

# The Wireless Constructor

AND TELEVISION REVIEW

PRICE

6<sup>D</sup>

VOL. XVIII  
OCTOBER  
1934  
No. 96

*Operating*



*The* **S.T. SUPER  
— GRAM  
DE LUXE**

BY JOHN SCOTT - TAGGART F. Inst. P., A.M.I.E.E.



Day in day out, year in year out, the lighthouse carries on with unfaltering reliability . . . guiding and safeguarding the ships that pass. And though their jobs are so vastly different, a condenser has perhaps one thing in common with a lighthouse . . . the need for absolute reliability. That is why so many set-builders are turning to T.M.C.-HYDRA condensers. By doing so they know not only that the condensers will be accurate to start with, but also that they will stay accurate in use. Equip your next set with T.M.C.-HYDRA condensers.

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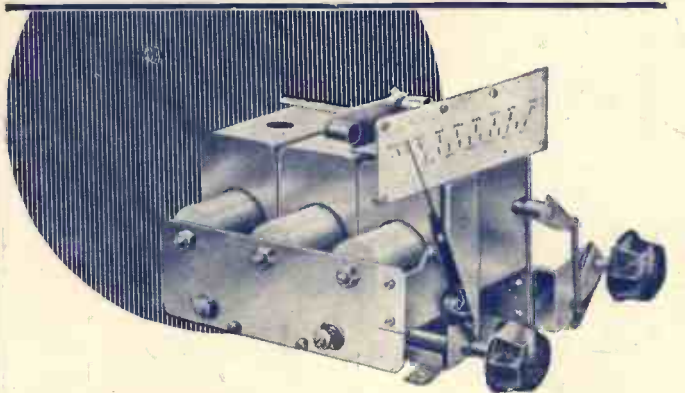


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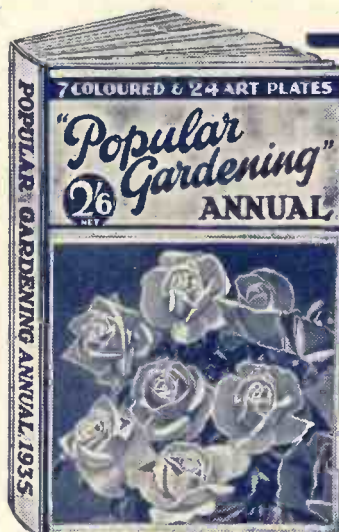


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*As some of the arrangements and specialties described in this Journal may be the subjects of Letters Patent the amateur and trader would be well advised to obtain permission of the patentees to use the patents before doing so.*



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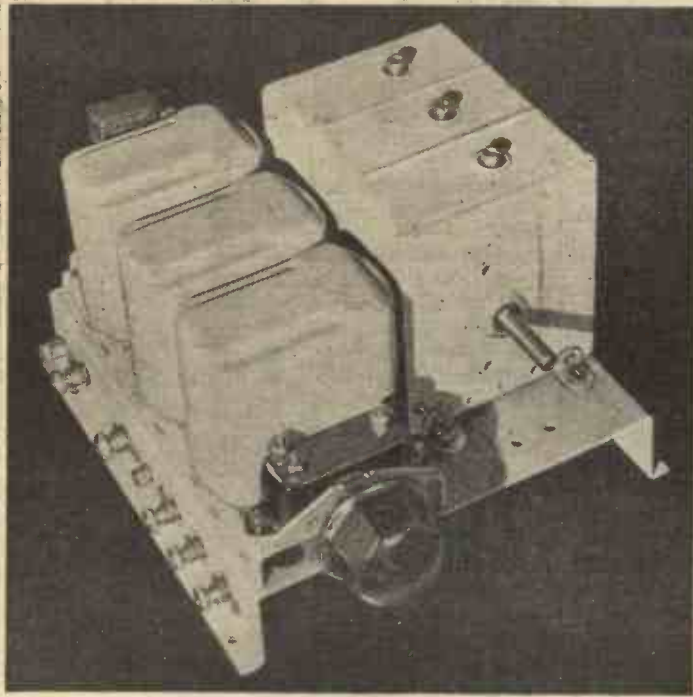
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# A COLVERN PRODUCT



THE  
EDITOR'S  
CHAT

# THE WIRELESS CONSTRUCTOR

AND TELEVISION  
REVIEW

## Big Business at the Radio Show—The Future of Television—B.B.C. to Move Soon?

THE 1934 radio exhibition may justly be described as a great success. It broke all previous records.

The attendance during the nine days the show lasted totalled 238,285, compared with 209,000 last year.

The amount of trade done this year is, roughly, £29,500,000, compared with £22,563,000 a year ago.

At our own stand we sold more copies of this journal, and our sister journal, "Popular Wireless," than at any previous radio exhibition. And that is saying something!

### Eager Throngs

Those pessimists who have been moaning that home construction is a dead hobby must have had a shock when they saw the eager throngs around stand Number 12.

Most of our visitors had questions to ask; and members of the technical staff on duty report that the problems they were asked to solve this year were, in the majority of cases, pretty hard nuts to crack. Technical standards are undoubtedly higher all round—not only amongst commercial set manufacturers and component makers, but amongst readers of wireless journals.

### Rapid Progress

One reader—having put a real puzzler to one of our technical men—waited expectantly for the oracle to speak. In due course the oracle did, and gave the required answer (but not without a deal of hard thinking!), and before the gratified reader could move away, asked him how long he had been interested in radio.

"Oh, only for a year," was the reply. "I read Scott-Taggart's Radio Manual and sort of got interested."

Our technical man is reported to have stood to attention and saluted

a la Hitler and Mussolini rolled into one. But he denies this. Even if he had, we wouldn't blame him!

Statistics are usually as dry as dust. But in connection with the exhibition they read like a thrilling novel. Study these: Business done in all-mains receivers totalled £8,360,000; in battery sets, £7,684,000; in radio-gramophones, £2,347,000; in valves,

### CATHODE-RAY RECEPTION



Germany is rapidly forging ahead with high definition television. Here is a combined vision and sound receiver for short waves, using a cathode-ray tube, shown and demonstrated at the recent Berlin Radio Exhibition.

£3,263,000; in batteries and accumulators, £4,128,000; in components and accessories, £3,549,000.

In fact, business done is a pretty sure indication that before this year is out licensed listeners in this country will exceed 7,000,000.

Here are a few interesting sidelights on the radio show. One woman

visited a stand and bought a superhet transportable.

She then said that she had a small one-roomed flat and wanted to combine the set with an electric cooker.

The manufacturers agreed to arrange with a dealer to cover the top of the set with thick asbestos and metal shielding and mount two electric hot plates on it.

### Free Radiotelegrams

At the Post Office exhibit the equivalent of £3,000 has been given away to the public. Free wireless messages to friends on ships at sea were offered and more than 3,000 people took advantage of the offer.

The average cost of these messages would have been £1 each.

More than 100,000 paid for admission to the B.B.C. variety theatre during the show.

The Postmaster-General's technical committee on television, under the chairmanship of Lord Selsdon, has, we are informed, made more rapid progress with its inquiry than was anticipated. A decision by the B.B.C. to begin high-definition transmissions may possibly be taken before the end of the year.

### Receiving Simplified

Development of the cathode ray has simplified the receiving problem. There remains that of transmitting on ultra-short waves, but sufficient progress has been made in Britain, Germany, and America to warrant an experiment. The B.B.C. stated recently that the present low definition, or "30-line," transmissions are liable to be discontinued.

Undoubtedly this is going to be a very important year for television—in fact, a crucial year. Television

(Please turn to page 288.)



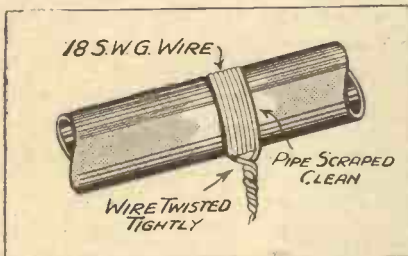


Ideas about current practice culled from actual experience.

A MONTH or two ago I described on this page how to make an indicator to show instantly all the connections for a seven-pin valveholder when using different types of valves. This month you will find details of another indicator on similar lines.

It is a more elaborate affair, but at the same time is, if anything, more useful. Fascinating both to make and

**STRONG AND SIMPLE**



How to join an earth lead to a water pipe without a special clip.

to use, this gadget tells you the value of any resistance marked with the colour code system.

For those who as yet are unfamiliar with the colour code, which is steadily widening in its use, the following brief description will make its working clear.

**The Resistance Marking**

Each resistance is marked in three colours. There is the body colour which covers most of the resistance, a band of colour at one end, and a coloured dot half-way along the resistance.

The body colour indicates the first figure of the resistance value, the end colour the second figure, and the dot the number of noughts on the end. Thus a red body, green end, and orange dot would indicate 25,000 ohms. Each figure from 0 to 9 has its own colour, and two noughts is given the same

colour as 2, three noughts that of 3, and so on.

The indicator consists of four discs of cardboard cut to the shapes shown in the diagram. The diagram also shows the appearance of the indicator when assembled.

The diagram is not full size, of course, but it is drawn to scale, and so should enable the discs to be marked out quite easily. If they are made three times the size of the diagram a convenient size indicator will result.

**Very Easily Assembled**

The discs are assembled in the order indicated by the numbers. One goes on top, followed by two and three, with number four on the back.

They can be held together with a paper clip or nut and bolt. They should be fixed together in this way before any attempt at putting on the colours or numbers is made.

The areas to be coloured can then be marked through the various holes, and their equivalent numbers marked in pencil. After this the indicator

may be taken to pieces, while the numbers are inked in and the colours applied.

The colours, with their equivalent numbers, are marked on the diagram against the figure two disc. Thus, black equals "0," brown equals "1," red equals "2," and so on.

**The Final Disc**

A similar scale is used on discs three and four. But on disc 4, which carries the nought range, there are fewer colours, although they run in the same sequence. Black equals "0," brown "0" (namely one nought), red equals "00" (two noughts), and so forth.

The use of the indicator is simplicity itself. The top of disc two is first turned so that the body colour shows through the long slot, then the end colour is obtained in the small outside

**RADIO**

**REMINDERS**

Unlike ordinary output valves, those for Class B do not necessarily require grid bias. In some cases the addition of grid bias may completely spoil results. Always study the maker's instructions carefully.

The grey paint commonly used on screened components, and sometimes on ordinary screens, is non-conductive and should be scraped off when connection to a metal baseboard is to be obtained simply by contact.

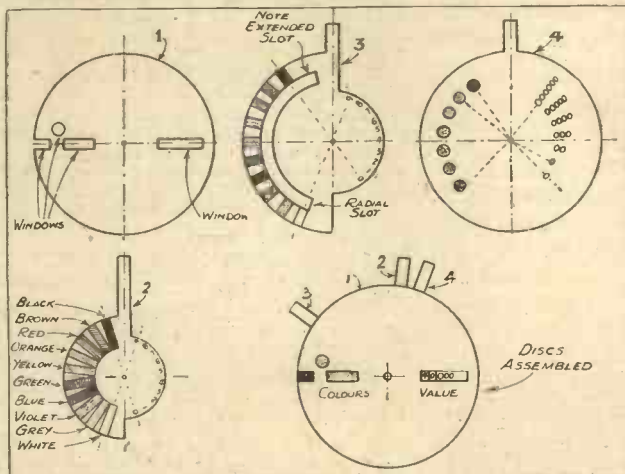
slot by moving tab three, and finally the correct coloured dot is arranged with tab 4. The value indicated then appears in the window on the right.

Similarly, the indicator can be used to find the colour scheme for any given value. Just set the first figure with tab 2, the second with tab 3, and the number of noughts with tab 4. The colours showing then indicate the correct colour scheme.

My second diagram is self-explanatory. It explains how a good temporary earth connection may be obtained to a water-pipe without a clip.

The secret lies in winding the wire round the pipe for a sufficient number of turns to prevent it being movable after the connection is completed.

**MAKING A COLOUR-CODE INDICATOR**



The various discs and how they are assembled.

A. S. C.

# OPERATING The S.T. SUPER- GRAM de LUXE



It is not often that a designer for the technical press can let himself "go" when it comes to cost.

When, therefore, it was suggested that I should design a radio-gramophone in which the latest modern technique should be adopted without regard to cost, I was delighted to accept. The result is the S.T. Super-Gram de Luxe, with its 12 watts output, automatic record-changer and simple one-knob tuning.

Incidentally, the fact that there are six knobs on the panel is a little misleading, since the true tuning control is the middle one of the upper row. The other controls are the wave-change switching, volume control, radio-gram switch, tone control and what might be termed a stability control, which latter could easily have been dispensed with, but, as it enables a higher degree of sensitivity to be obtained, was kept on the panel, although in a commercial factory-made set it could be dispensed with. These various controls will be explained later.

### Many Attracted

The interest displayed by visitors to the Olympia Exhibition shows that there are many people who would like to be able to turn on a radio-receiver or gramophone with very large output, provided the quality was flawless.

How many of these people would be prepared to pay for such an instrument as the S.T. Super-Gram de Luxe is a more doubtful matter. The average constructor usually has to

consider cost closely, while the person who is willing to pay substantial sums for his radio-gramophone entertainment often does not know one end of a valve from the other.

### A Radio Thrill

Those, however, who build the S.T. Super-Gram de Luxe will certainly have an instrument which will give as near perfect reproduction as anyone could possibly want. Moreover, the

associated in the minds of most people.

In the case of the S.T. Super-Gram de Luxe, however, the design is such that overloading is highly improbable. On the radio side it can be made impossible by the simple device of adjusting the setting of the automatic volume control. On gramophone reproduction it is possible to turn up the volume control so far that a certain amount of overloading takes

place, but I can assure you that long before that happens the listener himself is overloaded! The walls of your house would be over-loaded; vases on the furniture would totter and a mass-petition of neighbours

would be delivered at your door.

Those who heard the music coming from the speaker at Olympia in the S.T. Super-Gram de Luxe may be interested to know that in their own homes they will be able to get twenty-four times the output!

### Faithful Reproduction

Rather than stress the glorious volume which is obtainable from this receiver or gramophone, I would draw attention to the extraordinary care which has been taken to ensure faithful reproduction.

The whole of the L.F. amplification is carried out by means of resistance-capacity coupling, and the fact that pure reproduction from 20 cycles to 10,000 cycles is possible is a guarantee that signals or gramophone currents will be faithfully dealt with. The

.....  
Mr. Scott-Taggart gives further details concerning his new radio masterpiece, introduced exclusively to "Wireless Constructor" readers last month. With the designer's clear explanation of the many salient features of his wonder set, and his description of its operation, every constructor who builds it is assured of obtaining the very best from this last word in radio-gramophones.  
.....

12 watts output (which looks a good deal more when expressed as 12,000 milli-watts) will enable the apparatus to be worked at great loudness if desired, but will, at all volume levels, provide a richness of reproduction which would otherwise be impossible.

Here, again, I must repeat that sheer loudness is not a merit which most people particularly desire. But when it comes to the reproduction of extra loud passages or notes, the effect of full volume, even though only temporary, is thrilling.

Loudness in many sets is accompanied by a certain amount of distortion. In most receivers extra signal strength can usually be obtained, but when it exceeds a certain value, distortion sets in owing to overloading. The result is that there is a tendency for loudness and distortion to be closely



## The Sensation of the Radio Exhibition

speaker used is of an excellent type, admirably suited for this outfit, although I would not go so far as to say that there are no others equally good.

An extremely successful feature of the receiver is the automatic volume control, which is of the delayed type. The circuit diagram was given last month, from which it will be seen that the intermediate frequency currents are amplified by the triode portion of a separate double-diode-triode and, after amplification, the I.F. currents are rectified by the diodes, the final D.C. voltage being communicated to the first H.F. pentode, the first detector and the intermediate frequency pentode amplifier.

### A.V.C. Adjustment

At the back of the radio chassis is a control knob which governs the negative voltage on the diodes, and therefore controls the point at which A.V.C. commences. This control knob will usually only be set to a suitable

value when the receiver is first installed in the house.

The only adjustments in the receiver itself relate to ganging the three signal-frequency circuits and the usual trimming of the three I.F. transformers, each of which has two tuned circuits. A medium value of coupling

*Nothing approaching the S.T. Super-Gram de Luxe has previously been designed for the home-constructor. It is the outcome of years of experience and research in Mr. Scott-Taggart's laboratories, and sets a standard of reproduction unsurpassed by any.*

*With its nine tuned circuits, the radio section is the acme of selectivity, while the powerful purity achieved by the push-pull amplifier provides amazing realism and astounding fidelity.*

between the I.F. coils in each transformer should be used to start with, but by loosening all the couplings an extremely high degree of selectivity can be obtained—far more than is required or desirable.

A preset condenser in the aerial circuit is recommended, except where very small aerials are used. The posi-

tion of the preset, which should have a value of about .0003 mfd. is shown in the circuit diagram on page 194 of last month's issue of this journal. The constructional illustrations do not show this condenser, but it goes next to the aerial terminal on the coil assembly and there is space for it on the top of the chassis. The adjustment of this preset is such that all three signal-frequency circuits can be ganged by the variable condenser. Without the preset in the aerial circuit, the aerial capacity—being thrown across the first tuned circuit—may make this circuit incapable of being accurately ganged with the other circuits.

As regards the A.V.C. arrangements, these are not of the quiet automatic volume control type. Serious problems arise when an attempt is made to provide effective Q.A.V.C. without interfering with high-quality reproduction and certainty of efficient operation. The problems are greatly simplified where adjustments can be carried out on a finished set in a factory.

### ALL THE PARTS USED IN THE S.T. SUPER-GRAM DE LUXE

#### RADIO CHASSIS.

Valves: Mazda—2, A.C./V.P.1: 1, A.C./T.P.; 2, A.C./H.L.D.D.; 2, 6-volt pilot lamps.  
Polar Minor 4-gang superhet condenser, with tracking section at the front end.  
Polar V.P. horizontal drive with wavelength scale.  
Wearite 4-gang assembly for S.T. Super-Gram.  
3 Colverdyne I.F. transformers, air-core type 110.  
Valve holders (Clix chassis type, without terminals):  
1 9-pin.  
4 7-pin.  
1 8-mfd. wet electrolytic T.C.C., type 805.  
1 100,000-ohm volume control (used for tone control), Polar, N.S.F.  
1 bracket for same (Peto-Scott).  
1 50,000-ohm Graham Farish potentiometer (used for A.V.C. control).  
1 250,000-ohm volume control—Polar N.S.F. (used for volume control).  
1 600-ohm potentiometer (used for standing bias control), Colvern, type M.T.  
1 Semi-rotary double-pole double-throw switch (Claude Lyons).  
Brass rods, ¼-inch diameter:  
1 10½ in. long (Bulgin).  
1 10½ in. long  
2 Coupling links for rods (Bulgin).  
2 Bushes for rods (Bulgin).  
3 Brackets (overall height 2½ in.). Peto-Scott. (One of these will be bent to act as clip for 50-mfd. condenser.)  
1 Nicore H.F. choke (screened).  
1 Bulgin superhet H.F. choke, type H.F.10.  
1 Goltone screened H.F. choke, type S.H.F.  
Dubilier 1-watt resistors (metallised):  
1 100,000 ohms.  
3 250,000 ohms.  
1 500 ohms.  
1 1,000 ohms.  
Erie 1-watt resistors:  
3 15,000 ohms.  
1 20,000 "  
3 30,000 "  
2 600 "  
1 5,000 "  
2 50,000 "  
1 500,000 "  
1 25,000 "  
Graham Farish Ohmite 1½-watt resistors:  
1 5,000 ohms.  
3 1 megohms.

1 20,000 ohms.  
Dubilier, type 4,405 condensers:  
3 25-mfd.  
Dubilier, type 4,403:  
4 1-mfd.  
Dubilier, type 4,401:  
1 .002-mfd.  
Dubilier, type B.B.:  
1 1-mfd.  
Dubilier condenser, type 670:  
1 .0001-mfd.  
Dubilier dry electrolytic condenser:  
1 50-mfd., type 3002.  
5 Graham Farish vertical holders for 1½-watt Ohmites.  
Telsen tubular condensers:  
1 .0003-mfd.  
1 .001-mfd.  
Graham Farish mica condenser:  
1 .0005-mfd.  
Telsen preset condenser:  
1 .002-mfd.  
Graham Farish Mansbridge type condenser:  
1 1-mfd.  
T.C.C. condensers:  
2 .0001-mfd. upright moulded type.  
4 1-mfd. tubular.  
1 .02-mfd. tubular.  
1 Peto-Scott chassis to specification (or "Metaplex," aluminium sheets, etc.).  
8 knobs, type K34 (Bulgin).  
Screened lead (low capacity), Peto-Scott.  
Wire, screws, etc.

#### AMPLIFIER CHASSIS.

Valves—Mazda: 2 P.P.5/400.  
Osram: 2 M.H.L.4.  
4 terminals, type B, with insulating washers (Belling-Lee).  
Dubilier condensers:  
2 1-mfd. tubular, type 4403.  
2 25-mfd. tubular, type 4405.  
2 50-mfd. dry electrolytic, type 3002.  
2 50-mfd. dry electrolytic, type 3003.  
T.C.C. condensers:  
1 8-mfd. wet electrolytic, type 805.  
2 4-mfd. wet electrolytic 440 volts D.C. working.  
Dubilier resistors:  
2 1,000 ohms 1 watt metallised.  
2 250,000 " 1 " "

2 100 ohms 1 watt metallised.  
2 1,000 " 3 " "  
Erie resistors:  
2 25,000 ohms 1 watt.  
2 15,000 " "  
2 10,000 " "  
Graham Farish resistors:  
2 500,000 Ohmites, 1½ watts.  
4 5-pin valve holders, chassis type, without terminals (Clix).  
2 40-ohm centre-tapped resistors, Varley type C.P.75.  
2 Aluminium sheet clips (home-made).  
1 Triangular aluminium sheet (home-made).  
1 Chassis of "Metaplex" (Peto-Scott).  
Wire, screws, etc.

#### RADIO MAINS UNIT CHASSIS.

1 Westinghouse metal rectifier, type H.T.8.  
1 Varley Mains transformer, type E.P.32.  
4 T.C.C. 4-mfd. condensers, type 87.  
1 Wearite L.F. choke, type H.T.12.  
1 Wearite L.F. choke, type H.T.14.  
1 Plain wooden board, 17½ in. x 10 in. x ½ in. (Peto-Scott).  
Wire, screws, etc.

#### AMPLIFIER MAINS UNIT CHASSIS.

Valve—1 Mazda U.U.120/500.  
1 Mains transformer (for this set): R.I.  
1 L.F. choke, 28/14 henries, 0-100 milliamps—max. current 140 milliamps (R.I.).  
1 L.F. choke, 20 henries, 60 milliamps (type D.Y.51, R.I.).  
1 L.F. choke, type D.P.11 (Varley).  
1 T.C.C. 4-mfd., 800 volts D.C., working type 101.  
2 T.C.C. 8-mfd. dry electrolytic 550 volts peak working, type 802A.  
1 Aluminium bracket for mounting dry electrolytics (home-made).  
1 Vibroder, 4-pin (Benjamin).  
2 Baseboard fuse-holders, type F.17 (Bulgin).  
2 Fuses, 150 milliamps, type R (Bulgin).  
1 Plain ply-wood baseboard, 7 in. x 18 in. x ½ in. (Peto-Scott).  
Wire, screws, etc.

#### LOUDSPEAKER.

R.K. Senior, with push-pull transformer (B.T.H.), A.C. model.  
CABINET.  
G.A.C. Cabinets, Ltd.  
AUTOMATIC RECORD-CHANGING UNIT.  
Garrard (A.C. model).



## The Most Outstanding Set of the Century

It has always been my contention that a receiver for home-constructors can never be, and should never be, exactly the same as a manufactured set. The complete simplicity of a manufactured set is usually impossible of attainment where the designer does not know the exact components the constructor is going to use and has no knowledge of the characteristics of the individual valves which he will employ. The result is that a slight increase in complexity is necessary, but this is balanced by the fact that the increased flexibility provides greater efficiency in one direction or another. In a receiver of this magnitude, there is no necessity for silencing the receiver between stations because the output is so great that the listener would in any case be compelled to reduce the output when tuning in to a different station; he would increase the output by means of the volume control when the station has once been received.

This is the recommended procedure, the obvious reason

being that in view of the loud signals it is undesirable to receive snatches of programmes of other stations when tuning. The volume control of this receiver affects the low-frequency input to the amplifier and thus the actual receiver portion remains at its normal sensitivity. Signal strength can therefore be varied between zero and maximum while the rest of the receiver is working and receiving in the ordinary way.

Actually, one would keep the volume low while tuning and then increase it when the desired station is correctly tuned. Since this is done in any case there would be no point in having quiet A.V.C.

### The Six Knobs

Looking at the front of the receiver the six knobs are as follows: The bottom left-hand knob controls the bias primarily of the first valve. Since it is impossible for me to estimate the amount of inherent reaction produced by any particular sample of valve used, it is desirable to have it completely under control, and this particular knob will enable the inherent reaction to be adjusted to correspond to high amplification without oscillation. Any tendency to oscillate at the bottom end of the dial may be corrected by increasing the bias with this control.

Actually it provides a means of controlling the H.F. amplification of the receiver, an extremely valuable



### THIS MAGNIFICENT RECEIVER—

1. Has Nine Tuned Circuits for Selectivity!
2. Has Amplified Delayed Automatic Volume Control, Banishing Fading!
3. Automatically Changes the Records!
4. Gives Perfect Reproduction from 20 to 10,000 cycles persecond!
5. Gives an Undistorted Output of 12,000 Milliwatts—Six times that of the Average Mains Set!
6. Is the Most Powerful Receiver ever Designed for the Technical Press!
7. Has been Designed from Start to Finish by JOHN SCOTT-TAGGART, Britain's Acknowledged Leader in set Design.

