

# The Wireless Constructor

Vol. XIV.

JULY, 1932.

No. 69.

IN THIS ISSUE

from  
**FLEXIDYNE**

AN ORIGINAL AND  
POWERFUL BAND  
PASS DESIGN

by  
**VICTOR KING**

ALL  
THE  
WINNERS

AND

**ROUND THE DIALS**

**ARTICLES**

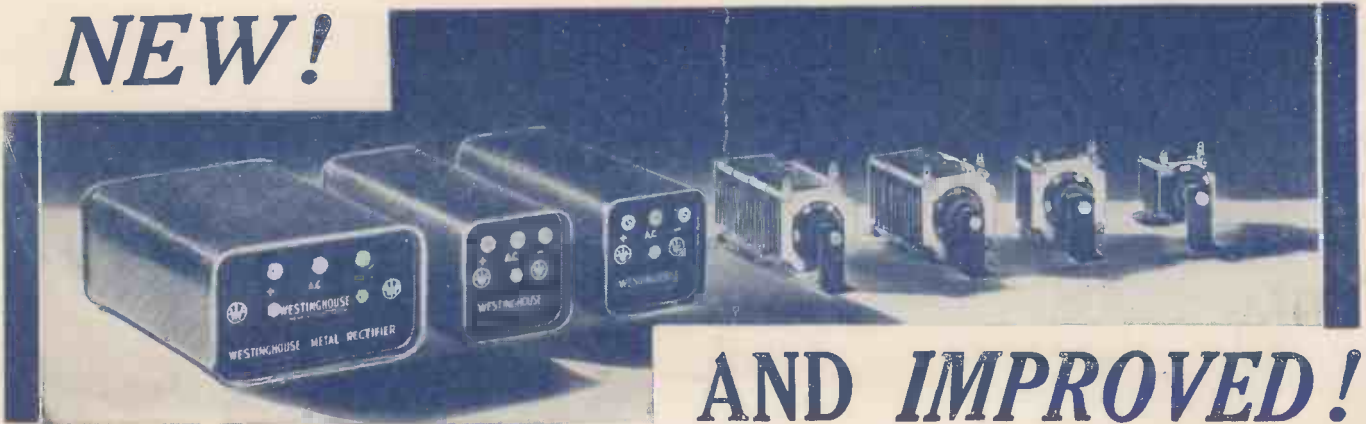
THE MYSTERY OF THE  
**METAL RECTIFIER**

BY JOHN SCOTT

by  
**JOHN  
SCOTT-  
TAGGART**  
F. INST. P. A. M. I. E. E.



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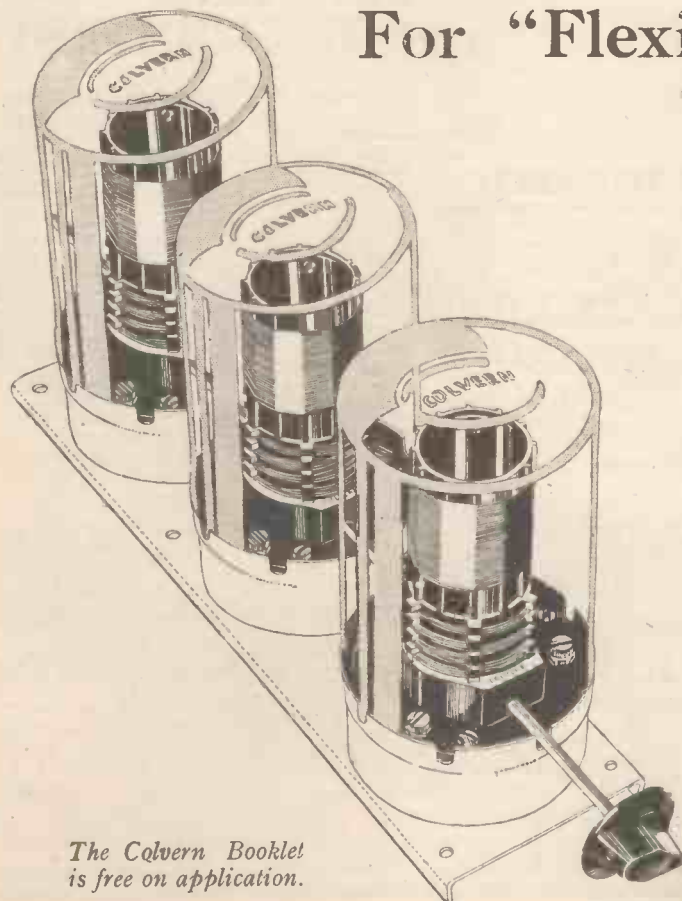


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*As some of the arrangements and specialties described in this Journal may be the subject of Letters Patent the amateur and trader would be well advised to obtain permission of the patentee to use the patents before doing so.*

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1 Panel, 16" x 7" x 3/16", ready drilled	4 6
1 Telsen '0001 differential condenser, with black knob	2 6
2 Telsen I-mid, Mansbridge condensers	4 6
1 Telsen binocular H.F. choke	5 0
2 ReadRad 3-point switches	3 0
1 ReadRad '00015 diff. condenser	2 6
1 Peto-Scott standard screen, 10" x 6", with notches filed	2 0
1 Peto-Scott terminal strip, 16" x 1½" x 3/16", ready drilled	1 3
1 Peto-Scott baseboard, 16" x 10"	1 3
1 Peto-Scott copper sheet, 10" x 7", about .006" thick	1 0
2 Ormond '0005-mfd. S.M. condensers	13 0
1 Pair Colvern "S.T.300" coils, with supporting pillars, special "S.T.300" windings and terminal connections	12 0
1 Dabiller '0001-mid. type 670 condenser	1 0
1 Graham Farish "Megite" 1-meg. grid leak	1 6
1 Lewcos H.F. reaction choke, Ref. M.C.	2 6
1 Lewcos Spaghetti resistance, 20,000 ohms	1 6
1 Varley "Nictet" L.F. transformer, 3-5:1, type D.P.21	7 6
2 Lotus valve holders, type T.H.K.	1 0
1 W.B. valve holder (S.C. horizontal)	1 0
10 Bulgin terminals, marked	2 8
1 J.B. midget condenser, .00004-mid.	4 0

Use this detailed Price List when ordering parts for the "S.T.300." Any items sent separately, if value over 10/-, sent Carriage Paid or C.O.D.—all Post charges paid.

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3 Valves as specified - £1 12 3  
Cabinet as specified - 15/-

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**£7 : 7 : 6** Complete with valves and cabinet. Factory wired—Aerial tested—Royalties Paid.  
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or 12 monthly payments of 12/2

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Selected C.O.D. lines—We pay post charges on orders over 10/-.

Set of specified valves	£ s. d.
Peto-Scott cabinet (21" x 7" x 10")	2 2 6
Polar "Tub" double-gang .0005-mfd. screened variable condenser with disc drive and minimum trimmers	17 6
Polar No. 4 '0005-mfd. disc drive variable condenser.	1 6 0
Colvern Band-Pass 3-coil assembly	9 0 0
Igranic "Midget" L.F. Transformer	1 10 0
	10 6

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# The WIRELESS CONSTRUCTOR

Published by the Amalgamated Press, Ltd., Fleetway House, Farringdon Street, London, E.C.4.

## THE EDITORS' CHAT



STRIKING POPULARITY OF THE "S.T.300"—"HE HAS NEVER LET US DOWN"—VICTOR KING'S "FLEXIDYNE"—THE "LOCALISOR"—136 MILLION LISTENERS!

By every mail letters are converging on these offices from all parts of the British Isles, all praising the "S.T.300." Whether from a schoolboy of sixteen in Bristol, a doctor in the Isle of Skye, a reader one mile from the Belfast station or one a quarter of a mile from the Bournemouth relay, these letters are part of another national tribute to Mr. John Scott-Taggart as designer and inventor.

### Good Judges!

These scores of letters—from the North of Scotland to the Channel Islands—should be read in conjunction with our introductory remarks about the "S.T.300" and Mr. Scott-Taggart's own original article. Those thousands who forthwith built his set were good judges. And those who waited and then built it will have now joined that great band of constructors who, ever since broadcasting began, have learnt to place their confidence in "S.T."

As one constructor puts it: "He has never let us down." When Mr. Scott-Taggart produces his next "big" set he is assured of an even greater public for it than in the case of the "S.T.300." We ourselves will be as interested in it as any reader, and there is one thing that is certain—our faith will not be misplaced.

### A Transformation Set

In this issue the reader will find full details of the "Flexidyne"—a Victor King production, and one of his best at that. The main feature of this set is that by the touch of a switch it can be transformed from a simple-to-handle but powerful receiver for family use into an extremely flexible and sensitive set which, under more practised handling, can accomplish marvels in the way of long-distance

loudspeaker reception. It is a four-valver, and the change over allows for the altering of tuned intermediate coupling into aperiodic coupling, thus, of course, eliminating a tuning control.

### For "The Local"

The "Localisor" will doubtless strike readers as an interesting and rather novel set, inasmuch as it not only small in size, but makes use of hardly any components! Further, there is no reaction, and yet such is the amplification developed by the S.G. detector that, even though there is only resistance coupling to the second and last valve, considerable volume is obtained. The "Localisor," as its name implies, is intended for local station reception, and it provides

### A CRYSTAL LOUDSPEAKER



The use of piezo-electric crystals, which change their shapes under the influence of electric currents, is well known in connection with the control of transmitters. This photograph from Cleveand, U.S.A., shows similar type crystals that are being used in experimental loudspeakers, which it is claimed give more faithful reproduction than any other kind of speaker.

a most inexpensive and satisfactory method of carrying this out.

### Armchair Enjoyment

I should like to draw the particular attention of readers to the fact that I have arranged with Mr. Scott-Taggart to contribute a much longer article under the heading "From My Armchair." I asked Mr. Scott-Taggart to increase the length of his "Armchair" articles owing to the numerous letters from readers persistently asking for "more S.T." Mr. Scott-Taggart also contributes another article this month, entitled "The Mystery of the Metal Rectifier," as well as "Hints for 'S.T.300' Users."

### The World's Sets

Some very interesting figures showing the estimated number of wireless listeners in the world have recently been published by the International Broadcasting Bureau at Geneva.

These figures show that there are no fewer than 34,000,000 sets in use, which, allowing for the Bureau's estimate of four listeners per receiver, gives the extraordinary total of 136,000,000 people making use of wireless broadcasting.

### Surprising Spain

It appears that the United States of America has the greatest number of receivers in actual use in any one country. They are estimated at from 12,000,000 to 14,000,000. Our own country's licences now number 4,686,000, which represents nearly 100 sets to every 1,000 of the population. Spain is rather surprising, inasmuch as although Spanish broadcasting stations are very popular the number of listeners in that country is estimated at only 48,050—which works out at about two sets per 1,000 population.



# ON THE GRID

*Impedance matching and parallel valves—High-voltage mains valves—Sealing the valve's pinch—A portable suggestion.*

"WHY is it," said my inquirer, "that when I remove one of my parallel output valves the results are just as loud?"

One of the good old queries, and one that used to be more common when parallel output valves were in fashion. But the reason for it is closely allied with a subject of which we read much nowadays—the matching of output impedance with output valve.

### Valves in Parallel

When two valves are placed in parallel their impedance is halved, and so it is possible for the ratio of the valve impedance to output impedance to be more suitable for maximum power transference when one is removed. At the same time the wattage change in the anode circuit will be less, so the two changes can

more or less balance one another out.

But with one valve removed conditions will not be set for the transference of maximum *undistorted power*, which, after all, is what we want. Removing one valve will probably cause quality to suffer.

### Direct on the Mains

A good many months ago—to be precise, last August—I mentioned high-voltage mains valves in these columns, pointing out that up to that time they had not been much of a success as tried in America.

It is interesting in view of this to note that successful models of such valves have now been produced. And also that they are now on the market and available to all.

And writing of valves reminds me of an interesting point connected with

their manufacture. It concerns the wires that pass through the pinch.

Obviously, when the glass expands, due to heat from the filament or heater, these wires must expand the same amount if the vacuum is to be preserved. At one time the only way was to use platinum wire, because nothing else suitable expanded at the right "speed."

### Getting Over the Difficulty

Nowadays makers are not so extravagant; they are very clever, though. They take one material that expands less than glass and one that expands more, and, by getting the right proportions, make a wire that expands exactly the same amount.

The usual process is to electro-plate a wire of one material with metal of the other. Truly ingenious!

What do you think about this suggestion?

If you tried carrying a heavy parcel tied up tightly with string, and then tried carrying the same parcel lying at the bottom of a long, flexible shopping bag, you would find it seemed much heavier in the bag than when carried by the string.

So next time you design yourself a portable, keep the batteries as near to the handle as possible, and note how much less bothersome the set is to carry about.

A. S. C.

My old friend, L. J. M., of London, W., has turned up this month with a really original query—so original, in fact, that I began to think that our sudden heat-wave (both days!) must have been too much for me!

### Moscow's Second Harmonic

It appears that L. J. M. has received two 25-metre "harmonics" of the 50-metre Trades Union station at Moscow—one just slightly above the other! Can you beat that one?

I have heard of second, third, fourth harmonics and so on, but two second harmonics on slightly different waves...! I really think that I should have commenced a feverish investigation but for a catch which I discovered in a later paragraph of L. J. M.'s letter.

Oh, yes, there was a catch in it right enough, and the cat was properly out of the bag when L. J. M. confessed that the "harmonics"—although certainly Russian—were both doing different programmes! Shame on you, L. J. M.—I might have had an "Epileptic" fit!

\*\*\*\*\*  
\* THE MONTH ON \*  
\* SHORT WAVES \*  
\*\*\*\*\*

As a matter of fact, the point raised by my esteemed correspondent is one of considerable interest, because it is a fact that a lot of confusion exists concerning the Moscow stations, and it is also a fact that there are two Russian stations in the neighbourhood of 25 metres.

### Easily Solved!

So far as I have been able to determine, the lower one, which is dead on 25 metres, is definitely a harmonic of the 50-metre Trades Union station, but the one just slightly above it—on 25.26 metres to be precise—is quite an independent transmission, although it emanates from Moscow. Incidentally, quite a good musical programme is at times available from the latter station; that is, if you like that sort of thing!

I am afraid our old friend

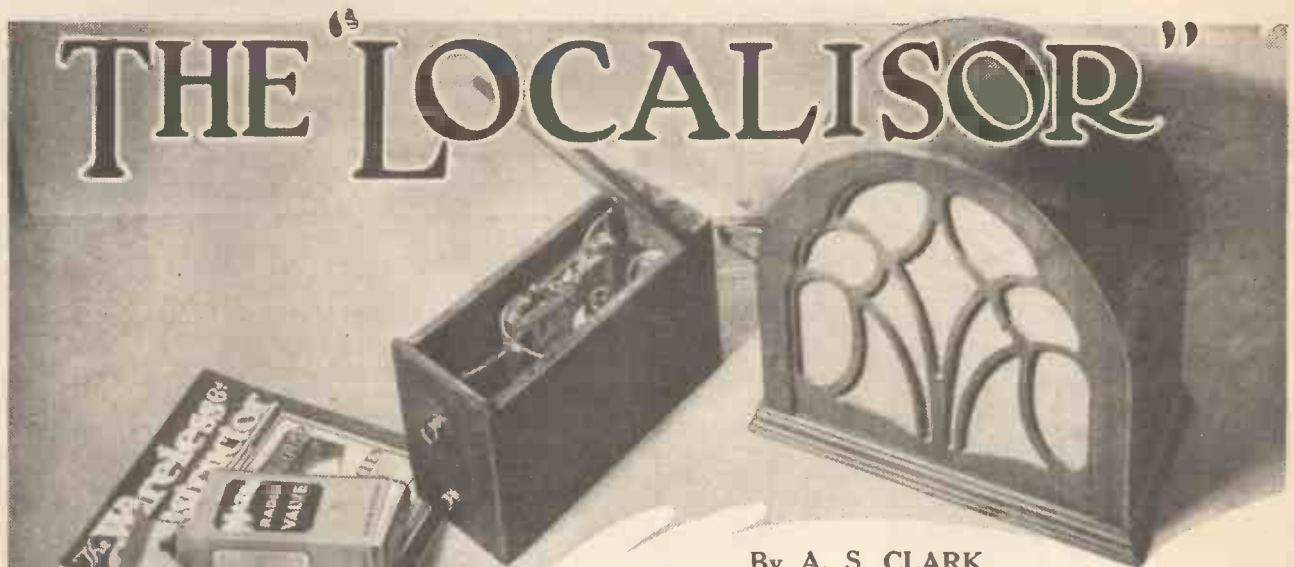
W3XAL was a very "bad lad" over the period of our recent "H.M." test. His signals at times were barely audible, whereas the month preceding the test...! But isn't it always the way?

### Two More "H.M.'s."

The "H.M.'s" go to A. W. Brookson, of King's Lynn, Norfolk, and T. C. Daniel, of Newport. Incidentally, I have given "H.M.'s" to these two gentlemen not so much on the grounds of performance as in recognition of the amount of time and trouble they obviously must have spent in the compilation of their reports. Keep it up, "gents" there is only one "double H.M." so far!

The Spanish Government has recently granted a broadcast licence to Transradio Española at Aranjuez, near Madrid. The station is to transmit on a wavelength of 34.4 metres, and a special programme for our part of the world is to take place every Saturday evening from 7 p.m. to 9 p.m. B.S.T. I shall be interested to hear of readers' results on the new transmissions.

G. T. K.



By A. S. CLARK

THE bare fact that a receiving circuit is a departure from usual practice is enough to ensure constructors being keenly interested in it. But when the results from it are also a departure from the usual—in the right direction, of course—it becomes a matter worthy of special attention.

Such then is the "Localisor," and amazing—in more ways than one—

*A handy and inexpensive little two-valve designed specially for medium-wave local-station reception. High-quality reproduction is one of its outstanding merits, and as for simplicity, well, there are only just over a dozen components altogether, and the set can be built with ease in an evening.*

is a fair description of the results that I have been able to obtain from it. You will see where the name comes from in a moment.

Let me hasten to say, just in case you should get the impression that it is an achievement little short of the thermionic valve, that it will not deign to tackle anything but local reception. But as the quartette of quality, volume, simplicity and inexpensiveness are its shining lights, this localisation is in no way a detracting factor.

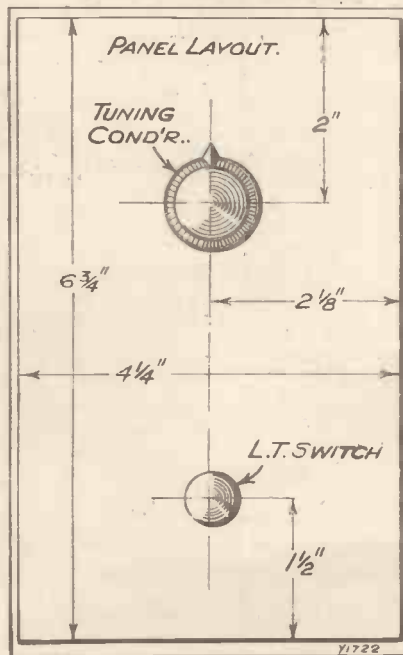
**Quality First**

As an indication of what I mean by "local," the unit, or set if you prefer, will work on an input from the aerial

**EVERYTHING YOU REQUIRE IS INCLUDED IN THIS LIST**

- 1 P.J.3 coil (Ready Radio, Peto-Scott, Ferranti, Sovereign, Lewcos, Wearite, R.I., Formo).
- 1 .001-mfd. max. compression condenser (Telsen, Formo, Goltone, Tunewell).
- 1 .0005-mfd. solid-dielectric condenser (Magnum, Ready Radio, Polar, Telsen).
- 1 Push-pull on-off switch (Lissen, Ready Radio, Telsen, Bulgin, Wearite).
- 1 2-mfd. fixed condenser (Telsen, Igranic, Lissen, Dubilier, T.C.C., Sovereign).
- 1 .01-mfd. mica condenser (T.C.C., Lissen, Dubilier).
- 2 Valve holders (Lissen, Bulgin, Telsen, Wearite, Igranic, W.B., Magnum).
- 1 3-megohm resistance, with terminals or tags (Graham Farish Ohmite, Igranic, Dubilier, Lissen).
- 1 1-megohm resistance (Graham Farish Ohmite, etc.).
- 1 200,000-ohm resistance (Graham Farish Ohmite).
- 1 150,000-ohm resistance (Graham Farish Ohmite).
- 1 Terminal strip, 3½ in. × 2 in.
- 4 Indicating terminals (Igranic, Eelex, Bulgin, Belling-Lee).

**ONLY TWO KNOBS**



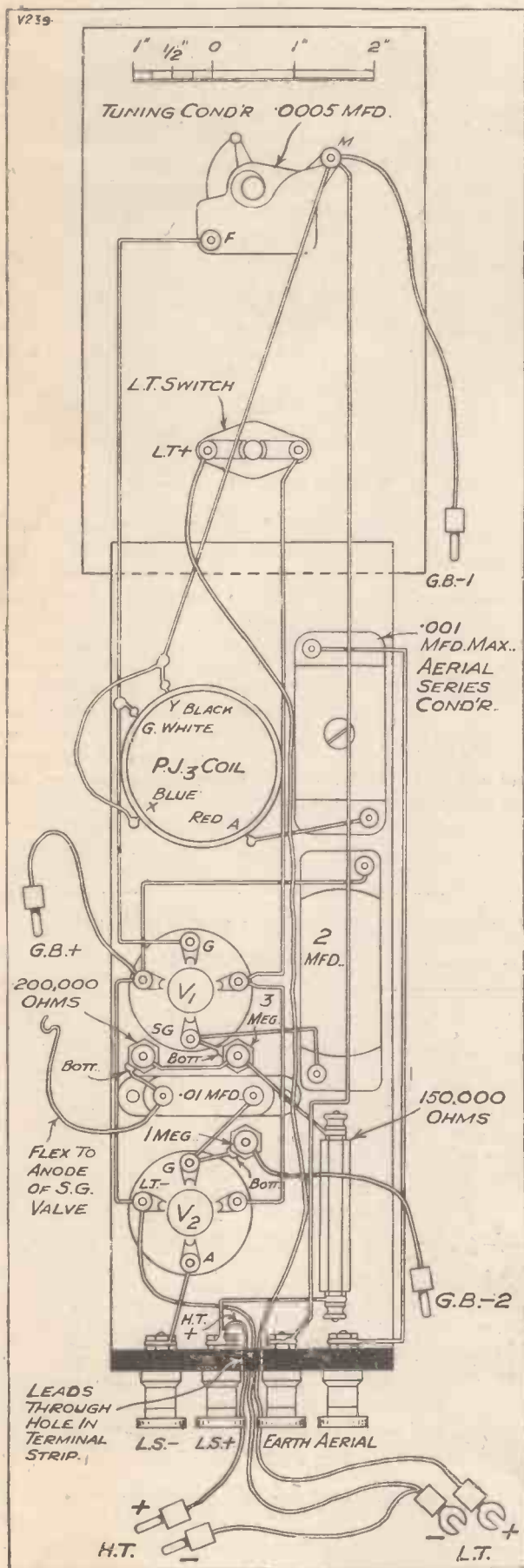
- Wooden panel, 4½ in. × 6½ in.
- Baseboard, 10 in. × 3½ in.
- Battery plugs, etc. (Belling-Lee, Clix, Igranic).
- 18-gauge tinned-copper wire and sleeving (Wearite), or Glazite, Laco-line, Jiffilix, Quickwyre, Soldawyre. Flex, screws, etc.

**ACCESSORIES.**

- Loudspeaker. (Blue Spot, Epoch, Celestion, Marconiphone, R. & A., B.T.-H., W.B., Cossor, Graham Farish, H.M.V.)
- Valves. S.G. (Cossor, Mazda, Mullard, Marconi, Eta, Osram, Tunggram, Lissen, Six-Sixty).
- Power. (Osram L.P.2, Mullard P.M.202, Cossor, Mazda, Marconi, Eta, Tunggram, Lissen, Six-Sixty)
- Batteries. H.T., 120 to 150 volts (Pertrix, Ever Ready, Ediswan, Drydex, Lissen, Siemens).
- G.B., 16½ volts (Ever Ready, Lissen, Siemens, Drydex, Pertrix).
- Accumulator. 2-volt (Exide, Ever Ready, Pertrix, Lissen, Ediswan, G.E.C.).

*You will have to drill four holes in the panel, one for the tuning condenser, another for the switch, and two more for the fixing screws.*

## The "Localisor"—continued



and earth system that would be sufficient for satisfactory results on a crystal set. And with that settled, let's take the items of the quartette and see how their whys and wherefores line up with the circuit.

First of all there is quality. The reason why reproduction is so clear and crisp, with ample high and low response, and with a general cleanliness about it, is not very obvious.

### FOR WIRING UP

When wiring up the receiver follow this diagram closely, and take particular care about the connections to the "Ohmite" resistances, making sure you get the "top" and "bottom" leads right.

But I personally reckon it is because there is only one low-frequency stage and because it is resistance-capacity coupled. Normally, when one takes advantage of this form of coupling it is necessary to use at least two stages of amplification, and the question of feedback takes on dangerous proportions. The entire absence of reaction is no doubt also a contributory cause.

Item number two, volume, is a much more obvious matter. A screened-grid valve is used as a detector, and as it is resistance-capacity coupled, and a high value of resistance is used, it is giving a large portion of its theoretically possible amplification.

You see, as anode-bend detection is used, in which rectification takes place in the anode circuit, the screened-grid valve is able to amplify at what might be termed "half-wave high-frequency." An interesting point in connection with the detector is that disconnecting the by-pass condenser to the screening-grid causes reception almost completely to "pick up."

### Straightforward Tuning

A good idea of the volume obtainable may be gathered from the fact that in most cases the detector will fully load the largest 2-volt power valve obtainable. And if that is not enough for you—well, you want a lot!

The simplicity requires no explanation; it is obvious. Few components, no reaction and a straightforward tuning system—of which more in a moment—all help. The practical design, with its two small knobs on one end of the box, also makes for simplicity.

Lastly, inexpensiveness. There is no doubt about this, for with its few simple parts it is the cheapest local receiver for quality and volume that could be built. As a stand-by set for local work should your big set "konk out," or should you be making adjustments or alterations to it, the "Localisor" is ideal.

You need not in these circumstances have extra valves for it if you happen to use two of suitable type in the main set; an S.G. valve is to be found in many sets nowadays and a power valve in most. As a matter of fact, if you only want local reception you will not get better service programmes from any set.

### Modifications for 5XX

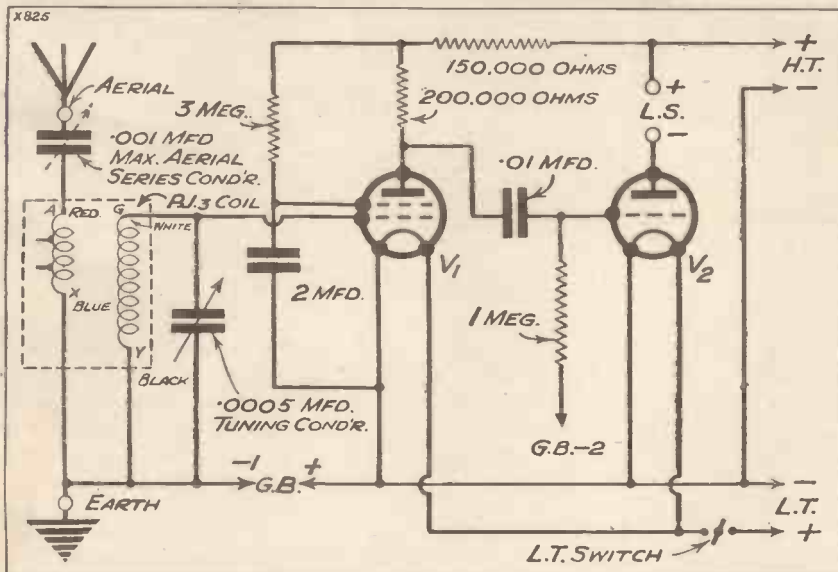
To enhance the simplicity and inexpensiveness, provision is not made for the reception of the Daventry National programme. As everyone, except listeners near 5XX, gets a National programme from a medium-wave station, the necessary "extras" would have been completely wasted except for those with 5XX as a local.

(So long as the input is large enough, the scheme is every bit as effective on the long waves, so those who want to listen to Daventry National can easily modify the design to incorporate a long-wave as well as a medium tuning system.)



# The "Localisor"—continued

## A NOVEL CIRCUIT ARRANGEMENT



No doubt many of you will consider this circuit a little out-of-the-ordinary, and wonder how such a simple arrangement can give such exceptional results. The secret is in the special S.G. detector, and the comparatively high coupling resistance employed. There is also the fact that no reaction is used—a very unusual feature in a two-valver.

So far selectivity has not been mentioned, and it may be wondered how such a simple tuning arrangement can be selective enough to separate the two locals when they are quite near. Nevertheless it can do this very well in all cases except in the real swamp areas, and the reason is the small damping across the tuning coil.

The impedance of the S.G. valve being high, and the use of negative bias for anode-bend rectification preventing grid current, the load on the coil is very small. As a matter of fact, the sharp tuning is one of the remarkable points about the circuit.

### Making the Coil

The coil, which has two windings, one for the grid circuit and one for the aerial, can be made very easily at home. Alternatively, if desired, it can be purchased ready-made, and is known as a P.J.3 coil. On the latter there is a reaction winding, but it is simply ignored.

For the benefit of those who prefer to wind their own coil, I will give the details for so doing before getting on with any other constructional points. Briefly, they are as follow:

The former is 2 in. in diameter and about 2½ in. long, and the wire used throughout is gauge 30 D.S.C. Starting about ¼ in. from one end of the former put on 30 turns with taps at the 10th and 20th turns.

This is the aerial winding, and the beginning is marked A "red" on the circuit diagram, and the end X "blue." At about ⅓ in. farther along the former from the end of this winding, the grid turns are started, and there are 64 of them. The beginning is marked G "white" and the end Y "black." The

colours refer to the colours of the flex leads that are fixed on commercial versions of the coils.

That is all there is to the making of the coil; no reaction winding being necessary. When you have made the coil (assuming you don't buy it ready-made) it will not be long before the unit is completed.

The two controls (the on-off switch and the tuning condenser) are mounted on a wooden panel.

