three valves as amplifiers. Thus the whole team operates for both radio and record, and there is ample magnification for the most insensitive pick-up sold.

In regard to the wireless side, either an ordinary indoor aerial or an outdoor aerial is required. (It should always be remembered that you need up to two valve amplifiers to make up for the less efficient pick-up of a frame.)

Two-Band Efficiency

Within the next two or three months there will be an " M.W." radio-gram having a built-in frame aerial, but it is doubtful whether the results given by any such instrument could exceed those given by this present radio-gram using an efficient outdoor aerial. And, of course, it is as economical and easy to make as well could be.

The " M.W." " Star Turn " Selector system provides a high degree of selectivity, together with added power. A simple Contradyne effectively deals with " breaking through " troubles. There is also a differential reaction

ABOUT THE ACCESSORIES YOU NEED

Loud Speakers. (See text, or suitable models of B.T.-H., Ormond, Undy, Mullard, Amplion, Celestion, Blue Spot, etc.)

Valves. (See text). (Mazda, Cossor, Six-Sixty, Eta, Marconi, Osram, Mullard, Lissen, etc.)

Batteries. H.T., 108 volts or over, double-capacity type (Ever Ready, Drydex, Lissen, Fuller, Siemens, G.E.C., Oldham, National, Grosvenor, Pertrix, etc.).
G.B., 18 volts (see above).

Accumulators. 2-, 4-, or 6-volt, to suit valves (Fuller, Ediswan, Lissen, Pertrix, Exide, Oldham).

Mains Units. State type of receiver when ordering, and mains voltage, etc. (Westinghouse, Junit, R.I., Atlas, Ekco, Tannoy, Regentone, etc.).

MAKE YOUR RADIO-GRAM WITH THESE COMPONENTS

PANEL
18 × 7 in. (Goltone, or Permcol, Lissen, Becol, Keystone, Parex, etc.).
Cabinet and baseboard (Camco " Waverley," or Langmore.)

VARIABLE CONDENSERS
1 ·0005-mfd. Extenser (Cyldon, etc.).
1 ·0001-mfd. or over (up to ·0002 mfd.) differential reaction (Ready Radio, or Telsen, Lotus, Igranic, Ormond, Polar, Magnum, Parex, Lissen, Formo, Burton, J.B., Dubilier, Wearite, etc.).

SWITCHES
1 double-pole double-throw, with " off " position (Wearite).

RESISTANCES
1 100,000-ohm " Spaghetti " type (Lewcos, or Bulgin, Ready Radio, Magnum, Sovereign, Keystone, Graham Farish, etc.).
1 25,000-ohm and holder (Ready Radio, or Parex, Bulgin, Wearite, Ferranti, Keystone, Magnum, etc.).
1 2-meg. grid leak and holder (Lissen, or Dubilier, Mullard, Ferranti, Ediswan, Telsen, Igranic, Graham Farish, etc.).
1 1-meg. grid leak and holder (Dubilier, etc.).

VALVE HOLDERS
3 ordinary 4-pin (W.B., or Clix, Telsen, Junit, Lotus, Wearite, Formo, Magnum, Dario, Bulgin, Igranic, Benjamin, etc.).

FIXED CONDENSERS
1 ·0003-mfd. (T.C.C., or Telsen, Ferranti, Dubilier; Ediswan, Formo, Graham Farish, Lissen, Ready Radio, Watmel, Mullard, etc.).
1 ·01-mfd. (Lissen, etc.).
2 2-mfd. (T.C.C., or Dubilier, Mullard, Ferranti, Formo, Hydra, Igranic, Lissen).

CHOKES
1 H.F. (Lewcos, or Magnum, Varley, Telsen, Wearite, Keystone, R.I., Parex, Dubilier, Lotus, Lissen, Watmel, Ready Radio).
1 Output (Varley, or Igranic, R.I., Ferranti, Bulgin, Magnum, Atlas, Wearite, Lissen).

TRANSFORMERS
1 L.F. (Ferranti A.F.5, or R.I., Varley, Lotus, Lewcos, Telsen, Igranic, Mullard, etc.).

COILS
1 " Star Turn " Selector (Ready Radio, or Wearite, Goltone, R.I., Parex, Keystone, Magnum, etc.).
1 pair " Pop-Vox " (Home made, or R.I., Wearite, Ready Radio, Parex, Magnum, Watmel, Keystone, Atlas, Goltone).

MISCELLANEOUS
Terminal block with two terminals (Belling & Lee, or Eelex, Junit, Igranic, Clix, etc.).
Grid-bias battery clip (Bulgin, or Magnum).
2 3-in. x 3½ in. coil-formers (Parex, Paxolin, etc.).
3 oz. of 30 D.S.C.
2 oz. of 24 D.S.C.
} For coils if home-made
1 Coil Quoit (Keystone, or Wearite).
Plugs, Spade Terminals, etc. (Clix, Eelex, Belling & Lee, Igranic, etc.).
Wire (Glazite, or Lacoline), flex, etc.

"Radio-Gram" Three

control to contribute effective and easy-to-handle regeneration.

But it is to the tuning units that the outfit owes its unusual two-band efficiency.

The coils are divided into two groups, each being wound on simple solenoid formers. On the medium (or "short") waves only the one coil unit is in operation, the long-wave subsidiaries being shorted out of circuit. But owing to the fact that the latter are embodied in a separate construction, isolated from and placed at right angles to the other, there are no dead-end effects to cause losses.

Unrivalled Simplicity

On the long waves all the windings are in use. The long-wave aerial coupling is automatically adjusted by the introduction of a tap, while the long-wave reaction is also brought to its optimum efficiency for the lower frequencies by bringing into series with the short-wave reaction coil another winding which closely couples with the long-wave grid coil.

It is the most effective system that has yet been evolved.

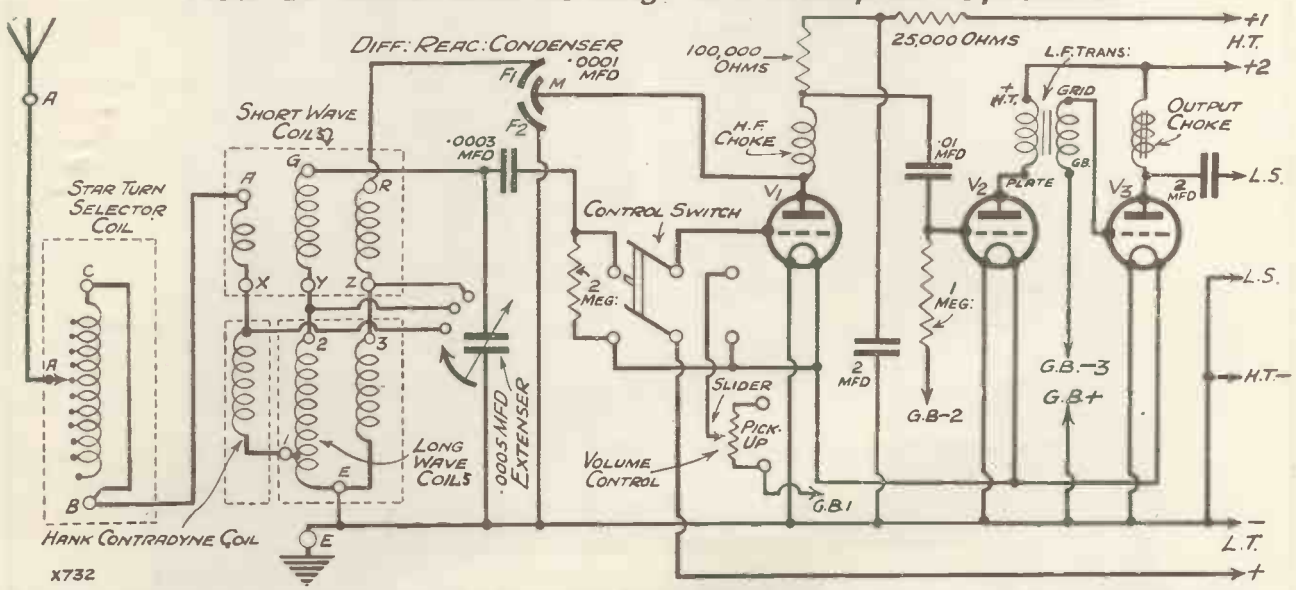
The operation of the set is of unrivalled simplicity. There is an Extenser replacing the older variable-cum-switch combination, so that, from the operator's point of view, there is no wave-changing. Medium- and long-wavers are all tunable merely by the rotation of the one dial. The readings run from 1 to 200 and the corresponding wave-ranges are approximately 185 to 2,000 metres.

Supplementing the Extenser is a single control switch which switches the set on and off from either radio or gramophone. The pick-up volume control is situated on the motor platform. So you see the instrument constitutes as close an approach to the perfect household radio-gram as could possibly be imagined.

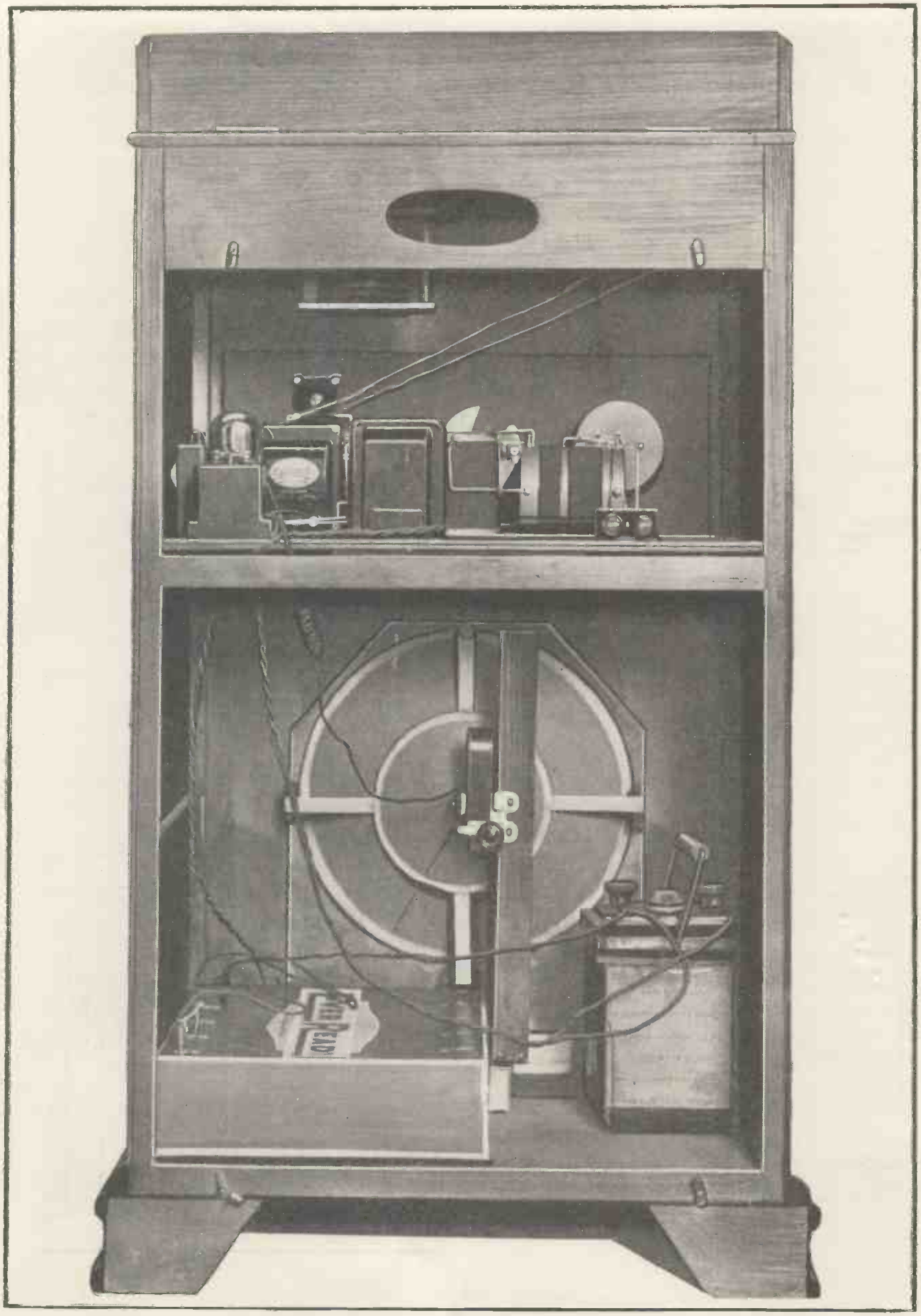
Looking further into the circuit you will note that there is one resistance-

All the sections work together in perfect harmony to provide harmony for you.

Most Efficient Wave-Change with Simplest Operation



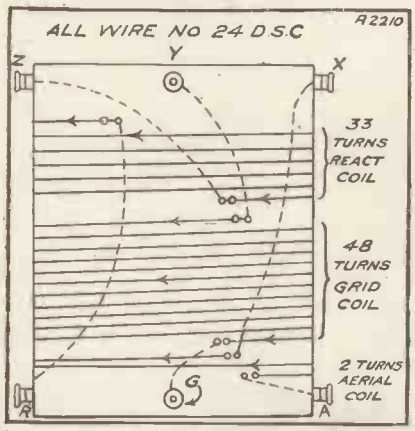
By having two entirely separate tuning units the utmost efficiency is obtained, because there are no "dead" windings which can cause losses on the medium wave-band. And by the use of an Extenser the control of the units is completely automatic. Two other points of interest are the Selector coil to give very high selectivity and the special Contradyne coil which cuts out any medium-wave interference on the long-wave band.



Remarkably Simple Construction

capacity-coupled amplifier and one transformer-coupled stage. This is an ideal combination for stability and purity. And those qualities are

FOR MEDIUM WAVES



All three coils—the reaction, grid and aerial—are wound in the same direction, and the dotted lines show how to connect the ends to the various terminals.

emphasised by the provision of a properly-arranged output circuit.

There are many of you who will prefer to make your own coils, although commercial versions are available at reasonable prices. The accompanying diagrams clearly illustrate the construction of the long- and short-wave units.

All the windings should be wound in the same direction. The long-wave reaction winding is wound over the one end of the grid winding in the form of a hank. You need not worry if you cannot achieve a neat, machine-like finish for this particular coil. Needless to say, it is very important that the winding ends should connect exactly to those points shown in the wiring diagram.

Contradyne Construction

If you fit small terminals to the formers these can be lettered, or, alternatively, small paper labels can be affixed to the wire ends. One or other of these procedures is highly desirable in order to prevent any confusion in wiring.

The Contradyne coil should comprise some sixty turns of the No. 24 D.S.C. wire wound in the form of a hank about 2½ inches in diameter. We have used a small ebonite former for this, although technically it is not essential. But it makes for convenience and neatness of appearance.

The "Star Turn" Selector coil is a more difficult component to construct. We have given full details of how to make it in the May, 1930, number of "M.W.," but it is our experience that most constructors prefer to purchase this item.

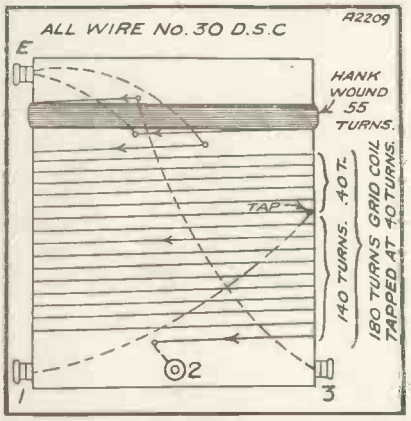
There is little that need be said about any of the other individual components, although it might be as well once again to point out that there are ordinary reaction condensers having three terminals on the market. Such are quite unsuitable for a set of this nature. A proper *differential* is essential. A close adherence to all the component values given is also highly desirable.

Mounting the Coil-Formers

You will find that there is ample space and to spare for everything on the baseboard. Some of you may consider that there is too much space to spare, but we have chosen the most suitable available cabinet, and there is no point in adding things merely for the sake of covering a baseboard. There are numerous items that could have been put in, but we have deliberately excluded everything of doubtful value.

If you have purchased your coils you will find that these are provided with "feet" for mounting. On the other hand, with home-made coils you have to improvise your own method of mounting. In the case of

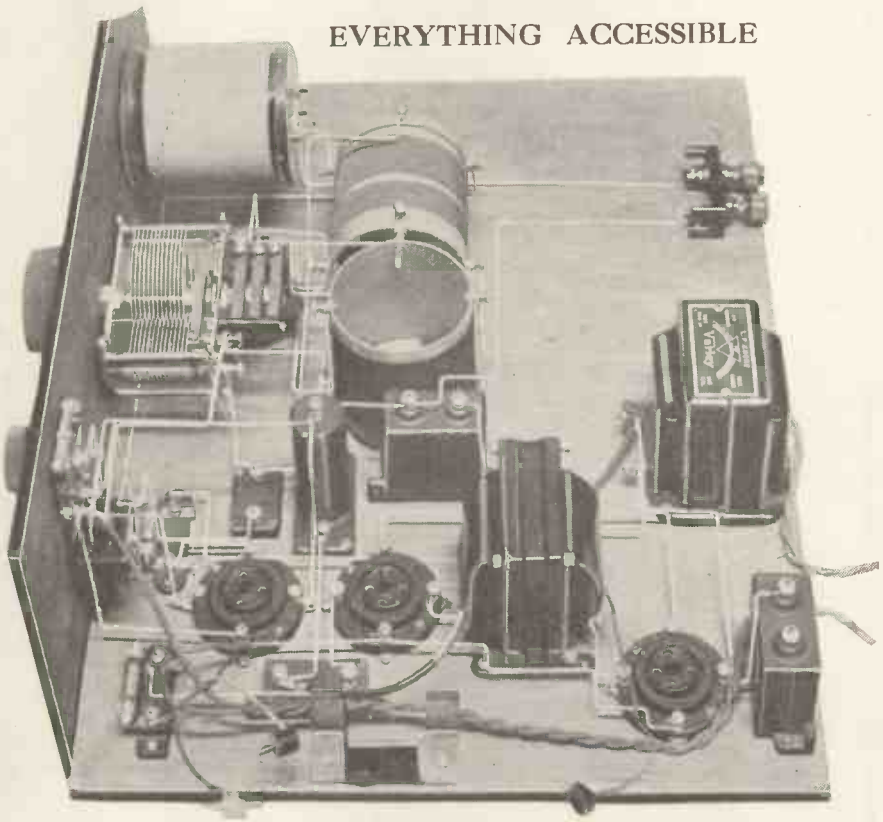
THE LONG-WAVE UNIT



In the case of this unit both coils are also in the same direction, but the reaction coil is bunch wound in the form of a hank.

the short-wave coil this is simplicity itself, as all you need do is to drive small screws through the ends of the former into the baseboard.

EVERYTHING ACCESSIBLE



Due to the ample size of the baseboard, there is no crowding of components, a fact which facilitates wiring and also helps to ensure efficiency in the tuning arrangements.

The long-wave coil stands vertically and necessitates a wooden crosspiece fitted inside and screwed to the former, which, in its turn, is secured to the baseboard.

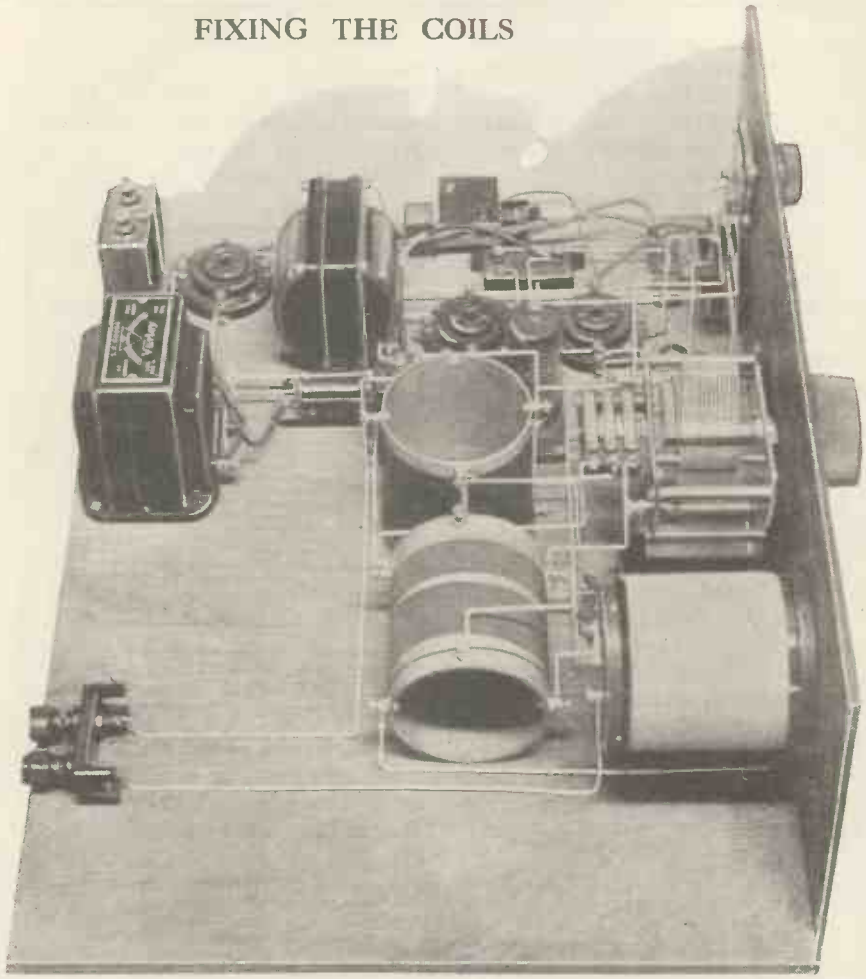
The little Contradyne hank can be fixed in position with a strip of ebonite or hard, dry wood.

When you come to the wiring you will notice how much trouble the Extenser saves. This is perhaps just as well, for the coils are not quite as easy to join up as is a single dual-wave unit! However, the winding ends have been numbered and lettered so as to make this part of the work as simple as possible.

If you glance at the diagrams with the knowledge that the markings have some significance you will be insured against making slips. For instance, E on the long-wave coil must have its end more or less directly joined to the earth terminal of the set by some means or other. Similarly, 2 and 3 are joined to Y and Z respectively on the short-wave coil, while 1 goes to X on the short-wave coil via the Contradyne.

1, 2, 3—X, Y, Z. See the idea?

FIXING THE COILS



The two tuning coils are quite easily secured to the baseboard. In the case of the vertical one a piece of wood is fitted in one end and a screw passes through it into the baseboard, while the other unit is secured by the simple expedient of having one screw passing through each end of the former.

Wiring the Extenser

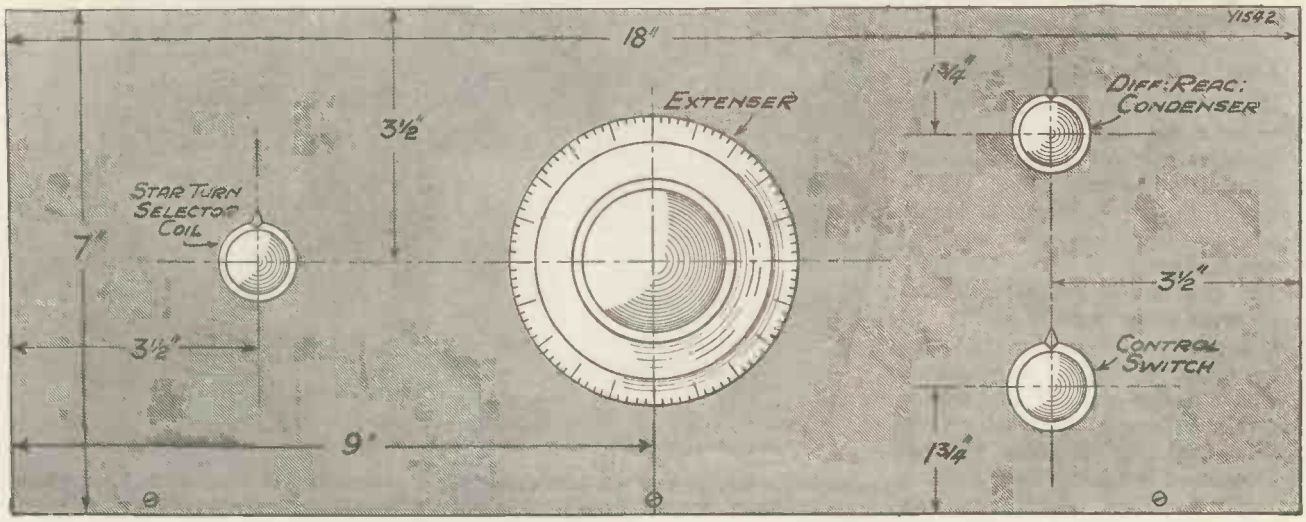
There are no battery or loud-speaker terminals. Inasmuch as the batteries will be contained within the cabinet, terminals are hardly needed. Obviously the leads can be taken out direct.

One loud-speaker lead connects to a terminal on the 2-mfd. output condenser, while the other is joined to the indicated filament terminal of the V_3 valve holder.

The volume control is mounted on the motor platform. This volume control has only two wired terminal points. One end goes direct to a negative socket on the grid-bias battery. The slider connects to that point on the control switch which is appropriately marked in the wiring diagram.

The connections to the Extenser are completely straightforward. There are fixed- and moving-vane terminals corresponding to those found on ordinary variable condensers. In addition, there are three terminals on

Radio or Record Reproduction as Required



The control switch changes from broadcasting to records, and also switches the set off.

A Complete Home-Entertainer

the "self-changer," and these coincide with the three terminals of a wave-change switch. Had a separate variable condenser and wave-change switch been used, the latter would have had to be of the four-point variety, so you see that at least one lead is eliminated by the use of an Extenser!

Buying the Valves

Choose your valves carefully. The instrument is not critical in regard to valve impedances, etc., but it is obvious that a great deal depends upon the use of more or less correct types.

V_1, the detector, should be of the H.F. type, but not of particularly high impedance. One of those "H.F. and detectors" having an impedance of something round about 18,000 ohms will be most suitable.

An ordinary L.F. valve can occupy the second valve socket, while the output valve should be of the small super-power variety. Appropriate H.T. values will range up to about 120 to 150 volts. (All reputable valve makers supply detailed instructions regarding the proper H.T. and grid-bias values to use with their products.)

You will find the tuning of this set is uncannily strange in its simplicity, and we predict that you will discover the Extenser considerably more fascinating than you have ever imagined it to be.

When the "Star-Turn" Selector has its pointer turned right round to the "B" stud only the small winding on the short-wave coil unit is in use, the Selector coil itself being cut out of circuit.

It is seldom that you will need to take the set to such selective limits. For ordinary station searching a slight readjustment of the Selector to keep the switch more or less in step with the tuning adjustments on the medium waves is advisable.

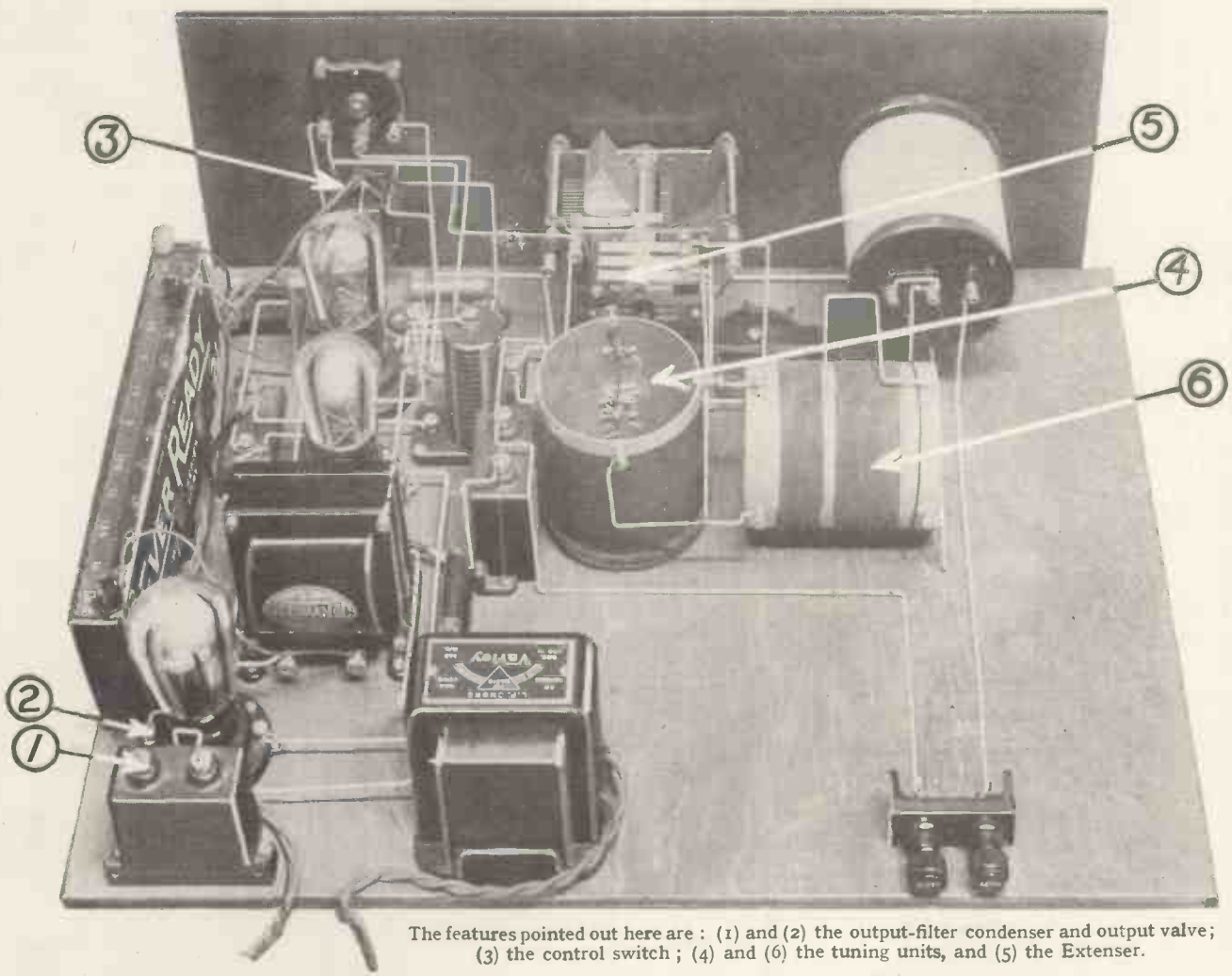
Use a Unit

Do not forget that the Selector coil is inoperative, or practically so, on the long waves. Its work is confined to the medium-wave band.

Should you by chance find that your local conditions are such that there is an exaggerated breaking through of the short-wave stations on to the long-wave preserves, it may be necessary for you to add a few more turns to the Contradyne coil, but we do not anticipate that more than an extremely few constructors will need to make this alteration.

A failure to oscillate on either the short- or long-wave band will

GIVING PROMINENCE TO IMPORTANT POINTS



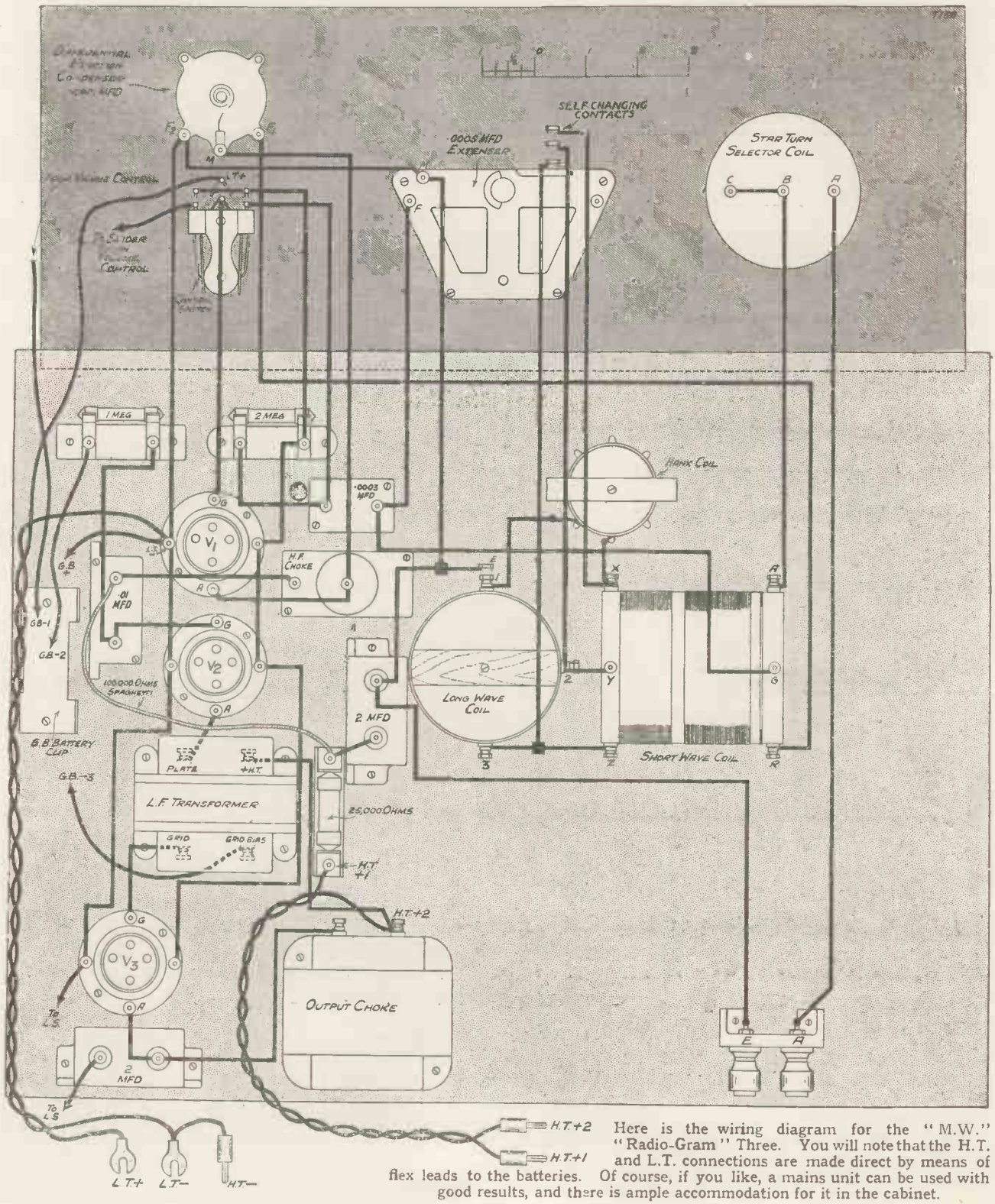
The features pointed out here are: (1) and (2) the output-filter condenser and output valve; (3) the control switch; (4) and (6) the tuning units, and (5) the Extenser.

No Battery Terminals to Worry About

probably be due to an accidental reversal of the connections to the appropriate windings.

By the way, this radio-gram is particularly suitable for use with an H.T. unit, in view of its efficient de-coupling and output circuit.

The assembly of the set, loud speaker, and gramophone motor into the one cabinet calls for little comment. It is a completely straightforward affair, and as there are no "wangles" at all that call for detailed description you simply follow the diagrams!



Here is the wiring diagram for the "M.W." "Radio-Gram" Three. You will note that the H.T. and L.T. connections are made direct by means of flex leads to the batteries. Of course, if you like, a mains unit can be used with good results, and there is ample accommodation for it in the cabinet.

THE ADVANCE OF THE "EXTENSER"

By G. V. DOWDING,
Associate I.E.E.

The progress of our new radio component continues unabated and it is evident that it will soon be in almost universal use. You can read the latest news about it in the following interesting article.

"IN two years there will be over two million Extensers in use."

"I cannot visualise a set of the future without some form of Extenser."

"I advise all set designers to use Extensers."

"The Extenser starts its existence as a vital necessity."

That is the kind of thing the leading radio engineers of the country, including such men as Capt. P. P. Eckersley, M.I.E.E., have recently been saying.

And as far as I am aware there has not yet been a single criticism recorded against the Extensor.

An even more concrete proof of its merits is to be found in the fact that one of the greatest manufacturers of high-grade variable condensers in the country is already in production with commercial versions. I refer to Sydney Bird & Sons, a test report of whose "Cyldon" Extenser is given in another page of this issue of "M.W."

An Economical Proposition

Of very special interest is the fact that the "Cyldon" Extenser has been so designed that it can, with extreme ease, be paired for double-drum drives or ganged in solid groups.

This indicates that Sydney Bird & Sons are not lacking in vision, and that they appreciate the fact that dual and triple Extenser assemblies multiply, by a good deal more than two and three times, the advantages contributed by the Extenser in simplifying the design, construction and operation of receivers.

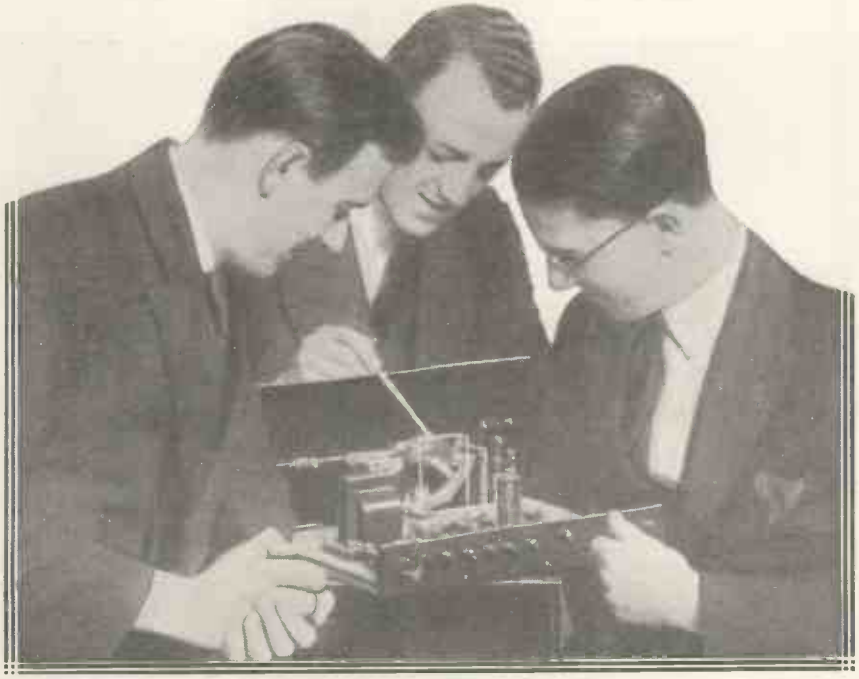
It is also very gratifying to note that the recommended dial design has been adopted in this first Extenser. We want the Extenser to start "clean" and not have to labour through the painful processes of evolution that almost inevitably confront new devices.

But I suppose, in a sense, the Extenser can be said to have passed through all these. You see it doesn't happen to be a hurriedly conceived brain-wave. Stretching back into the past it has a "prior production" or "prior commercialisation" history of an almost unique character, as I have already recorded in our weekly contemporary, "Popular Wireless."

Here to Stay

It is a great pity that all innovations are not cautiously developed in a similar manner. Having had many such experiences myself, I can warmly sympathise with those multitudinous members of the public who have been caught up in the whirl of something new only to learn a few months after they have spent their money that some belated improvement is thought of which throws their purchase into immediate obsolescence.

IT SIMPLIFIES SET CONSTRUCTION



Listeners and constructors alike share in the advantages of the Extenser, for it simplifies the building of sets in addition to rationalising the controls.

Quite often, too, something similar, but vastly better, at an absurdly small proportion of the price, is introduced.

But I am completely convinced that nothing like this will occur to the Extenser. The trade goes into production with a quite perfected device, and not one that has only recently immerged raw and half-baked from the laboratory.

The Extenser has the very great advantage that it starts off where the modern perfected variable condenser leaves off, and it owes its thanks to this component for a most secure foundation

" I advise all those who have an interest in the design of radio receiving sets to make use of the Extenser."—

Capt. P. P. ECKERSLEY.

All the highly developed technique of right-up-to-the-minute condenser design is available to the Extenser, and it is only in regard to mere details that care is needed.

A Brilliant Future Assured

Slight variations from our recommendations or even radical diversions can hardly affect its future.

Nevertheless, I am strongly of the opinion that a strict adherence to at least broad principles will prove of the utmost benefit to trade and public alike. Therefore, I am going to devote the remainder of this article mainly to emphasising these recommendations.

Realising that recommendations without the reasons why we are advancing them may easily assume an autocracy of expression that you would find distasteful, I will also outline all the accompanying " whys and wherefores."

Points to Remember

Firstly, I think all Extensers should be so designed that they are easy to gang, for, as I have said, ganging greatly emphasises the advantages of the system. Of course, the same end is partially served if all those manufacturers who enter into the production of Extensers make available gang assemblies in addition to simple single units.

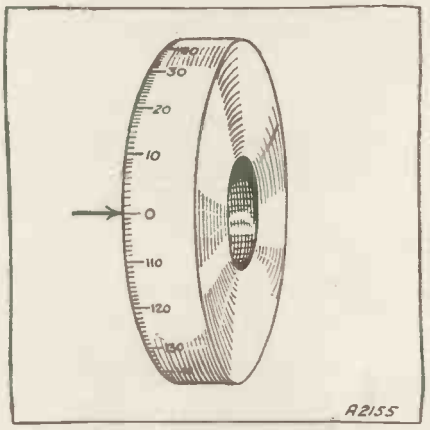
But here is a point to note. If single units are constructed so that they can be coupled in " dual drum " and " gang " arrangements, those constructors who possess single units and who find themselves desiring to go over to a " hook-up " demanding a " gang " will save that amount of money represented by the cost of one unit.

But all this is very much a matter for the individual concern. The question of dial and drum markings is a vastly more vital matter.

It is no exaggeration to say that the dial readings can make a colossal amount of difference to the handling of the Extenser, though I must add it can never be anything but good as compared with that of an ordinary condenser! Many of you may be able to obtain a pretty clear idea of this point from my explanation, but I think one has to handle Extensers with different dials fully to appreciate the difference.

Our recommended markings for ordinary dials are shown in the sketch

AN EXTENSER DRUM



How the readings will run.

accompanying this article. In the case of a drum drive the same markings obtain—you can visualise the dial turned edgewise.

It will be noted that the readings do not run around the dial progressively as with an ordinary 360 markings. To have them like that would be fatal and would knock quite a bit off the Extenser's value from the operating point of view.

" The Extenser will be used on every receiver of distinction during the coming autumn."—

Wireless Correspondent, " Daily Sketch."

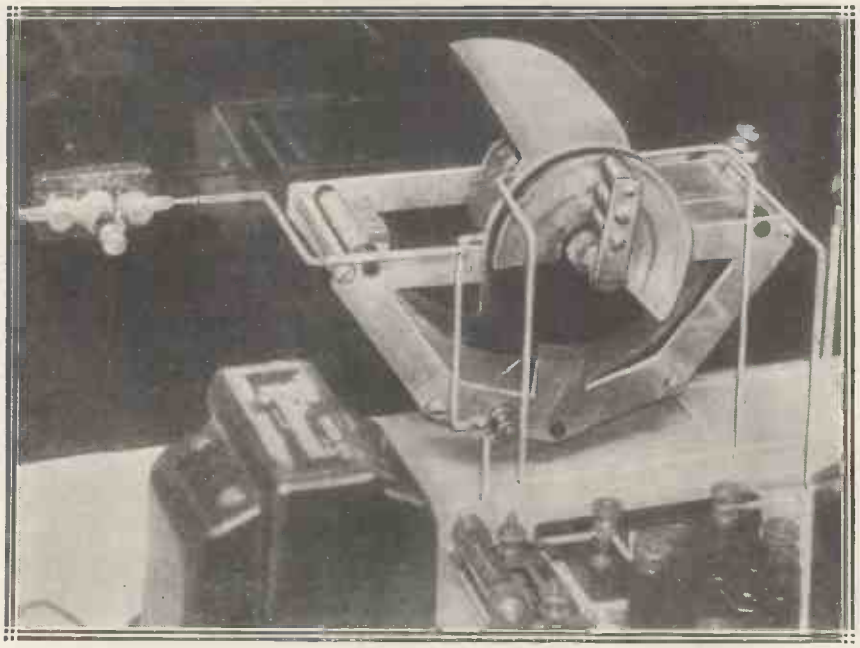
It would make it necessary to have a triangular calibration chart instead of a straight line. Up to 180 there would be an increase of capacity, and from then on the capacity would again decrease.

Dial Details

Our markings run from 10 up to 90 in the one direction and from 100 up to 200 in the other direction, there being a central zero point which indicates minimum capacity—and wave-length—for both long- and short-wave stations.

We have adopted the 0–200 plan, so that the double-figure numbers can stand for the medium-wave stations

THE VERY FIRST EXTENSER MADE



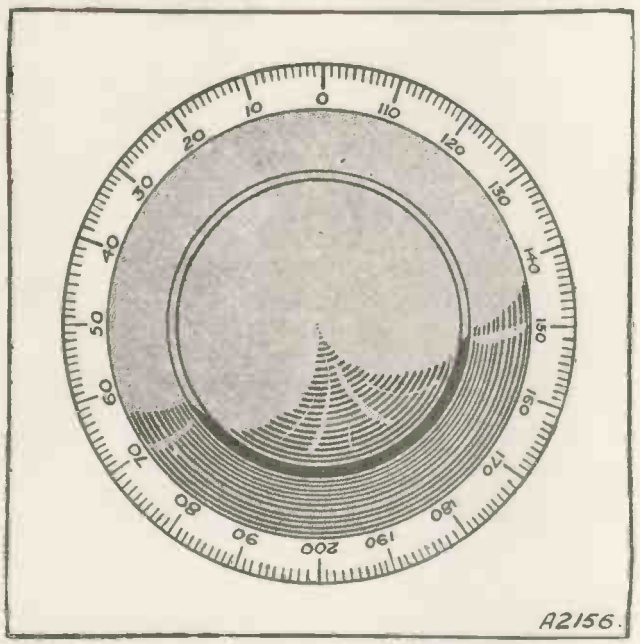
It is a hand-made model, but it operates excellently, although it hasn't the silky action of the commercial productions.

Delightfully Simple and Completely Logical Control

and the triple-figure numbers for the long-wave stations. By this means the operator can see at a glance what range of programmes he happens to be scaling through.

The diverging run of numbers also makes it necessary to rotate the dial through an area of unwanted readings before one gets to the station one desires. With the straight run of 0–360 it might be necessary to go "up and down a hill" of capacity variation to get from one medium-wave station to a long-wave station, and that would prove most confusing to the listener; it would take him a long time to get used to the reversal of tuning effects that would occur right in the middle of a progressive scale of readings.

THESE READINGS MEAN SOMETHING!



Medium-wave stations are indicated by two-figure readings on an Extenser dial, while the three-figure readings correspond with the long-wavers.

A Satisfactory Solution

With our method all such possibility of confusion is swept away, and station-finding becomes wonderfully simple.

You move up the medium-wave readings (0–99) by turning the dial in a clockwise direction, just as you do with any ordinary variable condenser on any ordinary set. But to run up the long waves you turn the dial from zero in an anti-clockwise direction. You increase the capacity (and wavelength) in each case.

If you refer to the illustration you will be able to gain a moderately clear impression of how delightfully simple and logical it all is. Place your hand on the drawing as though it were a real dial. And now imagine that you want to see what is happening on the medium waves. To do so you merely twist the dial slowly in a clockwise direction and the readings move upwards from 0 to 99. Back again at zero, you can turn the dial in the opposite direction and scale up from 0 to 200 for the long-wavers.

But the greatest tribute to the simplicity of the Extenser is that if you do not want to take the trouble to explain even the above elementary procedure to some complete "ham," you need say nothing more than "Just twist the knob slowly round until you hear the station you want."

The phrases "long and short wavelength," "wave-changing," and others of that ilk, do not have to be used at all!

So much for the dial. And now for the switching.

We are advising manufacturers to adopt four-point "self-changers" in at least their first models.

By four-point switching I mean that there should be at least three points (each of which is supplied with a terminal) that are completely separated, electrically, from anything during the one 180-degree movement of the vanes. They should all be brought into contact with the spindle of the condenser (which, in its turn, is metallically joined to the moving vanes) during the remaining 180-degree movement.

"I imagine that before long the new method (the Extenser) will be the only one in use."—

Wireless Correspondent, "Evening Standard."