## Superlative Reproduction

feature since the main volume control governs the L.F. amplification. It is really, however, a luxury adjustment and most people will simply leave it at such a value that the circuit is perfectly stable, and then never touch the control again.

### Simple Controls

The middle knob of the top three is for tuning while the right-hand top knob is the tone control which requires no explanation. The top left-hand knob is for wave-change switching. The middle bottom knob controls the volume while the bottom right-hand knob is for switching the radio set out and the gramophone pick-up in. Matters are so arranged that the radio cannot break through while gramophone records are being played.

The operation of the automatic gramophone record-changer is fully explained in the pamphlet supplied by Garrard, and there is no need for these instructions to be repeated here.

The variable condenser assembly may be mounted, if desired, by means of rubber grommets on to the chassis.

The grommets, which look like small rubber pulleys, may be split in half, each half being arranged on each side of each bracket which is screwed down



Eight 10- or 12-inch records can be played on the automatic record-changer without the operator having to touch the instrument.

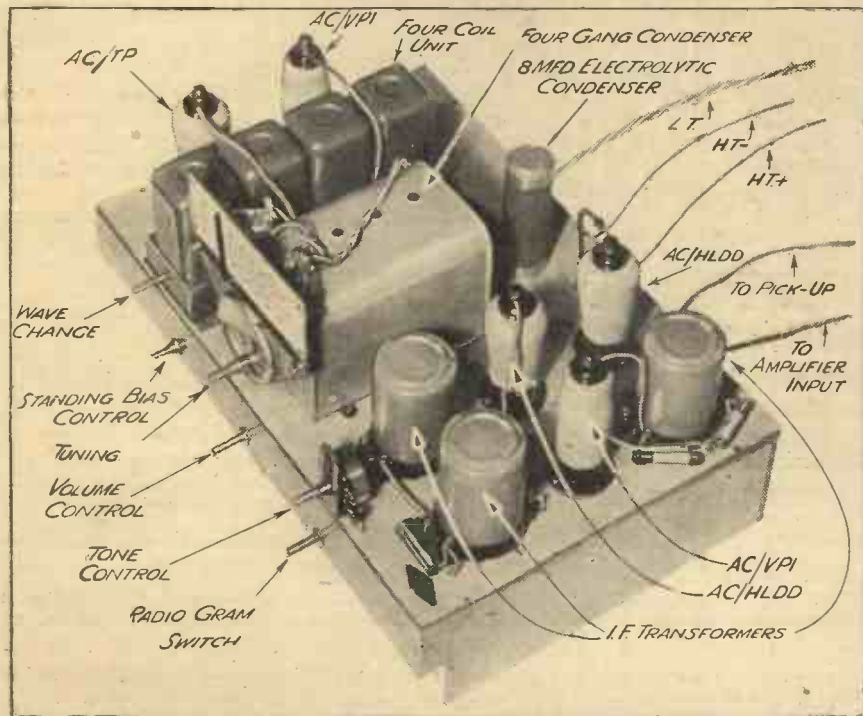
This photograph shows a selection of 12-inch records being placed on the changer.

to the "Metaplex" chassis; this provides a resilient cushion which will prevent any risk of microphony due to vibration of condenser vanes, especially the oscillator vanes. As a matter of fact, this trouble did not arise on the particular set built by myself, but it is conceivable that it might occur.

It is, however, important to see that the loudspeaker does not vibrate

the shelf on which the receiver chassis is mounted. Nor should the speaker press tightly against the baffle. A small gap should be arranged. If the speaker actually touches the shelf or presses tightly against the baffle, the vibration at maximum output adjustment will be such as to encourage a low-frequency microphonic howl.

### THE RADIO SECTION OF THE S.T. SUPER-GRAM



The main features of the radio portion of the receiver are depicted in this illustration. There are four trimmers in the variable condenser unit, the fourth being hidden in the photograph by the flex to the dial lights.

### A Point to Note

Should this occur, the two points mentioned should be attended to. It is only a moment's attention that is required, but it is as well to mention the fact in case the trouble should arise. It must be remembered that the vibration when the 12 watts output is being provided is very considerable and, of course, is inevitable; apart from this risk of improper positioning of the speaker, there is no fear of microphony.

In view of the very simple tuning arrangements the operation of the receiver calls for no further comment. It will be found extremely sensitive and selective and even the most ignorant user could not fail to get good results. In fact, the only possible thing he could really do wrong would be to make the set oscillate on its H.F. side by an improper initial setting of the bottom left-hand knob.

Needless to say, I should be only too delighted to hear from builders of this ambitious radio-gramophone. Provided it is built exactly as described, it should be a source of entertainment for many years, and the envy of all who hear it.

J. S.-T.



# WIRELESS IN THE GREAT WAR

THE BATTLE OF JUTLAND, BY "RADIAT"



"FLEET action imminent," wirelessed Admiral Jellicoe, Commander-in-Chief of the British Grand Fleet, to the Admiralty in London on May 31st, 1916. It was the most important message ever sent by radio in naval warfare. For it meant that at long last the two mighty fleets of two modern nations were face to face. England and Germany matched in a trial for naval supremacy.

## German Messages Decoded

Nor was it less momentous for the English nation, for should their navy fail them now, then Great Britain was finished. No more could she rule the waves or hold sway over a mighty and far-flung Empire.

But thanks to the wireless, the Admiralty in London was prepared. Some days before, German messages had been picked up by the various wireless stations along the East Coast, and, when decoded, these messages had told us that important moves were contemplated in connection with the German High Seas Fleet and that it was ready to put to sea.

Experts at the Admiralty were able to decode nearly all German radio messages, for we had been presented with copies of the German secret codes by the Russians who had, in turn, obtained them from a captured German warship.

Thus the whole British Grand Fleet was now concentrating in the North Sea, the greatest armada which the world had ever known.

## The First Encounter

Admiral Beatty, in command of the Battle Cruiser Fleet, was the first to come in contact with the enemy. At 2 p.m., one of his light cruisers, H.M.S. *Galatea*, saw a strange steamer about fourteen miles away and decided to examine it.

On approaching the vessel the *Galatea* suddenly spotted a German

destroyer also bent on examining the steamer, apparently this destroyer was part of an advance German scouting squadron under Admiral von Hipper. In a moment *Galatea* had hoisted the famous signal, "Enemy in sight," and had wirelessed to H.M.S. *Lion*, Admiral Beatty's flagship.

## "Am Engaging the Enemy"

A few minutes later *Galatea* was heavily engaged with enemy light cruisers. The battle of Jutland had begun.

Sixty miles away Admiral Jellicoe, with the major portion of the Grand Fleet, picked up the wireless signals

## COMMANDER-IN-CHIEF



Admiral of the Fleet, Lord Jellicoe, then Sir John Jellicoe, was Commander-in-Chief of the Grand Fleet at the Battle of Jutland.

from *Galatea* and hurried southward, although he was not aware, as yet, that a first-class battle was at hand.

Jellicoe wirelessed to Beatty for further information, and at 3.30 p.m. received the reply: "Am engaging the enemy." As a matter of fact, the

German scouting squadron under von Hipper, on seeing Beatty's squadron, had retreated in the direction of the German High Seas Fleet, which was some twenty miles to the southward.

But Beatty was following them up, they would not escape if he could help it. He had one more vessel than the enemy, but on the other hand our ships were outlined against the western sky and were therefore easy targets, whereas the Germans were half hidden in the haze to the eastward.

## An Unsuspected Trap

In this, the first encounter of the battle, we lost H.M.S. *Queen Mary* and *Indefatigable*, while *Lion* caught fire and had her wireless damaged. The Germans were also suffering severely, but as they were now drawing within range of the German High Seas Fleet, Beatty retreated and made to join his own main fleet under Jellicoe.

On seeing Beatty retreating, Admiral Scheer, in command of the German fleet, gave the order to pursue the enemy, little dreaming that he was walking into a trap in the form of the dreaded British Grand Fleet. The last thing which he wished to do was to meet the British navy face to face.

All this time Jellicoe, hurrying southward, was endeavouring to establish wireless communication with *Lion*, but, as we now know, this flagship had lost her wireless and despite the heroic efforts of the telegraphists, the damage had not yet been repaired.

## Mistaken Instructions

Eventually Beatty managed to pass a message to Jellicoe via *Princess Royal*, telling him what was happening, and giving the position of the enemy. Unfortunately, this position was either incorrectly given or wrongly received owing to jamming, and Jellicoe, on manoeuvring his vast fleet of approximately one hundred and sixty ships of



## "A Battle Such as Men Had Long Dreamed of"

all sorts and sizes, into position, found that the enemy were not there.

However, just before 6 p.m. Jellicoe received a wireless from *Black Prince* telling him that the enemy were in sight. Shortly afterwards, from the bridge of his flagship he sighted the van of the German fleet and opened fire on the nearest vessel, which happened to be the *Konig*. But the action only lasted a few minutes for the *Konig* soon disappeared in the haze. As a matter of fact the German Commander-in-Chief, although he had not yet realised that the Grand Fleet was before him, had seen enough and was in full retreat.

### Redoubtable British Destroyers

But the British were between the Germans and their home ports, and in attempting to get past, the German Fleet came in sight once more—"Enemy in sight to the Westward," wirelessed *Galatca*, well to the fore as usual.

In a moment the action was general, but almost at once the German

The seas were alive with ships and falling shells; destroyers and light cruisers dashing hither and thither amid the bright glow of burning warships. Bobbing up and down, in the shell-tormented waters, were shot-riddled lifeboats and many pieces of wreckage, to which clung wounded or half-drowned men. It was a battle such as men had long dreamed of, a modern nightmare of the sea with all the forces of destruction let loose, science and civilisation gone mad.

### Kaiser's Instructions Intercepted

At 9 p.m. the Kaiser wirelessed to the German Commander-in-Chief von Scheer, telling him to return to Germany. Von Scheer must have smiled somewhat wryly; it was easier said than done, with the might of the British navy between him and home.

He wirelessed back to Germany saying that he would endeavour to make for home via Horns Reef and asking for Zeppelins to survey that area at dawn.

German force, but this was natural, as the attacker in naval warfare frequently suffers the more severely.

### Once Bitten, Twice Shy

Admiral Scheer had escaped what might have been total destruction only by the skin of his teeth. He had soon realised that the German High Seas Fleet was no match for the British Grand Fleet and never again ventured within fighting distance.

From the wireless point of view there is one criticism, namely that wireless was not used sufficiently and that too much reliability was placed on visual signalling. This led to ignorance on the part of the British Admiral-in-Chief as to what was really happening in the case of the Battle cruiser action. If wireless had been used more widely there is the distinct possibility that the German Fleet would not have escaped.

### TUNING BY SIGHT

THE ear is by no means always to be trusted when you are tuning-in stations with a highly-selective receiving set. The eye is much more accurate than the ear, and fortunately there is a very convenient method of tuning visually. This consists in connecting a millimeter into the plate circuit of the detector valve of a "straight" set or that of the second detector in a super-heterodyne.

### Anode-Current Changes

If the detector is of the grid leak-and-condenser type the plate current falls as resonance is approached, and is at its minimum when exact resonance is reached. Exactly the opposite happens with the anode-bend detector. Here the plate current is at its maximum when the set is tuned to resonance.

Generally speaking, a millimeter reading from 0 to 2 milliamperes is suitable for either kind of detector valve, though if a power detector is used a considerably higher maximum will be required. The instrument must be placed in that part of the plate circuit which is at the lowest potential from the high-frequency point of view. If the detector valve is decoupled it should be wired between the high-tension positive lead and the decoupling resistance. R. W. H.

### WAITING FOR THE GERMAN FLEET



A War Museum official photograph of the Grand Fleet at full speed in the North Sea.

Commander-in-Chief was again in full retreat. Nevertheless, minor actions were taking place from one horizon to the other. Beatty and Hipper were again at each others' throats, and Hipper's flagship was almost a complete wreck.

The daring work of the British destroyers was the main feature of the whole battle, again and again they would dash up to within a ridiculously short distance of the enemy's great vessels, fire their deadly torpedoes and dash away again under withering fire.

The English wireless stations intercepted these messages and as soon as they could be decoded, wirelessed the information back to Jellicoe. But by this time it was growing late, darkness had fallen and although minor action occurred in the darkness it was difficult to tell which was friend or foe.

Consequently after many a narrow escape and much damage the Germans managed to reach Horns Reef, saved by the darkness of the night.

The British losses were in some respects heavier than those of the





# IS REACTION WORTH WHILE?

The use of regeneration is such a commonplace phenomenon to-day that we are apt to lose sight of the exact effect it has on the characteristics of our sets. In fact, so general has become the incorporation of reaction in receiver designs that we may be excused for looking upon it as almost inevitable. It is only when we are asked a question such as that in the title of this article that we are forced to think about the whys and wherefores of this thing we all take for granted.

By E. H. CHAPMAN, M.A., D.Sc.

WE are all of us familiar with the term reaction as it is used in wireless. The majority of our receiving sets have a reaction control, plainly marked reaction, or disguised under some such term as volume control. How many of us understand what difference this reaction control makes to the way a receiving set works?

It is usual to explain reaction by analogy to a flywheel, a reciprocating engine, a pendulum or a clock spring. Shorn of all analogies though, reaction is a perfectly simple phenomenon.

## THE BASIC CIRCUIT

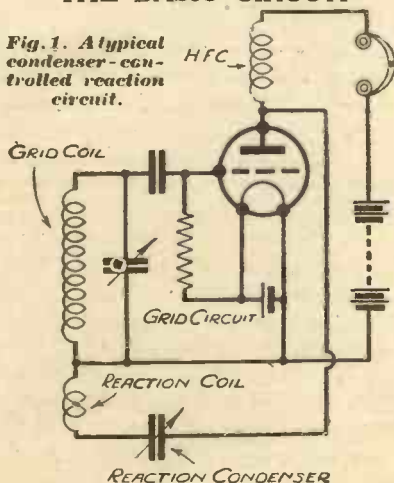


Fig. 1. A typical condenser-controlled reaction circuit.

All reaction implies is the transference of energy back from the anode circuit of a valve to the grid circuit of the same, or a preceding valve.

## An Early Method

How do we transfer energy back from the anode circuit of a valve to the grid circuit? At one time the most common method in use was the swinging reaction coil, or the "tickler" coil as our American wireless cousins, with their more expressive language, called it. This reaction coil, placed in the anode circuit of the valve,

was brought nearer and nearer to the grid coil until the desired effect was obtained.

## Using a Variable Condenser

In the modern wireless receiver, a reaction effect is usually obtained by a combination of a fixed reaction coil and a variable reaction condenser, as shown in Fig. 1, the variable condenser giving the variable reaction effect.

What happens as we transfer energy back from the anode circuit of a valve to the grid circuit by means of this fixed reaction coil and variable reaction condenser? In other words what happens as we turn this reaction condenser on slowly from its minimum position?

One of the most attractive features of wireless is that there is a practical solution to each one of its problems. There is a practical solution to the problem of reaction, and one way to illustrate that practical solution is by means of a Moullin voltmeter. This very useful voltmeter is of special interest to the wireless enthusiast, since it consists essentially of a sensitive galvanometer in the plate circuit of a valve.

## Practical Experiments

In my own practical experiments on reaction, I used a receiving set of simple type having three valves: screen-grid valve, detector valve and low-frequency amplifying valve. So that I could obtain a numerical measure of the effect of reaction on my set, I placed my Moullin voltmeter across the grid-filament coil of the detector valve, as shown in Fig. 2. With the set switched on and the voltmeter adjusted, I tuned in a station. Then, gradually turning on the reaction condenser, I noted the effect on the reading of the voltmeter

and on the volume of sound given out by the loudspeaker.

The first station I tried was Daventry National, and I took three sets of readings on this station, first with the aerial series condenser at .0001 mfd., next with the aerial series condenser at .00005 mfd., and next with the aerial series condenser at .000025 mfd. The observations are shown in the form of a diagram in Fig. 3.

## Important Conclusions

At once there are several important conclusions to be drawn from this diagram. Since the voltage recorded by the Moullin voltmeter gives a measure of signal strength, there is first of all the obvious conclusion that reaction increases signal strength in no uncertain fashion. How considerable this increase may be is shown by the lowest curve C C, in which the effect of reaction was to

## A SIMPLE CHECK

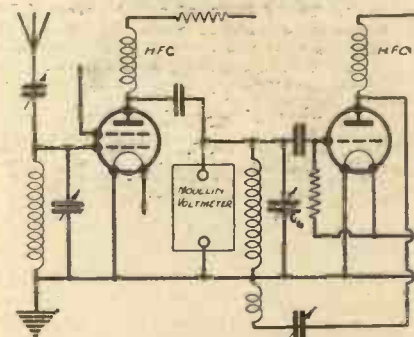


Fig. 2. The valve voltmeter is connected across the grid coil of the detector valve to measure the voltage developed across it.

increase signal strength from .1 volt to .87 volt, nearly nine times.

Next, the diagram shows that practically all the signal strength lost by placing a series condenser in the aerial lead can be regained by reaction, a most interesting result. From a comparison of the three curves in

# There is No Doubt About the Value of Reaction

Fig. 3 one might reasonably conclude that the less you start with the greater the proportionate increase obtainable by the application of reaction.

Another, and most important point, not shown in this diagram, is that tuning is very noticeably sharpened as reaction is increased, a very valuable property of reaction indeed.

### Further Observations

Observations were next taken on three long-wave Continental stations: Huizen, Radio Paris and Eiffel Tower. In each case the aerial series condenser was set at .0001 mfd. The observations are shown in the form of a diagram in Fig. 4, and the three curves in this diagram show the remarkable way in which reaction brings in such stations as these.

### A 1,500 METRE TEST

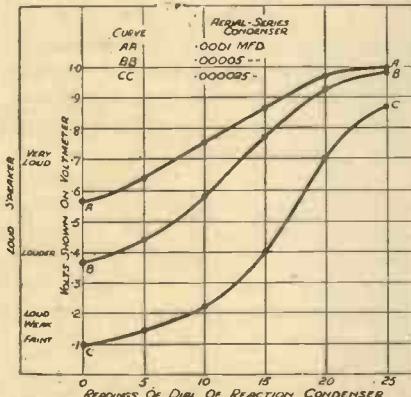


Fig. 3. The effects of reaction on 1,500 metres are shown in this diagram, the set being fed through an aerial series condenser whose capacity was varied.

The next observations were made on the medium-wavelength band. The observations for North Regional are shown as a diagram in Fig. 5. By comparison of Fig. 5 with Fig. 3 it is seen that the effect of reaction is sharper on the wavelength of the North Regional transmitter than on the wavelength of the long-wave National transmitter.

### An Interesting Comparison

Similar observations for London Regional are given in the form of a diagram in Fig. 6. It is very interesting to compare, by means of the curves in Figs. 5 and 6, the effect of reaction on the reception of London Regional one hundred and fifty miles away, with the effect of reaction

### LONG-WAVE CONTINENTALS

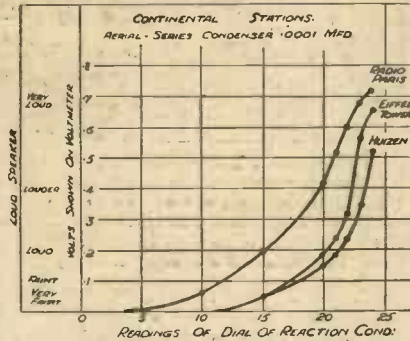


Fig. 4. The curves obtained on three Continental long-wavers. Note how reaction controls the sensitivity.

on the reception of North Regional some fifty miles away.

The last test made was on the reception of Nürnberg. As the reaction condenser was turned from 0 to 13 divisions on the dial, nothing was registered on the Moullin voltmeter. At 14 on the dial, the voltmeter gave a reading of .2 volt, and the station was heard distinctly. At 14½ on the dial, the strength of Nürnberg was .5 volt, and the station was heard quite loudly. These Nürnberg observations show very clearly the sharp effect of reaction on the reception of a distant station whose wavelength is at the lower end of the medium-broadcast band of wavelengths.

### What the Tests Indicate

Summing up, the observations referred to in this article show the three main effects of reaction in a receiving set to be as follows:

- (1) A big increase in volume;
- (2) A recovery of volume lost by

### THE MEDIUM WAVES

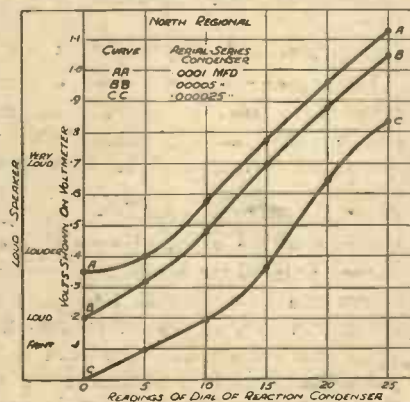


Fig. 5. The North Regional reception varied as depicted above when the value of the aerial series condenser was altered and reaction applied.

increasing the selectivity of the aerial circuit; and

- (3) A sharpening of tuning.

In face of such a list as this, there is no need to ask whether reaction is worth while or not.

### PREPARING FOR DROITWICH

There are sharply divided opinions regarding the new B.B.C. giant, or at least it is safe to assume that there will be when it is working regularly.

Many of those listeners with powerful sets well within its range will hear a little too much of it. They may find their long-waveband reception experiences considerable interference through spreading.

On the other hand, those living in

### LOWER DOWN

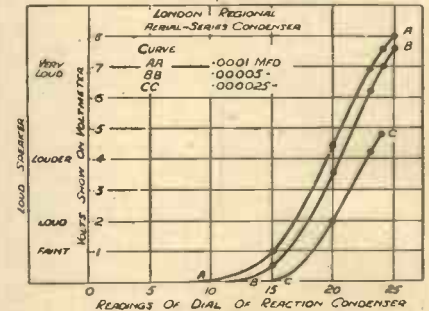


Fig. 6. Further tests were carried out on the lower end of the medium waveband. Here are the curves obtained on the London Regional.

the more remote quarters who have less powerful sets will be very well served in the future so far as one B.B.C. programme is concerned.

It is inevitable that many must suffer from an overdose of Droitwich. However, even those residing within close range can modify their equipment in order to reduce the spreading.

But the simple wave-trap expedient is not likely to be successful in more than a few cases. Wave-traps are not usually particularly effective on the long waves.

In the next issue of THE WIRELESS CONSTRUCTOR we shall give full details of efficient schemes for dealing with the trouble.

In the meantime constructors can try the normal selectivity expedients. Reducing the length of the aerial, or using an indoor aerial of modest dimensions are worth trying as pro temp panaceas.





**Greater Topicality**  
**More New Studios**

**Choosing the Staff**  
**A Popular Revival**

**Talks—The New Policy**

**T**HE reform of talks has gone quite a long way. Farther indeed than I dared hope when I reported the early deliberations. During the past seven or eight years the B.B.C. talks have got into a "rut" of undue rigidity and ridiculously early planning. It is hardly an exaggeration to suggest that it took well over twelve months to get included in a Talks programme. Now much of this rigidity will disappear. For one thing, there will be no more elaborate talks *syllabi*.

For another thing, there will be not more than two or three regular series of talks in the main programme periods. There will be spaces for topical talks and emergency subjects almost every day. This is a move which I am sure will make the B.B.C. much more popular among listeners.

Incidentally, I hear that it is being proposed to set up a new and quite small Talks Advisory Committee, which will include amongst others, Miss Hilda Matheson, Sir John Squire and Mr. Gerald Barry.

**The Battle About Crooning**

A bitter struggle is in progress in the B.B.C. about crooning. Colonel Dawnay, head of programmes, is believed to be the redoubtable leader of the anti-crooning brigade. He enjoys the powerful support of Mr. Whitley, the chairman, and the other Governors. Sir John Reith's attitude is neutral. Mr. R. H. Eckersley, the Director of Entertainment is in command of the pro-crooners and has an able lieutenant in Eric Maschwitz, Director of Variety. Behind these two banners is arrayed a large proportion of the staff.

**BY OUR SPECIAL CORRESPONDENT**

The anti's are credited with the determination to use the B.B.C. as the main instrument in repelling the growth of crooning and ultimately banishing it from England. The pro-crooners, on the other hand, are staunchly in favour of the continuance of the practice under proper safeguards of taste and judgment. It is too early to say which side will win. I feel, however, that in view of the debacle of the twenty-four-hour clock, the B.B.C. will not be anxious to embark on any crusade to stamp out crooning!

**A Bristol Opening**

In the near future the B.B.C. will be staging an official opening of some new premises and studios

in Bristol. As much as possible will be made of this occasion if only in an attempt to keep the difficult balance between the interests of the West Country and the interests of Wales, which have to be served on the same transmitters in Somerset. The new studios in Bristol are designed to help recruit more suitable material from the Western English Counties.

**Selection of B.B.C. Staff**

I have not yet met anyone who could give me a satisfactory explanation of the method and system by which people get jobs in the B.B.C. This despite the fact that fully a dozen officials have told me in detail the train of circumstances which led to their appointments. There is apparently no regular procedure. This does not mean that people are not carefully vetted; on the contrary, they are vetted and re-vetted for months. There is the most elaborate inquiry. And then, in most cases, nothing happens.

There is indeed too much vetting of possible candidates for jobs in the B.B.C. There are scores of people in London who have been interviewed by various administrative officials at Broadcasting House in a way which led them to believe that they had good chances of appointment. And then all went silent. I think that one of the most important subjects for next year's Parliamentary Inquiry into the B.B.C. will be this matter of regularising the recruitments of staff.

**Scotland More Independent**

Mr. Melville Dinwiddie has gone on steadily extending the frontiers of his Regional activity. He has

**THE WADE GIRLS AT RADIOLYMPIA**



Listeners and visitors to the Radio Exhibition were in unison in acclaiming the Rosalind Wade Radiolympia girls with enthusiasm. They are here seen enjoying a "spot" of light music from one of the new season's models.