### Increasing Bass Values!

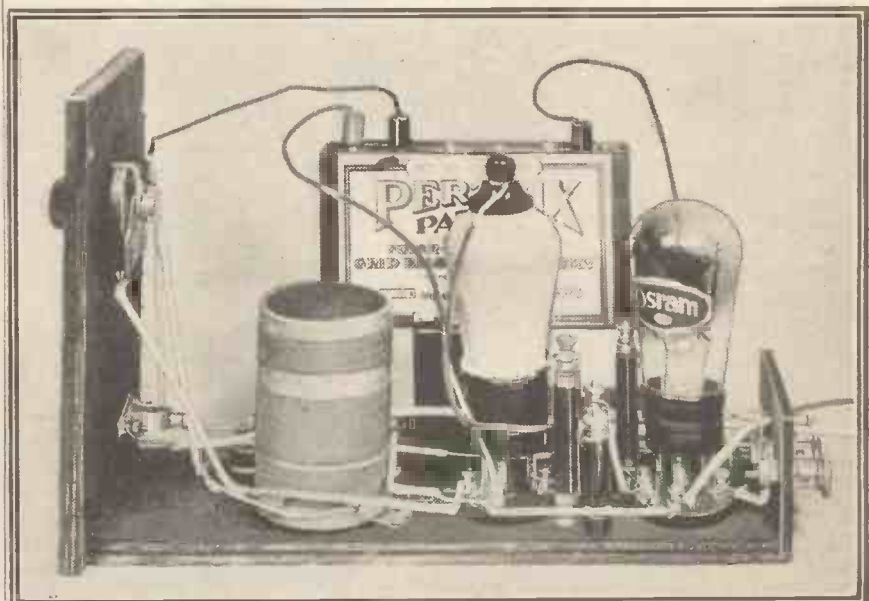
Note that the flexible leads that connect up the batteries are taken through a small hole in the terminal strip. There is one common high-tension positive plug, the necessary voltage-dropping resistances being incorporated in the set itself.

In this connection it is interesting to note the high value of resistance in series with the H.T. supply to the screening grid of the detector valve. Another interesting value is the .01-mfd. coupling condenser. If you are very, very fond of bass, the value of this can be increased with a corresponding increase in the bass response of the set.

I don't think there is any more to say about the construction, and so we will get along with the operation, although this, as a matter of fact,

(Please turn to page 160.)

## IT EMPLOYS AN S.G. DETECTOR



This photograph of the finished "chassis" will give you a good idea of the simplicity of the set, which is enhanced by the fact that it is designed for medium-wave reception only. The S.G. valve, next to the coil, is the detector, and the other is of the ordinary power type.

# All Britain Endorses

## "Best of Dozens"

176, Wellington Street,  
Luton, Beds.

Dear Sir,—Having obtained Feb. issue of WIRELESS CONSTRUCTOR, and seeing a circuit by "J. S.-T.," I guessed here was something worth looking at, knowing the great results of the "S.T.100." So the "S.T.300" was built, and I congratulate you on the finest circuit I have ever found, and I might say I have made dozens of sets.

In my opinion, a real set has range and power combined with simplicity, and, believe me, the "S.T.300" has all these, and then some.

At the first test, roughly made, I bagged a moderate 27 stations, 5 long and 22 medium. The second attempt proved more—41 in all, 7 long and 34 medium waves. I am looking forward to a real good night station-logging before long, as I think it's possible to double this number. One main difference to the original spec. of parts—I used a Telsen 7-1 transformer, and I think this has made a great improvement. All the stations I received were full loudspeaker strength, using a Blue Spot 66R. in a 20-in. cabinet. Please advise readers to use specified coils, as there are a lot of imitation ones on the market, but I don't think these will get results worthy of a magnificent set and clever designer. My coils were Colvern. You may use this letter as you like, and again thanking you for this fine circuit.

Yours faithfully,

L. E. SNOW.

P.S.—I forgot to mention selectivity on the "S.T.300" is marvellous. London National and Regional being tuned out in three degrees on the dial.

## Radio Mechanic's Opinion

6, Shakespeare Road,  
Eastleigh, Hants.

Dear Sir,—I write to thank you and also to show appreciation of the best set I have heard, and I must say that your four months' work has been well worth while. I have made your set, and I am really delighted with it. It will give pure, clear, undistorted tone.

I am a service mechanic, and deal with every make of set. The best commercial sets I have so far handled are H.M.V. 531 (a 9-valve super-het.),

*From every part of the country are for John Scott-Taggart's skill as progressive and far-sighted policies. confidence he enjoys*

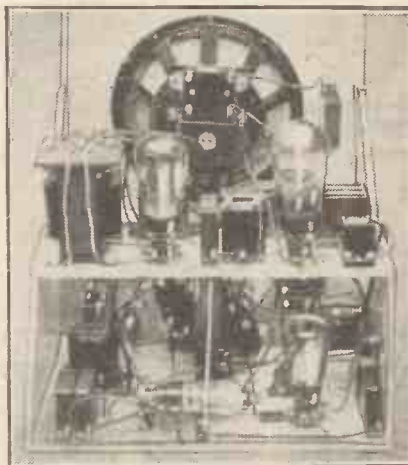
and Marconi 535 (a 6-valver), and I must say your set is easily in their class. I have an Ormond balanced-armature unit, and three old valves—Cossor: S.G., 210 L.F., and 215 P.

I am amazed at results. Perhaps I have been lucky, but I very much doubt if your own original model is any better. Thanking you again for your kindness in letting such a circuit go to "the workers."

Yours faithfully,

S. R. BEARD.

## WITH MOVING COIL—



*This is the set built by Mr. John G. Cavanagh, of Middlesbrough, who says his results are "perfectly amazing."*

## "Best of Twenty"

5, St. James Road,  
Victoria Park,  
London, E.2.

Dear Sir,—I would like to thank you for your "S.T.300." Since I started wireless I have built some 20 sets from crystal to five valves, and with every set there has been something missing. I have wireless just for music, whether British or otherwise, and the "S.T.300" is the only set I have had that will give it to me. I have not made a log yet (it takes too long), but I have only to dial and there is not a blind degree.

Yours truly,

W. H. ANGOTT.

## Wales Says: "Everything You Claim"

The Firs,  
Gilwern,  
Nr. Abergavenny.

Dear Sir,—I wish to compliment you on the wonderful achievement you have made in the wireless world by the "S.T.300." I have just made one up and it is everything you claim for it.

It was delightful to hear Katowice come in on Easter Monday evening quite clear of other stations, and hear the story direct of how Easter was spent in Poland. Beautiful clear-cut English, crisp, and no background of music, which sometimes gives the speech on badly-designed sets the sound of a musical monologue.

You may use my letter, as another friend of mine has built one and we are the envied ones of the locality.

I am, yours, a constant follower of some years,

R. O. WILLIAMS.

## Glasgow's Verdict: "Positively Amazing"

54, Govanhill Street,  
Glasgow, S.2.

Dear Sir,—Allow me to add my letter of appreciation of the "S.T.300" to what must be by now, I should think, an enormous "wireless mail." I cannot express my delight in the "S.T.300." Sufficient to say that the results are positively amazing. Hitherto seemingly impossible foreigners—on a three-valve set—are now coming in at full loudspeaker volume. I thought perhaps you would be interested to hear of results in Glasgow, which is vastly different from London. Let me say that since making the "S.T.300" I have had the utmost satisfaction.

The coupler knobs are a remarkable means of cutting out local stations and tuning in others that would be otherwise impossible.

Yours faithfully,

JNO. CLARK.

# Progressive Design Work

*pouring letters of enthusiastic praise inventor and designer and for his Every letter will add to the unique among constructors.*

## Belfast's "Best in 10 Years"

Templepatrick,  
Belfast.

Dear Sir,—I have built the "S.T.300" and find it a wonderful set. I have been building sets now for the past ten years, but I think the "S.T.300" is the greatest surprise I have got.

I can get any station worth while in Europe full loudspeaker strength, without reaction; in fact, I am forgetting there is such a control as reaction on the set. I usually have to use the volume control on the most powerful stations, as my last valve overloads badly (a Mazda P.220A.).

One night, with an inside aerial, 9 ft. high and 50 ft. long, I logged twenty stations in about fifteen minutes, full loudspeaker strength, without taking any great care with tuning. No doubt if I had taken a little more care I could have got many more.

I would like to thank Mr. Scott-Taggart for a splendid set at a reasonable price.

Here is a little idea of my own to use only two valves on local station. I would be interested to know what you think of it, and if you find it O.K. I thought, perhaps, some of your readers would be interested also.

I break the L.T.+ lead going to S.G. valve and insert a switch. I take a centre-tap from medium-wave coil (on anode coil) to No. 2 terminal. No. 2 terminal I take now to one side of a pre-set condenser, other side of pre-set condenser now acts as aerial terminal for a two-valve set. This condenser and switch I have mounted on screen, as I didn't want to add further controls to panel. This switch, by the way, must have an insulated spindle.

It works O.K. as a two-valve set, and this centre-tap and condenser doesn't seem to upset the working of three valves. I would be glad to hear if you could recommend this.

Yours faithfully,

W. H. ADAIR.

[If it works, it must be all right!]

But Mr. Scott-Taggart is opposed, as we all know, to modifications being made—except at owner's own risk!

—ED.]

## Forty-Nine Stations in North London!

10, Kingdon Road,  
W. Hampstead, N.W.6.

Dear Sir,—I feel that I would be very ungrateful if I did not write and tell you how delighted I am with the "S.T.300." I built it a few days ago,

## —WORKED FROM PENTODE



Here is a front view of the all-from-the-mains version of the "S.T.300," as described in the accompanying letter from Mr. Cavanagh. He drives the loudspeaker (shown in the opposite photograph) from a pentode.

and within half an hour of completing it I was listening to the Geneva Disarmament Conference. To-day I have had my first chance of trying the set out, and in spite of the fact that there was a loud "local" programme I had no difficulty in bringing in thirty-seven stations at full loudspeaker strength on the medium waves, and twelve on the long waves. There were dozens of others, but not quite full strength. I might add that I am a comparative beginner in radio, and I have not as yet mastered the art of tuning. Thanks for a fine set.

Gratefully yours,

J. GILBERT.

## Bristol Gets "Whole of Europe"

88, Pembroke Road,  
Clifton, Bristol.

Dear Sir,—I hasten to add my little drop of water to the sea of universal praise of the "S.T.300." I received my kit of parts by parcel post on Tuesday, and so accurate and so simple are your "rapid construction" directions that notwithstanding the fact that this is my first attempt at home construction, I heard it working before I went to bed that night.

I simply hooked up to an "Ekeo" eliminator and accumulator out of a set which a friend made for me about a year ago, and tuned in, and got results at once.

Not only did I get results, but what results!!! The whole of Europe at instant command. No interference, no "mush," clear reception of excellent quality, and truly remarkable volume.

For a loudspeaker I am using the paper cone described as the "Duo-Vise" speaker (in THE WIRELESS CONSTRUCTOR of January, 1932), operated by a Hegra unit.

Good luck to "J. S.-T."! He deserves to go down in history as the man who solved the problem.

Honestly, I feel that I cannot do justice to the excellent qualities or to the simplicity of this set.

If asked to sum it up in a sentence I think I should say: Incredible selectivity, hyper-sensitivity, excellent quality and great volume, together with extreme simplicity of construction and handling.

I remain, sir,

Yours faithfully,

A. MORE-O'FERRALL.

## Super-Selectivity at Birmingham

101, Sycamore Road,  
Aston, Birmingham.

Dear Sir,—On February 1st I built your "S.T.300," and since then I have had it in constant use. It is all you claim it to be in the way of selectivity. I can get Sottens without a trace of 5 G B (my local station) by careful adjustment of the coupling condensers, and quite loud enough to fill an ordinary room with a power valve in the output stage. The district in which I am situated is very densely populated, and as my outdoor aerial has a total length of only about 40 ft., I use an indoor one of about 70 ft. for the "S.T.300," as I find it has the greater collecting powers.

## “The ‘S.T.300’ is Undoubtedly—

I have made one or two slight alterations which I think are improvements. First of all, I use a metal panel, as I always think they not only look better but compensate for any slight hand-capacity effect. I have also substituted a Parafeed system (having a curve of 25–8,000 cycles) instead of the ordinary transformer amplifier. I always find this amplifier to be the best of all, as it gives such pure reproduction and is only a slight bit weaker than the ordinary method. I have also put a filament resistance in the S.G. valve circuit to cut this valve out when I am using a gramophone pick-up, and I find this an excellent volume control on radio.

I would like to thank you again for an excellent circuit.

Yours faithfully,

L. A. PERRINS.

### Praise From the Hebrides

Craig-a-Charran,  
Portree, Isle of Skye.

Dear Sir,—I wish to add my praises to the many already expressed about the wonderful “S.T.300.”

I am a doctor, in the Highlands and Islands Medical Service, and my home is here in the Hebrides, very much cut off from the mainland. You can scarcely appreciate what a boon wireless is to us out here in these lonely and wild parts.

When I was on leave last autumn I bought a fairly expensive set at Olympia, at the Exhibition, but it was a complete failure and I never had any satisfaction with it. In fact, the long waves never came in at any more than a whisper.

I am a regular reader of THE WIRELESS CONSTRUCTOR and was struck with the look of the “S.T.300,” and so sent for a kit of parts and built it. It was the first set I had ever built, and I am possessed of the minimum of technical knowledge.

But this little set banged out programmes right from the minute I connected up my aerial, and ever since then I have never had a moment's trouble.

This part of the world is notoriously a bad spot for reception. But the “S.T.300” gets me all the programmes I want at night (I even got America one night at 3 a.m.!), and during the day I can get Daventry, Radio-Paris, and Oslo quite reasonably strong on the speaker.

My friends are all amazed, for most people in the district require to use four valves to get steady reception. I am certainly going to watch out carefully for Mr. Scott-Taggart's circuits in the future! I can assure him of a very warm welcome here if ever he cares to stay with me—for testing or otherwise.

Yours, etc.,

R. C. SCOTT, M.D.

### Radio Club's “Best Three-Valver”

68, High Road,  
Beeston, Notts.

Dear Sir,—Your article entitled “From My Armchair” in THE WIRELESS CONSTRUCTOR has prompted me to write and offer you our aerial and premises as a “test station.” We are only a small club, but you can rest assured that we should give you a

What they say about—

## SELECTIVITY

“... It really does select just what one wants . . . .”  
“... Selectivity is no longer a problem . . . .”  
“... No interference, no ‘mush,’ clear reception . . . .”  
“... Hitherto seemingly impossible foreigners are now coming in at full loudspeaker volume . . . .”

keen and hearty welcome should you ever decide to test a set in our district. In conclusion, I should like to mention that we consider the “S.T.300” to be the best three-valve set we have built up this season and interested us almost as much as the “S.T.100,” which was the first set that we ever built.

Yours faithfully,

L. HALL

(Chairman, Beeston Radio Club).

### “Truly Amazing and Delightful”

Morris Cottage,  
Much Hadham, Herts.

Dear Sir,—I feel that I must write and thank you for the “S.T.300” circuit. I have built many circuits up, but for three valves I feel certain there is nothing on the market at the moment to compete with this set of yours, which is truly amazing and delightful to handle.

I must also thank you for saving the pocket of the amateur. I have been contemplating building a super-het. for some time in order to overcome the selectivity problem, but was prevented from doing so on account of the initial expense and also current consumption of same. Now you have given me all I want in this amazing set, which really does select just what one wants and enables one to bring in any station at its fullest strength—compatible with selectivity.

What is so delightful is that round about 400 to 500 metres one can just flick the two small controls right over to the right and get full volume on such stations as Brussels, etc.

On my old compromise set I had to be content with a quarter the volume on these stations that I am now able to enjoy.

I am using an R.I. Parafeed transformer for L.F. coupling. On the medium waves the tone of this coupling is exceptionally good and the bass reproduction a joy to listen to.

Thanking you for a very interesting circuit which really does all that you claim for it.

Faithfully yours,

D. BURKE (Rev.).

[The writer in another letter states that he receives sixty stations.]

### Fifty Stations on a Bad Aerial

Alton Barnes,  
Nr. Marlborough,

Wilts.

Dear Sir,—I have constructed the “S.T.300” some five or six weeks now, and the results, battery operated, are a revelation. I have been a wireless experimenter since about 1920 or 1921; but in the past three or four years had dropped out of touch somewhat. I have you to thank for reviving my interest, chiefly by the fact that the “S.T.300” can so easily pick out the station one wants from the present overcrowded state of the ether. With a low, badly-screened aerial I can get about 50 stations at loudspeaker strength.

Yours faithfully,

ALEC H. W. HUNTLEY.

### A Pentode “S.T.300” A.C.

33, Stowe Street,  
Middlesbrough.

Dear Sir,—After trying many circuits, all of which have been on the

## —The Finest Set I Have Ever Handled—

band-pass principle, I came to the conclusion that the "band-pass" system of tuning was grossly over-exaggerated. This made me think that an interference-free straight three-valve was a myth. However, I chanced to look at a copy of THE WIRELESS CONSTRUCTOR and read of the claims of "S.T.300." At first sight these seemed preposterous for such a simple circuit, but having tried some "S.T." circuits years ago, and having faith in the author, I tried this one with perfectly amazing results.

The set, which has been working for a month, is an all-mains version of "S.T.300" (photos enclosed), costing about £12. It has a pentode output valve and a moving-coil speaker, the field of the speaker being energised by the plate current of the valves. The power output being in the order of 1,900 milliwatts.

Thanking you for such a wonderful circuit.

Yours truly,  
JOHN G. CAVANAGH.

### "Does Everything You Claim"

4, Tanner Street,  
Hightown Heights,  
Liversedge, Yorks.

Dear Sir,—Please accept my congratulation on such a fine set as the "S.T.300." I have built this set and I find it does everything you claim. I find it very satisfactory. I have great pleasure in inviting you to try out any set on my aerial any time from 6 p.m. to 11 p.m., or later if required.

I live in the "swamp" area about six miles from the North Regional station. From my door on one hill, I can see the masts of North Regional on the other!

Yours faithfully,  
JOSEPH F. SMITH.

### Thirty-Five Stations in Daylight

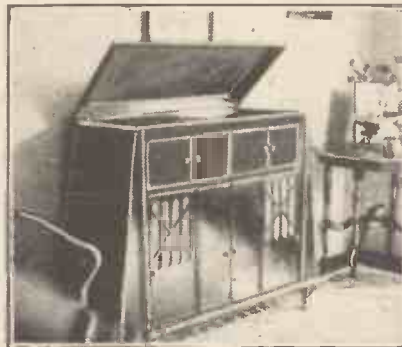
Leigh-on-Sea, Essex.

Dear Sir,—You ask for reports on "S.T.300" when made up. I take the liberty of writing you with reference to same. I have been using for three years a neutralised H.F., Det., 2 R.C., and I removed H.F. and det. departments and substituted your S.G. and det. in place, leaving the 2 R.C. intact, using the old base-board and panels. I finished it on Sunday and must say the results are little short of marvellous. This afternoon in daylight I tuned in on the loudspeaker 35 stations on medium

and long waves. The quality with 2 R.C. is excellent. I have not heard one yet with a transformer. I find that if one connects the aerial to the plate of S.G. it provides a really selective three-valver (Det. and 2 R.C.), using the anode coupler to make the selectivity required. I do not know if I am particularly well situated here for reception, but 35 stations in daylight appears to me to be a fairly good bag. Thanking you.

I remain,  
Yours faithfully,  
S. C. BONE.

### "S.T.300" RADIO GRAMOPHONE



*Here the set is shown built into a radio-gramophone cabinet, and this version incorporates a charger and eliminator built round a metal rectifier. The builder, Mr. A. V. Hichison, writes: "The set works extraordinarily well. I have greatly improved my selectivity and range with this circuit."*

### "Finest Set Ever Handled"

"Glenholme,"  
Dale Road,  
Matlock, Derbyshire.

Dear Sir,—I suppose by now you are getting tired of reading letters of congratulations on your wonderful achievement of designing the "S.T.300." Nevertheless, I feel I must write you and put in my little bit also. I have been a dabbler in wireless for several years, and have built nearly everything from a crystal set to a super-het. six, so I think I am able to criticise and know what I am talking about. The "S.T.300" is undoubtedly the finest set I have ever handled.

Yours truly,  
W. ROBSON.

### Sixty Stations at Land's End

"White Cross," Ludgvan,  
Long Rock, Cornwall.

Dear Sir,—I must write to you and tell you how delighted I am with the

performance of your circuit, the "S.T.300." I live near Land's End and the reception is wonderful. I get about sixty stations, and the performance is far above any other S.G.3 for volume and purity of tone. It is amazing. It is far above others.

Yours faithfully,  
C. J. PENBERTHY.

### Scotland's "68 Stations"

74, Gateside Street,  
West Kilbride,  
Ayrshire, Scotland.

Dear Sir,—I would like to let you know how the "S.T.300" performs in this part of the country. I have built it and given it a thorough test before writing to let you know the result.

First of all, let me state that I am no authority on wireless sets. I have been playing about with them, however, for the past seven or eight years, and have built and operated quite a few in that time.

Not one, however, has ever given me anything approaching the volume, clarity and distance which is the normal output of the "S.T.300." For three valves it is really a wonderful circuit. I have now logged 68 stations at full loudspeaker strength, and quite free from interference. Selectivity is no longer a problem, and the range of the set is tremendous.

To mention a few. Munich, Budapest, Vienna, Rabat, Prague, Rome, Madrid, Bordeaux Lafayette, Turin, Fécamp, all the old continental acquaintances on the medium band; Moscow, Warsaw, Motala, and several others on the long-wave band.

With a 66R Blue Spot speaker the output is amazing, and tuning is a pleasure. London Regional and Muhlacker may be tuned in quite clear of one another, which is a really good test in this part of the country.

The amount of control which can be exercised by a judicious use of the aerial coupler and the diff. anode coupler, and the simplicity and ease of handling generally, leave nothing to be desired. I offer my congratulations on your achievement.

I am, sir,  
Yours faithfully,  
ROBERT CURRIE.

(Please turn to page 160.)



# PICK-UP HINTS AND TIPS

*Some interesting notes on various practical aspects of radio-gram. reproduction.*

By A. BOSWELL

*Concerning Motor-Boards—Care of Records—Adjusting Tone—A Suggestion.*

RADIO was ever a subject where attention to details is just about as important as care of the big items. And electrical gramo. work is no exception.

For instance, there are several points about the board on which the turntable motor (whether clockwork or electric) is mounted that need consideration. The most obvious of these, and perhaps the one that is most often referred to, is the question of rigidity.

## Mounting the Motor

Naturally a firm piece of wood should be utilised, and for two reasons. First, if a thin piece of board is employed there will be a tendency for the motor to cause it to whip slightly as it revolves and thus prevent the record from being perfectly steady.

Secondly, a thin piece of wood may tend to act as a sound-board, and if the pick-up used is one of the noisy, chattery ones there will be a great tendency for this noise to be emphasised. While this would not matter if a really sound-tight lid were used, it is surprising how much chattering noise can creep past a loosely-fitting lid.

But there is another point concerning the use of a really thin mounting board that does not get emphasised so often as the two just mentioned. It concerns the mounting aid applies to most motors.

If the wood is thin the spindle of the turntable would project farther through the board than if a thicker board were employed. And in consequence the turntable would be higher above the board.

## Use a Thick Board

The effect of this would be that if a combined pick-up and arm were employed in which the angle of the needle to the record was not variable, this angle could be quite different

from that intended by the makers. A little thought will show that the angle that the needle made with the record would be more acute than normal; that is to say, the needle would be farther from the vertical.

Care of records is another instance of where attention to detail is well repaid. The majority of record users

## ASK FOR THESE

### RECORDS WORTH HEARING.

Vocal.		
In Bed With the 'Flu.	Leonard Henry	Broadcast
You'll Find Out.		
Jack and Jill		Zonophone
Dance.		
There's Another Empty Saddle.	The Blue Mountaineers	Broadcast
It's Just the Time for Dancing.		
Henry Hall		Columbia
Black Beauty.		
Duke Ellington and his Colton Club Orchestra		H.M.V.
Good-night, Vienna.		
Ambrose's Blue Lyres		Zonophone
Comedy.		
Turkish Delight.	Ray Noble and his New Mayfair Orchestra	H.M.V.
Dick Turpin's Ride to York.		
The Highwaymen		Zonophone
Instrumental.		
Because.	Albert Sandler	Columbia
Good-night, Vienna (Hawaiian Guitar)		
Len Fills		Columbia

carefully place their records in stiff covers and leave matters at that.

## Care of Records

Quite a few, however, take the trouble to use a dusting pad. Although records kept in proper cases do not collect much of the ordinary household dust, dusting is nevertheless well worth while in order to keep the channels free of small scrapings of wax that inevitably collect in them.

The removal of these scrapings helps to keep down wear on the records

and naturally makes them last longer. But there is something else that can be done to make records last.

How many people, I wonder, lubricate their records? And surely lubrication is quite an obvious thing to do, although there are very divergent opinions on the matter.

## An Effective Method

A suggested material to use is just the smallest trace of best graphite powder on a piece of cotton wool. The method of application is to dab it on, and not rub it in.

In this way there is more certainty of the lubricant making its way well down into the bottom of the grooves.

The idea should be particularly useful on old records, and readers' experiences with this and similar lubricants would be interesting.

Quite a common way to control the high-note response of a radio-gram on records is to put some capacity across the input from the pick-up.

The effect is often controlled by means of a variable resistance in series with the condenser, but it is not generally appreciated that the tone can be very effectively controlled with the resistance alone.

The lower the value of the resistance across the input leads the greater the attenuation of the high stuff, and at the same time the less the scratch. But there is the drawback that volume is also at the same time reduced.

But where there is ample power available, and volume controlling is necessary all the time, as happens on quite a lot of modern all-mains receivers, the scheme can be quite useful. An ordinary potentiometer type of volume control is first connected across the pick-up in the usual way.

## Controlling Volume

Then across the two leads that come from the volume control to the pick-up input of the receiver a variable resistance with a fairly large resistance range is connected. Tone can now be adjusted by means of this resistance, and volume by means of the potentiometer.

As there is ample volume in hand, the loss due to the tone controlling is easily made up by an adjustment of the potentiometer.

In practice this scheme often seems to give a more decided control than the usual arrangement of resistance in series with a fixed condenser.



# The "FLEXIDYNE"

## AN ORIGINAL AND POWERFUL BAND-PASS DESIGN

I've got two easy questions to ask my readers, and to make these questions even more easy I'm going to answer them myself! Here they are:

First, what are the ideals of a set for "family" use? (I put inverted commas over the word "family" because, when used in this way, it denotes all those not expert in the

**VICTOR KING**  
*already has a great name for simplified efficiency of design, but in this fine four-valver he has excelled himself! For the "Flexidyne" has a "Range" switch on the panel—and when you push it in you have a one-knob tuning set for family use; pull out the switch and you have a highly-selective long-distance four!*

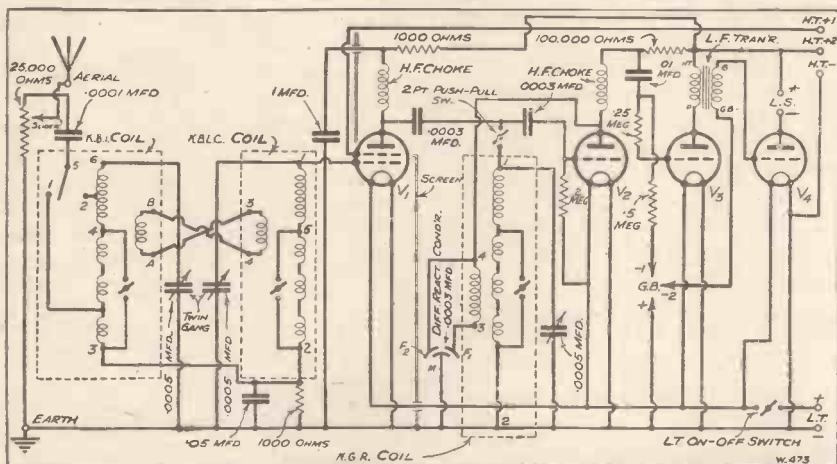
us—fewer if possible. Good quality and sufficient selectivity to separate the local programmes from one another, and from foreigners sitting almost on top of them, are further ideals—or perhaps they should be termed necessities.

### Maximum Efficiency

At one time the enthusiast would ask for as many knobs as excuses for them could be found! Now he will have only as many as are necessary for maximum efficiency; because the speed with which he can tune from one to another of the multitude of foreign stations available will be greatly limited by a multiplicity of adjustments.

Other requirements are sensitivity, volume and selectivity, and as much of all three as the valves can put out. So, as you could foresee, the requirements of the "family" and of the enthusiast are very widely separated, and are, in fact, almost opposites.

### ONE-KNOB CONTROL FOR DAY-TIME LISTENING—



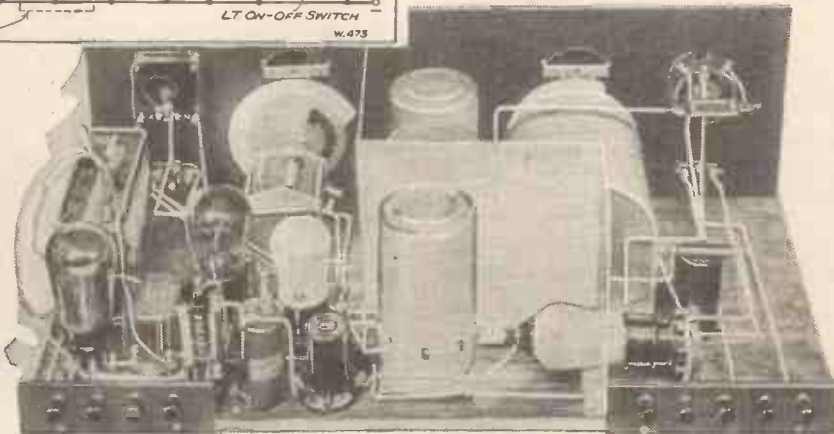
The circuit is extremely "cute," a two-point push-pull switch completely converting the set into a local-station receiver with one-dial control, or else into a powerful foreigner-fetching arrangement for the skilled operator!

ways of radio receivers, but who enjoy listening to the programmes.)

Then, secondly, what are the ideals of the enthusiast where receivers are concerned? Of course, you can see in a moment that the answers will be as different from one another as chalk from cheese.

So far as the "family" set goes, there's single-knob tuning, and as few other knobs as the science will allow

### —AND EASY "DX," TOO!



In its most sensitive form the circuit is a wonder—as stable as a rock and amazingly selective.

## The "Flexidyne"—continued

But what, you will ask, is all this leading to? I'm just coming to that.

In spite of the "oppositeness" of these requirements, many sets attempt to combine both in a receiver at one and the same time. Now to do this—and it has been done up to a point—demands some compromises somewhere, and something must be lost from the point of view of the "family" operator or the enthusiast, or perhaps something from both.

What I want to suggest is, why not make a set that will do *both*, but one at a time, when it is required? Anyway, both will not be wanted at the same time.

### Straightforward Controls

The idea, no doubt, sounds all right, you will think; but surely the necessary change-over will be involved, and hence detract from the advantages of such a scheme? But, nevertheless, it is achieved in the "Flexidyne" in the most simple manner possible—the operation of just one simple two-point on-off switch!

Take a look at the panel diagram of the set. What do you see? First of all, there are two tuning knobs with their indicating dials above them.