Flexibility Essential

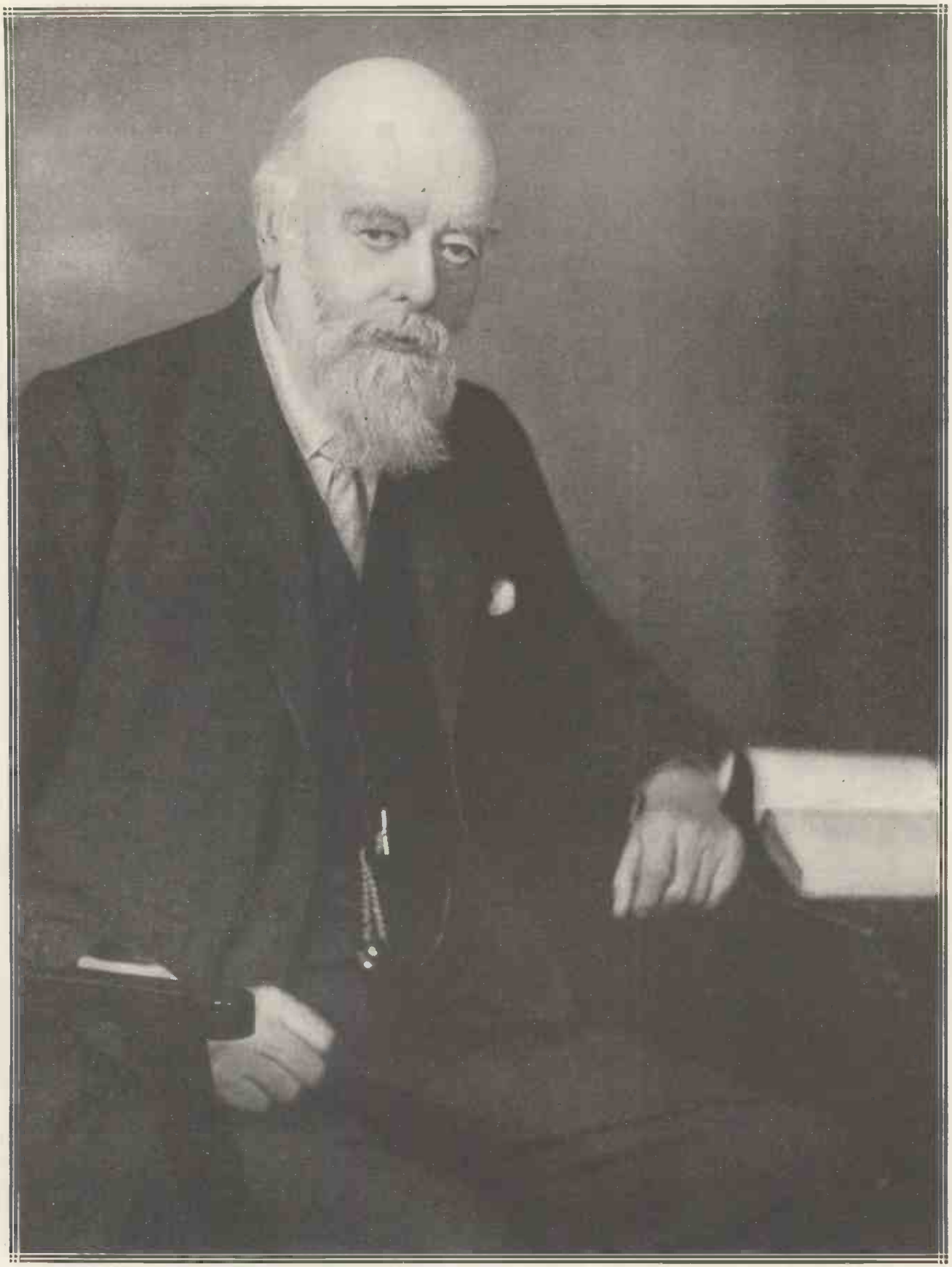
In many instances it may not be necessary to use all these switching points, but their presence will render the component much more versatile. A simple crystal set might not require more than the one switching terminal, but I can visualise excellent switching systems in multi-valvers for which all four points will prove essential.

And I feel that if every commercial Extenser has four-point switching, of the character I have indicated, we as set designers will be very well served for many years to come. I have been

(*Continued on page 642.*)

A VERY CRITICAL GROUP!

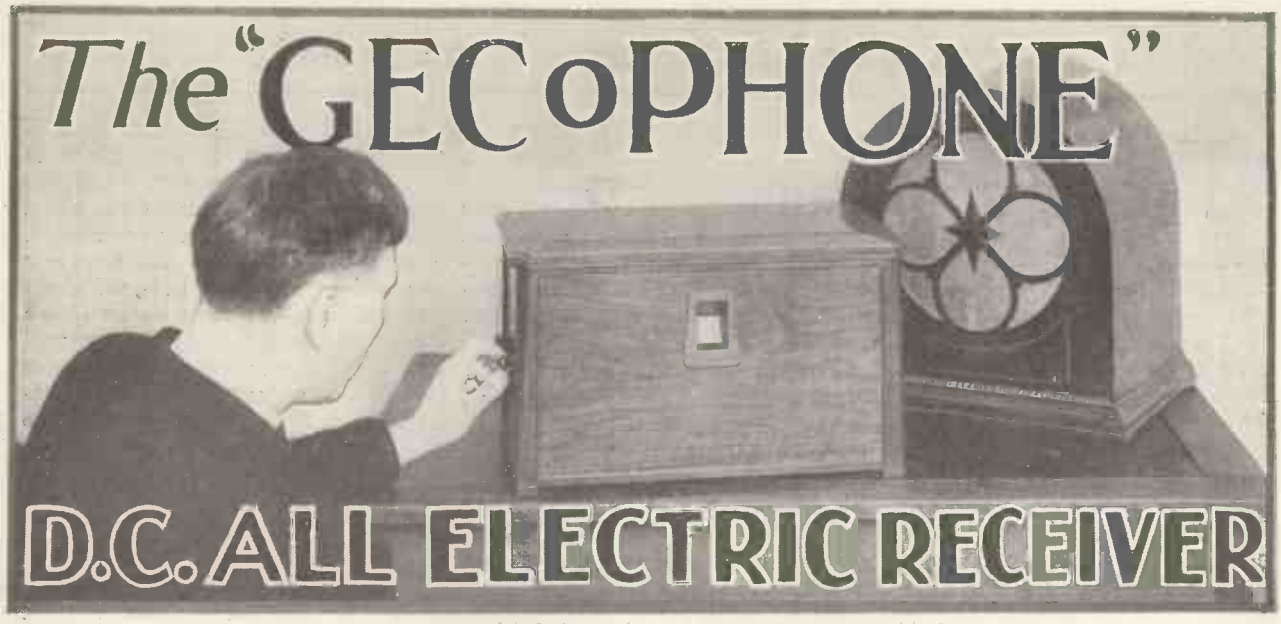
Members of the "M.W." technical staff examining a receiver in which there is an Extenser.



SIR OLIVER LODGE, F.R.S.

Who celebrates the eightieth anniversary of his birthday on June 12th.

The "GECOPHONE"



D.C. ALL ELECTRIC RECEIVER

One of the most popular mains receivers that have recently been brought out is the G.E.C. D.C. Four, and below we publish a brief description of the set and our experiences with it.

WE have recently had the pleasure of testing out one of the latest G.E.C. all-mains receivers, the four-valver for D.C. mains, which sells for £25. Although the larger proportion of the electricity supply of this country is A.C., there are many districts where it continues to be direct current, and it is an open secret that wireless enthusiasts in such districts consider they have been to some extent neglected by manufacturers of sets designed for all-mains operation.

A "Long Felt" Want

This applies particularly in the case of the more modern receiver, in which such factors as range and volume and selectivity provisions have been developed to meet the demands of the time.

Well, the General Electric Company, Ltd., has gone one better. It has laid itself out to supply what is apparently needed in this direction by bringing on the market a four-valve receiver designed for all-mains operation and covering a range of mains voltages from 200 to 250.

This receiver incorporates a circuit similar to the A.C. mains set which has been an extremely popular product and which is noted for its outstanding selectivity and its great sensitivity.

Pentode Output!

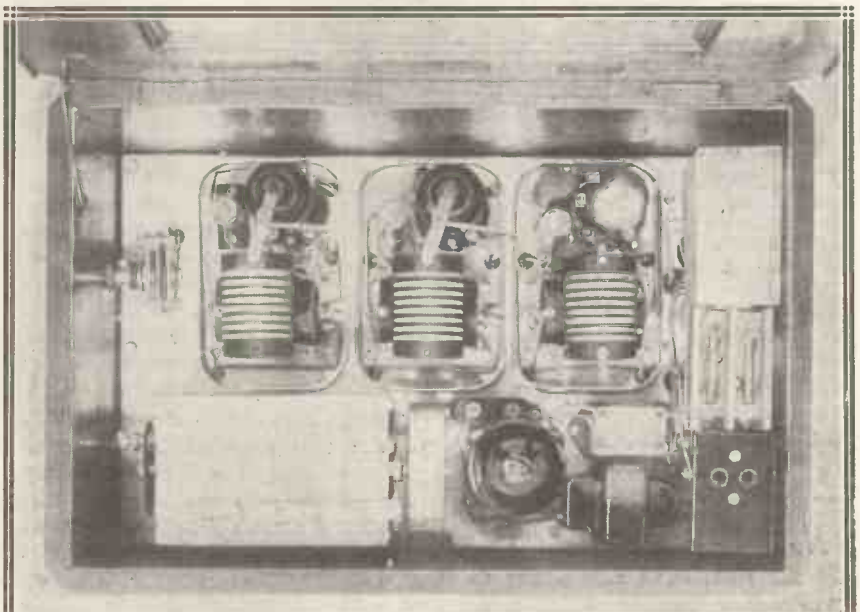
Tests which have been carried out have proved that the performance of the D.C. model is a faithful reproduction of that obtained with the A.C. type. Though perhaps hum is not completely absent, it is of a very negligible quantity, and this is exceptionally praiseworthy in view of the fact that a pentode output valve is employed; and, as you know, it is very difficult to get rid of the last trace of hum when a high-magnification valve in the output stage is being used.

Valves are of the 2-volt type in the case of the two screened-grid and the detector, and of the 6-volt in the output valve, and they are run in series. Two S.215's are employed for the H.F., and an Osram H.210 as detector, with the P.2.625 in the output. Adjusting resistances operate across the filament of each valve so that they are not overrun.

Safe as Houses!

The set is housed in an attractive walnut cabinet, and complies fully with the I.E.E. requirements. The whole of the electrical portion of the set being insulated from the metal

A REALLY SATISFACTORY SCREENING



A view of the inside of the "Gecophone" D.C. Four, showing how the S.G. and detector circuits are arranged. The screens have had the lids removed so that you can see inside.

Ether Full of Excellent Entertainment

chassis, and the ganged condenser being of special construction and so arranged that both sets of vanes are insulated from the case.

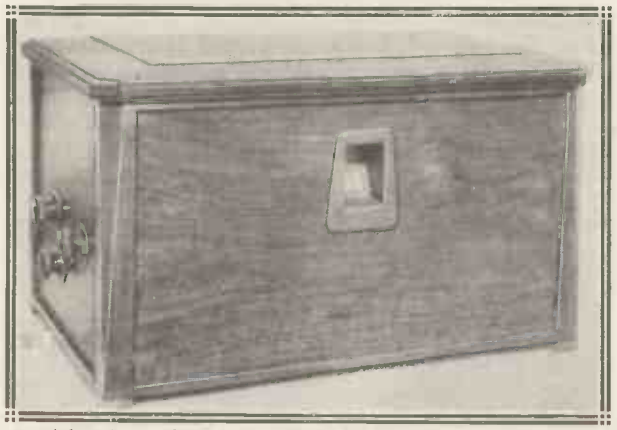
On opening the lid a safety switch comes into action, so that the set is isolated from the mains the moment the lid is opened. The safety switch is coupled through a double-pole fuse, making the set independent of the operation of the house-lighting fuse, and as a convenience for switching on and off the set a double-pole switch is fitted.

Convenient Controls

The smoothing circuit is arranged so that the set will function from mains with either the positive or negative main earthed without any adjustment being necessary to the set. The wave-length range covered is 230 to 550 and 1,000 to 2,000 metres, while the power consumption is 56 watts at 200 volts.

The controls are placed in extremely convenient positions. The left-hand side has three knobs, the one at the back serving as the volume control, the centre being the range switch, and at the front is the tuning control, which is adjustable to a precise degree and which operates a moving drum which gives wave-length indications through a neat escutcheon in the front of the set.

HANDSOME IN APPEARANCE—



—and handsome in results. Such is the G.E.C. D.C. Four, the front view of which you see here. The controls on the left are: tuning, volume control, and wave-range switch.

No Trimming Troubles

At the right-hand side is the reaction control and the main switch, so that the bottom of the set is completely clear of knobs or switch controls. Very careful trimming up of the ganged condenser is done by the manufacturer and sealed before the set is passed ready for use.

The H.F. stages are transformer coupled, and both the aerial and the two intermediate stages are completely screened in metal boxes, fitting down on to the metal chassis.

Good Earth Essential

The metal boxes enclose both the valve and the tuning circuit in each case. This is clearly shown in the photograph, where we have removed the metal top.

The operation is extremely simple. The aerial lead is connected to one of the connecting plugs provided and inserted in the socket marked aerial, and the earth lead is connected in a similar manner to the socket marked earth. Quite a small aerial works perfectly well with this receiver owing to its very high degree of sensitivity, but we found that a good earth connection is almost essential in order to keep the mains hum down to the very lowest minimum.

On switching on for the first time, of course, the usual thing happened—we got no signals, denoting that the mains plug was in the wrong way. On reversing, the set immediately showed every evidence of extremely lively eagerness for work.

Remarkable Results

It is very advantageous when handling the set that the wave-lengths are indicated on either side of the dial indicator instead of merely 0 to 100 degrees, as is the case of so many condensers.

Quite a high degree of amplification of the two screened-grid valves is given, so that it is found necessary in a number of cases to reduce the volume on certain stations to prevent overloading. As a pentode valve is used in the output, even with a considerable grid swing this is very easily overloaded, and the volume control has to be used quite a lot.

When receiving at full volume without overloading the strength of programmes is more than adequate for ordinary living-rooms, and the number of loud-speaker stations which can be received is truly remarkable. Especially between 8 and 9 o'clock in the evening—that is, round about sunset time—far more stations than you want to listen to were received on the medium wave-band; while at least half a dozen really good programmes, and a lot more which were not worth listening to, were heard on the long waves.

A Joy to Handle

What struck us most, perhaps, was the way the ganging had been arranged. The three tuned circuits are all operated by the one gang condenser, and the trimming has been carried out to a remarkable degree, so that we felt that over the whole wave-length range on both medium and long waves we were practically perfectly in tune and not losing any magnification due to one or other of the condensers being slightly out of step.

With a good loud speaker the Gecophone four-valve D.C. set is a real joy to handle, and its compactness and beauty of cabinet design make it a really outstanding piece of furniture.

INTER-AXIAL v. MOVING COIL

An interesting loud-speaker experiment, carried out by an "M.W." reader.

Sir,—I made up your "Inter-Axial" Senior cone-speaker, and found it very successful indeed. Having only an Ormond unit, I used this, and the effect from its old chassis was startling. I made the baffle with three-quarter plywood, and also fixed a surround of the same material, which completely hides the back portion, or chassis.

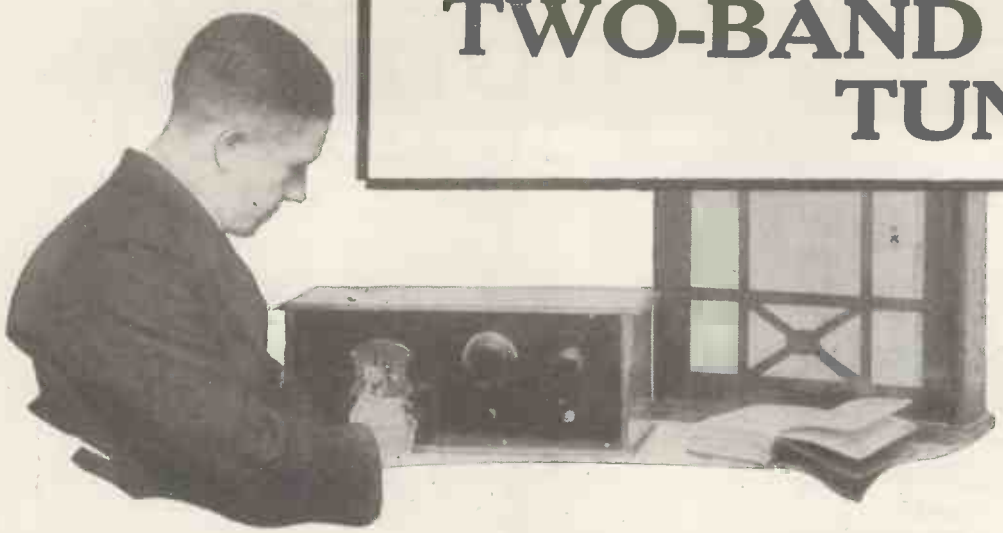
People who hear it are very pleased with the quality of reproduction, and as I have also a moving-coil speaker, I am able to judge effectively by comparison.

I thought you would be glad to know this, especially after having taken so much trouble with your experiments.

Yours faithfully,
R. BURNS.

Harrow.

TWO-BAND TUNING



A few words concerning the pros and cons of the various methods of wave-changing, concluding with a reference to something new in the way of coil devices.

A SET designer views the European ether with decidedly mixed feelings. The heterodyning and mush that accompanies many of the transmissions do not worry him much. Ether chaos is a matter for the international politicians of the ether. And, anyway, bad though may be the conditions, it is an indisputable fact that there are quite a number of programmes available free, or moderately free, from interference.

Saving the Situation

But what is decidedly annoying is that the stations are not confined within the one compact wave-band as in America, but are divided up into two definite groups which are generally referred to as the short-wavers and the long-wavers.

It should be added that if the set designer considers this annoying there are many others who would not see a contraction of wave-lengths for anything. The trade rather likes the existing state of affairs, because they automatically impose limitations on American-made sets, and stop these from flooding into the country at acutely competitive prices.

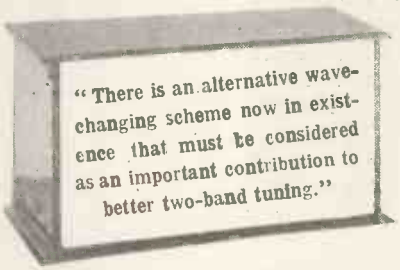
That great army of distant-station listeners has a wholesale respect for the long-wave broadcasters and listens with admiration to the fadeless, reliable service they provide.

Always Reliable

Some of the programmes may not be as attractive, but the fact remains that one can turn to a long-waver at any time of the night or day during which it may be in operation with the comfortable assurance that once tuned-in it will "stay put," and will not swing up and down in strength in time with the spasmodic upheavals of the restless Heaviside layer.

Therefore, the British set designer has to arrange for two-band tuning as a matter of course. In earlier days the problem was solved by the provision of plug-in coils. You had one set of coils for the one band of wave-lengths, and when you wanted to change over to the other band out came all these coils and in went another set.

At first the coils were planted on the exterior of a receiver, but later on, in answer to the first calls for neater or more compact apparatus, the coils sank into the inside of the set. Coil-changing then necessitated lifting the lid of the set—after having



removed the loud speaker and other things standing on it!

Such a state of affairs could not be tolerated for long, and soon it became an essential feature of practically all sets that they should incorporate some means of enabling wave-band changing to be effected from the panel of the set.

That brings us to the present day, and now the Extenser has arrived as a thoroughly practical and completely commercialised device to make wave-changing so integral with the operation of the receiver that, from the listener's point of view, it can be said that two-band tuning is a purely academic consideration.

The two bands have been merged into one—from the aspect of set-handling. But the constructor will still have to meet two bands in the "innards" of sets.

A "Modern" Coil

There will always have to be two sets of inductance values. For purposes of compactness and ease of wiring it is preferable that all the necessary coils should be contained in one dual-wave unit. And there is a very good example of such a device in the "Kendall" "M.W." Unit.

But there is an alternative scheme now in existence that must be considered as an important contribution to better two-band tuning. This scheme makes use of two very simple easy-to-make units, and the efficiency obtained on both bands is most striking. The reasons are that it is possible to adjust values so that absolutely the optimum results on each band are given; no compromises of any kind are required.

"Extenserised" Sets!

This scheme makes its first appearance in the "Radio-Gram" described in MODERN WIRELESS this month. And next month you will find it repeated in a 2 H.F. four-valver of exceptional merit—undoubtedly the most effective receiver of its kind we have ever produced. Here, too, you will meet our new "Coil Quoits" for the first time.

And those "Coil Quoits," by the way, are destined to have a decidedly interesting future, of which more anon.

Sir DAN GODFREY ON THIS AGE OF

WE are living, it is said, in an age of "mechanised music." The gramophone and the wireless have combined to thrust us into what might be equally well termed an epoch of robot reproduction. Machine-carried sounds, whether reproduced through the medium of a mica sound-box or a thermionic wireless valve, to-day encircle the world.

Ten years ago, when the gramophone had already become a standard article of furniture in all but the humblest homes, and radio telephony, although not definitely established in national life, was well on the way to an inevitable outcome, there was a good deal of speculation as to the result of this trend towards "domestic" entertainment. There were a few who asserted that the gramophone was so highly esteemed that wireless broadcasting would never stand a chance.

The "Death" of the Gramophone

Others declared that the gramophone would die a natural and unlamented death, for it could not hope to compete with the variety and cheapness of entertainment that would soon be provided by the radio. Still a third opinion was that gramophones and the wireless between them would kill the ordinary public forms of entertainment, including the popular concert.

There was something to be said for each point of view, especially the last. It was argued that if a man could enjoy the finest types of music by his own fireside, he would not be enticed to a concert hall.

One's own armchair was infinitely cheaper, and therefore preferable, to a public stall. In addition, there was privacy at home, and no obligation to listen to music for which one had little personal regard.

Above is Mr. Christopher Stone, of gramophone music fame, and, to the right, the author of this article, Sir Dan Godfrey.

MECHANISED MUSIC

Consider for a moment what this prophecy would have meant had it been fulfilled. It would have meant the total abolition of an institution which had become something more than a popular form of entertainment. The concert hall was, and still is, a national tradition, just as the theatre is a tradition.

And you cannot scrap a national tradition without incurring the possibilities of some very serious consequence. The actual consequence in this particular case need not concern us here.

It is sufficient to say that the concert hall, with its symphony orchestra, fulfilled a definite national requirement. The argument prophesying its doom was that broadcasting would produce music to suit all shades of individual taste, and for that very reason would oust the concert hall from popularity.

Music Improves with Familiarity

We know to-day that the argument, reasonable though it may have appeared at the time, was fundamentally false. The gramophone, the wireless, and the concert hall thrive and flourish side by side. This is rather an extraordinary thing, and certainly very few people foresaw it.

It is a fact, too, that the concert hall is more popular now than it has ever been in its long history. One is led to the assumption that "mechanised" music has befriended, rather than rivalled, public entertainments.

That, of course, is exactly what has happened. Most of the people who attend public symphony concerts are devotees of both the gramophone and wireless.

"Mechanised" music has popularised music; it has introduced music into hundreds of thousands of homes which comparatively few years ago were without it. It has cultivated a broader and nicer taste; for music is one of those things which improve, rather than deteriorate, with familiarity.

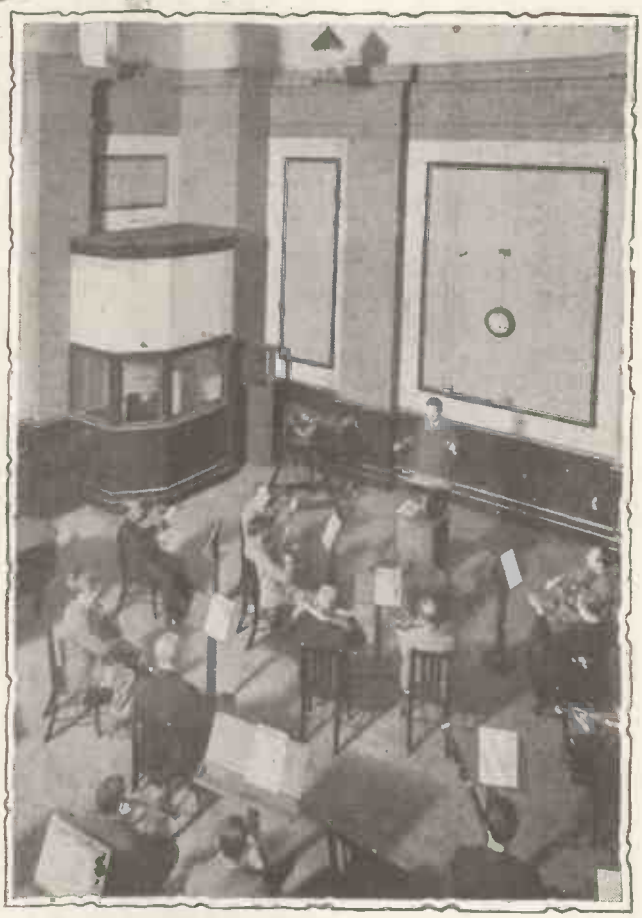
You can no more become contemptuous of good music than you can of a good picture. What is good must remain good, and the more you have of it the more you are likely to appreciate its finer points.

The Threat of the Talkies

Public taste in music is at least fifty per cent better than it was ten years ago. This age of science, educating us as it is in its thousand diverse ways, is doing no better work than its cultivation of a finer appreciation of music amongst the masses.

We can discriminate more easily; pick out the good from the bad with an ease born of constant practise. And it is because of this that really good music will continue to attract, whether it is heard in a concert hall, or through gramophones or loud speakers. It is not the medium which matters, but the quality.

The true influence of science on popular musical taste can be more fully appreciated when one remembers another factor which has tended to divert public interest from the older forms of public entertainment. I refer to the talking pictures.



The Manchester Wireless Orchestra giving listeners real music from the Manchester studio.

Whether one's personal opinion is for or against them, one is bound to admit they have reached a very high peak of popularity. It is difficult to conceive of two things more directly opposed than talking pictures and symphony concerts. Yet, as I have already pointed out, symphony concerts have never been more popular than at the present time.

Now, although it is true that science has popularised music in a tremendously powerful way, it is equally true that music has been of considerable service to science. Without the popular love of music, the gramophone and wireless would have been confined to scientists. Neither could have spread to the public, and consequently established themselves as the industries we know they are to-day, and it is only because of an insistent public demand for music that the radio set and gramophone are universally employed.

What a question—There is no "Best"—A neat needle chuck—Too "Perfect"—The overall effect—

By "TONE ARM."

SOMEBODY has written and asked me what pick-up I use at home with my own personal set for my own personal enjoyment. Well, I am sorry I cannot tell him. He would be no better off if I did, because my choice has been made after going through practically every pick-up on the market, not once but several times, and making the various adjustments necessary to the set for each pick-up, so that what suits my particular outfit and loud speaker might not suit his.

* * *

Besides, I am firmly convinced that there is no "best pick-up." The choice of a pick-up, if you have many to choose from, is a most exasperating business. You try one and then another, and possibly another, then you go back to the first, and finally decide on a certain one and say, "Ah, that's the best!"

A "He-Man's" Job

You keep it going for some time, and unless you are really strong minded there will come a day when you will suddenly decide that that pick-up is not really so good as you thought, and you would like to try one of the other makes. Then you may find that after all one of the others is rather better, especially on certain records, and you will go through the whole performance of testing again.

* * *

Finally, you will arrive at one or other pick-up, and then you will again get a grip on yourself and decide which is the one you need. And you will stick to it—until some other pick-up comes out on the market!

Novel Needle Grip

I have recently been trying the Celestion, and, like others, it is really excellent. It is somewhat distinct in design, both internally and externally. Instead of fitting the needle into the hole and screwing it tightly, one simply presses a little knob, pops the needle in and releases the knob, and it is gripped in a jaw of knife-edge characteristics, and there you are.

I have got one grouse against this pick-up on my own set: it is almost too "perfect," if one may use the saying. What I mean is this, the curve of the Celestion pick-up appears to be almost dead straight from something like 80 to 4,000 or 5,000 cycles. Very fine, you say; put that on a straight-line amplifier, and there you are.

Too "Perfect"!

But there you are not. Your speaker, for instance, is not straight line (or, if it is, please send me the name and address of maker). True, you can correct for that in the amplifier, but you cannot easily correct, in my opinion, the troubles of the record.

* * *

Recording is not straight line by any means. It falls off very badly below about 140, and falls off again at about 3,000. Consequently, if we use a straight-line pick-up and a straight-line amplifier, or a combination to give straight-line reproduction in the loud speaker, we are still going to have a falling off of bass and of some of the high notes in the final reproduction.

* * *

We can, of course, correct for the pick-up, but somehow or other such correction does not always sound good. It is very easy to *get* bass, but the

(*Continued on page* 638.)

A FAVOURITE ON RECORD AND RADIO

Mr. Peter Dawson, the famous bass-baritone (on the left), with Mr. Alfred Clark, the Chairman of the Gramophone Co., and a 25-year-old gramophone which played the first Peter Dawson record.

THE WORLD'S PROGRAMMES

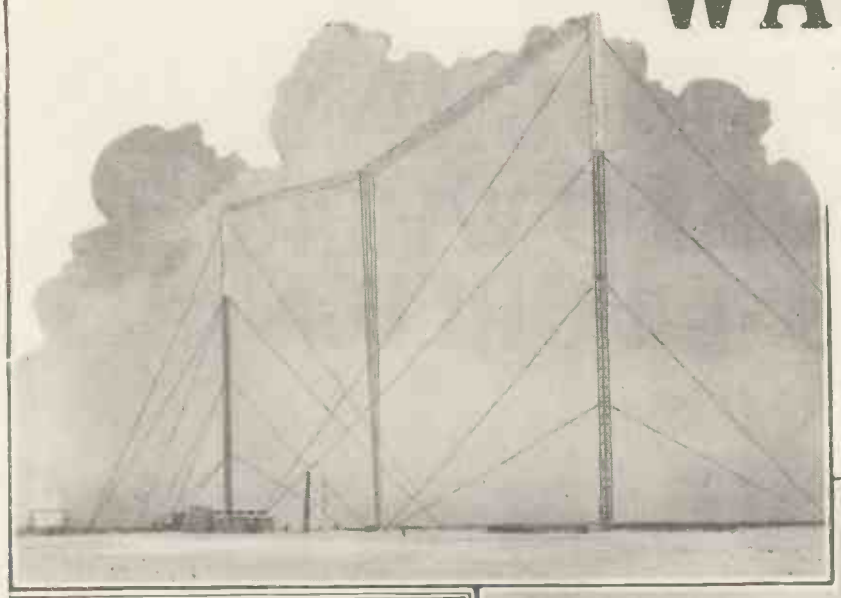
HOW, WHEN AND WHERE TO HEAR THOSE FOREIGNERS

CONTENTS OF THIS SPECIAL SUPPLEMENT

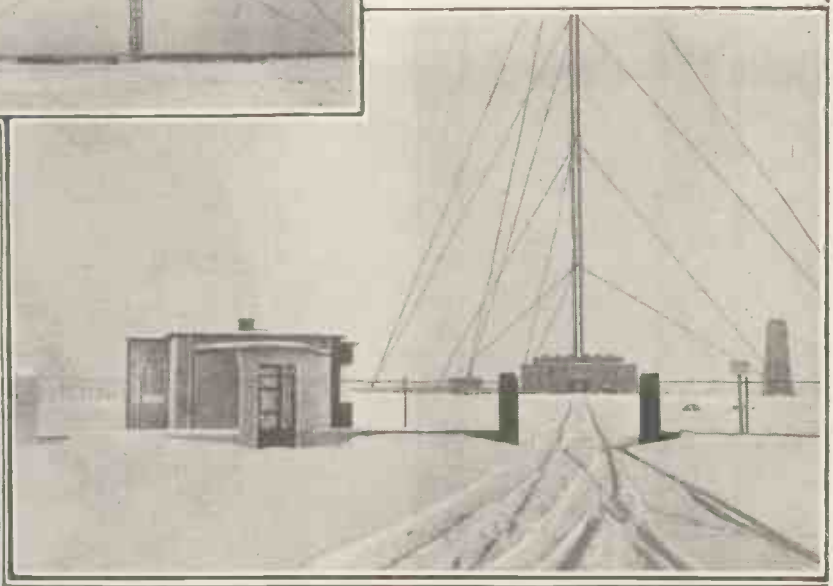
The photograph in the circle above is a mysterious one—until you know what it is all about! It is a view of a radio broadcast from the Statue of Liberty, in New York Harbour. Note "Liberty's" nose and her inscrutable smile.

WARSAW'S WONDER-STATION

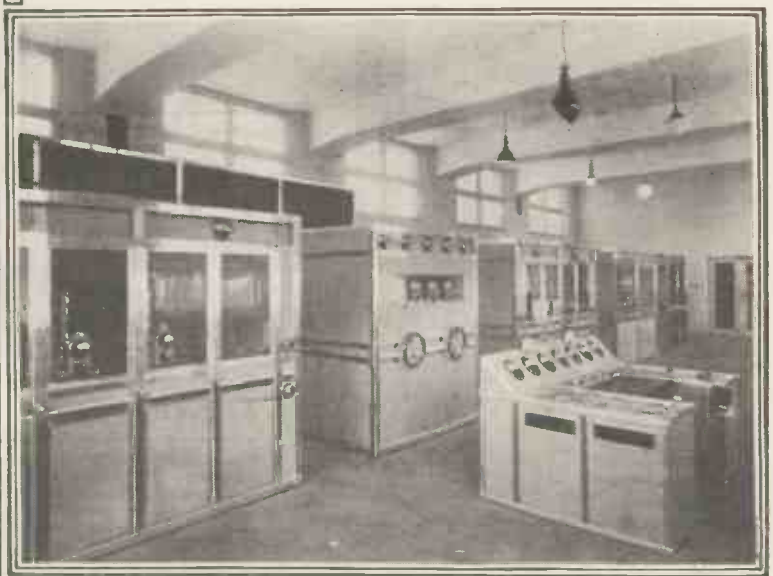
Some glimpses at the Polish giant—Europe's most powerful broadcasting transmitter.



A general view of the aerial system is shown above. The masts are no less than 600 ft. high—the tallest of their kind in the world. The station works on 1,411 metres, developing an aerial power of 160 kw. Below, some of the huge transmitting valves, with water-cooled anodes and filament leads, can be seen.



A general view of the station, taken only a few months ago.

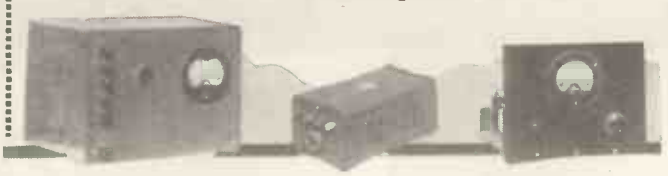


(The three photographs above are reproduced by courtesy of Marconi's Wireless Telegraph Co., Ltd.)

The transmitter panels, with the control engineer's desk, are shown above.

ON MEDIUM WAVES

Some notes on recent reception conditions.



The taking over of full programme duties by the North Regional station has not been without its difficulties from the DX-man's point of view. ("DX," of course, is simply the usual radio abbreviation for long distance.)

* * *

Quite a large proportion of the letters received by the B.B.C. in connection with the North Regional's advent dealt with the difficulty of separating foreign programmes under the new conditions. The exact proportion of such letters was something over 12 per cent—a figure that caused some higher officials of the B.B.C. to blink in amazement, for they had believed and maintained that interest in foreign programmes was almost negligible in industrial areas like the North Regional area.

* * *

Considering the fact that the advance of the clock to B.S.T. and the advance of summer are both inimical to long-distance reception, it is amazing how well the foreigner can still be picked up in the evenings. Near the top of the dial, Rome, Toulouse, Langenberg, Brussels No. 1 and Budapest have been singularly good, with Sottens, Katowice and Berlin all giving lusty support later in the evening.

* * *

The lower section of the medium wave-band has seen at its upper end Mühlacker, Strasbourg, Brussels No. 2 and Goteborg all in fine fettle; while lower down, Bordeaux Lafayette and Hilversum have been consistent.

* * *

Lower still, Heilsberg has been quite a star-turn, and several others have been really good, especially Nurnberg. A rather surprising feature of this part of the wave-band is the strength of Gleiwitz, on 253 metres—it is only a 5·6-kw. station, but on many nights it romps in from about 9.30 p.m. onwards.

* * *

The heterodyning position is still somewhat involved at the time of writing, and several "uneasy" stations, notably the French, have been wave-wobbling and causing a lot of spoiled programmes. Bordeaux-sud-Ouest is a bad offender, but there are too many tarred with the same brush to name them all.

A SELECTION OF FIRM FAVOURITES

WAVE-LENGTH (METRES)	NAME
574·7	Ljubljana (Yugoslavia).
566	Hanover (Germany) (relays Hamburg).
550	Budapest (Hungary).
533	Munich (Germany).
525	Riga (Latvia).
517	Vienna (Austria).
509	Brussels No. 1 (Belgium).
501	Milan (Italy).
487	Prague (Czechoslovakia).
479·2	North Regional Station (Gt. Britain).
473	Langenberg (Germany).
466	Lyons (La Doua) (France).
459	Beromünster (Switzerland).
447·1	Paris (P T T) (Ecole Supérieure) (France).
441	Rome (1 R O) (Italy).
436	Stockholm (Sweden).
424	Madrid (Spain).

WAVE-LENGTH (METRES)	NAME
418	Berlin (Witzleben).
416	Rabat (Morocco).
413	Dublin (2 R N) (Ireland).
408	Katowice (Poland).
403	Sottens (Switzerland).
398·9	Midland Regional Station (Gt. Britain).
394	Bucharest (Rumania).
390	Frankfurt (Germany).
385	Toulouse (Radio) (France).
381	Lwów (Poland).
376·4	Glasgow (5 S C).
372	Hamburg (Germany).
363·4	Algiers (N. Africa).
360	Mühlacker (Germany).
356·3	London Regional Station.
349	Barcelona (Radio Barcelona).
345	Strasbourg-Brumath (France).

WAVE-LENGTH (METRES)	NAME
338·2	Brussels No. 2 (Belgium).
332	Naples (1 N A) (Italy).
328·2	Poste Parisien (Paris).
325	Breslau (Germany).
322	Göteborg (Sweden) (relays Stockholm).
319	Sofia Rodno-Radio (Bulgaria).
316	Marseilles (P T T) (France).
312·8	Cracow (Poland). Genoa (Italy). Radio-Vitus (France).
309·9	Cardiff (5 W A), 1·2 kw.
304	Bordeaux-Lafayette (PTT), (France).
301	Aberdeen (2 B D), 1·2 kw.
298·8	Hilversum (Holland).
293	Kosice (Czechoslovakia).
288·5	Bournemouth (6 B M). Dundee (2 D E). Edinburgh (2 E H).

WAVE-LENGTH (METRES)	NAME
288·5	Newcastle (5 N O). Plymouth (5 P Y). Swansea (5 S X).
283	Berlin Relay (Germany).
276·5	Heilsberg (Germany).
274·2	Turin (Italy).
268	Barcelona (E A J 13).
263	Moravská-Ostrava (Czechoslovakia).
261·3	London National Station.
259	Leipzig (Germany).
257	Hörby (Sweden).
253	Gleiwitz (Germany).
242	Belfast (2 B E) (Ireland), 1·2 kw.
239	Nürnberg (Germany).
237·2	Bordeaux-Sud-Ouest (France).

STATION INFORMATION

Interesting radio items from abroad.

VIENNA time is now the same as English, its normal lead of one hour being off-set by the fact that Austria does not observe a Summer Time.

* * *

ISTANBUL (or Stamboul) listeners have been informed that a studio is to be erected in the nave of the world-famous Sophia Mosque.

* * *

KONIGSWUSTERHAUSEN (on 1,635 metres) should come in with greater vigour now that the power is being increased from 35 to 75 kw.

* * *

FRANKFURT and **LEIPZIG** will exchange wave-lengths when their new transmitters are put into action. They should be ready by or before Christmas.

SAN FRANCISCO fits its underground trains with microphones and speakers so that the guard can inform passengers of the stations as the train approaches.

* * *

BORDEAUX LAFAYETTE is now regularly using its increased power.

* * *

HEILSBERG is working on 75 kw., but its power can be increased to 120 kw. if necessary.

* * *

MOSCOW is often mistaken for a German station, owing to the fact that many announcements are preceded by "Achtung! Achtung!"

* * *

NEW YORK claims the world's biggest radio receiver. It is fitted in a hotel, and each of the 2,000 rooms can switch on any one of six programmes as required.

* * *

ROTSURBEN is the actual site of Breslau's new transmitter, now being erected. It will work on 325 metres.

LANGENBERG listeners expect their station's power to be increased to 75 kw. very shortly. It is now 17 kw., and the charge should considerably increase its range.

* * *

PRAGUE uses a gramophone recorder during auditions and rehearsals, so that performers can hear their own voices, etc., and correct faults.

* * *

BERLIN broadcasting authorities are contemplating the advisability of running an opera house for the benefit of radio licensees.

* * *

HUIZEN and **HILVERSUM** changed over to Dutch Summer Time on May 15th, and their time is now twenty minutes in advance of B.S.T.

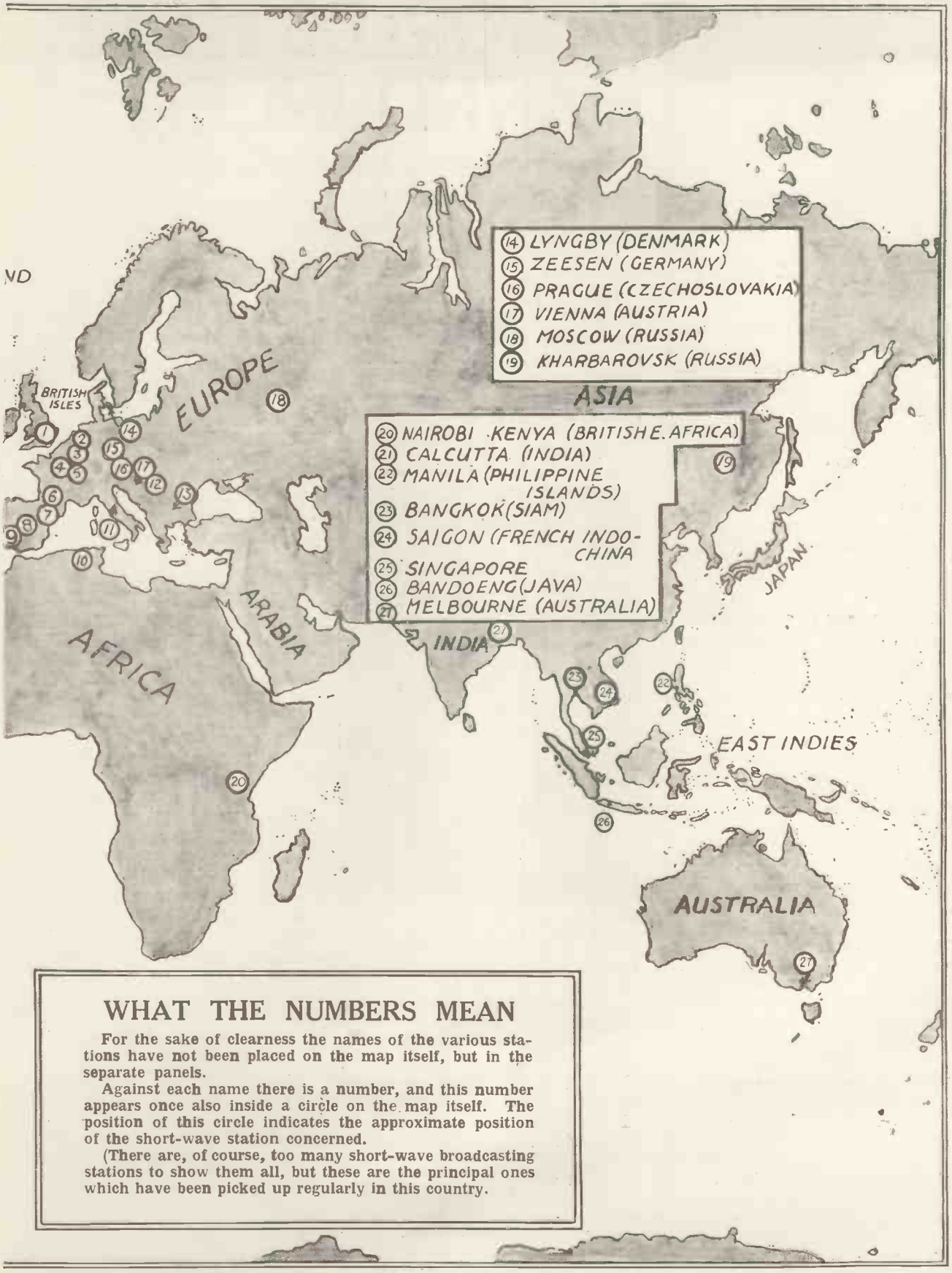
THE WORLD'S PRINCIPAL SHORT-

THE WAVE-LENGTHS USED

Below are the numbers marked on the map with the corresponding wave-lengths of the various stations.

No.	Wave-length (Metres)	No.	Wave-length (Metres)	No.	Wave-length (Metres)	No.	Wave-length (Metres)
1	25·53	11	25·4	21	25·27	31	31·35
2	16·3	12	30	22	24·5	32	49·18
3	31·28	13	21·5	23	37·76, 29·5, & 16·9	33	34·63
4	41, C1, & 32·5	14	31·51	24	49	34	31·3
5	15·5	15	31·38	25	41·7	35	19·72
6	10·75	16	58	26	28·2 & 36·92	36	—
7	50	17	49·4	27	31·56	37	49·5
8	43	18	50	28	49·22	38	21·3
9	42·9	19	70·1	29	25·34, 49·34, & 49·83	39	48·62
10	45	20	49·5	30	62·5, 54·52, 49·67, 49·02, 31·48	40	48·35
						41	44·6
						42	28·98

WAVE BROADCASTING STATIONS

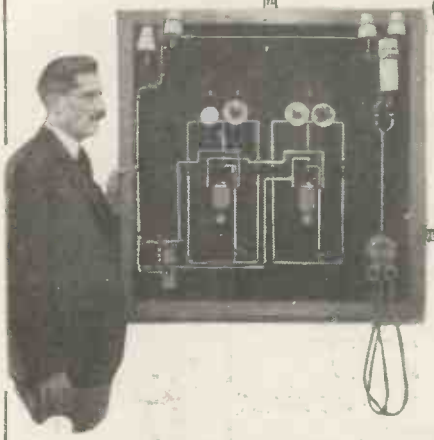


WHAT THE NUMBERS MEAN

For the sake of clearness the names of the various stations have not been placed on the map itself, but in the separate panels.

Against each name there is a number, and this number appears once also inside a circle on the map itself. The position of this circle indicates the approximate position of the short-wave station concerned.

(There are, of course, too many short-wave broadcasting stations to show them all, but these are the principal ones which have been picked up regularly in this country.



The WORLD'S FIRST —ANNOUNCER—

An interesting account of one who was a trained announcer before broadcasting began.

By A. A. GULLILAND.

I AM not going to tell you about a man who did announcing for Moses or for Noah way back when the world was young. It is the life story of a man still going strong, still announcing, the story of a real live radio announcer.

It is only right that the world's first announcer should belong to the world's first broadcasting system. This was opened in 1893 at Budapest, Hungary. Telefon Hirmondo was the rather picturesque name it went by and still goes by.

Announcing in the "90's"

A system of wires connected up all paying listeners to the studio. And even though wires were used, I think Hungary can claim that its Telefon Hirmondo was the world's first broadcasting system. Performances from the Royal Opera House were broadcast, but the main idea of the Telefon Hirmondo was the broadcasting of the latest news items every half hour.

And it was in 1907 that Eduard von Scherz was appointed permanent announcer to the Telefon Hirmondo. There must have been one before him, certainly, but Scherz is the only man who has been doing radio announcing since 1907, and is still at it now.

I went to see him at Budapest. Heard him speak in front of the microphone, recognised his voice from many an entertaining evening spent in front of my loud speaker listening to Radio-Budapest.

He Starts Broadcasting

Eduard von Scherz is the son of a wealthy landowner. He is just a little over fifty, and told me of the time when he married, how he spent his honeymoon on the Riviera, and used to haunt the Casino, till he had to get more and more money sent him; and then one day he lost it all.

Then he met an old friend, the director of the Urania, in Budapest. The Urania, a kind of lecture society, required a man who had a good voice to read lectures to the members.

And here in the Urania, now a cinema and exactly opposite the old studios of the Telefon Hirmondo, near the same building in which Radio-Budapest had its first studios, here the director of Telefon Hirmondo discovered Scherz. Heard his voice, heard that he spoke German and French fluently besides his native Hungarian, and immediately gave him a contract.

He told me of a bad storm, just before the Easter of 1910, when the complete wiring of the Telefon Hirmondo was blown down. When the whole company would have had to close down if the distributing system was not got going again within a week.

ANNOUNCING EVER SINCE 1907!