## Henry Hall Asks the B.B.C. for More Money

even succeeded in gaining time on both wave-lengths in Scotland. His religious work is now largely independent of London; likewise, his educational activities. And now in entertainment Scottish broadcasting is acquiring a distinctiveness and an initiative which set the pace for the other Regions. Mr. Dinwiddie represents a great source of strength to the B.B.C. North of the Tweed.

### Television Stalemate

Those who look forward to a sudden development in television after the P.M.G.'s Committee has reported in October are doomed to disappointment. Enough is known already of the opinions of the Committee to forecast that its report will be on very cautious and tentative lines. There is not very much confidence in the immediate future. The B.B.C. will be advised to continue its reduced thirty-line transmissions while experiments with ultra-short-wave phenomena are developed. While, however, there will be caution about the immediate future, the Committee will indicate that in its view popular television on a big scale will be in existence in five years' time. There will be nothing very specific about the problem of paying for the costs of transmission, obviously the most serious problem of all to tackle.

### A Henry Hall Episode

Although it was understood that Henry Hall's renewed contract with the B.B.C. had been signed and sealed back in April, it is none the less a fact that there was nearly a breach

*Mr. Melville Dinwiddie, who has done much for the Scottish Region, including the obtaining of extended hours of transmission on both wave-lengths.*



between H. H. and the B.B.C. in August. The misunderstanding arose in this way. At the time the renewal was being debated, Mr. Hall made it clear he would expect somewhat improved terms, and these were agreed in conversation between Mr. Hall and Commander Goldsmith, the latter acting for the B.B.C.

But, unfortunately, the arrangement

was not reduced to precise writing. Then Commander Goldsmith went sick, and in his absence other officials, taking a different view of the B.B.C. end of the business, told Mr. Hall that he would not get what he expected. There was some highly critical negotiations, but, of course, Mr. Hall got his rights as soon as the matter was examined by Colonel Alan Dawnay. It is a pity these occasional "crises" occur in B.B.C. negotiations; they leave behind an unpleasant atmosphere even although they are admittedly due only to excess of keenness in the public interest.

### "In Town To-night" Returns

"In Town To-night" broadcasts are to be revived on Saturday, October 6th, and will continue each week until further notice.

This is good news for the thousands of listeners who have written to the B.B.C. asking that the series shall not be dropped, although frankly that was the intention of the B.B.C. Variety Director since the idea was so extensively copied by films, music halls, and dance bands.

That being so there is nothing for it but to carry on and to make "In Town To-night" even better and brighter than last winter and spring. Many new novelties and personalities will be introduced before the microphone.

THE wireless valve is a direct descendant of the ordinary electric lamp, and it was while experimenting with electric lamps that Sir Ambrose Fleming discovered the principle of the present wireless valve. He found that under certain conditions the red-hot filament in the vacuum, which was throwing off rays of light, was also shedding electrons, which later were controlled and directed.

### A Practical Reality

And now the filament in an electric lamp is no longer necessary—in fact, the filamentless lamp has now become a practical reality.

It has been known for some time that when a suitable gas at low pressure is enclosed in a glass it conducts electricity and light is emitted, the colour of which depends upon the gas used. For instance, sodium produces a yellow light, nitrogen a buff light, mercury vapour a white-violet light, and so on.

The question is, will this filamentless

### VALVES WITHOUT FILAMENTS?

*A possibility in the future.*

lamp affect the wireless valve? Can we have a filamentless valve?

The filament in the lamp and that in the valve serve, of course, two entirely different functions. While the lamp filament emits light waves, electrons and heat waves, only the light waves are required in the case of the lamp, while in the case of the valve filament only the electrons are desired.

(Here we become very involved, for the emitted electrons and light waves are inextricably connected, their connection being mixed-up with that nasty and intricate piece of work, the Quantum Theory, which we have no use for here.)

However, we are clear that the filament in the lamp performs a different purpose from the filament in the valve, and we can now ask the

question: as the gas in the filamentless lamp emits light waves, does it also emit electrons?

In the usual way the electronic stream which is necessary for the passage of electric current cannot be produced otherwise than by heating the filament!

### Yet To Be Explored

But if light waves are created as in the case of the gas-filled lamp, then it can be said that electrons are not far away. The problem will be then to get hold of these electrons and cause them to form a stream.

As far as is known, this new lamp has not been explored from the wireless point of view; but there would appear to be possibilities in this direction, for the valve, like everything else in our scientific age, must go on changing and improving, and perhaps the filamentless valve is another step in this path of progress.

R. T.



# The NEW TELEVISION IDEAS *By Victor King*

WITH all the ingenious work and thought which is being devoted to television, it would seem inevitable that sooner or later it will arrive at a stage where it can be absorbed into the broadcasting service.

I know it has been said by eminent scientists that television may be an example of "not bound to happen" dead-end of science, but I simply don't believe it. Though the ultimate goal of the television enthusiast may still be some little way off, a tremendous amount of progress has been made.

## "Television Is Here"

Just picture television of 1924. You can't, because, for all practical purposes it did not exist at all! Even five years after that only the crudest of results were to be obtained. But in this year of grace television is here. Yes, it is. Given the apparatus and the conditions moving pictures comparable with the home cinematograph can be transmitted across miles of intervening ether.

The only snag is that neither the apparatus nor the wavelengths at present used can claim to be all that are required of popular broadcasting. Are the outstanding problems insuperable?

Well, there are so many pointers to possible solutions of them that it would be foolish to say that they are. At least, that is my opinion.

One of the greatest of the outstanding difficulties relates to the actual transmission and reception of the television impulses.

## Getting Good Detail

It cannot be gainsaid that a good picture having good detail of necessity calls into use a large number of impulses per second, for every point of a picture that differs from every other point, and there are tens of thousands in most pictures, demands its separate electrical impulse to be sent for translation back into picture form at the receiving end.

How can all these electrical impulses be accommodated on a wavelength

*Is it not too early to decide, as many have, that the future of television lies in the use of the very short waves? This question, and others vitally concerned with the development of television, are considered in the light of modern ideas in this absorbing article.*

suitable for public use? Some say that they cannot and that the only thing to be done is to use a short wavelength, for there is room on the short waves for spreading.

But short waves are temperamental and tricky waves. Perhaps you may remember that some time ago I sug-

they are for the benefit of the Empire. Well, why shouldn't the Empire send out short-wave broadcasts for us?

You have to get some way away from the source of origin of short waves before they can be picked up with any real consistency. That is, ordinary short waves of the order of 30 metres or so.

## Too Many Difficulties

I don't think this scheme of mine offers much hope for television, because the difficulty of conveying the original impulses to a remote transmitter has its own set of problems.

And obviously we do not want to restrict our television to pictures occurring in the immediate vicinity of remote stations.

No, I think our television transmitters will have to be situated conveniently in this country. What about Marconi and his micro-waves? These extremely short waves do not act like the longer ones, but leave the transmitter more or less as a beam.

## Micro-Wave Drawbacks

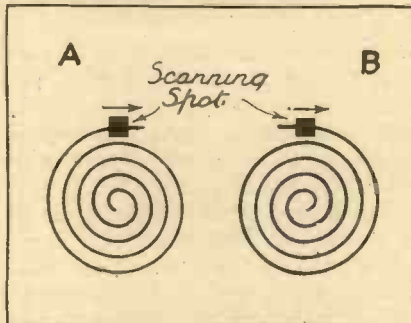
Now, with all due respects to our master wizard of radio, I do not feel particularly hopeful about these micro-waves. They seem to me to be too beamish. If television is to be thrown into the ether for all to enjoy, then

surely it will have to be radiated in the same way as broadcasting, and not confined to beams.

Of course, the micro-wave can be spread, but my experience of the very, very short waves is that, while under good conditions reliable com-

munication between pre-determined points can be established, reception varies terrifically at different places.

## SPIRAL SCANNING



*Something new in scanning systems. Instead of the spot going backwards and forwards either vertically or horizontally, it moves in the form of a spiral.*

gested how short waves might be used for domestic purposes.

By this I mean for our own listeners.

## A VARYING-SPEED CATHODE-RAY TUBE



*Cosor cathode-ray television apparatus which employs a system of accelerating and decelerating the speed of the cathode-ray in order to produce the light and dark shades of the picture.*

At the present, Great Britain sends out almost as many short-wave programmes as any other country, but



## The Use of Two Wavelengths for Television

These waves do not soak in and around everything like normal broadcast waves. Shadows are cast, peculiar variations in field strength occur.

And even more importantly, the apparatus cannot compare in simplicity with that used for ordinary waves.

Another scheme suggested is that electric light and power wiring should be employed for television purposes. This is a quite sound idea, but it has the snag that there is still a hefty proportion of houses in this country served only by gas.

### A Practical Method

I am not sure, though, that we are not all tending to think away from this particular television problem. Is it absolutely certain that we should never be able to accommodate television on an ordinary broadcast wavelength, either medium or long?

I ask this because, already, what seems to me to be a practical method of doubling the frequency handling capabilities of such a wave has been suggested by my friend and colleague, Mr. G. V. Dowding.

His scheme is to take a carrier wave of, say, 300 metres, and to divide the modulation into two. Each half is then given the use of the carrier alternately to the other, the changes being continuous and rapid.

I believe that it was while experimenting with this ingenious invention

same means, but there may be some quite different line of approach as yet not thought of by investigators.

So I say, don't forget the ordinary broadcast waves; they may yet prove capable of coping with any demand, television or otherwise.

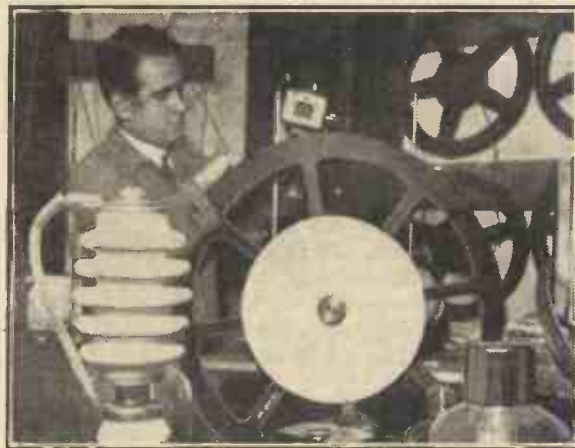
Among the multitude of new scan-

comparatively low frequency, for the light spot is moving slower. At the outer edges of the picture the frequency rises.

Therefore, a picture of high definition could be transmitted with the higher frequencies of the transmission cut down to any required limit to

### A GERMAN TELEVISION LABORATORY

*Many of the latest ideas in television have come from Germany, and here we see an engineer at work in the television laboratory of the Reich's Postal Headquarters.*



ning methods for television there is one which has a close bearing on this question of detail. It is a spiral-scanning system. Instead of the spot of light travelling in a succession of vertical lines and thus building up a rectangular picture, the spot travels in a spiral movement. Always in the same direction, first as an expanding spiral and then as a contracting spiral, as shown in the little diagram.

The spot maintains a consistent

conform with the requirements of the ether traffic.

The picture would have good detail at the centre and fall off towards the edges. Is this a chance for frequency-faking?

By the way, I note that several television workers are concentrating on the use of two wavelengths for television. I think those that are trying to "get away" with systems which demand two ordinary wavelengths for picture transmissions alone are rather on the wrong track. There are not enough medium and long-wave channels available for it to be possible to allocate *pairs* of wavelengths for single television transmissions.

As it is, there must be a second wavelength to carry the accompanying sound. If television is to have *three* channels—!

### Combining Pictures with Speech

I see that one inventor claims to have perfected a scheme for combining television pictures transmission with speech transmission. Apparently he mixes them up at the transmitting end, sends them out on one wavelength, and then disentangles them at the receiving end. Or, at least, that is what he claims to be able to do.

But that is surely what the Dowding scheme amounts to in practice, although here there is not a "mix-up."

(Please turn to page 289.)

### THIS IS A COMPLETE TELEVIEWER

*The latest in midget televiewers. Its size can be gauged from the hand holding it. The mirror screw for scanning can be seen at "h," while "f" indicates the synchronising gear and "d" the driving motor.*



that he first conceived the idea of infrasonics.

However, such a scheme gives you only twice the accommodation on the wave for television, and we want much more than that for really good detail. Still, if the accommodation can be doubled, why not trebled, or even quadrupled? Not necessarily by the

"revolutions per minute" speed, and so you will appreciate that it travels much slower at the centre of the picture than at the outer edges, where in the one revolution it has to cover much more ground than when it is rotating nearer the centre.

The result is that good detail at the centre of the picture is given by a



# Hier Ist

# Leipzig!

The broadcaster at Leipzig is among the best received in this country, and its well-modulated transmissions stand out among the Continentals for their excellent technical quality. Below is an interesting description of the famous station.

## By a Special Correspondent

WHEN I visited the Leipzig station I got a favourable impression right from the start, being driven up to the ground in a high-power Mercedes—not owned (need I say it?) by one of the engineers! We were swirled up the broad drive to the long, low, white building which houses the station staff and the broadcaster.

The Leipzig ground allows plenty of room for station expansion, temporary wire fencing being used. There are trees bordering the station drive. I noticed that these were supported by wires—a trivial point, but one which attracted my attention as I thought the wires were part of a counterpoise earth!

### No Electrical Shadows

We went out first to see the aeri-als. Wooden masts, of course. The Germans have gone crazy over them. They say that the wooden masts, if treated against moisture, have little capacity to earth, and do not make the aeri-als directional. Steel masts always have an electrical shadow.

I had noticed on the drive up to the Leipzig station that the masts had far more cross bracing than a steel mast, and I guessed for that reason that they were of wood. Other than that there is no sign. They are the same shape as steel masts, being of the Eiffel Tower variety.

Leipzig's aerial is just an ordinary combination-wire affair. A truly British note is struck by the aerial feeders, which run out to a tiny feeder hut in the middle of the field. Except that these twin feeders are on wooden poles like telegraph poles, they are just like those at any big B.B.C. station.

### Ultra-Modern Interior

And so back to the station. The transmitter hall is virtually a double-height room. The main part of the building is only single-storey height. It is ultra-modern, being finished in glaring white and provided with a futurist-style canopy over the broad entrance hall.

As with most German stations, there is a large section devoted to research. (What all these engineers can research into, I don't know.)

At Leipzig there is space for the testing studios, field-strength measurers and landline testing gear, while in the transmitter hall itself there is space for another complete transmitter. When I suggested to my Lorenz friends that there might later be a Leipzig National and a Leipzig Regional, I was greeted with only a cryptic smile.

### Room for Expansion

I was surprised at the machine room—*maschinenhaus*, to give it its proper name. The motor generators are quite small considering Leipzig's high power. There is enough room for three times the plant. Each

while grouped round three sides are the instrument panels and water-cooling pedestals.

The man in charge at the desk is faced with a bevy of knobs and lights. Down by his knees are the main anode voltage controls.

### Relay Buttons and Meters

On the flat part of the desk, on each side, are relay control buttons, interlocked so that the plant cannot be damaged by incorrect switching, or by a failure in the water supply.

On the sloping part of the desk are, to the left, six meters (edge-on type, not disc), giving the voltage readings controlled by the main wheels below, and five other meters to the right. On the left, also, are indicator lights grouped in a panel.

They are connected through Post-Office-type relays to the circuits, in this way. While the anode current is flowing in a valve circuit, a relay is held down. The armature is connected to a two-way switch, the contacts of which are wired to red and green indicator lights on the panel.

### Fool Proof

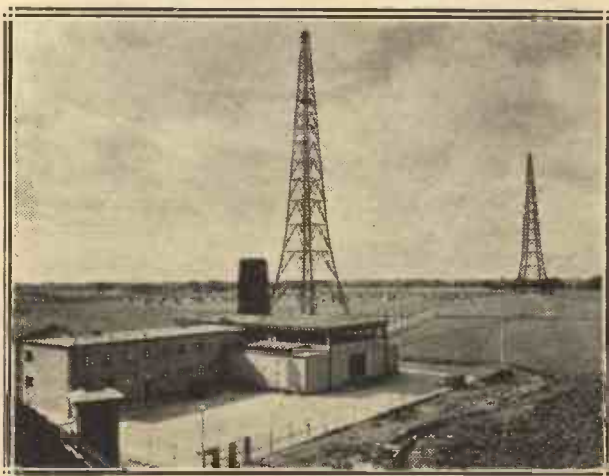
While the current is flowing the relay is held over to the "green" side. The red lamp comes on immediately the current stops. If a valve breaks down, there-

fore, the indicator lamps show at once which circuit has gone wrong. Similar relays are controlled by the cooling-water circuits.

Outside, standing in the big central portion of the floor in front of the desk, are the water-cooling pedestals. They are just like weighing machines on the pier—nice white ones, of course, and not the painted-iron Victorian horrors!

(Please turn to page 287.)

## VERY BRITISH IN APPEARANCE



A general view of the transmitter, showing the main building with its water tower for valve cooling, and the two wooden aerial towers. Wood has been chosen as the mast material to obviate any radio "shadows."

motor has its relay control on a wall panel, and each rests on concrete blocks and an ingenious cushion spring device to cut out vibration.

Never have I seen anything more like the bridge of a liner than the control room of Leipzig. It is a broad, low room, with long windows on three sides, accentuating the ship-like appearance. In the centre of the "bridge" is the main control desk,



# SHORT-WAVE NOTES

By W.L.S.

*The short waves offer a fascinating field of experiment to everyone, and the coming season is going to be the "best ever" for short-wave work. This article by our short-wave expert tells you what you may expect to find on the high frequencies, and should convince you that they will be worth your while.*

A LETTER from a reader, received during the last month, ends with the following paragraph: "Now that we are about to enter on a new season of radio, will you please give us a candid and honest article telling us what reasons there are, if any, why we should take up an interest in short waves?"

This is certainly an opportune time to discourse upon the advantages and disadvantages of short-wave reception. Please remember this, though, at the outset—the point of "short waves versus broadcast waves" has not arisen, and never will arise.

## An Interesting Addition

A short-wave receiver is looked upon as an interesting addition to the family "stable"; no one would be advised to scrap his broadcast receiver and instal, in its place, a short-waver. It seems almost unnecessary to say this, but some good people have got hold of that rather curious idea.

If you build a short-wave receiver you have equipped yourself with the key to an altogether new world of radio. It has its attractions—many

## AN ELECTRA-HOUSE LABORATORY

*A corner of the Marconi laboratory at Electra House, London, where experimental work on micro-waves is carried out. The apparatus is connected up with the special aerial on the roof of the building, and regular communication is carried on with a station eleven miles away at Belvedere, in Kent.*

of them—and it has its disadvantages. Considering, however, that any enjoyment you derive from short waves will be a real addition to the enjoyment that you already get out of radio, it surely seems worth while.

This article is addressed to all those who know nothing, very little, or not quite enough about the short waves.

Let us start from the beginning. The chief property of all the wavelengths below about 80 metres is their power to carry over very long distances.

They travel mostly by reflection, from one or more of the ionised layers that we believe to exist above the atmosphere.

## The "Skip" Effect

This implies that these waves will not be nearly so good for short-distance work as those that are normally employed for it. For instance, a transmission on 80 metres originating in London would probably be very poorly received in the outer suburbs, but would be 100 per cent reliable in Plymouth. That, too, is a mild case, for this property becomes more and more noticeable as we go down in wavelength.

By the time we reach 20 metres we have this state of affairs; a station in the heart of London would probably be heard on its "ground-wave" for six or seven miles. After that it might be completely inaudible for over 1000

the Empire Station on its 19-metre wave is so weak in London that one cannot follow the programme announcements; yet it is of real programme-value in South Africa.

This, of course, is a commonplace to anyone acquainted with short waves, but it must seem very puzzling, and even ridiculous, to a real newcomer to the game.

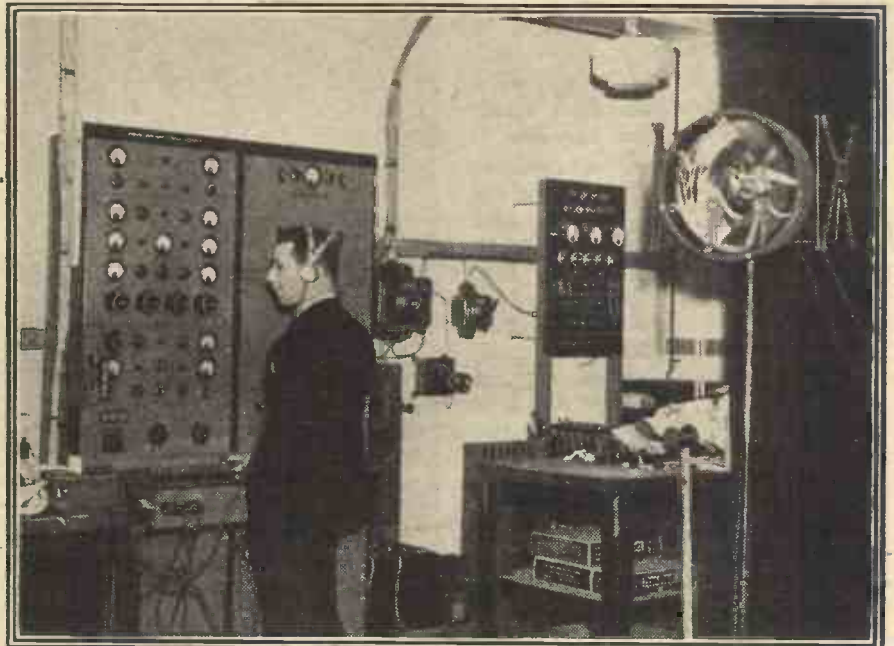
This brings us at once to one of the advantages and disadvantages of short-wave work. We can hear long-distance stations well, but we don't get good reception from the nearer ones except under certain conditions.

The ionised layers that do all the reflecting of these short waves are in a constant state of change; they are affected by sunspots, by the seasons, by the phase of the moon, by the time of day. Thus we can't always rely on hearing the same stations.

## Changeable Behaviour

The American broadcasting stations, owing to reception conditions, may perhaps be inaudible for weeks at a time; instead of them, we shall have the unaccustomed experience of hearing the European stations coming in very strongly.

Then, again, the behaviour of the different groups of wavelengths between 80 and 12 metres varies so tre-



miles, after which there would be various distances at which its strength reached a maximum.

## Peculiar Phenomenon

In practice, this complete inaudibility doesn't often occur, but we reach a state very near it. As an example,

Under normal conditions we can hear America on 19 metres during the hours of daylight only; and we can hear them on 49 metres during darkness only.

By the time one has had a little experience of short-wave reception on

(Please turn to page 289.)



# QUESTIONS I AM ASKED



by  
**JOHN SCOTT-TAGGART**

**Q. 100.** I have been told that an ohmmeter should be used for testing the resistance of a radio-frequency coil. This means nothing to me as I do not know what the coil resistance should be. What am I to do?

**A.** Either find out what the resistance is from the manufacturers or see if there is a similar coil (known to be good) in the set; then measure the good coil and compare the result with the resistance of the doubtful coil. In nearly all sets there are similar coils. It may also be possible to estimate what the resistance of a coil should be. A resistance measurement will reveal a partial short, a partial open circuit, or shorted turns. Zero resistance will indicate a short-circuit, of course.

**Q. 101.** I have no instruments whatever, and want to know how I can test the insulation of a 0.06-mfd. coupling condenser in an S.T.400. What can I do?

**A.** You can either charge the condenser with the H.T. battery and after removing the battery leave the condenser standing for, say, quarter of an hour. Then connect the loudspeaker across it; if there is a click the condenser is probably O.K.; if no click the condenser is open-circuited or leaky. A very good test is to charge up a large condenser (1 mfd. or more) with the full H.T. voltage. After ten minutes place the metal shaft of a screwdriver across the terminals. A spark should be obtained if the condenser is O.K. Now charge up the condenser once more. Connect the 0.06-mfd. condenser in parallel with the charged condenser, leave for ten minutes, and repeat the spark test. If no spark, the 0.06 is leaky, and has discharged the large-capacity condenser.

**Q. 102.** Why, in some circuits is the grid leak connected across the

grid condenser while in other circuits it is connected straight from grid to filament? What are the relative merits of these two methods?

**A.** It is very slightly better to connect the leak directly across the grid condenser, provided the "bottom end" of the tuned circuit (i.e. the earthing end) can be connected to the positive side of the accumulator (in a battery set).

If, as is usual, it is desired to have one side of the tuning condenser connected to the earthed negative of the L.T. (and this is more or less essential if a gang condenser is employed), the leak is connected directly across grid and the positive side of the filament. The resistance will thus be virtually in parallel with the tuned circuit and thus will "damp" it very slightly.

Here is a selection of the varied assortment of queries received by Mr. Scott-Taggart during the last few weeks. They are answered in the author's usual direct and forceful manner.

A third course is to do what I have no recollection of seeing done—although it is obvious—namely, connecting the leak across the grid condenser, joining the bottom of the inductance to the positive side of the filament, and connecting the moving vanes of the tuning condenser to the negative side of the filament. A large good quality by-pass condenser is now connected directly across the filament terminals on the valveholder.

**Q. 103.** How can I tell which valve is causing the howl which builds up sometimes and spoils reception? What remedies can you suggest?

**A.** I presume you mean the microphony howl due to sound waves or

vibration caused by the speaker affecting a valve. If the receiver is howling, grip each valve firmly in turn, taking care, as far as possible, to avoid upsetting tuning and reaction with the presence of your hand. When the howl stops by gripping the valve it is probably that particular valve that is microphonic.

When the howl is not there normally, but can be started readily, tap each valve in turn while the set is tuned-in. When the erring valve is tapped, there will probably be a ringing note and the howl will begin to build up.