Above, to the right, is the reaction condenser, and to the left the volume control. In the centre is the wave-change switch, at the left the L.T. on-off switch, and, lastly, to the right, the converter switch.

When this switch is pushed in the second tuning condenser and the

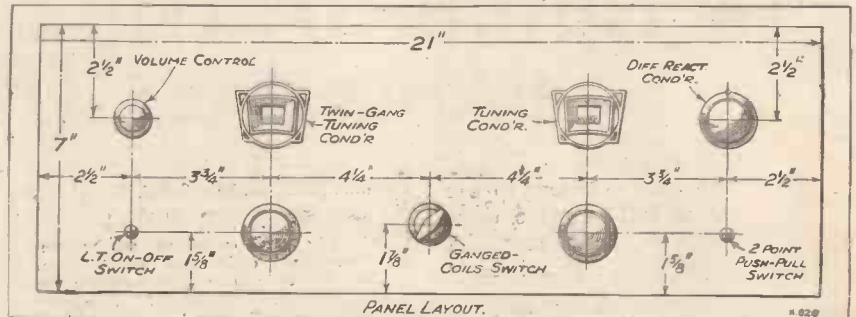
reaction condenser are put out of circuit. The set can then be completely controlled by the one tuning knob and the on-off switch, as the wave-change switch will not usually be required when local reception only is wanted. The volume control can be set beforehand, or, if it is not, it is the most "obvious" of controls to operate.

parallel-fed tuned-anode arrangement with reaction on to this tuned circuit from the anode of the detector.

### Aperiodic Coupling

But when the switch is open the coil and tuning condenser are cut right out of circuit except for their earth ends.

### CHOOSE WHICH—WITH THE SWITCH



In the right-hand bottom corner you see the little two-point push-pull switch that controls the flexibility of this amazingly versatile receiver. "In" for local stations; "out" for "distance."

Thus when the right-hand switch is pushed in, it is set for home reception, whilst when it is pulled out the receiver becomes a very sensitive full-range, full-volume outfit.

### How It Is Done

The circuit diagram will show you in a minute how the change-over effect is accomplished. It all takes place in the circuits between the H.F. valve and the detector valve.

If the two-point push-pull switch is closed, the circuit comprises a

There is now no anode or grid tuning, and the coupling comprises a parallel-fed aperiodic H.F. stage. Since the reaction coil couples into a circuit that is now disconnected, no reaction effects will take place, and it is immaterial at what position the reaction condenser is left set.

To ensure that sufficient selectivity is available when working with the aperiodic coupling, a band-pass input from the aerial is provided, the two sections of which are controlled by a double-gang condenser. The volume

### YOUR SHOPPING LIST FOR THE "FLEXIDYNE"

- |  |  |  |
|--|--|--|
| 1 Panel, 21 in. × 7 in. (Peto-Scott, Permeol, Lissen, Wearite).  | Sovereign, Telsen, Lissen, Wearite, Tunewell).   | 1 25-meg. resistance, with tags or terminals (Lissen, etc.).                                 |
| 1 Cabinet to fit, with baseboard 10 in. deep (Peto-Scott, Camco, Pickett, Osborn, Morco, Smith, Ready Radio).                        | 1 Horizontal-mounting valve holder (W.B., Lissen).   | 2 1,000-ohm resistances, with tags or terminals (Graham Farish "Ohmite," etc.).              |
| 1 Double-gang .0005-mfd. screened variable condenser with disc drive and minimum trimmers (Polar Tub, Lotus, Cyldon, J.B., Utility). | 3 Four-pin valve holders (Lissen, Telsen, Bulgin, W.B., Igranic, Lotus, Benjamin, Clix, Magnum).                           | 1 100,000-ohm resistance, with tags or terminals (Dubilier 1-watt, etc.).                    |
| 1 .0005-mfd. disc-drive variable condenser (Polar No. 4, Lotus, etc.).   | 1 .05-mfd. fixed condenser (Dubilier 9200, Telsen, T.C.C., non-inductive).   | 1 L.F. transformer, medium ratio (Igranic Midget, R.I., Lotus, Lissen, Varley, Ferranti).    |
| 1 .0003-mfd. differential reaction condenser (J.B., Cyldon, Ready Radio, Telsen, Lotus, Magnum, Graham Farish).                      | 1 1-mfd. fixed condenser (Dubilier 9200, T.C.C., Lissen, Telsen, Igranic, Sovereign, Peto-Scott, Ferranti, Graham Farish). | 9 Indicating terminals (Belling-Lee type R, Igranic, Clix, Goltone, Bulgin).                 |
| 1 25,000-ohm volume control (Wattmel, Colvern, Magnum, Sovereign, Wearite, Igranic).   | 1 .0001-mfd. fixed condenser (Igranic, etc.).  | 1 Terminal strip, 6 in. × 1 1/2 in.  |
| 1 Band-pass three-coil assembly (Colvern KB1, KBLC, KGR).  | 2 .0003-mfd. fixed condensers (Dubilier 665, etc.).  | 1 Terminal strip, 5 in. × 1 1/2 in.  |
| 2 Push-pull on-off switches (Lissen, Ready Radio, Wearite, Telsen, Bulgin, Graham Farish, Magnum).                                   | 1 .01-mfd. mica fixed condenser (T.C.C., Lissen, Dubilier).  | 18-gauge wire and sleeving (Wearite), or Jiffilinx, Glazite, Quickwyre, Lacoline, Soldawyre. |
| 2 H.F. chokes (R.J. Quad Astatic and Ready Radio Standard, Lawcoo,   | 1 2-meg. grid leak, with tags or terminals (Igranic, Lissen, Dubilier, Loewe, Graham Farish).                              | Battery plugs, etc. (Clix, Eelex, Igranic, Bulgin).  |
|  | 1 .5-meg. grid leak and holder (Telsen, Lissen, Dubilier, Graham Farish, Igranic, Ready Radio, Loewe).                     | Flex, screws, etc.   |
|  |  | 1 Metal screen with hole for S.G. valve, 9 1/2 in. × 6 in., bent to shape.                   |
|  |  | 1 Metal screen without hole, 6 1/2 in. × 6 in.   |



## The "Flexidyne"—continued

control is in operation for both arrangements.

It consists of a potentiometer resistance in the aerial circuit, in which position it prevents the local station from overloading either the screened-grid valve or the detector. When set at "maximum volume," the resistance is so great that it does not exert any undesirably limiting effect.

Stability on the high-frequency side is assured by the ample screening that is provided. At first glance it might appear that the vertical screen, apart

In this connection it may be mentioned here that with band-pass receivers it is very necessary to keep high-frequency currents out of the low-frequency side of the set. To ensure this, apart from layout precautions, there is a decoupling arrangement in the anode circuit of the screened-grid valve and a grid stopper in the grid circuit of the first L.F. stage.

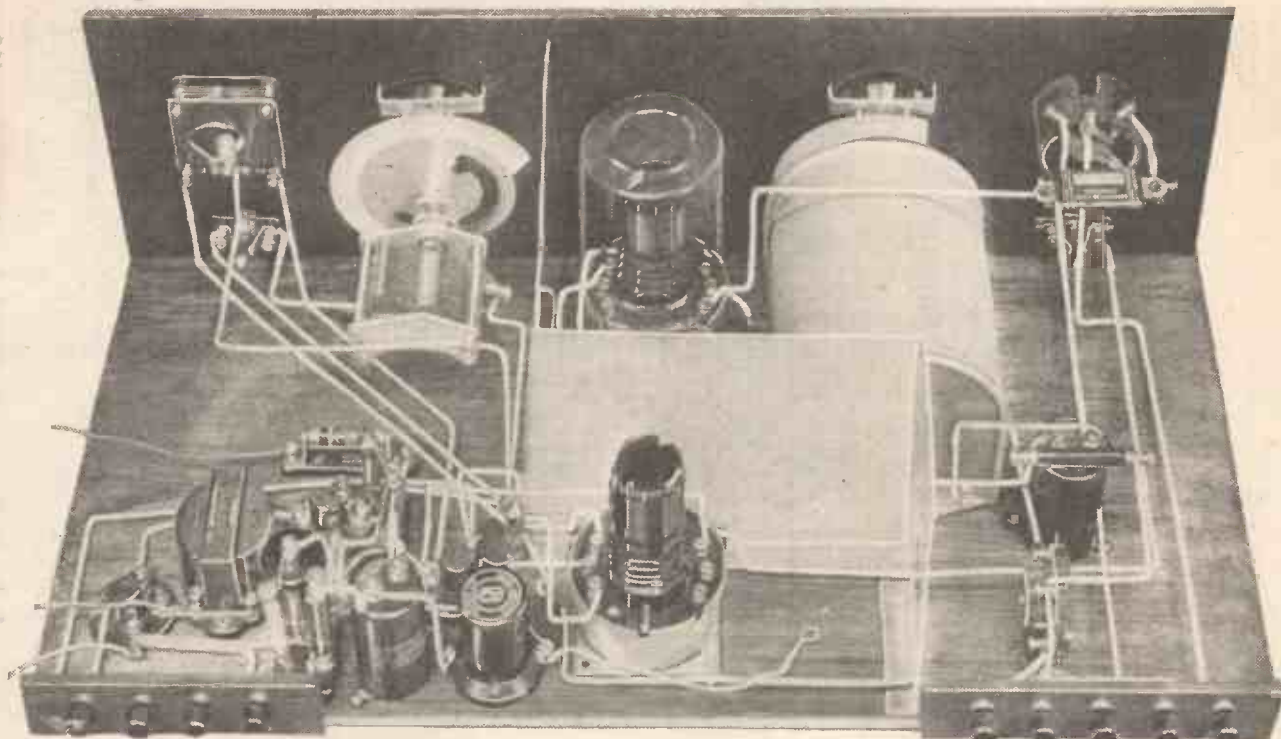
Ample evidence of the stability of the L.F. side is given by the fact that no detector decoupling is necessary.

Other double-gang condensers are suitable so long as they are of the completely screened type, but note that there must be a screen between the two sections as well as around the condenser as a whole.

### An Important Component

In connection with the band-pass circuit it is worth while to explain that the 1,000-ohm resistance across the common coupling condenser is to enable the grid of the S.G. valve to be set at the potential of L.T. negative

YOU WILL FIND IT'S AN EASY SET TO CONSTRUCT



*This photograph, with the wiring diagram on the next page, excellently illustrates the fundamental simplicity which is such a feature of Victor King's designs. The screening covers have been removed to show the coil units, but the "ghost" of one between the tuning condensers indicates how they appear when fitted.*

from the section round the S.G. valve, was unnecessary, because all the coils, as well as the double-gang condenser, are totally enclosed. But there are the leads to these components to be remembered, hence the continuing of the screen.

### Aim At Short Leads

There is nothing of special note about the layout, but, at the same time, there is nothing whatever difficult about it. The primary consideration has been to arrange the components in the most efficient manner, and to keep vital leads short.

Another point to note is that there is room on the baseboard for the grid-bias battery, right at the end of the baseboard, next to the reaction condenser.

And now for some details that will be helpful when you come to build the set. First of all a few words about the components.

In the complete list of those required you will find that there are plenty of alternatives except in the case of the set of three coils. It is, of course, necessary to use those specified, because the set is designed around them, and the adoption of others would no doubt completely upset it.

If this resistance were absent the grid would be in the state commonly known as "up in the air."

Continuing with the notes on components, there are five resistances without holders.

These are of the type with either terminals at their ends or with small lengths of wire, and are held in position by the leads which connect them up. Four of them are arranged vertically, and therefore do not show up very prominently on the wiring diagram.

So that there shall be no doubt about the connections to these, I propose to describe their connections



## The "Flexidyne"—continued

beside it, and then along to the .01 fixed condenser. Now we come to the top of the  $\frac{1}{4}$ -megohm grid stopper.

This goes to the other side of the .01-mfd. condenser, and from there to one end of a  $\frac{1}{2}$ -megohm horizontal resistance. The bottom of the  $\frac{1}{4}$ -meg. goes simply to the grid of  $V_3$ .

quite a good plan to reinforce it with a small piece of insulating tape.

Also, take care when placing the cans on the coils that the insulation on the wires to the coils is not damaged. A final wiring caution is to point out that both sections of the vertical screen are earthed, as also is the

wiring diagram. The part with the valve hole in it and the adjacent length is all one piece.

The hole can be approximately  $1\frac{1}{4}$  in. in diameter, and with its centre about  $1\frac{1}{4}$  in. up from the baseboard.

It so happens that I have dealt with the wiring first, but there are nevertheless two items to mention in regard to the drilling of the panel. First of all there are no panel brackets.

### Supporting the Panel

These are unnecessary, as the double-gang condenser is screwed to the baseboard and at the same time is fixed to the panel. It therefore serves the purpose of a panel bracket, keeping the panel quite rigid.

The second point concerns the drilling of the necessary apertures for the escutcheons of the condensers. A template is provided for these, and as one large round hole is all that is necessary for them they are very easily fitted.

And I think my story is nearly completed now. All the details about accessories, operation, etc., are given in very convenient and compact forms in the special operating chart and the list of recommended accessories.

### O.K.'d LINES FOR "FLEXIDYNES"

Loudspeaker. Blue Spot, Celestion, R. & A., H.M.V., Marconiphone, Graham Farish, Cossor, W.B., Epoch, B.T.-H.

Valves. S.G.: Cossor 215 S.G., Mullard P.M.12, Mazda S.G.215, Osram S.22, Marconi S.22, Eta B.Y.6, Lissen S.G.215, Six-Sixty S.S.215 S.G., Tungram S.210.

Det.: Mazda H.L.2, Mullard P.M.1H.L., Cossor 210 Det., Osram H.L.2, Marconi H.L.2, Tungram H.210, Eta B.Y.2020, Lissen H.L.2, Six-Sixty S.S.210H.L.

L.F.: Mullard P.M.2D.X., Marconi L.2B., Osram L.210, Mazda L.210, Lissen L.210, Cossor 210 Det., Tungram L.G.210,

Eta B.Y.1210, Triotron T.D.2. Power: Mullard P.M.202, Mazda P.220A., Cossor 220P.A., Osram P.2, Marconi P.2, Tungram P.220, Lissen P.220A., Eta B.W.602.

Batteries. H.T., 120 to 150 volts super-capacity (Lissen, Pertrix, Ever Ready, Siemens, Drydex, Magnet, Cossor).

G.B., 18 volts (Pertrix, Ever Ready, etc.).

Accumulator. 2 volts (Pertrix, Ever Ready, Lissen, Exide, G.E.C., Oldham).

Mains Unit. To supply 25-30 milliamps. at 120 to 150 volts (Atlas, Heayberd, R.I., Tunewell, Tannoy, Regentone, Ekco, Formo).

That leaves the 2-meg. grid leak of the detector valve. The top of this goes to the positive filament terminal of  $V_2$ , and from there to several other points. Its bottom connection is joined to the grid of  $V_2$ , which also goes to the .0003-mfd. grid condenser.

There is only one other point on the wiring diagram where anyone might go astray, and that is where there are four wires running very close together and close to the screen that comes between the back coil and the one next to it. So here are the points to and from which these leads run.

### Wiring Points

One comes from the positive filament terminal of  $V_2$  and goes through the screen to the positive filament terminal of  $V_1$ . Another comes from the anode of  $V_2$  and goes to 4 on the back coil.

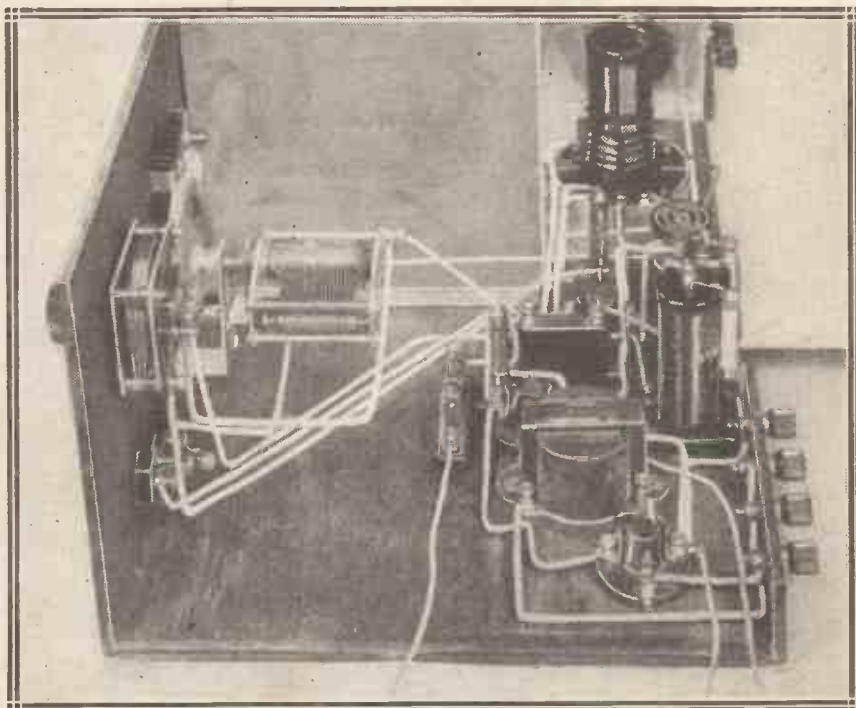
The other two run on the opposite side of the screen and are the lead from 2 of the middle coil to the .05-mfd. fixed condenser, and the lead from 1 on the middle coil to the fixed vanes on the back section of the double-gang condenser.

While on the subject of wiring I should like to emphasise the necessity of seeing that the insulation round the lead to the positive filament terminal of the first valve holder is fairly strong at the point where it passes through the screen. It is

metal base on which the three coils are mounted.

If you fashion your vertical screens at home you can get the position for the bend and the dimensions by making use of the scale marked on the

### AT THE "QUALITY" END



Well-designed L.F. stages employing resistance-capacity and transformer-coupling give the set tremendous punch, and make the chief contribution to its outstanding quality of reproduction.

## The "Flexidyne"—continued

The chart is meant to be cut out and fixed to the set. You will then always have the necessary details handy for reference purposes.

There is, however, just one point covered in the operating panel upon which I should like to enlarge, because upon it the sensitivity of the receiver depends. It is the one preliminary adjustment that has to be carried out before the set is put into operation.

### The Gang Condenser

The point to which I refer is the balancing of the double-gang condenser that tunes the two parts of the band-pass arrangement. Once done, it is done for ever and need not be considered again.

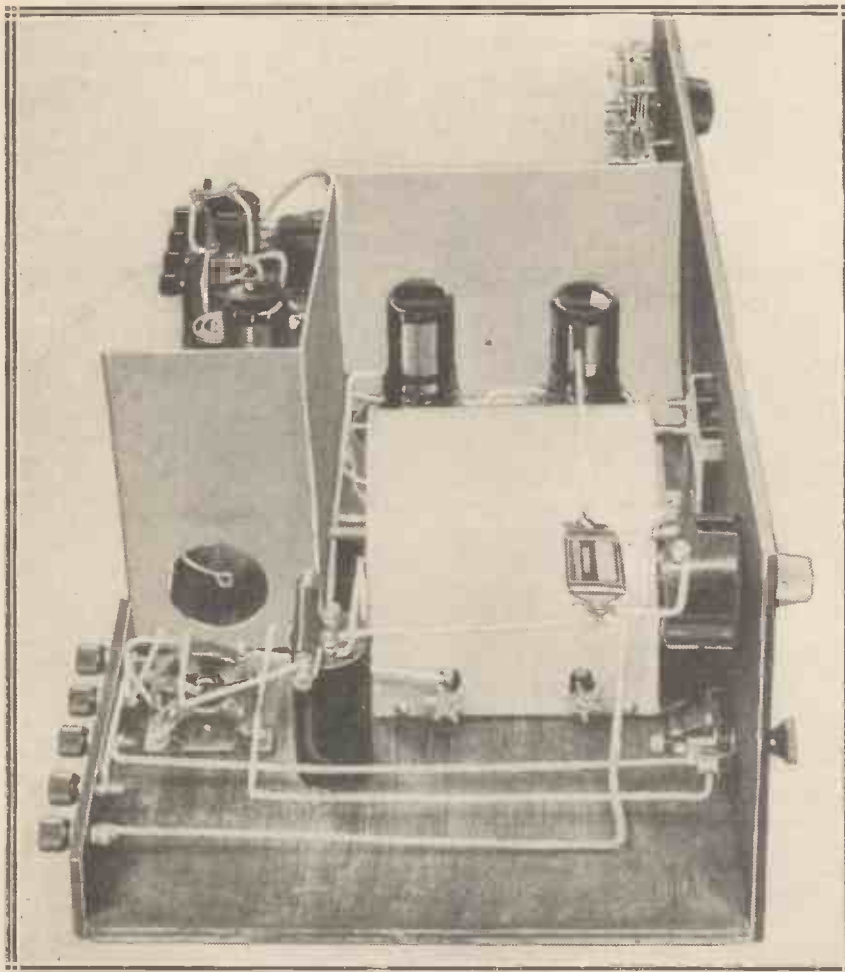
The adjustment is carried out by means of the two small wheels at the

<b>"THE WIRELESS CONSTRUCTOR" "FLEXIDYNE"</b>	
Circuit: S.G., H.F. stage, followed by detector and two L.F. stages, one R.C.C. and one trans. coupled.	
<b>VALVES</b>	<b>CONTROLS</b>
1st (mounted horizontally): Screened-grid type.	Bottom row: from left to right.
2nd (next to coils): H., H.L., or similar type.	1st: On-off switch. Pull out to switch receiver on.
3rd (nearest panel): L. or similar type.	2nd: Double-gang tuning condenser. This tunes the band-pass coils.
4th (next to end of baseboard): power.	3rd: Wave-change switch. Turn to the right, i.e. clockwise, for medium waves.
Valves may be of 2-, 4-, or 6-volt rating.	
<b>VOLTAGES</b>	
L.T.: 2, 4 or 6 volts, according to voltage of valves used.	4th: Tuning condenser. This tunes circuit between H.F. and detector valves.
H.T.+1: 60 to 80 volts.	5th: "Converter" switch. By pushing this in second tuning condenser and reaction control are put out of circuit for local and "home" use.
H.T.+2: 100 to 120 volts.	Left-hand top knob is volume control, and right-hand top knob reaction.
C.B.—1: 1½ or 3 volts.	
C.B.—2: Dependent on power valve used.	
<b>ADJUSTMENTS</b>	
The two trimming-condenser wheels on the side of the double-gang condenser should be set for loudest reception with a station near the bottom of the medium waveband tuned in.	

side of the condenser, and it is as well to use a small length of wood for turning them. In this way all effects that might be due to hand-capacity are completely avoided.

Before manipulating these trimmers, pull out both push-pull switches, set reaction at minimum, and the volume control at maximum volume. Turn the wave-change switch to the right, and tune in a weak station near the bottom of the tuning dials. The trimmers should already have been screwed up as far as they will go and then slackened off about two complete turns.

### HIGH EFFICIENCY BAND-PASSING



Preceding the S.G. valve is a delightful-to-handle band-pass tuner, and also a volume control. The latter is really in the logical place for controlling volume—namely, right in the aerial lead!

### Choosing a Weak Station

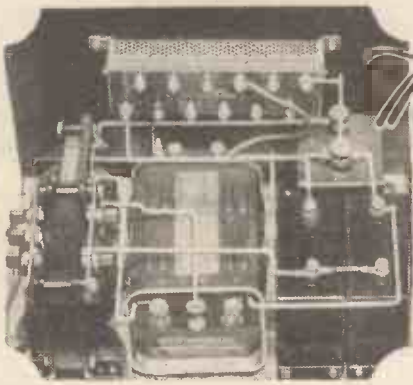
With the weak station tuned in, proceed to turn the trimmers one way and the other to find the setting that gives the greatest volume. If you find that in the case of one of them this occurs with the wheel screwed right up, then the other wheel should be slackened off a bit, the condenser retuned to the station with the main knob and the trimmers again set.

If, on the other hand, one of the wheels has to be completely unscrewed, then the other one should be screwed up a bit, the condenser retuned and the trimmers readjusted. If the trimming process brings the strength of the station up so much that it really ceases to be a weak station, a weaker station should be tuned in, and the adjustments checked.

### Time Well Spent

A little care with the balancing of the double-gang condenser will be well repaid in the better results obtained from distant stations.

So, feeling sure you will find all the information that you now need in these tables, I will end up with just one final point. Don't worry about the terminals on the coils that are not shown with leads going to them, they are not needed for this receiver.



# The MYSTERY of the METAL RECTIFIER

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

There must be tens of thousands of "eliminators" — horrible word—which use metal rectifiers, and yet only a few people know how they work. I certainly don't, and that is why I am writing about them this month!

There is something fascinating about writing on a topic that one knows very little about. If any reader

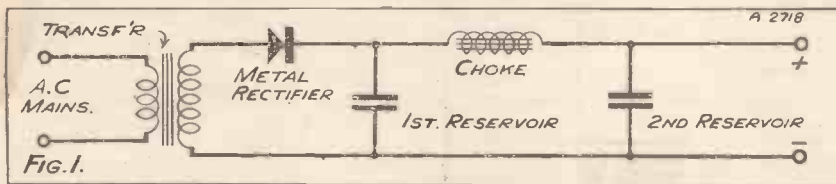
*Have you ever wondered how the metal rectifier works? The actual operation is still surrounded by mystery, and though "we dance round the magic cauldron, we do not know what is brewing inside it," says our distinguished contributor!*

die, but does not even fade away. The valve, of course, may develop into an invalid and invariably burns out. It is, however, light in weight, easily

current to flow from lead to copper, but not in the reverse direction.

Here, then, was a practical device for changing A.C. into D.C., and the Westinghouse people have developed a number of commercial types capable of dealing with any set of conditions. Various models have been operated at full load for five years and show no deterioration, and types have been built to deliver 1,000 amperes at 12 volts, and others to give 80,000 volts.

## A SIMPLE HALF-WAVE ARRANGEMENT



The circuits that can be used with a metal rectifier are much simpler than those necessary in valve rectification, as this diagram of a half-wave rectifier illustrates. There is the additional advantage that the metal rectifier is much more robust than the valve.

is beginning to think that I am being unusually modest in starting this article, I ought perhaps to add that nobody else knows very much about metal rectifiers!

Of course, we know a lot about designing and using them, and we even know how they don't work, but a certain mystery still surrounds their actual operation. We dance round the magic cauldron, but we do not know quite what is brewing inside it.

### The Valve's Competitor

Last month I discussed mains units using thermionic valves, and explained how alternating current is changed into D.C., which is then "smoothed." The "metal rectifier" is the valve's great competitor as a means of obtaining the current to feed our valves. There is a pitched battle going on at present between the heavy, robust, phlegmatic bunch of copper plates and the light, cheap and more agile valve.

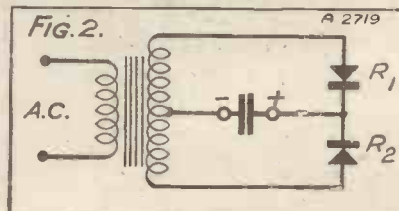
I am not betting on the result myself. The metal rectifier has more staying power; its life is a great deal better risk from an insurance point of view; in fact, it not only doesn't

replaceable, cheap—but there are a dozen arguments on each side. For the present I shall merely talk about the metal rectifier.

### Copper-Oxide Used

This name, by the way, is not a very happy one, because other rectifiers are made of metal. The kind we are now concerned with is a copper-oxide rectifier. The device is based on the work of Grondahl, who in April, 1926, gave a report of it to the American Physical Society. It was found that if a sheet of lead was pressed against the oxidised surface of a sheet of copper, the arrangement allowed

## THE CENTRE-TAPPED SCHEME

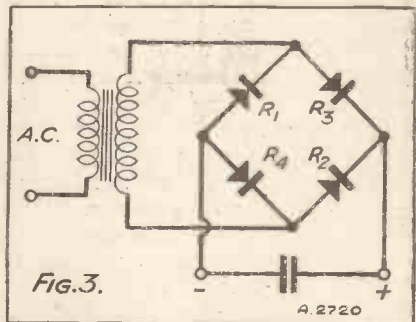


Full-wave rectification can be obtained by using a centre-tapped transformer, and a pair of rectifiers connected in the manner shown above.

### Fitted With "Fins"

Many readers will be familiar with the appearance of the rectifier unit which is built up of a number of rectifiers in series when an H.T. supply is required. The individual discs of copper coated with oxide are "threaded" together and are fitted with cooling "fins" which dissipate

### IN "BRIDGE" FORMATION:



Another method of getting full-wave rectification is to arrange four rectifiers in "bridge" formation, as illustrated in the accompanying diagram. For this circuit the total voltage given by the transformer need be only a little higher than the required D.C. output, as against double the voltage required for the centre-tapped arrangement.

the heat generated by the unit when in action. The size of the individual discs depends upon the output current to be delivered, while their number is governed by the voltage the unit is to handle.

The circuits which may be used with the rectifier unit are similar to those applicable to a valve or any other one-way device, but in actual practice the copper-oxide rectifier lends itself more

# The Mystery of the Metal Rectifier—continued

eadily to different kinds of circuits, since we do not have filament heating arrangements to provide for.

Fig. 1 is a typical half-wave rectifier circuit in which the symbol of arrow-head and plate represents the rectifier unit itself. A 1st reservoir condenser is used to store the rectified pulses of D.C.; and the output smoother circuit, consisting of iron-core choke and 2nd reservoir condenser, is the same as is used in valve rectifier circuits; the 2nd reservoir, of course, acts as the supply store for the D.C. output.

operate in the case of the rectifier under consideration is readily proved by heating the rectifier; the electromotive force set up is in the opposite direction to that required to support the theory.

### Electrolytic Theory

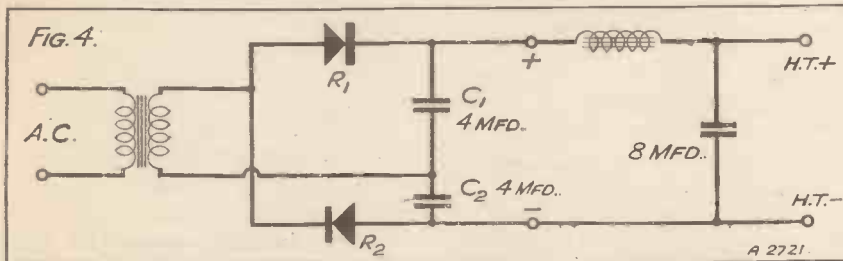
A further theory which has been considered is that which explains the action of electrolytic rectifiers. These are not always of the "wet" type; they may consist of dry plates of magnesium and copper sulphide, and do, therefore, resemble the copper-oxide

electrons comparable to that occurring in a two-electrode valve. In other words, we can think of the copper-oxide rectifier as a "cold" valve—a two-element valve in which the cathode does not require heating.