Mr. Scherz was in the "Hullo, Everybody" game long before broadcasting began!

Scherz offered his services. He got a gang of workmen, and there he was clambering up ladders, crawling about the roofs of Budapest, arguing with lazy workmen, getting the whole wiring system up again.

And within the week it was accomplished! Listeners could sit down comfortably with their single earphone (a single earphone was used in those days) and could listen to Scherz's voice telling them that the Crown Prince had been shot in Sarajevo.

A Tremendous Scoop

Scherz had heard this startling news from a friend in Sarajevo, and he had realised the scoop that this was for Telefon Hirmondo and immediately put it through. Nobody else in Budapest had heard the terrible tidings.

The directors came and told him that he would have to take the full responsibility, which meant that if the news was a fake he would hang, or that if it *were* true he could be sure of a medal and honours. A whole hour passed in suspense, then the official news came through—the news that the Crown Prince had been shot in Sarajevo on June 29th, 1914, the news that was to be the cause of the Great War.

Eduard von Scherz was the hero of Budapest. The Telefon Hirmondo had been an hour ahead of any other source of information.

Still Going Strong!

Then came the war. Scherz was at the Front doing his bit. A few years later, in 1924, wireless broadcasting cropped up.

Radio-Budapest has four announcers now, but Scherz is regarded by those in front of the microphone and those in front of the loud speakers as Radio-Budapest's voice. And long may he continue his work.

CANADA'S SHORT-WAVERS

Some sidelights on the part radio is playing in the development of the great Dominion of Canada.

From a Special Correspondent.

ON the tenth floor of the Winnipeg Grain Exchange Building is the private office of James Armstrong Richardson. That name in Canada is synonymous with wheat. For this six-foot Canadian is president and general manager of the largest wheat exporting firm in the world.

He is a young man—forty-five. He is big mentally and physically. He is the biggest big-business man in the Canadian West. And he is also the largest user of radio in the whole of the Dominion of Canada.

Right "On the Air"

The name of James Richardson is on the air every day of the year. It is on the air not only in voice, but also in code. From Montreal to Vancouver and from Winnipeg to the Barren Lands that name goes on the air day in and day out for 365 days a year.

It is spelled out in dots and dashes in regions where few white men live, and it finds its way out of the loud speaker in thousands of homes in more settled regions of the Canadian West.

C J R M and C J R W are the call letters of the two stations which tell farmers and urban dwellers of the Canadian West the market prices of wheat and other grains. Situated at Moose Jaw and Fleming, both in Saskatchewan, these stations operating on 500 metres are known to the radio public as the voice of James Richardson & Sons, Limited.

THE MAN BEHIND IT ALL!

MR. JAMES RICHARDSON whose widespread activities involve the use of a telegraph system and an extensive chain of broadcasting stations.

Somewhere in West Africa a man tunes in once a week to hear the English Soccer results. He turns his dials to 25·6 metres.

News Across the World

He knows from experience exactly when to tune in to hear what most interests him from the homeland. And exactly on the dot in rolls C J R X at Middlechurch, Manitoba, 6,000 miles distant. C J R X is the only short-wave station that can be heard in that part of West Africa, and the news that has to span the Atlantic Ocean and then penetrate the very centre of Canada finds its way to this far-flung section of the British Empire.

C J R X is the only short-wave broadcasting station actually on the air daily in the Dominion. It also has an experimental licence, V E 9 C L. It is the voice of James Richardson on the short waves.

The Market Centre

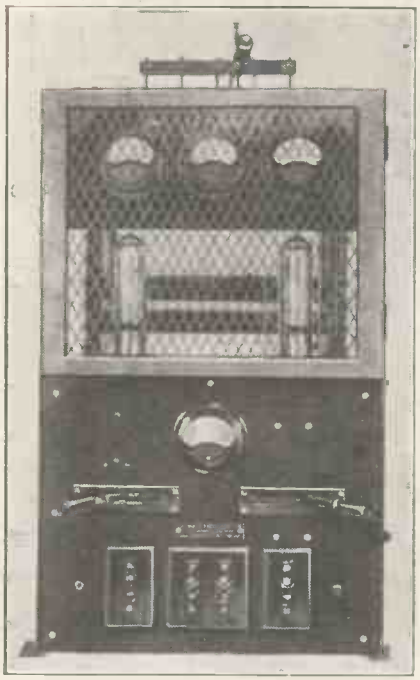
Winnipeg is the market centre of the Canadian grain trade. Here the world bids for 40 per cent of its wheat supply.

Here James Richardson has three

A Network of Radio Communications

short-wave stations which disseminate the market reports and the buying and selling orders of his organisation to all parts of Canada. C K D, C K L and C K W are the call letters of these stations, all operating below 50 metres.

FOR AVIATORS



Messages to aviators and aviation stations are handled by this short-wave transmitter.

From these three centrals go forth the quotations that are picked up at other stations owned by this broker at Vancouver, Edmonton, Calgary, Saskatoon, Moose Jaw, Brandon and Montreal. From Montreal, Saskatoon, Moose Jaw and Calgary quotations and reports come winging their way to Winnipeg.

Only the One Chain!

In all, eleven short-wave licences have been granted by the Canadian Government to this young man to carry on his own telegraph system by means of radio. And this is but one chain that he operates. The broadcasting stations mentioned are entirely separate and used for a different purpose.

In case you ask why a grain broker needs so elaborate a system of communication, it might be well to mention that James Richardson is a director of the Canadian Pacific Railway, the Canadian Bank of Commerce, the Hudson Bay Company, International Nickel Company, as well as interested in numerous other well-known international Canadian financial and commercial institutions.

Joy-Rides for Eskimos

Again, because he is a young man with a clear vision of the future he is in the airplane business. That is another of his hobbies where radio plays a part. He is sole owner of Western Canada Airways, a unit of Canadian Airways, which is said to be the first air transport company in the world to be operated on a paying basis.

That was five years ago, when the gold rush into Northern Ontario took place, and he engaged pilots and 'planes to take prospectors and supplies to open up the northland. So wide is the network of 'planes operated by him, that he even operates a taxi service at Aklavik, on the Arctic Ocean, in the summer, when Western Arctic Eskimos are given airplane rides.

Wonderful Organisation

All those 'planes are kept together by a network of radio stations. Wherever one travels in the northland one will be able to send word back to civilisation through one or other of the stations.

In Northern Ontario, Hudson, on the transcontinental railway, is an airplane base. It is the hopping-off point for the north. No rails go north from this growing community, which a few years ago was merely a signal stop in the wilderness.

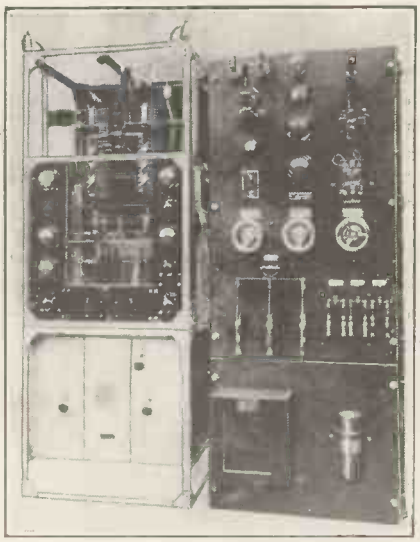
At Hudson, C G K keeps in contact with all 'planes in northern Ontario through the stations of the Ontario Department of Lands and Forests, which has a chain of stations at fire rangers' cabins throughout this region.

His Aerial Hobby!

In Northern Manitoba, The Pas and Cold Lake are the despatching centres for 'planes which wing their way with men and supplies even to the Arctic Circle and beyond. These stations are in easy and direct communication with C G L, the headquarters of the air transport company at Winnipeg.

On the west coast the name of James Richardson's aerial hobby and money-making toy goes forth from V F M at Vancouver and V F L at Swanson Bay, half-way up the coast. These stations, also operating as do the other stations of the company around 60 metres, keep traffic moving between the air bases at these points, from where operations are carried on to Prince Rupert.

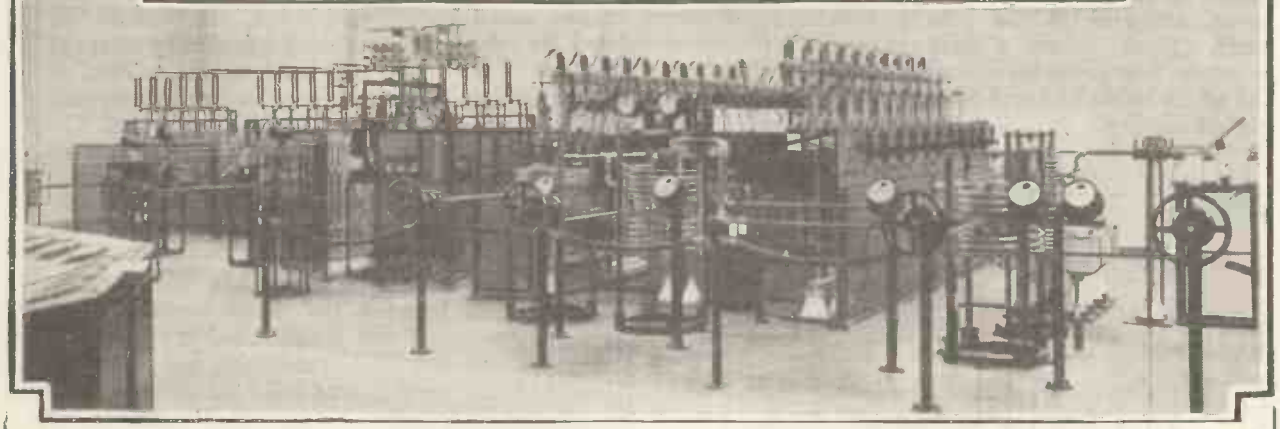
IT HANDS OUT HALF A KILOWATT



This is a 500-watt transmitting installation of the type used for keeping the northland in touch with the cities.

James Richardson is not all business man, he finds time to be chairman of the finance committee of the National Education Council and Trustee of Queen's University at Kingston.

— MORE — ABOUT MÜHLACKER



Some inside information about the giant German station that "sits on" the London Regional.

By Dr. ALFRED GRADENWITZ.

THE first two of the chain of high-power stations (Mühlacker and Heilsberg), destined to cover the whole of Germany, have been completed and put into operation. The former, Germany's first giant, has been causing quite a stir in this country owing to its interference with the London Regional.

Strong Modulation

Mühlacker is situated in Southern Germany, on a hill near the little town of that name, half-way between Stuttgart and Carlsruhe, and works on a 360-metre wave. Its output is 75 kw., with a 75 per cent modulation, thus exceeding more than 40-fold the output of Stuttgart. Moreover, the various parts have been so designed as to enable the output of the new transmitter to be raised to twice this figure at short notice.

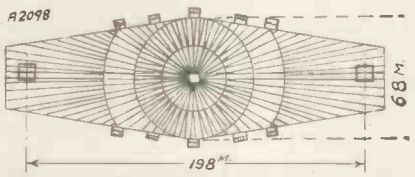
A new feature of the station is that the building is not situated midway between the two masts, according to the usual practice, but at a distance of about 415 ft. from them, being connected with the aerial by a power line.

Two-Storied Building

Owing to the slanting ground there was no difficulty in providing a "basement" floor in the front part of the station building, thus producing a lengthy hall section, the façade of which is connected with a two-storied residential wing at both ends, each comprising two flats for officials and employees of the station.

On the ground floor there are, in addition to these flats and beside the rooms accommodating the central-heating plant and cooling water pumps, two large rooms where the high-tension regulators for the various generators are installed.

A GOOD EARTH

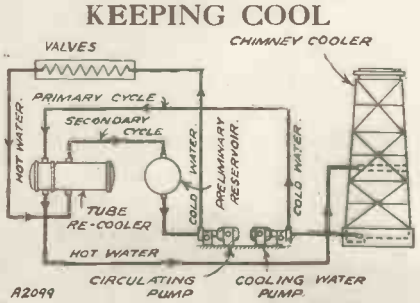


How the Mühlacker earth-system wires would appear from a point directly above the masts.

The machinery hall and high-frequency plant are in the hall section of the main floor, some small rooms for amplifiers and the like being provided in between.

On the right, next to the machinery hall, there is the low-tension switch gear and, beyond a corridor, the high-tension cells, behind which the transformer chamber, accessible from outside, are situated.

KEEPING COOL



An out-of-doors water cooler is one of the features at Mühlacker.

A Vertical Aerial

The power conductor already referred to, leading from the station building to the aerial, is suspended from telegraph poles. Two wooden masts, each 330 ft. high and about 660 ft. apart, carry the aerial. No iron has been used, not even for reinforcing; and hemp ropes are employed to support the aerial.

A vertically suspended cage aerial, about 280 ft. long and 1 ft. in diameter, is used. Its height corresponds to nearly one-fourth of the wave-length of the station. At its lower end the aerial terminates in a tuning cabin situated midway between the two wooden masts.

A net of copper wire was dug into the ground to serve as earth; this radiates in all directions from the tuning cabin and is made up of bronze wire connected together by three ring conductors. Copper plates dug into the ground and connected to the earth system by good conductors serve to improve the earth.

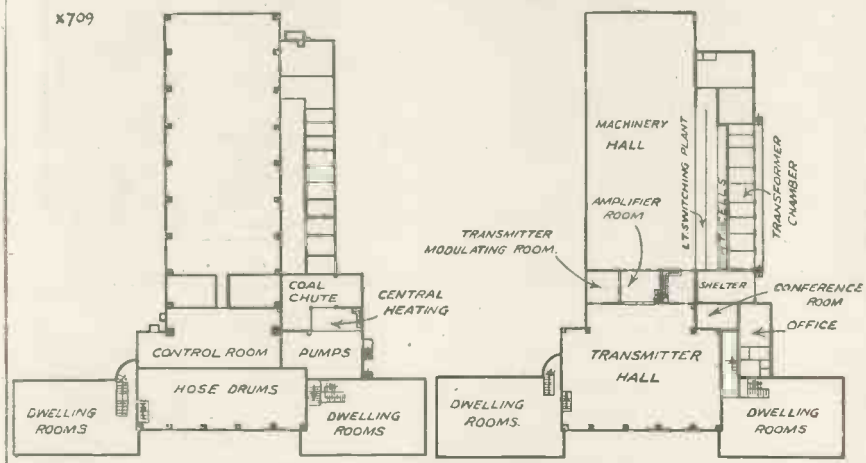
15,600 Volts

The power required to operate the station is supplied by two self-contained power systems. Cables are used to carry the power to about 650 ft. from the station building, to an open-air transformer plant, whence the energy at 15,600 volts–50 cycles is taken into the transmitter building.

The Seven Stages of Mühlacker

There are twelve transformer chambers in all, only half of which, however, are used at the present moment. These contain a lighting transformer, two power transformers, one of which serves as stand-by, and all the oil switches.

A VERY MODERN LAYOUT



A plan of the station buildings, forming an interesting contrast with the layout of our own Regional stations.

Also, there is an anode transformer and rotary transformer, a choke for the rectifier system and a change-over switch connecting either with the anode transformer or the 12,000-volt high-tension generator.

The sixteen high-tension cells connected up to the transformer chambers comprise all the disconnecting switches, fuses and overload relays used in operating the transformers, as well as measuring apparatus, reactance coils and change-over switches for the various anode tensions.

The Switchboard

Next to the high-tension cells there is the generator switchboard, which is made up of fifteen panels. While five of these have been set apart for apparatus eventually to be added, panels 3 and 4 are used for the 380-volt leads of the two power transformers, panels 6 and 8 for measuring apparatus, auxiliary converters and the cooling water pumps, and the rest for the high-tension machines and converter sets. On the right there are the starting transformers for the 12,000-volt machine, and the 2,000-ampere heating current generators.

The Mühlacker high-power transmitter comprises seven successive stages. The aerial is coupled to a secondary circuit, reducing as far as possible any upper harmonics. The coils and condensers of the aerial circuit are accommodated in the aerial tuning cabin, the earthing switch of the aerial being fixed on its outside wall, and being operated automatically from the switch desk of the transmitter room.

The first three transmitter stages are accommodated in some sort of desk, and are screened against one another.

In the remaining stages there has been adopted the open arrangement that has lately won so widespread appreciation. All parts of the high-frequency vibratory circuits are installed in the open hall, without any switchboard front, the various instruments being operated by means of levers and hand wheels. This, of course, ensures a straightforward arrangement of the whole plant. The modulator, which is screened on all sides, has been accommodated in the valve frame of the last stage but one.

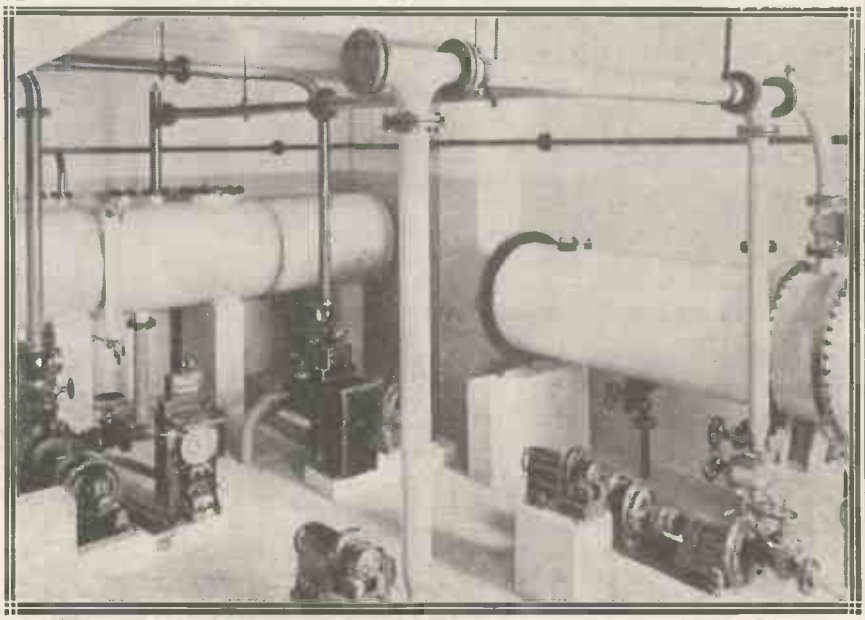
Smoothing Scheme

A filter chain has been inserted between the direct current circuit and the transmitter, thus reducing any D.C. pulsations, and the same arrangement has been adopted in all anode circuits. All heating generators have been fitted with sound-damping chokes, and overload relays have been provided wherever required.

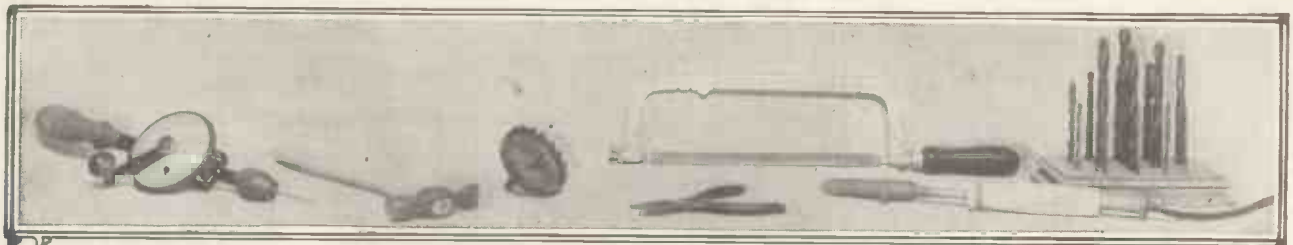
The aerial circuit comprises coupling condensers and variometer for continuously altering the wave-length. An artificial aerial in the cellar is used for experimental purposes and in tuning.

The transmitter is controlled either from Stuttgart or Carlsruhe, through a cable split at Pforzheim, where it is changed over to the former or latter as desired. A special radio cable connects the split with the transmitter station, where a line amplifier has been provided which comprises arrangements for correcting distortion and adjusting volume.

ENSURING A GOOD CIRCULATION



This is an interior view, showing some of the water-cooling plant for the valves



NOTES ON LONG WAVES

Now that full summer conditions prevail the superior carrying-power of long waves is well demonstrated by Europe's long-wave stations. A good set will provide long-wave alternative programmes during daylight without difficulty, but will often be baulked by anything below the 1,000-metre mark.

* * *

As expected, the high power of Warsaw (on 1,411 metres) is resulting in the usual follow-my-leader tactics, and Radio-Paris and Konigswusterhausen both report that increased power is necessary in their cases as well. Since the long-wave stations are less liable to heterodynes than lower wave-lengths, it is probable that the British listener will approve of this trend towards higher power on the high wave-band.

* * *

There has been some discussion on an even more important aspect of the long-wave power problem, viz., the desirability of strengthening the output of 5 X X. Capt. Eckersley is reported to be in favour. (And everyone "in the know" believes that his opinion carries great weight with the B.B.C., even though he is not now Chief Engineer.)

* * *

Another long-wave topic which has been much discussed is the power actually employed by Moscow (T.U.). Theoretically, it is 75 kw., but many listeners get better reception from Moscow than from Warsaw, who is using 158 kw.

* * *

One excellent feature of the Moscow programme is the care taken over announcements. Both the man and woman announcers speak clearly and slowly, and as they often follow one another—saying it all over again—their programmes on 1,304 metres are among the most easily recognised in Europe.

* * *

Very often two or three different languages are used by Moscow for his announcements, and as English is a great favourite a little patience in "hanging on" will generally reward the uncertain listener with a definite statement, "Hallo! Moscow calling!"

* * *

Another interesting point about Moscow is its slogan, which can often be heard, spoken (in English, too) with great distinctness. It is—as you probably know, or can guess—"Workers of the World, Unite!"

* * *

It would be all to the good for long-distance listening if other European stations had a slogan, as they do in America. One short, catchy sentence, repeated, say, every hour or two, gives a foreign station an individuality and distinction that will never be forgotten by the distant listener.

* * *

If your set does not appear to be pulling its weight at this time of the year the commonest cause of trouble is a dry or poor earth connection. And long-wave listeners often lose a good deal more power than necessary because their sets employ a "selectivity condenser" in series with the aerial lead.

* * *

Even when set "all in" such a condenser can have a noticeable blanketing effect on long-wave programmes in some instances. The cure, of course, is to short it.

* * *

An ordinary on-off switch wired across it is the ideal way. If it has been proved by experiment that it pays to cut it out on long waves, the switch provides an instant and effective means of restoring the aerial's selectivity for lower-wave stations.

Before going to the bother of fitting such a switch the effect of shorting your own selectivity condenser can be tried by means of a short length of flex, fitted with a crocodile clip at each end. Short the condenser experimentally by clipping this arrangement across it, and if that improves long-wave results it will probably pay you to wire an on-off switch in position permanently.

* * *

One pleasing feature of recent long-wave reception has been the wave-length "steadiness" of virtually all the stations. This good behaviour does not seem to have been commented upon as widely as it deserves.

* * *

The official check on the long-wave stations during the whole month of April, for instance, disclosed only two delinquents of importance. One was Boden (Sweden)—not by any means a favourite station in this country, because it puts out the Stockholm programme which goes out also from Motala, and is much more easily received via that station.

* * *

Even Boden did not shift about much during the period under review, the biggest deviation of all being by Oslo, which dropped four metres or so at the beginning of the month, and then remained steady

ABOVE 1,000 METRES

Wave-length.	Name of Station.	Remarks.
1935	Kaunas (Lithuania)	—
1875	Huizen (Holland)	8·5 kw.
1796	Lahti (Finland)	54 kw.
1725	Radio Paris (C F R)	17 kw.
1635	Konigswusterhausen, Zeesen (Germany) (relays Berlin)	35 kw.
1554·4	Daventry National Station (Gt. Britain)	35 kw.
1538	Ankara (Turkey)	—
1481	Moscow (Old Komintern) (Russia)	—
1445·7	Eiffel Tower	15 kw.
1411	Warsaw No. 1 (Poland)	158 kw.
1352	Motala (Sweden) (relays Stockholm)	40 kw.
1350	Kasbah (Tunis)	—
1304	Moscow (Trades Unions)	—
1229·5	Boden (Sweden)	0·75 kw.
1200	Istanbul (Turkey)	—
1200	Reykjavik (Iceland)	21 kw.
1153	Kalundborg (Denmark) (relays Copenhagen)	10 kw.
1116	Novosibirsk (Russia)	—
1103	Moscow, Popoff (Russia)	—
1073	Rostov-Don (Russia)	—
1071	Oslo (Norway)	75 kw.
1060	Tiflis (Russia)	—
1000	Leningrad (Russia)	—

GETTING GOOD REACTION

On a simple set you must have good reaction control if you want to rope in the foreigners. Here are some of the reaction points to watch.

* * *

When no reaction, or extremely erratic reaction is obtained, a reversed reaction coil should be suspected.

* * *

In sets which employ a stage of resistance capacity following a detector valve, the value of the anode resistance should be checked. Too high a value of resistance will produce poor (or even complete absence of) reaction effects.

* * *

A freely oscillating valve of the H.F. or special detector type should be used in the detector valve holder.

* * *

Coupling condensers used with the "M.W." dual-range coil should have a maximum value of ·001 or ·002. The use of a condenser of too low a capacity rating, or one that is in any way defective, will very seriously affect the working of the set on the long waves.

* * *

The differential condenser used with this coil must be of good make. And have a capacity of ·0001–·0002. In many cases faults have been traced to this source.

* * *

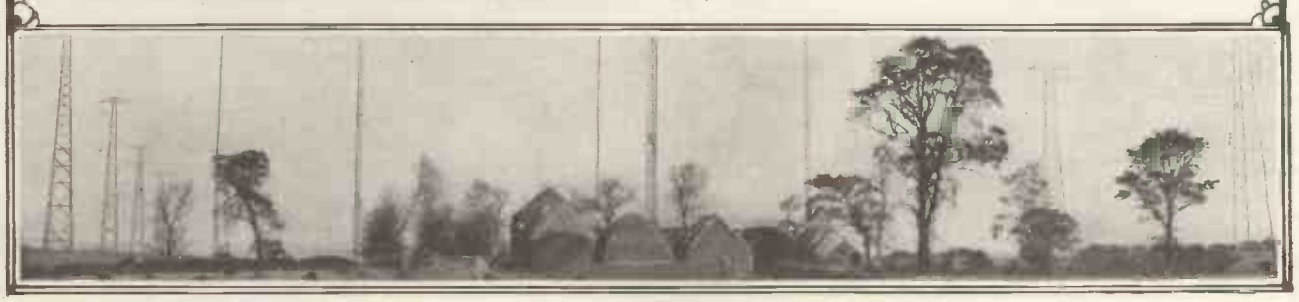
Reaction troubles may also be caused by the use of a poor quality H.F. choke, in sets where the H.F. choke is used for reaction purposes.

* * *

In all cases the value of H.T. which is applied to the valves should be carefully checked up, and the H.T. batteries, if of the dry cell or accumulator type, should be tested on load after the set has been working for a period.

* * *

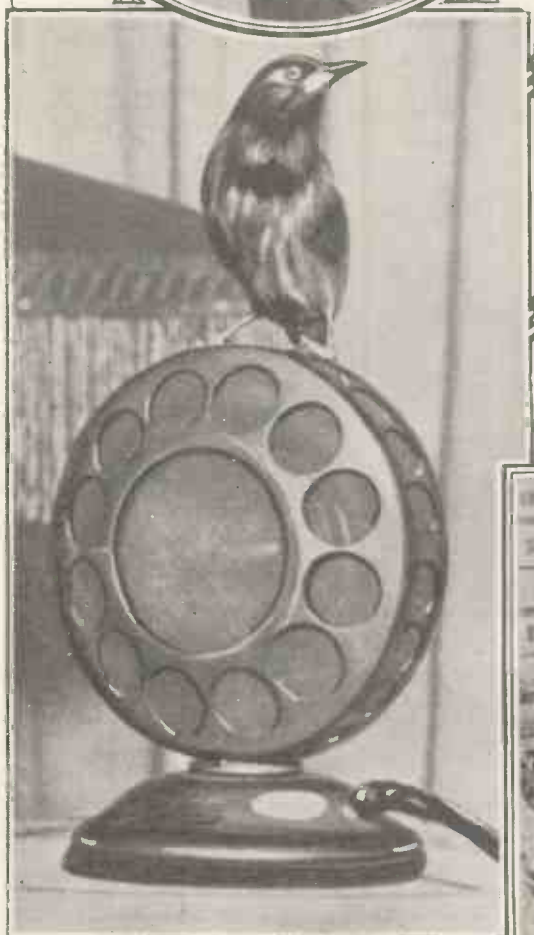
H.T. eliminators must be capable of giving the required current output. Mains units having a rated output of 20 m.a. or under are suitable only for receivers employing up to three valves if one of them is of the power type. (Sets which utilise super-power or S.G. valves require mains units with an output of at least 30 m.a.)



RADIO IN OTHER LANDS

The picture above shows the Pope broadcasting from the Vatican station.

Fitting Gas-masks on talkers before they are allowed to broadcast has been suggested in this country ! In Germany they have actually done it, but it was in connection with a talk on industrial perils, given from Munich.



This is a Troupial—a very rare bird who hails from the Amazon. There are only two in captivity, but they got this one to broadcast from New York.

Claiming to be Britain's most northerly permanent radio station, this Herschel Island shack is 200 miles north of the Arctic Circle.

Short-wave amateurs who work with W 3 A K B, of Philadelphia, should not call the operator " Old Man," for the reason shown above.

MAKING A TUNING CURVE

Some practical notes on an invaluable aid to reception.

The new Polish station at Lwów, now coming over in fine style on 381 metres. The power has been increased to 21 kilowatts.

ALL you need is a sheet of "graph" paper and the dial readings of, say, half a dozen stations. A pencil and a list of station wave-lengths will then enable you to plot a "curve" to show just how the stations stand on your set.

Along the bottom of your sheet you mark off degrees to correspond with the dial. With 0, 10, 20, etc., placed at equal intervals, each little up-and-down line will now stand for a certain dial reading.

On an Extenser dial this is beautifully easy—all the medium-wavers are below 100 and all the long-wavers come in at three-figure dial readings.

Up one side of the square you make similar equal divisions, but this time to represent the wave-lengths (say, 200 to 500 metres, or 1,000 to 2,000 metres if it is the long waves.)

Plotting the Stations

The next step is to put in dots for all the stations you can receive. If it is a long-wave dial you may know the positions of, say, 5 X X, Radio Paris, Moscow and Kalundborg. Suppose these come in respectively at 65, 73, 53 and 37 degrees, you must put the 5 X X dot on the up-and-down line corresponding with 65; and because 5 X X's wave-length is 1,554 metres, the dot goes exactly where the left-and-right line that stands for 1,554 crosses the up-and-down "65" line.

When you have put all six stations in like that you have a string of dots in a sort of line, so you take a pencil and lightly mark in a thin line to string the dots together. This line is your tuning curve.

You can now use it to look for other stations, or to identify those received. Suppose you tune in somebody at 68·5, for instance. What station is it?

Your curve shows that 68·5 cuts the wave-length scale at 1,635 metres. And your list of wave-lengths will show that 1,635 metres is used by Konigswusterhausen, so this is the station you have picked up.

An Example

Similarly, if you want Oslo on 1,071 metres, you look at the curve and find it cuts the 1,071 line at 30 degrees. So turn the dial to 30, and there (or very close to 30) you will find him.

The above figures are just examples, of course, and your own dial readings may be different. But once you try it the whole thing seems wonderfully easy, and it is certainly a tremendous help in picking up foreign programmes.

AMERICANS TO LOOK FOR

Special concerts arranged for DX listeners.

"M.W." readers able to pick up America direct may like to know of the Anglo-American Radio Society Concerts which are broadcast from time to time from some 17 American stations.

These concerts are broadcast from the following stations:

	Metres.
K M T R, Los Angeles, Cal.	526
W O R, Newark, N.J. ..	422·3
(Will probably broadcast a test, and the short-wave relay W-2 X C X would then probably participate.)	
C K W X, Vancouver, B.C.	410·7
C M X, Havana, Cuba ..	333·1
W T I C, Hartford, Conn. ..	282·8
(Will broadcast a test after the W E A F-W T I C synchronised transmission has been settled.)	
W P G, Atlantic City (Tests)	272·6
4 N R H, Heredia, Costa Rica	272
W H B Y, Green Bay, Wisc.	249·9
W N B O, Washington, Pa.	249·9
C K P C, Preston, Ontario	247·8
K F O R, Lincoln, Nebraska	247·8
K G C X, Wolf Point ..	228·9
W J A C, Johnstown, Pa. ..	228·9
W-2 X C X, Newark ..	49·31
(See W O R)	
V E-9 G W, Bowmanville	49·22
H R B, Tegucigalpa, H.R. ..	48·7
4 N R H, Heredia, Costa Rica	30·88

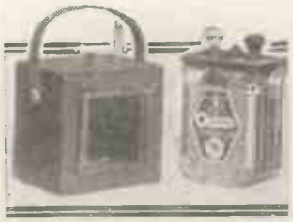
Prizes for Reports!

Anyone receiving concerts dedicated to the A.-A.R.S. from any of the above stations or other stations which will shortly participate not given above should send details of programme heard to the headquarters, A.-A.R.S., "Kingsthorpe," Willowbank, Uxbridge, England.

There is no entrance fee or obligation, but prizes are offered to make a bit of excitement for those hearing the concerts.

THOSE LONG-DISTANCE RESULTS!

Not everybody believes all that the radio men claim to be able to do!



Of all the hobbies that divert a tired public when its work is done radio reception is surely the strangest. To get home tired, to vow to go to bed early, to put out the cat and lock the door, and then to find oneself sitting up late after all because there's a good concert in Rome, or a fight in New York—that is a strange state of affairs, is it not?

A Challenge

Stranger still is the fact that some people *don't believe it can be done!* Quite honestly they don't believe it.

The following extract from a letter to the Editor illustrates the point perfectly. The writer says:

"Dear Sir,—My attention has recently been attracted by the large number of claims of reception of America.

"Now what I am going to say will probably cause a sensation, but it is my intention to haggle wireless enthusiasts until they give us *proof* with the lists of stations they claim to receive.

"Looking through your April issue I found several doubtful reports.

"Among the most remarkable was a report from Mr. Leslie W. Orton, president of the Anglo-American Radio Society, in which he claims reception of a remarkable number of distant stations.

"D.X. in 'The World's Programmes' is another offender, whilst W. L. S. in 'On the Short Waves' writes: '. . I was logging U.S.A. amateurs literally in hundreds.' A truly remarkable claim!

Proving Claims

"Now what I want to know is, can these genetlemen produce proof of what they claim?

"I do not think anyone has attempted the feat of making the D.X. man prove his claims, but I am attempting to do so.

"This challenge is to all D.X. enthusiasts and I expect answers, particularly from those I mention, and if I don't get them I can only think one thing: D.X. men are like fishermen!

"Yours truly,
"JEAN D'VINCENT.

"Denham,
"Bucks."

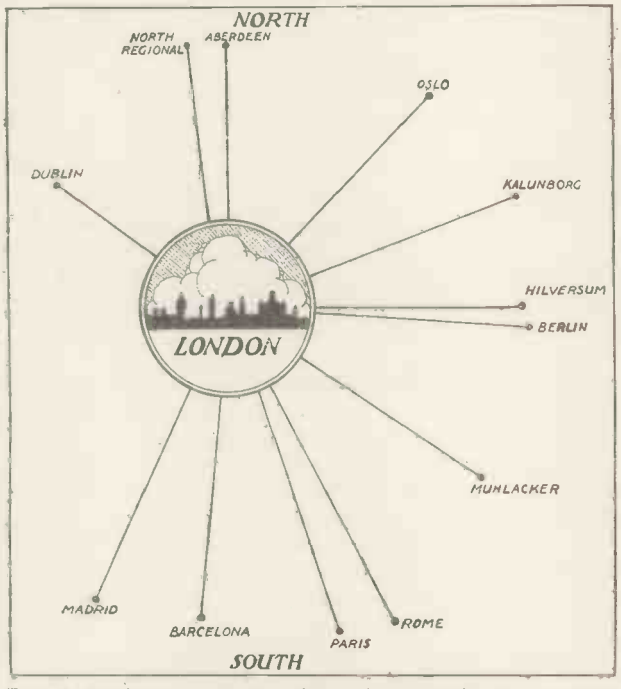
As a matter of fact, that is just how we felt about such long-distance results years ago. Surely it was impossible to pick up America direct, on a simple set, and without special short-wave coils, we thought!

And then we had the best proof of all, for *we did it ourselves*. Repeatedly! And even on a simple one-valve set.

It is not an easy thing to *prove* to other people, however, for it may mean much midnight oil. And the sceptical visitor may have a suspicion he is being tricked, unless he knows *and can trust* the other fellow.

Yet there must be plenty of proof. Hundreds of letters are in existence written by the officials of American broadcasting stations and acknowledging item by item the correctness of a programme received in this country. And scores of reputable witnesses—clergymen, justices and so forth—who will be able to testify to having picked up American broadcasting on ordinary wave-lengths, beyond the shadow of a doubt.

DO YOU USE A FRAME?



To get maximum strength with a frame aerial its windings should be pointing at the station required. For instance, to get Aberdeen the London listener should place his aerial in line North and South. This sketch shows London district listeners how to point their frames to get maximum strength from the more important European stations.

The other side of the picture is well depicted by another extract from a letter written by Mr. Orton, one of the very claimants referred to! This is what *he* says:

The Other Side

THE EDITOR.

"Dear Sir,—I had a really good night on April 6th. The best night, I consider, that I have ever experienced for American medium-wave reception in my radio career, which is by no means a short one.

"I logged quite fifty American stations, and at 3 a.m. there was hardly a point on the dials that was not occupied with one or more American stations.

"Among the stations I logged between 12 mdt. and 4 a.m. here are a few:

"WTIC, Hartford, Conn. (This station is working on about 5 kw. at present, according to my friend, Mr. Randall, the Chief Engineer, owing to their reducing to a minimum distortion at New Haven, Conn., caused by the sky waves coming slightly out of phase); WHAM, Rochester, N.Y.; WOWO, Fort Wayne, Ind.; WRVA, Richmond, Va.; KDKA, Pittsburg, Pa.; WBT, Charlotte; WLBL, Stevens Point, Wisc.; WJZ, Boundbrook, N.Y.; WHK, Cleveland, Ohio; WPG, Atlantic City, N.J.; WIOD, Miami Beach, Florida; WJJD, Mooseheart; KMOX, St. Louis, Mo.; KOA, Denver, Col.; WCSH, Portland, Maine; WRUF, Gransville, Florida; WSB, Atlanta, Ga.; WCAU, Philadelphia, Pa.; WGY, Schenectady, N.Y.; CNRL, London, Ontario, etc.

Too Many!

"Strength from all stations was remarkably constant, and very little fading was noticeable. Static was less troublesome than usual and luckily did not appreciably hinder the catching of announcements. My regret was that I could not catch the calls of all the stations I heard, but as they all announced at about the same time (every quarter of an hour) I could not do so.

"Yours truly,
"LESLIE W. ORTON.
"President Anglo-American Radio Society."

SUPER-STATIONS OF THE U.S.A.

The Federal Commission's New Rulings.

The maximum power permitted to broadcasting stations in the U.S.A. is 50 kw. And only eight stations are to be allowed this maximum power, there has been keen competition amongst American stations to be "one of the eight," and the Federal Radio Commission has now made the following high-power allocation:

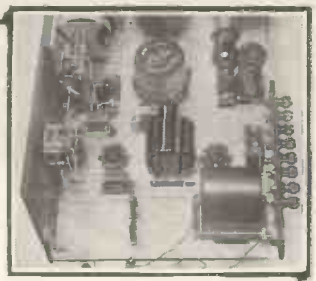
WJZ, New York (30).
WCAU, Philadelphia (10)
WSM, Nashville, Tenn. (5).
WSB, Atlanta, Georgia (5).
WCCO, Minneapolis (7·5).
WGN, Chicago (25).
KPO, San Francisco (4).
KOA, Denver, Colorado (12·5).

The figures after the names indicate the power in kilowatts being used at the time the new allocation was made. In future all these stations will be using 50 kw.

Certain experimental stations will be permitted to use far greater power than the above, but so far as ordinary broadcasting is concerned the super-stations of the U.S.A. will be the eight named.

The British listener interested in American reception will at once notice several conspicuous absentees, such as KDKA, East Pittsburg, and WGY, Schenectady. These two are not taking back seats in any way, but are included in the experimental class of stations.

NEWS FROM THE STATIONS



Interesting items from all over the radio world.

LIBLICE, or **CESKY BROD,** the new Czecho-Slovakian station that will work on 486 metres, is to have a power of up to 120 kw.

* * *

BRNO has recently put a new high-power transmitter into action on 342 metres.

* * *

PRAGUE has built itself a new "Broadcasting House," and the studio there will be opened shortly.

* * *

BUDAPEST has decided to erect a 150-kw. station near the present one, which has a power of only 23 kw.

* * *

RADIO SOTTENS (403 metres) has a man announcer when the programme comes from Geneva, and a woman when it is from Lausanne.

* * *

BEROMUNSTER has been coming over well on Zurich's old wave-length of 459 metres.

* * *

PRETORIA has been reopened as a relay station.

* * *

EAST LONDON and **BULAWAYO** are agitating for relay stations to augment the programmes receivable from Cape Town, Johannesburg, and Durban.

* * *

THE POLAR SUBMARINE to be used as a base by Sir Hubert Wilkins in his undersea voyage to the North Pole will keep in touch with civilisation by short-wave radio.

RADIO VITUS has been broadcasting a series of advertising concerts on Wednesday evenings at 8 p.m., on 312·8 metres.

* * *

MONTE CENERE, the powerful Italian-speaking Swiss station to be in action this year, will have its studio at Lugano. It will use a wave-length of 720 metres

* * *

HUNGARY has commenced the construction of five new relay stations.

BORDEAUX-SUD-OUEST has been causing much discontent by wave-length wobbles. Nurnberg being specially affected by this.

* * *

HILVERSUM is so strong in daylight on parts of the East Coast that his transmissions are preferred to the British programmes.

* * *

REYKJAVIK, the Icelandic station on 1,200 metres, has now been heard in almost all parts of this country.

BASLE and **BERNE** (on 244 and 246 metres respectively) will be linked with the new station at Beromunster to radiate Switzerland's German-speaking programmes.

* * *

CHICAGO expects that W C F L, its Labour-controlled station, will be assigned an exclusive wave-length by the Federal Radio Commission.

* * *

CANADA now permits gramophone records to be broadcast after 7.30 p.m. for an average of half an hour daily. This was previously forbidden.

BARCELONA usually closes down with the phrase: "Buenos Noches, Señores e Señoras. Hasta manána, si Dios quiere"; which means "Good-night, Ladies and Gentlemen. Until tomorrow, God willing."

* * *

NEW YORK is now employing "focussed" microphones, which pick out one speaker from a crowd, for operatic relays.

* * *

BELLMORE, LONG ISLAND (W E A F), recently increased its power by increasing the percentage of modulation.

OHIO broadcast the parliamentary proceedings of the State Legislature to instruct listeners in the methods of law-making. Nobody minded

* * *

PALERMO should be on the air with a new station by the time these lines appear in print. The old Rome transmitter is being used, and a wave-length of 200 metres was chosen provisionally.

* * *

NEW YORK is hoping to exchange programmes with Berlin on Sundays, from June 15th onward.

* * *

BUCHAREST has completed an agreement with the local opera house for more operatic broadcasts on 394 metres.

* * *

ROME will soon have five modern studios in operation from its new Broadcasting House.

* * *

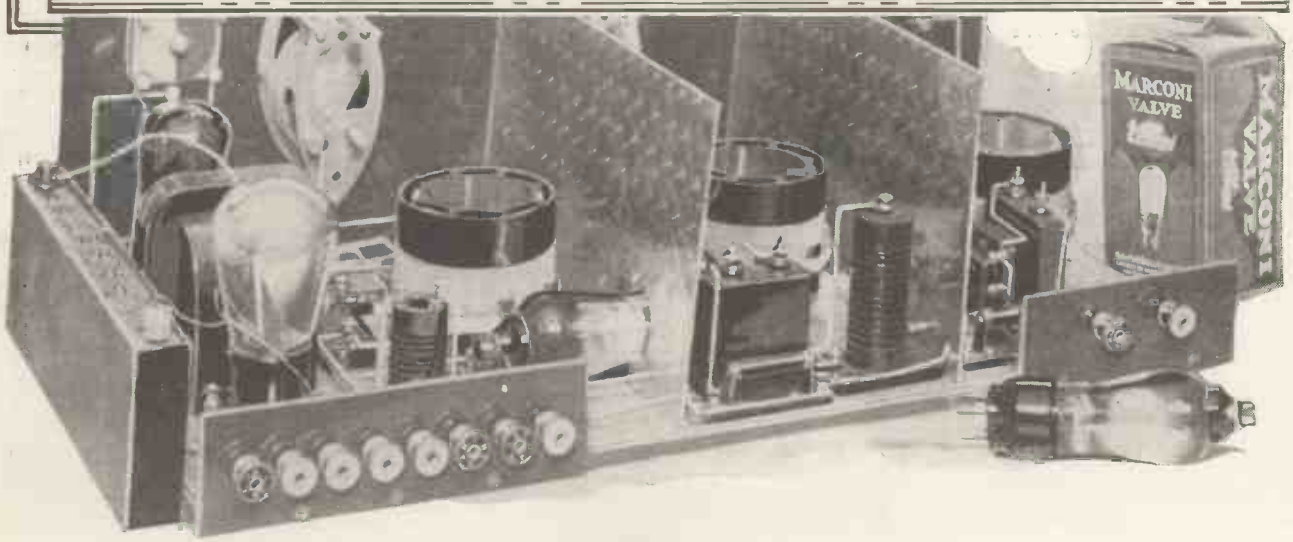
LEIPZIG is to broadcast a series of Bach's cantatas on Sundays on 259 metres.

* * *

RADIO POZNAN, which retransmits Polish programmes on 31·35 metres on Tuesday and Thursday evenings, is a 1-kw. station with the call-sign S R 1.

* * *

KAUNAS, the Lithuanian long-waver on 1,935 metres, generally begins his transmissions at noon, or thereabouts.



SHORT-WAVE SHORTS

Brief news items from the world's favourite short-wave broadcasting stations.

LYNGBY. This famous Danish short-waver, that radiates Copenhagen's programmes on 31·51 metres, was temporarily closed recently. It has now reopened on a new site at Skamlebaek.

* * *

BLOEMFONTEIN. South Africa has long been looking forward to a short-wave station of its own, and it is now likely that such a transmitter will be installed at Bloemfontein.

* * *

WASHINGTON. A sum of nearly £30,000 has been voted by the Federal Government to establish two experimental stations. They will be operated by the Bureau of Standards.

* * *

CHELMSFORD. The British short-waver on 25·53 metres has recently been received unusually well in Canada and the U.S.A.

* * *

EINDHOVEN. The PCJ programmes on Thursday afternoons on 31·28 metres are specially intended for British listeners.

* * *

LONG ISLAND. W2XV, the Long Island station, recently opened up on 62·5 metres, transmits on Friday afternoons, in addition to his 34·68-metre wave-length.

* * *

SAN LAZARO. This famous Mexican station, heard on 51·22, 25·5 and 20·5 metres, has changed its name to Chapultepec. The call-sign remains XDA.

* * *

JAPAN. Short-wave listeners have to obtain a Government licence before they can listen in Japan.

GEORGETOWN, BRITISH GUIANA. It is now officially confirmed that the report that Georgetown was to close down its short-wave programmes was correct. Many short-wave listeners who heard this station on 44·6 metres will regret it.

* * *

INDIA. Two new Indian short-wave stations are said to be under construction, and due to operate this year.

* * *

ST. ASSISE, FRANCE. A three-toned horn is the interval signal of both FTM and FTN, located at St. Assise, the respective wave-lengths being 15·5 and 24·46.

* * *

RUGBY. The call-sign GBU, on 16·1 metres, is used by this famous British Government station when working telephony to Deal, New Jersey, U.S.A.

* * *

GBS. These letters have nothing to do with Bernard Shaw, but form Rugby's call-sign on 16·36 metres when working with Ocean Township (WND), U.S.A.

MAKING A SONG ABOUT IT!

This is Sir James Sexton (left) and Mr. Ben Tillett, M.P., who have both served before the mast and so learned a lot about all kinds of waves! They broadcast a selection of sea shanties from London some months ago.

WINNIPEG. An increase in frequency has been made at this station, the VE9CL wave-length now being 48·7 metres.

* * *

NUEVO LAREDO. This is the name of a new Mexican short-waver. It operates on 40·7 metres, under the call-sign X26A, on Thursday afternoons from 5 to 6 p.m.

PRAGUE. Working on 58 metres on Tuesdays and Fridays at 8.30 p.m., B.S.T. (for two hours), this station can be identified by "Halo, Radio Praha." Reports on reception are welcomed by the Minister of Posts and Telegraphs, Praha.