The worst offenders are the H.F. valve or valves and the detector. When the H.F. valve (say, an S.G.) is "mikey," the fault will occur on a strong carrier. If reaction is applied to its grid circuit, a reduction of the reaction will perhaps stop the effect. But the only real remedy is to stop the vibration or to change the valve. A thick wad of cotton-wool wrapped round the valve sometimes effects a cure, while wedging the valve (e.g. a wedge placed through the hole in the vertical screen of an S.T.400) can be recommended.

Suitably placing the loudspeaker is the first consideration, of course, since the sound waves from it are the most probable cause of the howl.

There are other causes of microphony—e.g. vibration of condenser vanes, especially those of the oscillator section in a superhet.

**Q. 104.** When are you going to tell us how to build a television receiver?

**A.** When television becomes a reality, and if it is possible for a constructor to build the apparatus. The description of experimental receivers is outside the scope of my activities for this journal.

**Q. 105.** How can I convert my S.T.100 into the S.T.300 Star?

**A.** Oh, dear!



# How to obtain BETTER RADIO



Many constructors seem to be in trouble about that vital part of radio receiver control, the reaction. It is not only that in many cases failure to obtain smooth transition to and from the state of oscillation is experienced, but other peculiar effects are present. In this article, Frederick Lewis deals with the question of reaction with iron-cored coils.

IN these days of high-power broadcasting stations, and multitudinous transmitters, receiver design has become a matter of extreme trickiness. A mere collection of coils and condensers, valves and transformers, and so forth, will not do if anything like a good "bag" of programmes is to be received.

### Parasitic Oscillation Trouble

Really efficient coils, providing a high degree of selectivity with good sensitivity are necessary, and this fact has caused a great deal of experiment and reconstruction of coil design.

And among the new type of inductances we find that the iron-cored method of construction has placed us far on the road to our goal.

There are, of course, many different

### TRY THIS REMEDY

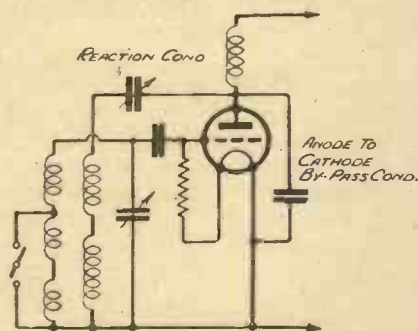


Fig. 1. The use of an anode-cathode by-pass may prevent "double reaction" effect that is sometimes experienced with iron-cored coils.

types and makes of iron-cored coils, and they do not all possess anything like the same characteristics. But all must be used carefully, and with variable condensers of good design, especially if ganged stages are to be employed, otherwise accurate matching

of the various stages of the set will be difficult if not impossible.

The reaction control, too, needs careful planning, for, as a rule, iron-cored coils are a bit more critical than their air-cored cousins. Especially is this so in some types, where there is a danger of parasitic reaction oscillation taking place on the long waves.

What happens is that the normal feed back through the reaction condenser to the reaction coil causes the valve to go into oscillation, but at a frequency other than that to which its circuits are tuned.

And it goes into oscillation at this unwanted frequency before it oscillates at the required frequency—corresponding with the long wavelength to which the receiver is tuned.

### The Usual Symptoms

Differential reaction is not always successful in iron-cored coil circuits, and sometimes we have to resort to the type shown in Fig. 1. This, of course, is the old method of condenser-controlled reaction that was in vogue before the differential scheme came in. The condenser by-pass should be from .0001-mfd. to .0005-mfd. capacity, as required.

But the presence of the by-pass condenser does not necessarily mean the absence of parasitic oscillation, and if you have a receiver in which there are two oscillation points on the long waves—and you will find that at the "first" you will lose signals rather than increase them—you should try the circuit shown in Fig. 2.

Here it will be seen that a resistance is inserted in the reaction feed lead as well as the by-pass condenser from anode to cathode. This resistance should have a value of 100-1,000 ohms,

probably 500 or 1,000 will be required, and will obviate the double-reaction trouble.

The resistance value, of course, should be kept as low as is possible consistent with effecting a cure, for if it is too high it will militate against the successful reaction control of the medium wavelengths, where the parasitic trouble is not experienced. The resistance will cause heavy damping at the high frequencies experienced on the medium waves, and if the value is too high, may damp out the oscillation altogether.

### Why the Resistance Scheme Succeeds

The success of the resistance on the long waves is because the parasitic oscillation is at a frequency below that of the true long-wave oscillation, and thus the former can be damped out without interference with the latter.

Naturally, the values of the resistance and the condenser must be decided conjointly—they are interdependent to a certain degree, though the exact values are not terribly critical.

It is best, of course, to keep the value of the condenser as low as

### A CERTAIN CURE

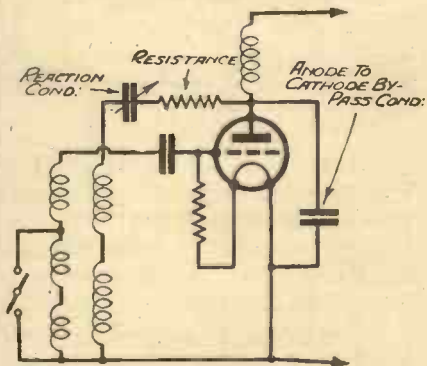


Fig. 2. You can usually rely on the combination of by-pass and series resistance to cure completely any parasitic oscillation that may occur in iron-cored coil circuits.

possible, say, .0002 mfd., in order to prevent too much cut off of the higher audio-frequencies, though naturally it must be of sufficient size to allow the valve to detect properly.

A good test is to try the effect of your set on a local station, with no reaction, and both with and without the by-pass condenser. Usually the increase in signal strength with the condenser in is very noticeable.

With iron-cored coils of the "parasitic" type, if I may so term them, you will find that a larger reaction-condenser capacity is required than is usual. Probably .0005 mfd. will be required as against the usual popular value of .0003 mfd.



# RAPID FAULT LOCATION



By H. CROSS

*In the following article our contributor deals with many interesting and illusive radio troubles and tells you how to tackle the job of fault finding. He explains that systematic testing is nearly always the quickest in the end.*

THE most distressing fault which can be experienced with a receiver is when it completely refuses to function. The territory in which the trouble may then exist appears infinite to the uninitiated, particularly with a receiver having, say, three or more stages.

And whether the set has just been built or has given previous service one may be equally at a loss where to begin the search for the trouble.

### Check All Connections

In a new receiver the wiring naturally first comes under suspicion, but this point is so obvious that no comment need be made. A little care will rectify the matter.

probably not possible even to check the battery voltages. For the time being, therefore, the batteries must be assumed to be in order. A very rough test, however, for these is to short momentarily each in turn with a length of wire, when, if the batteries are in order, a spark will occur. This procedure must be carried out very quickly to avoid damage. A lengthy short of this description would be bad for the health of the battery. Don't try it if you have a mains unit!

One of the simplest yet most elusive faults is a discontinuity between one of the battery connections and the receiver terminals. It is quite possible for one of the flex leads to have broken internally, although

ever, can best be tested, and the speaker tested at the same time, by brushing the ends across the terminals of the L.T. accumulator. A double click should be heard.

When these very simple tests have been made, if the fault is not already found, at least the field in which it exists will already have been considerably decreased, though perhaps not very strongly.

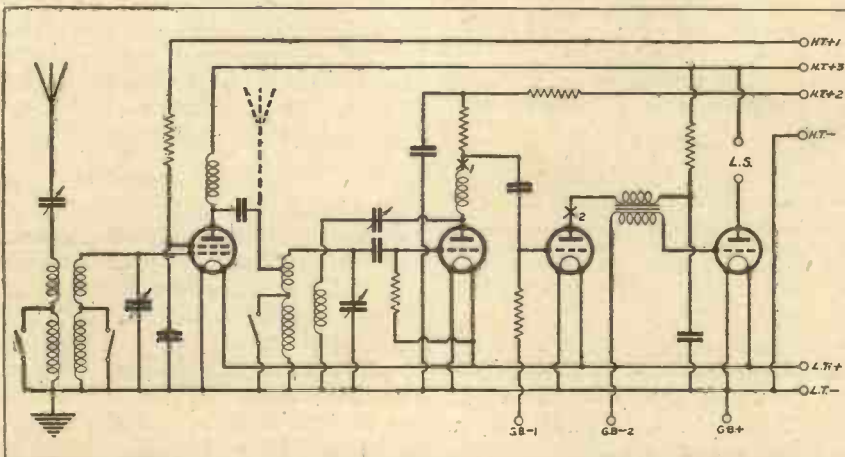
### Test the Reaction

Sometimes the set gives symptoms which more or less clearly indicate which stage is, or is not, at fault. Usually the latter.

Thus, if proper reaction can be obtained, then no doubt the detector stage is in order, and very probably the following stages. Conversely, if reaction cannot be obtained the detector or a following stage must be to blame. Again, a rather slow popping noise would most likely indicate a broken grid circuit. Clicks in the loudspeaker when switching the set on and off probably indicate that the output valve is in order. A click should be heard when each wander-plug is taken out of its socket and the absence of a click would point towards a faulty valve in the appropriate circuit.

It will be of assistance, here, to consider a typical receiver and a four-valver of the S.G.-det.-L.F.-power type shown in the accompanying diagram.

### A TYPICAL FOUR-VALVE RECEIVER



Here you see the theoretical circuit diagram of a typical four-valve broadcast receiver. It is used as an example to illustrate the methods to be adopted when tracing faults in a set of this description. Note the points 1 and 2 where a loudspeaker is inserted to make some of the tests referred to in the article.

If a meter of any sort is possessed the examination of the circuit and location of the fault is much simpler, since it can be used either for measuring the voltage at various points or the current flow.

But in the majority of cases no such instrument is available, thus it is

the outer cover may be quite intact. Or a wander-plug contact may be unsound.

Here a length of flex is useful, and should be substituted in turn for each of the battery leads. The same trouble may, of course, occur with the loudspeaker leads. These, how-

### Cut Out the H.F.

After the initial tests the first thing to do in any set with an H.F. stage is to connect the aerial direct to the grid end of the anode or tuned grid coil. If signals are heard, although tuning may be comparatively flat, the fault undoubtedly lies in the H.F. stage. If, however, nothing is heard, leave the aerial connected to the same point, then disconnect the

## Systematic Searching Should Always Be Employed

component (usually a spaghetti or transformer) from the A terminal of the detector valve holder. Do not, however, disturb the reaction arrangement, and if there is a reaction choke, join the speaker between the choke and spaghetti, as shown at 1. in the sketch.

### Now for the L.F. Side

In this case only the detector valve is being used, and signals if received will naturally be weak. In fact, when situated at a fair distance from a station it is preferable to use phones for this test.

thus. If there is an intermediate L.F. stage, however, it should be tested by the same means as the detector, the speaker being connected in the position 2 shown on the sketch.

This process cannot really fail to locate the faulty stage. For example, if in our four-valver signals could be obtained with the speaker joined in the detector, but nothing with it in the first L.F., then obviously the L.F. stage must be defective. Whereas if nothing had been heard in the first instance the detector must be faulty, assuming the aerial connected to the grid of the detector.

leads still connected to one filament pin. This time no clicks should be heard.

A decrease in filament emission or partially displaced electrodes cannot be detected by this means, and the valve can only be tested by substituting with a valve of known efficiency, or by trial in a receiver which is in working order.

### High Resistance Parts

The continuity of components such as resistances, transformers, H.F. chokes, etc., can be tested in the same way as the valve filaments, but since fairly high resistances are being dealt with you should use a section of the H.T. battery. With phones a smaller battery will do, since a much fainter click will be easily audible.

It is necessary to make sure that the component under test is quite disconnected from other components or wiring likely to cause a misleading indication.

Fixed and variable condensers can be tested by joining the battery and speaker up in the manner described. In this case, however, no click should be heard. A double click would indicate a broken-down component. Don't confuse it with a single lighter click that may be heard when the circuit is completed. This latter is due to a momentary current surge.

As mentioned previously, if a meter is on hand, investigation may be simplified, although in many cases the fault cannot be located except by applying the tests outlined above.

### Using a Voltmeter

With a voltmeter, check should first be made on the batteries—under working conditions. If the L.T., G.B., and H.T. voltages are correct at the battery terminals, then they can be traced through to the various points of the circuit.

Thus a two-volt reading should be obtained across the filament sockets of each valve holder. Grid-bias voltages should be registered across the grid and negative filament sockets of the output and L.F. valve holders.

H.T. voltages can be tested at various points in the anode lead of each valve with one terminal of the meter joined to the common negative line. A fairly high resistance meter is desirable, otherwise misleading readings may be obtained where there are fairly large resistances, such as decoupling resistances in circuit.

### IS ANYTHING WRONG WITH YOUR SET ?



*Every year at the Radio Exhibition "The Wireless Constructor" Technical Expert deals in person with thousands of queries concerning readers' sets. But whether or not you were able to get to Olympia you are offered an unrivalled postal query service by this journal, and any radio problem you may have can be put by post to our specially trained department.*

Now if signals are received the detector valve itself must be in order. Louder signals should be possible by re-connecting the aerial to its normal terminal.

We have then proved that the fault is in one of the stages following the detector, and it next becomes necessary to connect the speaker or phones in the anode circuit of the valve after the detector.

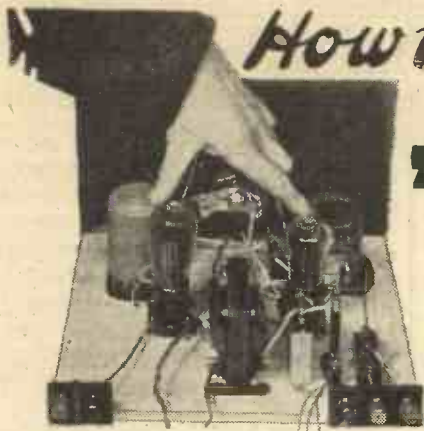
If this is the output stage, however, there is no necessity to do so, of course, because we already know the speaker won't work when connected

Further, any stage that fails to pass on the signal must have (1) a bad joint; (2) a faulty valve; (3) a defective component.

### Trying the Valves

Here again our loudspeaker or phones will be useful. Valves can be tested fairly well by joining the L.T. accumulator in series with the speaker and connecting across the filament pins. If the filament is intact a double click will result each time the circuit is completed. The other pins should be touched with one of the





## How to Make

# A TWO-VALVE ALL-WAVE RECEIVER

Once again "The Wireless Constructor" presents its readers with a really valuable design. By means of one simple push-pull switch this receiver can be instantly changed from an efficient broadcast set to a short-waver that will enable you to roam the whole world.

Described in detail

By A. S. CLARK.

ate set when you wish to explore the fascinating high frequencies.

And, what is more, by means of a very clever design you do not have to sacrifice anything on the broadcast medium and long waves. Even without its dual capacity this all-wave receiver would be an attractive pro-

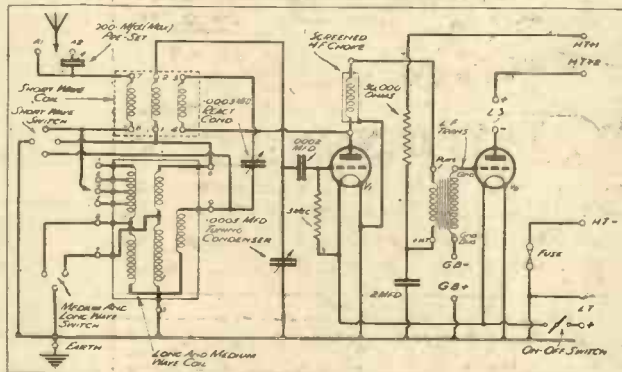
a selective screened component for medium and long waves.

### How It Works

Those of you who like to delve into circuits will "dig out" from the diagram how that the short-wave windings are always in circuit and how the screened coil is completely shorted out of circuit for short-wave reception. There are so few turns on the short-wave coil that they have no effect on the medium- and long-wave ranges.

As a matter of fact, there are only ten turns of wire in all on the skeleton former, so winding it at home will worry no one in the least. The former on which it is wound is a B.R.G. No. 8, and is supplied with the necessary terminals.

### THE DUAL-PURPOSE CIRCUIT



By a clever combining of a special short-wave coil and a dual-range coil for medium and long waves, it has been possible to devise this effective, but at the same time, straightforward circuit.

LET'S suppose for a moment that you have actually built the receiver illustrated in the heading to this page, and that the dance music has just faded out to give place to the chimes of Big Ben.

As the twelfth sonorous beat dies away you decide to have a search round the ether as you are not feeling tired (and, anyway, to-morrow's Sunday, so you need not be up early). Reaching over, you click down the left hand of the three switches, and immediately the whole world is yours to roam.

You turn the knobs carefully, and the silence is broken by an unmistakable nasal twang announcing that the next number will be a hot rhythm entitled— But you don't stop to hear the announcement; America is easy meat.

### Instantaneous Conversion

Further round the dial you pause to investigate a soft whistle, and you learn that the speaker is on the other side of the world. Why, you wonder, do people trouble to fly round?

And so you go on enjoying yourself far into the night, for by the operation of that one switch you have converted your broadcast receiver into an efficient short-wave set. For you, changing to short waves is as easy as going from medium to long. For you, there is no laborious connecting up of a separ-

position to anyone to whom saving in expense is more than "just a talking point." And that, I'm sure, includes most of us these days.

In designing this receiver, careful thought has been given to both short waves and the so-called "broadcast" waves. It is not primarily a receiver for medium and long waves which will work after a fashion on short waves.

And it is not a short-wave receiver that can be made to work on longer waves if specially desired.

No, it is designed as a whole, to be simple, inexpensive and efficient. There are two separate coils, one on a skeleton former for short waves, and the other

### WHAT THE SET IS BUILT WITH

- 1 Polar .0005-mfd. tuning condenser, type No. 2 S.M.
- 1 Colvern screened coil, type T.D.
- 1 B.R.G. coil former, type No. 8.
- 1 T.M.C.-Hydra 2-mfd. fixed condenser, type 25.
- 1 T.C.C.-0002-mfd. fixed condenser, type 34.
- 1 Formo-0001-mfd. preset condenser.
- 1 Graham Farish 3-meg. Ohmite grid leak.
- 1 Graham Farish 30,000-ohm Ohmite resistance in vertical holder.
- 1 Graham Farish screened H.F. choke, type H.M.S.
- 2 Benjamin 4-pin-valveholders, "Vibroholder" type.
- 1 Bulgin toggle on-off switch, type S.80.
- 1 Bulgin toggle 4-pt. shorting switch, type S.87A.
- 1 Bulgin toggle 3-point shorting switch, type S.87.
- 1 Graham Farish .0003-mfd. reaction condenser.
- 1 Ferranti L.F. transformer, type A.F.4.
- 1 Peto-Scott panel, 12 in. x 7 in.
- 1 Peto-Scott "Metaplex" baseboard, 12 in. x 10 in.
- 1 Peto-Scott terminal strip, 3 in. x 1 1/2 in.
- 1 Peto-Scott terminal strip, 2 in. x 1 1/2 in.
- 5 Clix indicating terminals.
- 1 Coil B.R.G. "Quikon" connecting wire.
- Small quantity of 18-gauge T.C. wire.
- Small quantity of 30-gauge D.S.C. wire.
- Screws, Flex, etc.
- 4 Clix wander plugs.
- 1 Belling & Lee wander fuse.
- 2 Clix accumulator spades.
- Peto-Scott cabinet.

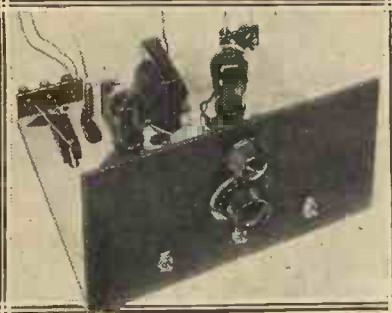
From the special diagram of this coil you will see how to space the windings and also how the connections to the various terminals are arranged. To ensure that the grid winding of four turns of 18-gauge tinned-copper wire cannot be displaced, four small

# Selectivity Variable Over a Wide Range

indentations should be made with the corner of a file in each of the uprights of the former. They should be spaced one-eighth of an inch apart.

All three of the windings are wound in the same direction, it does not matter which, treating the ends marked "top" in the diagram as the beginning in each case. As already indicated, the switch for changing to short waves is the one mounted on the panel close to the short-wave coil itself.

To avoid any confusion we had better make clear at this point the exact relationship of the three switches.



The simple panel lay-out includes three switches, one to switch the set on and off, one for the ordinary wavechange from medium to long waves, and the third for converting the set to a short-wave receiver.

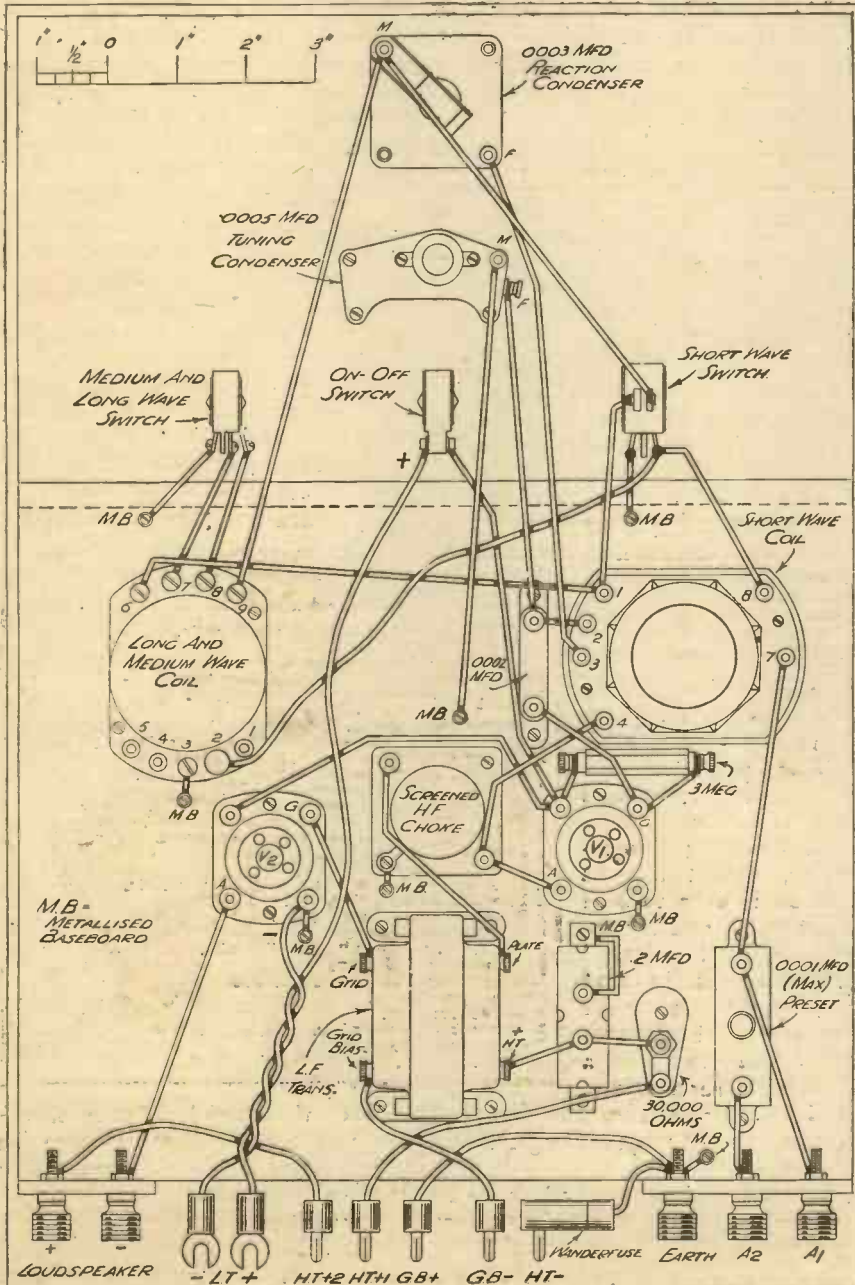
The middle one turns the set on and off in the usual manner, irrespective of what waveband it is set to receive.

Similarly, the left-hand switch changes over to short waves, no matter whether the other wave-change switch is set for medium or long waves. To operate the set on either of the latter two bands the left-hand switch *must* be in the "up" position.

## Two Aerial Terminals

Mention has already been made of the selectivity of the receiver, and it is interesting to note that this is variable over quite a wide range. There should be no difficulty in adjusting selectivity to suit most conditions and aerials. But please don't try to work this set within the shadow of a broadcast station. Such a location calls for an elaborate and *super-selective* outfit.

There are two aerial terminals, the one marked A2 providing the greater selectivity by virtue of the adjustable .0001-mfd. condenser in series with it. This terminal may be made use of the whole time, or it can be reserved for use on short waves only, on which



## VALVES AND ACCESSORIES

	Detector	Output
Cossor	210 H.F.	220 P.A.
Dario	T.B.262	T.B.122
Hivac	H.210	P.220
Marconi	H.L.2	L.P.2
Mazda	H.L.2	P.220
Osram	H.L.2	L.P.2
Tungsram	H.R.210	L.P.220

## BATTERIES

H.T.	120 volts	Ever Ready
L.T.	2 volts	Block
G.B.	9 volts	Drydex

## LOUDSPEAKER

W.B.  
AERIAL AND EARTH  
Electron "Superial" aerial wire and Graham Farish "Filt" earthing device.

band it can prove most useful if difficulty is experienced in obtaining smooth reaction over the whole of the tuning dial.

A further adjustment of selectivity for medium and long waves is provided by the plug and sockets scheme of input to the screened coil. The plug may be inserted into one of four sockets. These are numbered 1, 2, 4 and 5, and the higher the number of

All the wiring for the set is shown in the diagram to the left. Note the plug on the end of the lead connecting the short-wave switch to the long- and medium-wave coil. This enables selectivity to be varied according to the socket into which the plug is inserted.