It is an existing idea, and hysterical prophets have forecast, and even patented, remarkable developments in which the cold copper-oxide valve displaces the ordinary thermionic—or hot-cathode—valve. As, however, our Patent Office will even grant patents for perpetual-motion machines—and be very glad to take your money—healthy scepticism may be indulged in.

I even doubt whether we really want a cold three-electrode valve. At any rate, here we are with a very excellent cold two-electrode one, and it is very far from having the field all to itself. Nevertheless, by considering the copper as the electron-emitting cathode, and its layer of oxide as the anode, we do get a picture of the action of the device—and, fortunately, we do not need to know its exact theory in order to use it.

### A POPULAR VOLTAGE-DOUBLING CIRCUIT



This is one of the most popular rectifier circuits. By the clever arrangement of two half-wave rectifiers and a pair of condensers it is possible to get full-wave rectification and a D.C. voltage equal to almost double the A.C. input.

By means of the input transformer (which, by the way, is obligatory under the rules of the Institution of Electrical Engineers in the case of all A.C. mains units) any desired output D.C. voltage is obtainable, an appropriate copper-oxide rectifier being employed for a given set of conditions.

The reader may quite likely compare the action of the rectifier to that of an ordinary crystal detector. There are certainly considerable superficial similarities. For example, wireless crystals are usually metal oxides in crystalline form (e.g. zincite) which are brought into contact with a metal (e.g. a platinum) wire.

### A Definite Difference

But in crystals the action takes place at the point where the oxide and wire meet; a good "spot" has to be found. In the case of the metal rectifier the action of rectification does not take place where the lead touches the copper oxide; it occurs between the copper disc and its own layer of oxide formed on it.

An explanation offered for the action of the crystal detector was that the high-frequency alternating currents heated the junction point and a D.C. potential was set up across it. That such a thermo-electric effect does not

device. But the electrolytic rectifier undergoes chemical change, the "reverse" current is high, and the life is comparatively short. In the copper-oxide rectifier there is no chemical change at all.

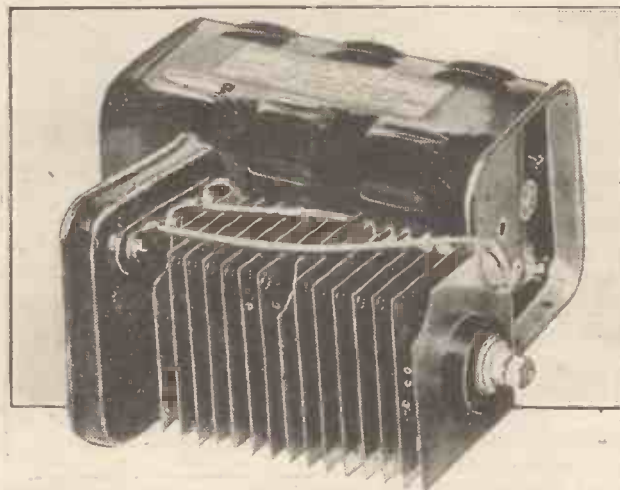
In fact, the action is a mystery. It has been accounted for by the assumption of the unilateral passage of

### "Middle-Tap" System

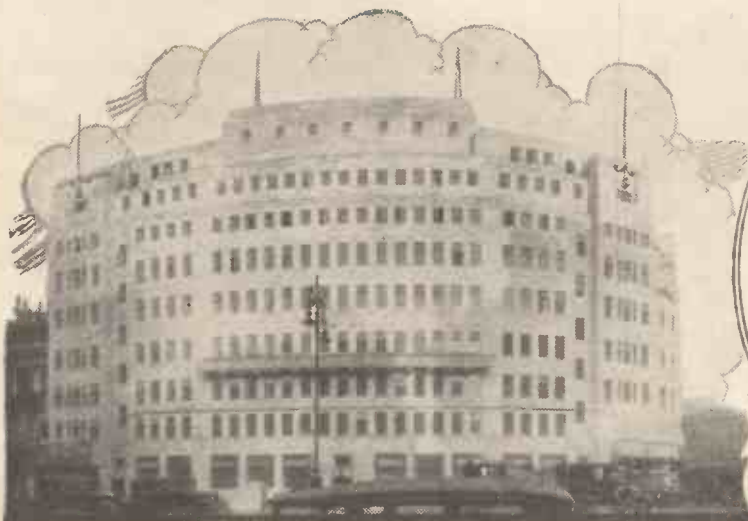
Apart from the simple Fig. 1 arrangement, which is rather crude for H.T. purposes, I have given three full-wave rectifier circuits. Fig. 2 shows the "middle tap" system so much favoured when using two-electrode valves. The mains transformer steps-up the A.C. voltage to double that which would be used for a half-wave rectifier, and  $R_1$  and  $R_2$  act on alternate half-cycles, the reservoir condenser being charged up by impulses from each rectifier in turn.

Fig. 3 is known as the "bridge" circuit. Four rectifiers are now used and the transformer does not now need to deliver the double voltage required by Fig. 2. Each pair of opposite rectifiers now act alternately to charge up the  
(Please turn to page 164.)

### INSIDE A COMMERCIAL UNIT



A commercial rectifier of the full-wave voltage-doubling type, removed from its case. The actual "oxide" elements are of comparatively small diameter, the large metal fins being for cooling purposes.



# B.B.C. NEWS

*Topical notes regarding British Broadcasting Stations and Programmes.*

By Our  
Special Correspondent.

### That B.B.C. Motto

THE B.B.C. motto, "Nation Shall Speak Peace Unto Nation," of which Lady Snowden and Dr. Rendall, two of the Governors, are reputed to be the parents, is now very much in the background. It was dealt a reeling blow by Sir John Reith in his challenging address to the Royal Institution in May.

Sir John made it clear in no uncertain way how he regarded such sentiment. And I find the same revulsion among members of the staff whom I meet. The B.B.C. has responded to the wave of nationalism and imperialism of last autumn; and although some internationalist talks are still given, their number declines steadily. The break-up of the International Union of Broadcasters at Geneva is hastened by this renaissance of British entity.

### Staff Changes

There have not been many staff changes since Miss Hilda Matheson resigned the job of Talks Director and was replaced by Mr. Charles Siepmann, one of her assistants. But I believe this autumn will see several important moves.

For one thing, there is the job of director of the Empire service, which is likely to go to Mr. Beadle, now in charge of B.B.C. operations in Ulster. The new job in Ulster will go to a head office official, probably Mr. D. H. Clarke, who was at Belfast for some time as senior assistant.

Then there is the possibility of the Music Department being promoted to the same status as the Talks, namely, being made into a branch and separated from the general programme branch under Mr. R. H. Eckersley. If this step is taken it will remove so

much from the general programme branch that it can be cut down a good deal.

### Severe Discipline at Portland Place

Complaints continue to reach me of alleged "ferocious" discipline at Broadcasting House, which, it is stated, is beginning to be known as the "Big House," after the prison film of that name. If true, this is a pity, and deserves investigation.

### Exchanging Programmes

The system under which the B.B.C. and other broadcasting authorities have been exchanging programmes is not likely to be continued. There has

been too much friction over the details, and there is some doubt as to the acceptability of the material. Also, the growing spirit of national consciousness is against this sort of thing.

### The Birthday Week

In celebration of its tenth anniversary, the B.B.C. will give a week of special programmes in November, thereby reviving the practice once very popular but discontinued unjustifiably about three years ago. A great annual effort of a week or so was enormously popular in the early days of the B.B.C., but presumably because of the attitude of programme staff it was regarded as inconvenient

### A NEW HOME FOR "RADIO ROMA"



"Radio Roma's" new headquarters are completed at last, and this photograph shows the very fine waiting-room that has been provided.

## B.B.C. News—continued

in that it set too high a standard for the rest of the year.

And now the old system is to return. I hope that the tradition will be fully revived and will include as its centre-piece a really informal staff programme compered by Captain Eckersley and Rex Palmer, with sound effects by R. E. Jeffrey and A. G. MacDonell.

### Revolt in Scotland

The anger of the Highlands against the B.B.C. continues unabated. As soon as the municipalities took common action they enlisted with success

Broadcasting House is obviously very nervous lest anyone should think that the addition of the lunch-time programme on Sunday means any broadening of the basis of Sunday programmes.

So far as we have gone this anxiety is unnecessary.

No one could accuse what we are now getting of being remotely secular. I think the programme-makers must bestir themselves and let us have better and brighter material. And after that we shall want appropriate entertainment alternatives to religious broadcasts.

ened to cut out the producer. A hint of this possibility having got round, there were angry meetings of those concerned, and it was said that if they were not to be given personal publicity they would go on strike.

Fortunately, the "direct action" weapon did not have to be used, because moderate councils prevailed with those in authority.

### B.B.C. Programmes—For Sale

Arrangements have been completed for the sale of B.B.C. programmes on gramophone records and other recording devices. It remains to be seen how great will be the demand, but there are already indications of interest in the Crown Colonies. Local broadcasters where advertising is allowed intend to arrange for sponsors to use the B.B.C. records.

### Postmaster-General versus B.B.C.

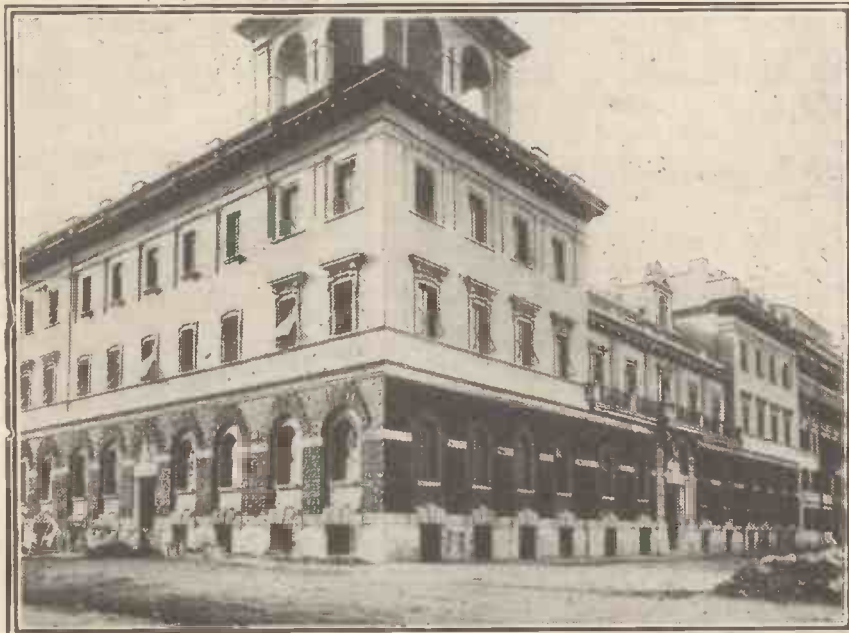
The struggle between the interests represented by Sir Kingsley Wood and Sir John Reith continues to grow in intensity. I am not sure whether in this conflict the Postmaster-General is primarily the mouthpiece and instrument of Sir Evelyn Murray, the Chief Permanent Official at the G.P.O.

If there is anything in the suggestion, it is easy to understand how the conflict came about. Sir Evelyn Murray has been hostile to broadcasting, and now he is understood to fear it as well. Honours are about even in the first round of this titanic struggle.

On the one side, the Post Office is believed by its tolerant policy towards wireless exchanges to be progressing in the creation of a counterpoise to the B.B.C.

On the other side, the B.B.C. has succeeded in enlisting all the organisations of the Press to resist the advertising tendencies of the wireless exchanges, and, indirectly, of course, the Post Office. This struggle is likely to go on for some years. The B.B.C. is well advised to rely on Press co-operation. This exposes the really vulnerable part of the armour of the G.P.O.

### THE BROADCASTING HOUSE OF ITALY



*This magnificent building is the headquarters of Italian broadcasting in Rome. Part of the interior is shown in the photograph on the previous page.*

the support of the Welsh Nationalists, each pleading for better treatment in the matter of distribution. Now that the Welsh and the Highlands have joined forces the difficulties of the B.B.C. are considerably accentuated.

It is now argued that unless and until adequate signal strength is provided throughout Wales and Northern Scotland there should be no attempt on the part of the Post Office to collect the 10s. licence fee.

### The New Sunday Programmes

After some weeks experience of the new Sunday programmes of the B.B.C. it is clear that they need brightening.

### Staff Publicity

There was recently one of the periodical "tightening ups" on the personal publicity of members of the B.B.C. staff. Strictly speaking, no one in the B.B.C. except the Director-General and the Governors is supposed to be known by name.

But, of course, it would be absurd to run a concert at Queen's Hall with an anonymous conductor, so exceptions were made on the musical side. Then the dramatic side naturally felt aggrieved, and they were allowed some publicity, gradually extending to include the author, the arranger, and the producer.

Then came a reaction which threat-

ORDER THE AUGUST

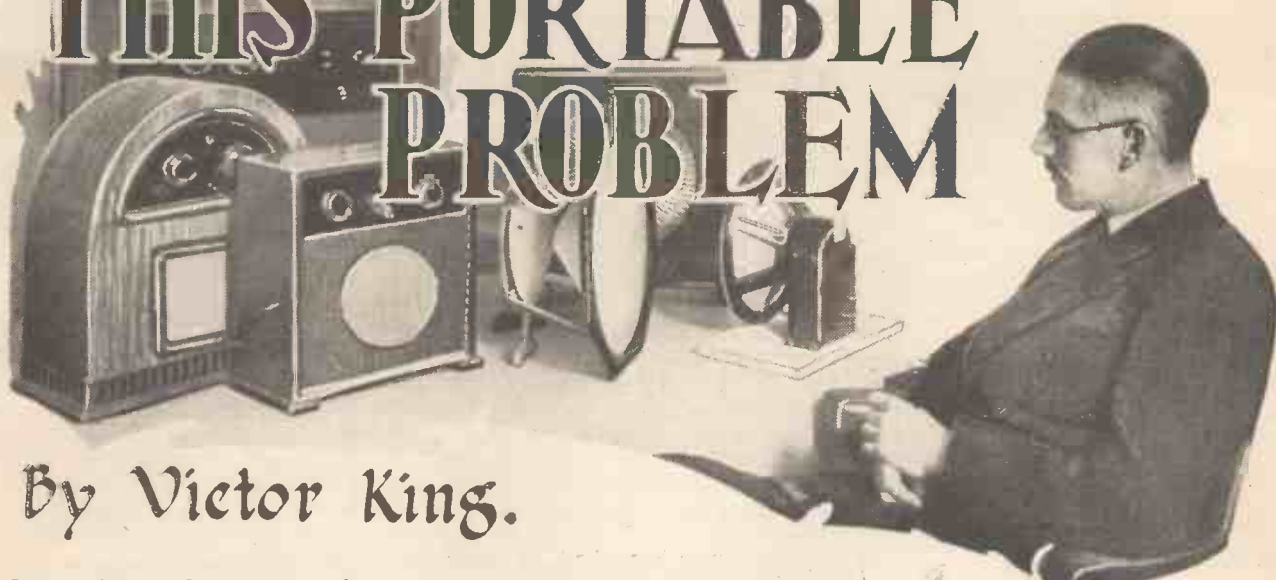
"WIRELESS CONSTRUCTOR"

Out July 15th.

Sixpence.



# THIS "PORTABLE" PROBLEM



By Victor King.

SOME few weeks ago one of my colleagues made the remark "constructors aren't so enthusiastic these days; they don't write to us so much." Well, my opinion was that there was as much enthusiasm as ever, and I have had overwhelming proof of this.

In the last but one issue of the CONSTRUCTOR I invited readers to let me know what they thought about portables, and whether or not they would like me to design one.

From the day the article appeared until this very moment of writing, postcards and letters have simply poured in—hundreds and hundreds of them.

And it has taken me hours to read them, and a more enjoyable and informative task it would be hard to imagine.

## The Daily Dozen

But there's one snag. Some four or five hundred of my correspondents write as though they are each my one and only communicant, and ask all sorts of questions which they obviously expect me to answer personally through the post.

I have answered and am still answering a dozen or two every day, but I really can't tackle the whole lot—it would be a physical impossibility. So please, CONSTRUCTOR friends, don't expect individual personal attention. I can read and enjoy and pick up tips from even more letters than I am getting, but I really cannot reply to questions by post—if I could I would.

It is curious, this letter-writing illusion, that the man or journal you are writing to is a kind of single-

*Some very interesting and useful information emerges from the correspondence received by our contributor from "Constructor" readers. But apparently Mr. King does not find it easy to arrive at a definite conclusion in regard to readers' requirements, for these vary from simple suitcase "three's" up to all-electric trans-portables!*

station receiver. I have it myself, for I have often shot off a letter to a paper or firm and felt quite slighted when I have had to wait or go without an answer to it!

Now to my task of analysing my correspondence on this portable problem and telling you how I react to it.

I think the most interesting aspects of the correspondence are the different reasons why various constructors want portables.

J. F. C., of London, N.16, wants one so that "I should be able to listen in my own room to my own particular programme, and feel independent of being obliged to listen to the family set which has taken the only good A. and E. position in our house."

## Indoor or Outdoor?

One wonders whether J. F. C. is a highbrow in a family of jeering lowbrows—or vice versa!

A. P., of Dundee, would like "a simple set in an attaché case" which he "could put in the car for the purpose of having the news and weather." He says he would not dream of listening to a symphony concert on it, but "for general utility purposes and even a little dance music it would be extremely useful."

V. A. P., of Southend, says: "I had thought about constructing one of some kind for my holiday. A fortnight in July at a house where there is no music at all would be awful."

B. K. is a theatrical artiste on tour, and pleads for a really good new portable.

An Ilford correspondent gives a most interesting reason for his requiring a portable. He says:

"I want a small and compact set which I can keep at the office. It must work without earth or aerial. It must be mains-driven, and the unit such that it can be plugged into any kind of electrical light socket (universal fitting, so to speak). It can be two or three valves, but it *must* be compact, say 14 in. by 10 in. by 4 in. overall, to slip away in a drawer. It must *not* be powerful in the sense of giving volume, but just powerful enough to ensure comfortable head-phone reception.

## Working to Music!

"And now let me tell you why I want it! I'm sufficiently far up the staff to have discretion in my actions, and, in my own little office, I am free from bothering others or leading them astray. There are times when I have to work late and miss tempting bits of programme, and, because I can work *and* listen, time would go by more comfortably if music helped along.

"Also, I should be able to get the lunch-time music without disturbing others in the next room. I should be able to listen in to the finals of Grand Nationals, Boat Races and

## This "Portable" Problem—continued

other exceptional events; in fact, there are many uses to which such a hidable little receiver could be put."

I quote at length in this case because here is a totally different requirement from the majority and one which aptly illustrates one of the biggest problems facing the set designer—the problem of being able to satisfy everybody. Of course, it is quite impossible to do so.

### Household Hints in the Heather

But before I discuss this at length I must tell you something about what my correspondents say regarding the falling off of popularity in portables. And I don't think I can do this better than by again quoting from the actual letters.

do get some light music we are usually in bed or dancing to the local band on the pier or at the hotel.

"You see, it's not the fault of the portable, but the fact that programmes are not designed solely for the portable user. Consequently, I take my own music in the form of records when I am on holiday; that is, if I want to have music.

"Given the right kind of programme, suitable to the surroundings and not requiring too much attention, I think we should see more portables out in the open. But you must agree that what is suitable for open spaces and the seaside is not always suitable for indoors—in programme value I mean."

Very well stated and very much

normal use, whose transformer burnt out a week later, and whose valve consumption can hardly be squeezed on to the milliamp. dial." (He mentions the name of one of the most boomed portables of last year.)

### What Do They Want?

But now, what do readers want in the way of a portable, for there is no doubt at all that many do want one, for a big proportion of my correspondents say so most emphatically.

Approximately 50 per cent desire a suitcase model, 45 per cent a trans-portable in wooden cabinet, and 5 per cent an interchangeable type which could be either at will.

About 50 per cent consider there should be not more than three valves, while 25 per cent are in favour of four and 25 per cent request five.

One reader suggests that the design should allow for an optional valve for frame-aerial working, this valve to be cut out when an ordinary aerial is available; not a bad idea this.

Quite a number of enthusiasts plead for real compactness, others want easy component accessibility.

E. T. P., of London, complains that my sets are usually too complicated. B. J., of Croydon, considers I pander too much to what he calls the "ham-handed."

### Tempted to Withdraw

My kindly correspondents have made me perplexed as to what line I should take if I attempted to design a 1932 portable.

Obviously, I cannot please everybody, but they all seem to hold such definite views on the subject that I feel any suggestion of a compromise would end with pleasing nobody.

Indeed, I am tempted to withdraw from the whole business and leave the onus of producing a portable (if one is to be produced) to S.-T. He, at least, would not *compromise*! On the other hand, I do not think there is the slightest possibility of him tackling a portable—from what he said when I mentioned the matter to him.

I'll have to spend a few more hours with your letters and see if any real degree of unanimity on fundamental questions exists, though I fear it does not; anyway, I haven't spotted it so far!

### BROADCASTING FROM A TRAIN



*An American singer, accompanied by a full orchestra, recently gave a recital from a train in America. A short-wave transmitter was fitted on this train, and its programme was picked up and relayed through the whole of the great Columbia network of stations.*

This is the opinion of J. S., of Aldershot:

"Dealing with your remarks regarding the non-appearance of these instruments at holiday resorts—don't you think that the main cause is the programmes? Who wants to listen to culinary talks or household hints while sitting on the sands or on the moors? During the lunch-hour music we are usually indoors talking, or perhaps listening to the proprietor's own wireless, so one of our own is unnecessary—and at night when we

to the point, isn't it? I choose R. W., of Walthamstow, to speak for those who have tried portables of a certain class and found them very much wanting.

### Afraid of the Name

He puts it this way:

"The song of the . . . has, of course, given such a terrible note to 'portable' reception that everyone is afraid of the very name. I know one purchaser of such a set whose battery (H.T.) ran out in five weeks of



# A PRACTICAL MAN'S CORNER

By R. W. HALLOWS, M.A.

*Into these pages, month by month, our contributor packs a wealth of practical information and advice on constructional work. The regular reader of this "Corner" cannot help picking up a more or less complete training in radio workshop practice, while every month there are wrinkles to read, gadgets to make, or hints to help you.*

THE Editor has referred to the practical nature of these notes, and many correspondents have been kind enough to do the same. Well, they *should* be practical, for they are almost written on the bench. Workshop jobs are one of my great hobbies, and hardly a day passes without the making or the alteration of some piece of wireless apparatus.

Close to the bench stands a Dictaphone, and when any little problem crops up, as is constantly the case, a note of the solution is made on the instrument's recording cylinder. When

useful tips from the many that have been recorded.

Some are rejected because they have been dealt with previously; others, possibly, because they demand tools or apparatus that the average constructor may not possess. Those finally selected concern jobs likely to come the way of any wireless enthusiast, and jobs which can be done by any moderately handy man with a limited outfit of tools.

Many—and these are by no means the least useful—require neither any particular skill nor the use of tools. Take the first one that I have chosen this month.

## Solving a Valve Problem

Realising the good qualities of valves with metallised bulbs, many constructors desire to fit them to their sets when they are making replacements, and would unquestionably do so if it were not for one rather important snag. If you hold such a valve with the points of the pins downwards, the grid pin to the front and the plate pin to the rear, the right-hand filament pin as seen from above is the one which is connected to the metal coating of the valve.

This means that looking down on the valve holder, and taking it that the grid socket is in front and the plate socket at the rear, the right-hand filament socket should be connected to low-tension negative and earth. Now, such is fate, that it is ten to one when you come to examine the wiring of a set into which you propose to insert metallised valves that you will find that it is the other filament socket which is earthed.

If the set is a big one with compli-

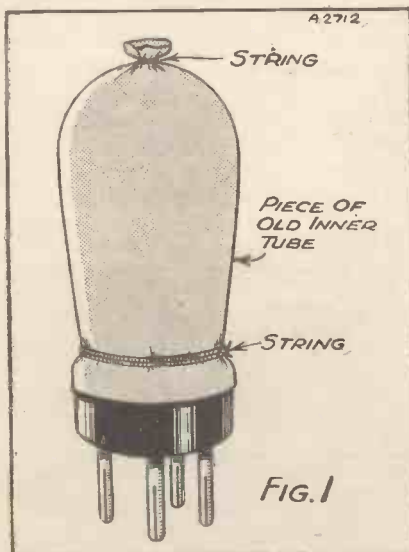
cated wiring you do not want all the bother of making alterations. From the point of view of efficiency it does not matter in the least whether the metallised bulb is connected to low-tension negative or low-tension positive.

## A Way Out

But there is another consideration. Every other earthed metal part of the set is at zero potential, and it is clearly undesirable to have large exposed metal surfaces such as those of valve bulbs at a potential 2 volts—or it may be 6 volts—positive to them. It is simply asking for short-circuit troubles.

Fig. 1 shows an absurdly simple way out of the difficulty. If you don't

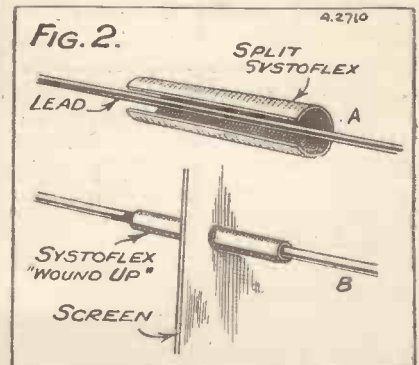
## FOR COATED VALVES



A "jacket" made from a piece of cycle inner-tube is useful in certain cases in preventing shorts on to the metal coating of a valve.

the time comes to write these notes the trouble is not to find material, but to pick out the most suitable and

## REINFORCED INSULATION



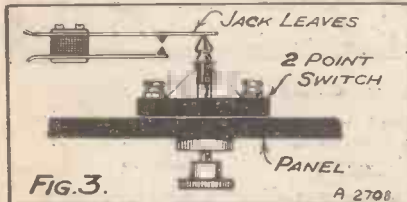
The insulation, at points where leads pass through a screen, can often be improved in this way without disconnecting the wires at all.

possess an old bicycle inner tube you can obtain one for the asking from a cycling friend or from a bicycle shop. Cut off from this a piece about 1½ in. longer than the bulb of the valve.

## A Practical Man's Corner—continued

Work it over the bulb as shown in the drawing, then tie at the top like the mouth of a sack with thin string, and if necessary tie with string also just at the "waist" where the bulb joins the cap. If you have any difficulty in getting the tube over the valve, apply plenty of French chalk

### SIMPLE THIRD CONTACT



Arranged in this manner, an old jack can be used to turn a two-point switch into a three-point one.

to the inside of the tube and it will go on with the greatest ease.

### Other Uses

Besides the use mentioned, this tip has two other very handy applications. It has, for instance, a wonderful silencing effect upon a microphonic valve, whether metallised or not. If, by the way, you want to fit a rubber overcoat to a very fat power valve, use a piece of motorcycle, instead of ordinary cycle, inner tube.

And have you ever thought of one risk with metallised screen-grid valves, even if the coating of the bulb is connected to low-tension negative?

Fixed to the plate terminal at the top of the bulb is a lead connected to high-tension positive and with a potential as a rule of from 120 to 150 volts.

When you are changing a metallised screen-grid valve one or two unpleasant things may happen. The first is that you hold the bulb with your left hand whilst you unscrew the terminal with your right. All goes well until the terminal is removed and you pick off the bare end of the lead. Then you discover in the most practical of ways exactly what 150 volts feel like. The other risk is one that frequently follows this experience.

You hastily drop the H.T. positive lead, whose bared end alights upon the metallised surface. There is no need, I think, to continue the description of a somewhat painful episode. You can render your metallised S.G. completely fool— That is to say,

you can make them perfectly safe from this kind of thing by providing them with rubber sleeves.

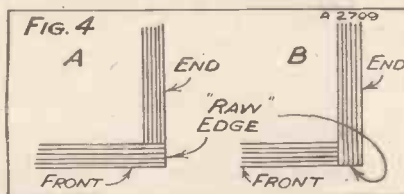
### Leads and Screens

I have given before some tips about supplying extra insulation at points where low-tension or high-tension positive leads pass through earthed metal screens. Here, though, is a delightfully simple and very effective one of which I made use the other day with excellent results.

I was looking over a set made by a friend, and I did not like the fact that in several places he had not reinforced in any way the insulation of wires passing through screens. All of the connections were soldered, and I did not particularly want the job of taking them apart and remaking them in order to be able to slip systoflex sleeving over them.

Fig. 2 illustrates a way in which the insulation of existing leads may be reinforced in such circumstances without undoing the connections. Choose a piece of systoflex big enough for

### THIS LOOKS UNSIGHTLY—



Plywood is very useful for cabinet-work, but plain corners made in this way "give the game away" immediately.

the wire to pass through it with plenty of room to spare. Cut off about an inch.

Now slit the systoflex from end to end, as shown at A in the drawing, slip it over the lead, and then "wind it up" quite tightly with your fingers, as shown at B. You will then be able to push the systoflex through the hole in the screen and all will be well.

### An Auxiliary Switch

In many modern sets a three-point battery switch is required. In some volume control is accomplished by means of a potentiometer regulating the screening-grid voltage; in others a potentiometer varies the grid voltage of a variable- $\mu$  valve.

When the set is switched off either kind of potentiometer must be cut right out of action or current will be wasted and batteries will run down.

On looking through your stock of parts you find that you have not such a thing as a three-point switch, though possibly you have more than one of the ordinary two-point variety such as that seen in Fig. 3.

This drawing shows also a method whereby such a switch can be provided with an auxiliary which converts it automatically in the way required. If you are an old hand at wireless you are sure to have in some corner of your junk box the parts of one, or possibly several, old single-closed circuit jacks.

All that you require from one of these is the two leaves which normally spring together so that the contact points touch. Remove the frame of the jack; or, if you like, cut away part of it and use the rest to help to make a mount. Fix the leaves as shown in the drawing and the job is done.

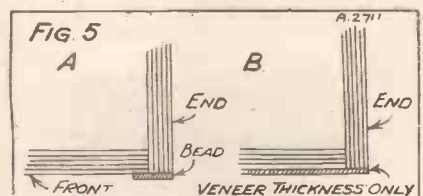
When the set is put out of action by pushing in the switch, the latter's point thrusts the two leaves apart, breaking the contact and disconnecting the circuit in which the switch is incorporated. Pull out the switch to bring the set into operation and contact between the points on the spring leaves is instantly made.

### Plywood Corners

Many readers have probably been struck with the possibilities of five-ply with an ornamental veneer as a material for the construction of wireless cabinets. I have been experimenting with it for some little time now, and I find that it is satisfactory in every way.

It is cheap, it is light, it is easy to

### —BUT THIS IS "OAK"!



Oak beading at the edges will successfully disguise the fact that plywood is used, as at (A). (B) shows the professional, but more difficult, way of using "faced" wood.

work, and, lastly, it enables you to make a really good job of a cabinet without any great amount of labour. The only snag about the use of plywood is what to do with the corners.

(Please turn to page 163.)