* * *

NORTHERN NIGERIA. Amateur transmitters who are interested in the reception of their signals in Northern Nigeria are invited to write to Mr. R. Patterson, Mallam Maduri, via Kano, N. Nigeria.

* * *

TOKIO. Japanese amateurs have recently been active on 20 metres and thereabouts, between 5 and 6.30 in the evenings.

* * *

AMATEUR CALL-SIGNS. The call-sign of every amateur station in the world, with addresses, etc., will be found in the "Radio Amateur Call-Book Magazine." (Obtainable from the Radio Society of Great Britain, 53, Victoria Street, S.W.1, price 4s.)

* * *

BOMBAY. The wave-length of 49 metres was recently abandoned in favour of 31·1 metres.

* * *

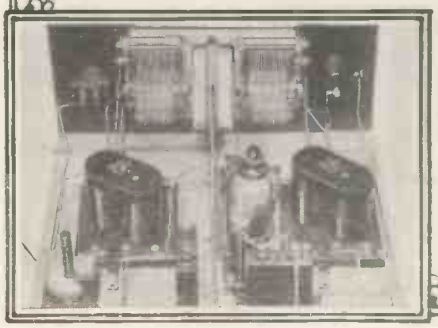
MOMBASSA (Kenya Colony) has been on the air experimentally on 21 metres.

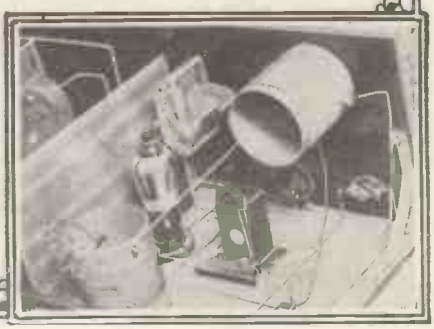
* * *

SINGAPORE puts out a programme on Sundays and Wednesdays from 3.30 to 5 p.m. B.S.T. Call-sign VS1AB. Wave-length 41·7 metres.

* * *

STUTTGART Technical School runs a short-wave experimental transmitter on 42·3 metres, with the call-sign D4XAA.





THE "SUPERADAPTOR"

IN the December issue of "M.W." I described some of the recent applications of the super-heterodyne principle to short-wave reception, with special reference to converters with which you can change your broadcast receiver into a full-fledged short-wave super-het.

Only Two Valves

There is not much doubt that the super-het is the ideal receiver for short-wave work. Not only does it possess high sensitivity and selectivity, but tuning and operation in general is definitely easier than handling the conventional short-wave outfit, however well designed the latter may be. When you have been accustomed to handling ordinary short-wavers, with their critical reaction adjustments, the "kick" you get out of the super-het is quite a revelation.

Now the "Superadaptor" is the economical and attractive alternative to building a complete short-wave super-het, which is naturally an expensive business, besides locking up valuable components and valves. The adaptor, on the other hand, is a two-valve affair, not requiring a lot of components, and it adds considerably to the usefulness of your receiver.

Easy to Instal

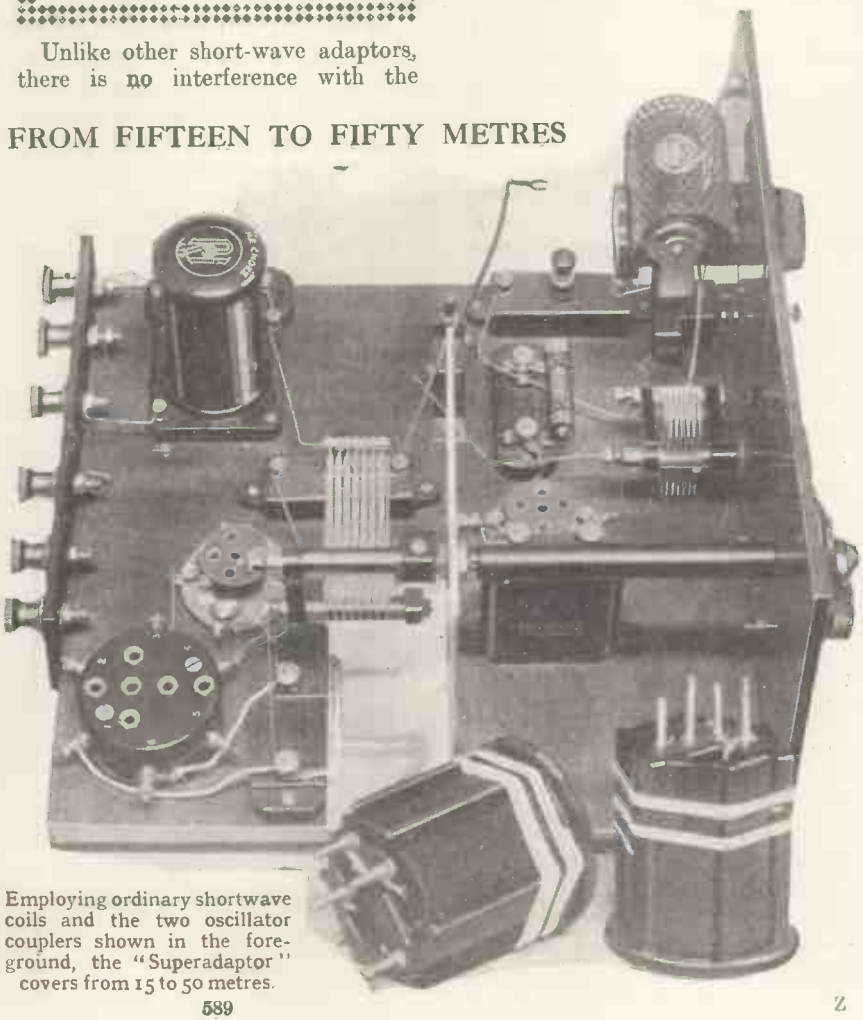
You can look upon this converter as a special unit placed between the aerial and the receiver for the purpose of changing the short waves into longer waves within the range of your broadcast set. The tuning of the latter is now fixed, however, and all the short-wave signals are converted into this fixed wave-length by tuning with the converter.

So much interest has been aroused by the description by Mr. J. English of the special S.G. Detector short-wave circuits a few months ago that we have asked him to design a "super-het" short-wave adaptor to plug into ordinary sets. The result is the neat little unit described below.

Unlike other short-wave adaptors, there is no interference with the inside of your receiver; the change-over from broadcast to short-wave reception or vice versa being a matter of connecting the aerial to either converter or receiver and switching on—which takes but a few seconds.

For some time I have been working on the idea of a compact super-het

FROM FIFTEEN TO FIFTY METRES



Employing ordinary shortwave coils and the two oscillator couplers shown in the foreground, the "Superadaptor" covers from 15 to 50 metres.

Z

convertor with the object of developing the most satisfactory design for short-wave reception. The result of this work, which incidentally I have found most interesting, is the two-valve unit illustrated in the accompanying photographs.

This unit is a distinct break-away from the usual short-wave adaptor, which uses only part of the broadcast receiver's total amplification without in any way simplifying tuning or reducing operating difficulties.

This "Superadaptor," however, changes all this; tuning approximates to one-dial control, hand-capacity and such-like troubles are completely absent, while we can be delightfully forgetful of such annoyances as threshold howl.

Some Super Advantages

The absence of reaction, with its consequent critical adjustments, means better quality, which is to be expected when you remember that the modern broadcast receiver is designed for high, distortionless amplification.

Although two valves are used in the convertor, we cannot expect from it a proportionate amount of amplification. Nearly all the amplification in a super-het is contributed by the intermediate frequency and subsequent stages; in this case, the broadcast receiver itself.

Consequently the latter needs to have at least one high-gain H.F. stage, with preferably one-dial tuning. This specification is filled by a great many modern designs for three- and four-valve receivers, but needless to say, you cannot use this adaptor satisfactorily with the detector-low-frequency type of receiver.

We certainly get some amplification from the first detector of the converter, but in any case two valves is a very reasonable price for the superior range and many practical advantages of the super-heterodyne. The converter itself is also economical of H.T. current, which on an average works out at 3 to 4 m.a.

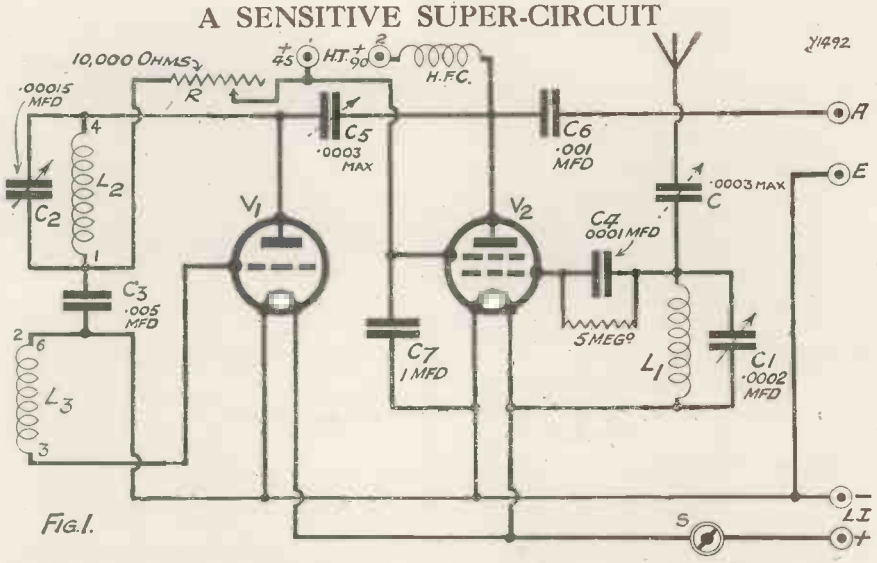
When the converter is used in conjunction with an efficient three-valve receiver, which may be either mains or battery operated, reception results are very gratifying. The usual short-wave broadcasters come in well on the loud speaker under normal conditions, even from great distances.

Results are certainly eminently satisfactory compared with those given by a conventional short-waver, while in all the tests the whole combination of five valves was perfectly stable, easily handled, and produced clear-cut signals against a quiet background.

Before passing on to practical considerations, those of you who are not quite at home with the super-het idea may welcome a brief outline of its theory. Taking the converter of Fig. 1 and your broadcast receiver as the super-het for consideration, we pick up a short-wave transmission on the tuning circuit L_1 C_1 and pass it to the first detector V_2, in this case a screened-grid valve.

This you see behind the panel of the unit. In the left-hand rear section of the baseboard we have the oscillator V_1 with its associated coils, which we tune by means of C_2 to oscillate at a frequency slightly different from that of the signal passing to the detector.

A SENSITIVE SUPER-CIRCUIT



The circuit is the outcome of a considerable amount of experiment on the lines indicated in our December issue. The ordinary radio set is attached at A. and E.

How It Works

These two frequencies mix in the detector anode circuit, heterodyning one another and giving rise to a beat or difference frequency, which is then passed on to the H.F. stage of the broadcast receiver, now the intermediate-frequency amplifier, via the choke-condenser coupling, H.F.C.–C_6 (on the right-hand rear), as an exact replica of the original signal, but of a considerably longer wave-length. It then passes through the successive stages of the receiver to the loud speaker like any other medium- or long-wave signal.

If the receiver is tuned, for example, to 500 metres, equal to a frequency of 600 k.c., we can get this as a beat frequency by making the oscillator frequency either 600 k.c. greater or less than that of every short-wave signal tuned in. This explains why two settings of the oscillator dial normally tune in the same station. For example, a station on 30 metres, frequency 10,000 k.c., beating with an oscillator frequency of either 10,600 k.c. or 9,400 k.c., in each case

WHAT YOU WILL REQUIRE

PANEL
10×7 in. (Goltone, or Peto-Scott, Lissen, Parex, etc.).

CABINET
Panel space 10×7 in., baseboard 10 in. deep × 9½ in. wide.

VARIABLE CONDENSERS
1 ·00015-mfd. short-wave assembly with extension spindle and slow-motion dial (Formo, or similar type).
1 ordinary ·0002-mfd. (Formo small type, or similar component).

ADJUSTABLE CONDENSERS
2 compression-type, max. ·0003 mfd. (Formo, or R.I., Lissen, Polar, Lewcos, etc.).

FIXED CONDENSERS
1 1-mfd., 1 ·005-mfd., 1 ·001-mfd., 1 ·0001-mfd., with clips and 5-megohm grid leak (Dubilier, or other good makes).

VARIABLE RESISTANCE
1 0–10,000 ohms (Varley).

CHOKE
1 H.F., broadcast type (R.I., or Lewcos, Ready Radio, Telsen, Lissen, Lotus, Igranic, Varley, Magnum, Dubilier, Keystone, Parex, Wearite, etc.).

VALVE HOLDERS
2 four-pin type (Clix, or other good type of low losses).

COILS AND HOLDERS
1 plug-in coil holder (Wearite, or Bulgin, Lotus, Keystone, Magnum, etc.).
1 6-pin coil base (Keystone, or Lewcos, Colvern, etc.).
2 6-pin coil formers (Colvern).
Set of short-wave coils (Atlas, or Igranic, etc.).

SWITCH
1 low-tension on-off switch (Igranic, etc.).

MISCELLANEOUS
Terminal strip 7 in. ×2 in., 6 terminals, plug and socket, wire, and screws.

Converts Your Set Into a Super-Het

produces the required intermediate frequency.

By suitable design of the oscillator coils we can make one of the frequencies fall outside the oscillator's tuning range on important wave-bands.

On the other hand, if we tune the receiver to 1,500 metres, requiring an intermediate frequency of 200 k.c., then the two oscillator settings are closer together and not so easy to separate. Against this we must set off the greater I.F. amplification of the broadcast receiver at this higher wavelength. In many cases, however, I.F. amplification on the medium wave-band gives the best results with this converter.

Tuning is Simple

You will now see that in practice the tuning of the super-het boils down to the changing of the oscillator frequency to suit the wave-length tuned in, thus giving virtually one-dial tuning, the aerial tuning being relatively flat.

Referring now to the circuit diagram of Fig. 1, you will observe that the semi-variable condenser C_5 couples the anode circuits of the oscillator and detector; a form of coupling arrived at after much experiment.

In conjunction with the internal screening of the detector, this results in the oscillator tuning being independent of the aerial tuning except on the shortest wave-length, a very desirable condition which conventional couplings do not give.

Notice also that only the anode coil of the oscillator is tuned. This arrangement produces in practice the largest and most constant oscillator output. The variable resistance R controls the oscillator anode current, and consequently the strength of oscillations fed to the detector.

The H.F. Choke

It should be mentioned that the H.F. choke in the detector anode circuit is not a short-wave component, as casual inspection might suggest, but an efficient broadcast-wave type, as it has to deal with an H.F. output up to 2,000 metres.

Inspection of the photographs will doubtless reveal to you all you want to know about the make-up of the unit. There are, however, one or two features deserving mention.

Notice the oscillator tuning condenser set well back and shielded from the panel. This results in a complete absence of capacity effects when tuning, even if no earth be used. The same remark applies to the other controls on the panel. Consequently when you tune in a short-wave station it stays in (excepting fading, of course), even if you move right away from the receiver.

Coming now to the actual construction of the converter, there is nothing you need have apprehensions about, in spite of the somewhat unusual and rather crowded appearance of the layout.

Panel and Baseboard

The panel, which can be either ebonite or well-seasoned wood such as three-ply, has few holes to be drilled in it, as can be seen from the sketch. Observe, however, when screwing it to the baseboard that the level of the top of the latter is just 1 in. above the bottom edge of the panel.

Unless this distance is maintained the spindle of the special tuning condenser is liable to be thrown out of line. Incidentally, it is advisable not to drill the small hole in the panel for fixing the dial until after the oscillator tuning condenser and its extension spindle have been fitted in position.

Mounting the Condenser

The condenser assembly itself is best mounted after you have wired the rest of the components, as this makes it easier to get at some of the wiring.

When you come to mount your baseboard components it is important to adhere rigidly to the layout shown overleaf. The particular disposition of components here was finally decided

SCORES OF SHORT-WAVE STATIONS

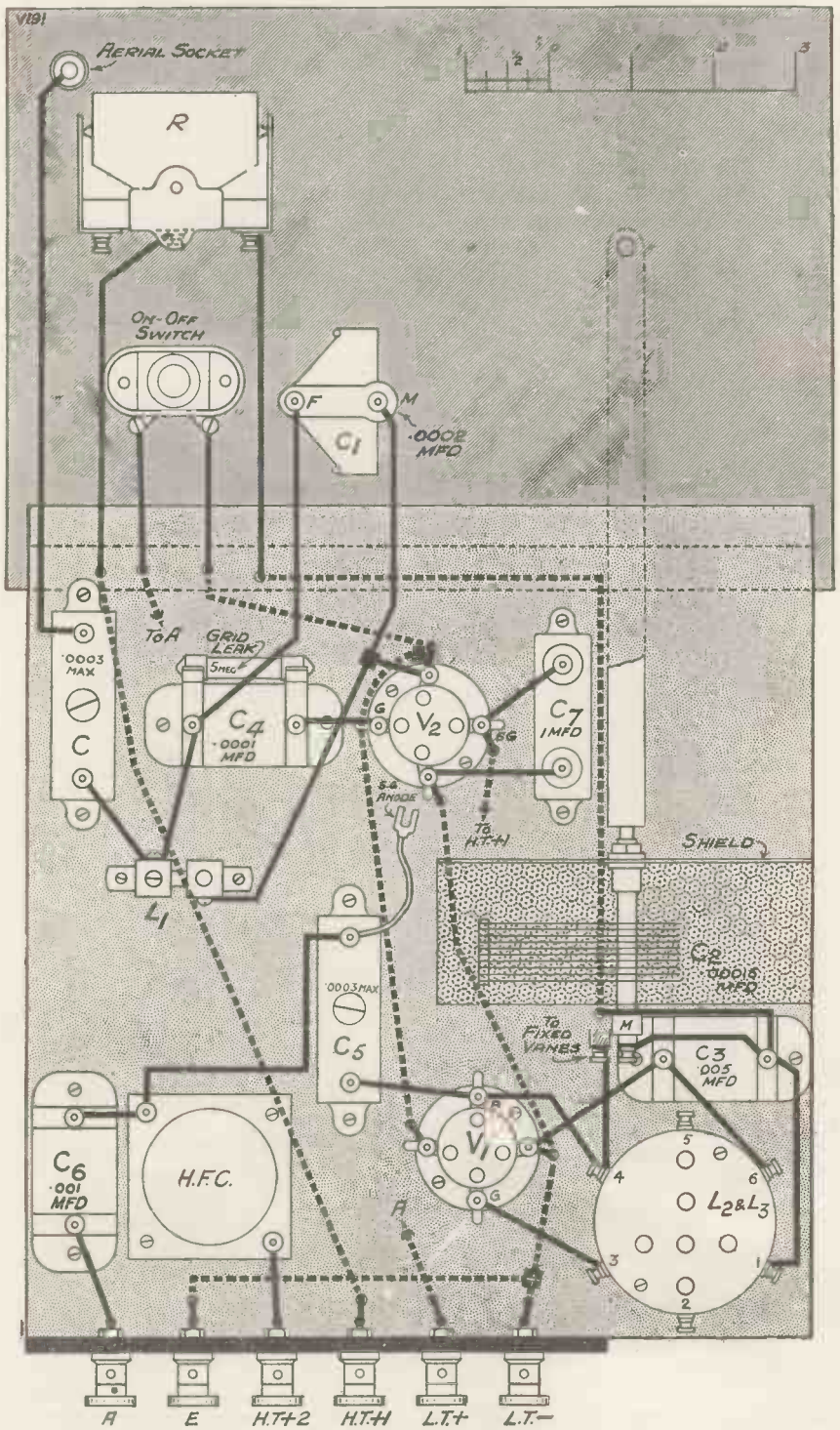
This general view of the adaptor, which enables one to hear scores of stations, provides a good idea of the layout and the simplicity of the wiring. The valve in the foreground is the oscillator; the S.G. detector can be seen partly hidden by the small metal screen.

upon after considerable thought and experiment with the view to obtaining maximum compactness consistent with full efficiency, and although the position of none of the components is what you would call critical, any alteration of the layout can only be attempted at the constructor's risk.

There is not a great deal of wiring to be done, as you will see below. As all the filament and anode current supply leads are run under the baseboard, as shown in dotted lines, it is advisable to follow carefully where the leads come through the latter to make contact with components on top. This under-baseboard wiring should, of course, be run with covered wire, such as Glazite, etc.

While soldering of contacts is not absolutely essential, I would certainly advise this being done with all contacts to components in the tuning circuits, excepting the tuning condensers, and to the valve holders. All the above-baseboard wiring can be carried out with No. 20 tinned wire, polished and stretched before you cut it into lengths preparatory to fashioning each lead.

EASY TO BUILD, ISN'T IT?



The dotted lines indicate those wires which are taken below the baseboard.

Coil Connections

The only components requiring individual construction are the oscillator coils, which are simple windings on standard six-pin formers. Only the four outside pins are used, as you will see from the wiring diagram.

To cover a wave range of approximately 15 to 50 metres, two oscillator coils are required. Number 1, covering 15 to just over 25 metres, has an anode (L_2) coil of $2\frac{1}{2}$ turns and a grid coil (L_3) of 3 turns each, of No. 22 D.C.C. or enamelled wire, wound in the same direction, each turn being equally spaced and situated near the top of the former, as you will see in one of the photographs.

Preliminary Tests

Coil No. 2, covering 25 to 50 metres, has $4\frac{1}{2}$ turns for the anode circuit and 4 turns for the grid circuit. Both windings are wound with turns touching with No. 24 D.C.C., a distance of $\frac{1}{4}$ in. separating the two windings.

The diagram that follows shows you to which pin on the former to connect the ends of the coil windings. These end wires are rigidly secured by threading through two small holes drilled close together in the former wall, and then passing direct to the appropriate pin. Soldered connections here are strongly recommended.

Construction having been completed and the wiring checked up, the converter is ready for preliminary tests. First of all, try out the oscillator, for which you require a 10,000-ohm valve of the same rating as those in your set. The Mazda L.210 works particularly well.

You may possibly find a small power valve useful; of these the Dario super-power functions quite well. In any case, a little experiment will soon decide which of your valves is the best for the oscillator position.

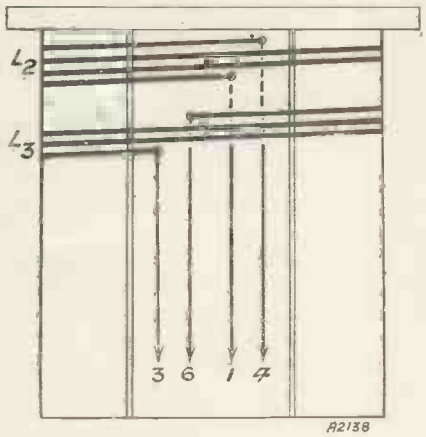
Suitable Valves

As regards the S.G. detector, the best results are obtainable with a low internal capacity valve, such as the Cossor S.G.215. A milliammeter will be needed during the first tests to tell whether the oscillator is working properly. This meter you connect between H.T. + 1 and the 45-volt tapping of the H.T. battery.

Search Slowly to Ensure Success

On switching on and setting R to about half maximum and C_5 at minimum, the meter should read some $2\frac{1}{2}$ to 3 milliamps. if the oscillator is working properly, dropping to 1 milliamp. or so when you touch the anode terminal of V_1.

THE OSCILLATOR COUPLER



This sketch shows how the oscillator coupler is wound, and how the leads are brought down to the six-pin base.

If there is no change in anode current, showing that the valve is not oscillating, try reducing R, and, if this fails, re-check the wiring and the wiring-up of the coil formers. Also see that the valve pins are making proper contact in the valve-holder sockets and that the variable resistance is not at fault.

The oscillator functioning as it should do, the next thing is to insert a 2- or 4-turn coil, according to the wave-range you want, in the single coil-socket. On switching on again the milliammeter should show little change from its previous reading, unless L_1 C_1 happens to be exactly in tune with the oscillator, which incidentally does not occur when actually tuning in short-wave transmissions.

Resistance Regulation

Once the resistance R has been adjusted to give a reading of some 3 m.a. whatever the setting of C_2, it requires little further adjustment, and the meter can be removed.

The "Superadaptor" can now be connected to the broadcast receiver, the output terminal E being joined to the earth terminal of the receiver if separate L.T. supplies are used. (If you run the converter off the receiver's accumulator, remove the earth lead from the set and join it to E on the converter instead, which serves the same purpose.)

The aerial lead is next furnished with a wander plug so that it can be plugged into either the aerial socket on the converter panel for short-wave reception, or into the aerial terminal of the receiver for normal broadcast reception. The change-over is thus a matter of a few seconds.

The converter terminal A is connected by a short lead to the aerial terminal of the receiver or to another point in the input grid circuit, whichever gives a moderately close coupling.

In some cases it will be found that the best results are obtained by connecting A direct to the grid end of the input tuning coil. If this happens to be an "M.W." dual-range coil, you can alternatively connect A direct to the aerial terminal, shorting or setting at maximum the series aerial condenser.

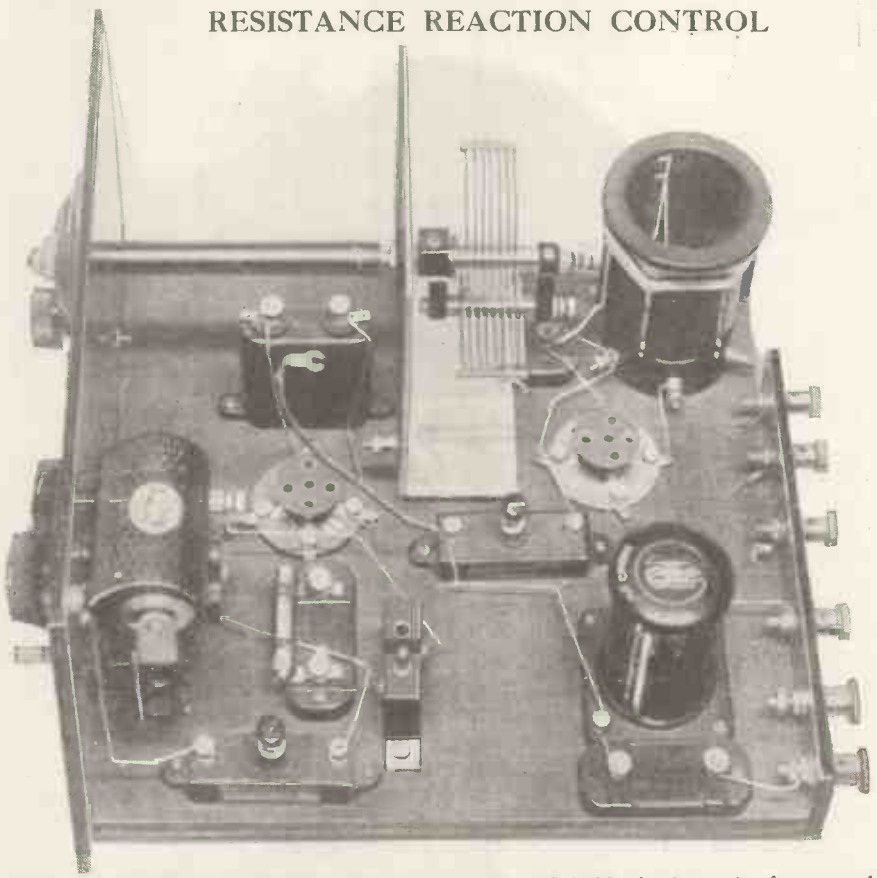
As the coupling between the converter and receiver has an important influence on the effective amplification of the combination it is well worth while experimenting with different connections until you find an adjustment giving the loudest signals. It is also very important to get the input and any subsequent tuning circuits of the broadcast receiver exactly in tune.

Choice of Frequency

The receiver must be tuned to some wave-length either on the medium- or long-wave band free from interference by direct pick-up on that wave-length. Later you will appreciate the practical advantage of the converter-receiver combination as a super-heterodyne receiver, because you can choose any intermediate frequency you please. This makes it easy to dodge external interference and to get the best conditions for maximum, trouble-free amplification.

On the first full test it is generally easier to pick up a signal on which you can adjust your apparatus if you use the No. 2 oscillator coil, with a 4- or 5-turn coil in the aerial socket.

RESISTANCE REACTION CONTROL



Another view of the unit—from the detector end. The coil holder in the centre foreground takes the aerial coil, which is of the usual plug-in short-wave variety. The resistance on the panel is for reaction control.

There is then only one other adjustment to be made before you start tuning. This is to set the variable condenser C_5 for maximum background noise when the receiver itself is just oscillating.

Putting It Into Service

As this is to a large extent inaudible on the loud speaker, 'phones must be used for this adjustment. The knob of C_5 is then slowly screwed down from minimum until you get a definite setting either side of which background noise decreases.

With some broadcast receivers you may not get this definite setting at all, in which case replace the milliammeter in the anode circuit of V_1, and with a long-handled screwdriver screw down C_5 until the anode current begins to decrease.

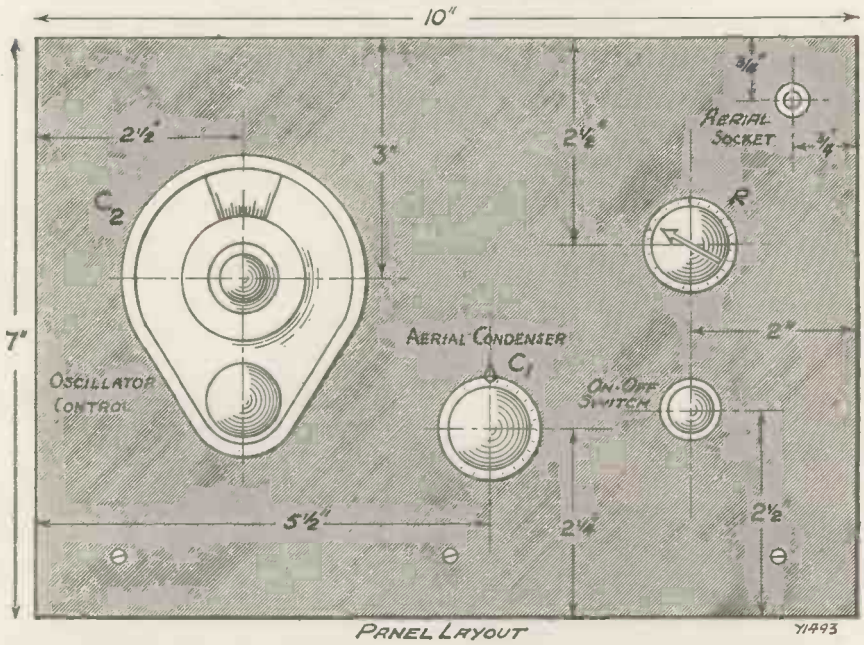
when the aerial circuit is correctly tuned.

As in normal short-wave practice, the aerial condenser C has a marked effect on results in reducing aerial damping, with consequent sharper tuning and louder signals. Consequently it pays to note the effect on volume of decreasing C from maximum, retuning C_1 at each setting of C.

Some Final Adjustments

Having obtained some sort of signal, whether long-distance broadcast or a commercial code station, you can make final adjustments to the tuning of the receiver and the converter controls. All tuning can then be done with the oscillator dial, adjusting the other variable condenser subsequently.

QUITE SIMPLE TO HANDLE



The oscillator is the main control, the aerial condenser being kept roughly "in step."

Then unscrew about a half-turn of the knob of C_5. The correct capacity of the latter depends to some extent on the form of coupling to the receiver. Normally this will be about three-quarter max. for wave-bands above 25 metres, and slightly less for the lower wave-band.

Having done this, very slowly rotate the oscillator dial from zero to maximum. Something is sure to be heard when the condenser is about the middle of its range, corresponding to the 30-metre band. While the tuning of C_2 is quite sharp, that of C_1 is rather flat. Consequently the latter is adjusted subsequently for loudest signals, a very definite increase in volume being obtained

For final adjustments it is a good idea to get as near as possible to the station with the adaptor, and then tune in fully by slight adjustment of the receiver's tuning, which is relatively much broader.

When you have got the hang of the super-het idea I feel sure you will be pleasantly surprised by the clear-cut tuning and the ease with which the whole outfit is operated.

As regards all-mains working, there is no objection to feeding H.T. + 2 from your eliminator or mains receiver. If the latter's output is well smoothed, the oscillator also can take its anode current from the eliminator, but bear in mind that any remaining A.C. ripple will modulate the oscillator and give rise to A.C. hum in the loud speaker.

If you want to handle C.W. code traffic, the receiver can be set oscillating without fear of any unpleasant H.F. interaction or radiation from the aerial, thanks to the circuit used for the converter.

You can thus even search for and resolve carriers in the normal way if you want to get the last ounce out of weak signals, while this is a useful way of tuning when first trying out the converter.

For another method of tuning I would refer you to my previous article mentioned above, lack of space precluding a full description here. The essence of the scheme is to fix the oscillator frequency and tune by varying the intermediate frequency, when a wider spacing of stations over the tuning dial is obtained.

This valuable method, however, can only be adopted when the receiver itself is sufficiently screened to reduce interference from medium- or long-wave stations, if normally present on some wave-lengths, to a minimum.

Go Gently at First!

In conclusion, I need only point out, but not to regular short-wave listeners, the uselessness of searching for short-wave stations at unsuitable times. Reference to the lists of operating times appearing often in "M.W." will show you what stations to expect on different bands. I should also stress the need for slow and careful rotation of the oscillator dial, as it is very easy to pass over a station by too rapid tuning.

TOOL-BAG TIPS

Scissors—Old Lead-in Tubes—Broken Files.

Broken pocket-scissors make a useful addition to your tool-kit. They are often excellent for enlarging small holes in panels.

* * *

Do not throw away an old lead-in tube, as a number of ebonite bushes can be cut from this, and will be very useful for raising components from the baseboard, spacing frame-aerial wires, etc.

* * *

An old broken file should not be thrown away, but removed from its handle, when it will often be found that the concealed end makes a good reamer.

TWO FINE FERRANTI SETS

Prospective buyers will be interested in this test report of two A.C. mains sets which were tried out by a member of the "M.W." staff.

MESSRS. FERRANTI have been associated with radio since its earliest days, and their products have always been held in the highest regard, so it was with a sense of keen interest that I took home two of their latest all-electric A.C. mains sets for test.

A Real Test

The idea was to try them out under "home" conditions, so that the reader would be able to judge correctly their capabilities. And I must say that I was very agreeably surprised at the splendid results obtained.

The first receiver tried was a little two-valver (Model 21), designed for working from A.C. mains of any voltage between 200 volts and 250 volts. It is housed in a metal container covered in Rexine, with a choice of several colours. This, combined with its handy size, only 12½ in. by 8¾ in. by 8½ in., makes it a very neat little receiver which should please the most critical eye.

There are only two main controls—the tuning condenser, or station selector, as it can be called, and the reaction control. The condenser dial is illuminated from inside the set, and is marked direct in wave-lengths, which should prove a boon to the non-technical listener.

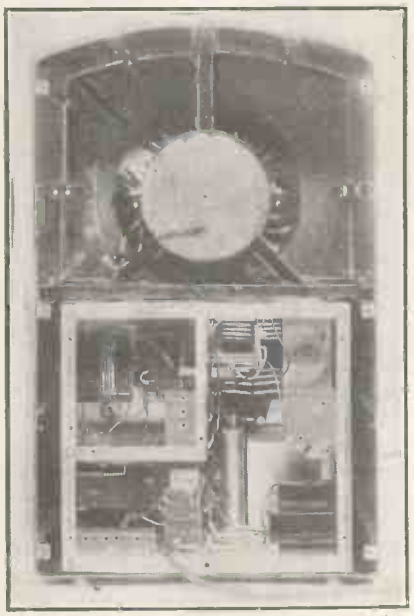
The "Two-Valver"

At the back of the receiver there is the "on-off" switch, and the various sockets for the aerial, earth, etc. There are two aerial sockets, marked 1 and 2 respectively. When the aerial is in No. 1 the receiver will tune between 300 and 550 metres, and when in No. 2 between 200 and 300 metres. This is correct when using an average aerial, but if it is on the small side better results will probably be obtained with the aerial in the higher one. (This was so in my own case, as I was only using about 40 ft. of bell wire taken to a tree at the bottom of the garden.)

Now for the actual results obtained. As I said previously, I was agreeably surprised at the splendid results, especially as I was using a very small aerial, and Brookmans Park was 20 miles away. On the medium-wave band the two London programmes came in at splendid strength, using a fairly big moving-coil speaker, and there was ample power to fill a large room and with some to spare.

The quality of reproduction is really excellent, well above the average in fact. Perhaps I am justified in going one better than that by saying that it is one of the best sets I have heard.

BUILT TO LAST



This shows the "Console" three-valve model with the back removed. It is a really well-made job, and includes a fine moving-coil speaker which can be seen in the top of the cabinet.

Plenty of Foreigners

Selectivity is quite good, and by the careful use of reaction it was quite possible to bring in most of the high-power continentals. Rome and Brussels were particularly good, and it was astounding how easy they were to tune in.

Midland Regional on his new wave-length was also good, being quite clear of London. On the long-wave band reception was not quite so good, but this was probably due to the very small and inefficient aerial. Daventry National and Radio Paris were fairly good, but not very strong.

The circuit used in this really excellent little two-valve receiver is of the normal detector and one L.F. amplifier type; the detector valve being a Marconi M.H.L.4, an exceedingly sensitive indirectly-heated valve of the latest pattern. This is coupled to a super-power valve of the directly-heated type by one of the famous Ferranti F.6 transformers.

Fitting a "Pick-Up"

A double-ratio output transformer is fitted, which enables low-resistance speakers of the moving-coil type or the more or less ordinary high-resistance pattern to be used. There is also provision for a gramophone

Ganged Control and Illuminated Dials

pick-up, a special plug being provided at the back.

The price of this receiver is £16.

The second receiver was an all-electric three-valve Console model, with a Ferranti moving-coil speaker in the top. In appearance it is very similar to its smaller brother, but, of course, considerably larger. The general construction follows very closely the two-valve model, as does the novel wave-change switch. There is, however, a separate reaction control, and also a volume control for use on very strong signals.

A high-efficiency screened-grid H.F. stage is incorporated, the valve being a Marconi indirectly-heated M.S.4. This valve is very sensitive and gives the receiver a wonderful performance.

Simple Station-Finding

A pair of ganged condensers tune this H.F. stage and also the aerial circuit; a small trimming condenser being provided to compensate for small differences in the size of the latter. The dial is illuminated and is calibrated direct in metres, both on the medium and long waves.

The wave-length readings were found to be extremely accurate and station-finding was extraordinarily simple, it being only necessary to adjust the condenser to the wave-length of the required station, and it was always found fairly close to its correct position.

The results obtained were truly amazing. The two London stations came in at terrific strength, as did Daventry National and Radio Paris. All the high-power foreign stations came in at full strength, and although some were badly heterodyned there were quite a good number of reliable stations to choose from.

Excellent Performance

The selectivity was only moderate, but quite sufficient for all normal requirements, and the makers point out that extreme selectivity has to a certain extent been sacrificed for quality of reproduction.

It is almost impossible to give a complete list of all the stations received, as there were so many of them. Besides the large number of stations which I definitely identified there were a number of transmissions from which no announcement was heard.

It is the type of set that gives the operator a real thrill, and although I am an old hand at the game, I must admit that I sat for hours tuning in station after station, with only the faint light of the illuminated dial to guide me.

The directly calibrated tuning condenser was most useful, it being possible to identify with certainty a large number of the stations received by just checking their wave-lengths off against the dial readings.

H.T. and L.T.

The high-tension is obtained from the mains via a Ferranti transformer and a Marconi Osram U.10 double-wave rectifying valve. (This, by the way, is the same as that used in the smaller two-valve model.) In this way a very smooth high-tension supply is provided. There is only the very slightest trace of hum.

The low-tension supply for the first two indirectly-heated valves and the rectifier is raw A.C., and is stepped-down from the mains voltage to a pressure of four volts. The last valve is of the normal directly-heated super-power type and works from a 6-volt supply. A separate supply is therefore provided for this valve, which is also unrectified A.C.

As regards the actual construction of the receiver, this is extremely well carried out. It is built in the form of a chassis, which slides into the outer metal cabinet. It might be mentioned that the moving-coil loud speaker, which is mounted in the uppermost compartment, is of the very latest permanent-magnet type.

Economical to Run

This means a big saving in the consumption of electricity, and combined with the very careful design of the set in general makes the whole receiver extremely economical.

The total amount of power consumed is only about 30 watts, and gives approximately 33 hours running for the price of one unit. (The average price of a unit is about sixpence, but it varies considerably in different parts of the country. In some places it is as low as one penny per unit, while in another place it may be as high as a shilling. This latter high figure, however, is very rare.)

The back of the receiver is held in position by six screws, which have the simple yet ingenious feature of a fairly wide slot enabling them to be unscrewed by means of a coin. When the back is removed the mains are automatically disconnected, making the inside of the set "dead."

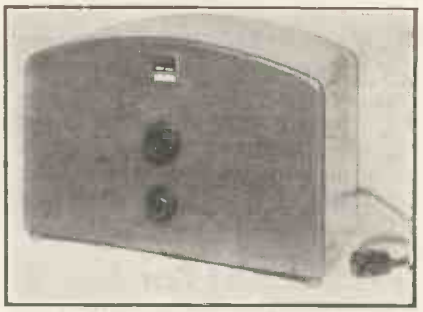
Provision for Pick-Up

The various plugs are situated at the back of the receiver, where there is also provision for connecting an extra loud speaker. If required, a gramophone pick-up may be connected, which enables records to be heard at their very best. The price of this Console model is 28 guineas, and when it is considered that a moving-coil speaker of the first order is included it will be evident that very good value for money is given by the makers.

A SET WITH "PUNCH"

Here you see the front of the three-valve model. The controls, starting from the left, are: Volume, trimmer, wave-change switch, tuning condenser, and reaction, with the "on-off" switch at the bottom.

FOR LOCAL RECEPTION



This is Model 21, an excellent little two-valve receiver which is ideal for local reception. It is extremely simple to operate, there being only two controls.

AT YOUR SERVICE

by

OUR TRADE COMMISSIONER

Here is some varied news of the trade that should interest all readers, whether or not they are connected with the radio industry. Manufacturers, dealers, home constructors and general readers are invited to send items of interest to be included under this heading.

The New Columbia Set

To meet the requirements of those listeners who seek a moderately-priced set with speaker enclosed in one cabinet, the Columbia Graphophone Company, Ltd., have brought out a new pedestal model.

This is fully described in a little leaflet which they will send upon request to anybody interested and is known as the model 33.2. Selling at twenty-three guineas, it seems remarkable value for money.

Simplicity of operation is a notable feature, an instance of which is the illuminated single tuning dial with wave-length calibrations. Variable aerial coupling is employed so that selectivity can be varied, and a gramophone selector switch is included with a plug and socket arrangement for gramophone connection.

The running costs taken at 6d. per unit are only a farthing per hour in the case of the A.C. model and ½d. per hour in the case of the D.C. model. It can also be obtained at deferred terms by paying a deposit of £2 8s. and twelve monthly payments of £1 18s. 1d.

An Interesting Little Brochure

An interesting little brochure has been received from Cecil Ridley, wholesale radio dealer and general factor, of Middlesbrough, containing details of the Ridley "Fireside" Three receiver, model A.1931. This receiver can be obtained for home construction, and a blue-print is supplied giving very minute details of the wiring and the mounting of the components.

Less accumulators and loud speaker, but including grid bias and H.T. batteries, cabinet and valves, the price of the components required for the "Fireside" Three is £4 15s. The circuit chart and instructions are provided free with the components.

An All-Wave Super-Het

The General Electric Co., Ltd., has just added to its range of Gecophone receivers a six-valve "all-wave" super-het. This receiver is an entirely new departure in design of circuit and its method of construction.

It functions as a combined short- and medium-wave receiver, covering a range of 30 to 750 metres, and is extremely sensitive and powerful. Six valves are used, including three S.G.'s, and it is designed for use with an outdoor aerial and earth, and band-pass intermediates are employed.

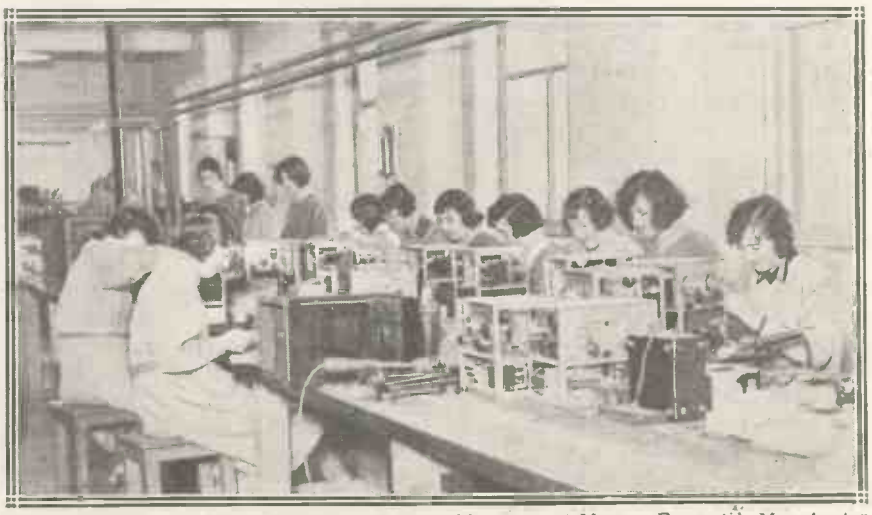
The total anode consumption at 120 volts H.T., using a combination of two-volt valves, is 20 to 24 milliamps.

The price of the set, including six sets of coils in a special container covering from 13 to 100 metres and 200 to 720 metres, is £27 10s., while the set of coils for covering 100 to 200 metres wave-band can be supplied separately at an additional cost of 15s. Apparently the receiver does not cover the long-wave band.

Some New Gramophone Records

Elsewhere in this issue you will find a review of the Brunswick records, including the new Panachord records. These latter are full-size 10-in. records and are offered to the public at the popular price of 2s. All the latest dance numbers are obtainable on them. In addition, Messrs. Warner-Brunswick, Ltd., are issuing speciality, novelty and hot records.

ASSEMBLING YOUR RADIO RECEIVER



This interesting photograph shows the assembly room at Messrs. Ferranti's Manchester Works, where their famous all-electric sets are made.

Cheaper Records for Your Radio-Gramophone

Summer Selling

I have received a leaflet from Messrs. Pye, Ltd., of Cambridge, entitled the "Pye Plan for Summer Sales." It describes for the benefit of the dealer what Pye's are doing to help the radio trade during the summer.

On the back of the folder Pye's describe their range for the summer stay-at-homes. It includes the Pye "Triple Three" battery and all-electric models, the all-electric three and the all-electric radio-gramophone, and the radio Console model, which sells at 60 guineas.

Up North

With the North Regional transmission in operation there is bound to be a certain amount of chaos in the British ether up in the north. To enable northern listeners to separate the new transmissions, Messrs. Ferranti, Ltd., have designed a new rejector, which is available for immediate delivery, specially to deal with the new North Regional transmission on 479 metres. It employs a very highly efficient tuning arrangement, so that in almost all cases where the rejector is used it is possible to reject the 479-metre wave-length and receive stations as near as 30 metres on either side without appreciable interference. Actually it will cover stations in a band approximately between 440 to 550 metres.

Telsen Expand

On May 1st Messrs. Telsen Electric Co., Ltd., of Birmingham, transferred their sales organisation in London from outside to inside influence. In other words, they have opened a new sales organisation, the offices of which are in Bush House, Aldwych, W.C.2, and have placed in charge Mr. C. F. Richards, who is already well known in the trade and who some time ago was responsible for the activities of Ready Radio. Messrs. Telsen obviously do not want the grass to grow under their feet, and a very vigorous campaign is being prepared.

A Reduction

The Celestion W.5 pick-up is now retailed, we believe, at £2 17s. 6d., a very welcome reduction from the previous price of £3 15s. We also understand that dealers who bought the W.5 at the old price can send full details of purchase to Celestion, Ltd., who will credit them with the necessary rebate.

Hats Off to E. K. Cole!

The most successful year in the amazing history of E. K. Cole, Ltd., was announced in the directors' report for the year ended January 31st last. The net profit is £105,900, and a dividend of 100 per cent less tax is declared on the ordinary shares. The capital of the company is, of course, £100,000. At the present moment Messrs. Ekco are busy adding a further 30,000 sq. ft. to their factory space, bringing the total to 101,000 sq. ft., and a very vigorous summer sales push is also being commenced.

Exide Again

Catalogue W, of the Chloride Electrical Storage Co., Ltd., recently brought out, forms a handy guide to accumulators and dry batteries and contains a very attractive price list of Exide products. Incidentally, Messrs. Chloride Electrical Storage issue a booklet containing the names and addresses of Exide service agents all over the world, and this can be obtained on application post free to Clifton Junction, Manchester.