## Quite a Normal Receiver to Operate

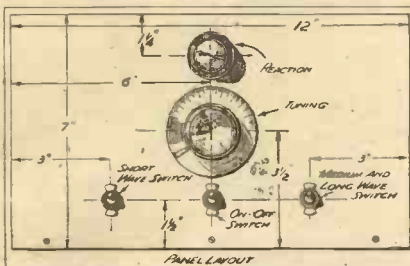
the one utilised the greater will be the selectivity.

The assembly of the receiver is carried out on an ebonite panel and "Metaplex" baseboard. The latter is of the single-sided type, the metallising being on the upper surface.

This metallising is made of use in the wiring, a number of connections being taken direct to it by means of wood screws and washers. These connections are marked "M.B." in the wiring diagram where they make contact with the metal coating.

In the case of the earthed side of the 2-mfd. decoupling condenser, contact has been made to the metallising by the simple expedient of clamping the

### ON THE PANEL



There are only two variable controls, the tuning and reaction knobs, and their exact positions, together with those of the switches, are given here.

wire under the end of the condenser where it is screwed to the baseboard. Apart from these points, there is nothing in the assembly to give rise to difficulty.

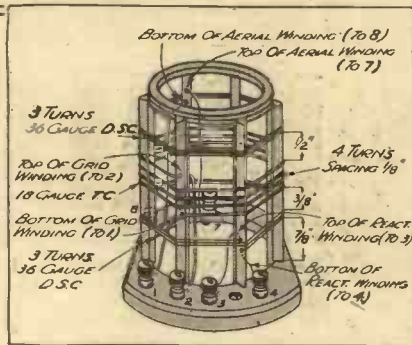
When you come to connecting the batteries you will find that there are two high-tension positives, one for each valve. H.T. plus 1 supplies the detector, and the voltage should be adjusted for best reaction results; but, apart from this consideration, keep the voltage as high as possible.

The other tap should receive the maximum of the H.T. battery.

### Fitting a Filter

You will note that the output terminals are marked for a loudspeaker, but this will not prevent telephones being employed on short waves if you desire to tune in very weak transmissions. At the same time it would be desirable to use an output filter or an L.F. type valve in place of the power valve, to prevent the heavy H.T. current doing damage to the telephones.

The connections for a filter would be as follows: Join a 20- to 30-henry



Complete details for winding the special short-wave coil. All three windings are put on in the same direction.

choke across the loudspeaker terminals, and connect the negative one also to a 2-mfd. fixed condenser. The other side of this condenser goes to one phone terminal, and the remaining phone terminal is wired to L.T. negative.

Operating the receiver is quite a normal procedure. You should try it on medium waves first, and for this the right-hand switch has to be down.

While on this band the best tap on the coil, the aerial terminal which gives better results, and the most effective setting of the preset condenser if it is used, should be found. In finding this out, various combinations of these variable factors should be tried. It is worth while spending a little time

on this preliminary adjustment, for once you have found the ideal arrangement there is no need for further alterations to be made.

The tuning and reaction controls are employed in just the same way on short waves as on medium or long, with the exception that on the short waves you should tune more carefully, and slower. The Polar condenser has a good slow-motion drive, and this will greatly aid accurate tuning on the higher frequencies.

### Searching for Short-Waves

Finally, the wave range of the short-wave coil. This is from about 18-50 metres, and covers the most attractive short-wave broadcasters, which are the stations that will enable you to get the most enjoyment and entertainment out of short-wave listening.

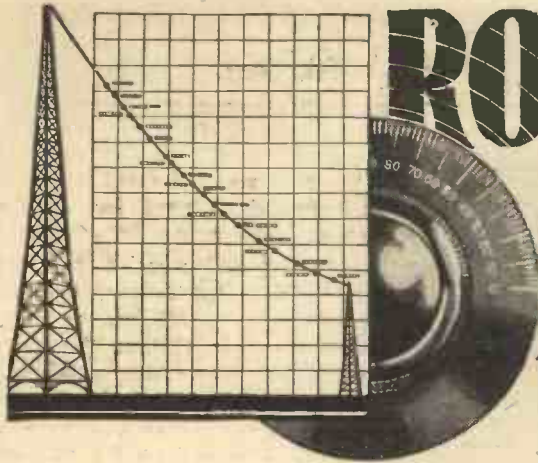
When searching for short-wave broadcasting stations it is generally necessary to have the set oscillating, and to resolve the carrier whistles when they are heard. But you must be careful not to have the set oscillating too hard, or you will easily miss many stations. If you keep one hand on the reaction control while you tune, you can adjust the set to be right on the edge of oscillation the whole time.

### A SEPARATE COMPONENT FOR SHORT-WAVE TUNING



Pointing out the home-wound short-wave coil which is quite independent of the coil for medium and long waves, from which it is well separated. The "broadcast" wave coil is of the screened type, and can be seen on the further side of the tuning condenser.





# ROUND the DIALS

*Foreign radio stations are simply "pouring" over now, and these notes on recent reception of outstanding Continentals will be of interest to all set-owners.*

"WHAT are the likeliest foreign stations that the ordinary good set will receive?" This is a question now being asked by new set-owners, and by those who have done little listening during the summer months, so we propose to give a rapid tuning review, commencing at the bottom of the medium-wave dial.

Radio Normandie (206 m.) is the only notable station below Newcastle, and he is now but a shadow of his former self, owing to power reduction. Just above Aberdeen two German stations (Nurnberg and Augsburg) share 236.8 m., but they are generally

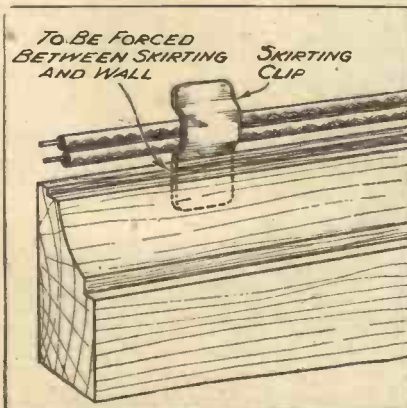
## USEFUL WIRE CLIPS

A NUMBER of little clips made up as illustrated will make the running of wires along skirtings and picture rails one of the easiest of jobs. The idea is to push a few between the skirting and wall at intervals, and then clip in the wires.

These clips will hold the wires really tight, while making it comparatively easy to remove them for dusting purposes. They can be cut out of old tin containers with a pair of scissors.

W. W.

### EASILY FIXED



An ingenious method of clipping loud-speaker and other extension wires along wall skirting.

distorted, and so, the first fairly reliable foreigner is Trieste (245.5 m.). Above that, on 251 m., is a group of Germans, often loud but distorted; and further up, on 257.1 m., is an Italian-speaking station.

This is Monte Ceneri, Switzerland. Its reading is generally about 2 degrees lower than London National's.

A sharp-tuned set sometimes gets another station about one degree above the London National. This is Turin, Italy, with its "nightingale" interval signal.

The next really outstanding station is Bordeaux Lafayette, on 278.6 m., about two degrees below Scottish National. At the same distance above the latter's dial-reading is a powerful German—Konigsberg, on 291 m.

A little higher, half-way between North National and West Regional, is our old friend, Hilversum, who is well worth listening for in daylight.

## "Excellent Foreigners"

Between West Regional and London Regional there are some excellent foreigners. In ascending order of wavelengths the chief ones are Poste Parisien (312.8 m.), Breslau (315.8 m.), Brussels II, speaking Flemish (321.9 m.), Toulouse (328.6 m.), and Hamburg (331.9 m.).

It is worth going to some trouble to identify the members of this group, as they are among the best programme-providers that we have.

Just a degree or so above London Regional is the Franco-German border station, Strasbourg. A few degrees higher the powerful German, on 356.7 m., is Berlin, but his programme is often marred by Moscow IV, on the wavelength above.

Milan (368.6 m.) is immediately below Scottish Regional, and half-way between it and the Midland is Leipzig, on 382.2 m., who is very powerful and consistent.

Sandwiched in between the Midland and North Regionals there is another fine group, the first being Katowice, a tick above the Midland Regional's wave. Then another powerful German, Munich (on 405.4 m.), Rome on 420.8 m., Stockholm on 426.1 m., and Sottens, Switzerland, close underneath the North Regional-reading.

## Regular Visitors

All the foregoing are good regular visitors, likely to be picked up any night on a decent set of three or more valves. But at the top of the medium waves there are still more in the same class, so continuing to tune upwards we find Prague, on 470.2 m., three or four degrees above the North Regional. Then Brussels I (speaking French), on 483.9 m., Vienna (506.8 m.), and Stuttgart, on 522.6 m.

Athlone (531 m.) everybody recognises, and if your tuning goes still higher there is Beromunster on 539.6 m. He speaks German, but is located in Switzerland, and relays Berne and Basle.

If you can tune still higher there is Budapest, on 549.5 m.

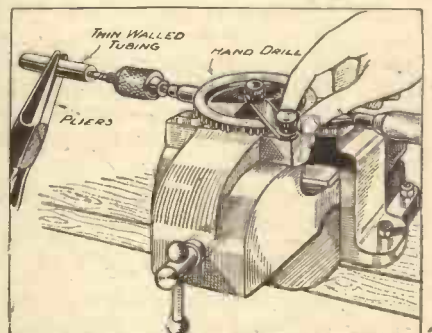
P. R. B.

## DRILLING TUBING

WHEN enlarging a hole through thin walled tubing do not hold the material in the vice—as is the usual practice—but fix the hand drill in the vice and hold the tubing in the hand, or a pair of pliers.

By reversing the usual procedure a perfectly parallel hole will result, for any movement out of line with the drill will be seen at once. Unless

## IT PREVENTS DAMAGE



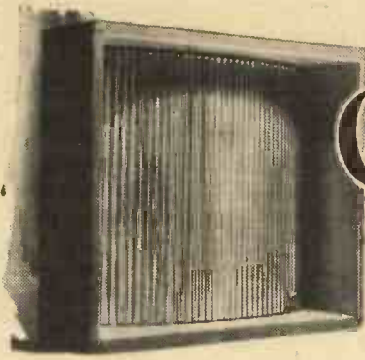
Parallel holes through tubing can readily be drilled if this manner of holding is employed.

you are really skilled with a hand drill it is so easy to be several degrees out of upright without noticing the fact.

There is also less danger of crushing the tubing, since with the normal manner of drilling the tubing would have to be gripped tightly in the vice.

I. R. W.





# OBTAINING THE FULL REGISTER

By  
JOHN RUSTON, B.Sc. (Eng.),  
A.C.G.I.

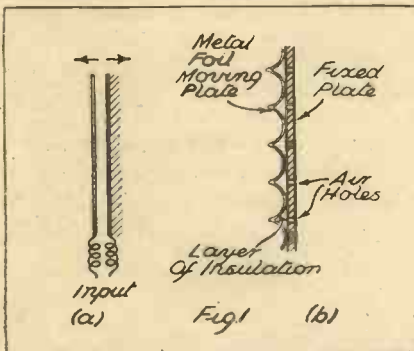


THE advantage of using two loudspeakers instead of one in a wireless set has only become apparent during the past year or so. This is because the modern receiver has been improved to such an extent that it can detect and amplify the received signals almost without distortion, and it is in the loudspeaker that most of the distortion occurs.

## Loudspeaker Development

Thus, in the bad old days when radio reception had just emerged from the headphone stage, signals were so horribly mutilated before they reached the loudspeaker that the

## SPEAKER CONSTRUCTION



The principle of an electrostatic speaker is that the two plates of a condenser tend to move when varying voltages are applied to them, see (a). The shape adopted for the plates in practice is shown at (b).

additional distortion caused by the horn speaker then in vogue was hardly noticed. But, as the quality of receivers improved we realised that the horn speakers were only reproducing the treble notes, and some of these were over-emphasised by harsh resonances of the diaphragm. So there was introduced the moving-iron cone speaker, which reproduced the middle register and some of the high notes, and was reasonably free from these objectionable resonances.

This seemed pretty good to us, and we thought we had achieved natural reproduction, until we listened to the real thing and then realised that our

*Electrostatic loudspeakers are ideal for the reproduction of treble, and, therefore, in view of the present tendency to use two loudspeakers at once, one for bass and one for the high notes, they may well come into their own. This article deals with the principles on which they work and the methods of connecting them into circuit.*

speakers were merely saying "squeak, squeak" instead of speaking naturally.

With the introduction of the all-mains receiver there appeared on the market the reasonably sensitive and reasonably priced moving-coil loudspeaker which, we found, said "boom, boom" instead of "squeak, squeak!" We then realised that what we had wanted and had now got was bass, and plenty of it.

## Too Much Bass

Consequently there was a rush for bass, and no speaker was worthy of consideration unless its low notes could make the floor vibrate violently. When the novelty had worn off, it was realised that this was no more natural than the reedy reproduction of the moving-iron unit, and efforts were made to reproduce the the high notes as well as the low ones with the moving-coil speaker:

Theoretically the moving-coil loudspeaker is incapable of reproducing any but the very lowest notes, and it is only by arranging suitable resonances of the cone diaphragm that any top notes are obtained at all.

To design a single loudspeaker so that the bass is fully reproduced and also to combine suitable diaphragm resonances to bring out the top notes, is, indeed, a superhuman task. Hence the need for dual loudspeakers, one for bass and the other for the treble.

## The High Notes

If it is not required to reproduce the bass it is possible to design a moving-coil speaker which will bring out the top notes quite well, but it must be remembered that the moving-coil speaker is fundamentally a low note reproducer, and it would thus be more desirable to reproduce the top notes with a type of loudspeaker which is especially suited for the purpose.

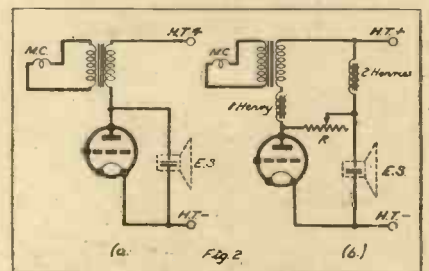
The electrostatic loudspeaker is such a type, and will possibly largely replace the moving-coil speaker as the high note reproducer in dual loudspeaker units of the future.

Although electrostatic speakers suitable for radio receivers have been on the market for some years now, they have been little used, chiefly because they reproduce only the high notes, and also because they behave quite differently from ordinary speakers when coupled to the output stage of a receiver. So perhaps it would be best to describe first how the electrostatic speaker works, and then how best to couple it to the output stage.

## Essentially a Condenser

The electrostatic speaker is essentially a condenser in which one plate is rigidly fixed and the other more or less freely supported closely in front of it, as shown by Fig. 1 (a). When a

## THE OUTPUT CIRCUIT



How an electrostatic loudspeaker may be connected up to a triode valve in conjunction with an electrodynamic speaker.

voltage is applied between the plates they attract one another, and the free plate moves in towards the fixed one.

Thus, when the output from a radio receiver is applied across the plates they attract one another in unison with the electrical impulses representing the sound to be reproduced,



# It Behaves Just Like a Pure Condenser

and so the free plate vibrates and produces the required sound waves.

But since the plates attract one another, whether the voltage is positive or negative, it is necessary to apply an initial steady voltage (usually the voltage of the H.T. supply) in order to reproduce the sounds correctly. Otherwise all sounds go up an octave, because the frequency is doubled.

## The Ribbed Diaphragm

In its practical form the moving plate is usually split up into a number of small parts spread over the fixed plate and separated from it by a thin layer of insulation. Thus in the type of speaker most used in this country the moving plate is made of metal foil arranged in ridges, as shown in Fig. 1 (b), one advantage of this arrangement being that the area of the plates can be increased indefinitely without adversely affecting the properties of the loudspeaker.

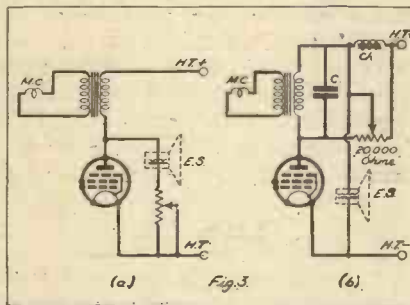
## A Falling Characteristic

The air holes in the fixed plate allow a free passage of air when the moving plate vibrates. Tests with this type of speaker have shown that for a constant electrical input the output of sound is greatest at high frequencies and falls off gradually until

it is very small at the lower frequencies, but the response to low frequencies can be increased by increasing the area of the plates or by stepping up the output from the receiver by means of a transformer.

However, the extent to which these means can be employed is obviously limited, and so, in normal circumstances, there is very little relative output of sound below a frequency of about 800 cycles per second. Hence, in its present form, the electrostatic loudspeaker is mainly of use as the high-note reproducer in a dual loud speaker

## WHEN USING A PENTODE



The connections for a condenser speaker when using a pentode are somewhat different from those for a triode output valve. Two suitable schemes are illustrated here.

unit, a moving-coil being used for the low notes.

When coupling to the output stage of the receiver it must be remembered that it behaves just like a pure condenser, its impedance decreasing as the frequency increases, so the type of coupling used depends upon the type of output stage, i.e. whether triode, pentode or push-pull.

## With a Triode

Fig. 2 shows two methods of using an electrostatic loudspeaker in conjunction with a moving-coil unit and a triode output valve. The simplest form is 2 (a), the electrostatic speaker being merely connected between the anode and H.T. negative, but this method has several disadvantages, chief of which is that no means is provided for adjusting the relative outputs of the two speakers.

Much more satisfactory results are given by 2 (b), and fully justify the extra cost of components. The 1 henry choke prevents the high frequencies from reaching the moving-coil unit, and the 2-henries choke by-passes the low frequencies from the electrostatic unit.

By adjusting the variable resistance R the input to the electrostatic speaker can be varied and in this way an excellent variable tone control is obtained.

When a pentode output valve is used and the electrostatic unit is connected direct to the anode a resistance must be used in series as shown in Fig. 3 (a). This also gives a certain amount of tone control. A more satisfactory arrangement is indicated in Fig. 3 (b). Here the condenser C of 0.1 mfd. by-passes the high notes from the moving-coil unit and the choke Ch of 2 henries by-passes the low notes from the electrostatic unit.

## Balanced Reproduction

The 20,000-ohm potentiometer, connected direct between anode and H.T. positive, prevents the load impedance from rising with frequency to too high a value, and movement of the slider provides a full range of tone control. It will be seen that with the slider at one end the electrostatic unit is completely cut out, and at the other end the moving coil unit is cut out. Hence, an intermediate position can be found to give the right balance of bass and treble.

By adjusting the values of by-pass condenser and choke slightly to suit the speakers used a dual loudspeaker unit can thus be constructed with a very wide range of frequencies.

## MORE READERS PRAISE—

### SUPERLATIVE

I beg to take the liberty of writing to you to thank you for giving us such a fine circuit as the S.T.300 Star, which I use in Mark II form. I had a four-valve screen-grid set which was considered good in its way, but I have been hankering for an S.T. Three ever since. The S.T.300 Star is a splendid set—superlative, I call it. Smooth as a kitten's wrist, it is, and pours forth sweet music without any effort.  
Thos. F. Heastip, 96, Southwood Road, Ramsgate.

### VERY GOOD

I am getting very good results from your S.T.300 Star.  
Sidney Lewis, 4, Towerlands Street, Liverpool.

### THE BEST THREE-VALVER

My aerial is hitched to S.T.300 Star, which is the best three-valver I have ever had the pleasure to handle; and I have been at radio since early 1923. The tone and power of the set gets me guessing; it's a marvel where it comes from.  
I have been a reader of THE WIRELESS CONSTRUCTOR since No. 1, and have tried a good many sets described, but none can approach anywhere near your S.T.300 Star.  
P. Hooper, Carriola, Silvester Road, Cowplain, Portsmouth.

## —THE FAMOUS S.T.300 STAR

### GOING GRAND

I have built an S.T.300 Star for my father, and it is going grand at his home.  
D. C., Southell Park, Biggleswade.

### ACCLAMATION

Might I add my quota to the chorus of acclamation evoked by the S.T.300 Star?  
A. C. M., West Avenue, Church End, N.3.

### ALL YOU CLAIM

I have changed the S.T.300 to the S.T.300 Star, and it is all you claim—plenty of stations, and the volume is so great that people hearing for the first time think that it is an all-mains set, and are surprised when I tell them that it is a battery set with three valves.  
B. Freeman, 2, Cambridge Villas, West Street, Woking, Surrey.

### A WONDERFUL SET

I have built the S.T.300 Star, and find it a wonderful set for getting stations.  
W. Tomlin, Aylesbury Road, Watworth, S.E.17.

### ALMOST PERFECT

Then you published the S.T.300 Star. What a set! It is almost perfect.  
A. G. Renvoize, Essex Road, Islington, N.1.





The Pilot KIT SERVICE was founded in 1919.



See the PILOT on the carton. It's a real guarantee.

**ALL-WAVE 2 • S.T.400 • SCREEN-PACK 4**  
**S.T. SUPER-GRAM de LUXE**  
 S.T. 300 STAR • S.T. 300 STAR MARK II

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**S.T.300 STAR**

**KIT "A"** Author's Kit of First Specified Components, including Ready-Drilled Panel, and Terminal Strip, with METAPLEX Baseboard. Cash or C.O.D. Carriage Paid, £4/7/6. Balance in 11 monthly payments of 8/3. SEND **8/-** ONLY

**KIT "B"** As for Kit "A," but with Set of Specified Valves only. Cash or C.O.D. Carriage Paid, £5/12/6, or 12 monthly payments of 10/3.  
**KIT "CT."** As for Kit "A," but with Valves and PETO-SCOTT S.T.300 Star Table Cabinet. Cash or C.O.D. Carriage Paid, £6/12/0, or 12 monthly payments of 12/-.

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**KIT "A"** Author's Kit of First Specified Components, including Ready-Drilled Panel, Terminal Strip and METAPLEX Baseboard. Cash or C.O.D. Carriage Paid, £4/0/0. Balance in 11 monthly payments of 7/3. SEND **7/3** ONLY

**KIT "B"** As for Kit "A," but with Set of Specified Valves only. Cash or C.O.D. Carriage Paid, £5/5/0, or 12 monthly payments of 9/6.  
**KIT "CT."** As for Kit "A," but with Valves and PETO-SCOTT Table Cabinet. Cash or C.O.D. Carriage Paid, £6/4/6, or 12 monthly payments of 11/6.

**KIT "CC"** As for Kit "A," but with Valves and PETO-SCOTT Console Cabinet, with Shelf and Baffle, less Speaker. Cash or C.O.D. Carriage Paid, £6/13/6, or 12 monthly payments of 12/3.

IF PETO-SCOTT P.M. SPEAKER REQUIRED WITH ANY OF ABOVE KITS, add 19/6 to Cash or C.O.D. Price, or 1/9 to Deposit and each Monthly Payment.

SEND FOR LATEST LISTS

**S.T. SUPER-GRAM DE LUXE** Described in last issue.

Detailed list of parts sent on request, by return of post.

ANY ITEMS SUPPLIED SEPARATELY. ORDERS VALUE OVER 10/- SENT CARRIAGE PAID AGAINST CASH or C.O.D.

**KIT "A"** Author's Kit of First Specified Parts for Radio Chassis, Amplifier Chassis, Radio Mains Unit Chassis, and Amplifier Mains Unit Chassis, less valves, cabinet, speaker and Garrard Record-Change. Cash or C.O.D. Carriage Paid £27/7/6. Yours for **67/6** and 11 monthly payments of 48/-

**KIT "B"** As for Kit "A" but including complete set of Specified Valves. Cash or C.O.D. Carriage Paid, £36/10/6. Yours for **£5.10.6** and 11 monthly payments of 62/-

**VALVES:** Complete Set of Specified Valves for Radio Chassis, Amplifier Chassis, and Amplifier Mains Unit Chassis. Cash or C.O.D. Carriage Paid, £9/3/0. Yours for **33/6** and 5 monthly payments of 39/5

**SPECIAL C.O.D. PARCEL**

Containing Set of 3 Peto-Scott Chassis ready-drilled exactly as specified, and 1 Baseboard ready-drilled, 5 Peto-Scott Brackets and Peto-Scott Screened Lead (low capacity). Cash or C.O.D. 16/-.

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**RADIO CHASSIS**

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**VALVES:** Set of Specified Valves for Radio Chassis. Cash or C.O.D. Carriage Paid, £4/8/0, or 6 monthly payments of 15/9.

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**KIT** comprises Author's first Specified Parts for Amplifier Chassis, less Valves. Cash or C.O.D. Carriage Paid, and 11 monthly payments of 6/8. Yours for **6/6**

**VALVES:** Set of Specified Valves for Amplifier Chassis. Cash or C.O.D. Carriage Paid, £3/17/0, or 6 monthly payments of 14/-.

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**KIT** comprises Author's first Specified parts for Radio Mains Unit Chassis. Cash or C.O.D. Carriage Paid, and 11 monthly payments of 10/3. Yours for **10/3**

**AMPLIFIER MAINS UNIT CHASSIS**

**KIT** comprises Author's first Specified parts for Amplifier Mains Unit Chassis, less Valves. Cash or C.O.D. Carriage Paid, £7/0/0, and 11 monthly payments of 12/9. Yours for **12/9**

**VALVES:** Specified Valve for Amplifier Mains Unit Chassis. Cash or C.O.D. Carriage Paid, £1/0/0, or 6 monthly payments of 3/9.

**ALL-WAVE TWO**

**KIT "A"** Author's Kit of First Specified parts, less Valves and Cabinet. Cash or C.O.D. Carriage Paid £3/5/0. Yours for **6/-** and 11 monthly payments of 6/-

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**KIT-BITS** You pay the Postman. We pay post charges on all orders over 10/-. GREAT BRITAIN ONLY.