# From My Armchair

by "S.T."

**A** MONGST my mail to-day I received a letter from an inventor of a wireless apparatus. He complains:

"I and my family have been reduced to destitution and utter ruin by reason of never being able to get satisfaction from the firms who have held my licence."

### A Sad Case

He goes on to say that he used to sell fifty of his patent apparatus per week, and that he is now asked to believe that only six per week are sold. The manufacturers refuse to give any certified accountant's proof unless he is willing to pay £26 10s. for an audit.

As he only gets six shillings per week royalties, and has had to apply to the local Public Assistance Committee for help to live, he cannot afford this sum. He does not mention the firms' names, but it is a sad case on the facts presented.

He may well ask: "I wonder what the public who see the advertisements of my patent in the various papers would think if they knew the inventor and his family were dying slowly from sheer want and hunger?"

### Born Pessimists

I have given this man certain advice, but his letter raises a question of interest to all of us. Any one of my readers may easily think of some useful gadget, and get some manufacturer interested; but if he relies

on good faith alone, he is being very foolish and unbusinesslike.

A solicitor should draw up a contract, and it should provide a clause entitling the inventor to see the books of the firm, special books being kept to record the sales of his invention. A clause of this kind makes it difficult to defraud an inventor. He has only to buy, through a friend, a model of his invention from the manufacturers, and if they failed to record the purchase in their books the inventor would find them out at once.

My correspondent complains that a firm previously licensed by him

My own experience has always been with big companies defending themselves against still bigger companies, and I can sympathise with a penniless inventor. Nevertheless, patentees have to be born pessimists, prepared to see their inventions exploited by others.

### Sell Outright

A classical case is that of Sir Oliver Lodge, the "father" of tuning. How little financial recognition he got for that early and immensely valuable tuning patent of his! And even companies with great resources have paid tens of thousands of pounds to force powerful infringers to pay their due.

The moral, I think, is to sell your patent outright for a lump sum, remembering that the purchaser is always making a speculation. Your patent may be invalid, or something new may come along which evades or supersedes your own invention.

If you sell on a royalty basis, see that you get a proper contract and that you deal with a very reputable firm. And, lastly, treat all you make out of inventions as manna from heaven.

### Have You Tried This?

Have you tried a potentiometer resistance across your detector valve filament, joining the slider to the bottom of the tuned grid circuit (or bottom of the grid leak, if this goes normally from grid to filament)?

*So greatly have our readers appreciated these delightful talks by Mr. John Scott-Taggart that the space allotted to them has been greatly increased this month. And in this and the following pages "S.T." deals in his own inimitable style with a wide variety of topics. He ranges from patents to potentiometers, and from the Isle of Bute to "The Sole of Honour"!—and you will enjoy every word.*

continues to sell his patent, and "defies" him to bring an action for infringement. This, also, could have been prevented by a clause in the agreement. In the absence of a protecting clause, the firm is perfectly entitled to defy him, just as any manufacturer can defy any patentee.

Many years of my own life have been spent in advising manufacturers how to defy patentees, and how to defend their case when the patentee has brought an action for infringement. Only four days ago I was asked to be expert for the defence in a big wireless patent action which is coming off.

## All About the "Silver Inkstrain" from Portugal—

The idea is worth trying, and I mention it because it has taken its place in a certain series of experiments on reaction which I am conducting with a view to my next big set. The potentiometer idea is well known, and much smoother reaction is claimed when it is used, although I cannot give very enthusiastic support myself.

### A String of Facts

Here is a string of facts about the matter. The potentiometer does two things: it varies the efficiency of the detector and alters the damping applied to the tuned grid circuit. The detector is least sensitive with the slider at the negative end, and most sensitive with it at the positive.

When the slider is at the negative end the grid current is least, and the tuned circuit is least damped. Hence the selectivity is greatest in this position, and worst when the slider is at the positive end. Since the damping applied to the tuned grid circuit can be varied by means of the potentiometer, it follows that if reaction is in use any variation of the potentiometer will vary the degree of reaction.

### Delicate Vernier System

Thus the potentiometer serves as a delicate vernier system of varying reaction; if the reaction is critically set with the potentiometer slider at the positive end, a movement of the slider towards the negative end will decrease the damping, the reaction will not be checked, and the valve will burst into oscillation. If the reaction has been set near the critical point, it may happen that a movement of the slider towards the negative end will improve signal strength by increasing the effective reaction.

### Slider Adjustment

All kinds of false conclusions can be drawn as to the usefulness of the potentiometer. For example, it is possible to believe that a critical position of the slider is essential; and you may want to tell everyone: Fit a potentiometer! But the fact is that the potentiometer has merely been giving a critical reaction adjustment which could equally well have been obtained by means of a different setting of the reaction condenser.

Here is a problem for you to solve, having been armed with the above facts. With a certain reaction adjustment I found that the loudest results were obtained with the slider in the midway position. Why is this? The answer appears to me to be this: When the slider was moved towards the negative end the signals decreased because the detector efficiency fell off more than the reaction increased. If the slider were removed towards the positive end the reaction fell off (due to damping) more than the detector efficiency increased, and so signals decreased.

### As You Were!

The moral of all this is: Adjust the reaction condenser for every position of the slider. If you do this, using more reaction as the positive end is approached, the merits of the potentiometer will tend to evaporate. It will, however, work as a good means of getting vernier reaction—but usually at the expense of detector sensitivity (thereby leaving us where we were).

And at a given setting of the reaction condenser somewhat greater selectivity (but less sensitivity) is obtainable with the slider at the negative end. But here is an accidental merit of the "positive end" arrangement: If there is any A.C. hum in the speaker due to feeble A.C. "reception" by the detector valve grid circuit (a quite common happening), it is greatly reduced when the slider is at the positive end (and much worse at the negative end).

### Damped Down

This is because the feeble A.C. e.m.f.'s are damped down by the grid current. This partly accounts for the fact that there is less hum in a set when no gramophone pick-up is in use. (When a pick-up is employed there is a more suitable "A.C. aerial" for picking up the field of stray mains hum, and there is no grid current to damp out the A.C.; on the contrary, a negative bias is given the valve.)

Some of the above remarks will appear blasphemous to enthusiastic potentiometer users.

Perhaps they will let me have their experiences.

A keen Portuguese reader decided to build the "S.T.300," but was short of ready cash apparently. At

any rate, I received a letter from Thos. Cook & Son, shipping agents, stating that a "silver inkstrain" had arrived for me, and would I fill in the attached half-dozen forms.

### Pampered Announcers

I found I would have to swear that the "inkstrain" was for my personal use and not for re-sale. After a day or two I was so excited over this "inkstrain" that I was almost ready to swear anything—although I knew nothing except that a certain ship had arrived at Liverpool bearing a silver one.

I thought that perhaps some quixotically appreciative reader had sent me this handsome gift. I had, you see, heard of B.B.C. announcers getting presents of dogs, flowers, vegetables, etc. But I had flattered myself in comparing myself to such company. A letter from Señor Carlos — (it wouldn't be fair to give his full name) arrived and explained the mystery.

### Quite Clear!

He had sent me, he said, a valuable "inktrain" (yes, it was now an "inktrain") weighing a pound and a half, as an appreciation, and would I reciprocate by letting him have (gratis) a complete kit (type C) of the "S.T.300," with aerial, accumulator, spare valves, "eliminator," moving-coil loudspeaker, and grid-bias battery. His English was of the pidgin variety, but his list of what he wanted was flawless.

He seemed doubtful of the reception I would give his idea for he writes: "Well, you shall say, why don't you sell it, and buy my 'S.T.300' set? Yes, that is just my idea, but, as it is over the silver valeur, has its antique valuer, excuse me, I should like you to be the person to have it for your desk, as it is unique, and, as I am not in a condition to make you a present of such an high valeur to me, would at least like to offer you it in first hand, as said for its antique valeur and, instead to sell it to whom some helst, shall be more than gratified it came in your possession."

### Our Oldest Ally

I am in a quandary. I don't want to hurt the feelings of a keen would-be "S.T.300"-ite. And Portugal is our

## —and a Talk in a Teashop!

oldest ally. And I think of that "inkstrain" pathetically resting in a Liverpool docks warehouse. Unless I perjure myself, I shall have to pay an enormous sum to get it. I am sure the tariff on "silver inkstrains" is colossal.

### Those Fearful Forms

And suppose I do accept it, I may be disappointed. But I could never send it back to Portugal. For one thing, I'd have to fill in another dozen forms, make several declarations on oath—and I'd do anything rather than wrap up a parcel for the post. Perhaps I'll decide to accept this "gift"—if only to find out what an "inkstrain" really is!

But it mustn't be taken as a precedent. If an Indian reader desirous of a super-het. is thinking of sending me a tiger skin from Jodhpur, or a South African contemplates forwarding half a dozen ostrich eggs as payment for an assortment of S.G. valves and pentodes, I accept no responsibility.

I was called in by a friend the other day to remove the hum from his factory-made A.C. all-mains set. I am not usually very obliging in these matters, although I'd walk ten miles to justify one of my own sets. However, I tried a second choke and condenser in the main D.C. supply to the valves.

This second smoothing circuit cuts any ripple down to a fraction, but it made no audible difference, indicating that there was already adequate smoothing. I remedied the trouble by putting an L.F. choke with decoupling condenser in series with the field winding of the moving-coil speaker, which winding was across a reservoir condenser of the mains unit.

### "Just Listen to Mine"

Incidentally, my friend told me today that the fuse of his set had just blown. That means another investigation. I felt like suggesting that he get in touch with the man from whom he bought the set, but I realised with horror that as the set had been modified, manufacturer and retailer would wash their hands of it.

That means that from now on I shall have to act as honorary service agent to that receiver! Let this be a warning to you.

As a matter of fact, when news of the hum was brought to me with a

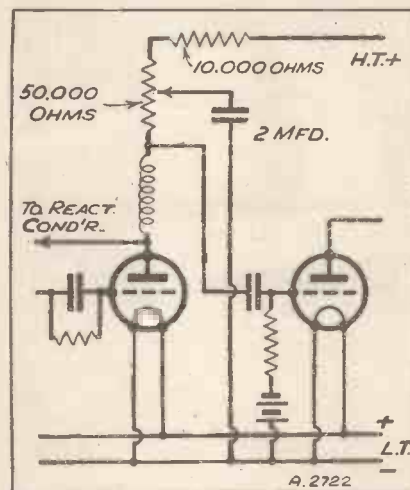
"You know something about wireless, Scott-Taggart, don't you?" I had gently and modestly suggested calling in the man from the wireless shop. I was told, however, "Oh, yes, we had him in, but all he said was: 'Hum? That's nothing! You just want to come and listen to the one I've got at my place!'"

Footnote.—The set was bought on the recommendation of the son of my friend. The son is in China.

### What the Waitress Said

I am getting a good many queries, but the latest method of obtaining information is certainly original. While having what Wodehouse would call "a thoughtful spot of tea at a teashop"

### WHY NOT TRY THIS?



The coupling resistance is a potentiometer, and with a 2-mfd. condenser in the slider lead it allows a beautifully smooth and effective control of coupling and volume.

recently, the waitress when handing me the bill said:

"Excuse me, but aren't you the gentleman whose face is on all the bookstalls?"

I was wondering whether she was confusing me with Ronald Colman or Wallace Beery, when she continued:

"Well, my boy's made your set, and it works fine, but he says the reaction's ploppy."

### Safety First

I was about to defend my young with the opening words "Has he tried varying the H.T. of the detector and —" when I recalled the "rector case," which was in full swing, and hurriedly left. If the young man sees

this, I suggest he tries reducing the H.T. +2 voltage.

I have advised using the P.M.2D.X. type of valve (or its equivalent in other ranges) as detector, but it was a toss-up between that and a P.M.1H.L., which has a higher impedance and a lower mutual conductance (i.e. less anode current variation per volt change of grid potential).

### Valves Are Too Good!

The P.M.2D.X. looks juicier theoretically, but on the "S.T.300" readers will probably detect no improvement on the "worse" valve—the P.M.1H.L., which on some adjustments gives a smoother reaction control.

In the A.C. valves there is a similar unexpected experience. The Mazda people produce an A.C./H.L. detector, and also an A.C./2H.L. which is twice as "good" a valve, the slope being twice as steep. I doubt whether on test in the "S.T.300" A.C. version readers could tell the difference between the two.

I am inclined to think that valves are getting too good—or that circuit technique is falling behind. We are certainly getting from the manufacturers three-electrode valves which are very good from the static curve point of view, but which are from the dynamic or "working conditions" aspect little better than worse valves.

The "goodness" of a valve may be improved by making the grid of finer mesh and reducing the distance between electrodes. Unfortunately, this increases grid capacity, which reduces the benefits of the higher mutual conductance.

Personally, I expect to see several very "good" three-electrode valves withdrawn from the market next season on account of their being "not worth the bother," because just as good results can be obtained with "poorer" valves.

### The Magical "Three"

Set-makers are beginning to fight shy of ultra-good valves for another reason. A much higher degree of uniformity is required in the sets themselves. The Americans, of course, have always inclined to more and poorer valves partly for this reason.

There is a great deal to be said for more valves being used. We have regarded the number "three" as rather magical in connection with

## From My Armchair—continued

home-made sets. With valves getting cheaper, cost will no longer be the main factor in deciding how many valves to use, and there may be a breakaway from the almost superstitious use of three valves.

### A Curious Coincidence!

I have received from a friend—H. D., of Southport—a booklet entitled "The Sole of Honour," by S.T. (First edition, 1897.) This surprising document, on being opened, reveals itself as the catalogue of S. Tennant, shoe repairers, of Southport. H. D. has

no Isles of Bute. Apparently there is only one Isle of Bute, but there are the Kyles of Bute. I apologise to readers north of the Tweed. I ought to know the difference between isles and kyles, because I soldiered with the Seaforth Highlanders (I deserted school to don the kilt and glengarry) and rubbed shoulders with men whose whole lives were wrapped up in isles and kyles and things.

The clans have certainly rallied round the "S.T.300." THE WIRELESS CONSTRUCTOR people tell me they are astonished at the large number of

not troubled to compile a log of stations, but I can receive on this 'three' distant stations that were only whispers on my previous set. I can separate Mühlacker and London and Algiers, and, most remarkable of all, Radio-Paris fills my room with his gramophone records while the long-wave Daventry is hard at it seven miles away on the top of the hill—and not a whisper from him! It's absolutely fine!"

### An Interesting Solution

The other day I was carrying out some tests on a resistance-coupled amplifier, and wanted to vary the anode resistance-coupling without changing the steady anode current and voltage. I first used a 50,000-ohm potentiometer as a plain, variable anode resistance, but this arrangement varied the anode current from 0.5 to 3 milliamps. These big changes in anode volts and anode current were not desired, as wide variations would alter the reaction adjustments—reaction being obtained from the same valve.

My solution was that shown in the diagram, which shows a detector valve (employing reaction) coupled by a resistance to an L.F. valve. A 10,000-ohm decoupling resistance is used and a 2-mfd. condenser is connected between the slider on the 50,000-ohm potentiometer and the filaments. This condenser virtually short-circuits all of the 50,000-ohm potentiometer which lies above the slider in the diagram. Therefore, with the slider at the bottom, the resistance is wholly short-circuited as regards low-frequency E.M.F.'s and no signals are heard. With the slider at the top the whole of the resistance is in circuit. Any intermediate adjustment (and volume) is thus easily obtainable.

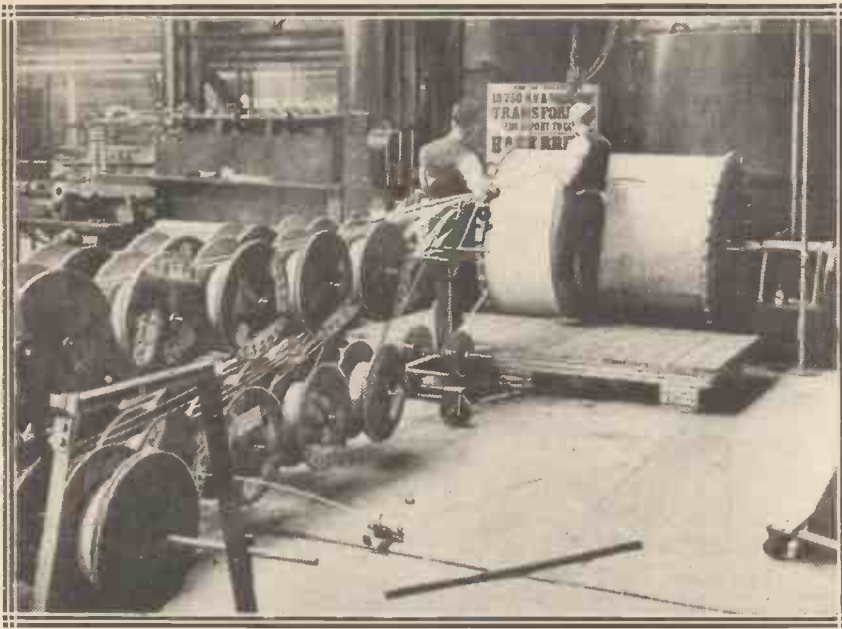
### A Cheerier Tone

Note that the condenser only shorts the L.F. and not the D.C. The steady anode voltage and current always remains the same. Note also that the condenser acts as a decoupling condenser, and the portion of the 50,000-ohm resistance unused for coupling goes towards improving decoupling.

With reference to Mr. Whetter's letter from St. Austell, I see in to-day's mail several letters of a

(Please turn to page 162.)

### COIL-WINDING EXTRAORDINARY!



These men are winding a 65-ton transformer, which is being made at Walton-on-Thames, and is going to be used for a voltage of 154,000!

read my recent novel, "The First Commandment," and wondered if this were some new activity of mine! No. But I shouldn't refuse to identify myself with this other S.T.'s ideals! "We stand before the public in our own name, we are ourselves, not a 'company' of the unknown. Just Plain, Honest, Reliable, at your service." Curiously enough, I was born in 1897 myself!

### Isles—and Kyles

Mr. H. Whetter, of St. Austell, Cornwall, desires publicity to be given in this journal for his postcard, which states: "The 'S.T.300' is a washout. You can publish this if you wish."

A fair Glasgow reader of my armchair notes tells me that there are

appreciations from Glasgow, which, apparently, has always been a bad spot for sets. And the outer islands and the North of Scotland seem equally satisfied.

If there are any "S.T.300" sceptics, apparently the cure is to have a fire at your house. At least, this is how Mr. J. D. Thompson, of Wootton, Northampton, was converted! He had written me a letter doubting the capabilities of my set, and shortly afterwards there was a fire at his home and his own four-valve receiver was destroyed! Accepting the punishment, this doubting Thompson made amends by building the "S.T.300" in one evening!

In a most interesting and generously appreciative letter he says: "I have





**I**F I were told that the latest thing in mouse-traps made use of a thermionic valve, I should not be at all surprised, because I have ceased to wonder at the application of this versatile device.

### The Silent Watchman

We all know that the valve plays an important part in wireless receivers, and most of us have seen photographs of the large fellows used in broadcasting stations, but it may come as a surprise to know that the silent watchman in some burglar alarms is our friend the valve.

Its activities do not stop at this by any means, and it is used for listening to the heart-beats of any creature, from a human being to a house-fly! We use tiny "pea-nut" valves for aiding the deaf, and at the other extreme it has been seriously suggested that we may some day use gigantic but silently operating valves to produce the alternating current to light our electric lamps.

### Manufacturing Miracles

The construction of this modern Aladdin's lamp is a miracle of precision. The manufacture is carried out on a mass-production basis by ingenious machines controlled by the deft fingers of women workers.

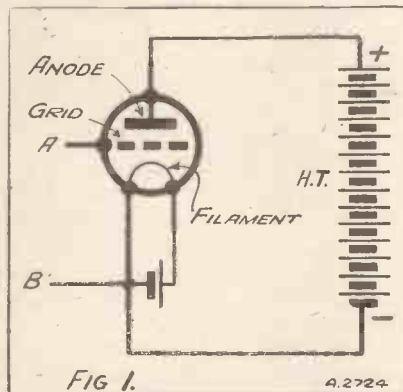
Much of the result of this work remains unseen owing to the silvery or black film on the inside of the bulbs. This film is the result of "flashing" magnesium or other substances inside the valve to improve the vacuum. The actual details of mechanical construction of a three-

*It makes a valve set so much more interesting if you know something about the action of the valve itself—what the H.T. is for, how the electrons hop across the vacuum, and so on. And this article gives you a really vivid picture of the actual operations going on inside the glass bulb. You may not have enjoyed reading valve articles before, but you should certainly enjoy this one!*

electrode "tube"—as the Americans call it—are outside the scope of this "how-it-works" article, but we must know what is inside.

In spite of its multifarious uses, the principal advantage of the three-electrode valve is its ability to amplify. What happens, briefly, in a valve is this: We pass an electric current through a vacuum and

### WHERE ARE THE 'PHONES?



*You wouldn't hear much with a valve connected like this, because there is nothing in the anode circuit except the H.T. battery! But this arrangement is shown to make perfectly clear the action of the batteries, which you will find discussed on this page.*

control its strength by means of the feeble impulses to be amplified.

The current through the valve passes through a grid, which is something like a sieve, and by applying the weak E.M.F.s to the grid we can produce big changes in the current

through the valve. The grid, in fact, acts like a water-tap, which requires very

little energy to turn, but which controls a great force of water.

### "Shooting" Electrons

The energy of a valve comes from a high-voltage battery connected across two elements or metal electrodes placed inside the vacuum. If these were simply two cold metal plates no current would pass, and there would be nothing to control. It was discovered, however, about fifty years ago, that if certain metals are raised to, say, white heat, a copious supply of electrons is shot off from the metals. These electrons are particles of negative electricity and their motion constitutes an electric current.

### Method of Heating

If, then, we heat such a metal as tungsten to white heat inside a vacuum, we can send a current through the vacuum by placing another electrode near to it and giving this second electrode a positive potential with respect to the heated tungsten.

The most convenient way of heating the tungsten is to form it into a wire or filament, which can readily be heated to incandescence by passing a current through it.

This simple arrangement forms a two-electrode valve, the filament being frequently called the cathode and the other electrode being known as the anode, or plate.

In a wireless circuit the battery which heats the filament is generally

## The Valve Made Readable—continued

known as the L.T. (low-tension) battery, while that of higher voltage which is used to pass a current through the valve (by drawing electrons to the anode) is known as the H.T. (or high-tension) battery.

Having obtained the current through the vacuum, we proceed to control it by making the electrons pass through a grid which is now placed between the filament and anode. Positive potentials applied to the grid will help the electrons on their way to the anode, thereby increasing the anode current, while negative potentials will repel them and so cut down the current to the anode.

### A Detailed Description

Having thus broadly discussed the action of a valve, we can deal with it in more detail. I ought to say now that I am only going to deal with the "ordinary" valve, or triode as it is called.

The starting place for anything that happens in a valve is the filament or cathode, as this is where the electrons commence their journey through the vacuum. The electrons that are thrown off are from the atoms of the metal of which the filament is made.

### INSIDE INFORMATION

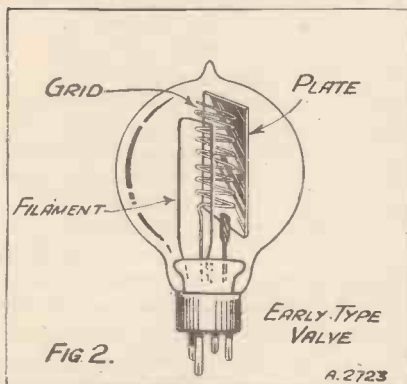


FIG 2. This valve is one of the "old-timers," and it clearly illustrates how the grid is interposed between the filament and anode so that it can control the electron flow. All ordinary valves employ this fundamental structural principle.

The separation takes place because the rise in temperature of the filament causes the electrons in the atoms to speed up in their movements, and those near the surface of the wire actually fly off.

This effect is somewhat similar to that obtained by shaking a sack of flour. A cloud of flour particles are ejected into the air and the more

vigorously we shake the sack the denser will be the resulting cloud.

Round the filament there is a cloud of electrons which can be compared to the particles of flour shaken out of the sack. The hotter the filament, the greater will be the emission of electrons from it.

### BIASING THE GRID

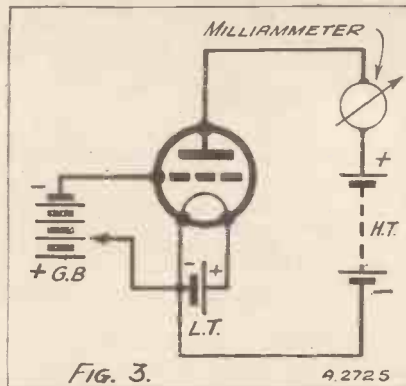


FIG. 3. As the negative voltage on the grid is increased, the milliammeter shows a fall in plate current, and vice versa, although the H.T. battery voltage is unaltered.

Now let us turn to Fig. 1, which is a symbolical way of showing a three-electrode valve, or triode. First of all the filament must be heated, and this is done by the L.T. battery sending a current through it. This battery only affects the valve's action incidentally, and much the same results would be obtained if the filament were heated by any other means.

### Watch It Work

In Fig. 1 is also shown the H.T. battery, which is usually of 120 volts in a modern receiver. The grid is shown by a dotted line, and the wireless signals to be amplified are applied at points A and B, i.e. across grid and filament.

One of the earliest types of three-electrode valve is shown in Fig. 2. The grid takes the form of a zig-zag wire placed between filament and anode. Modern valves are constructed in much the same general way, but the grid surrounds the filament, and the anode surrounds the grid.

To demonstrate the action of the valve we can rig up a circuit as shown in Fig. 3. The anode current is measured by a meter which reads in milliamps. Different voltages may be applied to the grid as shown.

We start with zero volts on the grid and note the anode current. We then apply gradually increasing negative potentials to the grid, noting the anode current in each case. As we increase the negative potential the anode current will fall, because the grid—being negative—is repelling the negative electrons which would otherwise have gone to the anode. Finally, the anode current falls to zero, the attractive force of the positive anode being now neutralised by the grid. Since the latter is closer to the filament its effect is greater than that of the anode and small grid volt changes are capable of causing large changes in anode current.

### Back to Zero

If now we go back to zero volts on the grid and start making the grid positive, the anode current will rise. The grid now helps to attract the electrons towards the anode; the electrons shoot through the open-work grid, and a few actually go to the grid and round the grid circuit.

A complete circuit of an amplifying valve is given in Fig. 4. A transformer steps-up the voltage from the wireless detector, and these increased voltages are applied to the grid of the valve and cause large changes in the anode current which is shown passing through a loudspeaker.

### THE COMPLETE CIRCUIT

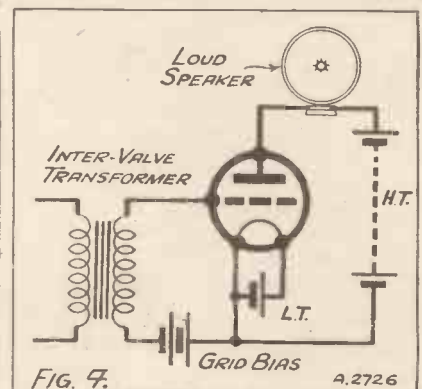
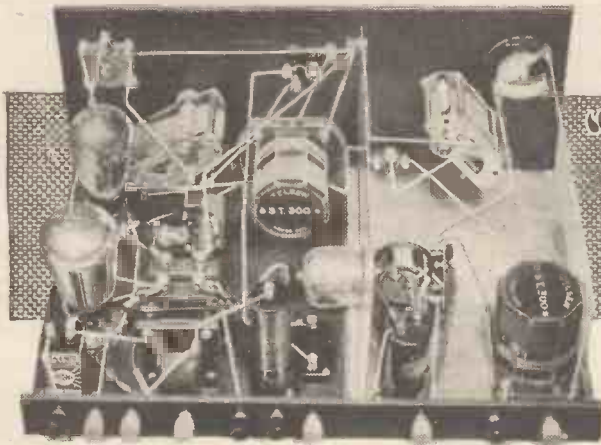


FIG. 4. Here is a valve fitted up for action, with an L.F. transformer in the grid circuit and a loudspeaker as the output.

A grid-bias battery is connected as shown to make the grid normally a few volts negative. This is done to prevent the grid becoming positive when the signals are applied; otherwise distortion would result.

Next month I propose to deal with the use of the valve as a detector.



# HINTS FOR "S.T.300" USERS

*The designer outlines "The Best Method of Getting the Most" out of this very famous three-valve.*

THE necessity for reprinting in abridged form the constructional details of the "S.T.300" also means that operating notes will be required by new readers who assemble this set. This occasion will also serve to summarise my own experiences and those of readers who have written to me.

## Selectivity Adjustments

I propose to give in considerable detail the best methods of getting the most out of this receiver, which at first startled a world of wireless which has been trained to look at one-knob control, not merely as the ideal to aim at, but the compromise to use.

Of course, I agree that "one knob" is the ideal, but I also know that it usually complicates rather than simplifies the construction of a receiver, and that losses are experienced through one or more of the tuned circuits being slightly off tune.

The extra knobs on the "S.T.300" panel are concerned with selectivity. In this set I have introduced what amounts to practically a complete 100 per cent possible selectivity variation on both the aerial input circuit and on the intervalve circuit—which latter is normally left to look after itself in other designs.

The aerial coupler knob (on the left of the set) governs the selectivity of the aerial circuit, while the middle knob (the anode coupler) changes the degree of selectivity obtained on the anode circuit (i.e. the intervalve circuit).

## Independent Circuits

Speaking generally, the two circuits in the "S.T.300" operate absolutely independently; they tune separately and you can get high selectivity on either circuit without affecting the other. Or you can get high selectivity on both, in which case you get very good results indeed. A 4½-kc.

separation is obtainable when required, e.g. to separate Warsaw and Eiffel Tower.

But readers must realise that such high selectivity will only be obtained when the signals of two stations do not differ too much in strength. You certainly could not get a foreign station 4½ kc. away from Slaithwaite, Falkirk or Brookmans Park if you live very close to those stations. The proportion between the local and the foreign station may be 100 to 1, and it would be more than 100 to 1 against your hearing the foreign station.

*"Exactly how should the coupler controls be used?"*

*"Can home-made coils be employed?"*

*"What can I do to remove a whistle?"*

*These and many other points for the easy and successful operation of the "S.T.300" are included in this summary, which will prove of the utmost interest both to the "old hand" and to the new owner who has just completed the connections.*

Those who live within a few miles of a "regional" must realise that, short of a miracle of invention, they will always require a more complicated (to build) and a more expensive set than those who live outside the immediate neighbourhood of one of these ether-shakers. Or, if they cannot or will not build a special set, they will have to content themselves with fewer stations.

That the "S.T.300" has solved the selectivity problems of those living in such a variety of districts is due to the fact that the selectivity is adjustable both to suit the district (i.e. nearness to a B.B.C. station) and the station to be received. Some stations,

due to their proximity on the dial to a very powerful station (British or foreign), will require the aerial and anode couplers moved farther to the left to give them breathing space.