British Ebonite Company, Ltd.

British Ebonite Company, Ltd., of Nightingale Road, Hanwell, London, W.7, have recently put on the market a rather interesting ebonite former especially for the home constructor. The max. length is 6 in. and the diameter about 3 in. across the ribs. There are six very tall ribs of the usual triangular section, and the No. 13 former, as it is called, is sold at 1s. 6d. per 3-in. length, 2s. for 4-in., and 3s. for 6-in.

C.A.V.

"Ten hours more in the same space" is the slogan Messrs. C. A. Vandervell have announced for their new unspillable accumulator of the jelly acid type. Rated at 25 amps., this cell only occupies the same space as an ordinary 20-amp. cell using free acid—hence the slogan.

Can You Solve It?

I have received a copy of a letter sent to the Marconiphone Company accompanied by a coupon offering a free demonstration of the Marconiphone portable.

"Dear Sir,—I should be glad to have the result quick because many of my friend are waiting fore the coupon and am waiting fore my own result that I can refound my money quick has possible. Am waiting fore your early request. I remain, Yours faithfully,——"

The letter is from Ecuador, and it is doubtful whether the puzzle will ever be solved.

A SNAP FROM SLAITHWAITE

Part of the transmitter hall, showing the Regional transmitter, also the control desk and a section of the main switchboard.

MY BROADCASTING DIARY

Our own Broadcasting Correspondent records the progress of the British Broadcasting Corporation, and frankly comments on the policies in force at B.B.C. headquarters.

American Interest

MR. J. ELWOOD, a high official of the National Broadcasting Company of the United States, has just completed a tour of reconnaissance in Europe. Mr. Elwood is a young man of great drive and personality, with conspicuous organising ability.

Of course, Mr. Elwood was charged with a double mission. He had to study the possibilities of exchanging programmes on a regular international basis. He had also to keep an eye on the development of the enterprising trade policy sponsored by Mr. David Sarnoff, of the Radio Corporation of America, who aims at a sort of world hegemony for American radio interests.

Mr. Elwood made no secret of his objective to secure a much closer programme co-operation with the B.B.C. than has existed hitherto. This no doubt will be considerably facilitated by the visit to the United States of Sir John Reith which is now in progress.

Incidentally, Sir John will have a difficult time to maintain an even balance between the rival claims on him of the N.B.C. and the Columbia System. I have no doubt he will deal with it successfully, but the situation would embarrass many lesser men.

Sir Henry Wood

Rumours of trouble between Sir Henry Wood and the B.B.C. have not been so insistent lately, but I understand that fresh trouble is imminent. Apparently the unanimity of hostile press criticism of the Handel programme at the Queen's Hall, in April, brought matters to a head.

Those responsible for the musical administration at Savoy Hill were already apprehensive that the orchestra was suffering from variety of conductors; but there had been no specific criticism of Sir Henry Wood. Nor is there now.

The situation is simply that the principle of changing conductors is being seriously challenged, it being felt that the new orchestra only showed its best form when it was being handled on five or six occasions in succession by Dr. Adrian Boult, the Music Director of the B.B.C.

I hesitate to say "I told you so"; but I cannot refrain from repeating what I have said several times in this journal, that the policy of the B.B.C. in using Sir Henry Wood outside the Promenade Season is entirely wrong.

There is no one else in the world who could handle the summer Proms as he does, but if he insists on the whole 114 members of the B.B.C. Symphony Orchestra he will hardly get the agreement of Savoy Hill, and rightly so, as 90 instruments will be definitely better for broadcasting.

Farewell to Miss Banks

As is not uncommon in great organisations, some of those who stand the burden and stress of the main encounter are the last to receive acknowledgment in a public way. This certainly is true of Savoy Hill.

Friends there have been telling me some most interesting and significant stories about Miss Banks, who for more than six years has been entirely responsible for the whole of the women staff of the B.B.C.

Miss Banks, who has now turned her thoughts to her home, has played an important part in the evolution of British broadcasting. Of outstanding natural ability, of consummate tact and astonishing resourcefulness, she has always been able to interpret with exactitude the wishes and policy of Sir John Reith. If ever there were a clear case for public recognition, this is one.

It annoys me to compare the claims of some recipients of important honours with those of quite half a dozen members of the staff of the B.B.C. This is a matter of individual concern to every listener, and I would not be surprised to see some manifestation of public opinion in the matter before long.

PASSING ON THE PROGRAMMES

This is the control room at Savoy Hill, where the programmes must pass out from studio to transmitter.

Latest News Items for the Listener

Musical Standards

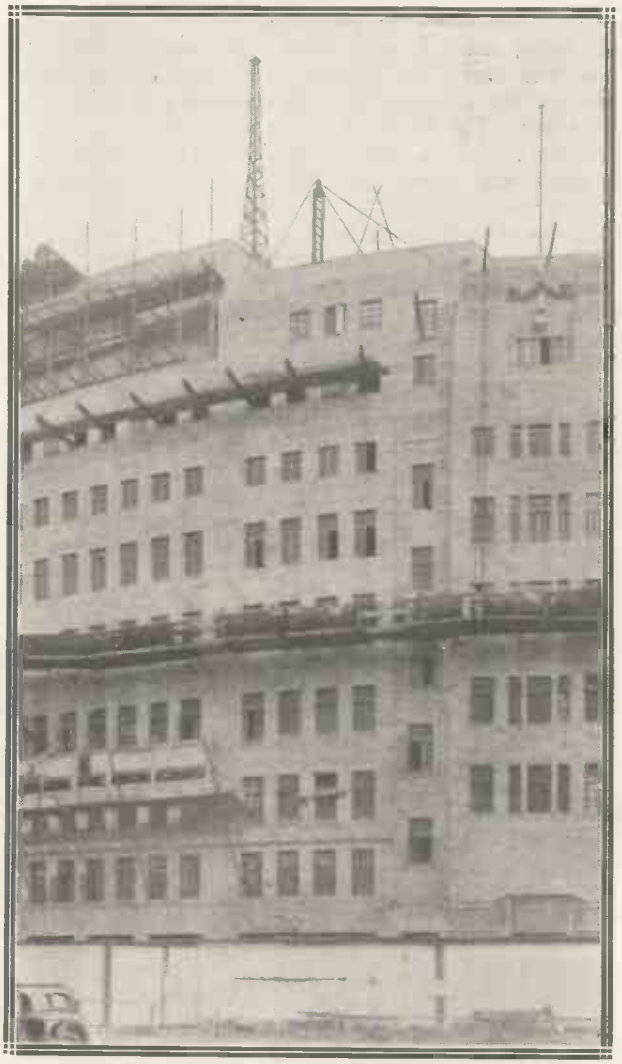
Since Dr. Adrian Boult took over the music directorship of the B.B.C. there has been a noticeable and entirely healthy stiffening in the application of standards for the selection of candidates for the microphone—individual or collective.

There is much less of the "good nature" which leads to the inclusion in the programmes of doubtful material on grounds other than absolute musical efficiency.

Of course, rejection does not mean that either the artiste or combination is bad or that the rejection is right; it does, however, signify that a selective mind is at work; and it is probable that, in the long run, music will be served and the interests of listeners safeguarded.

But, of course, each rejection of "border-line cases" is apt to arouse ill-feeling and create new problems. Examples of this are the decisions not to use Boosey's Concert Orchestra, conducted by Mr. Bainbridge Robinson, or the Royal Amateur Orchestral Society.

BUILT FOR BROADCASTING



The new home for the British Broadcasting Corporation in Portland Place, W. When completed it will contain 20 studios and be capable of holding an audience of 1,000 people.

Artistes' Fees

The fees of artistes for broadcasting will be a permanent difficulty, passing through acute phases, one of which seems to be occurring now.

What happens is that a competent artiste taken up by the B.B.C. gets an enhanced market value, perhaps becomes an international celebrity, and then naturally asks for more money from the B.B.C.

Naturally the B.B.C. contends that if there had been no broadcasting there would have been no enhanced market value, so the fee should remain as at the beginning. In most cases the difficulty is settled by amicable compromise, but there are one or two cases under discussion now that may defy this kind of settlement.

I am told that one well-known singer is demanding £75 an engagement, instead of the £50 she is stated to be receiving for microphone work. Also, it is confidently rumoured that a certain well-known violinist is insisting on his established fee of 25 guineas being doubled if he is to do any more microphone work.

If the B.B.C. accedes to the latter request, which, however, seems unlikely, the artiste in question would be getting a good deal more than some others of the same or of greater distinction.

Savoy Hill no longer pleads publicity value in extenuation of low fees, for the simple reason that there is no need to plead for low fees which do not exist. On the whole, the emoluments of artistes at the microphone are now not ungenerous; and this is as it should be.

What Sets are Used?

The B.B.C. has been greatly impressed by the report recently received of a census of German broadcast receiving sets, conducted by the R.R.G.

No less than two-thirds of the registered listeners of Germany took the trouble to fill in the elaborate questionnaire circulated through the Post Office.

It was discovered that in the country as a whole, 16 per cent of those listeners who replied had crystal sets, and 84 per cent valve sets. The valve sets were distributed as follows: 53 per cent with batteries, 35 per cent A.C. mains sets, and 12 per cent D.C. mains sets.

Bavaria, with 22 per cent, claimed the biggest district proportion of crystal sets, and the old Federal Post Office area, with 85 per cent, the biggest proportion of valve sets.

The most popular type of valve set appeared to be the three-valve type, which was that used by 53 per cent of the listeners involved. Of course, it does not follow that British practice is the same as that of Germany, but it would be of great value to the B.B.C. to procure equivalent statistics for this country.

I confess, however, that I do not quite see how it is to be done apart from extensive and intensive newspaper co-operation, with some big money prizes lurking in the background. But it is clearly up to the B.B.C. to take the initiative.

If, for instance, it were discovered that approximately the same distribution of broadcast receivers did apply to this country, the fact might influence radically the development of the high-power scheme for alternative programmes.

If crystal sets are being replaced so rapidly as to be almost negligible, then the standard of service area now accepted may be revised all round.

TROUBLE TRACKING

On this page the Chief of the "M.W." Query Dept. discusses, month by month, some of those common difficulties and troubles which can be so perplexing. This month he gives some very useful hints on summer-time conditions.

At this time of the year the L.T. battery requires a little extra attention. The listener is apt to forget the topping-up process which is vitally necessary during the summer season.

The battery electrolyte is made up of a solution of sulphuric acid and distilled water. In dry weather the water evaporates fairly quickly, with the result that the top of the plates are often left "high and dry" above the level of the electrolyte.

Dangers of Neglect

If the battery is left in this condition, the plates, where they are uncovered, will sulphate, and moreover the acid will become too strong, with the consequence that the cell loses efficiency.

In order to guard against this the procedure is very simple. Whenever you notice the level of the acid dropping add a little water through the vent hole on the top of the cell.

Do not forget, however, that this "topping up" process only holds good provided the loss is due to evaporation, and not to spilling. If any of the acid is spilled, then more of the correct specific gravity must be added.

H.T. Accumulators

These remarks apply equally well to H.T. accumulators, and in this case the "topping up" can be carried out with the aid of a fountain-pen filler, the requisite amount being injected via the vent holes as before.

You will probably have noticed a falling off in the volume of the continental transmissions. Those that came over at full loud-speaker strength a month or two back now require more reaction to pull them in, and many of the popular "foreigners" may be practically inaudible.

This is not due to any fault in the set. The lengthened hours of daylight are the main cause, and stations will commence to roll in again directly autumn arrives.

At the same time, it is as well to make quite sure that the aerial and earth systems are "up to scratch." Commencing with the aerial, clean all dirt from the insulators and then

DON'T FORGET!

Topping-up an accumulator is a very simple matter. A small quantity of water is poured into the cell through the vent hole until the level of the acid rises to just above the tops of the plates.

clean up, and if necessary remake, any joints. It is a good scheme to remove all evidence of corrosion or "blackening" from the aerial wire itself by rubbing it down with a piece of fine emery cloth.

Next have a look at the earth. If it is joined to the main water supply pipe, remove the earthing clip and scrape the lead pipe until it presents a perfectly clean and bright surface. Also clean up the earthing clip and the earth lead at the point where it is connected to the clip.

If the earth is a buried one, make sure that the soil is not absolutely dry. The contact between an earth tube or plate and dry soil is very poor, and usually results in a decrease in volume and in many cases selectivity.

You can remedy matters by giving the soil a good soaking with water, but it is always best to choose a permanently damp spot for an earth of the buried variety.

Atmospheric Noises

By the way, don't worry if you hear crackling or "sissing" noises in your speaker during the summer months. These are probably caused by static discharges and thunderstorms. If you wish to prove this, remove the aerial and earth leads from the set, and note if the noises cease. If the crackling is being picked up by the aerial-earth systems it will immediately disappear when you disconnect the aerial and earth leads.

To make things absolutely safe during a thunderstorm you should equip yourself with an earthing switch, which should preferably be placed outside the house. One of those special switches which are sold complete with a lightning arrester is a thoroughly sound investment.

A Case in Point

This reminds me of a case I had the other day in which a reader stated that he observed a spark passing between his lead-in and the aerial terminal when he disconnected the former. He mentioned that the weather was rather bad at the time, and that a hail storm was in progress.

In this instance the spark was probably due to the highly charged state of the atmosphere, so that when he disconnected his aerial lead the charge in the aerial continued to flow to earth, thus sparking across the small gap between the aerial lead-in and the aerial terminal.

A Two-S.G.

A powerful "Extensered" H.F. amplifier employing two screened-grid stages. It makes use of the wonderful new Extenser tuning, so that wave-changing is automatically carried out without the need for a separate wave-change switch.

Designed and described by the "M.W." Research Department.

How many radio receivers do you possess? Seems a silly question, doesn't it? But there is more in it than meets the eye.

Probably the answer is "one," or, possibly, "one broadcast receiver and one short-waver." But is that enough? What exactly can you do with those two sets? The short-waver is probably quite sufficient in itself for short-wave work, and the broadcast receiver—well!

A Perplexing Problem

This is where the pinch occurs. A broadcast receiver can be of so many types, and it is doubtful whether all the advantages of the various types will ever be combined together into one "perfect" set.

We want so many things with a so-called broadcast set. Firstly, we require good quality from the local transmissions; secondly, we want good reception from foreign programmes; and, thirdly, we must have ease of operation. Those are three very necessary qualities, but also they are very difficult—if not impossible—to achieve in one receiver.

It is expensive to have two sets—one for local work and one for long-distance reception—but that would be the best way of ensuring that all-round perfection was obtained. The super-het. does not solve this problem, as many might imagine, for it fails on the local transmission, where valve overloading is a very real source of distortion.

There is one way out—a compromise, of course, as so often is the case in radio—and that is to have a good local-station, first-class quality receiver, and to tack on a "DX" amplifier when distant programmes are required.

This enables quality to be retained on the local, and real good long-distance results when foreign programmes are required. If the "DX" portion is in operation all the time, detector overloading and, indeed, H.F. valve overloading is likely to occur on the local, while volume controls—dependent on the type—tend either to upset the characteristics of the valves (when they are controlled to the extent necessary on the local programmes) or else to flatten the tuning so that interference becomes rather prominent.

The Solution!

By having a separate H.F. amplifier, a transference of the aerial from the H.F. to the main set, and a turn of a switch on the latter unit will immediately transform the receiver from a "DX" to a "local" one.

And it is much cheaper to build and operate a set having a detachable unit than to build an elaborate dual-purpose receiver.

There is another point which we should like to bring forward. With summer coming on the reception of distant stations is becoming more and more difficult, and many sets that during the winter have given perfectly satisfactory results are now falling off and their owners find that not nearly so many stations as heretofore can be received.

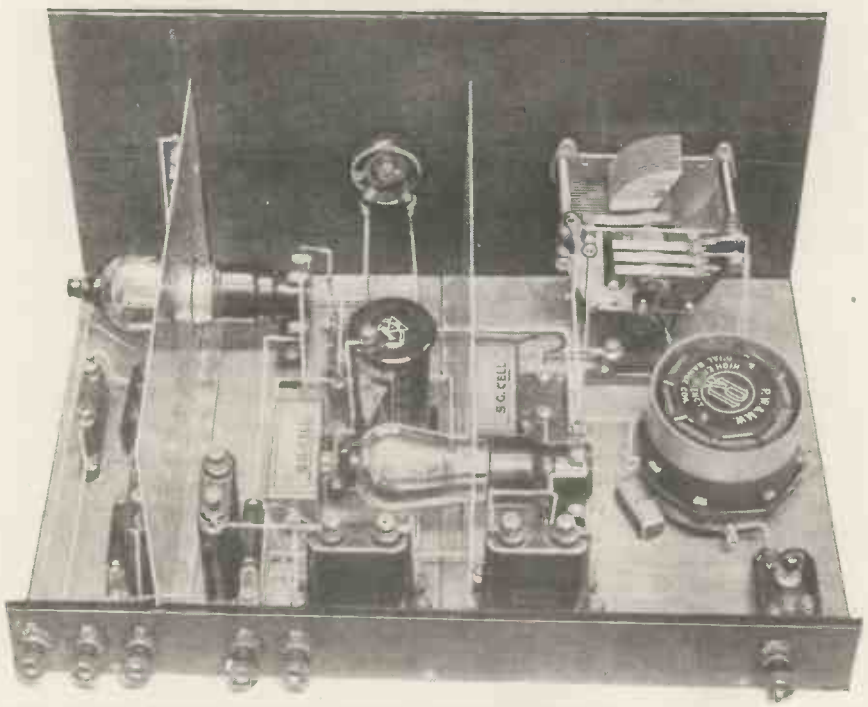
This trouble is undoubtedly experienced by many of our readers, as is exemplified by a letter we have recently received from the West of England. The writer complained that "something was going wrong" with his receiver.

He had built it last October and for several months it had given excellent results.

An Excellent Example

Plenty of stations on the loud speaker, and plenty of punch from the programmes, but during the last few weeks he complained it had been falling off. The local programme seemed to be much about the same, but some of his favourite foreigners died away until they were no longer worth receiving. Did he need new

"A GREYHOUND OF THE ETHER"



Ready to leap through space and pull in programmes from all over Europe. Note the self-changing contacts on the Extenser.

Amplifier

It is easily added to a set, and what a difference it makes!

valves? He had tested the H.T. and L.T. batteries and they were perfectly all right, the grid-bias battery was new. Would it be worth while to change his valves for new ones? Or could we recommend anything?

We promptly told him that it was probably not his valves, but merely the fact that summer was coming and that for the next few months he must expect his stations to get gradually weaker during the ordinary broadcast hours, though they might come up to full strength again after ten o'clock at night.

A Permanent Cure

Cold comfort, perhaps, but the truth of the matter. We pointed out, of course, that an H.F. unit added to his receiver would bring back his stations very much to the same degree of strength as he had them before, but it must be understood that the addition of an H.F. unit to an ordinary set was not a job to be undertaken lightly by anybody who knows but little about radio.

Now there must be a large number of readers in the same boat as that reader, and also a further large number of readers who would like to increase the range of their sets irrespective of whether it is summer or winter. Many owners of detector and L.F. sets would like to increase the distance-getting properties without having completely to rebuild the receivers.

Consequently this month we are publishing a design of a two-valve screened-grid amplifier which we feel will meet the requirements of a large number of set owners. But it must be constructed properly, otherwise it will give endless trouble.

From a two-valve screened-grid unit of the type described in this article one obtains a very large amount of magnification. Consequently one has to be doubly careful about such things as de-couplers and screening.

WHAT'S IN IT

PANEL
14 × 7 in. (Permcol, or Keystone, Lissen, Goltone, Parex, etc.).

CABINET
Panel space 14 × 7 in., baseboard 10 in. deep (Camco, or Pickett, Osborn, Lock, Kay, Gilbert, etc.).

VARIABLE CONDENSERS
1 ·0005-mfd. Extenser (Cyldon).
1 ·001-mfd. max. compression type (R.I., or Lewcos, Formo, Lissen, Polar, Sovereign, etc.).

SWITCH
1 on-off (Ready Radio, or Bulgin, Goltone, Lissen, Igranic, Lotus, Benjamin, W.B., Keystone, Magnum, Red Diamond, Wearite, Junit, Ormond, etc.).

RESISTANCES
4 600-ohm and holders (Ready Radio, or Parex, Bulgin, Wearite, Keystone, Magnum, etc.).
1 25,000-ohm Spaghetti type (Bulgin, or Magnum, Sovereign, Keystone, Ready Radio, Lewcos, Graham Farish, etc.).
1 ·5-meg. leak and holder (Dubilier, or Ready Radio, Mullard, Lissen, Telsen, Ediswan, Graham Farish, Ferranti, etc.).
1 filament rheostat (G.E.C., or Wearite, Lissen, Igranic, etc.). (See text.)

VALVE HOLDERS
2 horizontal-mounting 4-pin type (Bulgin, or Parex, W.B., Junit, etc.).

FIXED CONDENSERS
4 1-mfd. (Dubilier, or T.C.C., Ferranti, Formo, Igranic, Hydra, Mullard, etc.).
1 ·002-mfd. (Lissen, or Ready Radio, Telsen, Igranic, Ediswan, Ferranti, Graham Farish, Formo, Watmel, Dubilier, etc.).
1 ·01-mfd. (T.C.C., or as above).
2 ·001-mfd. (T.C.C., or as above).

CHOKES AND COILS
2 H.F. (Varley & Magnum, or Telsen, Parex, Wearite, Ready Radio, R.I., Keystone, Lewcos, Lissen, Dubilier, Lotus, Watmel).
1 "P.W." and "M.W." dual-range coil (R.I., or Ready Radio, Formo, Keystone, Wearite, Parex, Goltone, Magnum, Tunewell, etc.).

MISCELLANEOUS
6 terminals (Igranic, or Eelex, Belling & Lee, Clix, etc.).
1 terminal strip, 14 × 2 in.
2 standard screens, 10 × 6 in. (Parex, or Wearite, Ready Radio, Magnum, Keystone, etc.).
Flex, screws, copper foil, etc.
Wire (Glazite, or Lacoline).
H.T. wander plugs (Clix, or Eelex, Belling & Lee, Igranic, etc.).

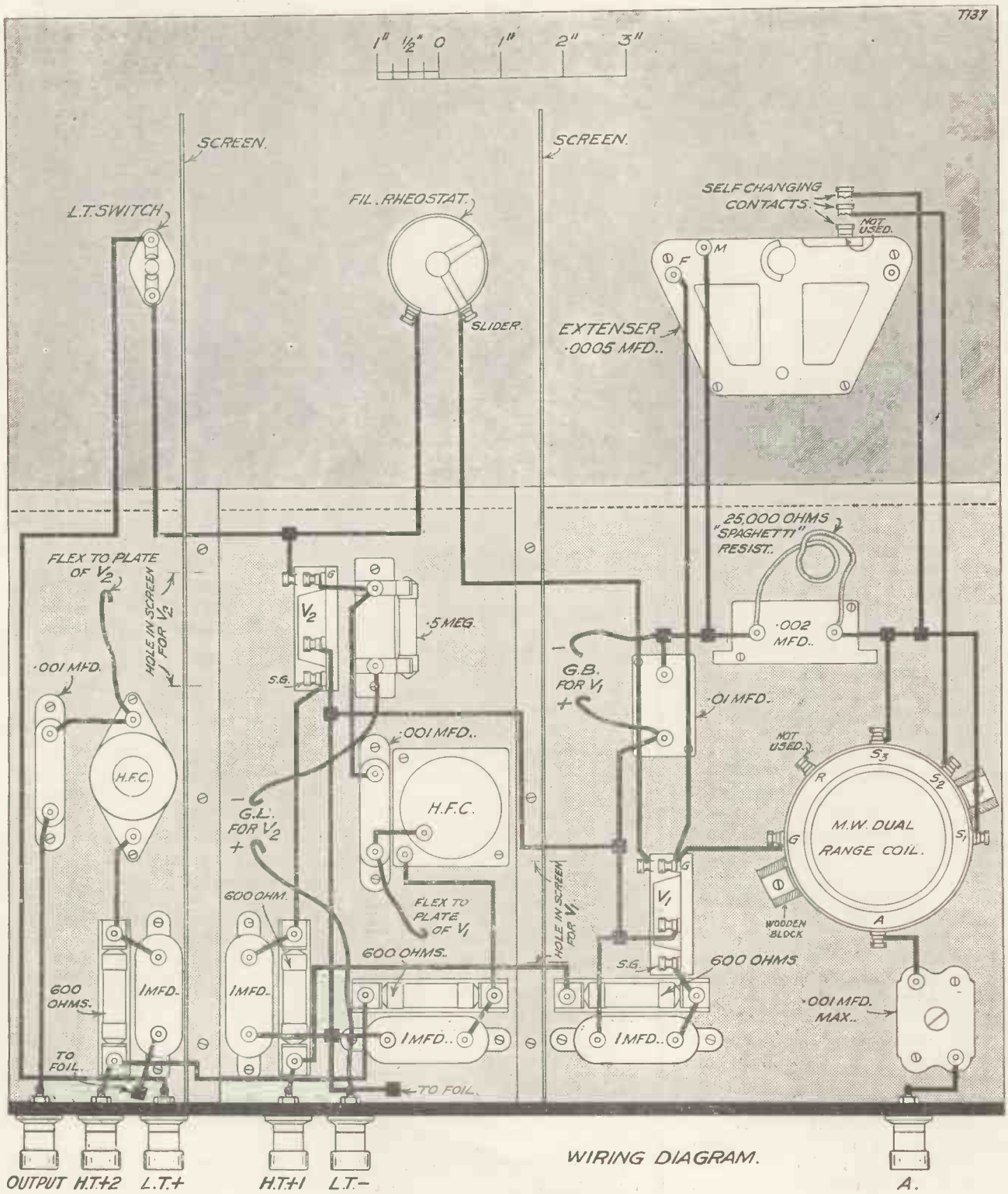
Standard Components

It would not, of course, be possible to add such a unit to a set already having an H.F. stage without the most elaborate precautions to prevent instability, but with a set composed of only a detector and note-magnifier or two note-magnifiers, such a two-valve screened-grid H.F. amplifier can be exceedingly useful.

You will see from the theoretical diagram that the amplifier is strictly conventional, and is based on the "M.W." dual-range coil and Inter-wave coupling. Selectivity on the long waves is obtained by means of that coupling, whilst should you require to increase the selectivity on the short waves a small compression type ·001 condenser is placed between "A" on the coil and the "A" terminal on the amplifier.

The Extenser Included!

There is, however, one extreme novelty in the circuit, and that is the use of the ·0005 Extenser instead of the usual condenser and wave-change switch. This automatic self-changing condenser immediately does away with wave-change switching, and enables one to go right



WIRING DIAGRAM.

SUGGESTED ACCESSORIES

Valves. S.G. variety, either 2-, 4- or 6-volt type. Can be metallised if desired (see text). (Cossor, or Osram, Mullard, Eta, Lissen, Six-Sixty, Mazda, Marconi.)

Batteries. H.T. 120 volts or upwards, ordinary capacity type. Most convenient to use same battery as receiver. (Ever Ready, Pertrix, Drydex, Grosvenor, Lissen, Fuller, G.E.C., National, Siemens, Ediswan, Oldham). Grid bias, ·9 or 1·5 volt (Siemens, or as above).

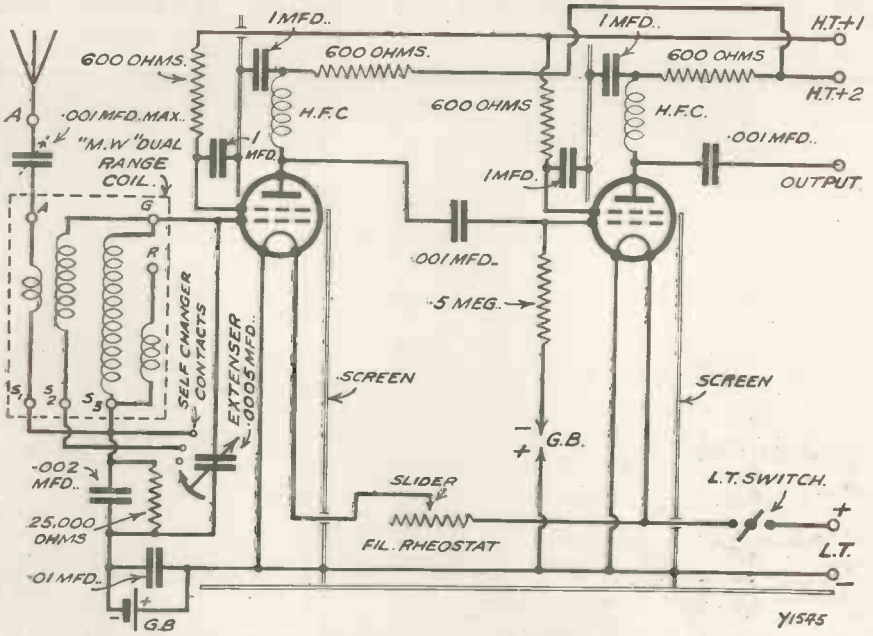
Accumulators. 2-, 4- or 6-volt (same as receiver). (Exide, Ediswan, Lissen, Pertrix, Oldham, Fuller.)

Mains Unit. State type of set to be used with, as well as details of the S.G. amplifier, mains voltage and type, etc., when ordering. (Westinghouse, Ekco, Tannoy, Regentone, Atlas, R.I., Junit.)

round the dial, embracing the medium and the long waves without pausing to change over.

The change-over at the top of the medium range to the long-wave range is automatically done by the condenser itself, by virtue of the three terminals at the back of the condenser which you will see in the photographs. It is the fact that this particular type of condenser *extends your wavelength range* that has given it the appropriate name of "Extenser," and it is as such that we will refer to it in the rest of the article.

A SIMPLE CIRCUIT WITH SUPER STRENGTH



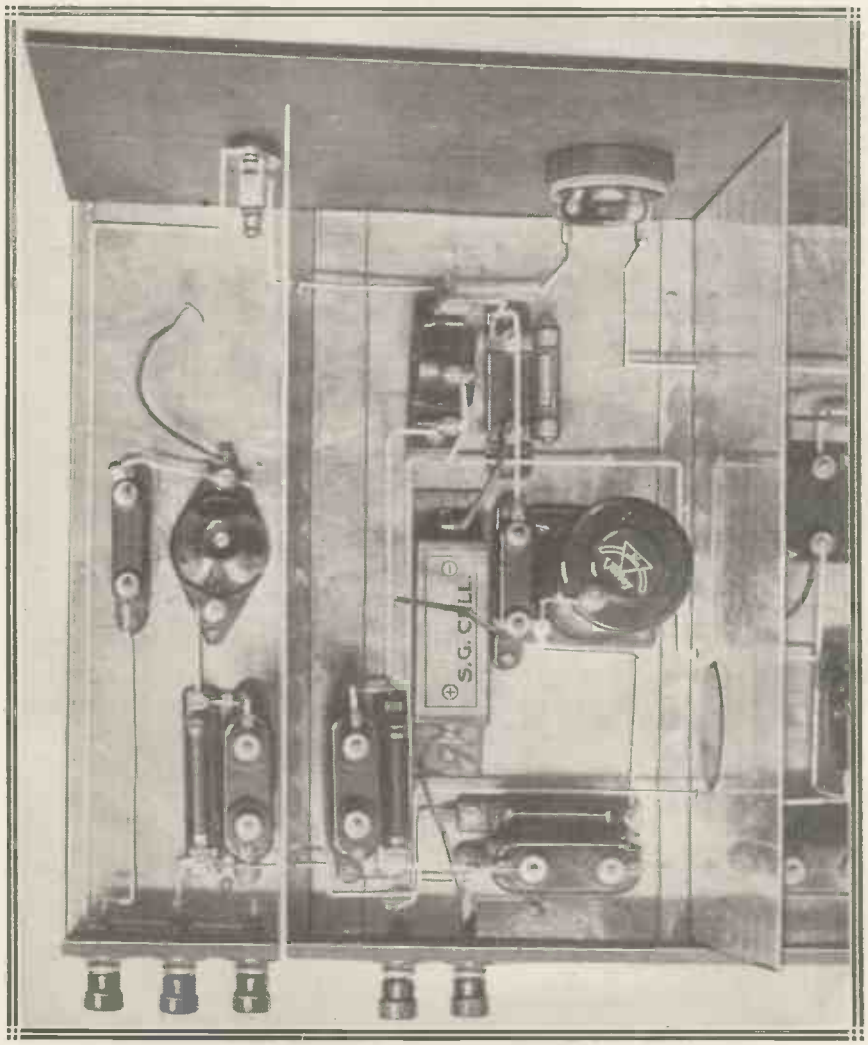
Very thorough de-coupling is carried out, as you will see above. Note also the method of wave-changing with the Extenser.

Choke Coupled

The first H.F. stage is choke coupled to the second aperiodically, and the second stage is, of course, choke coupled to the detector circuit of your main receiver. Volume control is obtained by means of the rheostat in the filament circuit of the first H.F. valve, this rheostat being of the value of 10 ohms in the case of four- and six-volt valves, and 30 ohms in the case of two-volt valves.

As you can see from the front of the panel illustrations, the unit is extremely simple to operate, the tuning being carried out by the Extenser, whose 200-degree dial is seen on the left. The next knob to it is the filament rheostat controlling the volume, and the last knob is the on-off switch.

SCREENING THE SECOND STAGE



Here we see the second H.F. stage. This has wonderful amplifying properties and will surprise you by the magnification it will give.

Eliminating the Earth

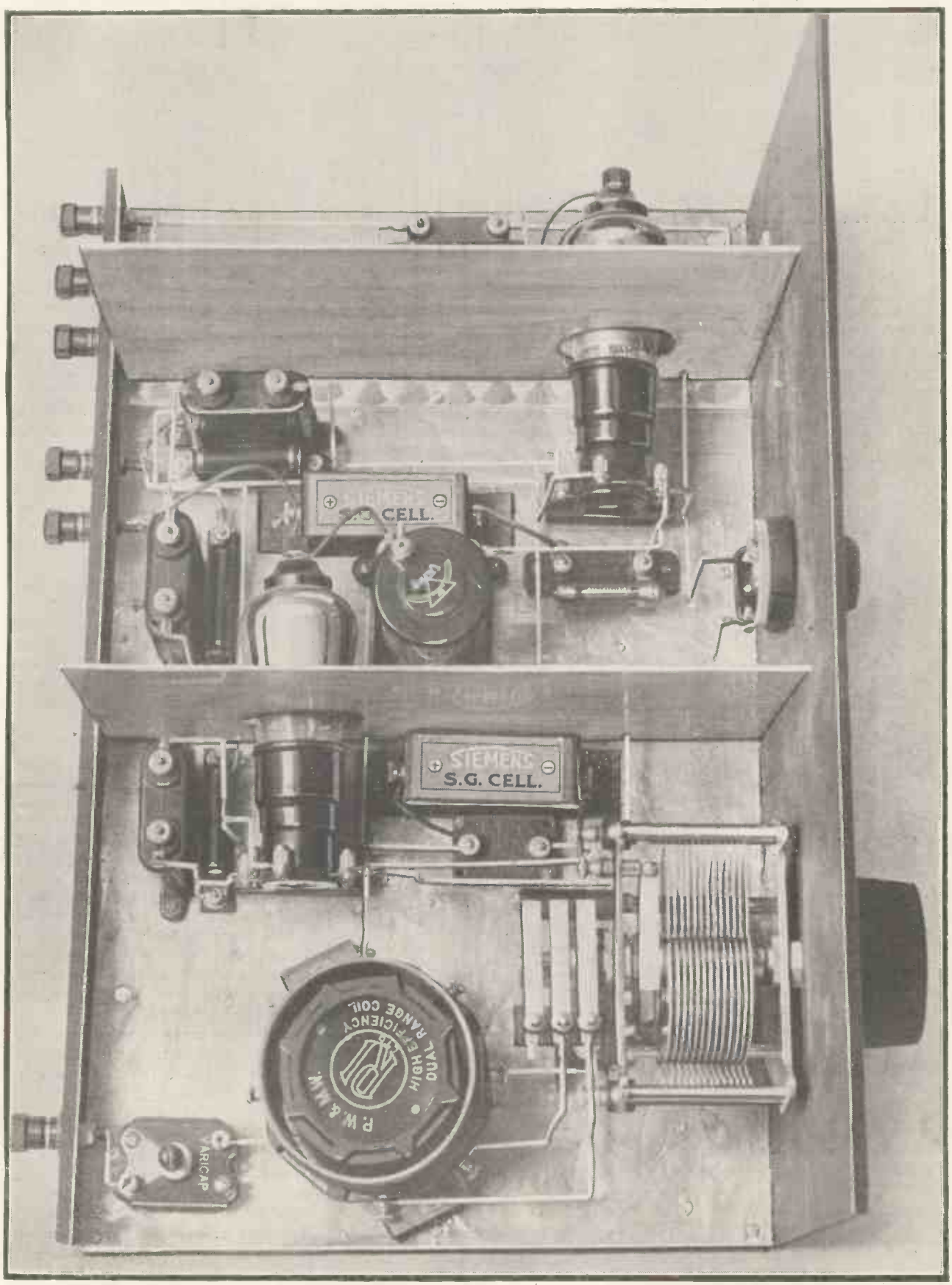
There is no earth connection for this unit, as it is taken through the filament wiring to the earth terminal of the ordinary receiver. In doing this we have assumed that you will be using a receiver such as those designed by ourselves in which L.T.— and H.T.— are joined together and then taken to earth. In the event of L.T.+ going to earth it is as well to discard the earth on the receiver and to take it direct to L.T.— either on the H.F. unit or on the receiver, or the battery itself.

No H.T.— connection is necessary on the amplifier, as connection between this and the L.T. battery is obtained in the receiver.

Only Six Connections!

Thus there are only four battery terminals to connect up, the aerial, and the one output terminal on the amplifier. The connections thus are H.T.+ 1, controlling the screening grids of the two valves, and H.T.+ 2, controlling the anode voltage. Then

From Ordinary to Long Waves Automatically



No Wave-Change Switches to Operate

there is L.T.— and L.T.+, completing the battery connections. Next we have the aerial, and, lastly, the output terminal is taken to the "A" terminal on the receiver, which, of course, is operated in the usual manner, and this makes the final connection.

Ordinary standard screens are employed in the construction, and horizontal valve holders, enabling the valves to go through the screens, are used. In the event of the constructor desiring to use the new metallised screened-grid valves, which have just come out, he must be careful that he wires the filaments of the H.F. unit the correct way round.

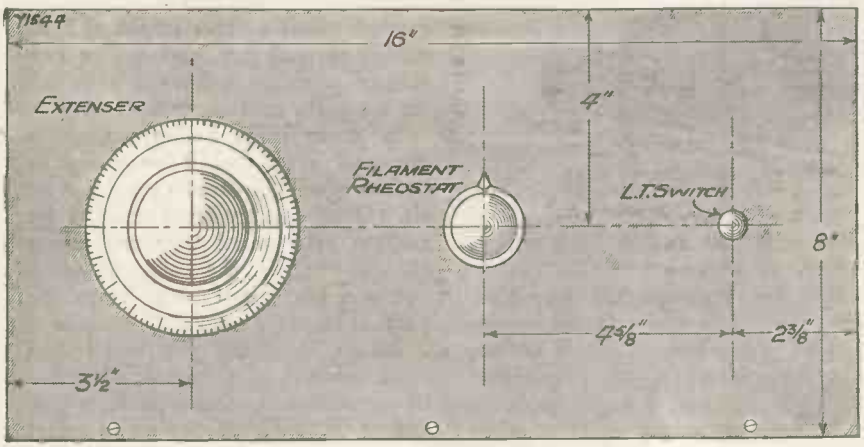
Using Metallised Valves

If you look at the base of a metallised screened-grid valve with the anode pin towards you, you will find that the metallised covering of the bulb is "earthed" to the filament pin which is on your left, so that looking down on a valve holder with the anode towards you the earth filament pin is the one on the right.

This H.F. unit was designed to operate with the ordinary type of screened-grid valve, in which case, of course, it does not matter which filament pin goes to L.T.—, but if you are going to use the metallised type you must make sure that your wiring agrees with the metallised valve connections.

It will be noted in the wiring diagram that in several cases where apparently L.T.— or earth could be taken to any particular part via the screening this is not always done, and quite frequently a direct connection to L.T.— wiring is taken. This is done advisedly, to stop any troubles due to eddy currents in the screens, and it is not advisable that the constructor should break away from the arrangement shown.

SIMPLIFIES SET CONSTRUCTION



PANEL LAYOUT

The Extenser enables us to have a beautifully simple panel layout, and long and medium waves at one sweep of the dial.

The grid-bias batteries employed are of the usual 9-volt type for the two-volt valves and 1·5 volt for four- and six-volt valves, as supplied by Siemens, and having cardboard tags at either end so that they can be screwed down to the baseboard.

You should also note that the baseboard is covered with copper foil, and care must be taken in mounting the components on it that no screws going through the components into the baseboard provide any possibility of short-circuit.

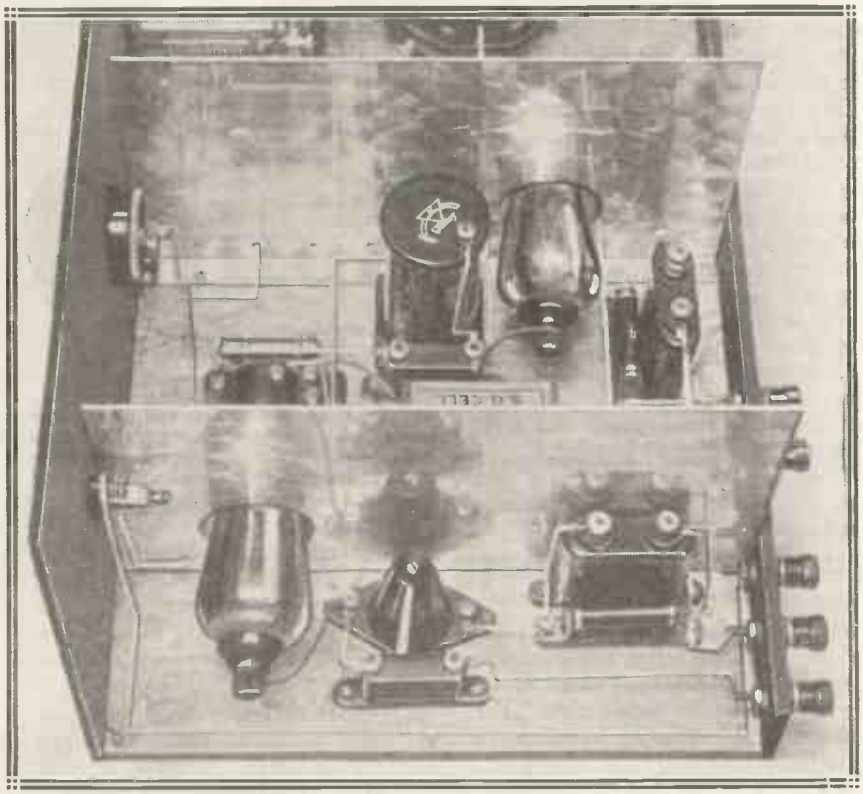
A Stitch in Time——

Some grid-leak holders, for example, have their terminals mounted on little round-headed bolts which project quite a long way down below the moulding, and in some cases would come into connection with the foil on the baseboard. It is advisable if there is the slightest doubt as to unwanted electrical contact being made between any component and the baseboard that a small piece of cardboard or stiff brown paper be slipped under the component.

The wiring of the wave-change

(Continued on page 644.)

ADD POWER TO YOUR PROGRAMMES



This is the output end, showing the top of the second S.G. valve coming through the second screen Ordinary 2-volt S.G. valves are employed.

MORE ABOUT THE "CONVERTIBLE" TWO

Details of this fascinating dual-purpose two-valver were given last month. Here are some interesting notes about it.

By J. ENGLISH

THOSE of you who have constructed the "Convertible" Two receiver described in the May issue will by now have discovered for yourselves what it is capable of doing, the usefulness of the two-in-one idea, and above all the versatility of the portable itself.

A Pleasant Surprise!

You may have been a little surprised by the latter's performance on its absurdly small frame aerial; in fact, a good many people have little idea of what two modern valves can do on a frame aerial, not expecting more than 'phone reception of local stations.

As a matter of interest I carried out several tests with the "Convertible" Two portable to get some idea of the extreme limit of its range. The results obtained under normal every-day conditions will doubtless be of interest if you are keen on making the most of your own model.

Reception during daylight is, of course, the severest test for any frame aerial receiver, the field strength of distant stations being much weaker than at night. However, no difficulty was experienced in receiving the New Northern Regional station clearly with careful tuning at 160 miles.

This is quite good for a daylight test, but after dark more striking results were obtained.

Stations Galore!

Considering the limitations of the receiver and the infinitesimal "pick-up" of its frame aerial, the distances over which reception was found possible are really remarkable. For instance, the following stations, in order of increasing distance, were nicely audible: Brussels, Mühlacker, Rome, Heilsberg, and Algiers; the latter only just audible with critical tuning.

For this long-distance reception, using the valves and voltages recommended in the constructional article, a 3 or 5-megohm grid leak is desirable; the lower value of 2 megohms being better for open aerial reception when the detector has to handle a larger input voltage. As regards the aerial series condenser, no attempt was made to adjust this for each station, a setting corresponding to a wave-length near the upper limit of the wave range being permanently adopted.

VERY FINE DAYLIGHT RESULTS

In spite of its small frame and consequent small "pick-up," the "Convertible" Two has received the North Regional at 160 miles without an auxiliary aerial and in broad daylight.

If this adjustment happens to fall on the wave-length of your local station, however, you get a background of the latter station on other wave-lengths. The remedy here is obvious.

Another point of interest about the portable is that the directional properties of the frame aerial, as in any other frame aerial receiver, can be put to good advantage in reducing interference to a minimum.

As an instance of what can be done in this way I need only mention that I have received Horby without a trace of background from the London National programme, although the separation between the two is only five metres! This degree of selectivity is not at all easy of achievement on an open aerial, even with a super-selective receiver.

For the erection of a temporary aerial to use with the portable receiver the minimum of material need be carried. Just a short length of light rubber-covered flex, and one or two thin metal spikes to drive into the soil for the earth contact.

In many cases I doubt whether you will even find it necessary to bother about an earth connection at all. Good selectivity is ensured by making your aerial wire not longer than 20 or 25 ft., the height at which you can suspend it being more important than its length.

Before attaching the aerial and earth leads it is, of course, advisable to disconnect the frame aerial wires, and then to adjust the series aerial condenser to a low value. Having made this adjustment for selectivity, the case can be closed; the aerial and earth lead, if used, coming out from under the lid. The receiver is then ready for operation as an ordinary cabinet set.

A Suggestion

If at any time you are experimenting with temporory aerials outside the "swamp" area of the local station, some very interesting results can be obtained by making use of unusual aerials. For instance, the wires of fences in fields and along railway embankments, in spite of their low elevation, have an extraordinary "pick-up"; hitch your portable to one of these wires and you will get some amazing daylight long-distance reception.

In conclusion, with regard to the housing of the "Convertible" Two as a permanent receiver. The conventional frontless box with a lid at the top is the best type of cabinet to construct, and in this case the usual dimensions give it a not unpleasing appearance.

In all, this is a really fine little portable receiver which should provide many interesting moments during the summer, and make a neat home receiver when the dark evenings are with us again. So if you have not yet built the "Convertible" Two, you should refer back to the May issue of MODERN WIRELESS, where full constructional details were given.

The M.W. "Plus-Volt" Unit

Designed and Described by

The "M.W." Research Department.

Everybody knows that good quality partly depends on a good H.T. supply, and here is the very thing for the man with A.C. mains. Easy to build, requiring no maintenance and absolutely safe in use, it solves that high-tension problem once and for all.

H.T. can be a distressingly expensive item. Even those who have only modest little two-valvers for receiving the local programmes on small loud-speakers must each year spend at least a pound or two on H.T. batteries.

Another disadvantage of the dry battery is that although it will give full voltage when new—say, 100 volts—it will not do so for ever. During the first few weeks it will probably give splendid results, with the foreign stations rolling in one after the other.

Battery Troubles

Then, after a little time, the volts will gradually fade away—very slowly at first, perhaps—in fact the process will be so slow that it will be hardly noticed. The distant stations will become weaker and weaker, until after a couple of months it may be found that the more far-away programmes can no longer be tuned in.

Some people would blame the weather, or it might occur to them to take a voltage reading of their still "new-looking" high-tension battery, and they would be horrified to find that instead of getting the full reading of 100 volts which was expected, it would only give, say, 70 volts. What are they to do about it? Put their hand in their pocket and buy a new battery, or make the best of their remaining 70 volts and be satisfied with the local fare!

Good Supply from A.C.