- 1 Peto-Scott Figured Oak Cabinet 15 0
- 1 Peto-Scott Ebony Panel, 12" x 7", ready drilled 2 6
- 1 Peto-Scott METAPLEX Baseboard, 12" x 10" 1 6
- 1 Polar .0005-mid. tuning condenser, type No. 2 S.M. 6 6
- 1 Colvern Screened Coil, type T.D. 8 6
- 1 Ferranti L.F. Transformer, type A.F.4 17 6
- 2 Cosor Valves, as specified 12 6

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**S.T.400 BATTERY MODEL**

**KIT "A"** Author's Kit of specified parts, Ready-Drilled Panel and foil-covered Baseboard, but less Valves and Cabinet. Cash or C.O.D. £4/12/6. Send **8/6** only

Balance in 11 monthly payments of 8/6.  
**KIT "B"** As Kit "A" but with Valves, less Cabinet. Cash or C.O.D., £6/3/0. Carriage Paid. Send **11/3**

Balance in 11 monthly payments of 11/3. only  
**KIT "C"** As Kit "A" but with Valves and Cabinet. Cash or C.O.D., £7/0/0. Carriage Paid. Send **12/9**

Balance in 11 monthly payments of 12/9. only

**SCREEN-PACK 4**

**KIT "A"** Author's Kit of First Specified parts, less Valves and Cabinet, Cash or C.O.D. Carriage Paid £6/9/0. Yours for **11/9** and 11 monthly payments of 11/9.

Set of 4 Specified Valves 15 6  
 Peto-Scott Cabinet, as specified 1 0 0

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

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**AS WE  
FIND  
THEM**

**NEW  
APPARATUS  
TESTED**

**W.B. Loudspeakers**

**I**N spite of the high standard of efficiency which W.B. loudspeakers have reached and maintained during the past year, the firm has not been content to rest on its laurels. The new season's permanent magnet models have been still further improved in several ways. One of the outstanding features of these new models is the use of a special magnetic alloy giving a much greater magnetic flux



**VERY SENSITIVE**

*The W. B. "Stentorian" Senior is priced at 42/-. It is remarkably sensitive, and has an oversize diaphragm. An ingenious switching scheme provides for accurate matching.*

than before, and in consequence a much increased sensitivity.

In fact, the sensitivity is such that the new instruments give almost double the volume of previous models from the same power input. The improvements in the design of the magnets have made it possible to provide a larger "air gap," which, in conjunction with the use of a new type of speech-coil former, has improved the general efficiency of the speech coil assembly. One result of the alteration in the design of the "air-gap" is its complete protection from dust, which latter, as many constructors will appreciate, can have a most detrimental effect upon the reproduction. W.B. are certainly thoughtful.

The latest W.B. chassis takes the form of a non-resonant casting, thus eliminating another possible source of trouble in so far as tone is concerned.

Accuracy in matching-up to any output has received special attention, and an ingenious switching arrangement enables the speaker to be matched to practically every type of output valve, or, if desired, adapts the

*Interesting reviews of the latest apparatus submitted by radio manufacturers and traders for examination and test in "The Wireless Constructor" laboratories.*

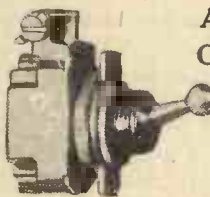
instrument for use as an extra speaker with any type of set.

The new W.B. range will be known by the name "Stentorian," and there are three models. The Senior is priced at 42s., and has an oversize diaphragm. The makers claim that the sensitivity of this model is such that it will give good domestic volume from a two-valve set almost anywhere in the British Isles.

Moreover, it will carry from 4 to 5 watts of undistorted output without distress.

The other two models are the "Stentorian" Standard (priced at 32s. 6d.), and the "Baby," which is only 22s. 6d.

The Standard is similar to the Senior, but has an 8-inch cone, whilst



**A RELIABLE COMPONENT**

*A British Radiophone toggle switch, which can handle up to 250 volts, 3 amperes.*

the "Baby" is a midget speaker, and is provided with a normal 3 ratio or Q.P.P. input transformer.

The new models are undoubtedly excellent examples of the most modern developments in loudspeaker design, and constructors—in particular battery-set users—should certainly lose no opportunity in obtaining a demonstration.

**A Neat Switch**

We have recently had the opportunity of testing one of the neat toggle switches manufactured by the British Radiophone Co. This switch, which we illustrate on this page, is able to handle 250 volts, 3 amperes. Two small but substantial terminal screws are fitted, and these project at an angle for easy and well-separated wiring. Moreover, the movement is light, but quite definite in its action. We can

recommend this well-designed little component.

**Two Useful Brackets**

Have you ever been faced with the problem of having to mount a wet electrolytic condenser on an ordinary baseboard? If you have you will agree that it's no easy matter. The trouble is that wet electrolytics need to be mounted in an upright position.

If you have a metal chassis all you have to do is to bore a hole and simply secure the condenser by means of the special nut provided. This at the same time gives you one connection to the condenser, since the chassis forms part of the "earth-line" of the set.

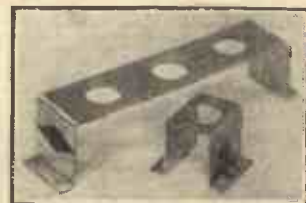
But when there is nothing but a wooden baseboard—But, that enterprising firm, Peto-Scott, have solved the difficulty by placing two very useful little brackets on the market.

There is a single bracket (4d.) to take one condenser or a triple bracket (1s.) for mounting two or three condensers. You just secure the condenser to the bracket as you would to a metal chassis, then join the terminal on the bracket to the "earth-line," and the job is done.

**Hydra Condensers**

With reference to our report in last month's issue on the new T.M.C. Hydra condensers fitted with terminals, readers will be pleased to learn that there is no difference in the price between these condensers and those fitted with soldering tags.

**A PROBLEM SOLVED**



*Two useful electrolytic condenser brackets for use with ordinary baseboards.*





**E**XHIBITION time always thrills me. I almost cry with excitement as I read the newspapers before and after. Below will be found typical reports.

One firm informed our representative that they had sold over 150,000 sets the first day, and that they now had enough orders to keep their factories busy, night and day, for seven years.

Another company in the West of England informed us that as a result of the good business done at the exhibition they had had to take on a further forty thousand staff. During the year they expect to increase this by ten thousand per month.

"We don't know which way to turn," said the sales manager of a prominent wireless firm. "We are three years late with our model of 1932.

The superb performance of our latest type has resulted in such a volume of business—certainly not less than half a million sets—that we doubt if the public will ever see one. A pleasing feature is the great increase in business from the Dutch East Indies."

#### A Forecast

Next year's Olympia is going to beat this one hollow. I anticipate next years' papers will read somewhat as follows:

Come to the radio fair and ride on real golden hobbyhorses (22. carat)!

I rode on a diamond studded giraffe and enthusiastic listeners can do the same. Then there is the Great Rainbow Slide—a gorgeous multi-coloured thrill experienced by all who have mounted the great chromium staircase which reaches from the Palace of Hours to the Great Celestial Tower—a flashing structure made of 50,000,000 pieces of real glass—from which vantage point every square inch of the great exhibition may be seen.

#### Charging the Visitors

The refreshment rooms this year are built to resemble accumulators—a novel touch which produced gasps of

Forfarshire by hand by an aged artisan and his son, who alone held the secret of the manufacture of this special glass. It is known as anti-lion plate.

One of the most popular stands was that of a new firm specialising in an artificial aerial which, it is claimed by leading authorities, will give signals a hundred times stronger than those obtained with an ordinary aerial. It is no bigger than a thimble. The stand consisted chiefly of a full size section of a jungle and the branches of the real trees (imported from Honduras) were clustered with five thousand real monkeys. A couple

of monkeys were also on the stand to answer technical queries.

The theatre accommodates 230,000 people at a sitting, and the B.B.C. stars were a great draw. Queues five miles long stretched

---

Our popular contributor is in fine fettle this month in dealing with the diversity of subjects on which he ponders in his armchair during "off-duty" moments. Amazing Exhibition reports, a legal question, and how Eddy discovered a cure for cat's mange while investigating the negative charges obtainable while stroking cat's fur, figure largely in this month's contribution. Mr. Scott-Taggart also comments on some of his correspondence, appreciative and otherwise.

---

delight from the vast crowds that surged into them.

As usual, the valve firms had their stands festooned with beauties from the Elstree film studios, while a loud-speaker firm had an army of three hundred Zulu warriors who distributed leaflets.

One of the lesser attractions was the stand of a radio firm which consisted chiefly of five hundred African lions, which stalked about in a huge sound-proof glass case. Altogether 35,300,000 panes of glass were required for this lion cage, and each was made in

from the doors of the exhibition and seventeen policemen were killed the first day by disappointed visitors who were unable to obtain seats.

#### Future Attractions

"We hope" said an official "that the deaths will be fewer next year. We are arranging to increase the accommodation to seat 750,000 visitors. We shall also have several side shows. There will be five hundred fortune-telling booths, seventy bearded ladies, a swimming pool to hold 50,000 bathers, and we have arranged to bring



## The Puzzling Problem of Ghostly Hall

over fifteen thousand real Bengal elephants. . . ."

The above is a forecast, but I dare say there will be a few wireless sets there.

### Hints and Tips

A woman's magazine has fallen into my hands and I must confess that I am a little under its influence in offering the following hints :

A good way of removing tobacco stain from the anodes of valves is to steep them overnight in hot lemon juice.

Food particles so apt to get between condenser vanes during the construction of sets, may be removed by holding the condensers up to a strong light and whistling through the vanes.

Presets which are inclined to stick may be made to work satisfactorily by smearing the surfaces with bacon fat and then dusting lightly with Fuller's earth.

To prevent tobacco ash from getting into reaction condensers, anode

versities are asleep and do not know what is going on around them. Don't you believe it. A don can be arch, flippant and modern. And those who set examination papers can twist the student's tail with questions of a whimsical but modern flavour. Here is a legal question which gave me a shock :

### Organised Annoyance

Q. 9. To the great indignation of the neighbours, Mr. Newlyrich, an artistic man, sensitive of ear and nose, purchased Ghostly Hall. His neighbours agreed to drive him away if possible.

Mr. Heavy sunk a well on his land so as to draw off the underground water so that Newlyrich had to go far to get water for domestic purposes ; Mr. A. Regime built a hideous erection which entirely shut out the beautiful prospect from Newlyrich's southern windows and made his studio too dark to be any longer used as such ; Col. Martial

Fécamp through his very loud speaker every morning from midnight till 3 a.m., thereby jarring upon Newlyrich's musical ear and causing him much loss of sleep.

Advise Mr. Newlyrich.

My own advice to Mr. Newlyrich would be to instal an S.T.600 this autumn and to open his windows. The signals from Fécamp and elsewhere would jar on nobody's nerves. The neighbours, hearing the glorious volume of sweet melody from Europe's choicest stations, would come to call on Mr. Newlyrich and stay for hours listening.

### The Complete Solution

Even if their hearts remained unmelted, Newlyrich would be so enthralled with his new acquisition that he would not want to look at the scenery, would not smell the sewage farm, and, in fact, would not care two grid leaks what his neighbours did.

\* \* \*

To Frank Fisher, 18 years, of Leemoor, Cornwood, S. Devon. Many thanks for your letter which is greatly appreciated. Let me hear of your future experiences; especially of your aerial which you never earth. Holy Writ gives you a clear 52 years in which to get struck by lightning.

\* \* \*

The short-wavers are at it again. The Hon. Secretary of the All-England Chapter of the Empire and International Short-Wave Club writes :

" We should like to draw your attention to the fact that we are not allied with the International Short-Wave and Television Society, which is quite a separate organisation and has nothing whatever to do with our own club.

" We are a club formed to foster short-wave communication between the different countries which form the Empire, and to encourage the use of short waves for communicating with brother hams across the Atlantic and other hams in foreign countries.

### Now Then, Hams!

" All those who are interested in short waves should communicate with our short-wave traffic manager, who will be pleased to supply Q.S.L. cards and printed notepaper on receipt of the usual subscription, details of which are obtainable from any of our offices. Provincial chapters are being formed

### S.T.400 RECEIVERS WIN FIRST PRIZES



Some of the home-constructed receivers which were exhibited at the annual show of the Nottingham Corporation Transport Radio Club. Among them may be spotted famous S.T. designs, and both an A.C. S.T.400 and a battery S.T.400 won first prizes.

couplers, etc., while building a set, a good plan is to avoid smoking

Mildew on screen-grid chokes is best removed by rubbing the affected part with the inside of the skin of a banana.

\* \* \*

You may think that the older uni-

set up a hospital for the disfigured and deformed, the sight of the inmates causing Newlyrich great mental distress ; Sir L. Dedlock started a sewage farm, the odours from which seriously incommoded Newlyrich ; and the Hon. Y. Blood poured out the dance music from



# IT STANDS ALONE



## THIS NEW "ATLAS" UNIT HAS 6 OUTPUTS AND GIVES THE MOST POWER at the LOWEST COST

A MODEL FOR EVERY SET.

TRY ONE FREE ON YOURS.

There is an "ATLAS" Unit to make any Battery Receiver Mains-operated without alteration to set or valves; giving vastly improved performance for one-fiftieth the running cost of dry batteries. Prices from 39/6 cash or 10/- deposit.

THE new "ATLAS" Model T10/30 is the last word in Mains Unit design. In power, output and value, it surpasses any mains unit ever made. No other unit in the world provides tapped alternative outputs of 10, 20 or 30 milliamps with alternative voltages of 120 or 150 for only 69/6 cash.

### WHAT THIS MEANS TO YOU.

You can run your battery radio set of any type or size from the mains and cut running costs from 50s. a year to less than ONE SHILLING A YEAR. Moreover, it means that no matter what battery set you may buy or construct in future years, you are assured of the correct voltages and outputs you require.

If you buy the "ATLAS" T10/30 and insist on it, you put an end for ever to the expenses and annoyances of battery replacements, and accumulator charging.

### SPECIFICATION

H.T. Tappings—60/80 v. (min. and max.), 50/90 v. (min., med. and max.), 120 v. and 150 v.

H.T. Outputs—10, 20 or 30 m/A. at either 120 or 150 v.

L.T. Trickle Charger—2 v. at 0.5 A.

For A.C. Mains 100/125 or 200/250 v., 40/120 cycles. Model for 25-cycle mains at same price.

Guaranteed for 12 months. Westinghouse Rectifiers.

NO OTHER UNIT GIVES SO MUCH FOR SO LITTLE.

Ask your dealer for a FREE demonstration to-day.

POST THIS COUPON NOW!

Messrs. H. CLARKE & Co.  
(M/cr) Ltd., Patricroft,  
Manchester.

Please send me full details of the unique new T10/30 and other "ATLAS" Mains Units.

Name .....

Address .....

57/7 .....

# ATLAS

CLARKE'S  
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## MAINS UNITS

H. CLARKE & CO. (M/CR) LTD., PATRICROFT, MANCHESTER

7 London; Bush House, W.C.2.

Glasgow; G.E.S. Co., Ltd., 38, Oswald St.



## "He Made a Very Great Deal of Money"

to encourage short-wave working by short-wave hams in this country both amongst themselves and other short-wave enthusiasts abroad.

### PERSEVERANCE CORNER

F.P.W., Worthing, writes :

*You may be interested to hear that I have at last managed to get your S.T.100 to work. Results are quite good but the selectivity is poor. The set was better seven years ago in this respect, but I then had trouble with a burbling noise which has now gone.*

*Yours gratefully,  
F.P.W.*

*P.S.—Can you tell me how to stop the catwhisker from slipping off the crystal?*

"No ham who has short waves at heart should fail to join our Short-Wave Club. But we earnestly request you to point out that we have no connection with any other short-wave organisation, however similar the name may be.

Yours cordially,

The letter has apparently something to do with short waves. Just please yourselves, boys.

\* \* \*

*Bouquet Department. S. P. of Lower Broughton writes :*

*You are quite right to ignore all comments about your photographs. No one can tell a sausage by its skin.*

\* \* \*

*Tactful Enquiry Dept. L. B. W. (I seem to have seen those initials before somewhere) of Belfast writes :*

*Do you design receivers out of love for the home constructor and the art, or do you find it a very well paying occupation?*

*I'm not grumbling.*

### The Eddy Research

The research which is necessary before the Life of Eddy can become a continuous record is proving very laborious. There is a gap of five years between his return to Amsterdam and his discovery of Eddy currents.

Very few incidents during these five years are publicly known. He visited Paris on several occasions to study conditions, and found them interesting.

It is certainly a fact that he made a very great deal of money out of his book, *The Manual of Modern Frogs' Legs*, in which he disclosed all that

was then known about electricity. Hitherto his chief source of income had been from the sale of the ointment for cat's mange which he had accidentally discovered while investigating the negative charges (in those days positive charges) obtainable by stroking cat's fur.

### The "Thumbs-Up Rule"

It was while insulating the fur of the sick pet cat of the king of Prussia that the cure was discovered. Eddy, who was trying to prove his five-fluid theory of magnetism never admitted his discovery was an accident, just as he falsely claimed all the credit for his Thumbs-up Rule for telling which way an electrified cat would jump when thrown out of a window.

It was his demonstrator assistant at the University of Göttingen who carried out the tests with some fifty cats, half of which were electrified with bars

when Eddy claimed the world's applause. Eddy, with that quiet calm that marks the great scientist, replied : "When you're a professor you'll do the same."

Eddy, of course, had his enemies. What person of eminence hasn't? Volta is declared to have said at Leghorn\*. "He no cutta any ice." Which was a singularly unfair remark to make about the inventor of the Ice Cream Wafer Experiment.†

### A Question of Knobs

I have had a letter from Little Hogsbottom. Yes, believe me, I do get letters from such extraordinary places. And as the name catches my eye, I am more likely to mention such correspondence in these columns. And I find that the more indelicate the name of the place the less decorous the letter.

This particular little hog is, however,

### MORE MARCONI SHORT-WAVE DEVELOPMENTS



*There is little doubt that many valuable everyday uses will be found for micro-waves in the future. Already they are proving their merits in a variety of ways, and here we see the Marchese and Marchesa Marconi on the Elettra on the occasion of its being steered "blind" between two buoys by means of short-wave radio control.*

of sulphur and half with ebonite rods.

The Rule is used even to-day in modified form by investigators of the Schottky effect. Without it, they can never remember whether the electrons turn to the left or to the right. Even with the aid of the Rule, they get it wrong.

The demonstrator was indignant

not so bad. I'll spare you three pages of quite conventional and undistinguished abuse. He then draws my attention to a cutting which reads :

*Kubelik's fingers are almost as*  
(Please turn to page 288.)

\*Italian town noted for its university and poultry.

†Which proved that when ice cream was placed between two exactly similar wafers it oozed out at each side.



# What My Friends Think of Broadcasting

By Rosita Forbes

Nor long ago I was at the sort of house-party which would have delighted a paragraphist with a thirst for capital letters. Almost everybody represented news. Only the weather failed to play up. So we sat—cold and rather miserable—in superlative garden chairs, with the lawn sloping down to a deserted bathing pool, and listened by radio to a spirited description of tennis finals in Paris.

The loudspeaker was in a summer-house. In terse and vivid phrases an eye-witness described the struggle between the world's champions, interpolating here and there remarks in a lighter vein which I'm sure he felt were a concession to that mythical "woman's point of view," at once the bogey and the goal of every editor!

## A Score of People

For the whole of a summer's afternoon a score of people—politicians, film-stars, diplomatists, and debutantes—all of them exhausted after a strenuous week in London, sat in what appeared to be a peaceful—even a dreamy—garden and listened to the tale of battle.

At one moment it was observed that a well-known Air Marshal had his fingers in his ears. An actress, with honeygold hair and skin (who looks at least six feet tall when she trails across the screen, but who measures a bare five feet in real life), curled herself up on the only seat cushioned in blue and, sure of a becoming background, went to sleep. A bride of twenty-two, in shorts, a scrap of a shirt and spectacles rimmed with transparent pink horn, threw back her head and clasped her knees ecstatically.

## "It Stops Me Thinking"

"Isn't it lovely!" she said. "I do like noise, don't you?"

When the match was finished and silence weighed upon the garden like a pall, I said:

"Well, now, you can all tell me just

*The various expressions of opinion on broadcasting recorded in this article by Rosita Forbes are definitely genuine—though you may not think so! For obvious reasons names cannot be given, but our distinguished contributor has given a few clues which might arouse the interest of our readers.*

—The Editor.

what you do think about broadcasting."

There was complete negation of sound. The English have few ideas, and when they do chance to possess anything so rare as an original thought, they're much too afraid of losing it to talk about it! However, after much persuasion, a daughter of the very-rich, who had run away from home to earn her own living, said:

"I think the radio is better company than a dog. I turn it on at night when I'm alone. It stops me thinking."

"Do you listen to it?" I asked.

"Oh, no, but it's companionable. It stops me feeling lonely!"

It occurred to me that to road-makers, or isolated frontier rangers

snowbound in Northern forests, to geologists and prospectors, missionaries, traders and the T.T.T.'s (typical tropical tramps), who wander about from cabin to camp in the back of beyond, wireless must bring the same relief from that feeling of being cut-off from the world in a self-made prison.

## Too Little Dance Music

At this point the film-star woke up, shook back a mane of blonde hair (with half an inch of ordinary brown at the roots) and said:

"Radio's a lot better in England than in the States. Over there, the air's so thick with advertisement, it don't make sense." After this there was a pause. Nobody seemed inclined to break it, so with the utmost firmness, I asked each in turn:

"What d'you like best on the wireless?" The answers were monotonously similar.

"Dance music, of course, and there's much too little of it," said a business woman who has made a success out of chain laundries. "But it doesn't come on till ten-thirty and by that time I'm so tired I'm in bed. If I

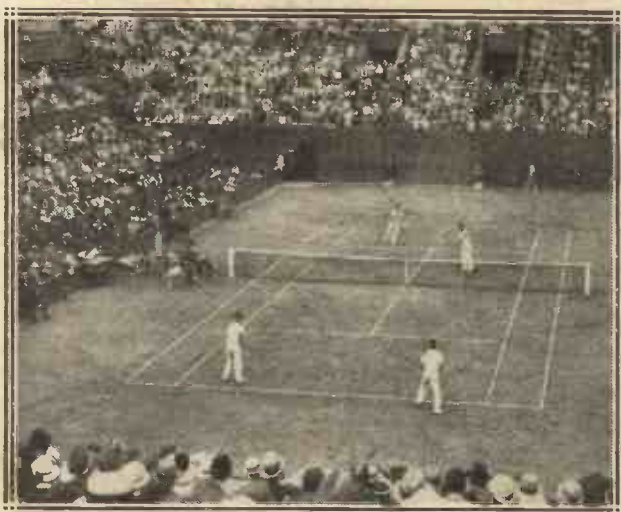
try to get a decent band at eight o'clock, I burst into the potato blight, or the children's hour."

There was general agreement.

## "Too Heavy"

"That's it!" said a feline beauty, without a bone in her body, whose grandmother was one of the wives of a Javanese Sultan. "There's plenty of music, but it's too heavy. They ought to have more light stuff. I

## THE TENNIS FINALS IN PARIS



"In terse and vivid phrases an eye-witness described the struggle between the world's champions . . . ."



## Many More Light Programmes Required

tried the wireless while I was having my bath this morning and it was all about cooking."

Several débutantes registered horror. "I always turn on the gramophone; thank goodness it's laid on to every bathroom here," said one.

A grey-haired Cabinet minister put the tips of his fingers together and said: "Sport is excellently reported. It isn't necessary to go to Wimbledon, or Epsom. One can see so much more of tennis and racing if one stays at home and listens."

A flying marquis, whose arrival by plane had sent all the guests rushing helter-skelter about the county with bath-towels trailing behind their cars, in order to guide him to confused and unsuitable landings, added: "The news is good, too. I don't have to read the papers so much. I can get it all as a tabloid with my coffee."

### "Who Wants Politics?"

But the youngest of the party, who was quite irresistibly lovely, broke in with: "Oh, they don't have the right sort of news at all. The other day I had to wait ages, through the

how you hear the thud of tennis balls, or bookies yelling the odds? Well, when there's a murder being described, somebody ought to do the last gurgles of the corpse. It would be much more exciting."

"You're not very helpful," I said.

### Several Alternative Stations

The hostess, who, at the time of her marriage, was described as the richest girl in England, and who is certainly the kindest, said: "Wireless would be ideal if, at any hour, one could tune in to exactly what one wants. I don't see why things shouldn't run simultaneously. I mean, why can't one station do only dance music throughout the day. Another could provide classical programmes, a third news and sport, a fourth educational stuff, and a fifth travel. I like travel, but it must have a name attached to it. That's a point! They don't have enough names on the wireless. They get somebody one's never heard of to talk about Tientsin or Timbuctoo, and then one wonders—quite unjustifiably—whether they've ever been there."

### "THERE WILL BE DANCE MUSIC UNTIL MIDNIGHT."



"What d'you like best on the wireless?" The answers were monotonously similar. "Dance music, of course, and there's much too little of it." Here is Harry Roy and his band, one of the favourites of the ether.

dullest political speeches, till I got the trunk murder. I do think they ought to have had that at the beginning. Who wants to hear politics?"

"Cabinet ministers ought to be banned from the microphone—they're enough to bust it, they're so dull," agreed an M.P. who won a spectacular seat for the National Government.

Encouraged, a girl who makes news for the Sunday columnists, continued. "I think news ought to be illustrated with appropriate sound. You know

"Yes, that's true," said the Air Marshal, who must have removed his fingers from his ears. "And what's more, they pare down their travel stuff for fear it should have any political or commercial significance, until it's so thin it tells you nothing at all."

### "Take Off the Brake"

"In fact, what we want is indiscretion. Tell the B.B.C. to take off the brake and the blinkers, what?" said a youth whose attempts to break

the flying record to Australia in a single-engined machine have so far ended at Constantinople and Baghdad.