The rule for using the coupler knobs is this: Turn to the left for more selectivity and (to some extent) weaker signals. Turn to the right for stronger signals and poorer selectivity. With both knob pointers vertical (i.e. both coupler condensers at half-way), you are working at "normal."

## An Interesting Test

The beginner can prove the effectiveness of the couplers on a local station. With both couplers over to the right, tune both main variable condensers till loudest signals are obtained. Now move the left-hand condenser about; signals may be obtained over quite a wide range of the dial. This means poor selectivity on that circuit; by moving the aerial coupler to the left, and then moving the left-hand condenser each way, you will find the aerial selectivity greatly improved.

Now put the aerial condenser back to its original setting and turn the aerial coupler back to the right. You can now repeat the test, but this time moving the anode coupler gradually to the left. At each new position of the anode coupler move the right-hand tuning condenser to test the "spread" of the local. Reaction should preferably be kept up to scratch at each test. You will notice that my "differential anode coupling" system enormously sharpens up tuning.

## Fascinating Experiments

Whether you get the selectivity on one or other or on both couplers is for you alone to say. A whole range of fascinating experiments is possible. You can often get the same result by no attempt at special selectivity on

## Hints for "S.T.300" Users—continued

the aerial and high selectivity on the anode circuit, as by high selectivity on the aerial and none on the anode circuit.

My experience is that most selectivity control comes from the differential anode coupler, especially on the long waves; the aerial coupler, even when to the right, is always providing a high degree of selectivity.

### An Important Point

Note this: Any variation of the aerial coupler will require a retuning of the variable condenser it affects, i.e. the left-hand condenser. Similarly, any variation of the anode coupler will necessitate a readjustment of the right-hand condenser. The effect of the anode coupler is more complicated than that of the aerial coupler.

The anode coupler provides an extra capacity in parallel with the right-hand tuning condenser, and this capacity is highest when the coupler knob is about vertical. A movement of the knob to the right reduces the extra capacity, and so, to keep the station tuned in, we must go higher up the dial. A movement of the anode-coupler knob to the left also reduces the capacity effect of the anode coupler, and we likewise have to re-tune higher up the dial.

This effect is useful to remember if there is a station which is normally on too low a wavelength to be received on the set. By moving the anode coupler to the right or left (particularly the left) you can bring the station on to the dial.

### Covering the Waveband

The .0005-mfd. tuning condenser now used as standard is only about large enough to tune in the usual waveband, so stations may easily slip off one end or other of the dial unless the "S.T.300" coils are very accurately made. I have been very fussy about these coils and have had to modify a turn here or half a turn there in the case of all the leading makes before officially approving them. Keeping to my approved list is the only safe policy in buying the coils. Incidentally, the need for accuracy makes it undesirable that readers should make their own, unless they have very exact information of the constructional details.

On short indoor aerials it will be found advisable to short-circuit the

aerial coupler, especially when receiving the long waves. This can be done automatically by bending the extreme end of a moving vane so that it shorts on a fixed vane when the coupler is full over to the right. Actually, the "S.T.300" is not advised for very small aerials. Four valves are required for such conditions.

A great merit of the aerial coupler, and the set generally, is that a high and long aerial may be used. Readers who can improve their aerials—and I see hundreds daily which are made intentionally short—will find that the "S.T.300" will enable them to take care of their selectivity.

### Reaction Adjustments

The value of the reaction adjustment is important. When the anode coupler is turned to the left, the

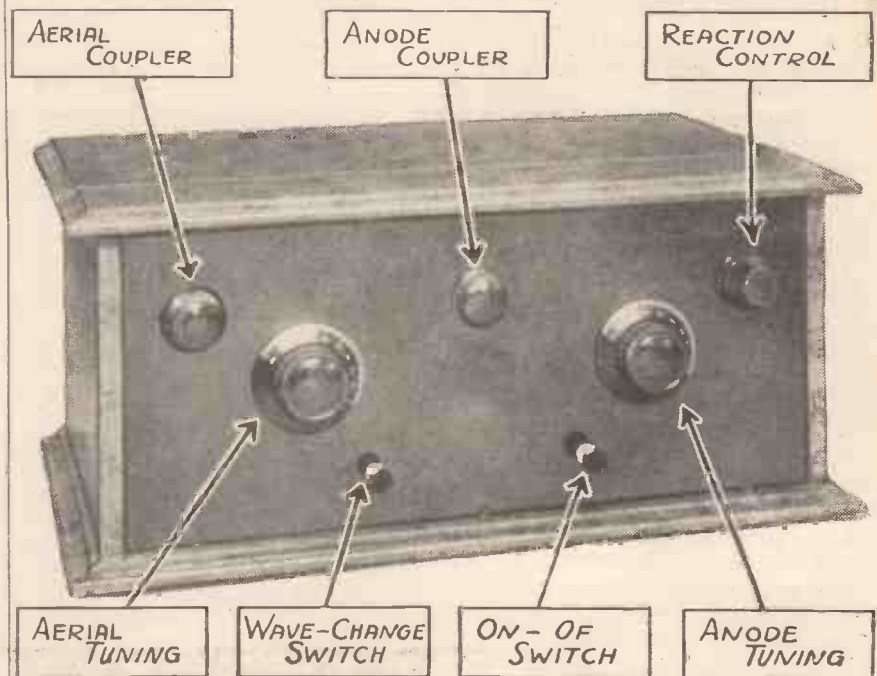
makes no difference except to signal strength.

If you are troubled with a whistle or other interference on your local station, you will be able to cut this out by using more selectivity on either or both couplers and keeping the reaction well up. You will get just as loud signals, but without jamming.

### Log the Stations

A log of stations is essential on such a sensitive set as the "S.T.300." This log should give first the position of the aerial coupler, then that of the left-hand tuning condenser, then position of anode coupler, and, finally, the right-hand tuning condenser. The positions of the couplers may be shown on your list by arrowheads inclined in the direction of the coupler-knob pointers.

### ITS SELECTIVITY IS 100 PER CENT VARIABLE



Here are the various controls, "labelled" to indicate their several functions. The couplers provide the widest possible variations of selectivity to be obtained, and the accompanying article is full of practical hints on swift and effective station separation.

signal strength will fall off appreciably unless the reaction is used to keep up the dynamic resistance of the circuit. But for "local" work, with no reaction in use, the anode coupler is a useful volume control. If altering it brings in a whistle of another station, this is usually put right by altering the right-hand condenser to a position where changing the anode coupler

You can make marks on the panel to correspond to quarter-left, vertical, and quarter-right positions of the couplers. (If a Telsen .0001-mfd. anode coupler is used, a nick on its rim is desirable, as its arrowhead is too far from the panel for accurate logging.) This enables you to go back at once to stations. Personally, I use the

(Please turn to page 164.)

# S.T.300

**A world-beater—built with a Ready Radio Kit**

## S.T.300

**Over 10,000 S.T.300's have been built with Ready Radio Kits**

Kit "A"—£3:18:6 less Valves and Cabinet  
**OR BY EASY PAYMENTS** 7/3  
 7/3 down and 11 monthly payments of

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## S.T.300 Adaptor

**will give YOUR set**

**'S.T.300 Range'**

Kit "A" **38/6**  
Complete Kit of Components less Valves & Cabinet

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Kit "B"—£2:15:0 Complete Kit of Components with Valves less Cabinet

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### A Wonderful Shillingsworth!

*Here's the Greatest shillingsworth ever offered in radio—a full-size blueprint of the S.T.300, and a full-size blueprint of the Cosmic Star, and a copy of G. P. Kendall's famous book, "Ten Hows for Modern Radio Constructors." All for one shilling. Send the coupon below while stocks last.*

### YOUR LOCAL DEALER SELLS READY RADIO KITS

*Ready Radio A.C. Eliminator. Type B.S. suitable for use with the "S.T.300." Supplies H.T. and charges L.T. accumulator, £5:17:6.*

*If you are interested in the "Flexidyne" write to Ready Radio for full details of Kits and Prices.*

## READY RADIO

Showrooms:  
 159, Borough High Street,  
 London Bridge, S.E.1.  
 'Phone: Hop 3000.

To: Ready Radio Ltd., Eastnor House, Blackheath, S.E.3

I enclose P.O. value 1/-. Please send me your Shilling Offer.

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Head Offices:  
 EASTNOR HOUSE,  
 BLACKHEATH, S.E.3.  
 'Phone: Lee Green 5678.  
 'Grams: Readirad, Blackvil.

# QUEER QUERIES

Some details about unusual radio faults and some suggestions that may help you to better radio reception.

By P. R. BIRD.

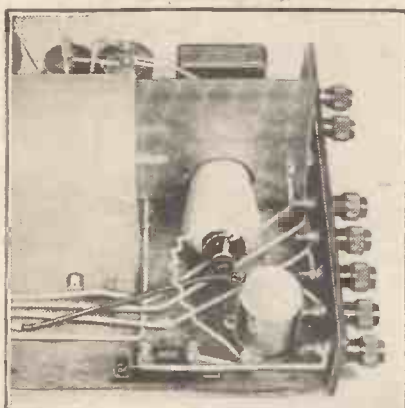
## Those Milliammeter Tests

FOR some reason or other there still seems to be a lot of uncertainty nowadays about the use of voltmeters and milliammeters. A reference to the latter was made three months ago, and since then the subject has continually cropped up in one form or another.

C. T., of Nottingham, mentions the matter at some length in the following terms:

"When I first bought a wireless kit I also purchased a \_\_\_\_\_ for

## METALLISED VALVES



If you use a metallised S.G. valve, take particular care to see that the filament leg to which the metal coating is connected is that which goes to the earth side of your L.T. battery. If this precaution is not taken, and the screen accidentally touches the valve, your accumulator will be short-circuited.

battery testing. After a time my set failed to tune in, and using my meter on the batteries, valves, etc., I found these were all O.K.; but still I got no results.

"Going to a local dealer and stating my trouble, also what I had done, he told me to make a 'general test.' I didn't know where to start on a job of that sort, but not caring to show my ignorance in front of other customers, I thanked him and left the shop.

## "Another Matter"

"I went to a friend, who was supposed to know all there was about wireless, but when it came to connect up a milliammeter for various tests he was about as wise as me!

"The trouble I went to to find out how to make the best use of my meter would surprise you. Your Liverpool reader says he didn't want a milliammeter to check up distortion because his set was all right; but was he like me—didn't know how to use it if his set were all wrong?"

Many others have written in the same strain, and although there is not room on this page for more than a few words on the subject, the following hints may be useful.

First of all, when you buy the instrument, be sure to keep the maker's instructions, etc.—even if you can't see any immediate use for some of them. And be very careful to observe the recommended precautions when connecting up.

Use the meter *when the set is O.K.* to find out its normal requirements. Make a note of the total H.T. current (milliammeter in H.T. neg. lead), and of the current in H.T. +1 lead, H.T. +2 lead, etc.; or, better still, of the current to each particular valve.

Keep a memorandum of all these, with the voltages applied, and check up every fortnight or so to see there are no unexpected variations. Remember that grid bias as well as H.T. voltages will affect the current consumption, so note all these carefully.

## Regular Checking

If you are fairly skilled in handling stray leads the regular checking can be done quickly by putting the milliammeter in the negative lead and disconnecting or withdrawing the valves one by one, to see the consequent reduction of H.T. current each time.

And when the last valve is out (or off) the reading should, of course, be zero. If it is not, something is wrong with insulation or connections.

A gradual falling-off in an anode current when voltages are O.K. is usually a sign of failing emission, indicating that the valve in question is wearing out and needs replacing.

If the set suddenly becomes faulty, the note of its proper current require-

ments will enable the erring circuit to be detected quickly, and then the substitution of the components, leads, etc., concerned, will rapidly prove which is wrong.

## A Grid-Bias "Sell"

The ordinary little chubby H.F. grid-bias battery has a long life, and it generally gives up the ghost so slowly that it is reposing in the dustbin long before it reaches the fully run-down condition.

Knowing those facts, the set builder usually regards a fairly new G.B. battery of this type as above suspicion. Sometimes it is not!

A case which came to notice recently was that of a portable set, which suffered from poor selectivity and indifferent sensitivity—both caused sometimes by run-down H.F. grid bias. Yet the little G.B. battery in use was new, and of good make.

## HOW IS YOUR SET BEHAVING NOW?

If you are troubled by a radio problem, remember that "The Wireless Constructor" Technical Queries Department is fully equipped to help you.

Full details of the service, including scale of charges, can be obtained on application to the Technical Queries Department, "The Wireless Constructor," Fleetway House, Farringdon Street, London, E.C.4.

SEND A POSTCARD, on receipt of which the necessary application form will be sent by return.

LONDON READERS, PLEASE NOTE. Application should not be made by telephone, or in person at Fleetway House or Tallis House.

Investigation showed an unusual fault, caused by the somewhat cramped layout. It so happened that this grid battery stood beside the tuning condenser, and there was only just room for it.

By some mischance it got moved slightly, and then was in such a position that the moving vanes of the condenser when "all out" rested on it.

Even the best battery will be ruined if its positive and negative terminals are being bridged by a conductor! And that was what had been happening to this one when the condenser was turned all-out.

Admittedly it was an unusual case, but accidental contact with a screen might have produced the same effect, and the possibility is certainly one that should be borne in mind by light-hearted users of these little batteries.

# Specified for The "FLEXIDYNE"

described in this issue



**10/-**  
DOWN  
AND BALANCE  
IN EASY  
MONTHLY  
PAYMENTS

MODEL A.C.244.

**59/6**

CASH.

Model A.K.260, with  
L.T. Trickle Charger,  
90/- cash.

Special models for the  
"S.T.300":

A.C.244/S.T. and A.K.  
260/S.T. at same prices:

Model D.C.15/25 for  
use on D.C. Mains,  
39/6 cash.

... Following hard upon John Scott-Taggart's specification for the "S.T.300," "ATLAS" is yet again the expert's first choice. Victor King now specifies the famous "ATLAS" Unit A.C.244 for the finest possible performance with his new "FLEXIDYNE" Receiver. This unit provides three sets of H.T. Tappings: one 60/80 v., with min. and max. positions, one 50/90 v., with min., mid. and max. positions, and one 120/150 v. Output, 20 m/A. at 120 v.

A similar model, A.K.260, includes in addition an L.T. Trickle Charger for automatically re-charging 2-, 4-, and 6-v. Accumulators between the periods of reception.

For A.C. Mains, 100/125 v., and 200/250 v., 40/120 cycles, Westinghouse Rectifiers. Guaranteed 12 months. Ask your dealer and insist on "ATLAS," winners of the Olympia Ballots, 1930 and 1931.

## "CLARKE'S" "ATLAS" MAINS UNITS

H. CLARKE & Co. (M/CR.) LTD.,  
OLD TRAFFORD, MANCHESTER.  
Southern Offices: Bush House, W.C.2.

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Please send FREE copy of "Power from the Mains" and full details of Models for the "S.T.300."

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W017



The Dubilier Type BB Condenser is a high-efficiency condenser in moulded bakelite case. Working voltage 200 D.C. (peak) test voltage 400 D.C. Capacities from .09 mfd to 4.0 mfd. Prices from 1/9



**BUY THE  
CONDENSER  
WITH THE  
NAME  
YOU CAN  
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**DUBILIER**  
CONDENSER CO. (1925) LTD.,  
Ducon Works, Victoria Road,  
North Acton, London, W.3

# AS WE FIND THEM

## NEW APPARATUS TESTED



Under this heading we publish reviews of apparatus submitted by radio manufacturers and traders for examination and test in "The Wireless Constructor" laboratories.

### Climax Radio-Gram

ON taking over one of the latest Climax all-electric radio-gramophones (Model 44A) we were impressed by two outstanding points. The first was the remarkable compactness of the set. Here was a complete A.C. all-mains radio-gramophone contained in a cabinet having dimensions usually associated with transportable receivers.

That such a comprehensive equipment can be compressed into so small a space without loss of efficiency is a tribute to the designers.

The second point was the extremely moderate price—22 guineas for a high-grade all-electric radio-gram. Good going, indeed!

A close inspection confirmed our first impressions as to the attractiveness of the receiver. The general "lines" can be seen from the photograph. The cabinet bore evidence of "quality" workmanship, the finish being of a very high standard.

### Pleasing Simplicity

The clean-cut cabinet design, with its pleasing simplicity and the grouping of the controls beneath the loudspeaker fret, showed that the makers were fully alive to modern requirements.

The circuit of the Climax radio-gramophone comprises a screened-grid high-frequency amplifier, a grid-leak detector, and pentode output valve. H.T. is obtained via a valve rectifier (full wave).

The controls are as follow: In the centre of the front panel is the tuning control.

This control is in two sections, viz., a large knob giving rapid tuning adjustments and a concentric knob

which operates a "trimmer" for fine adjustments. The calibration is in wavelengths.

The remaining controls are wave-change switch, selectivity and volume control, and reaction.



The Climax three-valve all-electric radio-gram. The receiver embodies dual-wave tuning, direct wavelength reading dial, and a moving-coil loudspeaker.

The wave-ranges covered by the set are approximately 200-550 and 800-2,000 metres.

The selectivity and volume control, as its name implies, provides an effective means of increasing the

selectivity of the receiver and of reducing the volume of powerful stations. This control operates only on the radio side and the pick-up has its own control.

The set is intended to be worked off a conventional outdoor or indoor aerial, and the results obtainable will, of course, depend upon the efficiency of the aerial system.

In order to meet the requirements of flat-dwellers and others who are unable to erect an aerial, provision is made for the use of the mains for this purpose. Although an aerial of this type will limit the range, it is, nevertheless, perfectly effective for local station reception.

Turning to the gramophone side, we have the turntable, together with the pick-up and arm, on the top of the cabinet and immediately accessible by the simple process of raising the lid.

### Electric Turntable

It is unnecessary to point out the fact that the turntable motor is electric, but it is interesting to note that the turntable is fitted with an automatic stopping device which comes into operation at the conclusion of the record, and, moreover, the pick-up arm includes an efficient volume control which is neatly housed in the supporting pillar.

Finally, the reproduction is looked after by a moving-coil loudspeaker, which is concealed behind an attractive fret at the front of the cabinet.

Our radio tests were carried out on a small and rather poor aerial, but in spite of this the receiver showed excellent sensitivity, and in daylight conditions Radio-Paris was receivable without difficulty. The London

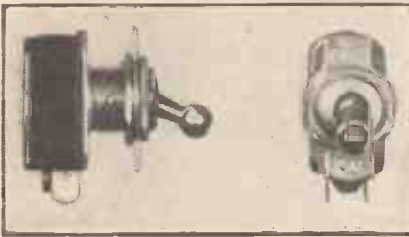


## As We Find Them—continued

stations, of course, came in at great volume.

The reproduction, both on the radio and gramophone sides, was clean-cut, with a very satisfactory bass response, and a retention of the high notes. Needle-scratch was conspicuous by its absence and the handling capacity of the moving-coil very good indeed.

### NEAT AND EFFECTIVE



Two one-hole-fixing toggle switches marketed by Messrs. A. F. Bulgin, and referred to on this page.

In conclusion, the Climax all-electric radio-gramophone is a thoroughly up-to-date design, capable of giving an ample choice of broadcast programmes, together with gramophone reproduction of a high standard, in return for a very moderate outlay.

The makers are Climax Radio Electric, Ltd., Parkhill Road, Hampstead, London, N.W.3.

### Graham Farish "Gard"

How many listeners frequently forget to earth their aerials? Quite a number! To these some sort of protective device is desirable, especially during the summer months, when thunderstorms are liable to occur at short notice.

The Graham Farish "Gard" is an arrester gap which, when connected across the aerial and earth leads, provides a path of relatively low impedance to any static charges on the aerial.

Capable of being fitted in five minutes, the "Gard" has substantial brass electrodes and a cowl to prevent surface leakage over the insulation. It is a useful protective device, and retails at the moderate figure of 1s. 6d.

### Bulgin Components

The high standard achieved by the Bulgin range of components is already well known. The firm's products are always well finished and thoroughly sound electrically.

We recently received two sample

single-pole quick make-and-break toggle switches.

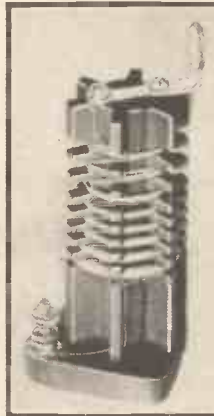
These switches are enclosed in a green bakelite moulding carrying a plate riveted to a one-hole-fixing bush embodying the toggle mechanism.

Inside the moulding are two phosphor-bronze contacts ready tinned for soldering on the connecting wires.

On the front of the switch there is a non-reversible indicating plate, bearing the usual lettering, "On-Off."

The contact is self-cleaning and the "break" rapid in action. These switches have a nominal rating of 250 volt 3 amps., and the insulation resistance between either contact and the metal plate and toggle is high.

### FOR SHORT WAVES



The "Gollone" special short-wave choke is wound so as to prevent resonance "peaks," and is designed to work from approximately 10-100 metres.

We found the insulation when tested at 500 volts D.C. to be perfectly satisfactory. The price of these switches, which are known as the S.102, is 1s. 3d.

Another component submitted by Messrs. A. F. Bulgin is the S.110 radio-gram switch. This is a substantial component having a double-pole double-throw movement, with a central "off" position.

The three positions of the switch are clearly defined, and there are six terminals, giving complete switching control over the receiver. This particular component is designed for battery-operated sets and should not be used for mains switching. Retailing at 2s. 6d., this switch impressed us as being a high-grade article and one which should achieve a well-merited popularity. The makers are A. F. Bulgin & Co., Ltd., Abbey Road, Barking, Essex.

### Short-Wave Choke

Messrs. Ward & Goldstone, of Frederick Road, Manchester, have sent us one of their recently designed

short-wave chokes which is effective over a waveband of approximately 10-100 metres.

It is a component upon which considerable thought has been expended, and it has several features which definitely raise it above the level of what may be called "ordinary"—for example, by removing the terminal from the top bracket it is possible to screw the lug directly under the anode terminal of a valve holder, and the bracket is made sufficiently strong for this purpose, being securely fixed by two screws.

The choke has a low distributed capacity and is cleverly wound so as to avoid resonance peaks. Its D.C. resistance is only  $4\frac{1}{2}$  ohms.

It is a good choke, both mechanically and electrically, and we commend it to the attention of the discriminating constructor.

### Loewe Condensers

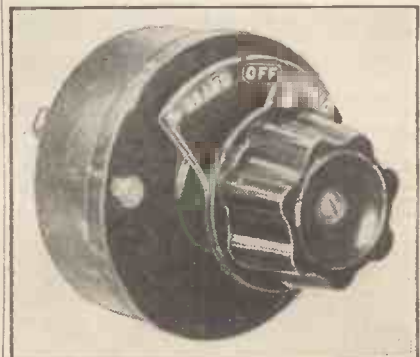
The Loewe Radio Co., Ltd., Fountayne Road, London, N.15, have sent us samples of their new tubular paper condensers.

These fixed condensers are remarkable for their small size and are provided with tinned-wire end connections. The dielectric and "plates" consist of waxed paper and tinfoil respectively, the resulting tubular condenser being enclosed in a cartridge the ends of which are shaped off by a special process.

The test voltage rating for these condensers is 1,500 volts D.C., and the makers state that the insulation resistance for all values is above 1,000 megohms.

The standard values range from .00005 mfd. to .02 mfd. The price for all values is 6d. each.

### AN "ALL-CONTROL" SWITCH



This is the Bulgin radio-gram switch, a well-made component having clearly defined positions and a "snap" action.

## As We Find Them—continued

### The "Pilot" "B.P." Unit

The present-day problem of how to achieve adequate selectivity is a difficult one. A set that will separate the various transmissions on the medium and long broadcast wavebands is of little value from the entertainment standpoint.

To tune in an eagerly awaited programme only to find that it is accompanied by a background of another transmission which cannot be cut out immediately destroys all the pleasures of listening.

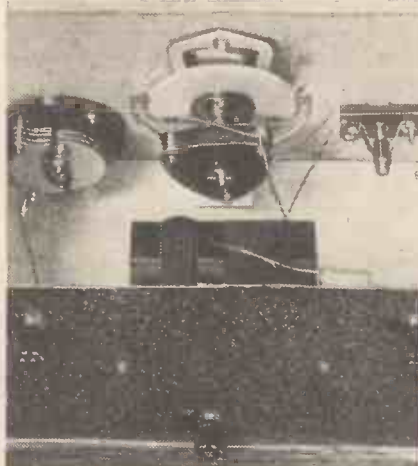
There are thousands of sets in existence at the present time which were designed several years ago, when ether congestion was nothing like so bad as it is to-day. The selectivity of receivers such as these is often quite inadequate.

### A Useful Addition

There are also many owners of selective sets who are situated in areas calling for a still greater degree of selectivity than their particular receiver was designed to give.

These listeners need no longer despair, because with the aid of a little unit which has recently been placed on the market they will be

### NOTHING TO GO WRONG



*This view of the inside of the unit confirms the fact that there is practically nothing to go wrong. The coil is particularly well constructed, and has every appearance of being highly efficient.*

able to greatly increase the selectivity of their receivers without altering them in any way.

The unit in question is the "Pilot" Band-Pass Unit, manufactured by Peto-Scott Company, Ltd., of 77, City Road, London, E.C.1.

The unit is in effect an additional tuned circuit, comprising the aerial portion of a conventional band-pass scheme together with the necessary coupling arrangements.

There are three terminals on the back of the unit. To the one marked "A1" you connect the aerial lead-in, and "A2" is joined to the aerial terminal on the existing set. Terminal "E" on the unit is connected to the earth terminal on the set.

### Easily Connected

No other connections are necessary. On the panel itself there are three knobs, viz., the wave-change switch, tuning control, and selectivity condenser.

Incidentally, in connection with this selectivity control it is advisable to set it with the pointer as near to the right as is consistent with adequate selectivity, because this gives the maximum coupling and, therefore, the best volume.

Now a few words concerning our tests with this little unit.

For our first test we coupled it up to a straightforward detector and two L.F. receiver in which the selectivity was definitely inadequate.

The "Pilot" unit immediately brought about a decided improvement in selectivity. The powerful Brookmans "twins," which had previously spread over a considerable portion of the tuning dial, were now confined to reasonably narrow bands.

The volume on distant stations was slightly better when the unit was out of circuit, but, as readers will know, this is quite normal with any schemes which enable such a marked improvement in selectivity to be obtained.

### Successful Tests

For the second test the unit was coupled to an S.G. three-valver, and again a very considerable improvement in selectivity was achieved.

In operation the unit was quite simple to handle, and we have no hesitation in stating that it provides an excellent means of improving the selectivity of existing receivers. Moderately priced at 25s., and extremely well made, it should command a ready sale.

### Magnum "Magnadenser"

Messrs. Burne-Jones & Co., Ltd., are marketing a very neat little solid-dielectric condenser of robust

construction which they call the "Magnadenser."

These condensers are individually tested at 500 volts A.C. and are available in three capacities, viz., .0002, .0003, and .0005 mfd.

### REAL SELECTIVITY



*By the addition of this simple unit you can transform an old unselective receiver into one comparable with a really up-to-date model.*

We found the sample "Magnadenser" to be a well-made component having a smooth movement and free from backlash.

The price complete is 2s. 6d.

### Sovereign "Vario-Choke"

One of the most useful components we have recently had on our test bench is the "Vario-Choke" marketed by Messrs. Sovereign Products, Ltd., 52/54, Rosebery Avenue, Clerkenwell, E.C.1.

Briefly, the component consists of an H.F. choke and a semi-variable compression condenser. These are neatly enclosed in a bakelite moulding. The "Vario-Choke" has a variety of uses. For instance, it can be employed in a parallel-feed H.F. stage to replace the usual H.F. choke and coupling condenser.

In this position it serves two purposes not provided for in the normal course of events.

Firstly, the variable coupling condenser assists in obtaining stability and, secondly, it is an aid to selectivity. The first point we can vouch for after a laboratory test on an amplifier that showed every indication of being unstable.

The unit can also be employed as an H.F. filter following the second detector of a super-het., or as an H.F. "stopper" in a short-wave set.

Retailing at 3s. 6d., the "Vario-Choke" will be found a "worthwhile" component by the constructor and experimenter alike.

Our Latest Model—  
The **Lanchester**  
"B.O.B"  
PERMANENT MAGNET MOVING COIL SPEAKER

is the ideal  
Speaker for the  
famous  
**S.T.300**

**PRICE: 20/-**  
with Transformer 25/6

An Enthusiastic  
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Moseley,  
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Messrs. Lanchester's Laboratories Ltd.  
Spring Road,  
Tyseley,  
BIRMINGHAM.

Gentlemen,  
I feel that I must write to you re  
the "B.O.B." Speaker recently  
supplied.  
I am using this with an S.T. 300 Set.  
The reproduction of speech is amaz-  
ingly lifelike, and music is real music.  
I have discarded an expensive Mains-  
excited M.C. Speaker in favour of  
your "B.O.B." Can I say more?  
Yours faithfully,  
R. F. FULLER.

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DAYS' FREE  
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**WRITE FOR FULL  
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**LANCHESTER'S LABORATORIES**  
TYSELEY ... LIMITED BIRMINGHAM

# POLAR

## Specified for the "FLEXIDYNE"

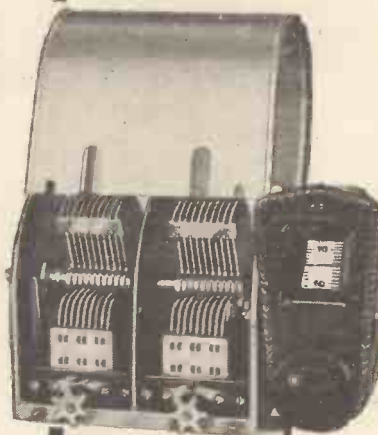


Illustration shows "Tub"  
Two with Drum drive.

### "Tub" Two-Gang CONDENSER

Matching is guaranteed to be accurate to within 1 per cent, and the rigid construction ensures this accuracy being permanently maintained. Complete and removable screening. All rotors independently earthed. Fitted with minimum trimmers.

Price (less drive) **21/-**

Disc Drive 5/- extra.

## A NEW VOLUME CONTROL

BY **WEARITE**



**PRICE 4/6**

In values 600 to 50,000 ohms  
(above 50,000 to 100,000  
ohms, 5/6)

Write for special applicable  
leaflet—and if you have any  
radio query—send it to our  
Technical Dept.

Here is the latest  
Wearite product—a real workmanlike  
job—the Q.V.C. Volume Control.  
Study these points, and note its price.

- SILENT IN USE due to the special roller contact.
- SQUARE LAW ELEMENT assures even control of volume.
- SPACE-WOUND WIRING assures free heat dissipation.
- COMPLETELY ENCLOSED ELEMENT with fireproof protective cover.
- RECESSED INSULATING BUSH for fitment to metal panel.
- LUG BRACKETS for baseboard mounting and for ganging.