A better answer to this question is—build the high-tension battery eliminator described in this article and finish with batteries for ever. That is, of course, provided there is an

YOUR SHOPPING GUIDE

CONDENSERS
- 3 4-mfd. (working voltage not less than 200 D.C.) (Formo and T.C.C., or Igranic, Ferranti, Hydra, Mullard, Lissen, Dubilier, etc.).
- 1 2-mfd. ordinary type (Dubilier, or as above).

RESISTANCES
- 1 25,000-ohm Spaghetti (Magnum, or Bulgin, Lewcos, Ready Radio, Keystone, Sovereign, Graham-Farish, etc.).
- 1 20,000-ohm potential divider (Bulgin, or Climax, Igranic, etc.).

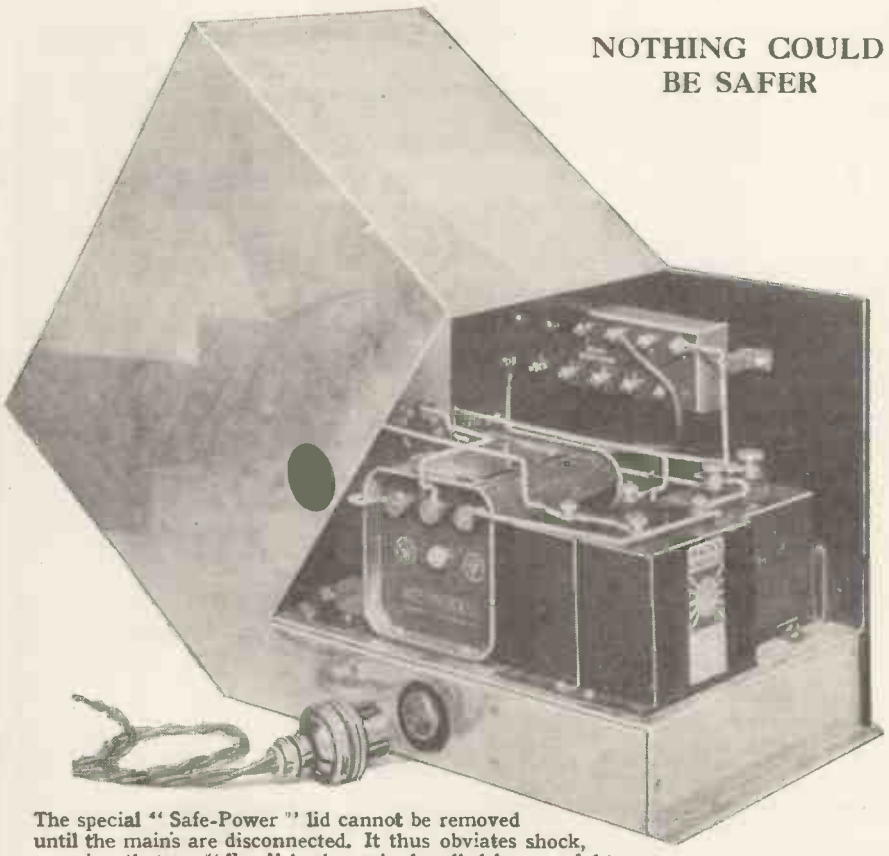
MAINS TRANSFORMER
- 1 type EY20 (80 volts secondary) (R.I. or Varley EP2).

RECTIFIER
- 1 Westinghouse metal type H.T.5.

SMOOTHING CHOKE
- 1 H.T.5 Wearite or other suitable small choke (such as R.I., Igranic, Bulgin, etc.).

MISCELLANEOUS
- 1 Safe-Power "Junior" box and panel (Magnum, or Keystone, Wearite, Ready Radio).
- 3 indicating terminals (Belling & Lee, or Clix, Igranic, Eclex, etc.).
- Wire (Glazite, or Lacoline).
- Screws, flex, etc.
- 1 Pendant type B.C. Lamp holder.
- 1 B.C. Adaptor.

NOTHING COULD BE SAFER



The special "Safe-Power" lid cannot be removed until the mains are disconnected. It thus obviates shock, ensuring that no "live" lead can be handled by oversight.

alternating current supply available. By the way, it can always be found out if the supply is A.C. or not by looking at the meter. Some alternating current meters have the sign "~" on the identification plate, denoting cycles per second, instead of the words "alternating current," or you may find that your particular meter has both.

Absolute Safety

Well, if your electric supply is A.C., and you decide to make the unit—and if you take good advice you will—the first thing to do is to consult the list of components required. It makes the job of construction much easier if you get all the parts together before starting, and have them on the table in front of you, then you can see exactly what you are doing.

Turning now to the actual construction of the unit, first of all drill the ebonite panel. This is a very simple matter, and the only holes necessary are three for the terminals and two small ones to accommodate the fixing screws for the 20,000-ohm potential divider.

After you have done this, refit the panel to the "Safe Power" base, making sure that the screws are properly tightened up. This base is used in conjunction with the special "Safe Power" cover seen in the photographs. As its name implies, it protects you from any possibility of getting an electric shock.

You will notice that the mains are fed to the eliminator via a long length of flex with a lampholder on the end. This lampholder fits over an ordinary adaptor which is mounted on a bracket underneath the base, with its "business end" showing through a 1¼-in. hole at the back of the unit.

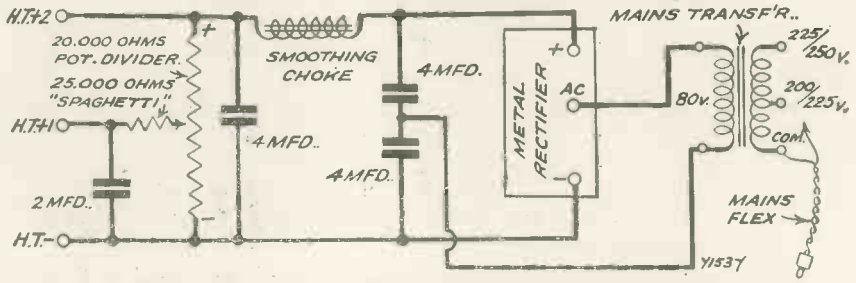
The Special Device

The metal cover also has a hole of the same size at the back, and when it is in position this second hole coincides with the hole in the base.

It will be seen from this that in order to connect up to the mains the lampholder on the end of the flex must pass through these holes before it can make proper connection with the adaptor. This locks the cover and makes removal impossible until the lampholder is withdrawn.

This is a very good point which should allay the fears of the most nervous listener.

IT EMPLOYS A DRY RECTIFIER



Here is the circuit arrangement, and it will be seen that instead of a rectifying valve a dry rectifier is used.

Having prepared the panel and base, the next thing to do is to mount the various components. This in itself should present no great difficulty, as there are really very few and their positions can easily be seen from the accompanying photographs.

No doubt you will have noticed by this time that there is no valve in this mains unit; instead, a Westinghouse metal rectifier is used, which has several advantages over the more or less usual form of valve rectifier.

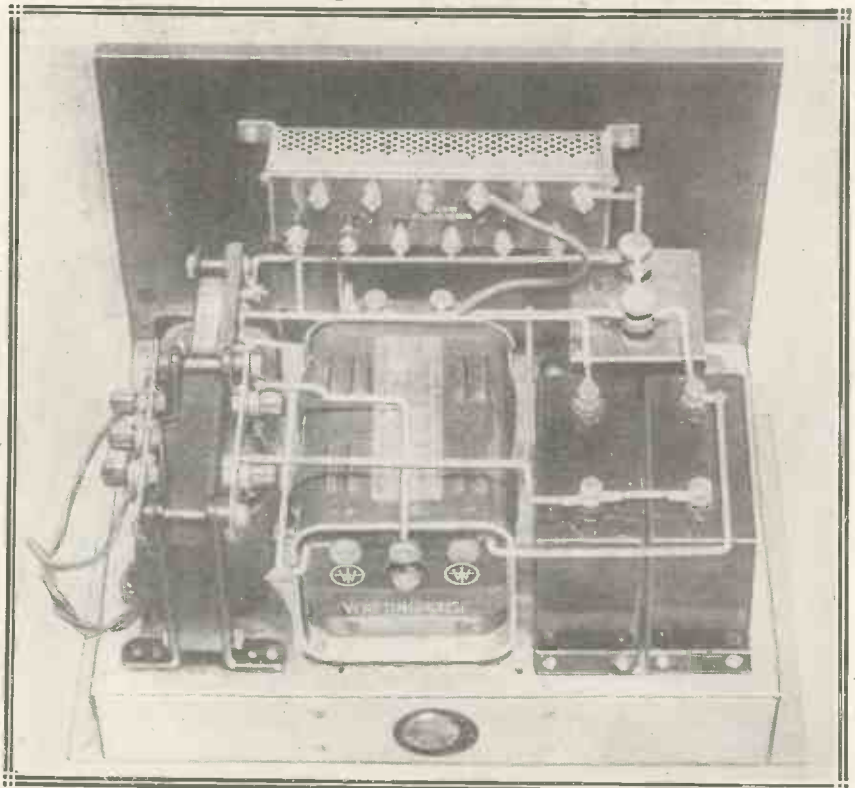
The main point being that of mechanical strength; then, of course, the metal rectifier has no filament which requires heating, and this makes it a very economical proposition, although in itself this is only a small point, as high-tension battery eliminators at their worst consume very little, and this one in particular almost nothing at all.

Cheap to Run

In fact, it can be safely said that the difference in your electric light bill will be so small as to pass unnoticed. On test, the total consumption worked out at about 5 watts, or, in other words, about 200 hours listening for the price of one unit of electricity. Not bad, is it?

Having got all the components securely fixed, you can commence the wiring. For this some form of insulated wire, such as Glazite, should be used, or about No. 18 gauge tinned copper wire with a covering of Systoflex. Whatever you do, don't use bare wire, as it may cause a lot of trouble, and there is a possibility of damaging the components if you get a "short" anywhere.

SET IT AS REQUIRED—AND FORGET IT!



The input transformer is tapped to suit your mains, and the Spaghetti on the potential divider on the panel permits of easy adjustment of the H.T.+ 1 voltage range.

Safety, Certainty and Simplicity

It is as well to leave the panel until afterwards, as it will be much easier to do the wiring-up without it in position. There is no need to solder the connections as long as you make nice neat little loops to go under the terminal heads, and don't forget to make sure that the terminals are well tightened up.

Easy to Wire

On the other hand, if you want to make a special job of the unit and are good at soldering, then by all means solder the connections. In doing so, however, it is as well not to solder the wire direct on to the terminals, but to fix it to small tags specially made for the purpose.

By doing this you obviate any possibility of damaging the components with the hot soldering iron; a thing that it is very easy to do, especially in the case of fixed condensers, or small transformers.

There are not many connections to make, so you should be able to do this without much trouble. Follow the wiring diagram carefully, and you won't go wrong, but it is always better to check over your work before joining up to the mains for a test.

On the Panel

You are now ready to fix up the panel, there is hardly anything on this—three terminals and the 20,000-ohm potential divider, that is all. When mounting these on the panel remember that the negative end of the potential divider and the H.T.+2 terminal go on the left-hand of the panel looking at the back of the eliminator, and the H.T.— terminal at the other end, with H.T.+1 in the middle.

It will save a lot of trouble if you make the necessary connections to the terminals before the panel is screwed in position, not forgetting to leave plenty of slack for connecting up to the other components afterwards. The reason for this is because if these connections are left until you have screwed the panel home they would be very hard to get at.

Voltage Adjustments

All that remains now is to connect up the potential divider. It will be seen that on this component there are several tappings, numbered from 1 to 10. Now the H.T.+1 terminal is connected to a 25,000-ohm "Spaghetti" resistance, which can be joined to any one of these terminals according to the voltage required by the detector.

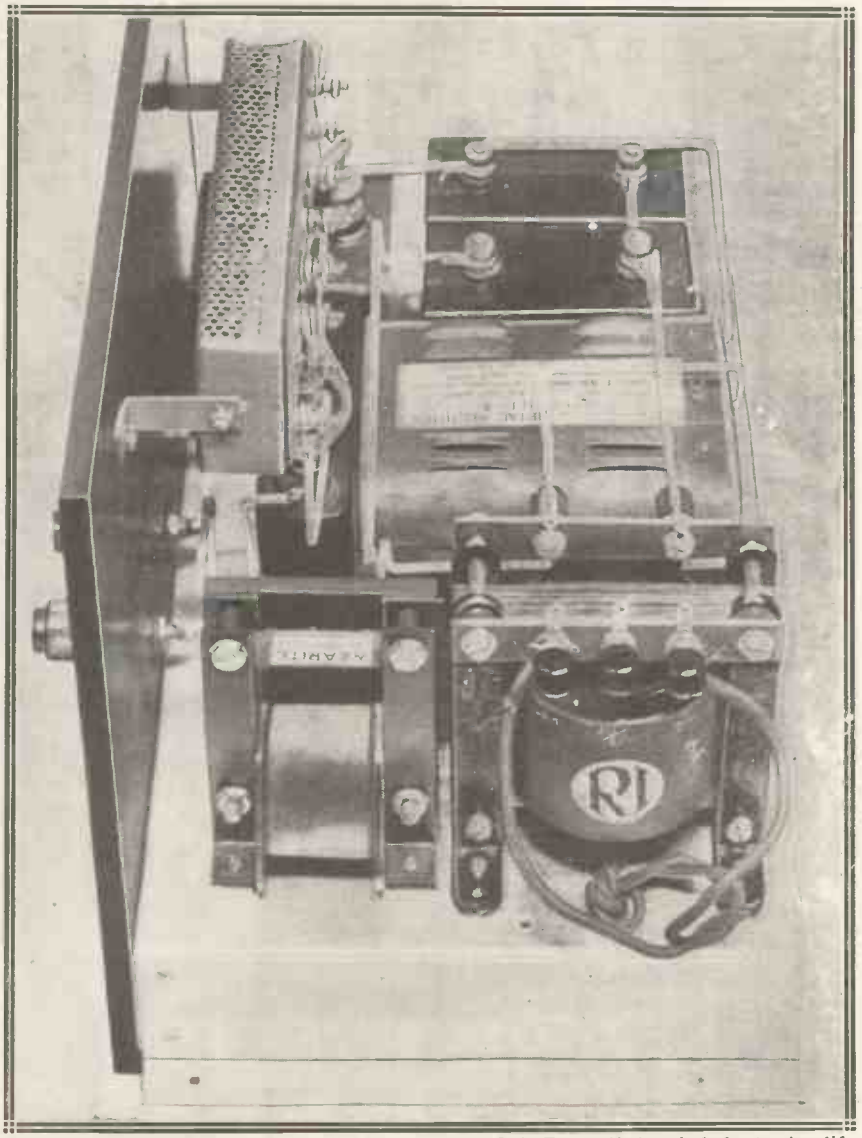
The best tapping to use will depend on the size of the set and also on the detector valve itself, but under normal conditions it should be one of the terminals between No. 6 and No. 10. A good method is to start with it on No. 6 and gradually work along until the best tapping is found. When using the unit on an average set No. 10 should give about 100 or so volts and No. 6 about 60 volts, so really it gives you quite a good choice of voltages for the detector.

The pressure at the H.T.+2 terminal varies with the load, and it should give about 120 volts with a current of 20 milliamps., but in practice it may actually be a trifle different.

On the other hand, if you only use a small power valve in the last stage of your set the voltage may go up as high as 140 volts, so be fairly liberal with the grid bias if the power valve is on the small side.

By the way, this eliminator is suitable for sets having a detector and one or two low-frequency amplifying valves. It is not suitable for sets incorporating an S.G. valve, as no tapping is provided for the screen voltage.

COMPLETE EASE OF CONSTRUCTION



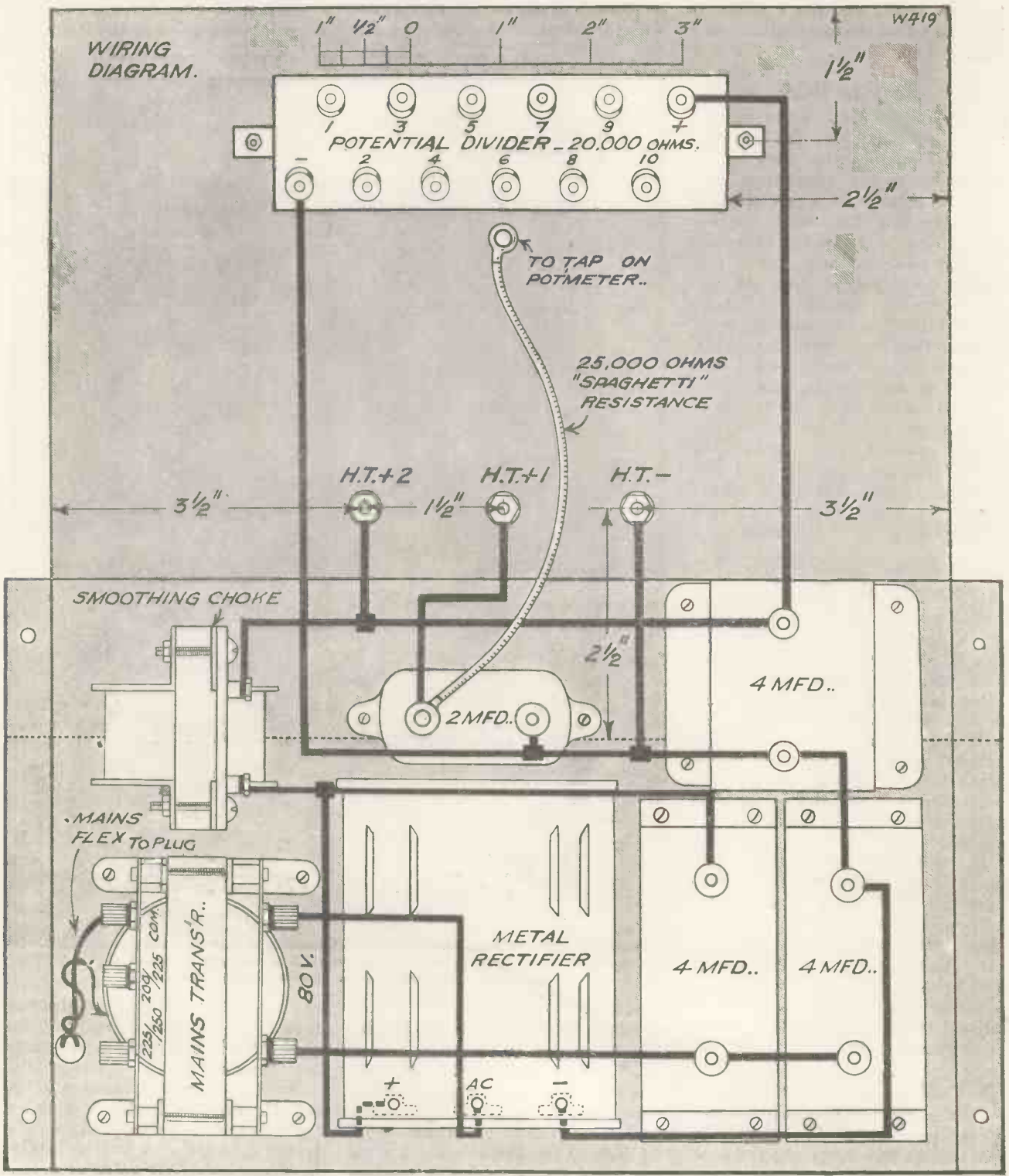
There are not many components, and the special "Safe-Power" chassis helps to simplify assembly. The wiring is thus rendered remarkably easy.

It Abolishes H.T.B. Renewals

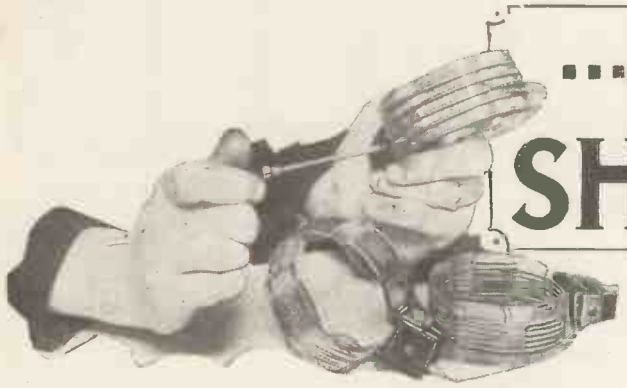
Regarding the 4-mfd. condensers, these should be capable of standing up to a working pressure of at least 200 volts, as they have to bear a considerable strain.

The small 2-mfd. condenser across the detector supply tapping, however, does not have to deal with such high voltages, so for this you may use with safety one of the ordinary receiving type. The transformer should be capable of working on any voltage mains from 200 volts to 250 volts, or if you are one of the few people who have 100-volt A.C. mains you could get a suitable one made up for you.

And that completes our description of a highly useful little unit.



The heavy black lines indicate the necessary wiring. Note the 25,000-ohm resistance, which acts as the lead from the potential-divider to the 2-mfd. smoothing condenser.



... ON THE ... SHORT WAVES

By W. L. S.

Our short-wave expert has much of interest to recount this month. Read what he has to say about unsuccessful listening on the "higher frequencies," in reply to critics.

I HAVE always maintained that the average radio listener (whether of the short-wave variety or not) is a queer phenomenon. He is willing to lose hours of sleep to pull in one coveted station; chiefly so that he can brag about it to his next-door neighbour, who hasn't heard it yet. And yet if the next-door neighbour is the lucky one, and gets it first, he is accused—to put it mildly—of overstepping the bounds of truth.

Rubbing It In!

All of which is a prelude to describing my hurt feelings on receiving a letter from a well-meaning gentleman who describes me as "MODERN WIRELESS's Professional Liar." There!

It is the penalty one has to pay for having a better receiver than the other man. All I can say is that in this case the other man's receiver must be unbelievably bad, for he doesn't believe that I can receive America before midnight. My dear, good sir, scores (and possibly hundreds) of readers of this journal receive America before midnight, many of them better than I do. So we will leave the subject.

Has anyone yet logged the newest addition to the short-wave range of broadcast in the person of Posen, S R 1? He works on about 31 metres and relays the long-wave Posen programme. He is generally well worth listening to during the evening.

From Across "The Pond"

Not many of the European short-wave stations are worth listening to nowadays, the two chief exceptions being Rome and Vatican City, both near 50 metres. The rest doubtless have greater programme value outside Europe. Most of my own short-wave entertainment certainly comes from the U.S.A., and the outstanding station for early work is, of course, W 2 X A D, on the famous 19·56-metre transmitter.

The range of this station is definitely world-wide, and the quality is beyond reproach. The only criticism I have to make is that I don't think very much of American programmes, however excellent the transmission.

I have a letter from Mr. R. Patterson, Mallam Maduri, via Kano, Northern Nigeria, who particularly wants to arrange tests with amateur transmitters in this country. He is interested in reception only, but would like to arrange schedules with anyone interested and to correspond with them by post. Will anyone who would like to know how his signals are received in Nigeria write to Mr. Patterson at this address?

Incidentally, "R.P.," you need not hang on to commercials thinking that they are amateurs, since the amateurs all work together in very narrow wave-bands. That on which you would be most likely to log Britishers is the band between 20·8 and 21·4 metres. I will give you a call myself on that band to start the ball rolling.

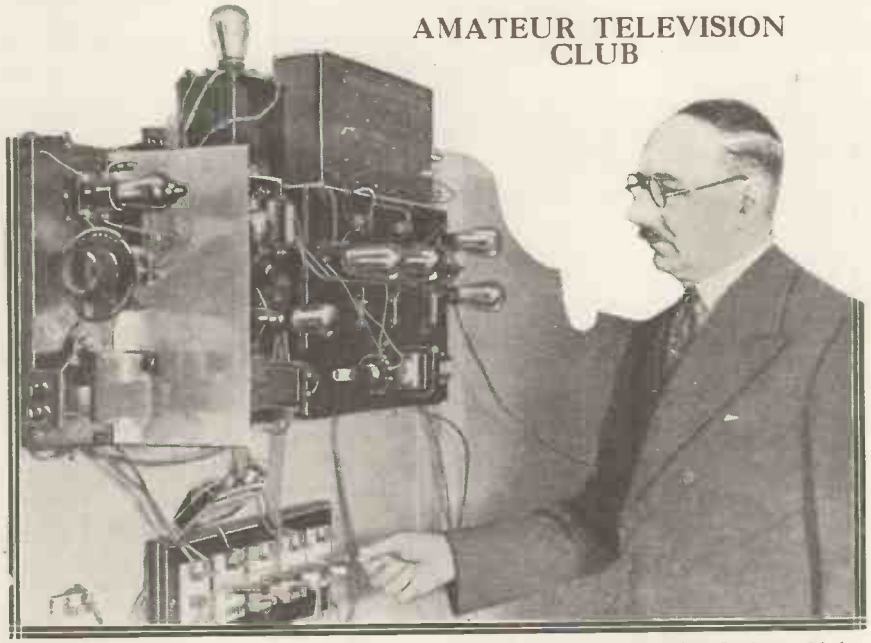
The best time, incidentally, for that band is between 14·00 and 19·00 G.M.T. On the 40-metre band (41·2—42·8 metres) you are not so likely to be successful.

A Great Improvement

And now for matters technical. The "screened-grid or no screened-grid"? I may as well make my own feelings clear by recording a vote for the "screened grid" right away. Personally, I could not bear to handle a receiver without one. My own screened-grid stage is in use for the following reasons:

First, it completely cures the small hand-capacity trouble that I otherwise experience, although my receiver is in an earthed metal box. Secondly, I find "aerial noises" a little trying without it, whereas they are absent when it is in use.

AMATEUR TELEVISION CLUB



Some of the apparatus at the recently inaugurated Radio and Television Society. Major W. H. Oates, O.B.E., of G 5 Y T, the president of the club, is seen at the controls.

WHEN H.G. WELLS

How a Famous Novelist Regards Radio

IT is a queer fact, but none the less true, that although broadcasting in its present form was prophesied years ago by scores of prominent writers and even artists, who ventured to depict crinoline-clad ladies listening to crude loud speakers, one amongst these vatic voices was missing.

That of H. G. Wells. Reflect that of all our prophets, Wells has the greatest honour and the greatest amount of truth in his words, and you will realise just how strange this is.

It was he who foresaw the League of Nations, a great war, a war in the air; even aeroplanes themselves he visualised in the days when flight was considered impossible. But on the subject of wireless transmission scarcely a word spake he.

Mr. Wells in the studio, giving his "Point of View" broadcast.

The singer is the great Chaliapine.

And nowadays he has flown into the realm of international politics so high that by such a mundane matter as broadcasting he simply cannot be bothered. It is apparently beneath his notice.

When I asked him to tell me his views on this—to me—all-important topic, he replied that he was sorry but that he was far, far too busy. And a week later I heard that he had gone to the South of France for a holiday.

But perhaps the great H.G. is not as detached as he might appear. Perhaps the results of the broadcast he made during the "Points of View" series, four years ago, irritated him. 1927

His First Appearance

He may have thought that insufficient notice was taken of the talk, or have resented people forgetting that this was not his first appearance "on the air."

They overlooked the fact that this was not his first broadcast, that away back in the dim ages H. G. Wells had introduced a speaker from a provincial station.

That everyone should have so forgotten such a landmark in broadcasting history must have considerably annoyed our pet prophet, and I made things worse by reminding Mr. Wells of the only manifesto he has ever issued on the topic of the B.B.C.

It was assuredly a tactical error to recall to the wise man the one occasion when he unwittingly indicated to all the world that he had temporarily donned the cap and bells.

"Wonder Followed by Disillusionment!"

He likened broadcasting to a little toy telephone he had been given for plaything when a small boy, with which, from one little pill-box to another along a length of string, his brother and he attempted to transmit human speech.

All the laws of vibration were adduced in favour of the experiment providing its own justification, but the two boys were, somehow, disappointed.

The little piece of string did not have all the magical qualities its appearance seem to indicate, and Mr. Wells said to the great British Public:

"To the world at large, the possibility of radiating and receiving electro-magnetic waves means almost exactly what the promise of that pill-box telephone conveyed to my childish imagination. The hope of an undefined wonder followed by disillusionment."

You get the drift? Our great man visualised broad-

WAS WRONG

By HAROLD A. ALBERT

casting as something excessively wonderful of which a great deal was to be expected. Speeches by all the great thinkers, demonstrations of opinion by such men as Huxley, Shaw, Rutherford, Churchill, Lloyd George, Barrie, Sir Josiah Stamp, even Mr. Wells himself.

No Use to Anybody!

The voice of the King and of the Prince of Wales, the fine tones of Chaliapine, the compelling performances of Kreisler, Paderewski, Suggia, and a hundred others. Well, but the prophet was right again, some may cry.

Ah! But Mr. Wells went on to declare that we had heard none of these people, that we had not heard any of the great opinions we had expected to hear, that broadcasting, in fact, was just so much blather and the programmes so much tenth-rate tripe.

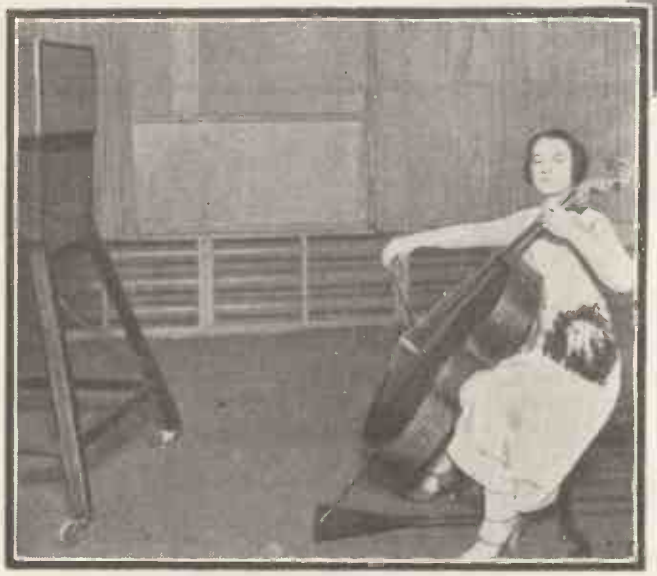
Wells complained that the radio was no good for the supply of dance music, because even that was liable to interruption for a talk by Professor Lotorot on the "Lower Intestines of the Earwig," or something similar.

It was no good for time, because the hour once struck was struck for aye and gone in an instant. One could never switch on the wireless, ascertain the hour and the minute, and switch off.

In this respect, to Mr. Wells, even a tape machine appeared to be more desirable.

Then, having thus effectively ground broadcasting and all broadcasters beneath his boots—as he thought—Mr. Wells turns his attention to the future aspect of the business. He first wonders what has become of all the sets that have been made since regular broadcasting began.

A FAMOUS 'CELLIST



Madame Suggia, broadcasting from London.

It apparently does not occur to him that the old have given way to new, and the obsolete contrivances bestowed upon the dustbin. He suspects that the number of useless, disused sets must be growing every day.

"Listeners," he cries, "are drifting to disillusionment. When the tide flows past, broadcasting will dry up."

Professor Longbeard and Mrs. Dryasdust

And then Mr. Wells visualises the sounds made by Professor Longbeard and Mrs. Dryasdust penetrating mile after mile through the ether, going all the while unheard.

"Yah!" he shouts, in effect. "Perhaps the only hope for the B.B.C. then will be to keep up a continual programme for the benefit of the sick, the blind, and the maimed of carefully chosen, helpful thoughts."

Assuredly, it would not do to take H. G. seriously. Why, he does not even find favour with the novelty programmes that every listener loves. If the fire of his anger could burn, everyone who took part in those experiments in telepathy of some little while ago would have withered in the scorching blast.

But let us be merciful. Mr. Wells has, maybe, changed his mind. Or why does he allow his maid a wireless set all to herself in the kitchen, and why does he contemplate the installation of radio in his house in France?

No, I should not have reminded the great man of the time when he donned the cap and bells.

QUESTIONS ANSWERED

Frame Aerials

F. L. (Kentish Town).—"I have recently been experimenting with a frame aerial connected between grid and filament of my S.G. H.F. valve, and although I obtain reasonably good sensitivity I find that the directional properties are not so marked as was expected. The majority of transmissions come in with the plane of the frame pointing towards my outdoor aerial, which incidentally is earthed. Can you explain this?"

The fact of the matter is, a frame is not truly directional unless it is removed from the vicinity of all metal work, such as pipes, electric wiring conduit, etc.

Your existing aerial is not only affecting the directional properties, but in all probability you will discover that if you take it down there will be a slight falling off in signal strength.

Threshold Howling

S. T. W. (Surbiton).—"How can I stop threshold howling in my short-wave three-valve set? I have tried a detector potentiometer and different grid-leak values, but this does not remedy the trouble."

You might try connecting a resistance across the secondary of your first transformer. The value cannot be stated definitely—you yourself will have to experiment with various resistances. Sometimes a ·5-meg. leak will do the trick, while in other cases a still lower value is required. This method cuts down the magnification somwhat, but it can't be helped.

Skip-Distance

L. T. (Colchester).—"I have often heard short-wave enthusiasts talking about "skip" effects, and have wondered what it means. Will you please explain this mysterious term?"

"Skip" distance is, generally speaking, the reason for the remarkable distances covered by short-wave transmissions working on comparatively low powers.

As you probably know, it is possible to receive American and even Australian stations in this country on a one-valve set employing reaction. A det. and 2 L.F. will frequently bring in these short-wave transmissions at loud-speaker volume.

TECHNICAL QUERIES DEPARTMENT

Are you in trouble with your set?

The MODERN WIRELESS Technical Queries Department is now in a position to give an unrivalled service. The aim of the department is to furnish really helpful advice in connection with any radio problem, theoretical or practical.

Full details can be obtained direct from the MODERN WIRELESS Technical Queries Department, Fleetway House, Farringdon Street, London, E.C.4.

A postcard will do. On receipt of this all the necessary literature will be sent to you, free and post free, immediately. This application will place you under no obligation whatever. Every reader of MODERN WIRELESS should have these details by him. An application form is included which will enable you to ask your questions so that we can deal with them expeditiously and with the minimum of delay. Having this form you will know exactly what information we require to have before us in order to solve your problems.

London readers, please note: Inquiries should not be made in person at Fleetway House or Tallis House.

Every short-wave station has two waves, called the direct and indirect rays. The direct ray, or "ground wave," is quickly absorbed and travels only a short distance. The indirect ray, sometimes called the "sky wave," "shoots off" into space, and is reflected by the Heaviside layer—an ionised conducting layer 100 miles or more above the earth. This reflected ray returns to earth, and may be received at distances which are sometimes many thousands of miles from the transmitting station.

The area between the direct ray and the indirect ray is a dead spot in so far as any one particular station is concerned, and its signals cannot be heard in this area. This area is known as the "skip" distance.

Transformer Markings

N. L. (Ealing).—"I have just purchased a new L.F. transformer, and it is marked H.T., A., G., G.B. My existing transformer is marked IP., OP., IS., OS., and I am doubtful as to the method of connecting up the new transformer. Can you enlighten me, please?"

It is quite straightforward, N. L. H.T. on the new transformer is joined to H.T.+, A to the anode of the valve, G to the grid of the following valve, and G.B. to grid bias negative. Thus H.T., A., G. and G.B. are equal to IP., OP., OS and IS respectively.

H.T. Accumulators

M. C. L. (Kidbrooke).—"I am very worried about my H.T. accumulators, which run down in approximately a fortnight. My set is supposed to take 15 m.a. Surely the battery ought not to run down as quickly as this. I have only had it for a few months, and it used only to require recharging about every six weeks."

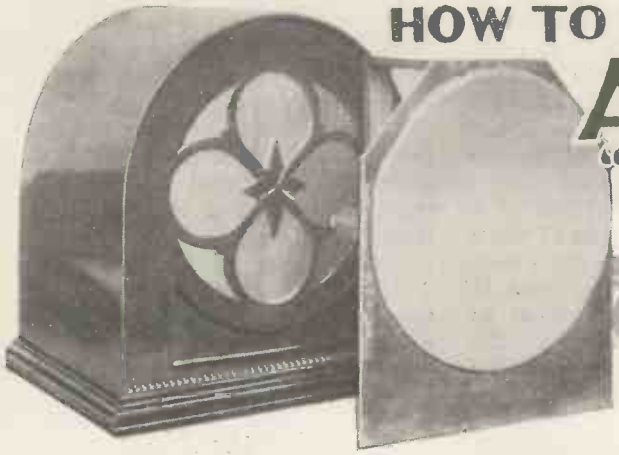
You should look for surface leakage across the tops of the cells. Inspect them and note whether they show signs of dampness. If so, dry them carefully and make sure that they are kept dry. Also have the specific gravity of the acid tested, and examine the cells for white patches denoting sulphation. Ask yourself these questions:

1. Has the battery ever been allowed to stand with the cells in a discharged condition?

2. Has any of the acid been spilt and subsequently topped up with water, thus weakening the acid solution?

3. Have the cells been accidentally short-circuited?

If the answer to any of these questions is in the affirmative, take the battery straight to a competent electrician or to the battery-maker's service station.



HOW TO MAKE A CABINET "INTER-AXIAL"

Readers have been simply delighted with the quality obtainable from "M.W." "Inter-Axial" Loud Speakers.

Here is a cabinet model—easy to make at home, and a sheer joy to use.

Designed and Described by the "M.W." Research and Construction Department.

WHEN we introduced the "Inter-Axial" free-edged loud speaker to readers of MODERN WIRELESS some months ago we knew it would create a stir. It was so easy to make, so cheap, and so remarkably life-like in reproduction that we quite expected to receive some enthusiastic letters about it.

Simple Construction

We did, too! Dozens of people who *never* write to the papers at all made an exception when they heard their "Inter-Axials" handing out the bass with a real rumble, and talking as naturally and distinctly as if the announcer were in the room.

"Extremely satisfied with the results"; "The realism in reproduction is really quite uncanny"; "There is a man singing, and it really seems as if he is in the room"—that is the kind of thing that delighted readers have written! So we make no apology this month for describing another loudspeaker of this type.

THE PARTS YOU NEED

Cabinet

(Camco "Truetone," or other suitable make.)

Loud-speaker Unit

(Blue Spot, Type 66P).

Miscellaneous

1 sheet of Kraft Paper (ask for "120 lb. ream" type) (Peto Scott, etc.)
3 ft. of wood, 1¼ in. × ⅜ in.
1 baffle board to fit cabinet (5/16 in., or ¼ in., or ⅜ in. thick).

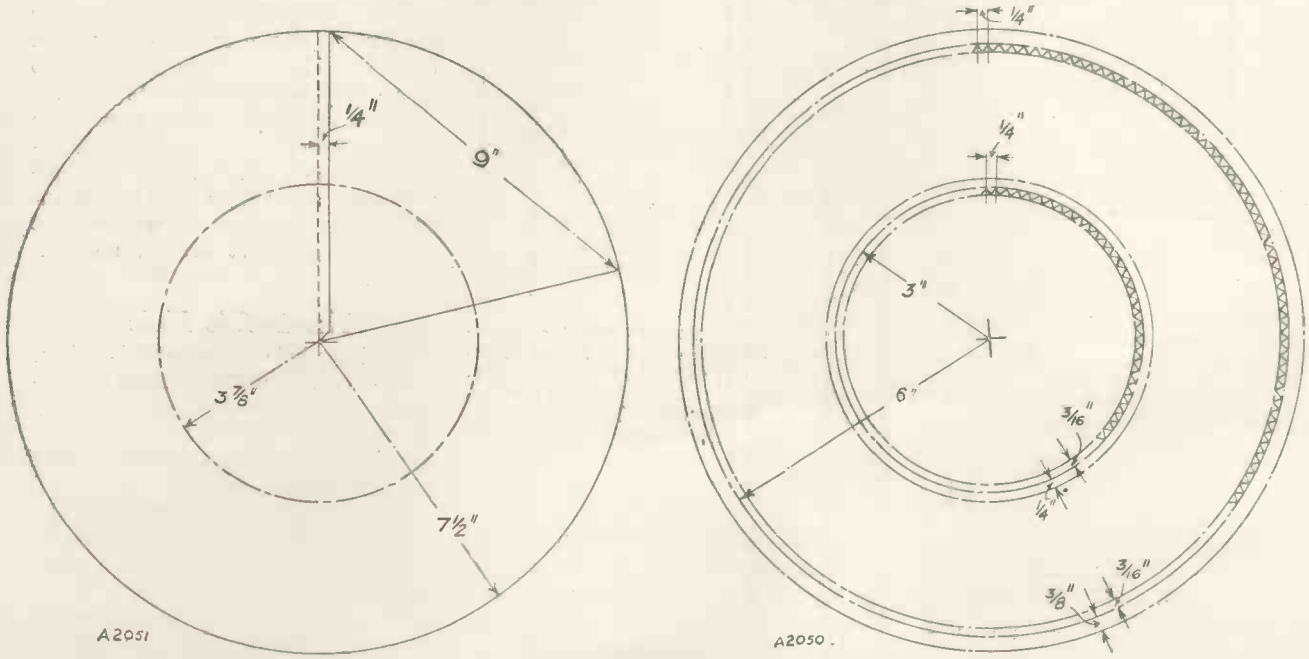
Even if you already have a satisfactory loudspeaker you would do well to read this article, but we warn you that you may then be tempted to try the "Inter-Axial" scheme, because the constructional work involved is of only the simplest kind.

Free-Edged Cone

If you look first of all at the heading photograph on this page you will see the cabinet of the "Inter-Axial," and also its chassis assembly which belongs inside. The constructional work is merely a matter of mounting the loud-speaker unit on a baffle, and fitting it with a special free-edged cone.

Most cones are not free-edged. That is to say, they are attached round their outer rims by some

Cutting Out the Cone and Its Supporting Rings



The sketch on the left shows how a triangular piece is cut from the paper to form a cone. Note the ½-in. flap allowed for the join. On the right are shown the dimensions for the two rings, with the serrated edges partly marked out.

pliant material such as thin rubber or suede.

The special qualities of the "Inter-Axial" are due to the fact that the outer edge of its cone *is* free. There is no support there to hamper its response, the cone being supported by a paper ring at the centre of it, as shown in the photographs on the next page.

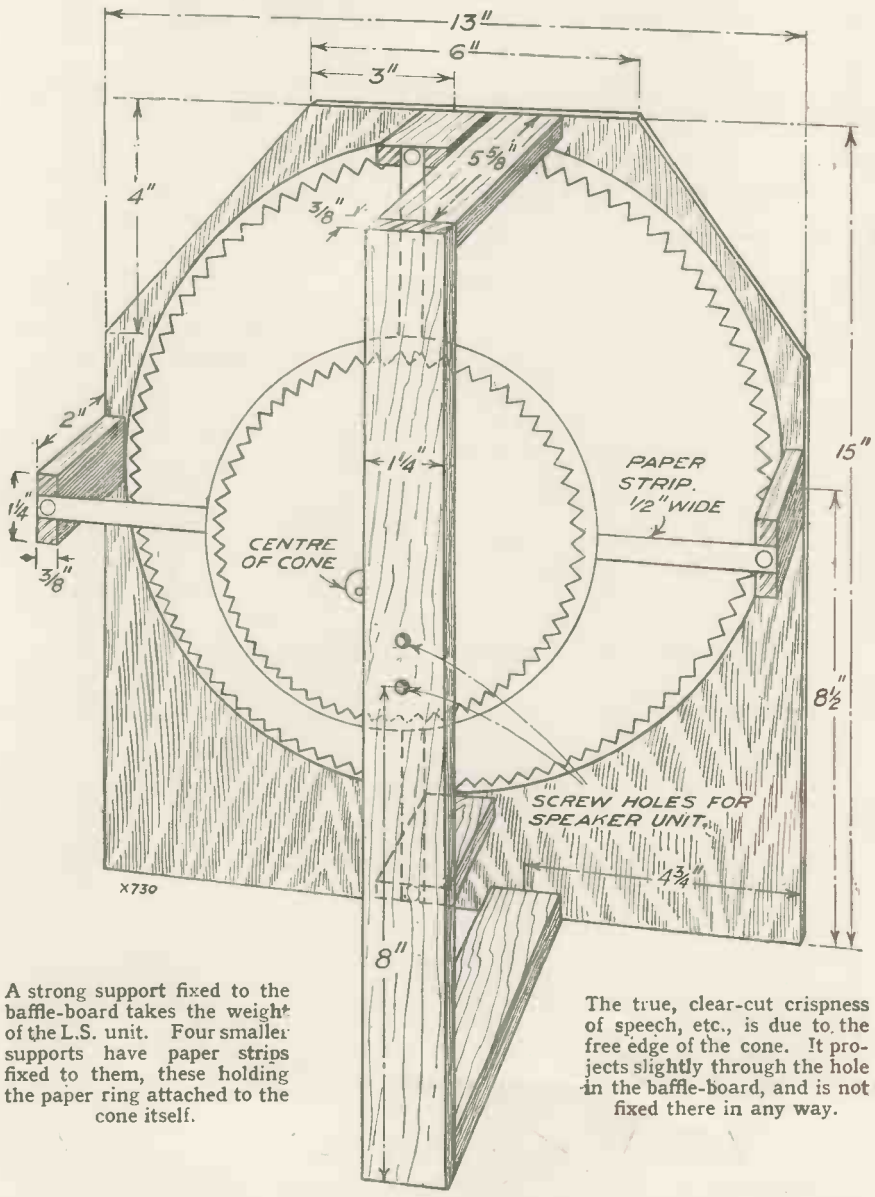
No Sound Leakage

Another ring, fastened to the front or mouth of the cone, overlaps the hole in the chassis, and so prevents sound-leakage. This is an important feature, but as it is all quite easy to fix we need give no more explanation than arises from the various practical points to be touched on.

The first step is to get the necessary parts together, and the small list on the preceding page will help you to do this. (Remember that if some other make of cabinet is to be used the list of materials may need to be a little different, the dimensions of the drawings, etc., being based on the cabinet shown.)

Spread out the Kraft paper on a smooth surface, and prepare to make the main cone by tracing a circle with a radius of 7½ in. Lightly mark in a second circle (3⅞ in. radius) as shown in the sketch. Then mark the "triangular" piece which must be cut out to form the cone.

THE WHOLE STORY AT A GLANCE



A strong support fixed to the baffle-board takes the weight of the L.S. unit. Four smaller supports have paper strips fixed to them, these holding the paper ring attached to the cone itself.

The true, clear-cut crispness of speech, etc., is due to the free edge of the cone. It projects slightly through the hole in the baffle-board, and is not fixed there in any way.

Follow the diagram carefully here, and notice that along one side (top in the sketch) a ¼-in. flap is allowed for. This will be the small overlap when the two edges are fastened together.

Cut out the "triangular" piece with sharp scissors or a razor-blade, and then fasten the ¼-in. flap with Seccotine to the opposite surface, thus forming the main cone. Put it aside carefully to dry.

The next task is to make the two rings. More circles are required, as shown in the second diagram; the main ones being 3 in. and 6 in. from the centre.

Each main circle has two "neighbours," the outer ones ¼ in. and ⅜ in. away, and the inner ones 3/16 in. With a fine pencil mark in the "teeth" as shown, with ¼-in. spacing between the upper points.

Fixing the Rings

These serrated edges, or "teeth," are the most tedious part of the whole business. (Mark them in carefully, however, as the rings will not "set" properly unless the teeth are even.)

Now cut round the inmost circle, and the third-from-the-centre circle, so that you have a ¼-in. ring with "teeth" on it. Cut these out carefully, lay the ring aside, and do the same with the outer ring.

Then gently bend back the teeth a little so that the rings will "stand off" the cone when fixed in position. (The photographs show the idea The larger ring completely hides the hole in the wooden baffle board when viewed from the front.)

Fix the two rings to the cone with Seccotine, not forgetting the four ½-in. strips cut from the same paper and fixed to the inner ring. Let the whole thing dry for a day or so, while the woodwork is being tackled.

This latter is not a long job, but like the making of the cones it may seem quite formidable "on paper," only to prove very easy indeed in practice.

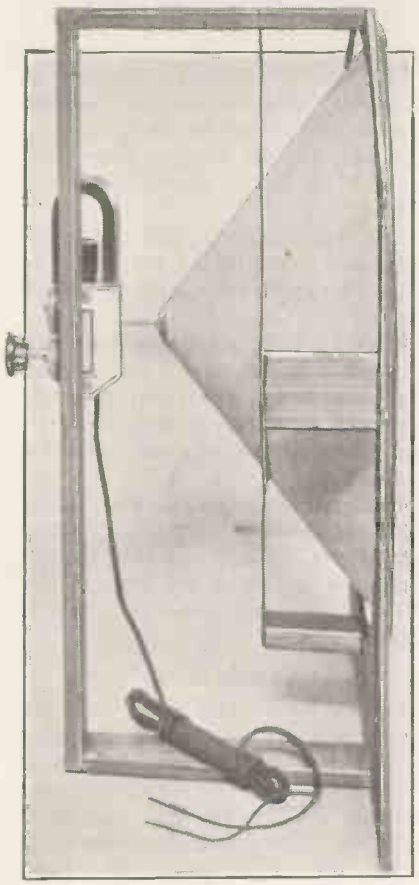
The woodworker of any experience at all will do this part of the construction "in no time." But even those who use a saw with a certain amount of diffidence will soon find that the chassis is going to present no difficulties.