Conversation became general, but the theme remained. Everyone was agreed upon the question of light music. They wanted more of it and they wanted it on tap all day. They thought the hostess' idea was great—simultaneous programmes covering the different fields which, at present, are all jumbled up together.

### News All Day

"It's too much of a nerve strain waiting for the exact moment to tune in," said an under-secretary of state who had hitherto been silent. "I don't see why news shouldn't go on all day, especially if it were filled out a bit. In Russia there is a commentator who puts a background to the news."

"The wireless seems to me like Ruth Draper on gardens," said a dreamy voice belonging to a stockbroker. "Whenever I turn the thing on, I'm always too late, or too early."

The Cabinet minister, who was treating the discussion seriously, ended it with a judicious, "You must remember that though we, here, represent a wide range of interests and activities; we are not the people most dependent upon the wireless. It must be an inestimable boon in lonely places where there is nothing to do after work is finished."

### Bugs the Best

On my way back to the house I saw a gardener disconsolate among blighted—well I think they were "erimurus," or, perhaps, in the plural "erimuri" (those huge, fluffy, pink or white, spiky flowers like caterpillars rampant). On an impulse I asked him if he ever listened to the wireless.

"Oh, I do regular," he replied.

"What d'you like best on it?"

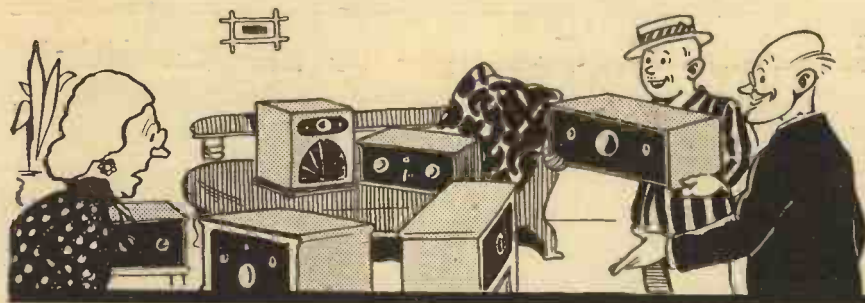
"Bugs," he replied, without a moment's hesitation.

"What?"

"Well, it do know a powerful lot about bugs," he said, looking morosely at the erimurus (or eremuri), which were not at all fluffy, or huge, or spiky, or any of the things they ought to have been.

And there you have it in a nut-shell. The wireless knows a powerful lot about everything, but I'm afraid—dreadfully afraid—the majority of people want to be amused rather than informed.





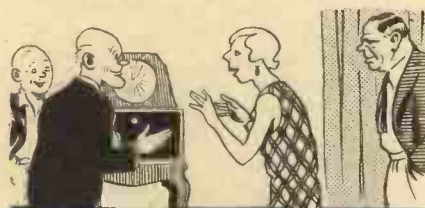
In  
Lighter  
Vein  
By  
WAYFARER

THE Professor and I have just returned from a very jolly holiday in that pleasant little seaside spot Shrimpsville. Shrimpsville, which, like Skegness, is so bracing, has made new men of us, and I think I may say without undue immodesty that we have done a good deal for Shrimpsville during our fortnight within its borders.

**Our Shrimpsvillian Introductions**

If we have done nothing else we have taught the Shrimpsvillians to expect something better in the way of quality, of sensitiveness and of selectivity from their wireless sets than they had previously been content with. You know how distressing it is for experts like you, dear reader, and me to visit the homes of others in which receiving sets are in operation. Frankly, did you ever hear another man's set yet

**A "GOOD TURN"**



"I expect we can make a bit of an improvement . . ."

that you couldn't have improved by just doing this or that? You didn't? Then you are a true wireless man and a worthy reader of THE WIRELESS CONSTRUCTOR.

Thanks to introductions from members of the Mudbury Wallow Wireless Club, the Professor and I found heaps of friends down at Shrimpsville. On our very first evening there we were invited to play bridge with the Pimpleby-Joneses at "Seaview."

**The "Experts" Get Busy**

Charming people, the Pimpleby-Joneses, but oh, the awful wireless set that was mumbling and snuffling out the second news bulletin as we entered their drawing-room. The Professor looked at me. I looked at the Professor.

Our inimitable pair from Mudbury Wallow have been on holiday, though they could not keep away from wireless. Their experiences during the "educational" campaign they conducted among the listeners of Shrimpsville make interesting reading.

Having shaken hands with our host and hostess, we moved by a common impulse over to the set. First, the Professor and then I twiddled this and that, but there was no improvement in the horrid sounds that came.

"How nice of you," cooed Mrs. Pimpleby-Jones, "to be interested in our poor little wireless set. Most of our friends who pretend to know something about wireless turn the knobs just as you have been doing; but we never expected that two of the world's greatest experts would pay any attention to it. Don't you think, though, that it's rather good?"

**Off Comes The Back**

"Ye-ees," I replied. "The reproduction is, of course, practically perfect, except that the poor announcer appears to be having difficulties with a half-swallowed potato. You will notice, too, if you listen carefully, that you don't hear the 'S' sounds at all, and that a funny little zizz occurs every now and then—well, don't you find it just a trifle trying? Then there's—"

"Oh, Mr. Wayfarer," gurgled the dear lady, "how clever of you to put your finger on all those things so quickly. We knew that there was something not quite right, and have always wondered just what it was."

"I expect we can make a bit of an improvement," smiled the Professor, "if you don't mind our just having a look inside the cabinet."

"Oh, but we couldn't dream of troubling you to do that."

"No trouble," said the Professor. "Believe me, it's a pleasure."

In a brace of shakes we had the back off the cabinet and were taking a look inside. It was a battery set, and we

disconnected both the batteries first of all to see that the connections were clean. I re-connected the H.T.B., and the Professor who was dealing with the accumulator, had got as far as L.T. — and was holding L.T. + in his hand when somebody asked him some silly question. He turned round to answer it and at the same time dropped the L.T. + tag on the H.T. + terminal.

**An Easy Get-Out**

There was quite a pretty display of blue flames which vastly intrigued the assembled company, who were crowded round us.

The Professor had gone as white as a sheet. But my well-known composure did not desert me.

"That," I said, "was an interesting and rather spectacular little test that is frequently applied. It shows quite definitely that all your valves are worn out.

"Look at this one, for instance," I continued, plucking a screen-grid from its socket and holding it up to the light. "Yes, absolutely threadbare." I dropped it into the coal-scuttle, where it exploded with a resounding pop.

"Yes, and this one, too," cried the Professor, scrutinising a pentode between his first finger and thumb. "Utterly moth-eaten."

Another jolly pop announced its descent into the coal-scuttle, followed

**FURTHER ADJUSTMENTS**



"... as for the selectivity—well, there just wasn't any."

by three more as I disposed of the remaining valves whilst the going seemed to be good.

"A very good thing," I went on, "that the Professor and I took a look



## The Receivers "For Repair" Continue to Accumulate

at this set. We were just in time. If those valves hadn't been changed you would have had really serious trouble."

### We Take it With Us

Mrs. Pimpleby-Jones was profuse in expressions of gratitude. Her husband said rather less, but urged on by her produced a complete set of spares from a cupboard. We inserted these and everyone called upon everyone else to observe how much better the set was.

"But not yet," I remarked, "as good as it might be. If you'll allow us, the Professor and I will take it back to our digs and put it into first-rate condition."

"No, I'll be blistered if you do," snapped Mr. Pimpleby-Jones, but his better half shushed him into silence.

"It would be absolutely too kind of you," she cried. "You can't possibly carry it. George, dear, do get out the car and drive the Professor and Mr. Wayfarer back."

### An Awkward Silence

On the following afternoon we had tea with Sir John and Lady Burple at "Seacroft." Theirs was a mains set. Once more the reproduction was not too good and as for the selectivity—well, there just wasn't any. As Sir John had a few tools handy we were soon at work inside the set. The thing was bringing in Hilversum and the Poste Parisien mingled together when the Professor's screwdriver skidded and complete silence followed.

### A CASE OF CHAMPAGNE



"This is indeed a holiday."

Once more the Professor paled. Again I leaped into the breach.

"These little adjustments are not too easy to make," I said. "The idea, as you know, is to get rid of one station. At the moment we've got rid of both. In a word, the selectivity is now too high. We won't bore you by finishing the job here. We'll take the set back to our digs and do it there."

"It's really too kind of you,"

chanted Lady Burple. John, dear, do get out the Rolls and drive the dear Professor and kind Mr. Wayfarer home."

The fact that wireless experts of our distinction were showing such kindness in the matter of adjusting wireless sets was soon noised abroad in Shrimpsville. In a day or two hostesses were battling for our presence at lunch, at tea, at dinner. They wanted us for breakfast, but I pointed out that both of us were on a strict diet and that we usually combined breakfast with lunch.

### Our Landlady Gets Worried

Anyhow, we lived upon the absolute fat of the land without spending a penny. This was particularly lucky since we had remarkably few pennies to spend.

"This," I observed to the Professor, as we clinked glasses filled from a sample of the case of champagne kindly sent us by Sir Hezekiah and Lady Orful; "this is indeed a holiday."

"It is," sighed the Professor, contentedly, offering me a cigar from the box that had just arrived with the compliments of Mr. and Mrs. Faraway-Fowlest.

Our landlady soon got used to our returning daily and nightly in Daimlers, Austins, Fords, Morrises, and whatnot. But by the end of the fifth day she began to be a little worried over the number of wireless sets that were occupying every available resting place in our sitting-room.

We told her all about it and explained that we were going to put in a real good morning's work on them as soon as we were feeling sufficiently braced by the glorious air of Shrimpsville.

### The End of a Perfect Stay

By this time we had sixteen sets awaiting just that little expert touch that would make them altogether different from the dull, distorting things that they had been.

There was the mains superhet from "Seabreeze," and the all-waver from "Seaholm," and the universal from "Seaspray," and the short-waver from "Seawave," and the battery straight from "Seaspume," and the portable from "Seacot," and eight others as well.

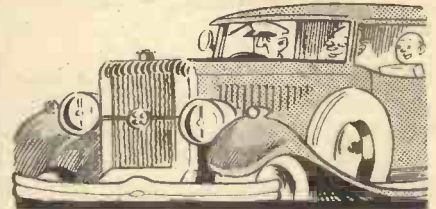
Each morning I said to the Professor, "What about getting to work on some of these sets?" Each morning he

said to me, "We'll spend the whole day on them to-morrow." Each afternoon we came back with another and each evening with yet one more.

When the last day of our visit dawned they filled not only our sitting-room and our bedrooms but also the hall, the bathroom, and the attic.

Before we departed we wrote the local wireless shop a letter stating that sets belonging to various owners were

### COLLECTING SETS



"... returning daily and nightly in Daimlers, Austins, Fords, Morrises, and whatnot . . ."

at our address awaiting slight adjustments. There followed a list of eighty-four with the names and addresses of their owners. We requested the good fellow to collect them, to adjust them and to return them to their owners with appropriate accounts.

As I said, we've taught the good people of Shrimpsville to expect better quality, better selectivity, and better sensitiveness from their sets.

I only hope they may get it.

### RAPID FAULT-FINDING

THE simplest way to locate faults in any wireless receiver is undoubtedly by means of a measuring instrument. But there are so many tests that may have to be applied that a measuring instrument for this purpose is of little use unless it is comprehensive.

The new range of "Pifco" All-in measuring instruments is particularly suited to constructors' needs. Pifco All-In-One Testmeters are available at prices ranging from 12s. 6d. to 42s., and in addition to measuring various voltage and current ranges, each instrument is equipped for valve and circuit testing.

Full details are available to readers mentioning this journal on application to the P.I.F. Co., Ltd., Shudehill, Manchester.



# THE GERMAN RADIO SHOW



The chassis of a typical low-priced German receiver. It is a two-valve single-tuned-circuit outfit.

As far as the receiver design is concerned, the German Radio Exhibition was a definite disappointment. There were still no portables, no transportables, and only one battery set. "Universal" valves dare not be introduced to the German market before August 1st, 1935, so that what the technically-minded visitor saw were just slightly improved editions of last year's sets. There are two exceptions to this: the one was a two-valve reflex receiver, and the second a three-valve reflex superhet. The introduction of these two sets obviously arose from the stringent price class arrangements made by the German Manufacturers' Association.

## A Novel Set

The reflex superhet, unfortunately, does not give very good quality, although selectivity is at a very high standard. It makes use of the new "Octode" valve as a frequency-changer, a hexode in the second stage, and a power pentode in the last stage. As in most cases, a mains energised moving-coil loudspeaker is fitted in connection with this set.

Prices are up by about 10 per cent. in Germany. The famous People's Set, the "Volksempfänger," still remains unchanged at its old price of 76mks. for the A.C. model. The battery "Volksempfänger" is the only modern battery set on the German market—official figures say that about one-third of the total number of German households are without electric light supplies, but seemingly the German manufacturer intends to disregard this potential market.

## Sensitivity Figures

It has now become a general practice in Germany to state figures for the

Details of the receiver designs available to the listener in Germany, and notes on the development of television apparatus in that country.

By

Our Special Correspondent.

sensitivity of a given receiving set. The high-class five-valve superhet has from 6 to 10 micro-volts sensitivity. The three-valve superhet has something like 25 to 30 micro-volts with the exception of one popular receiver which manages 15 micro-volts. This set is fitted with a highly interesting new tuning device. By means of this the set only receives stations belonging to a given country. When the indicator is turned to Italy, for instance, only Italian stations come in. Provision has been made to use this tuning device for all wavelengths.

## A TELEVISION RECEIVER



This new cathode-ray television receiver is intended for the new German standard pictures of 180 lines.

Television was by far the most important exhibit at this year's German Radio Exhibition. The German Post Office's new standard picture, 180 lines and 25 frames per second, gave rise last year to what seemed, at the time, unsurmountable difficulties as far as wireless transmission was concerned, even on ultra-short waves.

The pictures shown on the various stands were very good. They seemed brighter than last year, and certainly



This attractive Loewe universal receiver is covered with real leather.

had less flicker and more detail, but the greatest step forward has been in the part of the television receiver and transmitter which is not generally exposed to the public eye. I refer to the cables and the amplifiers; and also to synchronisation by wireless.

## Many Demonstrations

Manfred von Ardenne, the well-known young television inventor, together with the German Post Office laboratories, were demonstrating television pictures actually received by wireless. Other firms contented themselves with direct land-line connection between special transmitters standing behind the stand and the receivers on the stand. The Fernseh A.C., of which Baird Television are partners, had further developed their intermediate film television receiving projector by means of which 180 line pictures are projected on to a large screen.

The German Broadcasting Company ordered from this same firm the first television van operating in the same manner as the intermediate film receiver. Briefly, the van is equipped as follows: A special camera with a special lens is mounted on the roof (it can be laid flat and covered for transport purposes). The film, after being exposed in the camera, is passed through a light-proof duct to the developing, fixing and rinsing tanks situated in the van.

## Little Time Lost

After rinsing, the film is partly dried and then passed through a normal television film scanner. It is then dried completely, and rolled up for future use.

The interesting thing about this van is the fact that the time lapse between the exposure of the film and its passage through the television transmitter is just 1½ minutes, and the film is completely dried in less than two minutes from the first exposure.



# PLUG POINTS FOR RADIO

*Provision for radio in any room seems to many a desirable idea, but one difficult of attainment. That it is in reality a simple thing to achieve is made clear in this practical article, which is packed with hints and tips on installing extension wiring.*

By G. E. MOORE, A.M.I.E.E.

THE plug point is a very useful convenience in the ordinary domestic electric installation—one which is by no means as common as it ought to be. By its means portable appliances can be connected in a way that is much more satisfactory than by the adaptor-and-lamp-holder method. In this way, of course, can come the mains supply for a receiving set.

Some form of plug connection similarly has great advantages for the output of radio and radio-gramophone combinations. This is particularly so when the listener favours an arrangement whereby whether there is a reproducer mounted with the set or not, a speaker can be taken or used elsewhere in the house.

## Unlimited Radio

It is surprising how many listeners, and even keen "radio fans," do not avail themselves of this convenience. Why, for instance, limit the speaker's utility to the dining or living room, leaving the sitting room unprovided for—except perhaps by clumsy trailers run through via doorways? And what a boon radio-supply to bedrooms can be during illness!

Of course, in most cases the receiving set is more or less anchored owing to the lead-in and earth connections, but even when a speaker separate from the set is not available it is strongly recommended that a permanent speaker-supply be arranged in at least one other point. Once the convenience has been appreciated it ceases to be regarded in any way as a luxury.

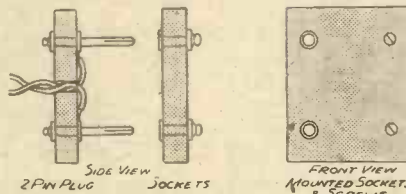
## Easily Accomplished

The cost is quite insignificant compared with the service given. Ordinary twin bell-wire suffices for the leads. In all but very large large houses the resistance of this wire (about 50 ohms per 1,000 yards "there and back") is not serious even for low resistance speakers of 15 ohms or so. The wire may be run in a simple and unobtrusive manner. Though, of course, short cuts through walls have many advantages over long roundabout runs, the

latter are by no means to be condemned.

For walls the use of a searcher in the form of a steel knitting needle ground flat at each end is useful. This may actually, if applied with discretion and not too quickly, be used to give the passage through brick walls; after a few trials the mortar joint can be found and the needle may be hammered through with fair ease if not permitted to jam.

## NEAT SPEAKER PLUGS



Simple speaker plugs and sockets can be cheaply arranged on small pieces of ebonite or other insulating material.

Recourse may be had to a hand wall-drill of small diameter, and even a rawplug tool can afford some help. With the use of a stiff wire feeler one may insinuate the leads in the space between door frame and wall. Lath-and-plaster walls are generally quite simple to penetrate, the needle being used to make the passage between laths.

In all cases special care is required when reaching and boring through

the plaster layer on the far side; otherwise the plaster breaks away. Generally speaking, it is not advisable to take rising leads through the floors, as the number of difficulties may be altogether too much for those not accustomed to such work. Rather should one pass to an upper floor via the stairway opening, and this is especially apt when it is decided to have a single central point upstairs—rather after the fashion of the plug-point for the vacuum cleaner.

## Hiding the Leads

Many ways of "taking cover" for the wire are possible, such as closely following door frames, skirting boards and so forth; running in picture-rails; concealing completely behind wallpaper or similar coverings at corners and projections of all kinds; taking advantage of cracks and openings on boards and so forth to hide and hold the wire. Flat twin wire with an overall binding is more adaptable than the twisted type.

With a little care the wire need rarely be supported by special means; when this is necessary, tacks or gimp pins may hold it into corners, but insulated staples are preferable.

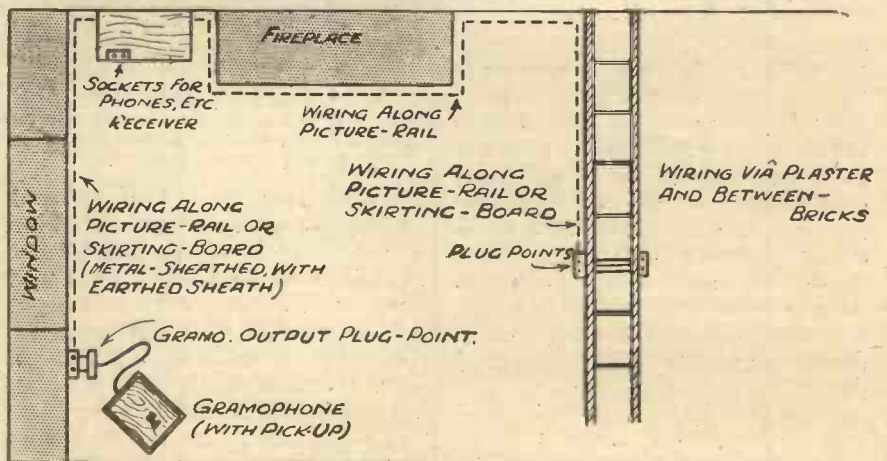
Naturally the covering of the wire must never be penetrated. Moreover, the leads should never be run where dampness from floor-washing or other domestic operations will affect it.

## The New House

When the listener with foresight proposes to move into another house, he will survey the latter as to the possibilities for his radio (as well as other) conveniences; while if ever he is interested in the building of a new residence, a little collaboration with the builder and electrician will result

(Please turn to page 287.)

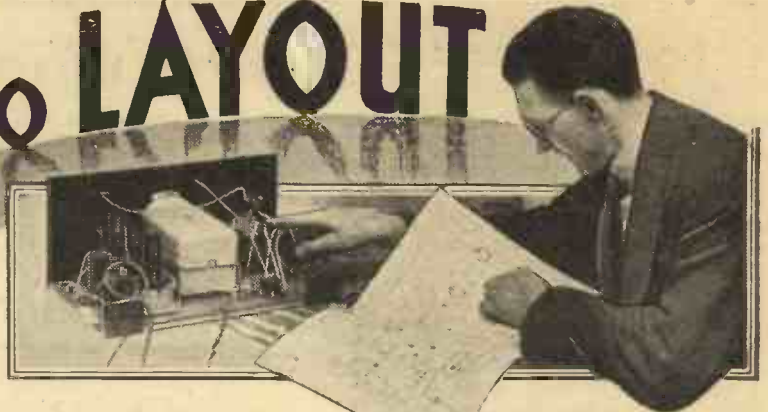
## HOW TO ARRANGE THE SPEAKER AND RECEIVER



A suggested method of placing the various items to provide a plug-in system of loud-speaker points.



# From CIRCUIT to LAYOUT



A FEW weeks ago I met a man who is a very great enthusiast at trying-out new receivers as they are described in the columns of THE WIRELESS CONSTRUCTOR. He never builds them up exactly to the designer's specification, but just tries out the circuit, "bread-board" fashion; and quite a good job he usually makes of it, from the point of view of pure workmanship.

### Not Uncommon

The amazing thing to me is that he doesn't seem to have the remotest idea of producing an efficient and sensible layout. Either he blindly follows the designer's diagram or blue print, or he tries to be original, with disastrous results.

I have an idea that this state of affairs is by no means uncommon. I believe that there are still many readers of this journal who could no more plan out their own idea of a simple two- or three-valver than fly. This implies no discredit to them; they are simply in need of a little help in the elements of the matter.

The idea that I want to put forward concerns the "translation" of a circuit diagram on paper to a layout on a baseboard. It is really quite a straightforward matter once one has grasped certain fundamental facts.

### That Theoretical Diagram

First of all, you *must* learn to read a theoretical circuit. It seems hard to believe that there are still many home-constructors who can't, but there certainly are—I met two last week! If you will only take the trouble to learn the conventional signs, and to puzzle out a few simple diagrams for yourself, you will find it easier to work to a theoretical diagram than to make a blind copy, wire for wire, of a blue print.

We must learn to crawl before we can walk (so I am told), but that doesn't mean that we continue to crawl, when no one is looking, for the

By L. H. THOMAS,

A.M.I.R.E.

*An interesting article for enthusiastic constructors, explaining how to use a circuit diagram for planning the layout of a receiver, and pointing out the relation between the theoretical circuit and the practical wiring diagram.*

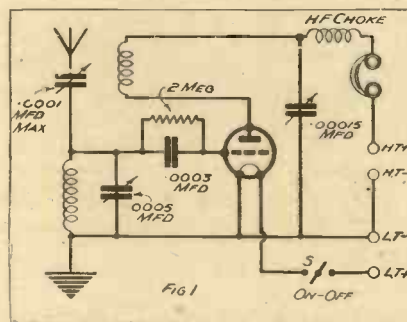
rest of our lives. Speaking from purely personal experience, I am sure that I felt very resentful when it was first suggested to me that a progression in the vertical position across the drawing-room carpet was preferable to the less dignified, but much simpler method of crawling! But had I been allowed to crawl for the rest of my life, catching the 8.52 would be a tiresome business nowadays.

### Many Still "Crawl"

This is no irrelevant statement, for there are far too many radio enthusiasts, even now, who have never troubled to get beyond the "crawling" stage. Let me do my best to help them, here and now.

Fig. 1 is a theoretical diagram, drawn in the usual manner, depicting the simplest of single-valve receivers.

### CAN YOU READ THIS?



*Here is an ordinary one-valve circuit diagram. On the next page will be found the wiring translation of the same circuit, and also an illustration of how the theoretical diagram can be redrawn to assist the set constructor.*

Personally, I do not find it at all difficult to take in every single detail of that circuit at one casual glance, lasting, perhaps, for not more than a few seconds.

Fig. 2 shows exactly the same circuit

in terms of a baseboard layout. I should have to stare at that for some minutes before being satisfied that I knew all the details.

### A Transition Stage

My idea is that a "transition stage" would help beginners in two ways. It would assist them to translate the theoretical diagram into terms of wooden baseboard and solid components; and at the same time it would begin to teach them how to lay out a receiver made simply from the circuit diagram.

If you will examine Fig. 3 you will see that the actual connections have not been changed in any way at all; yet it represents, in a fair degree of accuracy, the "layout" of Fig. 2. The valve is in the middle; the coils on the left, with the reaction coil behind the grid coil; and the tuning condenser straight in front of the latter.

For simplicity the terminals have been mounted at the right-hand end of the baseboard, so that they can be shown in their usual place on the circuit diagram instead of being mounted in a row along the top.

### Slightly "Cooked"

Surely there is no difficulty in seeing the almost exact correspondence between the "layout" of Fig. 2 and the theoretical diagram of Fig. 3, which is only Fig. 1 slightly "cooked."

As I have already hinted, this works in two directions. To start with, a mere novice comparing Fig. 3 with Fig. 2 could learn quite a lot about circuit diagrams, and should never have any more difficulty in understanding one of a single-valve set.