For your "Flexidyne" use the new volume control described, also these parts: Two push-pull on-off switches (G.22), Price 1/-. Metal Screen with hole for S.G. Valve, Price 1/3. Ditto, without hole, Price 1/- (both to designer's specification)—AND THE NEW SCREENED H.F. CHOKE (H.F.P.), Price 3/6.

**WRIGHT & WEAIRE LTD., 740, High Road, Tottenham, N.17**  
Telephone: Tottenham 3847/8/9.

### DISC DRIVE

A knob-control slow-motion drive with provision for pilot lamp. Smooth, firm action. Neat, moulded escutcheon. Clear scale.

Price . . . . . 5/-



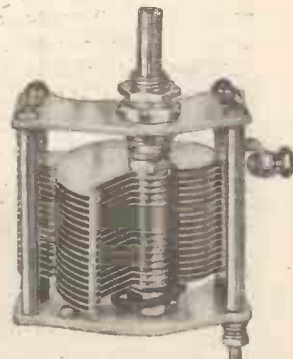
### "No. 4" CONDENSER

A direct-drive condenser which, by the addition of the Polar disc drive is given a wonderfully smooth and precise slow-motion control.

Bonded rotor vanes prevent capacity variations and the condenser is designed to give long, reliable service.

·0005 . . . . . 4/-  
·00035, ·0003 . . . . . 4/-

From all dealers.



24-page Catalogue  
"C" on request.

WINGROVE & ROGERS, LTD.,  
188-9, Strand, London.  
W.C.2.

Polar Works, Liverpool.





*Practical notes on what stations to look for and how to get the foreigners that are coming over well.*

WHATEVER you say about long-distance listening you have got to admit one fact—it's never monotonously regular. Sometimes one is tempted to wish that conditions would remain just a little more constant, but on the whole perhaps it's just as well for us that "DX" is a fickle jade.

**An Interesting "Catch"**

It certainly adds a lot of zest to the dials to never know quite what is coming to you. Eskilstuna surprised me the other night—a place I'd hardly heard of, and one I had certainly never "visited" by radio. For Eskilstuna is a little Swede that relays Stockholm on a power of only

2 kw. And six or seven other stations habitually sit on the same wavelength! (246 metres.)

Even on a good night in mid-winter one hardly expects a programme from a place like that! And yet, at the time it was received, conditions had not seemed astonishingly good, and the 240-250-metre band was being explored more in curiosity than in hope of finding anything much beside Trieste.

The first spell of really warm weather, which ought to have visited us at Whitsun, but didn't, seemed to have a less detrimental effect on

reception than might have been expected. Atmospherics certainly cropped up crisply, especially on long waves, but the dials retained plenty of interesting programmes, even in daylight. A station that I can heartily recommend in this respect is Hilversum, on 296.1 metres—his strength in the London area some days, using very little reaction, is an eye-opener.

**Worth Trying For**

Brussels (509 m.), Paris (328.2 m.), Prague (488.6 m.), Radio Normandie (round about 220 m.), Strasbourg-Brumath (345 m.), Stuttgart (360.5 m.), Toulouse (385 m.), are all especially worth watching for before sunset, and after dark has fallen the number of worth-while stations is prodigious. But of late a good many have suffered from a hearty heterodyne infection, which has often been blamed on Russia, but may be due to causes much nearer home than the Soviet stations!

Falkirk's Regional is now well in his stride, there is the Scottish National to come next, and plenty of powerful foreigners, including the French and Spanish revisions and the remainder of Germany's Regional scheme.

**A New S.G. Valve**

NOT only portable-set owners, but all 2-volt valve users will be interested in the latest addition to the Mullard screened-grid range—the P.M.12A. At the time of writing there is still an air of "hush-hush" about some of the characteristics, but it has emerged that the valve is designed to give a high stage gain at comparatively low voltages—only 100 on the plate and 70 on the screen. The amplification factor is round the 500 mark, and the slope about 1.5 m.a. per volt.

When combined with very modest H.T. and L.T. requirements these performance figures sound amazingly good.

**"Stay-Put" Plugs**

Constructors who have had the annoyance of an awkwardly fitting grid-bias or H.T. plug, which looks all right but is really making shaky contact, will rejoice over the plugs that Belling-Lee are now selling.

The top of the plug holds the flex itself, gripping braiding and all, while the business end of the plug hangs on to the battery socket like a limpet on a rock.

All for 2d. a time!

\*\*\*\*\*  
**POINTS FOR PURCHASERS**  
*Interesting details from manufacturers about recent trade activities.*  
 \*\*\*\*\*

**For "S.W." Enthusiasts**

The B.B.C. experts are forecasting a new public interest in short-wave reception, and the manufacturers seem to be sensing a new market.

One example is the Burne-Jones S.W. Adaptor, which plugs into an A.C. set, on a super-het., or a battery-driven receiver with equal facility and hands out the short-wavers like a magician. Costing less than a couple of pounds, all in, this is enough in itself to cause a new interest in short-wave reception.

**Valve Price Reductions**

The many users of Tungram barium valves will be gladdened by the reduction in prices which became effective on May 16th.

The 2-volt general-purpose valve is now 5s. 6d., instead of 6s. 3d., and the 2-volt power is reduced from 8s. 3d. to 7s. All other types have been re-priced in proportion.

**Ferranti Products**

Following the installation of increased production facilities, "Ferrantis" are now in a position to give immediate delivery of their products, including components for the battery and the A.C. types of Ferranti band-pass receivers.

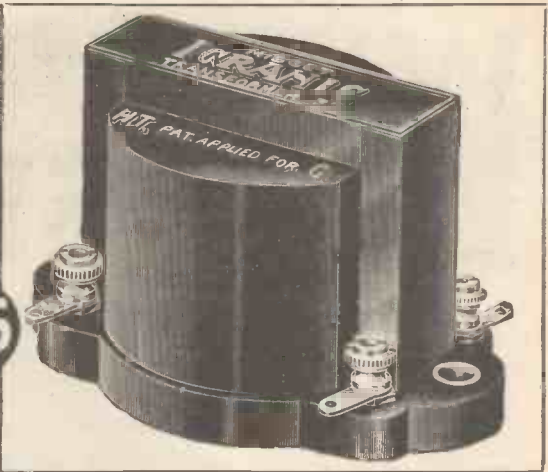
The total price of the battery type, including cabinet, valves (S.G., det., and super-power), and G.B. batteries, but excluding H.T. and L.T. batteries, is £10.17s. 3d.

The A.C. model, including cabinet and valves, comes out at £15 12s. 6d. Full particulars and chart can be obtained (send 1½d. for postage) from Ferranti, Ltd., Hollinwood, Lancs.

**"Guide to Super Radio"**

This is the name of the new Tunewell folder, which is supplied free to any reader who writes to Tunewell Radio, Ltd., 54, Station Road, New Southgate, London, N.11. Details of eight free circuits—including a band-pass all-mains three—accompany the description of the complete range of Tunewell components, which, by the way, is now extended to cover coils, chokes, resistances, transformers, mains components, and mains units.

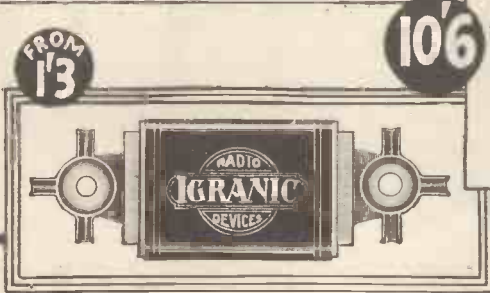
# IGRANIC COMPONENTS CHOSEN FOR THE "FLEXIDYNE"



## The "MIDGET" L.F. Transformer

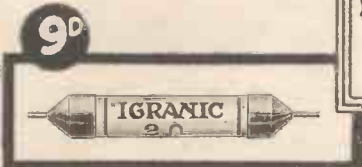
For the discriminating set builder it is incomparable in quality and price and is backed by IGRANIC prestige. The technical advisers to this magazine have recommended the use of this transformer in the "Flexidyne"—positive proof of its capabilities. It possesses high primary inductance with absolutely no trace of "drumming." In two ratios: 3:1 and 5:1.

Price 10/6 each . . . and worth it.



FROM 1/3

10/6



9d

## FIXED GRID LEAKS

The IGRANIC Grid Leak is perfectly silent in action and does not become noisy after prolonged use. Supplied in four resistance values, viz.: 5, 1, 2 and 5 megohms. Price 9d. each.

## FIXED CONDENSER

A little giant in performance although lowly priced. Moisture-proof, it gives highest performance under all climatic conditions. Sizes .0001-mfd. to .01-mfd.

Price from 1/3 each.



**IGRANIC ELECTRIC CO. Ltd.,**  
149 Queen Victoria Street, London.  
Send for fully descriptive leaflet J1185.

**"If it's IGRANIC.... it's best for your set!"**

**FREE!**  
THE 24-PAGE CAMCO CATALOGUE

Details of Camco's fine range of Radio Cabinets—a Cabinet to meet every need—YOUR need.

Write immediately for a copy

**CARRINGTON LTD.**  
MFG. CO.  
Showrooms: 24 Hatton Garden, London, E.C.1. Phone: HOLBORN 8202  
Works: S. Croydon.

THE CAMCO "LINCOLN"

PLEASE be sure to mention "Wireless Constructor" when communicating with Advertisers. THANKS!

All applications for Advertising Space in "The Wireless Constructor" must be made to the Sole Advertising Agents,  
**JOHN H. LILE, Ltd., 4, Ludgate Circus, London, E.C.4.**  
Phone: City 7261.

## The World's Foremost Reproducer

UNQUESTIONABLY the finest value on the market. Gives perfect reproduction of speech and music with volume more than adequate for normal requirements. Not surpassed by any other type of speaker at any price. A demonstration will convince you of its superiority. Sold by all reputable radio dealers.

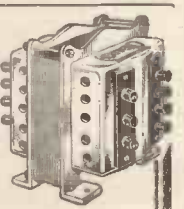


COMPLETE  
**35/-**

Write for descriptive leaflet to  
**REPRODUCERS & AMPLIFIERS LTD.,**  
Frederick Street, WOLVERHAMPTON.

## FIRST ALWAYS!

Since 1923 Heyberd have been first in the design, construction and delivery of powerful Mains Transformers. First again . . . Heyberd announce their latest Transformers, concurrent with the introduction of the new Westinghouse Rectifiers. Carefully selected steel and wire, with adequate insulation, ensures maximum efficiency in the



Transformers detailed below.	Secondary Tappings.	Cap.	Rectifier.	Rectified Output.
Tear out this ad. NOW and send with 3d. stamps for useful lists, with diagrams, of Mains Transformers, Chokes, Condensers and Mains Units.	W.33 { 240 v.	200 ma. . .	H.T.9	300 v.
	{ 4 v.	5 amps. . .	A.C. valves	60 ma.
	W.34 { 150 v.	1 amp. . .	Power valve	35/-
	{ 4 v.	550 ma. . .	H.T.100	200 v.
	W.35 { 4 v.	5 amps. . .	A.C. valves	100 ma.
	{ 4 v.	1 amp. . .	Power valve	45/-
	{ 300 v.	550 ma. . .	H.T.11	500 v.
	{ 4 v.	5 amps. . .	A.C. valves	120 ma.
	{ 4 v.	1 amp. . .	Power valve	65/-

**HEYBERD** 10, FINSBURY STREET, LONDON, E.C.2.

The **P&A**  
**"CHALLENGER"**  
PERMANENT MAGNET MOVING COIL REPRODUCER

# WITH PICK-UP AND SPEAKER



by  
A.  
JOHNSON-  
RANDALL

*Some interesting details regarding two good examples of electric turntables.*

FOR those who are fortunate enough to have a mains supply an electric turntable is a distinct asset. There are, however, listeners who still pin their faith to clockwork motors, because, they say, clockwork has stood the test of time and, moreover, it gives absolute silence.

### Which Shall It Be?

These listeners contend that the electric turntable is liable to cause induction noises and that its speed is not necessarily constant. Sometimes there may be a certain lack of smoothness in running which produces a suspicion of mechanical vibration in the pick-up.

Until a short while ago I must confess that I had a preference for the clockwork motor. My experience proved them to be trouble-free—spring breakages were almost unknown and I knew that I would have no interference from them.

These days the balance has veered in favour of the electric variety, because troubles due to induction seem no longer to exist and one is relieved of the task of having to wind up the motor after every two records or so.

### Electric Drive Better

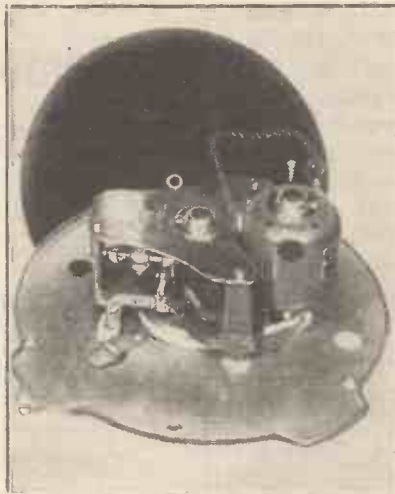
It is true that a good universal electric motor is by no means inexpensive compared with the clockwork type, but the additional cost is offset by its convenience. In any case, given silent running, the question of electric or clockwork really boils down to a matter of individual preference.

I recently had the opportunity of trying two excellent examples of the

electric type. They were products of the well-known Garrard Engineering Co. The name of "Garrard" requires no introduction, since it has been associated with high-grade clockwork gramophone motors for years. The firm's productions are made to a standard—a standard in which quality is the main consideration.

The Garrard electric turntable motors are of two types, viz., induction and universal. The induction

### A FINE MOTOR



*This is the latest Garrard Universal electric turntable. It will run from either D.C. or A.C. and is provided with an efficient automatic stopping device.*

motor is designed for A.C. only and is equipped with an automatic stopping and starting switch.

There is ample power for the playing of the heaviest recordings—overheating is unknown even after long periods of continuous running, and the motor is silent in operation. At 58s. 6d. it is a thoroughly sound

proposition, and the cost of running is extremely small.

The second motor is a remarkably fine job. Designed for universal use, it will run on all voltages from 100–250, either A.C. or D.C., and on all A.C. frequencies from 25–60. Special windings can be supplied for voltages lower than 100 or frequencies above 60 cycles.

### Automatic Stop

The motor is fitted with an automatic stopping device which will operate on any record having a "run-off" groove, and needs no previous setting.

Although it is a more ambitious piece of work, the motor is just as easy to install as the induction type. Full instructions for fitting are supplied by the makers and two forms of resistances are available. One of these employs plugs and sockets and the other a slider.

As in the case of the A.C. induction motor, there is ample power, coupled with dead-silent running.

I was unable to detect any sign of interference due to sparking at the brushes or from the A.C. field in either of the Garrard motors, and the turntables exhibited no tendency to "wobble" nor showed any other indication of "want of truth" in the spindle.

### Value for Money

The price of the Universal motor is £5 15s. and it is well worth it.

Those readers who have any doubts as to the suitability of the electric motor for gramophone pick-up work should make a point of obtaining demonstrations of some of the latest types.

# THE MAGNADENSER

Specified for the  
**'LOCALISOR'**

A solid dielectric variable condenser with a beautifully smooth movement, free of back-lash. One-hole fixing. Complete with knob and terminals.

**•0005 - 2/6**

The "Localisor" and all "Wireless Constructor" sets are available ready-wired and tested.



Send for lists, including particulars of the latest "Stenode," and a list of Short-Wave Stations, Free on request.

## SHORT WAVES on A.C. MAINS or BATTERYSETS...

An entirely new design of amazing efficiency.

This Short-Wave Adaptor can be used with any type of receiver (excluding D.C.), whether A.C. mains, battery operated or super-het., irrespective of the circuit or the number of valves. Price complete with 40/80 metres coil, cord and plug . . . **39/6**

Extra Coil, 18/40 metres, 3/-

**BURNE-JONES** & Co., Ltd., "Magnum" House, 296, Borough High Street, London, S.E.1. Telephone: Hop 6257 and 6258. Scottish Agent: Mr. Ross Wallace, 54, Gordon Street, Glasgow, C.1.

# Bring Your Music Out of the Instrument

Get rid of that tunnel effect by fitting the Howe Box Baffle. No ordinary Loudspeaker cabinet is entirely free from resonance, and resonance means distortion, a muffled tone and unpleasant "boominess."

The Howe Box Baffle eliminates all resonance and is a scientific solution of this difficult problem.

The B.B.C. Year Book says: "Actually, the results obtained from a Loudspeaker thus treated are superior to those obtained using a flat baffle."

Any home constructor can fit a Howe Box Baffle. It requires no alteration to your set and no technical knowledge. The Kit contains full instructions and every single item required to construct it. Price, including Royalty, 20/-, delivered free.

Don't put up with faulty reproduction any longer.

Ask your dealer or post this coupon for full particulars to F. McNeill & Co., Ltd. (Radio Dept. 6), 16, Lamb's Passage, Bunhill Row, E.C.1.

## The Howe Box Baffle Kit

'The Doom of Boom'

Not suitable for Portables.

**POST THIS FOR FREE BOOKLET**  
To F. McNeill & Co., Ltd., Radio Dept. 6, 16, Lamb's Passage, Bunhill Row, E.C.1  
Please send me details of the Howe Box Baffle Kit.  
Name.....  
Address.....

## "A MAN MUST FIGHT"

is the title of a series of articles which GENE TUNNEY is contributing to CASSELL'S MAGAZINE. In the first of the series, appearing in the JUNE issue

### Gene Tunney begins his own LIFE STORY

The man who was, until recently, the world's heavy-weight boxing champion tells the fascinating story of his rise to world-fame. Each article will carry that story nearer to the moment of his final triumphs in the Ring against the great Jack Dempsey at Philadelphia and Chicago.

You'll be thrilled by this stirring saga of the gay and grim realities of the struggle for championship honours. There will be, for instance, a breathless description of the famous "long count" at Soldier's Field, Chicago, in 1927. Here's an "inside" story of a champion's career told by the champion himself. Don't miss it! Of course, there are many more splendid features in the JUNE CASSELL'S, including contributions from BEVERLEY NICHOLS, L. C. DOUTHWAITE, E. C. BULEY and others.

# CASSELL'S

MAGAZINE FOR JUNE—Now on Sale 1/-

# TUNEWELL have removed the Price Bar to Quality Radio

QUALITY has been the main consideration in producing the new Tunewell Components, and only by careful design and lowering our profits are the low prices possible. Unless big sales continue Tunewell prices must advance, as we are determined not to lower the quality.

## 8 FREE BLUEPRINTS

The Tunewell "Guide to Super-Radio" contains details of the new components, and 8 Circuits, including Kit; Eliminator and All-Mains Band-Pass 3. Write today for FREE copy, mentioning your nearest dealer's name and address.



### Tunewell L.F. Intervalve Transformer

Super tone and performance for Battery or Mains Sets. Good response from 50 to 15,000 cycles. Wound on 4-section bobbin, with alternate primary and secondary windings. Finest Silicon Steel laminations, ensuring maintenance of primary inductance. Ratio 3:1 to r. 7/6 Housed in handsome bakelite case.



### Tunewell Volume Control

By far the most satisfactory made. Tunewell Volume Controls eliminate cracklings caused by ordinary types. No more faulty contacts! No breakdowns! Wonderful smooth control! Will last for years. Logarithmically wound with double silk-covered wire. Paper laid between windings. Connections by German Silver contact to 14 studs. One-hole fitting. Type V, 50,000 ohms. 5/6 Type P. Variable Resistance or Potentiometer. Equal resistance between studs. Maximum dissipation 3 watts. 5/6.

# TUNEWELL

TUNEWELL RADIO LTD.  
54, STATION ROAD, LONDON, N.11



they also had a hand in stimulating broadcasting in this country, and getting it started on a proper footing.

### Further Accommodation

It is interesting to note that the B.B.C. has to expend yet another £50,000 in order to purchase the freehold of two houses next door to Broadcasting House. Of course, as has been well known for some time, the B.B.C.'s palatial new headquarters are not big enough, and consequently extra accommodation will shortly become a real necessity.

### Costing a "Million"

It is understood that the B.B.C. originally budgeted to spend £650,000 for the purchase of the existing premises on the site of Broadcasting House, and £200,000 on furniture, etc. Altogether the budget worked out at £900,000, but this sum has been exceeded by at least another £100,000. In consequence, Broadcasting House will probably cost about £1,000,000 by the time it is really complete.

### Those Relay Systems

The B.B.C. and the Post Office are quarrelling over the alleged breaches of the conditions covering certain wireless relay stations. It is alleged that some of these stations have been relaying foreign programmes as well as transmitting programmes on their own account, and the B.B.C. holds the view that these local transmissions often constitute an infringement of the licences under which relay stations are allowed to operate.

### Many Subscribers

Altogether there are about 120 relay stations in various parts of this country, and they are particularly noticeable in areas where reception

### Desert Radio

IT is reported from Cairo that caravans crossing the Sahara Desert nowadays usually carry wireless sets on the backs of the camels. At several of the desert oases, wireless receiving equipments have been installed for the use of travellers. It is even said that some of the Arab nomadic tribes have fallen for radio, and many of their camps are equipped with up-to-date portable sets.

### Very Amusing!

The radio gossip writer in the "Daily Herald" is often amusing, but the other day he was extra specially amusing when he claimed that an article which he had written ten years ago brought the B.B.C. into being. This article, it seems, was printed on April 17th, 1922, in a daily newspaper now defunct.

### In U.S.A. First

Now, as a matter of fact, broadcasting was first boomed in the United States, and articles about this new entertainment began to appear in the daily newspapers in this country early in 1922. In June, 1922, our contemporary, "Popular Wireless," made its first bow to the public—many weeks before 2LO gave its first broadcast service.

### An Early Demonstration

And, farther back than that, Mr. Tom Clarke, then News Editor of the "Daily Mail," was one of the first newspaper men to demonstrate the use of wireless broadcasting by being instrumental in arranging the famous Melba broadcast concert.

### Manufacturers Helped

Many people have claimed to be responsible for the inception of the B.B.C. in this country, but no doubt the manufacturers—the "Big Six"—who originally started the old B.B.C. will be able to convince the gossip writer in the "Daily Herald" that

**JOHN SCOTT-TAGGART**

describes his sets  
only in

**"THE WIRELESS CONSTRUCTOR"**



## OUR NEWS BULLETIN

—continued from page 158.

from B.B.C. stations is found to be difficult. According to available statistics, there were 30,000 subscribers to these relay services in June last year, the number increased to 44,000 by December 31st, and is now reckoned to be well over 50,000.

### Sponsored Programmes

It is claimed that a sum of £5,000 from sponsored radio advertisement programmes may be reckoned on when the new high-power station in Ireland gets on the air. Last year the estimated revenue was £1,500—obtained by a station with a limited range. There is no doubt that there is a growing belief in the efficacy of the sponsored programme, and advertisers are sitting up and taking notice.

### What Broadcasters Earn

Readers may be interested in a few figures about the B.B.C.'s scale of payments these days. Although a good many artistes receive only small fees, such as 4, 5, 6, or 8 guineas for one broadcast, there are definitely stars in the broadcasting firmament to-day who do very well. The B.B.C. pays as much as £50 to £100 to a good tenor, while really celebrated artistes can command £500 a performance.

### Surprising Figures

Here are some points about Broadcasting House: The total building weighs 24,000 tons; in order to lay the foundations 43,000 tons of earth had to be excavated; 2,630,000 stone blocks have been used in the construction of the building.

There are 133 miles of wires in Broadcasting House, including 50 miles of electrical wires.

### Puzzling the Experts

In one studio there is a curious instrument on the wall, which even puzzled some of the expert guides showing the Press round the building the other day. In the end this was discovered to be a clock.

### Falkirk Now Calling

By the time this issue is on sale the Scottish Regional transmitter at Westerglen, Falkirk, should have started test transmissions. These transmissions are scheduled to begin daily at 10.15 a.m., and to continue until the end of the midday programme.

Dance programmes will be broadcast late in the evening. If all goes

well it is expected that the transmitter will be fully on the air roughly by mid-June.

### An Opportunity Missed

The B.B.C. lost a fine opportunity of brightening the programme on Sunday, May 22nd. As everybody knows, Miss Earhart arrived unexpectedly, and although she was willing to broadcast it was decided not to interfere with programme arrangements at Broadcasting House. The official explanation is that, although Miss Earhart broadcast for twenty minutes to America, her talk would not have proved suitable for British broadcasting.

### That Red Tape

Consequently, listeners only heard Miss Earhart on Monday, the 23rd, and a good deal of the excitement and thrill of hearing this brave young woman broadcast on the very day of her arrival in this country was lost to British listeners because of a red-tape regulation.

### More Elasticity Needed

It is little things like this that make one realise how nice it would be if a little more elasticity were introduced into the conduct of British broadcasting.

### Limits of Response

A correspondent in the "Daily Telegraph" the other day pointed out that the majority of the receivers now in use fail in their reproduction of sounds below 150 and over 4,000 cycles per second, and that we have no means of judging how far our receivers are at fault.

### Frequency Broadcasts

This correspondent suggested that the B.B.C. could give valuable assistance and, at the same time, give considerable impetus to the designing of better receivers. "Let them," suggested this correspondent, "occasionally broadcast a scale of pure tones or notes free from harmonics, from 30 to 10,000 cycles per second."

### Why Not?

"I believe," continued the correspondent, "that there is a gramophone record available giving a series of tones from 30 to 700 per second. If this were broadcast occasionally it would do for a start, but we should aim at 10,000 at least, since the ear is sensitive to between 15,000 and 20,000 cycles per second."

We ourselves have made this suggestion in the past, and we again commend this idea to the B.B.C. as a first-rate one.

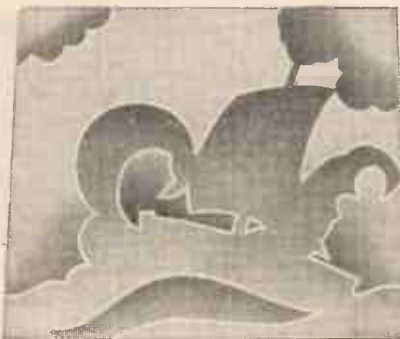


Protect your set, your home, your family from injury by lightning.

Fit a "GARD" between your aerial and earth. It only takes a minute and protects for all time. No interference with your reception of radio entertainment. Fit a "GARD" now and forget to switch off when lightning plays. "GARD" keeps it outside.

From all Dealers, or  
Post Free for 1/6.

**GARD**  
TRADE MARK  
**1/6**  
GRAHAM FARISH · BROMLEY · KENT



# FOREMOST AS PIONEERS

The name of Varley is associated with the earliest research work of the Electrical Industry. To-day, in Radio as in Electrical Progress, the firm which bears his name are still foremost as pioneers.

Creative force and initiative are the Varley Tradition. *The first big step forward in the quality of reproduction from L.F. Amplifiers, the first real solution to the selectivity problem, came from Varley.*

Watch **Varley**  
(Proprs. Oliver Poll Cont'l Ltd.), 103, Kingsway, London, W.C.

Famous Makers Offer! **£5 Radio-Gram CABINET for 65/-**  
**7 DAYS' FREE TRIAL** (or 10/- monthly)  
Polished Oak and Piano built! The acoustic Tone brings a fine thrill. Makers to (Radio Press, H.B.C., 3,000 clientele). Other Models 35/- to £15. Photographs and List **FREE**.

**PICKETTS** Piano-Tone Cabinets, (C.W.) Albion Rd., Bexleyheath.

**FREE A Luxury Wireless Set**  
or components of equivalent value. Wonderful offer to introduce the Radialaddin Club. Write for particulars. **RADIALADDIN CLUB, Dept. W.C., 47/48, Berners St., London, W.1. Museum 1821**

**WE invite readers to support our Advertisers**—care being taken to accept only announcements of reputable firms!

The ACME of CRAFTSMANSHIP  
High-Grade RADIO-GRAMOPHONE CABINET

of exclusive modern design, hand made and polished, on Queen Anne legs.  
Figured Oak £4 12 6  
Figured Walnut or Mahogany " " £5 10 0  
Carriage Paid.  
Illus. Catalogue Free. Cabinets made to order a speciality.

**GILBERT**  
Cabinet Maker,  
**SWINDON**  
Estimates Free, Estd. 1866

## THE "LOCALISOR"

—continued from page 119

is just about as easy as the construction.

First of all, valves. Any S.G. valve will do and any power valve will do also. If you are at all doubtful whether you are near enough to your local station for good results, use high-mag. or steep-slope valves.

On the other hand, if you are extra-near to the stations to be received, you should employ a low-impedance power valve that will take a fairly large value of grid bias. And the S.G. valve may be one of lowish amplification.

### Sharper Tuning

When near to the station you will be surprised how easy it is to overload quite a large power valve in this set. But it is an easy matter to cut down the input by unscrewing the knob of the compression type condenser in series with the aerial lead.

Incidentally, this also serves another purpose apart from that of volume control. It enables the selectivity to be adjusted to the particular conditions under which you wish to work the set, and the more it is unscrewed the sharper will be the tuning.

And now a word about the high-tension voltage. This is not critical, and the set is capable of giving surprisingly good results with a hundred volts, which is really the lowest value that is suitable.

Since resistance coupling is used there is naturally a "bigish" voltage drop across the coupling, and for this reason 120 or 150 volts is to be preferred to a lower value. As a matter of fact, the ideal is to use a voltage equal to that given as the maximum for the particular power valve in use.

In this connection don't forget that you can allow a bit of extra voltage for the drop across the loud-speaker.

To finish up this article, just a word about the cover for the set, which is shown in the heading. This is extremely easily made, and it is unnecessary to give dimensions for it.

### A Neat Cover

Plywood  $\frac{3}{8}$  in. thick is ideal for the job, and you will note from the wiring diagram that the panel is made wider than the baseboard so that the cover will fit on neatly.

It consists of two sides, a top and a back.

The latter is not so long as the sides, because a little has to be allowed for the terminal strip. When completed the cover can be fixed in place by means of wood screws passing through the sides into the baseboard, and it will enhance the appearance of this interesting "unit."

## ALL BRITAIN ENDORSES PROGRESSIVE DESIGN WORK

—continued from page 123

### EVERY TOWN SAYS THE SAME ABOUT THE "S.T.300"!

**TAMWORTH**: "I am overjoyed with the performance of this set, especially as I have only a poor indoor aerial. I think there are very few stations which I cannot get.—G. H. CLARK, 47, Piccadilly, Kingsbury, Tamworth.

**LEICESTER**: "Last week I took it all down and built your 'S.T.300' because it was the circuit I had been looking out for. This week I tested it out on my indoor aerial, also in my car. It does what you claim for it.—W. PAVORD, Lexham Street, Leicester.