The Baffle Hole

The large hole in the baffle is 12¼ in. in diameter. Then the cone will have plenty of room inside it, and yet, with the flap, there will not be too large an air-gap between the moving paper and the fixed baffle.

For the loud speaker shown here the wooden baffle used was 3/16 in. in thickness. A stouter board can be used with advantage (up to, say, ⅜ in.), but if this is done the side supports—those which lie in line from front to back of the cabinet—must be shortened to correspond.

A Revelation in Easily Obtainable Quality Results



Here is a sideways view, showing the supports in profile.

The large hole is most easily cut with a key-saw, or a fret-saw, or if this presents any difficulty often a carpenter will willingly cut it for a few pence extra when you buy the wood.

When the baffle has been cut and shaped, screw on the four small side supports at even distances. Then fasten the large supports, a little to one side as shown, with the long centre-piece holding them rigid.

Final Assembly

The screw holes for the speaker unit are best done last of all, when you can see from your own unit exactly where they must be placed. Remember that the cone must be *central*, and on no account must it touch the baffle at the edges when finished.

We are now approaching the final stages of the work—assembling the speaker and fixing it in the cabinet. And it is best to assemble and try it out on the chassis before fixing this in the cabinet in case of any small hitch arising.

Four drawing-pins or tacks will be needed to hold the paper strips. Have these ready, mount the unit so that the driving-rod is "dead-centre," and then slip the cone on, tightening it up so that its front ring projects not more than ¼ in. beyond the face of the baffle. (The closer the better, but *it must not touch*.)

Now with the paper strips take up the weight of the cone so that it is free to move just as the unit impels it, and yet is without unnecessary air-gaps round its front edge. (If it actually touches the baffle speech is sure to "zound fuzzy.")

Watch the Spacing

When all is fixed, join up the L.S. leads (watching + and — if no output filter is used), and try out on speech and music. You will at once be all eagerness to get it into the cabinet and surprise the family.

But don't forget that the cone projects through the baffle a little, so it will touch the fret or cabinet-face unless you put in a spacing of wood. Just a couple of short lengths, thick enough to hold the cone away from the fret will do.

Alternatively there is the simple method of fixing at the required distance from the front by carefully arranging the spacing and driving a screw up through the bottom of the cabinet and into the chassis frame. (Be sure that you countersink the head of the screw, so that it does not scratch the table or other surface on which the speaker stands.)

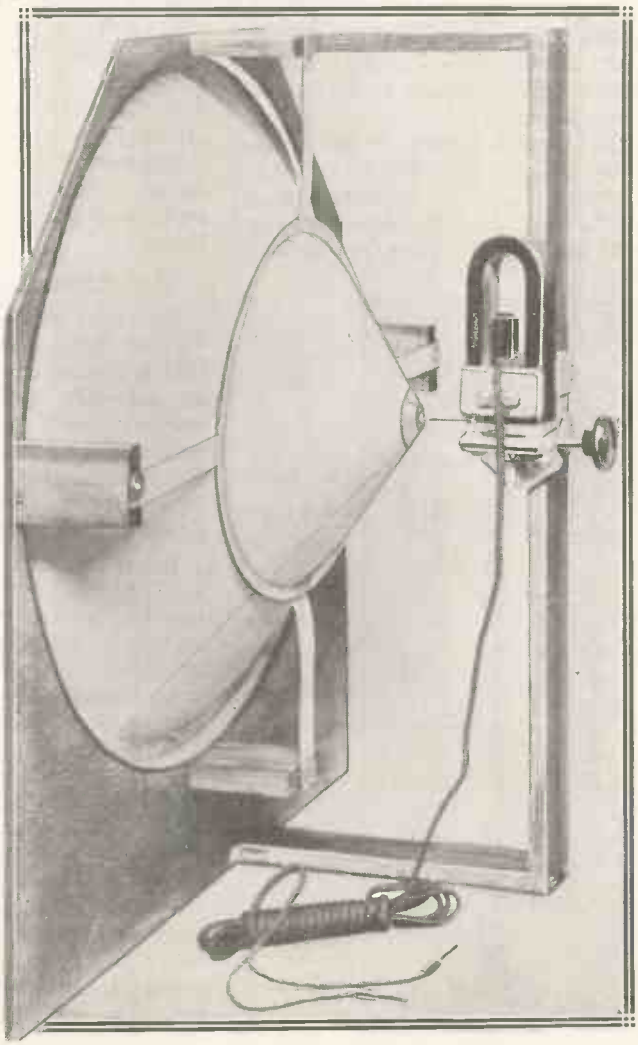
Screw everything down tightly, so that you can get no rattle (and for goodness sake don't forget to see that the unit's washers and nuts are all tight), and then sit back and enjoy the "M.W." Cabinet Inter-Axial—a triumph of realistic reproduction.

THE METHOD OF FREE-EDGE SUSPENSION

This photograph makes perfectly clear the system of suspension. Note how the central supporting ring and its paper strips hold the cone securely in place, allowing its free edge to project slightly through the baffle-board.

You need not be an experienced wood-worker to tackle a job of this kind, and it does not require many tools nor previous skill at radio or carpentry.

Nor need you be an experienced musician to appreciate the results—they will simply compel you to notice their fidelity!



By the Technical Editor — On the

A Fine Frame

You will be able to gather some idea of the shape of the new Lewcos Frame Aerial from the accompanying photograph. But this cannot reveal the full effects of its fine appearance. For example, it cannot show you the sheen of the colourful wire made by master manufacturers of such material—the Lewcos people themselves.

The Lewcos Frame Aerial is designed for long- and short-wave working, and there is a wave-change switch built into the base—a very right and proper place for such a control.

The wave-change switch of the Lewcos Frame Aerial is situated on the neat base-plate, as can be seen in this photo.

The unconventional form of the frame contributes to its excellent appearance and in no way interferes with its efficiency as a collector of energy. It is, in fact, one of the most efficient frames we have tested, and it enables one to obtain good results with quite modest receivers. At twelve miles from Brookmans Park quite comfortable loud-speaker volume was obtainable using only a quite ordinary three-valve outfit.

The price, 32s. 6d., is strikingly low for an article of this nature having such good points as we have mentioned.

An Attractive "Gang"

Makers of sets should welcome the "Polar Drum Two Gang" variable that is illustrated on this page. It is an assembly embodying definitely coupled units, the necessary balancing being obtainable by means of two independent controls.

It is essentially a "gang" for matched inductances, inasmuch as these controls are accessible only from the back of a receiver's panel. But if this implies something of a limitation from the point of view of the home constructor, it certainly does not in the case of the manufacturer of sets. It seems to us the best possible scheme, for it makes for simplicity in tuning.

The "Polar Drum Two Gang" is completely shielded and this renders it eminently suited to that compactness which is yet another important desideratum in commercial set design of to-day.

The drum control itself and the associated panel fitting are both excellent in appearance and in actual use.

It is interesting to note that the "pigtail" is helped on its way to obsolescence by this Polar product, inasmuch as an effective brush contact takes its place in each of the two sections.

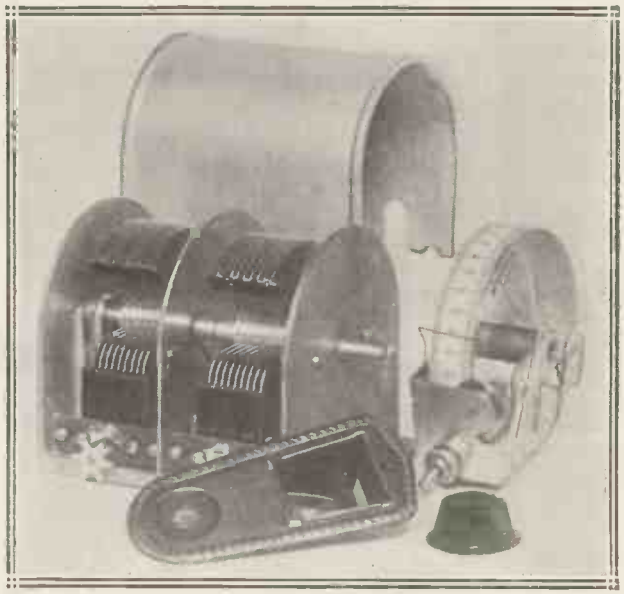
In regard to the general mechanical and electrical efficiency of the component, we can only say that Messrs. Wingrove & Rogers are seen at the top of their form, more than which nothing need be said.

Konductite

Gramo Radio Amplifiers, Ltd., are supplying a new material for screening which they call Konductite, and which can easily be fixed to baseboards, etc., with any ordinary adhesive. The material is very easy to handle and it can be folded or bent as desired without injury. The retail price of this material is 2s. for a sheet measuring 30 in. by 20 in.

Cyldon Extensers

Sydney Bird & Sons were quickly "away from the mark" with Extensers, and we are sure they have



Here you see the Polar Two-Gang Variable with its cover removed.

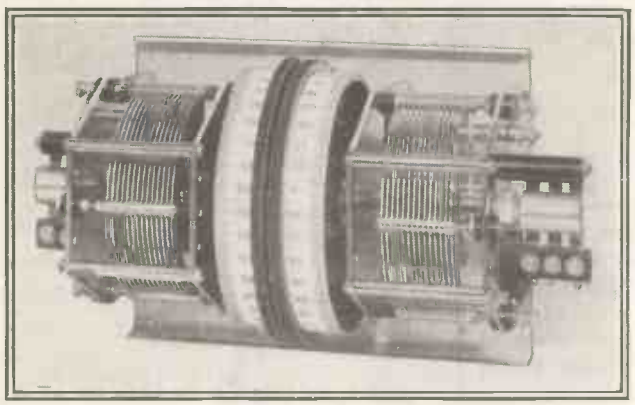
Test Bench

Impartial and critical comments concerning new products due to Lewcos, Polar, Cyldon, Ferranti and others.

our readers' as well as our own best wishes, for no new component could be given a better start in its commercial career.

Indeed, it is distinctly fitting that one of Britain's oldest established and highest class of condenser makers should be first in the field with a product that constitutes such a definite "break away" in tuning technique.

In their Extenser, Sydney Bird & Sons have displayed their universally



The dual-assembly of the Cyldon Extenser is a first-class piece of engineering.

recognised soundness of engineering skill and artistry of craftsmanship to the very best effects.

It is not an experimental product in any way, but a perfected and polished article capable of lining up against the best examples of any ordinary manufacturing production.

The keynote of the design is "robustness." The framework, though beautifully finished, is rocklike in its rigidity and strength, and the vanes are hard and firmly aligned. In the self-changer Sydney Bird & Sons have excelled themselves. The contacts are completely effective and cannot possibly ever give the slightest trouble. It should be mentioned at this point that by way of emphasising the reliability of their Extenser a five-year guarantee is given.

The self-changer, though providing as good switching as any specially designed and individual switch, imposes no noticeable hindrance on the action of the Extenser. As a matter of fact, the movement is completely silky and there is no "going over" feeling as you run through the change-over action.

As you can see from the accompanying photo, all the terminals are completely accessible, and those for the self-changer are indeed in a much better position for convenient wiring than are those on most panel switches. And this, remember, in addition to the fact that in the majority of cases there will be fewer leads.

The Cyldon Extenser is completely universal in that it has a "straight-through" spindle to facilitate ganging, and can be used either with a plain dial or with a drum-drive.

We are able also to illustrate a pair of Cyldon Extensers assembled as a dual-drum unit. It is, of course, when you come to such assemblies of Extensers that the advantages of the new scheme are tripled or even quadrupled.

Glance at the photo of the dual Extenser and visualise the simplicity of disposing of the various leads from a pair of dual-range coil units as compared with the difficulty of arranging and wiring the four components that this single Extenser replaces.

A First-Class Milliammeter

We have had the opportunity of examining and testing one of the new Ferranti moving-iron type measuring instruments. The actual model was a

A measuring instrument of distinction—a Ferranti Moving-Iron Milliammeter.

milliammeter measuring up to 100 milliamperes (D.C. or A.C.).

The Ferranti moving-iron "meters" are designed on scientific lines and definitely are high-grade instruments.

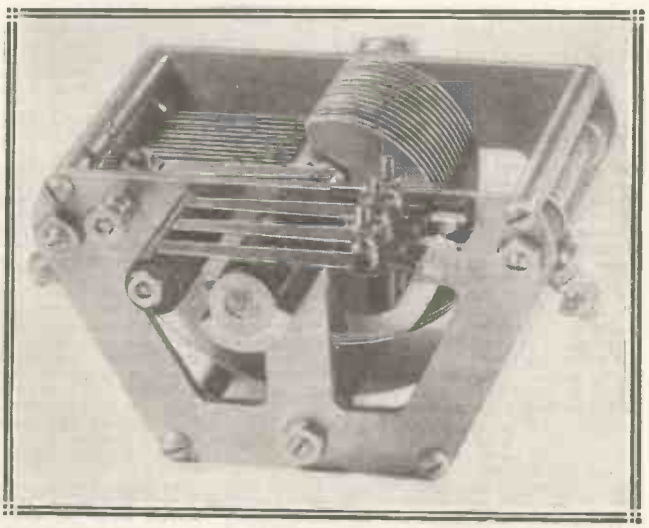
They are provided with wide, sharply engraved scales and are fitted with alert, knife-edge needles enabling close readings to be taken.

Also they possess high degrees of accuracy. Ferranti have deservedly earned a very high reputation for their meter and instrument work, and in these latest "Moving Irons" they are to be seen at their best.

Two Volume Controls

We recently received two Preferato volume controls. The special feature of these components is that each embodies two resistance elements.

The idea being that a series resistance is operated simultaneously with the potentiometer so the volume adjustments are not followed by tonal upsets. The Preferatos are well-made components and retail at 5s. 9d. and 7s. 3d.



The Cyldon Extenser—the first commercial version of a fascinating new component.

BROADCAST

NEARLY all the favourite up-to-date dance numbers and comedy songs are available on the Broadcast Tens, which, as you will remember, were recently reduced in price to one shilling. From this month's we have chosen a number of light items to which to draw your attention.

Sandy Powell, the well-known comedian, provides us with a couple of rollicking items portraying Sandy as a plumber's mate, under the name of **The Old Geyser** and **The Washer on the Tap.** These are recorded on 703, and are well worth a "bob!" A lively banjo solo is given in **Cupid on the Cake,** on 707, while of the more unusual type of record a couple of yodelling numbers will meet with the approval of a large number of people. These are recorded on 696.

Coming to the dance numbers we find Lew Sylva and his Band have recorded a large number of popular hits, including **Drink, Brothers, Drink,** and **Tears,** on 698; **Bathing in the Sunshine** and **When You Were My Sweetheart,** on 701; **Overnight** and **Reaching for the Moon,** the latter with organ, recorded in Madame Tussaud's cinema, on 711. Another couple of dance records which are well worth hearing are **Shout for Happiness,** by Hal Swain and his Band, and **The Little Things in Life,** on 709.

So much for the Tens. The Twelves, of course, are concerned with more serious stuff, and this time we have the Gershom Parkington Quintet, great radio favourites, playing **Whisper and I Shall Hear.** This is probably the most popular quintet which the B.B.C. has broadcast, and a large number of radio listeners will like to get their record. The one we have mentioned is No. 5234.

The Indian Love Lyrics (selections), vocal solos with strings and organ in Madame Tussaud's cinema, provides an interesting record on 5227; while another novelty record is provided by Nicolai Finkowsky, the famous Russian Balalaika player, on 5229.

But popular as the Broadcast Twelves are, probably the Broadcast Super Twelve is even more welcome in the gramophone library. Sophie Tucker is still hard at it, and gives us **My Canary Has Circles Under His Eyes** and **On a Little Balcony in Spain** (3042); and Bob and Alf have contributed another couple of their clever duets in **Shout for Happiness** and **You're the One I Care For,** on 3041. **Grandma and the Weather Announcer,** a broadcast sketch by Mabel Constanduros and Michael Hogan, has been recorded on 3025, and forms a very good record indeed.

A couple of organ solos by Edward O'Henry, at Madame Tussaud's, **Dancing Ball** and **Un Peu D'Amour,** on 3031, are well worth hearing; and Marius B. Winter and his Dance Band have done a number of items, including **Laughing at the Rain,** on 3047, and **Tap Your Feet,** on 3036.

BRUNSWICK

Warner-Brunswick, Ltd., have brought out a series of new records which are sold for two shillings under the name of "Panachord." These, of course, are electrically recorded, and are really excellent in quality and tonal balance. The organ solo, **I'm Alone Because I Love You** and **Ukulele Moon,** on 25099, is a good number; while **I Miss a Little Miss** and **In a Window in a House in Carolina,** a novelty instrumental trio on 25011, is another peculiar record which one should really hear. You may not all like it, but there is no doubt it will appeal to a large number of gramophone enthusiasts.

Sing-Song Girl and **It's an Old Spanish Custom in the Moonlight,** a couple of foxtrots, the former by Sleepy Hall and his Collegians, on 25000, form a couple of lively items which make useful editions to the novelty dance numbers.

COLUMBIA

One of the finest recordings the Columbia Graphophone Co. have done for some time is the **On Wings of Love,** sung by Isobel Baillie, soprano, with 'cello, organ and harp accompaniment, on DX230. This is coupled with Ave Maria Intermezzo, from "Cavalleria Rusticana," with organ accompaniment, and is a very fine record indeed. A somewhat lighter number, but none the less enjoyable, is provided by Albert Sandler and his Orchestra, playing **Serenade** and **The Song of Songs,** the latter being a particularly tuneful and charming item. These are recorded on DB469 in a concert hall, and should certainly not be missed by any lover of light orchestral music.

Jack Payne and his B.B.C. Dance Orchestra are keeping well up to their contract to turn out so many dance numbers a month, and we have picked two of their records out this time: **Miss Elizabeth Brown** and **River Stay 'Way From My Door,** on DB254; together with **Alma Mia** and **Tears,** the latter is a very tuneful waltz, on DB256. But one of the most lively records, and one which will probably be well to the fore in popularity has been made by Debroy Somers and his Band. On one side is **Koppa Ka Banna,** a six-eight one-step, while on the other is **My Canary Has Circles Under His Eyes,** a peculiarly haunting foxtrot which is excellently rendered by Debroy Somers, with vocal chorus by Dan Donovan. These are on DB261.

DECCA

Two of the outstanding items in the latest list of Decca are the **Invitation to the Waltz** (in two parts), played by the Hastings Municipal Orchestra, conducted by Julius Harrison, and recorded at the White Rock Pavillon at Hastings. This is

A brief selection of outstanding records that have been released during the month. They are chosen because of their special value to the pick-up user.

on K575. The second record is a Xylophone and Vibraphone solo, with piano and accordion accompaniment, **Cupid On the Cake** and **Baby's Birthday Party,** played by Rudolph Power, on F.2277

H.M.V.

What are probably the finest pianoforte recordings in the world have been made by H.M.V., and now they have added two more records which though perhaps not quite up to standard of some of the more expensive types, are nevertheless remarkable recordings. We refer to Mark Hambourg playing Beethoven's Sonata in A Flat Opus 26. This takes up four sides, and is recorded on Nos. C2117 and 2118. Of the quality of the recordings we need say nothing except that it is H.M.V.

In the lighter music we have Marek Weber and his Orchestra in a pot-pourri entitled **A Night in Venice** and a selection of **Merrie England,** played by the New Symphony Orchestra, conducted by Dr. Malcolm Sargent. This is well recorded, though it is not quite so full-bodied as we would like in the excerpts "Oh Peaceful England," and "My Troth is Plighted."

Two interesting records by Joseph Hislop, the world-famous tenor, are **When I Am Dead, My Dearest** and **A Pair Well Matched,** on disc B3816. These songs are both by Sir Landon Ronald, and the piano accompaniment is played by Sir Landon. It is interesting also to note that Joseph Hislop has also recorded the famous and somewhat unfortunately hackneyed **Down in the Forest,** by the same composer, having learnt it specially for this recording under Sir Landon Ronald's supervision, so that one obtains the song expressing the spirit of the piece in exactly the way the composer wanted it expressed.

The Revellers make another "appearance" on B3840, singing **Blue Again** and **Lady Play Your Mandoline**; while only a few hours after the Royal Command performance H.M.V. issued **Gracie Fields in Pass, Shoot, Goal!** and **The Clockwork Courtship,** on B3795, and the first recording of Alexander and Mose (parts one and two), on B3843. In our opinion the pianoforte accompaniment in the background of this record is a great improvement over the way these two "niggers" put their stuff over the ether.

Marek Weber and his Orchestra, in addition to the twelve-inch disc already mentioned, give us **Darling, My Heart Longs to Greet You,** from the film "At the Petrol Station." This is recorded on B5998. We were glad to hear Stuart Robinson singing two rousing songs, **Good Friends and Drink, Brothers, Drink,** on B3842; and those who like Jack Hylton and his Orchestra will enjoy his playing of **River Stay 'Way From My Door** and **Lonesome Lover,** on B6004. This latter is a typical Jack Hylton record. One of the best dance recordings that H.M.V. has done for some time, however, is **The Sleepy Town Express,** a foxtrot, played by Victor Arden-Phil Ohman and their Orchestra, on B6002. This is coupled on the other side by The Troubadours playing **You Didn't Have to Tell Me.** The former is by far the better of the two orchestrations and will assuredly be a best-seller. As a recording it is perfect.

ZONOPHONE

This month we have received practically an "all-vocal" selection from Zonophone, including four records under the following numbers:

Beware of the Maidens and **Bill-Sticker Joe,** sung by Foster Richardson (5852); **Hurt** and **Wedding Bells are Ringing for Sally,** sung by Norman Blair (5853); **The Little Things in Life** and **Under the Spell of Your Kiss,** sung by Lewis James (5858); **The Convict's Rosary** and **Will They Love Me Up in Heaven Like My Mother Used To Do?** sung by Maurice Elwin (5861).

The first number, by Foster Richardson, contains two of those jolly songs which he sings with such enjoyment.

Next comes Norman Blair with two very popular titles, especially the latter one, which suit his style perfectly. This record will be a big-seller we are told.

The vogue for sentiment is still at its height. The Zonophone Company are selling hundreds of this type of record, and if you have not yet heard any you should really make a note of this one.

A very bright selection of old-favourite songs, played by the London Orchestra, is included in the latest list, on No. 5850. This contains some interesting relics which you seldom hear nowadays, but which everyone will remember when they are played over.

This orchestra has recorded some very fine records for Zonophone, including selections from the most popular talkies and musical shows.

The dance records this month are as good as ever. Four records are listed.

Two outstanding ones are: **Here Comes the Sun** and **If You Can't Sing, Whistle,** played by The Rhythmic Eight (5864); **Bathing in the Sunshine** and **Memories of You,** played by Orpheus Dance Band (5865). Lastly we have a re-recording—two very old titles are played by Bram Martin ('cello): **The Flowers of the Forest** and **An Old Highland Melody** (5872).

A USEFUL INSTRUMENT

Remember the grid bias—Transatlantic telephone reception—England to U.S.A. pictures.

Every valve-set owner should aim at possessing a two-range voltmeter, for this is invaluable for keeping a check on voltages.

* * *

One dud cell in an H.T. battery can entirely ruin reception.

* * *

Never work a set if you suspect a fault in the grid circuit of the power valve, for if this means that correct grid bias is not being applied you may be ruining the valve's emission.

* * *

The receiving end of the P.O. transatlantic telephone system is a station at Baldock, Herts.

* * *

The British Post Office has been testing out picture transmission with the United States.

A RADIO RECKONER

By W. A. BARCLAY M.A.

This is the fourth of a series of very interesting and valuable articles which will save you a lot of time and trouble. You should make sure to keep these articles by you, as they contain many very useful tips and easy methods of doing various calculations, such as converting metres to kilocycles, or vice versa.

So far we have dealt only with the properties of direct current. We now turn to that very important form of current which is known as "alternating."

Explaining A.C.

As this name implies, such currents "alternate" back and forwards along the conductor. This means that, starting from zero, the current grows until it attains a maximum value; thereafter it decreases till, passing again through the zero value, it attains a maximum in the opposite direction, after which it once more decreases to zero.

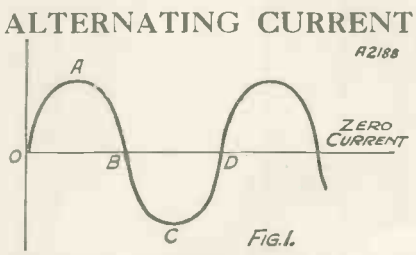
This complete chain of events is termed a "cycle," and may be likened to the swing of a pendulum about its central position. We may conveniently represent the rise and fall of an alternating current by means of a wavy curve, as in Fig. 1.

Here the central line represents the zero value of the current. At A the current is a maximum, while at C it is again a maximum, but this time in the reverse direction. At D the current is about to commence a similar cycle of variation to that at O; the portion of the curve between O and D therefore represents one complete cycle, and this is, of course, repeated indefinitely.

Two Important Things

There are obviously two things which are important about an alternating current. The first is its magnitude, or, as it is sometimes called, its amplitude. Here we need not say more than that the amplitude depends upon the maximum value which the current attains during the cycle of its variation, so that the bigger this maximum, the bigger the current is reckoned to be.

The second important thing to know about an alternating current is its "frequency," or the rate at which it goes through its cycle of variations. Naturally, some alternating currents perform these variations more quickly than others, and electricians mean by the term "frequency" the number of complete cycles which the current accomplishes in one second.



The above curve shows very clearly how alternating current changes its direction, first rising to a maximum in one direction, falling to zero, then rising to a maximum in the other direction.

High- and Low-Frequency Currents

The differences between the frequencies of the various alternating currents met with in a receiver form not the least of the marvels of radio science, and are seldom fully appreciated. Most readers are familiar with the terms "H.F." and "L.F." as applied to different circuits, but how many have stopped to enquire just how "high" these high-frequency currents really are?

Have You Tried This?

Try to see how quickly you can count. It is safe to say that you will find it impossible to count more quickly than ten every second.

The lowest frequencies used for house lighting are commonly much more than this, being usually 50 or so cycles per second. The eye itself cannot follow such rapid changes, and the light appears to be continuous.

(An interesting experiment by which the changes may be shown visually consists in swinging the lamp rapidly, or, better, moving its image quickly in a mirror. The lamp will then appear as a series of images, each of which is caused by the maximum values of the current, the intervening dark spaces corresponding to the zero values.)

Audible Range

The so-called "low-frequency" currents which are responsible for the musical sounds emitted by the loudspeaker may have any frequencies between 50 and 5,000 cycles per second, while the very highest notes, such as the "harmonics" of a violin, have frequencies even higher than these. These frequencies, of course, represent the highest possible rapidity at which it is possible to cause the mechanical diaphragm to vibrate

and yet to affect the auditory nerves in our ears.

But these are by no means "high" frequencies such as are attained by the radio-frequency or "H.F." currents of our wireless receivers. The tiny currents supplied to our aerial from the transmitter at Daventry 5 X X fluctuate backwards and forwards some 193,000 times per second, while those supplied by the London National station have a frequency of well over a million times per second!

Inconceivable Rapidity

Such rapidity is almost inconceivable to our human senses. Let us think, for example, of the seconds pendulum of a "grandfather" clock, beating the seconds throughout every hour in the week. Such a pendulum would require over eleven days to make a million beats, or twenty-three days to make a million complete "cycles." Yet in our aerial wire, such is the extraordinary rapidity of the radio oscillations, a million complete cycles can take place within the space of one second only!

The close connection between musical sound and frequency has been already referred to. The most convenient means of distinguishing between the pitch of different sounds is to state the "frequencies" of the corresponding vibrations.

Thus the "middle C" of a piano has a frequency of roughly 256 cycles per second, i.e. the corresponding string in the instrument vibrates at that rate when it is struck. A note an octave lower in pitch vibrates only half as quickly, while the C above will vibrate twice as fast.

In the diagram of Fig. 2 the outer circle is graduated with a scale of frequencies generally used in sound reproduction, and, for convenience, the notes of a piano keyboard have been arranged in circular fashion around the interior of the diagram. By this means the "frequency" of any note may be read off approximately in line with its position on the keyboard.

The inner scale shows the time required to accomplish one complete oscillation, measured in *thousandths* of a second. To find this extremely small interval of time corresponding to any desired frequency we simply join the centre point to the frequency in question, reading the time period on the inner scale. Thus for the note "middle C," whose frequency is 256 cycles, the time required for one complete cycle is seen to be only four thousandths of a second!

HOW MANY CYCLES—AT A GLANCE

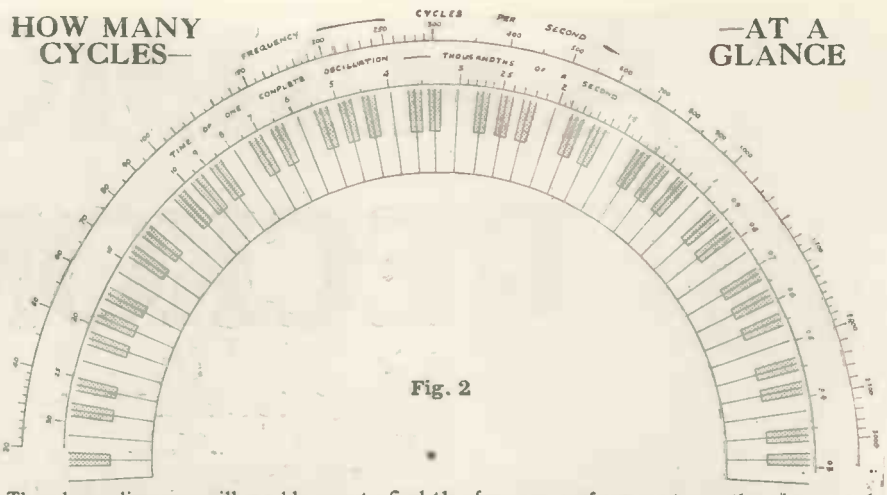


Fig. 2

The above diagram will enable you to find the frequency of any note on the piano, and also the time taken to complete one cycle. All you do is—take a line from the centre through the required note, and read off the necessary information on the outer rims.

Radio Frequencies

The diagram of Fig. 3 has been designed to perform the same service for waves of radio-frequency. We have seen that for such waves the number expressing the frequency in cycles becomes very large, amounting to over a million in some cases.

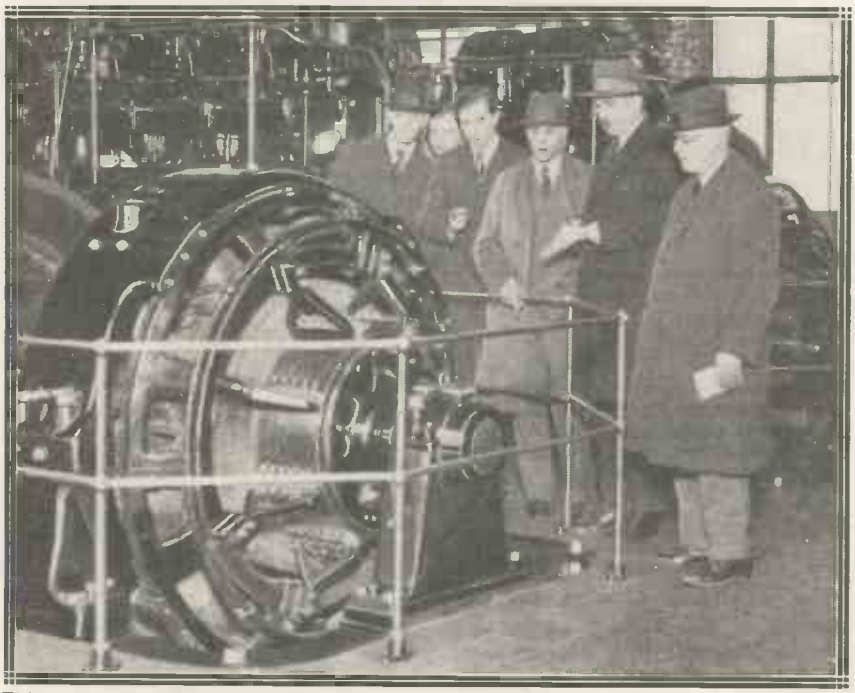
To avoid such large numbers it is now becoming usual to express the frequency in "kilocycles," the kilocycle being equal to 1,000 cycles. Thus the frequency of Daventry 5 X X is 193 k.c., while that of the London National transmitter is 1,148 k.c.

The old method of referring to such transmissions by means of the "wave-length" is still, however, in very wide use, though the conception of a wave-length is of very little utility for radio purposes, and so need not be discussed here. For convenience, however, a scale of wave-lengths has been shown on the outermost circle of Fig. 3, which thus displays at a glance the corresponding wave-lengths and frequencies over the high-frequency or "radio-frequency" band.

Tuning-In

To show the similarity between the range of sound or "audio" frequencies (Fig. 2) and the radio-frequency band (Fig. 3), the names of a few well-

SEEING SLAITHWAITE



This photograph shows a representative of "Modern Wireless" with other Pressmen inspecting some of the generating plant of the new North Regional station.

Converting Wave-length to Kilocycles

known stations are indicated at their proper positions in Fig. 3, and it will be seen that these definitely allotted positions are somewhat similar to the piano notes on the audio-frequency scale.

Indeed, this conception of a radio wave as operating a " note " of a definite frequency is fundamental to wireless science.

A Similarity

Despite the fact that the vibrations of such " notes " are far too rapid to affect the human ear, we yet speak of " tuning-in " to them, and also of " resonance " at certain wave-lengths —both of which conceptions had original reference to audible sounds. The phenomenon of resonance, indeed, is met with in both the low- and high-frequency amplifying stages of a modern receiver.

Low-frequency resonance is definitely bad, whether in the loud speaker or its associated circuits, and where possible should be avoided. High-frequency resonance, on the other hand, is usually essential to a wireless receiver, being the necessary condition in which it must be to " receive " any given station. To this subject it is hoped to return in a future article.

Time in "Micro-Seconds"

For completeness, the inner scale shown on Fig. 3 gives the time taken for one complete oscillation of the radio-frequency wave. As is only to be expected, this interval of time is an almost inconceivably minute fraction of a second, and we can best express it by giving it in terms of the *millionth* part of a second, or " *micro-second*."

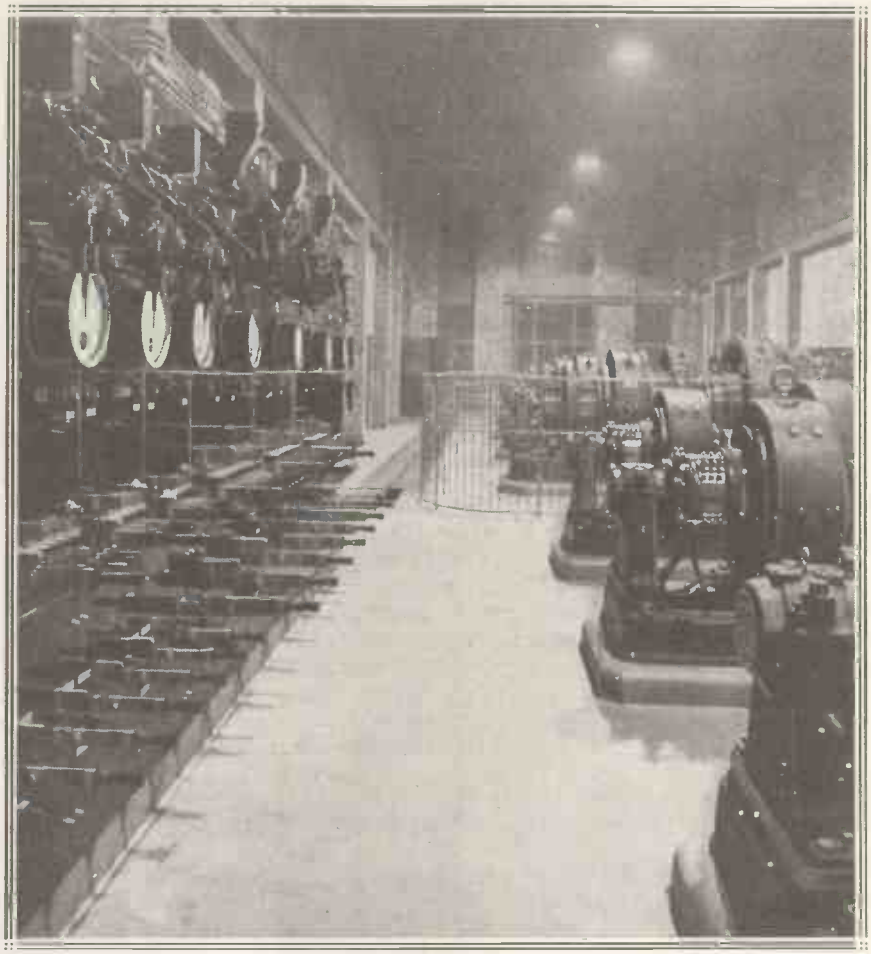
For example, it will be seen that the time taken by a single oscillation of the London National wave is actually less than 0·9 of a micro-second !

Small, but Important

This quantity of time is almost fantastic to consider ; yet it should be remembered that such small intervals are now the commonplace of our modern physical laboratories, where investigations are being conducted into the nature of the swiftly moving ultra-microscopic particles which we call electrons.

Indeed, it is not too much to say that in this connection the science of radio is playing its part in the development of the important researches which are now taking place into the ultimate nature of the atom. Thus radio may one day be responsible for the greatest discovery science has ever made.

POWER FOR THE NORTH REGIONAL



A long view of the machine room. The filament current generators can be seen to the fore, with the high-tension generators behind.

WAVE-LENGTH, TIME AND—FREQUENCY FIGURES

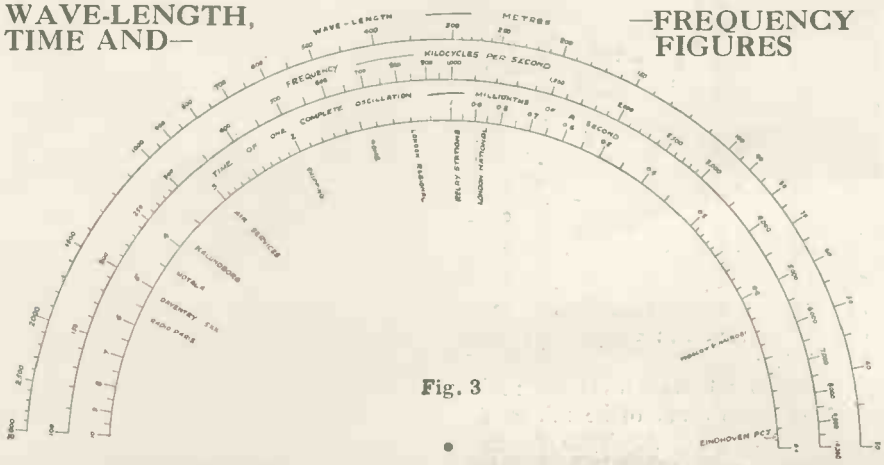


Fig. 3

This diagram is similar to Fig. 2 and should prove very useful indeed, as it supplies an easy method of converting metres to kilocycles, and vice versa. The inner scale also provides some very interesting information, for it gives the time, in millionths of a second, taken by one cycle at the various frequencies shown on the frequency scale.

CALIFORNIA CALLING

An interesting letter from an American reader.

I HAVE before me a copy of the December, 1929, issue of MODERN WIRELESS, and therein, under the title of "The Other Side," was published my first letter to your excellent magazine.

Upon reading it over I thought that it might be interesting to note the changes in radio which have occurred since that was written, just a little over a year ago.

"M.W." Did It!

First I would like to say that MODERN WIRELESS surely "did its stuff," and as the result of my quest for correspondents I was just about snowed under! Some very fine friendships have subsequently been formed, not only with fans in England, but with MODERN WIRELESS readers as far distant as Australia.

We still have the same two local stations: K F S D, 1,000 watts, 600 kilocycles; and K G B, 250 watts, 1,330 kilocycles; but we are no longer required to go over to Los Angeles for our National Broadcasting Company programmes, for K F S D has been made a member of this coast-to-coast radio chain, and releases many of their programmes.

Midgets and Autos

Recently a new network of stations took the air, under the name of the United Broadcasting Company. This chain is composed of smaller stations than those affiliated with the big networks, and comprises eight stations extending along the Pacific Coast from San Diego, California, in the South, to Bellingham, Washington, in the North. This is practically from Canada to Mexico, as San Diego is but 17 miles from the Mexican border, and Bellingham is about the same distance from the Canadian border.

K G B is the local member of this new network, which plans to present a three-hour programme nightly, between the hours of seven and ten, and increase their programmes as they go along.

International re-broadcasting has become almost a common occurrence. For many months the C.B.S. has released a talk from London each Sunday morning at 9.30 a.m., local time.

It has become not at all unusual to hear a talk or dance music relayed from London, and many of these programmes are as clear and steady as though they originated in some local studio instead of across the ocean. I believe the series of relays I most enjoyed were the talks by Mr. Vernon Bartlett.

In radio receivers the two major developments seem to be midget set and auto-radio.

Midget sets originated in Los Angeles, I believe, and although yet a novelty have spread from coast to coast, and many different firms are producing them. These receivers are entirely self-contained and housed in ornamental cabinets. They can be easily carried with one hand, and range in price from 39.50 to 69.50 dollars (about £8 3s. to £14 2s.).

They are, of course, all-mains driven. One firm advertises that their receiver, which includes tone-control and dynamic speaker, "concentrates the latest radio developments into the size of a mantel clock." Another claims tone-control, four screen-grid tubes, four-gang condenser, single illuminated dial, dynamic speaker, phonograph pick-up, and local and distance switch!

The latest in tuning dials is the projector dial, whereby a light projects the dial figures with a coloured background on to the screen, which one reads through the opening in the panel.

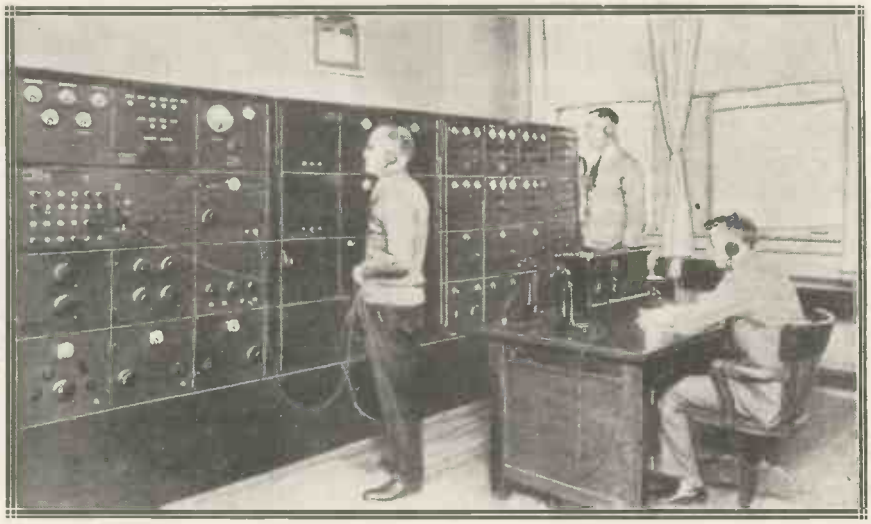
5 S W in the U.S.A.

Automobile radio has caused a minor boom in obsolete compact battery sets, and all "the boys" are equipping their cars for radio with such installations. I can remember some years ago when an automobile party were enjoying a radio they had installed in their car, and the novelty caused a curious crowd to continually press around as long as the radio was switched on.

I had, at the time of my letter, been trying for over a year to hear G 5 S W, without success, but finally, last March, I was rewarded, and upon four successive afternoons heard, at 4 p.m., P.S.T., the chimes of Big Ben.

I have been after G 5 S W harder than ever since that time, but as yet I have had no further luck.

A FAMOUS PACIFIC BROADCASTER



This is the control-room of K G O, the famous Oakland station which serves a large part of California.

. . . . SINGLE FILE . . . .

Get Your Stations One by One

without interference!

Cut out that local with the Ready Radio "Popular Wireless" Brookmans Rejector. It definitely eliminates local interference and improves distant reception.
Made strictly to specification by Ready Radio—tested and approved by "Popular Wireless"

PRICE **5'9**

No Ready Radio "Popular Wireless" Rejector leaves our test room until it satisfies the conditions laid down by "Popular Wireless" and has received an actual broadcast test.

PRICE **5'9**

"MODERN WIRELESS" "RADIO-GRAM" THREE

	£	s.	d.
1 Ebonite panel, 18in. × 7in. × 3/16in., drilled to specification		6	0
1 Radio-gram cabinet to specification, in oak	5	10	0
1 Cyldon ·0005-mfd. "Extenser" condenser with dial		17	0
1 ReadiRad ·00015-mfd. differential reaction condenser		5	0
1 Wearite 2-way rotary switch		3	6
1 Lewcos 100,000 ohm flexible resistance		1	6
1 ReadiRad 25,000-ohm resistance and holder		2	6
1 ReadiRad 2-megohm grid leak and holder		1	4
1 ReadiRad 1-megohm grid leak and holder		1	4
3 Telsen 4-pin valve-holders		3	0
1 ReadiRad ·0003-mfd fixed condenser			10
1 T.C.C. ·01-mfd. fixed condenser		2	6
2 T.C.C. 2-mfd. fixed condensers		7	8
1 ReadiRad "Hilo" H.F. choke		4	6
1 Atlas 20-henry L.F. choke	1	1	0
1 Telsen "Radiogrand" L.F. transformer (ratio 3-1)		12	6
1 Each ReadiRad short- and long-wave coils as specified		8	6
1 ReadiRad "Star Turn" Selector coil		12	6
1 ReadiRad "Quoit" coil		2	6
1 Junit terminal block			8
2 Belling Lee "B" terminals			6
1 Packet ReadiRad "Jiffilinx"		2	6
3 Valves to specification: Det., L.F., Power	1	7	6
Screws, flex, wander plugs, etc.		1	8

Total (including valves and cabinet) **£12.16.6**

KIT "A" (less valves and cabinet) **£5.19.0**
or 12 equal monthly instalments of 9 1/-

KIT "B" (with valves less cabinet) **£7.6.6**
or 12 equal monthly instalments of 13/6

KIT "C" (with valves and cabinet) **£12.16.6**
or 12 equal monthly instalments of **£1.3.6**

GRAMOPHONE ACCESSORIES.

	£	s.	d.
1 B.T.H. pick-up and arm	2	5	0
1 Igranic volume control		6	0
1 Garrard 11B double-spring gramophone motor	2	3	0
1 Bulgin N.C.1 needle cup		2	6

THE "SUPERADAPTOR"

	£	s.	d.
1 Polished ebonite panel, 10in. × 7in. × 3/16in.		3	6
1 Oak cabinet with 10-in. baseboard		15	0
1 Formo ·00015-mfd. short-wave assembly with S.M. dial		13	6
1 ReadiRad ·0003-mfd. variable condenser with knob		5	0
2 Formodensers, ·0003 mfd., type "J"		3	0
1 T.C.C. 1-mfd. fixed condenser		2	10
1 T.C.C. ·005-mfd. fixed condenser (flat type)		2	0
1 Telsen ·001-mfd. fixed condenser		1	0
1 ReadiRad ·0003-mfd. fixed condenser, with clips			10
1 ReadiRad 5-megohm grid leak			10
1 Varley 10,000-ohm power potentiometer		10	0
1 ReadiRad "Hilo" H.F. choke		4	6
2 Clix 4-pin valve holders with terminals		1	8
1 ReadiRad single-coil holder			10
1 Lewcos 6-pin coil base		2	0
2 6-pin oscillator coils, wound to specification		12	6
1 Set Atlas short-wave plug-in coils		10	0
1 ReadiRad filament switch			10
1 Terminal strip, 10in. × 2in. × 3/16in., drilled to specification		1	0
6 Belling-Lee "R" terminals		1	6
2 Valves to specification: Cossor S.G.215 and Mazda L.210	1	8	6
Screws, flex, wander plugs, wire, etc.		1	8

Total (including valves and cabinet) **£6.2.6**

KIT "A" (less valves and cabinet) **£3.19.0**, or 12 equal monthly instalments of **7/3**

KIT "B" (with valves, less cabinet) **£5.7.6**, or 12 equal monthly instalments of **9/10**

KIT "C" (with valves and cabinet) **£6.2.6**, or 12 equal monthly instalments of **11/3**

THE TWO-S.G. AMPLIFIER

	£	s.	d.
1 Polished ebonite panel, 14in. × 7in. × 3/16in.		4	6
1 Hand-polished oak cabinet, with 10-in. baseboard	1	0	0
1 Cyldon ·0005-mfd. "Extenser" condenser with dial		17	0
1 Formodenser, ·001-mfd., type "G"		1	6
1 ReadiRad filament switch			10
4 ReadiRad 600-ohm, resistances and holders		10	0
1 ReadiRad 25,000-ohm link resistance		1	6
1 ReadiRad ·5-meg. grid leak and holder		1	4
1 Wearite rheostat to suit valves		1	6
2 Junit S.G. valve holders		3	6
4 T.C.C. 1-mfd. fixed condensers		11	4
1 Telsen ·002-mfd. fixed condenser		1	0
1 T.C.C. ·01-mfd. fixed condenser		2	6
2 Telsen ·001-mfd. fixed condensers		2	0
1 ReadiRad "Hilo" H.F. choke		4	6
1 Telsen H.F. choke		2	6
1 ReadiRad "M.W." dual-range coil		12	6
6 Belling-Lee type "R" terminals		1	6
1 Terminal strip, 14in. × 2in. × 3/16in.		1	4
2 ReadiRad 10in. × 6in. screens, with S.G. holes		5	0
1 Sheet foil, 14in. × 10in.		1	3
1 Packet "Jiffilinx" (ReadiRad) for wiring		2	6
2 Valves to specification (S.G.)	2	0	0
Wander plugs, screws, flex, etc.		1	5

Total (including valves and cabinet) **£7 11 0**

(Including valves and cabinet.)