But it goes farther than that. Surely we can work it the other way round.







**PLUG POINTS FOR RADIO**

—continued from page 284

in a "real job." The writer, for example, found that the large and readily accessible roof void of a bungalow-type of house was admirably suited to his purpose.

Various handy forms of connection are available. A jack can be adopted, and the writer has seen single dry-battery plugs used in the holes of wood-screw terminals. Again, miniature 2-pin plugs and sockets with round wood covers may be obtained. But the writer favours a home-made arrangement which utilises in 2-pin plug form the neat little nickelled pins and sockets purchased so cheaply.

**Easily Constructed**

The plug is made by mounting 2 pins about  $\frac{1}{4}$  in. apart on a short strip of  $\frac{1}{4}$ -in. ebonite or fibre, a central hole tightly holding the speaker flexible leads. The sockets are mounted on a piece of similar insulator, one socket being fitted and the 2-pin plug used as dividers to scribe the position for the second; two holes for the wood screws are also drilled.

The plug point can be arranged on skirting board, window ledge and picture rail. Polarity marking may be carried out if required, or the ingenious constructor can arrange for one-way insertion only. Not only is such plug-connection useful for the actual speaker; it may flexibly couple-up the gramophone, thus allowing the latter to be moved for domestic purposes.

**HIER IST LEIPZIG!**

—continued from page 261

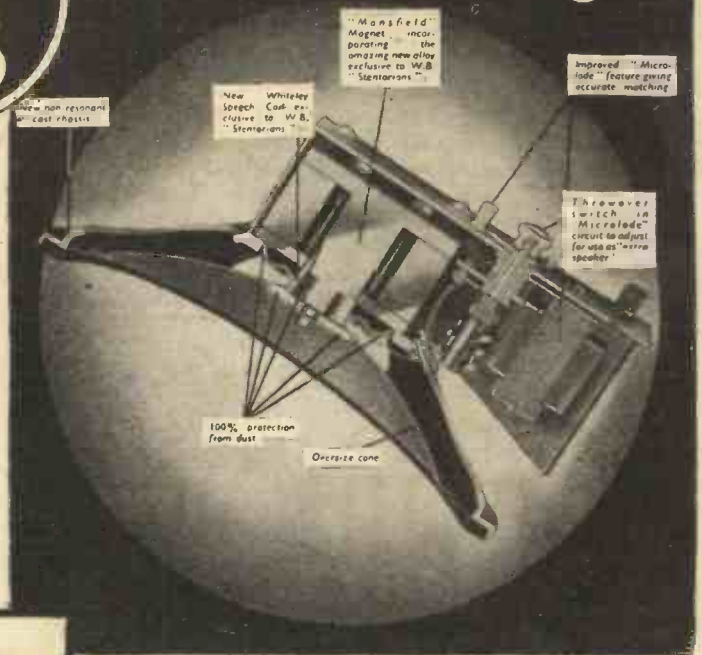
It really is an apt description. They are about shoulder height, have a wide platform on which the big valves rest (one to each pedestal) and a dial at the top. The rest of the water-cooling apparatus, cooled voltage-dropping rheostats and so forth, are hidden inside the pillar.

During broadcasting, of course, only one man is in the control room. The relay lights will tell him what is happening in the panels before him, in the generator room, in the water-cooling and pump room, and even in the landline amplifiers connected with the distant studios!

In this way Leipzig can boast of a radio Robot controlling its broadcasting, even if the Robot is under the thumb of an engineer.



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FROM MY ARMCHAIR

—continued from page 278.

heavily insured as Mistinguett's legs. The first, second and third fingers, and the thumb of his left hand, are insured for £2,700 each. The little finger for £2,100. The right hand is cheaper. The first, second and third fingers are marked up at £6,900 for the three. The thumb is assessed at £900, the little finger at £470.

He then writes :

"Knowing your fondness for knobs,

I should like you to know for how much I have insured my own hands (£5,000), my big toes (£3,000 each), the little toe of the right foot (£750), the tip of my nose (£180), and my left ear (£320). I require all these to work my S.T.400."

Should he propose visiting London, he might consider increasing the insurance on the tip of his nose and his left ear.

I see from the papers that Dr. Goebbels, one of Herr Hitler's ministers, has declared : "Nobody has the right to write ; the right to write

must be acquired by moral and national maturity." Quite right. Will Sunday letter-writers please note.

Things I see in the papers (wouldn't Caxton have been pleased!) often give me ideas. Listen to this :

A man at Southend police court to-day said that because he did not get his wife early morning tea, she got a pair of scissors and cut up his bowler hat.

I am sure a revengeful wireless widow could do better than this. What about slipping a piece of blotting paper soaked in salt water between the plates of a preset ? Or sprinkling iron filings in the reaction condenser ? Less technical and more homely, but fairly useful suggestions for wives desirous of teasing their husbands would be soaking the loudspeaker in soup or smearing strawberry jam over the H.T. battery.

Harry G. Froth, Frith, Frosh, Furth or Fragl, of Gorbals, writes :

I don't like your face, pipe, arm-chair, articles, sets, or anything else. They ought all to be drowned.

Now, Harry, naughty, naughty. Nurse spank !

I don't blame Harry Fugh, Ferl, Fith or Fseh. Many a decent fellow, after a heavy Sunday meal, a snore, a short stroll down the road with the dog, returns home to find things dull, his wife unattractive, his children repulsive, and his wallpaper loathsome. He sits down heavily, grunts, and then gets bright ideas. "Let's kick S.T.," he says.

No wonder the churches are empty. J. S.-T.

THE EDITOR'S CHAT

—continued from page 247.

sets at Olympia, selling at popular prices, proved a distinct attraction. More than one firm report surprisingly successful business.

Since television was purged of ballyhoo public interest has awakened. The true facts about television are now generally known. What can be done and what can't be done are no longer shrouded in mystery. Lay members of the public are no longer scared of being "stung."

This is all to the good. Television is now "respectable" : and even in its present stage of infancy it is attracting a great deal of custom. Good. Now it is up to the B.B.C. to give us high definition transmissions. And soon.

YOUR FUTURE

Radio enjoyment will be assured by the use of a Pifco A.C. and D.C. Radiometer.

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**SHORT - WAVE NOTES**

—continued from page 262.

one's own, one begins to find that the part of the world that is wanted can usually be heard on some particular wavelength at almost any time of day.

This is the greatest advantage of short waves—there is always “something doing.” Now, to be fair, let us quote the biggest disadvantage, from the amateur's point of view.

Most of the available space on short waves is packed out with high-speed commercial Morse that is not of the slightest interest to the general listener. But there is *so much* space between 80 and 12 metres that even the bands allotted for broadcasting total several times more “space” than the medium and long wave-bands put together.

Set-construction is a very simple matter; indeed, an effective short-waver is easier to construct in these days than a really first-class broadcast receiver.

Operation, to be “candid and honest,” is tricky. Not difficult, but it requires patience and “knack.” But that soon comes, and one enjoys things all the more. After all, nothing that is really easy is worth doing!

**THE NEW TELEVISION IDEAS**

—continued from page 260.

The speech and picture transmissions, or two packets of picture frequencies, as the case may be, are kept quite separate and the carrier wave is rapidly switched over from the one to the other.

I was very much interested in Mr. Dowding's recent article on television in *THE WIRELESS CONSTRUCTOR*, and I believe that he has given us some good leads in his various suggestions.

Particularly do I think that about his optical picture-analysing schemes. You will remember that he brought forward an idea for splitting up pictures by means of light filters. I do not think enough work is being done on the purely optical side of television.

In my opinion it is there that we shall ultimately find our solutions to the various problems. The cathode ray systems are being regarded in many quarters as the most fruitful lines of research. But I do not hold that view. Excellent though some of the results with these may be, I think that we must look elsewhere for the scheme that is to make television comparable in results and simplicity with the home cinematograph.

Mr. John Scott-Taggart says

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DE LUXE**

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<b>AMPLIFIER CHASSIS</b>		1. 4-mfd. 800-volt D.C. Working type 101. Price 17 6	
1. 8-mfd. wet electrolytic. Type 805. Price 6 6	2. 4-mfd. wet electrolytic. Type 802. Price each 5 0	2. 8-mfd. 550 volt peak Working type 902A. Price each 7 0	

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# SIMPLE AUTOMATIC VOLUME CONTROL

*How the Westector metal rectifier can be employed to overcome fading when receiving distant stations.*

THERE is little doubt that fading is one of the greatest annoyances experienced when receiving a distant station. Those who suffer from this trouble no doubt would provide their sets with automatic volume control, usually referred to as A.V.C., if this could be effected fairly easily.

### For Existing Sets

Double-diode triodes and double-diode-pentodes are available for A.C. operation and the first-mentioned type is also obtainable in battery and D.C. types.

Unfortunately, however, many existing receivers would require such considerable modification to enable these valves to be used that this plan cannot be generally recommended.

But the introduction of the Westector made possible an alternative method of obtaining A.V.C. in any type of set, provided this has a leaky grid or anode bend detector. It cannot be employed in a set using diode detection.

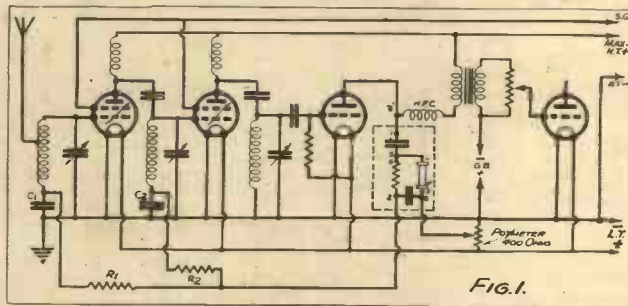
It may be mentioned that in the

latter type of set a double-diode-triode can usually be employed with only small modifications.

To give a satisfactory range of control it is desirable for at least two H.F. stages to be used. This may of course include the I.F. valve of a superheterodyne and in this type of receiver the H.F. valve in front of the "mixer" also.

An exception to this ruling may be

### HOW TO EMPLOY AN A.V.C. UNIT



This circuit is similar to that indicated in Fig. 2, but employs a Wearite type unit instead of all separate components for the A.V.C. control.

made in certain cases, including a superheterodyne with no pre-first-detector H.F. valve. The characteristics of the Westector enable a wider range of control to be obtained as the frequency becomes lower.

### After the Detector

It is necessary to consider the operation of a detector in order to understand how A.V.C. operates. The input to the detector valve is in the form of an H.F. carrier wave, the L.F. modulations being superimposed on this.

With a leaky grid or anode bend detector a large H.F. component always appears in the anode circuit and this H.F. component bears a definite relation to the magnitude of the carrier. Normally, this H.F. component

*The connections for A.V.C. by means of a Westector in the case of a leaky grid detector receiver run from batteries.*

is by-passed to earth by a condenser, or in part used for reaction.

When using this simple method of A.V.C., this H.F. component is converted into a D.C. voltage and applied to the H.F. valve grids as a negative bias.

### The Necessary Filter

Obviously this negative bias will vary in sympathy with the strength of the H.F. carrier wave applied to the detector. This is the basis of all A.V.C. systems.

It is essential to provide suitable filtering in order that inter-stage coupling be prevented. The resistance and condenser values of the filter should be such as to give good filtering down to low audio-frequencies and yet leave the response quick enough to follow fast-fading periods.

To satisfy fully both of these requirements is not possible, and therefore a compromise must be effected. The values shown in the diagrams will be found quite satisfying except, possibly, on the very fast fading sometimes

experienced on short waves.

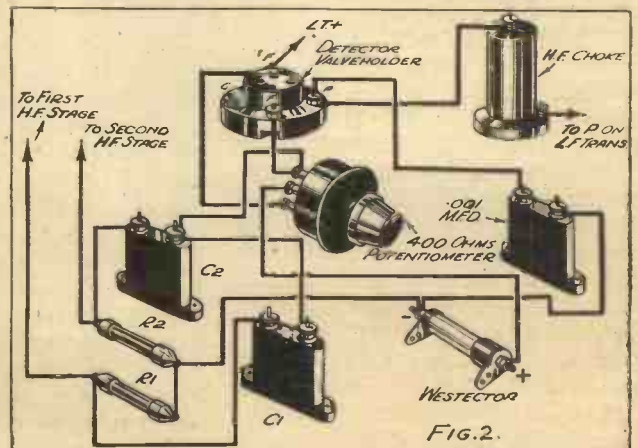
It will be seen that even when receiving very weak stations a small negative controlling bias could be applied to the H.F. valves. This would reduce sensitivity slightly.

To avoid this it is necessary to "delay" the control slightly. This means that the control will not become effective on weak stations, and this delay is effected by opposing a small positive bias to the control bias.

It is necessary that the S.G. valves

*(Continued on next page)*

### FOR USE WITH BATTERY SETS



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To Success



## SIMPLE AUTOMATIC VOLUME CONTROL

—continued from previous page.

to be controlled should be of variable-mu type. In battery sets the short-base type of valve is slightly preferable. H.F. pentodes of any type may be used if desired.

In order to illustrate the details of the A.V.C. system three diagrams are shown.

action is obtained, the degree of delay being altered by adjustment of the potentiometer slider.

The two non-inductive fixed condensers C1 and C2 and the two resistances, R1 and R2 form two filters. It is often found that using one filter common to two H.F. stages provokes instability.

A typical A.C. mains receiver incorporating "delayed" A.V.C. is shown in Fig. 3. In this case the positive "delay" voltage is obtained from the potentiometer, which is inserted in the H.T. negative lead.

### THE CONNECTIONS FOR AN A.C. MAINS RECEIVER

This diagram shows how the Westector is wired into circuit in the case of a mains receiver. Irrelevant connections are omitted for the sake of clarity.

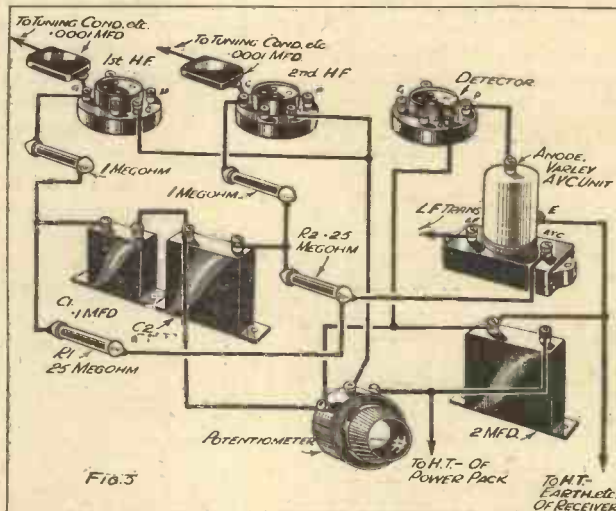


Fig. 1 shows a battery set with leaky grid detection. Such details as wave-change switching, anode circuit decoupling, and so on, are omitted as they are irrelevant.

The H.F. choke in the detector anode circuit forms a barrier to H.F. currents. These are by-passed through the blocking condenser to the Westector. The condenser is needed to prevent H.T. being applied to the A.V.C. components.

A suitable value for it is .001 mfd.,

This potentiometer carries the total anode current of the set and should be of such a resistance that it causes a voltage drop of 5 to 10 volts. Care should be taken to ensure that this potentiometer is not overrun. The feed method necessitates little alteration of the receiver.

It is now possible to obtain several commercially made A.V.C. units, and the best known are the Varley and Wearite.

It will be seen that the Varley unit shown in Fig. 3 incorporates an H.F. choke and therefore an external choke is not necessary.

#### Very Easily Added

Fig. 2 shows a similar circuit to Fig. 1, but the connections of the Wearite unit are indicated. In this case an external H.F. choke is required.

When adding A.V.C. to a set it is also necessary to provide a manual volume control in the L.F. stages. This permits the general volume level to be adjusted, after which the A.V.C. keeps the volume sensibly constant.

The application of A.V.C. is a comparatively simple and inexpensive modification in most sets. It will be found to give excellent results, and considerably to increase the pleasure of distant station listening.

NEXT MONTH:

## The Midget Super

A Tiny Set with Remarkable Distance-Getting Powers

but with an anode bend detector a smaller condenser (down to .0001 mfd.) may be desirable. The "delay" of the control is obtained by returning the Westector to a potentiometer instead of to L.T.

By this means a variable "delay"

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**CUTTING OUT THE H.F. STAGE**

*An interesting account of a simple and practical circuit conversion.*

THE attached diagram shows a perfectly conventional H.F. circuit such as many readers have in use.

During recent experiments with bandpass tuning, it occurred to the writer (who was using such a circuit as that shown) that it would be a very simple matter to cut out the H.F. stage and convert the set to bandpass tuning. All that was necessary was to connect a small condenser, as

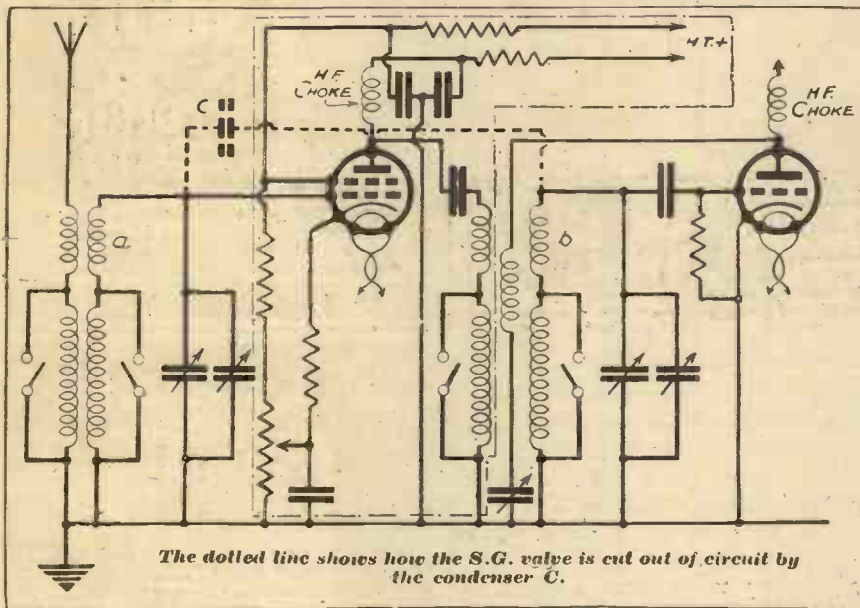
“a” and “b.” The reaction coil still remains operative, but where a ganged condenser is used for tuning, some adjustment may be necessary to the trimmers.

**The Coupling Condenser Value**

Such an expedient may prove of use to readers who wish to make alterations to their H.F. stage without putting the whole set out of commission in case the alterations cannot be completed during an evening. Also it may prove illuminating as to the degree of amplification normally obtained from the H.F. stage.

To do justice to the bandpass tuned detector, when the H.F. valve is removed, the coupling condenser C

**AN ALTERATION WORTH EXPERIMENTING WITH**



shown dotted, and then remove the H.F. valve from its socket. The removal of the valve puts the whole of the section shown within the thin chain-dotted lines out of circuit, and no disconnection of L.T. or H.T. becomes necessary.

The small condenser C acts as “top end” coupling between the coils

should have a capacity of about .00004 mfd., and should preferably be variable. An old neutrodyne condenser serves admirably. Also, do not forget to adjust the trimmers so that both circuits are in tune under the new conditions, and re-adjust when re-installing the H.F. stage.

R.H.B.

**DUBILIER PROGRESS**

*Details of a helpful and comprehensive catalogue.*

EVERY constructor has to use condensers and resistances. Therefore, every constructor should make a special point of securing a copy of the new Dubilier catalogue which has just been published.

It is unnecessary to refer at length to the high reputation for reliability and dependability achieved by Dubilier products, for the name itself is a household word for these qualities wherever anything at all about radio components is known.

Turning the pages in this well-produced catalogue, one notes that, in addition to the standard lines, there are many new ones of value and interest.

On page 4 there are details of those excellent and inexpensive non-inductives with wire ends. On the opposite page a full range of condenser blocks is listed.

**A Wide Range**

Indeed, every kind of fixed condenser for every purpose is to be found including all types of electrolytics among which, by the way, are high-voltage dry and reversible dry types.

And then there are the Dubilier metallised resistances in values from 100 to 500,000 ohms, a wide range of colour-coded wire-end resistances for servicemen and dealers, and the attractively neat and robust “Spirohm” resistances.

Finally, we come to motor radio suppressors, and a large diagram showing their application to a car ignition system, and details of various anti-interference devices for applying to electrical domestic apparatus.

It is a first-class catalogue descriptive of first-class components, and we urge our readers to write to the Dubilier Condenser Co. (1925), Ltd., Ducon Works, Victoria Road, North Acton, London, W.3, for copies of it.

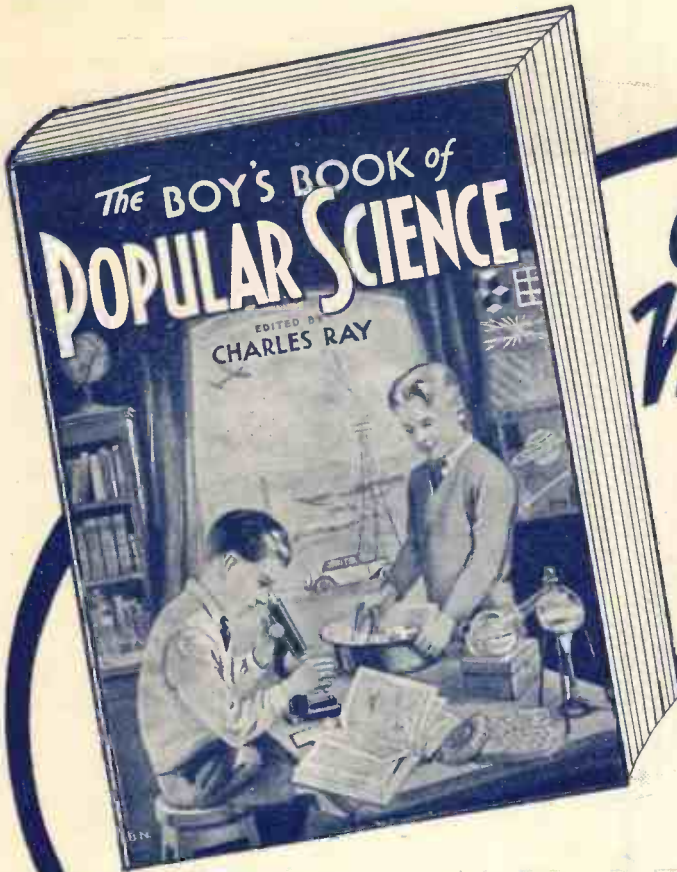
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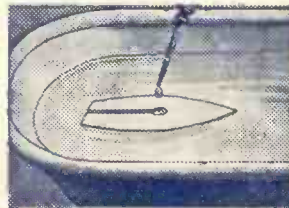


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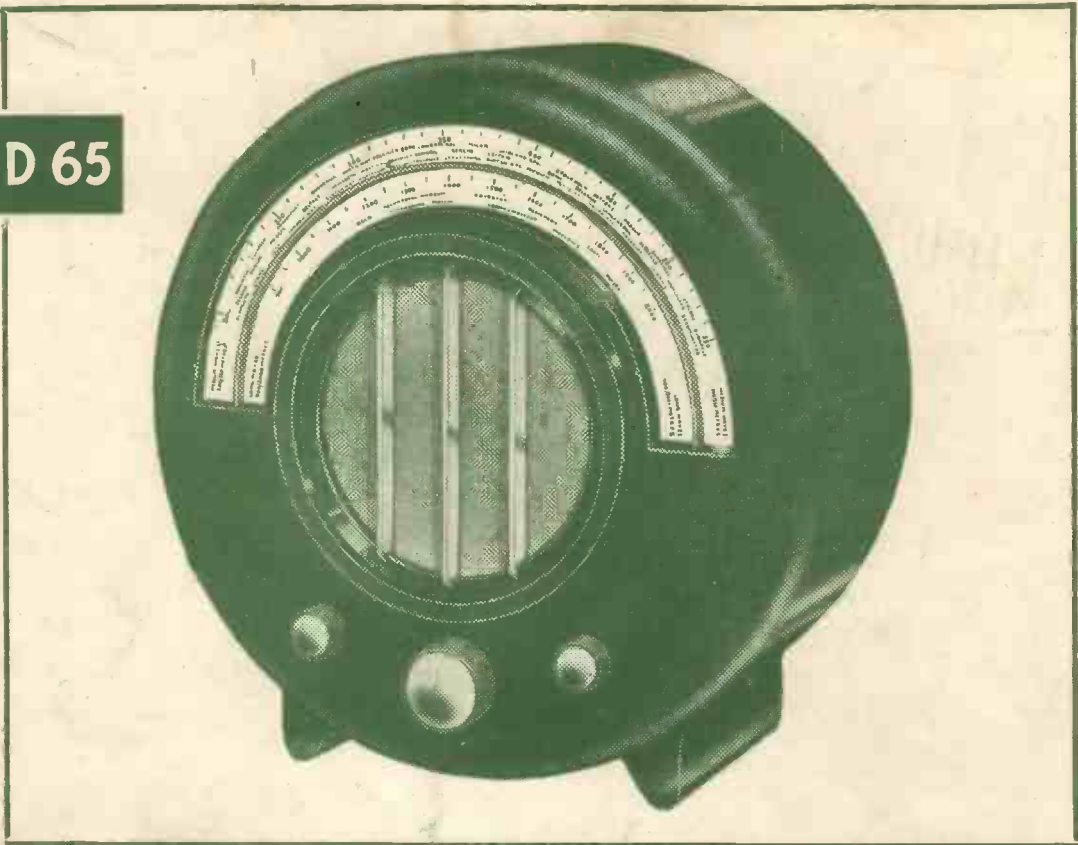
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