**WALTHAMSTOW (E.17)**: "More punch in it than any set I have made up. I always thought my 'Four' was a good set, but it does not come near your 'S.T.300'.—P. PITSON, Tinky Road, Walthamstow, E.17.

**SLOUGH**: "I have run up your A.C. model 'S.T.300' and it may interest you to know that I have decided to retain this set as my regular stand-by for the next year. I ran quickly round the dial the other night and picked out 33 stations on the medium waveband, and there are many more can be brought in with care.—K.G., Farnham Royal, Slough.

**LEEDS**: "Your 'S.T.300' is the best that I have tried.—I. W. E. HILL, Oldfield Lane, Wortley, Leeds.

**MUSWELL HILL**: "I have constructed your wonderful set and get very good results from it.—A. D., Steeds Road, Muswell Hill, London, N.

**ROCHDALE**: "Permit me to thank you for a wonderful set which beats anything I have previously owned.—J. CALDWELL, Lomax Street, Rochdale.

**NOTTINGHAM**: "Having built the 'S.T.300' I am writing to let you know how pleased I am with results from same. I have built upwards of a dozen sets and find it the best as yet.—ARTHUR SLATE, Ball Street, Nottingham.

**PENRITH**: "I have built your 'S.T.300' and I am obtaining better results from it than I obtain from a six-valve super-net, which I built in January. It's simply marvellous.—P. BACKHOUSE, Glenridding-on-Ullswater, Penrith.

**PECKHAM**: "I have just completed my 'S.T.300' set, and words alone cannot express how satisfied I am with it.—E. POLLARD, Nutcroft Road, Peckham, S.E.15.

**COLWYN BAY**: "It does all you claim for it, and what's more the quality is wonderful, and I am noted for being an extremist in this respect. Our local wireless dealer was frankly astonished when he heard the set working.—H. MILLER, Mauldeth Road, Rhos-on-Sea, Wales.

**BOURNEMOUTH**: "Result, a dozen stations straight off. What a surprise! And the local, only a quarter of a mile away, well cut out; and no interference at all from it on the long waves. The selectivity on the long waves was also good—different from one or two kit sets. I then made up the set properly. I have an indoor aerial and not a very good earth, so I cannot claim as many as some of your correspondents, but I have logged 25 stations at good strength. I have now sold my 2 S.G. factory-made set.—E. STONE, Wimborne Road, Bournemouth.

**LIVERPOOL**: "Having built your 'S.T.300' I can with confidence say I am more than delighted with results. It is on a different plane to others.—A. F. KELLY, West Derby, Liverpool.

**FOREST HILL, S.E.23**: "I have just built your 'S.T.300', and I will back it against any other four- or five-valve on the market. Foreigners simply pour in.—D. JACKSON, Carholme Road, Forest Hill, S.E.23.

**WIVENHOE**: "Having constructed your 'S.T.300' receiver a few days ago, I feel that I must write and congratulate you on such a wonderful design. It is just the receiver we have been wanting for this district, where interference is very bad at times. I am delighted; it does all you claim.—E. R. CHAMBERLAIN, Queen's Road, Wivenhoe, Essex.

(Please turn to page 161.)

**ALL BRITAIN ENDORSES  
PROGRESSIVE DESIGN WORK**

—continued from page 160

**SALOP:** "I can endorse the previous letters of appreciation I have read in THE WIRELESS CONSTRUCTOR."—H. E. PIGOTT, Ludlow, Salop.

**DURHAM:** "The best 'Three' I have ever built; this being the sixth in six months. It gives me what I wanted—range, selectivity and power. I have logged 40 stations."—H. S. OLIVER, Fence-Houses, Durham.

**NEWCASTLE-ON-TYNE:** "I live within a mile of Newcastle's aerial and have logged over 40 stations, including Turin. I have recommended the circuit to a good few of my friends."—A. L. PIERCE, Strathmore Crescent, Newcastle.

**CROYDON:** "I have built your 'S.T.300,' and certainly am very pleased indeed with results."—L. G. BOOMER, Beddington, Croydon.

**CLAPHAM:** "I have recently built your 'S.T.300,' and wish to tell you how pleased I am with it—a vast improvement in radio reception."—H. K. CRANFORD, Clapham Park, London.

**CARLISLE:** "My 'S.T.300' is answering well, although I am living next to a large corrugated iron building which causes a lot of damping."—F. W. TODD, London Road, Carlisle.

**DARLINGTON:** "I am more than satisfied with the 'S.T.300.' Stations roll in one after the other."—N. YARROW, Hurworth-on-Tees, Darlington.

**ST. HELENS:** "I have just constructed your wonderful set, the 'S.T.300,' and as I am quite a novice at the game you will no doubt understand my joy at being the owner and builder of such a set."—ALBERT GRUNDY, Alfred Street, St. Helens, Lancs.

**LEVENSHULME:** "My brother has made the 'S.T.300' up and speaks very well of it."—R. N., Stockport Road, Levenshulme.

**ENFIELD:** "I have built the 'S.T.300,' and must congratulate you on bringing out such a wonderful set, which is both cheap and good. I am delighted with it."—G. DERHAM, Skelty Road, Enfield.

**FARNHAM:** "Am very pleased with it. I have logged about 50 stations all free of interference. Thanking you for a great set."—R. E. BIDE, Farnham, Surrey.

**ABERDEEN:** "This being the first valve set I have ever built, you can imagine my delight in hearing station after station rolling in by just altering the dials a hair's-breadth."—J. D. PATERSON, East North Street, Aberdeen.

**BROMLEY:** "It is the best set I have ever had, and I have had several good sets, but none to come up to it."—G. A. OSBORNE, Churchdown, Bromley, Kent.

**ENFIELD:** "Yours is indeed some set. With the 'S.T.300' and a Magnavox moving-coil speaker we are indeed delighted."—W. BROOKS, Holly Walk, Enfield.

**CARDIFF:** "I have much pleasure in adding to the many my appreciation of the splendid capabilities of the 'S.T.300.' It is far ahead in performance to the previous set I used, a S.G., det. and power, and which my friends thought a fine set, but it was hopelessly outclassed by the 'S.T.300.'"—F. A. HODGE, Llandetty Road, Fairwater, Cardiff.

**HULL:** "How it works! Stations never heard before came in at full strength. I was astonished. I must have had at least 50 stations clear of each other. The set is by far the best three-valve I have ever handled."—J. A. RAWCLIFFE, New Road, Willerby, Hull.

**MERTON PARK, S.W.20:** "The quality is first-class. Selectivity is very good and stations roll in without reaction, even on the medium waves in daylight on an indoor aerial. I am more than pleased I used your tuning. It is far in advance of anything hitherto used—constant and stable from top to bottom of wave-bands."—F. W. GADD, Cannon Hill Lane, S.W.20.

**LIVERPOOL:** "I am a wireless fiend for a pastime and a newsagent for a living. When I heard that you were coming to THE WIRELESS CONSTRUCTOR, I told my wireless customers to look out for your first set. I staked my foresight and I am pleased to say you came up a winner. I have built the set."

**EAST DULWICH:** "I am very pleased with the circuit and the set is far above others."—A. MYLES, Worlingham Road, East Dulwich, S.E.22.

**PERTH:** "I get exceptionally good results."—W. MILNE, Alexander Street, Perth, Scotland.

**ILFORD:** "We made two 'S.T.300's' to specification. They are delightful."—Supt. of Police H. R. READ, Wanstead Park Road, Ilford, Essex.

"I have built the 'S.T.300,' and am very pleased with results."—S. GILBERT, Uphall Road, Ilford.

**ALDERSHOT:** "As a wireless fan of nine years' experience of home construction I wish to thank you for designing such a fine set as the 'S.T.300.' Of the numerous sets that I have made, the 'S.T.300' stands alone."—S. J. PRIOR, Weybourn Road, Aldershot.

**BURY:** "I hope to have the 'S.T.300' complete this week. I had one 'S.T.300' set, but a friend has got hold of it!"—W. G. MOULD, Lonsdale Street, Bury, Lancs.

**WIGAN:** "I have built the 'S.T.300' and, needless to say, I am more than pleased."—H. ROSS, Warrington Road, Wigan.

**SHEFFIELD:** "I am delighted with your 'S.T.300,' and for quality and quantity of stations I am sure there is no other set to touch it."—G. KITCHING, Hathersage, Sheffield.

**BLACKBURN:** "It really is very good. Having built two six-valve super-hets. lately, I am in a position to say that for selectivity, ease of working and freedom from mush, the 'S.T.300' has them all beaten."—E. O. HOLDEN, White Bull Garage, Blackburn.

**LEEDS:** "After studying the circuit I immediately made up my mind to build the set instead of buying a commercially-made instrument. I am highly satisfied with it."—N. S. BLACKBURN, Parkville Road, Bramley, Leeds.

**CHADWELL HEATH:** "I am running an 'S.T.300' very effectively."—A. W. MASON, North Road, Chadwell Heath, Essex.

**CAMBERWELL:** "The 'S.T.300' is the first set I have constructed; in fact, I am an absolute novice, but results have exceeded my expectations."—A. J. CASTLE, Camberwell New Road, S.E.5.

**WILLESDEN:** "The best three-valve set I have built."—I. FAYRE, Church Road, Willesden.

**MILDENHALL:** "When your new set appeared in the February WIRELESS CONSTRUCTOR I ordered the parts and built it, with wonderful results."—G. P. R. WILLIAMS, "Kingsway," Mildenhall, Suffolk.

**KEIGHLEY:** "I am twenty-two, and have been making sets of one kind and another since I was twelve. I think it is absolutely the set. I had a 2 S.G. set until February, when I scrapped it in favour of the 'S.T.300.'"—

**GLENLUCE:** "I have recently built your 'S.T.300' and I am delighted with the results."—T. MILLER, Glenluce, Wigtownshire, Scotland.

**PLYMOUTH:** "I have made up the 'S.T.300,' but what more can I add to that already said? It is a marvellous set, and amazing."—W. G. WAKEHAM, Carfax Terrace, Plymouth.

**YEOVIL:** "As regards the 'S.T.300,' I have built three of them during the last five weeks, and all went first time. It is the best three-valve I have built, and I have constructed about sixteen sets during the last three months, including S.G. fours and kit sets."—W. CORNELIUS, "Goldcraft," Yeovil, Somerset.

**TOOTING:** "I am writing to let you know how pleased I am with the 'S.T.300' wireless set which I built as soon as I could get the parts

as near as I could to your original set. I have tuned in about fifty stations. I have now got what I have been wanting."—J. CLARKE, Brentwood Lane, Tooting, S.W.17.

[Editor's Note: Many other similar letters are held over through lack of space. We have already published typical letters of appreciation from West Kilbride, Liversedge (Yorks), Beeston (Notts), Marlborough (Wilts), Isle of Skye, Aston, Bristol, Hampstead, Belfast, Glasgow, Abergavenny (Wales), Land's End, Eastleigh (Hants), Victoria Park (London), Matlock, Luton, Middlesbrough, Much Hadham (Herts), Leigh-on-Sea, Marble Arch (London), Longsight (Manchester), Nottingham, Tooting Common (London), Airdrie (Lanarkshire, Scotland), Harrogate, Wortley (Leeds), Cirencester, Mitcham, Edmonton (London), Whalley (Blackburn), Weston-super-Mare (Somerset), Edinburgh, Renfrew (Scotland), Manchester, Kentish Town (London), Channel Islands.]

\*\*\*\*\*  
\* WHERE TO SEE "S.T.300's" \*  
\* AND "COSMIC's" \*  
\* A further list of official exhibitors. \*  
\*\*\*\*\*

- BIRMINGHAM.**  
The Electroet Radio Co., Solihull.  
Wallace & Co., 856, Bristol Road, SELLY OAK.
- BOLTON.**  
Olympia Radio, Ltd., 74, Bradshawgate.
- CHESHIRE.**  
R. Manning, Acton Bridge, Nr. NORTHWICH.
- COTTERIDGE.**  
Wallace & Co., 1,339, Pershore Road.
- HALIFAX.**  
C. Kinder, 49, Saddleworth Road, WEST VALE.
- LONDON.**  
C. H. Appleton, 74, Upper Clapton Rd., CLAPTON,  
Corry, S. T., & Co., 52a, SOUTHAMPTON ROW,  
W.C.1.  
C. & W. Thew, 44, BLACKHEATH HILL, S.W.10.  
(Please turn to page 162.)

**USED UNIVERSALLY**  
**The World's Standard for Eight Years—Still the Best.** (Patent)

"B" Type. Non-rotating name. 2 B.A. Price 6d. each.  
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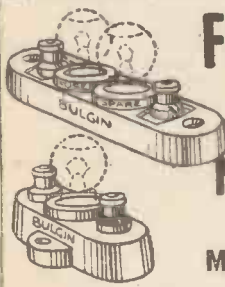
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**BELLING-LEE TERMINALS**

Advert. of Belling & Lee, Ltd., Queensway, Ponders End, Middlesex.


HINTS TO BETTER RECEPTION. 6.

**FITTED IN FIVE MINUTES IN ANY MAKE OF SET**



Simply break the lead joining H.T. - and L.T. - and insert fuseholder as shown. A "Competa" fusebulb (6d.) will then give complete protection to your valves in case of accidental short circuit. The F.4 is fitted with spare fuse carrier.

Send 2d. Postage for 75 pp. Catalogue for full details

NºF4  NºF5

**1/-** **6<sup>d</sup>**

LT+ LT- HT- HT+

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**MOVING-COILS FOR THE MILLION**



**NEW "WB" MODEL P.M. 4**

**42!**

**PERMANENT MAGNET Moving Coil Speaker**

Complete with special output transformer mounted on top.

Write for leaflets (post free.)

**WHITELEY ELECTRICAL RADIO CO., LTD.**

Radio Works, Nottingham Road, Mansfield, Notts.

Irish Free State Distributors: **KELLY & SHIEL, LTD.**, 47, Fleet Street, Dublin.



A triumph by Britain's most famous makers, after months of research. Glorious and true moving-coil reproduction from ANY 2-, 3-, or multi-valve set. No mains needed. Sheffield-made cobalt steel magnet guaranteed for 5 years.

**WHERE TO SEE "S.T.300's" AND "COSMIC's"**

—continued from page 161

- MAIDSTONE.**  
Cyclo-Rado, Ltd., 3, Mill Street.
- NOTTINGHAM.**  
Pickbourne, 93, Sneinton Boulevard.  
Reliance Engineering Co., Theatre Quadrant.  
Reliance Engineering Co., 101, Alfreton Road.  
Reliance Engineering Co., 144, Derby Road.
- PENRITH.**  
A. B. Bowe, late Frank Smith, Cornay Square.
- PORTSMOUTH.**  
Wild Bros., 60, Fratton Road.
- PULBOROUGH.**  
L. R. Willmer, Lower Street.
- RADCLIFFE.**  
The Talkie Shop, Picturedrome Buildings.  
Turner & Booth, 51, Church Street.
- RADCLIFFE-ON-TRENT.**  
H. S. Smith, The Wireless Stores.
- RAMELTON, CO. DONEGAL.**  
S. B. Corry, Market Square.
- RAMSGATE.**  
J. Cornman, 65, King Street.
- RATHFRILAND.**  
S. G. Kentley, Castle Hill.
- RAWTENSTALL.**  
O. Borsay, 101, Bank Street.
- READING.**  
F. Gale & Son, Ltd., 133, Friar Street.  
Wilson, G., 45, Castle Street.
- REDHILL.**  
J. Brems, 35A, Clarendon Road.
- REDRUTH.**  
E. Russell, Higher Fore Street.
- REIGATE.**  
B. Finch & Sons, 35, Bell Street.
- RICHMOND.**  
Morley & Thuey, 14, The Quadrant.
- ROCHDALE.**  
A. K. Cotton & Co., 2, Water Street.
- ROCHESTER.**  
Clarke & Simmons, 212, High Street.
- ROMFORD.**  
Filmays Radio, Filmays Corner, South Street.
- ROTHWELL, NR. LEEDS.**  
W. Gibson, Radio Co., 34a, Commercial Street.
- ROYSTON, YORKS.**  
J. Gordon Cheetham, 127, Midland Road.
- SAXMUNDHAM.**  
O. W. Lane, Radio Dealer.
- SCHILLY ISLANDS.**  
Alfred Green, The Steval, St. Mary's.
- SEAFORTH.**  
J. Murphy, 13-15, Seaforth Road.
- SELLINDGE.**  
F. G. Ware, Near Ashford.
- SEVENOAKS.**  
F. J. Lawrence, Westinghouse, Quakers Hall Lane.
- SHEFFIELD.**  
W. H. Sherwood, 56, West Street.
- SIDCUP.**  
Sidcup Electrical Co., 72, High Street.
- SITTINGBOURNE.**  
E. & C. Landen, 55, High Street.
- SMETHWICK.**  
Lambert Bros., 326, High Street.
- SOUTHEND-ON-SEA.**  
L. V. Bridge, Warrior Square.  
London Radio Supplies, 29, Victoria Arcade.
- SOUTHPORT.**  
Wireless Supplies & Repairs, 14, Princes Street.
- SOUTHSEA.**  
Southsea Radio Exchange, Ltd., 9, Elm Grove.
- SPALDING.**  
R. S. Barlow, Francis Street, Hole-in-the-Wall.
- SPENNYMOOR.**  
E. F. Cator, 24, High Street.
- STAFFORD.**  
E. B. Clendinning, 37, Cramer Street.
- STIRLING.**  
Lockhart & McNab, 34-8, Craigs.
- STOKE-ON-TRENT.**  
G. Balance, High Street, LONGTON.  
"Bows," Bews Corner, BURSLEM.  
C. Podmore, 47, High Street, LONGTON.
- ST. ANNE'S-ON-SEA.**  
E. Sumner, Ltd., 14, St. Andrews Road, South.

- ST. HELENS.**  
W. Cawley, Junr., 66, Liverpool Road.  
F. Cholerton, 52, Bridge Street.
- ST. NEOTS.**  
Moore & Co., High Street.
- STOWMARKET.**  
Stannard & Co., Taverna Street.
- STROOD.**  
Clarke & Simmons, 26, High Street.
- SWANSEA.**  
Dadem Ltd., 206, High Street.  
G. P. Evans, The Square, BRYNHIFYRD.  
J. Mitchell, 46, Clydaek Road, MORRISTON.
- O.K. Radio & Gramophone Stores, Church Street.**  
Peacocks (Swansea), Ltd., 32-6, Woodfield Street, MORRISTON.
- Tom Roberts' Radio Service, 8a, Humphrey Street,**  
Suell & Sons, 20-26, High Street, Arcade.  
Waldron Electrical Manufg. Co., 6, Portland Street.
- SWINTON.**  
The Swinton Battery Service, 125, Swinton Hall Road.
- TAUNTON.**  
G. F. Small, 60, Station Road.
- TORQUAY.**  
S. J. Searle, 33, St. Marychurch Road.
- TROWBRIDGE.**  
A. R. Farr, 7, Islington.
- TUNBRIDGE WELLS.**  
R. C. Woodcraft, Barden Road, SPELDHURST.
- WALLASEY.**  
Cheshire Wireless Co., 89-100, Brighton Street.
- WARMINSTER.**  
The Orchestron Radio Service, 10, Market Place.
- WARRINGTON.**  
J. Lawson, 26, Horsemarket Street.
- WELLINGBORO'.**  
Jessops, 2A, Midland Road.
- WELLING, KENT.**  
S. A. Holmes, Holmes Stores.
- WEST BROMWICH.**  
W. Hughes, 30, Bull Street.  
E. J. Spiers, 345, High Street.
- WESTCLIFF-ON-SEA.**  
Chalkwell Electric & Radio, 88ia, London Road.
- WEST HARTLEPOOL.**  
Edgar Phillips, Ltd., 61, Church Street.  
C. H. Iderton, 79B, Musgrave Street.
- WESTPORT, CO. MAYO, IRELAND.**  
T. Hastings, Fair Green.
- WEYBRIDGE.**  
E. W. Farrow, 42, High Street.  
E. Rogers & Sons, Ltd., 56 and 58, High Street.
- WHITEFIELD, LANC'S.**  
Turner & Booth, 228, Bury New Road
- WHITSTABLE.**  
Masons Motors, Canterbury Road.  
E. C. Sparrow, 13, Harbour Street.
- WISBECH.**  
C. H. Plummer, 37, West Street.  
Rouse's, Hill Street.
- WOLVERHAMPTON.**  
Cox & Tustin, 26, Broad Street.  
Fenwick's Radio Stores, Gt. Brick-Kiln Street.  
G. E. Griffiths, 21, Steelhouse Lane.  
Radio Services, Market Street.
- Wolverhampton Radio Installation Co., Ltd., 56, Victoria Street.**
- WOMBWELL.**  
E. Denton, 75, High Street
- WORKSOP.**  
E. Sugden, 109, Gateford Road.
- YARDLEY.**  
P. J. France, 60, Church Road.
- YORK.**  
A. J. Kemp, Crayke.

**FROM MY ARMCHAIR**

—continued from page 142

cheerier tone from the English Riviera. For example, The Athenæum Radio Stores, of Plymouth (25 miles from St. Austell), write: "May we offer our congratulations on having designed such a remarkable set for the home-constructor as the 'S.T.300'? The demand here for demonstrations (Please turn to page 163.)

**FROM MY ARMCHAIR**

—continued from page 162

has been great, resulting in the sale of many components and complete kits.

"In every case the customer has returned to us with glowing reports of the receiver's merits and capabilities. This, we think, is extremely satisfactory when one remembers the unenviable reputation of the Plymouth district for radio reception."

**The "Ayes" Have It!**

I think the "Ayes" have it in the West Country. But I hope readers do not imagine that I treat lightly a perfectly sincere plaint. If I weren't so busy I should want to dash off to St. Austell with my own "S.T.300" under my arm, my own valves, my own loudspeaker, my own H.T., and my own accumulator. There are always some people who don't get good results.

It may be a faulty or inferior valve, an old-fashioned speaker, a badly-soldered joint on a coil, a different and perhaps worse transformer, a dirty switch, a bad electrical connection between vertical and earth screens, or a bad earth connection to the decoupling condenser of the valve screening grid. Some people take all sorts of liberties with a design.

Six years ago I used to be violently irritated if a letter of complaint came in. That was one reason why I established the big laboratories at Elstree and engaged very able men to help in research and demonstration. I wanted to challenge any antagonistic reader to come and hear for himself, and every reader who came went away convinced that any fault in his receiver was, at any rate, not due to the design. The result was that an extraordinary degree of confidence was placed in the sets for which I was responsible.

**Real Responsibility**

New readers of THE WIRELESS CONSTRUCTOR who have joined the "Old Contemptibles" of 1923-1926 may not be aware of the vast amount of trouble and expense I have gone to in order to gain that public confidence so essential to a designer.

The fact that 50,000 people forthwith, and without "waiting to see," built the "S.T.300" is treated by me as not so much a tribute as a responsibility, and one which is constantly before me as I work on the plans for my next "big" set.

**A PRACTICAL MAN'S CORNER**

—continued from page 138

The other day I undertook the making of a radio-gram cabinet and the problem presented itself in acute form. If one carried the front over the end-pieces, unsightly raw edges would be left at the ends, as seen at A in Fig. 4. If, on the other hand, the front were fitted inside the ends, matters would be worse still, for then the raw edges would appear as seen in Fig. 4B at the front of the cabinet. Whatever pains you take to finish up the edges of plywood, you can never make them look very well.

**Two Solutions**

The simplest solution of the difficulty is, I think, that illustrated in Fig. 5A. Here the front is fitted inside the end-pieces of the cabinet, and a bead of the same wood as the veneer is used as shown in the drawing.

Personally, I have a preference for plain sectioned beads, since I do not much care about "frills" in cabinet making; but that is purely a matter of taste, and it does not matter what kind of bead is used so long as it is

wide enough to cover the raw edges of the end-pieces.

It is best, I think, to make it rather wider than the end-pieces (I have indicated this in the drawing). A flush-fitting bead calls attention to itself and gives away the purpose for which it is used. Let your bead stand out as at Fig. 5A, and it serves both as a concealer and as an ornament.

**For the Expert**

At B in the same drawing is seen the woodwork expert's solution of the problem. This is exceedingly difficult to carry out unless you are a really good carpenter and have first-rate tools at your disposal.

The method is this. If you are using five-ply, which is  $\frac{3}{8}$  in. thick, each end of the front and back of the cabinet is planed down for a width of  $\frac{3}{8}$  in., until only the outer veneer layer of the plywood remains.

It makes a really beautiful job, for if you examine a cabinet made in this way you cannot possibly tell without opening the lid that it is not made from solid oak, or whatever the wood chosen may be. As I said, though, it is a very ticklish job for any but an expert, and one false stroke with the plane may spoil a whole large piece of wood.

NO SLIP OR BACKLASH



**J.B. THUMB CONTROLS**

A gentle pressure and they revolve the condenser vanes smoothly and slowly. Hairline Visor. Neat panel appearance. All metal parts insulated from condenser.

Type No. 1 .. .. Plain 4/6  
 Type No. 2 .. .. Vernier 6/-  
(for condensers with vernier spindle)  
 Type No. 3 .. .. Dual 8/6  
(to gang two condensers)  
 Supplied with black bakelite panel plates. Mahogany finish 6d. extra.

**J.B. DRUM DIAL**

Its smooth and powerful friction drive will move your condenser vanes the merest fraction of an inch. Ivorine reversible scale.

**WITH 4" DIAMETER DRUM**

Vernier ratio 16/1. Bronze or oxidised silver finish. Price 10/6

**3" DIAMETER DRUM**  
 (illuminated) 9/6

**PRECISION INSTRUMENTS**



**HINTS FOR "S.T.300" USERS**

—continued from page 146

vertical marks only and, having picked up the station, alter the tuning condensers as I alter the couplers until the desired selectivity is obtained. I call this "following the station."

If you want de-luxe logging, you can stick a graduated semi-circle of paper behind each coupler. If, on the other hand, you don't wish to bother about the couplers, you can set them for the best average results. These average settings will vary with every district and aerial. But any increase in "jamminess" of the ether may be remedied by turning both couplers a little more to the left.

**H.T. Voltage Values**

The voltages for the valves are important if one desires best results. The anodes of the S.G. valve and the last valve (i.e. H.T.+3) should be 120 volts. The screening-grid (H.T.+1) should be 75 volts. The detector valve anode (H.T.+2) should be about 45 volts. All these values may be varied, especially those of the detector H.T., but it is doubtful if they can be improved upon. I advise any reader of these notes to check up his H.T. leads. It is very easy to get, say, 45 volts on the screening-grid and 75 on the detector by mistake.

As regards components, modifications are carried out "at owner's risk"! The L.F. transformer is a common example of substitution resulting in poorer results. As for wave-change switches, many readers have got themselves into trouble on the long waves by using a slightly different type. Some have altered the position of the switch and produced self-oscillation. Queer breeds of aerial couplers have found their way into readers' sets. But these are

condenser. It will be found in practice that smoother reaction is obtainable with less first-valve inherent reaction and more second-valve deliberate reaction. This occurs when the anode coupler is not over to the right, but in an intermediate position.  
J. S.-T.

**THE MYSTERY OF THE METAL RECTIFIER**

—continued from page 132

condenser the same way. While one pair is working the idle ones are substantially non-conducting.

The circuit now most commonly used is that of Fig. 4, which is a voltage doubler as well as a rectifier. The transformer now delivers half the ordinary voltage, but each rectifier charges up its own condenser (thus R<sub>1</sub> charges up C<sub>1</sub> and R<sub>2</sub> charges up C<sub>2</sub>). By taking our D.C. output from the condensers C<sub>1</sub> and C<sub>2</sub> in the manner shown, the e.m.f.'s across these add together. They are, in fact, in series, and thereby the transformer peak voltage is doubled. A smoothing system is shown added in Fig. 4. There are several important advantages to be gained by using this voltage-doubling circuit, but a lengthier article than the present one would be necessary to give in detail the respective merits of each circuit.

Sufficient information has, however, been given to enable the reader to form some idea of the working and applications of "the metal way."

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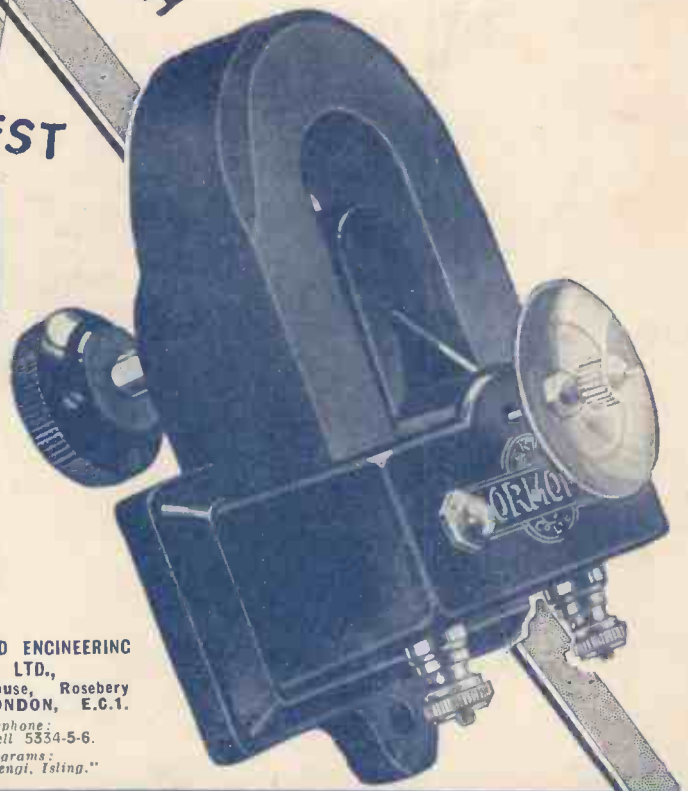
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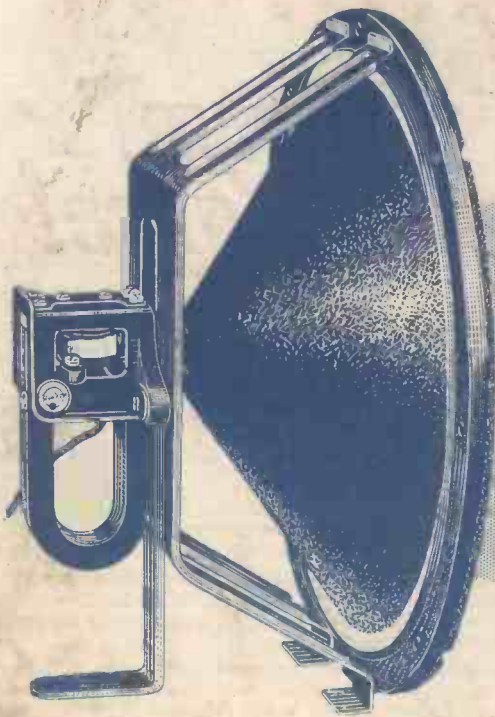
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