KIT "A" (less valves and cabinet) **£4.11.0**
or 12 equal monthly instalments of 8/4

KIT "B" (with valves less cabinet) **£6.11.0**
or 12 equal monthly instalments of 12/-

KIT "C" (with valves and cabinet) **£7.11.0**
or 12 equal monthly instalments of **13/10**

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Your goods are despatched post free or carriage paid.

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Telephone: Hop 5555 (Private Exchange) *Telegrams: READIRAD, SEDIST.*

Immediate Dispatch

THE VITAL LINK

An incident concerning a B.B.C. Outside Broadcast that must not be accepted as being even remotely probable.

THROUGH the whole of the north-eastern purlieus of London Dare had been haunted by one of those "baby" cars. He was driving a 60 horse-power Blitz himself, and you can be sure that he was quite considerably irritated by this little automobile that would persist in grazing by, first his off-side wings and then his near-side wings. Of course, his tormentor was able to negotiate the traffic much more easily than he could, and the leads Dare obtained in clear stretches of roadway were quickly lost when heavy traffic was encountered.

But up the Lea Bridge Road, Dare's sixty "horses" could be unleashed, and the midget car was soon lost to sight in the rear. The radio engineer heaved a sigh of relief and settled down to "knock off the miles." All went well until he came to the Epping Road, which is rather narrow. Here he very soon found himself on the tail of *another* "baby" car. The driver of this one evidently spotted the Blitz in his driving mirror, and determined that at all costs he would prevent it from passing.

Completely Baulked!

Hugging the crown of the road and completely blocking the "fairway," the midget bumped and bounded along at forty-five or so miles an hour, and that constituted a mere crawl for Dare's Blitz. Dare hooted and hooted, but the leading driver would not give him an inch.

The procession of two continued all the way to Epping, and Dare passed through all the finer shades of emotion from trifling annoyance to boiling rage, and then from boiling rage to that philosophical "well, what does it matter after all" feeling that is the inevitable conclusion of all such incidents where sane men, and not unbalanced fools, are concerned.

The baby car drew up outside an inn, and the radio expert slowed down so that he could catch a glimpse of the face of the driver. The back view, it must be mentioned, had been disturbingly familiar!

"Blazer, *of course!*" he grinned to himself. "That's not a coincidence—it's fate!"

He pulled up the Blitz with a jerk, climbed out and walked back.

Blazer Again!

The detective was still in the process of prising himself away from the glove-like grip of the tiny cockpit. Blazer is a fairly big man, and the huge leather coat he was wearing more than comfortably filled any spare room there might have been.

"I can't say you were *following* me, my jinx," greeted Dare, "but failing the stars, can *you* possibly tell me why it is my lot that I should find this otherwise quite passable scene rendered unholy by the presence of one, Blazer, ex-inspector of police?"

AN O.B. TAP

Dare looked up from the junction where the connection to the P.O. lines was made.

Blazer completed the difficult process of alighting, produced a cigar from some hidden recess in his voluminous apparel and, with deliberation, bit the end off it.

"And I can't take a week-end off and go down to my country mansion without asking his permission," he said, apparently addressing the sky.

"Didn't know you'd got a place out this way!" exclaimed Dare in some surprise.

"Stark Tragedy"

"Haven't had it long. Bought one of the lodge houses of New Hall. Great snip! Wonderful little show!" explained the detective enthusiastically.

"Great Hall! Great Scott! That's where I'm going."

"Well, why not? Suppose you call *that* a coincidence," grunted Blazer disgustedly. "Why *shouldn't* you meet me going down to Big Hall? Why *shouldn't* I happen to be staying at one of the lodge houses? You folks that live in an atmosphere of 'curious coincidences' make me tired. Why, it's a month since I've even set eyes on you, and I expect you've been to a hundred places in the meantime. Now, it *would* be a coincidence if I'd met you—or you'd met me, as I suppose you'd like me to put it—every blessed time you ever went out into the street!"

"No," admonished Dare kindly, "not a coincidence, my Blazer—stark tragedy!"

"You're too high-frequency for *me*," chuckled the detective. "I suppose you are down about that big hospital bazaar business, aren't you? I've seen 'em fixing up all those loud speakers for blowing the Prince of Silesia's speech all over the grounds."

Twenty-five Speakers

"Yes," agreed the radio expert; "the public address system, as they call it, is my affair—that is, in conjunction with one of the big firms."

"Come and have a tonic before you start scaring the local police again with that hideous steam-roller of yours," invited Blazer.

"Righto! And if you ask me nicely I'll give you and your—ahem!—car a lift for the rest of the journey."

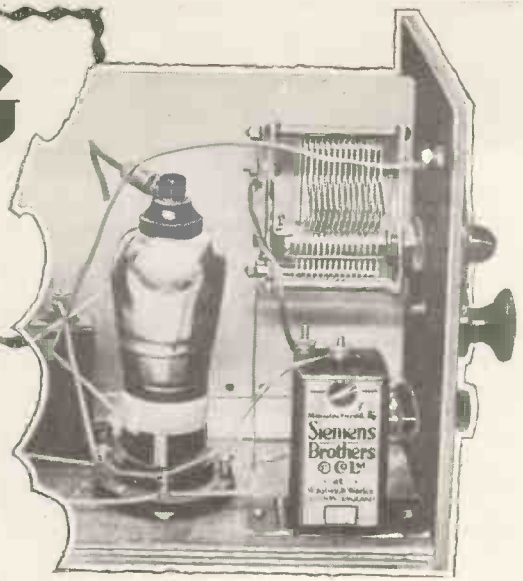
Arrived at his destination, and with a hurried "au revoir" to Blazer, Dare set to work to disentangle all the wrong connections the mechanics had made in the public address system in the grounds of the New Hall, Chudley-Wick. Time was pressing, so the gloriously hot sun overhead was to him nothing more than an annoying heat-producer, and all the gaily-coloured tents and marquees so many obstacles impeding his progress from loud speaker to loud speaker. There were some twenty-five big moving-coil instruments, and the amplification between these and the microphone, which was fixed on a platform in the centre of the huge lawn, represented enough power for a small transmitting station.

Keeping the Bass

As Dare patiently explained to Lady Montgomery-Smythe-Browne, it was essential that powerful apparatus should be used, for there is such a vast difference between the results given by loud speakers indoors and when they are employed in the open.

(*Continued on page* 640.)

SHIELDING THE S.G.



With the increased efficiency of screened-grid H.F. valves the importance of screening has also increased, and schemes for shielding the valve itself, apart from inter-stage screening, have been devised. The latest ideas in this connection are described in this article.

By K. D. ROGERS.

THIS month I want to talk about S.G. amplifiers, and of the new valves which have recently been put on the market. Before doing so, however, I must correct a misprint which appeared in the characteristics of the Mazda P.P.5/400 in last month's issue. Owing to a printer's error it was stated that the milliamps. consumption was 80. This, of course, should have been 60 for a round figure, though 63 milliamps. is the actual consumption when the valve is properly biased at 400 volts H.T. I trust nobody has been seriously misled by this error as to the true characteristic of the valve.

A REALLY NOVEL IDEA

Two Cossor screened-grid valves, one battery and one mains type, which are shielded by being sprayed with a metallised paint which is in electrical contact with the filament.

And now about the screened-grid valve. It is some years since the screened-grid H.F. amplifier was first placed on the market in horizontal form by Marconi and Osram. In those days the grid and filaments were at one end, and the screening grid and the anode were taken off to two pins at the far end of the valve.

Increasing Efficiency

It was not long, however, before that design was scrapped and the vertical type of screened-grid valve, having the anode at the top and the screening grid and two filaments and ordinary control grid at the base, was placed on the market.

Characteristics were revised and gradually the valves became more and more efficient, and with increasing efficiency it naturally became more and more difficult to use. No one will insist that the screened-grid valve is really easy to employ. At first sight the fact that it was self-screened and did not need neutralising would make it appear that it was a simple type of valve and one which was almost "foolproof," if I may use the term, in its application.

Stable Sets

Neutralising a valve was always a bit of a bother. The screened-grid valve did not need neutralising, and therefore we thought sets would be simpler. Well, to a certain extent they did become simpler, though it is necessary to screen the anodes and grid circuits of the screened-grid valve satisfactorily in order to get amplification without instability. And nowadays with the increased magnification factors it is becoming increasingly important that the screening should be adequately and properly carried out.

The mounting of the valve vertically behind a screen, and the taking of the anode lead through the screen, gradually became inadequate in most cases, and one usually has to arrange the valve horizontally through a hole in the screen in order that adequate screening be obtained. The trouble—I will not say difficulty—in screening the S.G. valve has been one of its drawbacks, but now the manufacturers have come to the set designers' assistance; and although their latest advancement will not obviate screening, it will to a large extent assist in enabling full stability to be obtained.

The Latest Idea

I refer, of course, to the new metallised screened-grid valves, on the bulbs of which a deposit of metal strongly resembling our old friend

"CANS" FOR S.G.s

Special Six-Sixty aluminium shields which fit round the valve, and have a tab on the bottom through which one filament pin passes, thus earthing the shield

Latest "Screened-Grid" Information

aluminium paint is placed and connected mechanically with one of the filament pins. That is in the case of the ordinary battery S.G. valve. In the case of the mains valves this metallised shield is connected to the cathode.

I am in two minds whether the decision of the valve manufacturers definitely to connect the shield to filament or to cathode is a better scheme than to take it to a terminal on the base, because it does restrict one's wiring a little bit.

A Wiring Tip

With the shield connected to a terminal one can wire up the valve how one wishes and put the shield just as one likes, but with the shield connected to the filament or to cathode one has to look out for some small snags which make themselves apparent.

In the case of the battery valve, for instance, if you look at the base of the valve—that is, with the valve pins sticking out towards you, and with the anode pin nearest you—you will find that the metallised coating of the valve is connected to that filament pin which is on your left. In other words, when the valve is in its valve holder the filament socket of the valve holder which is on the right (looking at the holder with the anode socket towards you) is the one which must go to earth.

Unfortunately, this makes it rather difficult in many cases to put metallised screened-grid valves into sets which are only built for the ordinary screened-grid valves, because in such cases it is quite on the cards that one will find the wrong filament socket is taken to L.T.—.

It may, or may not, depending upon circumstances, make any difference, but there is a possibility that the wrong path to earth, through which, of course, a certain amount of H.F. is likely to be flowing, will cause trouble; and in order to short-circuit this trouble I would advise those who want to use metallised valves in sets "wrongly" wired to put a 1-mfd. between L.T.+ and earth or across the filament wiring close to the H.F. valves.

This is especially recommended in sets which have pentodes, because H.F is funny stuff, and you do not want it wandering about round the L.F. side of the set, even via the filament wiring, if such a thing as a pentode is being employed in the receiver.

Metallised "Mains" Valves

Of the A.C. screened-grid valve with its metallic coat there are several snags, and one appertains to the automatic biasing. The metallic coat is taken from the valve to the centre pin, which is the cathode; and, of course, it becomes immediately apparent that the cathode is connected not direct but through a 1,000-ohm resistance, or something of that value, in order to give automatic negative bias to the grid.

So in such circumstances it is absolutely essential that a large fixed condenser should be placed across the biasing resistance.

By-Passing the H.F.

Naturally one uses a fixed condenser across the resistance whether the valve be of the metallically screened type or not; but in case anybody was tempted to leave that condenser out—and I know of cases where it has been left out because, as the owner of the set said, "it made no difference"—it becomes doubly important to keep it in position across the biasing resistance.

In addition to the metallic screened-grid valve there is the metallised detector A.C. valve, which has been brought out for the express purpose of cutting off the effect of the A.C. heater element inside the valve upon the surrounding circuits.

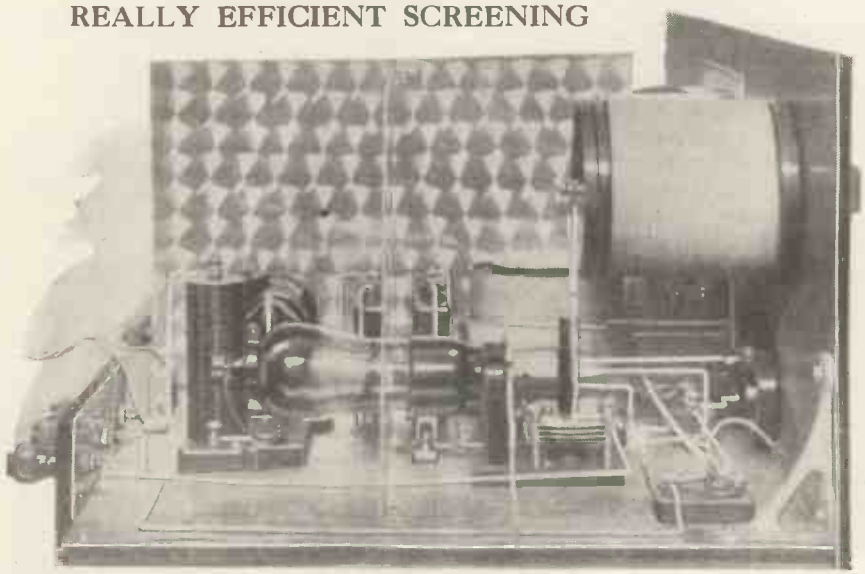
Preventing A.C. Hum

It has been found that even if the heater or filament wiring be carried out properly a certain amount of hum may be introduced into the surrounding stages—especially if they are transformer coupled—by direct induction from the heater element of the detector valve.

Therefore, metallic coats over the detector are being tried, and this is earthed in the same way as the screen of the S.G. valve.

On test both the S.G. and the detector screened valve have proved exceedingly efficient. At the time of writing I have only received Cossor valves for test, though valves of other makes are coming along and will be on the market by the time this article appears.

REALLY EFFICIENT SCREENING



A good way of obtaining efficient shielding when a set employs more than one S.G. stage is to arrange a vertical screen around it, so that this screen is virtually a continuation externally of the actual internal screening-electrode.

IN PASSING

A Day in the Life of Jones

As I lay a-thinking the other morning I recalled the dictum of Cæsar about blowing one's own trumpet. "Autobiography," he remarked, to Brutus, I think. . . . But I should explain that I sleep and write in a garret commanding an unrivalled view of a railway siding which is devoted entirely to the accommodation of cattle-trucks which exude "Moo's" and "Baa's" in great quantity and with demnition iteration.

High Life

Scandalised relatives have tried to tear me from my garret, but I have the excellent examples of St. Simeon Stylites, who lived atop a pillar; of Jove, who was nursed upon a mountain; of Tibullus and Lucretius; and of Dr. Sam Johnson, who wrote an essay in the "Rambler" on the advantages of living in a garret. So I keep to my garret and survey the world, if not "from China to Peru," at least from the cattle-trucks to the drainpipe warehouse on the other side of the line.

Starving Too Romantic

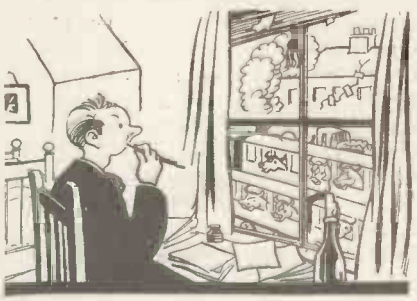
As I was about to observe, before that rat scuttled across my feet and reminded me of garrets, Daniel Defoe pointed out that autobiography is—— Mind you, this garret is not the sort of place in which authors starve to death and are found grasping sheaves of immortal prose in their thin, cold hands. Not at all; a spot of slimming, perhaps—and on rare occasions—but not starving! Too romantic for a fellow of my build.

The rats are not likely to starve, either, so long as my window-blind holds out. They like it, and have devoured a hole through which at this time of the year the sun shines at about five-forty a.m. and gets me bang in the eye. It did that the other morning, and so—I lay a-thinking and recalled that Professor Huxley told Queen Victoria that autobiography is——

Anyhow, autobiography is publicity reduced to a personal equation and squared. It is vanity masquerading as mock modesty; a blast of brass on the note *mi* or "*me*."

"Disintegrate yourself, brother! Disintegrate yo'self," I said. "Hush yo' mouth about dat," replied my conscience. But the idea of writing my autobiography gnawed at me until I placed my conscience in the pocket of my Sunday waistcoat and began to dally with the auto notion.

MY LITTLE GARRET HOME!



Where I work and watch the cows go by!

Mature consideration revealed to me that the autobiog of a man who has never done anything more thrilling than to "sack" a cook—there were eighteen empty gin bottles divided between her mattress and the chimney of her bedroom!—would not be a seller, except for Messrs. Foyles', who on occasion sell old books at *fourpence a pound!* Nevertheless, after a gas-meter inspector had told me the history of a day in his life I realised that even the drab daily round of Brown might be of great interest to Robinson.

I propose, therefore, to describe a normal day, a working day, of my life. Multiply it by *x* years—and behold my autobiography!

The Beginning

Seven a.m.! Mary Jane Adelaide Pansy Hypatia Slumble clumps downstairs. Hence I wake and switch off my alarum, which is timed for seven-fifteen. I am awake, but warm and comfortable. The bulls in the siding are grumbling noisily, and I lie there—bed, not siding—wishing that I were the Editor of the "Pigstickers' Annual," and could remain in bed till ten.

Always Before Me

I do not properly recover consciousness until about eleven a.m.—unless my morning mail at home contains a cheque or a bill. It generally does—specially bills! At nine-thirty I slope into a certain underground den in "town" and suck down half a pint of strong coffee. I am then fortified, and pass without a tremor through the palatial portals of my daily prison.

"'*E's* 'ere, sir," hisses Old Erb, the much be-medalled hall-porter. "'*E*" is the Bloke—the Editor—not the Editor of "M.W.," but another. Energetic brute! Can't he sleep? However, it is handy to know that he is on the premises, even if, as usual, he is out for blood.

"Can't I Go Down Some Nice Kentish Chalk Pit?"

My room, fresh from the charlady's hands, shows a conglomeration of books, magazines, radio parts, sets, gadgets and dust. I light my pipe and draw up to my desk to look at the mail. First letter. ". . . and so I venture to ask whether you would send me a copy of your book and any spare components you may have. Our Village Club—*blah blah* . . ." Ting-a-ling. Telephone. Yes! Who? Mr. Yop-yop, of Wah-wah? Eh? Can I tell you whether the B.B.C. sends out S.O.S.'s for strayed ponies?

More Trouble

Second letter. ". . . from point A to the junction of the terminal P (marked F) and thence to a grid leak. Now do you think that——" Boy bursts in. "Will you step down and see Mr. Colbottle, sir?"

Mr. Colbottle is a printer. He can't leave his post, and as I know that some of my writing has puzzled him I am bound to visit him. A noisesome stew! Odour of printing ink, paper, beer, boots and oil—mixed. Mr. Colbottle brushes his beard off a desk and discloses a sheet of my MS., mono-marked with the fingerprints of about thirty compositors, boys and sub-editors, and freely embellished with hieroglyphics peculiar to the "chapel."

AN AWFUL AFFAIR!

"It's about this halgebra, sir."

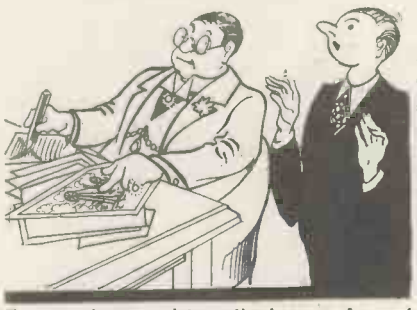
He fits on a pair of steel-framed pince-nez and, looking well over the top of them, focusses his slightly bloodshot eyes, through a forest of eyebrows, upon a patch of my calculations.

"It's about this halgebra, sir. Cormon says he can't rightly say as how a nay is a nay or a nar a nar, seeing that some of the hays looks like heckses. And this halgebretical composing's very expensive, sir. We had quite a turn-up about this bit. Corman says it's a nay, while I reckon it's a hecks squared."

I examine my algebra. It looks as clear as mud and I forget what it was all about, anyhow; so I say:

"Never mind, Colbottle, delete all and add 'continued.' I'll think up some more algebra next month. How's Clarice?"

A HOT JOB!



To experiment with radio in unsafe coal mines.

Clarice is a goat. He bought her at a jumble sale and is trying to train her to bleat to dictation. Boy dashes up, knocks over a forme of small ads., treads on Colbottle's spectacle case, and gasps: "Editor's been asking for you, sir—long time." I sigh and plod upstairs. The Bloke's room always smells of cigar smoke and scent.

"Got a little job for you, Jones," he says, drawing a blue pencil viciously across a page of some poor blighter's "stuff"—young Gudlings, the ganged-condenser specialist, I think.

A Mining Expedition

"Want me to interview Ghandi?"

"No. No interview! You know that the Greenridge coal mine keeps on catching fire or caving in and that scores of lives have been lost in it this year? Well, I am arranging for you to go down the thing and conduct an exhaustive inquiry into the possibility of equipping the men with pocket-size radio sets. It's an old idea, but no one has ever gone into it to a final conclusion."

"I don't like 'exhaustive' and 'final conclusion.' They sound sinister. I have little if any desire to reach my final conclusion down a coal mine—and in an exhausted condition. Send Jimwell! He's an expert on pocket sets; he's pocketed most of mine from time to time."

He continued: "Jimwell has already been detailed to assist you at the surface."

"S-shall I need any assistance there? Isn't it down below that I shall want help? Can you guarantee that I shall regain said surface? You can't! Well, can I toss with Jimwell for the surface job? No? Well, I was appointed to help run this periodical, not to be a private commission on Safety in Coal Mines! Why choose such a rotten mine, anyway? Is some friend of yours after my job? Can't I go down some nice Kentish chalk-pit?"

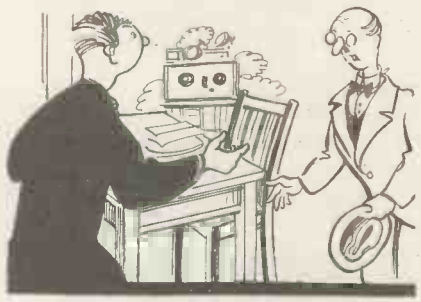
An Inventor Calls

I left him to it, remarking to myself as I padded along the corridor: "Well, he's paid for it—and, anyway, he don't go down dud coal mines."

As I entered my room an apparition rose from a chair and greeted me. Good heavens! That idiot again! Yes, Mr. Marius Freedge, the world-famed inventor, well known in Clapham for his lectures to "Bands of Hope," had called again.

However, on this occasion all he wanted was a slight advance on account of preliminary expenses. Ha, many's the scamp that lives on prelim. exes.! I gave him a copy of the "Scientific American" (specimen!) and a proof of Prof. Gimbal's article on "The Rhomboidity of Rhombuses," which I found in some packing round a loud speaker—and sent him on to our Patent Expert.

CAUGHT AGAIN!



Mr. Marius Freedge, the world-famed inventor, to see me.

Buzz (Office buzzer). "Hallo! Yeah! What? Greenridge mine flooded? Good! Refer to Marine Radio Dept. That let's me out!"

With a sigh of relief I light my pipe and settle down to my mail. Good old stuff! What? *Ting-a-ling.* "Editor speaking. Jones. Greenridge Mine search party proposes to take radio equipment down. Catch the four-fifteen, will you?"

What a life!

RADIO NOTES and NEWS of the MONTH

I HEAR that for the twelve months ending 31st March there were 1,433 prosecutions for the use of wireless sets without license, the aggregate of fines imposed being £1,110.

It looks as though the "Pirate" was far from dead! Why don't the B.B.C. prepare some badges with the skull and crossbones as an emblem, and present "retired" pirates with a memento?

5XX to be Overhauled

Daventry (5 X X) is six years old, but it is still giving good service. However, it will soon be re-built. Since 5 X X was erected many technical advances have been made, and these will be incorporated in the new transmitter.

It is likely that the Daventry medium-wave station (5 G B) will also be brought up to date along with 5 X X, and the two transmitters linked together as a twin-wave station on the lines of Brookmans Park and Moorside Edge.

The alterations at Daventry will be put into effect at the same time work is due to begin on the Belfast station, which is to be entirely rebuilt. The new Belfast station will have a power of 15 kw.

Denmark Still Leading

A chart just issued by the International Broadcasting Union shows the number of licensed receiving sets in Europe. Denmark has the largest ratio of wireless licences to total population. During 1930 the number of licences rose from 308,927 to 420,000. Compared with other European countries Denmark has made the biggest strides in the matter of licence expansion. This is probably due to the enterprise of the broadcasting authorities in determining and taking into account the tastes of listeners in the matter of the composition of programmes.

Swedish Progress

Sweden comes next, having 482,300 licences, a proportion of 78·99 to each thousand population. These figures compare with 427,564 and 70·03 respectively in 1929. Much of the progress in Sweden is traceable to the big transmitter at Stockholm, along with two or three other powerful stations in provincial cities.

Britain Third

Great Britain holds third place, but during the past year has slightly reduced the lead held by Sweden at the end of 1929. Great Britain's figures are returned at 3,411,910 licensed wireless receivers, a proportion of 77·5 per thousand population. The figures at the end of 1929 were 2,956,736 and 67·16 respectively.

(*Continued on page* 636.)

RADIO NOTES AND NEWS OF THE MONTH

—*continued from page 634*

Much of the progress in this country is due to the opening of the Brookmans Park twin-wave transmitter, and as the Regional scheme is further developed greater progress may be expected.

The "Also-Rans"

Austria comes fourth with 423,534 wireless licences, a proportion of 63·34 per thousand population, as compared with 376,366 and 56·25 in 1929. Germany has 3,509,509 licensed wireless receivers, as compared with 3,056,692 in the previous year. The proportion per thousand population has increased from 49·1 to 56·23. Mühlacker and Heilsberg have a lot to do with this increase. Hungary is sixth in the list, while Norway, with the introduction of the Oslo high-power station, has gained a place at the expense of Finland, and now occupies seventh position.

During the year 1930 it is calculated that the total number of licensed wireless receivers in Europe has increased from 8,346,066 to 9,853,463.

More Power for Paris

I hear that Radio-Paris will soon become one of the most powerful stations in Europe. A new transmitter has been erected at Essarts-le-Roi, outside Paris, with a power rating of 120 kilowatts.

Apart from the huge increase in power, the new station has an aerial system which employs three masts over 600 ft. high. The transmitting plant is ready for operation, and will be brought into service as soon as the sanction of the Post Office authorities is obtained for the establishment of lines to link up the transmitting plant with the studios in Paris. The wave-length of Radio-Paris is 1,725 metres.

West Country Licences

More facts and figures are now to hand about licences in the West of England.

The number issued for Bristol alone is 46,202, and new licences issued in the six months ended March 31st numbered 8,472.

Bristol heads the list of principal West Country centres in the increases with 18 per cent. Other centres are:

Bath licences number 9,664, an increase of 1,511 during the past half-year; Weston-super-Mare, 4,744, increase 643; Chippenham, 4,739, increase 775; Trowbridge, 3,543, increase 571; Frome, 1,465, increase 227; Devizes, 1,364, increase 234; Wells, 850, increase 122.

The Swiss Stations

The second of Switzerland's high-power stations, Beromünster, began regular broadcasting a few weeks ago on a wave-length of 459 metres. Unlike Sottens, which makes its announcements in French, Beromünster announces in German—for the benefit of German-speaking Swiss.

The power of Beromünster is given as 80 kw., but so far it has not equalled the volume or quality of Sottens (although the latter has nominally less power), and it also shows more tendency to fading.

The station is built at Münster, about 12 miles from Lucerne, and is connected to studios at Berne, Basle, and Zurich.

That Opera Subsidy

Major Attlee, the Postmaster-General, said in Parliament the other day that no payment had been made towards subsidising Grand Opera in

(*Continued on page 638.*)

RADIO NOTES AND NEWS OF THE MONTH

—continued from page 636.

anticipation of the specific sanction of the House.

One member then asked if he could assure the House that this proposed expenditure would be specifically referred to the Economy Committee ?

The answer was " No " !

It looks as though the opera subsidy is subsiding !

ROUND THE TURNTABLE

—continued from page 572

usual types of bass correctors available to the average man seem to impart a sort of persistence in the notes which rather takes away their naturalness.

* * *

The Celestion pick-up is undoubtedly one of the finest pick-ups ever put on the market, and from the point of view of design we must congratulate the manufacturers. It now behoves the record makers to improve their records in order that the pick-up may do itself full justice, but somehow I do not think they will yet.

NEXT MONTH

There will be a full description in "M.W." of a very special set for distant-programme reception.

JULY ISSUE

ON SALE JULY 1st Price 1/-

I must remind you, however, that these criticisms and comments are only expressions of my own opinion, based on results obtained on my own receiving apparatus, and the fact that the " perfect " pick-up does not always sound quite so " perfect" on my apparatus, whereas it may sound infinitely better on someone else's, goes to show how very difficult it is to give advice on such matters.

Simply Relative

It is all a matter of relative values, and the speaker forms no unimportant link in the chain. I do not want you to get the idea that no bass is reproduced. I do get bass, but not quite such healthy bass as on radio because of the record " fall-off." Hence my argument in favour of less straight-line ' 'perfection." Its all very difficult, isn't it ? Trying to match up radio and record reproduction on the same outfit is no joke !

* * *

And this brings me once more to my correspondent who asked which pick-up I used, and also to those who ask me which is the best pick-up. They will see by now from these few notes how absolutely impossible it is to say that such-and-such a make is the best.

* * *

You can say that such-and-such a make has the best theoretical characteristics, and, provided everything else is equal, will give the best results. In such a case one would say that the Celestion is certainly an excellent example, but in practice one must make all sorts of allowances.

* * *

One can base one's choice on the theoretical " perfection " of a pick-up's response, but before final " perfection " is obtained in practice it is likely that a great deal of " faking " will have to be done. Constant velocity records don't help us much ; if we could have the constant amplitude type we might do much better.

LOUDSPEAKERS OUT-OF-DOORS

A short and extremely interesting constructional article describing how a miniature loud-speaker bandstand can be used for supplying music in the garden.

By F. N. GANDON.

THE apparatus and the large powers required for public address systems are well known, and to suggest using an ordinary three-valve amplifier out-of-doors may well sound absurd. In point of fact, it is absurd when compared with the commercial article, but as a novelty it can be quite a success.

A Great Idea!

The writer was called upon to supply a little incidental music to a club garden party. The idea was not to blast forth a huge noise over two or three tennis courts, but to make a kind of side-show. The experience of one such victim of the secretary's sweet tongue may be helpful to others.

Before anything else is attempted, the site of the proceedings should be visited.

In the writer's case the ordinary home receiver was called into commission. This is a three-valve set (det. 2 L.F.) of the home-made variety, with provision for a pick-up.

The output to the loud speaker is by the choke and condenser method. Incidentally, this or an output transformer is essential, for much trouble will be experienced if the H.T. current is allowed to flow through long loud-speaker leads.

Loud-Speaker Layout

The H.T. for this set is supplied by double-capacity dry cells, the normal output valve being a P.M.254.

There is no loud speaker to compare with the moving coil, and if the amplifier is powerful, and power available permits, one should be used. In the writer's case, being forced to use dry cells and a moderately small valve, this was not advisable, and so a "stunt" loud-speaker assembly was made up.

The photographs give a general idea of the layout. A miniature "bandstand" was constructed to hold three loud speakers of the moving-iron type; two wooden horn instruments and one cone. The framework of the "stand" is made of 1 in. by 1 in. wooden batten; and the baffle board of the cone speaker, which forms the front of the assembly, is of three-ply wood, 2 ft. square.

The baseboard is five-ply wood. Stiff brown paper forms the roof, the overhanging eaves of which are held up by four wooden rods, painted white. Coloured muslin is draped round the front.

Building the Bandstand

To complete the effect, a frieze representing bandsmen may be fixed round the base, and a flag on the roof flying club colours, if any. Size will vary with individual requirements, but as a rough guide the assembly described is as follows: Height of framework, 2 ft. 6 in. Greatest width from side to side, 3 ft. Depth from back to front, 2 ft.

The horn loud speakers are placed one on each side of the cone. It may be wondered why this obsolete type of speaker is used at all. The reason is this: They are very sensitive to the middle register of the musical scale, and it is this which carries the farthest. To compensate for the lack of bass, however, the cone speaker is specially constructed to be "boomy."

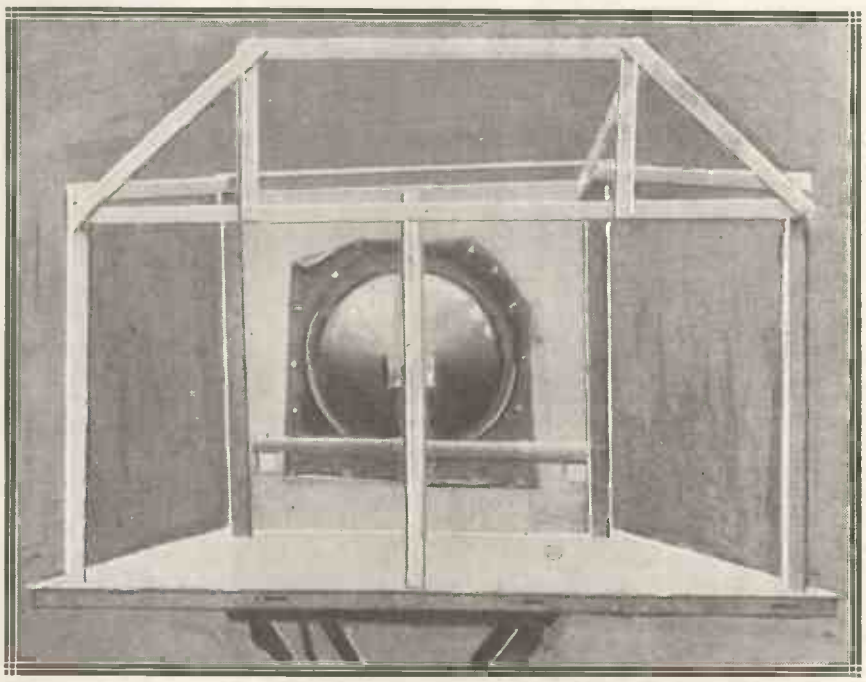
Remote Control

For convenience the apparatus should be set up on a table which, if possible, is out of sight of the audience. As a result of this the operator will be some distance from the speakers and may not hear when "blasting" occurs. A milliammeter in the plate circuit of the last valve is therefore essential to check overloading.

The music should be faded in and faded out again when finished. This obviates scratching noises when the pick-up is placed on or removed from the record. If a microphone is to hand, annoucements can be made, although this is not always desirable.

In conclusion, it must be repeated that the whole idea is to provide a novelty. With limited apparatus, anything in the nature of real public address work is impossible.

BUILT WITH BATTENS



This shows very clearly how the miniature bandstand is constructed. A light framework of battens covered with brown paper and muslin, that's all. Note the cone loud speaker with the baffle forming one side of the stand.

THE VITAL LINK

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"You see," he continued politely, though he was inwardly writhing at the delay, "the attenuation of the sound waves is enormous out-of-doors. You notice it with bands at the seaside. Near them you hear the 'boom, boom' of the drums, and the grunting of the bass notes in their right proportions, but as you walk away these low notes are rapidly lost, until you are finally left with nothing but the shrillest of high notes. You must always employ much more power out-of-doors if you want to preserve a decent balance at a respectable distance from the loud speakers. That is where the average portable set is so apt to disappoint. In the shop, or at home, it may sound loud enough for anything, but in the open it thins away into a miserable inadequacy."

"Ay see. Thenks fraytfully, Mr. Bear!" murmured her ladyship vaguely, as she drifted away to extend a languid hand to some new arrival.

By three o'clock in the afternoon, and with quite comfortable time to spare, the radio expert completed all his tests. With a very big sigh of relief he gave the O.K. to his mechanics, lit a pipe, and proceeded to take more interest in the general surroundings. The grounds were now filling up, and the vista of coloured dresses and the streams of gay bunting idly quivering in the soft, warm breeze made a most pleasing picture.

He was passing round the back of a marquee, in order to dodge a particularly dense group of people, when he was hailed by a familiar voice.

"Hallo, Skelton!" he returned, wending his way through some long grass to where a man was busily engaged over a small manhole. "I didn't know you broadcasting people were doing an O.B. here."

"We weren't till first thing this morning," said the other, straightening up and dropping the coil of wire he had been holding. "You see," he explained, "there was some sort of political objection against putting the Prince on air at first. I say, do you mind if we break in on *your* mike circuit? It would save an awful lot of time, and I guess your amplifiers are the real he-man's stuff!"

"Sure you can, Skelton. I've got a little one-valve mike booster in the chain which you can feed to your gear, or you can nip in at the third stage and volume control it direct on to the line. You taking a tap on to the telephone cables here?"

"Put Your Hands Up!"

"Yes, that's it. Thanks awfully, old man. I've made the joints. Would you mind keeping an eye on things here while I run the line to your tent? Ever so many thanks. Oh, by the way, our van's about a hundred yards down the road. If any of the boys happen along, tell 'em where I am, will you?"

. . . .

Some ten minutes had passed since Skelton, trailing wire behind him, had disappeared into the sea of canvas, when Dare, ruminating pleasantly over the incidents of the day, was startled by a hoarse whisper.

"You will put your hands up, mistair, yes?"

He spun round, and for a moment couldn't locate the source of these sinister instructions. He first saw the revolver, but it was the face behind it that decided him to take safety-first steps. A completely villainous man was peering at him through the hedge that bordered the lane. Indeed, dirt, whiskers, broken teeth and fanatical eyes were there in positively nightmare concentration!

Playing for Time

Still holding the revolver at the "ready," the apparition gingerly negotiated its way through the gap in the hedge. Dare glanced round, but there was no one in the immediate vicinity. The place was a sort of backwater. But he felt it couldn't be long before someone, perhaps a B.B.C. engineer, would come along. Clearly, he must delay matters. He was thinking this was an ordinary "hold-up" for his pocket-book and watch, but he was quickly disillusioned!

"You broadcastairs feex your wire here, huh?"

The radio engineer did not answer; he merely smiled distastefully.

"But I—I know eet. Now you will feex thees little wire of mine to the cable of the telephone, too, eh? Queek, mistair, or I shoot you and myself make it!"

"My dear brigand, I'm not a B.B.C. engineer," expostulated Dare.

The foreigner's eyes narrowed, and he brought the revolver up into line with Dare's second waistcoat button.

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"You make it me the fool of," he growled. "You join my wire queek or I keel you."

Now Dare was no coward, but all the same he did not feel that the threat was an idle one. The man was obviously quite mad. He glanced down the manhole at the three or four wires snaking their way across the bottom. He thought it couldn't be long now before help arrived, so he pretended that his resistance had broken down. He would cause as much delay as he could.

"Give me the wire," he commanded.

The foreigner threw the cable across, taking care not to get too near Dare and so give him a chance of disarming him.

The Fanatic's Plan

Dare slipped into the manhole and began to unhitch the B.B.C. wire.

"You leave heem on, yes," grunted the other with great ferocity. And as the radio expert dropped the wire obediently and began baring the end of the unofficial lead, the foreigner relaxed a little and became quite expansive.

"You hurry like smoke, mistair, or I keel you. Ha, ha! I speak through my so-pretty little microphone and amplificator. Ha, ha! The so-great Prince, he speak to your so-big country, but I speak too—in a voice more bigger—see? I tell your so-big fools English how they can be free—free! But I whispair, no?"

And so the propagandist cheerfully chattered on while Dare, as slowly as he could in the circumstances, made joints in the wires connecting the telephone system and the fanatic's microphone. But to his disappointment they were still undisturbed when

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the job was completed, and, under the threat of the gun, he had hidden the foreigner's cable in the grass.

"While I speak my great speak to your so-foolish English, I watch that you stay here on the ground behind this so-nice hedge. When you make the sound or move, I shoot you hard, yes? I go into this so-nice bush place to make the ready with my so-nice small portables machines."

Dare concealed himself as ordered and, with his hands spread out on the grass, settled down on his back and puffed away at his pipe. Perhaps he had a faint hope that this would constitute a smoke signal!

. . . .

Meanwhile the splendid climax of the great hospital fête arrived and the Prince of Silesia began his gracious speech before the microphone. In a million British homes a million radio sets were tuned in to one or other of the stations taking this important S.B. O.B.

Blazer Gets the Benefit!

Within half a mile of the actual bazaar, Blazer sat in the front room of his little country house—one of the lodges of the park itself. He was glancing at his radio set and wondering whether he would tune in and hear the speech, when the telephone bell began to ring. At first he ignored it, arguing that he was "off duty," and that it was unlikely that it was a relative or friend ringing him.

But the bell continued to ring. Finally, with a grunt of exasperation, he rose from his chair and went over to the demonstrating instrument. He placed the receiver to his ear. For the space of at least a minute he stood transfixed, then with a bellow of rage he dashed the thing from him and began violently to joggle the ear-piece hook. He did this for some seconds, and then once more placed the instrument to his ear. This time he was only saved from apoplexy by the timely arrival of his wife, who hastily appeared from upstairs in great alarm at the disturbance.

. . . .

"You see," explained Dare, some time later, "this *was* a coincidence, even you will admit that, Blazer. There were only three cables in that manhole, it is true, but I hadn't the ghost of an idea that one connected to your 'phone! I had the vision of some country squire, or some rural peeress in her own right, getting the benefit of old whiskers' propaganda. Better such a one than the poor public—they stand enough as it is from their radio! However, it is rather fitting that you took it—it's in your line of business, my policeman."

"Wish I had *him* on the end of a line," grunted Blazer.

"Well, you did, didn't you?" grinned Dare.

THE ADVANCE OF THE "EXTENSER"

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informed that the extra cost for four as against three is trifling, in which case I earnestly hope that the practice will be entirely universal.

The shape of the vanes is another point where manufacturers have plenty of freedom for the expression of their own individuality. There are several shapes possible and all have their points. I, personally, prefer either the shape included in our original design, or that more symmetrical shape, wherein the spindle is centrally disposed, which was illustrated in one of our contemporaries.

The switching itself can be varied in numerous ways. Already at least three distinct forms have been advanced. But so long as the action is electrically and mechanically good, and there is no mechanical reaction on the movement of the vanes, we are prepared to praise any of them quite impartially.

Regarding the Terminals

Nevertheless, the arrangement of the switch-point terminals is a matter of some importance. We don't want finicky little terminals crowded together in an inaccessible place, but we do want terminals instead of, or in addition to, soldering tags.

We also hope that those manufacturers who are still preparing their designs will make sure that the terminals are properly grouped and not spread about the component haphazardly. They should be positioned so that there is no possibility at all that the constructor will mix up the "self-changer" and the vane terminals.

The "Cyldon" Extenser provides an excellent example of sane terminal grouping. As a matter of fact, it is

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my opinion that the "Cyldon" Extenser has set a hot pace all round. There may be cheaper Extensers produced, but it will be a mighty difficult task to produce a better one. This is all the more creditable to "Cyldon," in that they were the first in the field.

However, in all due fairness to other firms, I must place it on record that I have seen other models of sterling merit.

No Limitations

And now for a reply to a number of correspondents that have written to me; these have all anxiously asked the same question—i.e. does the Extenser in any way interfere with the normal technical applications of radio circuits?

No limitations whatever are imposed. Actually, Extensers can be applied to practically any existing set, and in every case there can only be an improvement in the set from an operating point of view, and often, owing to the shorter and simpler wiring, a definite increase in the outfit's efficiency.

No, there are no snags! The scheme has been studied by nearly everyone connected with the radio industry, and, to end on the same happy note with which I commenced this article, there has not been a single criticism recorded against it.

AN "M.W." SHORT-WAVER

Sir,—In the March issue of MODERN WIRELESS you illustrated a short-wave set, and although I had never undertaken to make a set before, the simplicity and clearness of the instructions enabled me to make my first attempt with this set.

The results were astonishing, so much so that within a few minutes of the set being put together I was able to get at least six American stations, two of them at loud-speaker strength.

Such distant stations as Batavia, Saigon, and Casablanca came through with exceptional clearness.

I would like to congratulate the designer of this set on the exceedingly clear directions.

Yours faithfully,
CHAS. E. AITKEN.

Ashbourne, Derbyshire.

A TWO-S.G. AMPLIFIER

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device on the Extenser is extremely simple, as you will see; the operation being very similar to that of an ordinary wave-change switch, except, of course, that the Extenser does it automatically.

When listening on the long waves the three contacts points (only two of which are used in this set) are left isolated, but on the ordinary waves the moving vanes which operate through a cam make contact with the two strips on the back of the Extenser and short the whole lot. This is denoted in the theoretical diagram by means of the little arm on the bottom of the arrow denoting the variable condenser.

Extenser Connections

This arm, in theory, swings up so that it short-circuits the contacts connected to S_1 and S_3, and to S_2, and joins the whole lot to the moving vanes of the condenser itself, which is connected to G.B.+ and the L.T. wiring.

Should you decide, however, not to make use of the Extenser, and prefer to use an ordinary condenser and a wave-change switch, this latter must be of the three-contact variety, and must be wired up in the following way:

Your condenser will be wired with the fixed vanes to grid (G on the coil), and the moving vanes to L.T.—, to G.B.+ and to the ·01 condenser in the same way as the Extenser, and the three contact points on the switch will be as follow: One will go to L.T.—, another one will go to S_1 and to S_3, and the third one will go to S_2.

Then on the medium waves you pull the switch out, the three contacts are "made," and S_1, S_2 and S_3 are connected to L.T.—. It means another operation, however, and you will find the Extenser is a much easier method, and greatly simplifies the operation of the receiver.

Easily Added

The use of this S.G. unit is quite simple. It should be placed alongside your set, or it could be placed above it, owing to the fact that the metal foil on the baseboard of the unit sufficiently screens the unit from your receiving circuit.

It should not, however, be placed near any mains power unit, otherwise hum may be picked up and trouble may ensue. The connections are simple: L.T.+ and L.T.— go to L.T.+ and L.T.— on the receiver, the output terminal on the unit goes to the aerial terminal on the receiver, the aerial is undone and put on the A terminal on the unit.

H.T.+2 should be placed in about 120 volts, and H.T.+1 from anything from 60 to 80 volts. Adjustment of these two, of course, can be carried out to see which position gives best results.

Tremendous Amplification!

The tuning is extremely simple, especially if you have the Extenser; rotating the dial on the unit controls one tuning circuit, while rotation of the dial on the receiver controls the other. These two dials must be rotated simultaneously and must be kept in step.

Volume control is carried out by the filament rheostat, volume being reduced when the rheostat is turned to the left, and you will find in quite a number of instances that it is necessary to use the volume control quite considerably in order to keep the magnification down and prevent overloading of the detector in the receiver.

This is especially the case on the long waves, where the magnification given by the H.F. unit is simply colossal. Amplification can be reduced somewhat if desired by reducing the screening-grid voltage on the unit and, of course, knocking down the H.T. voltage, but in most cases you will find that the filament rheostat control of volume is quite sufficient, allowing very fine variations of volume to be obtained.

As regards valves, the ordinary two-, four-, or six-volt screened-grid valves should be employed, and they can be of any good make. As we remarked before, the metallised valves can also be used, providing precautions regarding the filament wiring are carried out.

A Revelation

A high-mag. unit of this description, however, will take some time to get the hang of, as although the tuning is not difficult the magnification is such that one will have to revise one's ideas of the conditions and possibilities of reception of one's receiver.

Stations that were only faintly heard before are liable to roar in at tremendous strength, though, of course, the high magnification is also liable to bring in such unwanted stuff, such as mush and any local interference.

We have tried in this design to produce a unit which will give high magnification for the man who wants plenty of noise, plenty of punch behind his programmes, and if he uses this excellent little unit he will certainly get it!

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