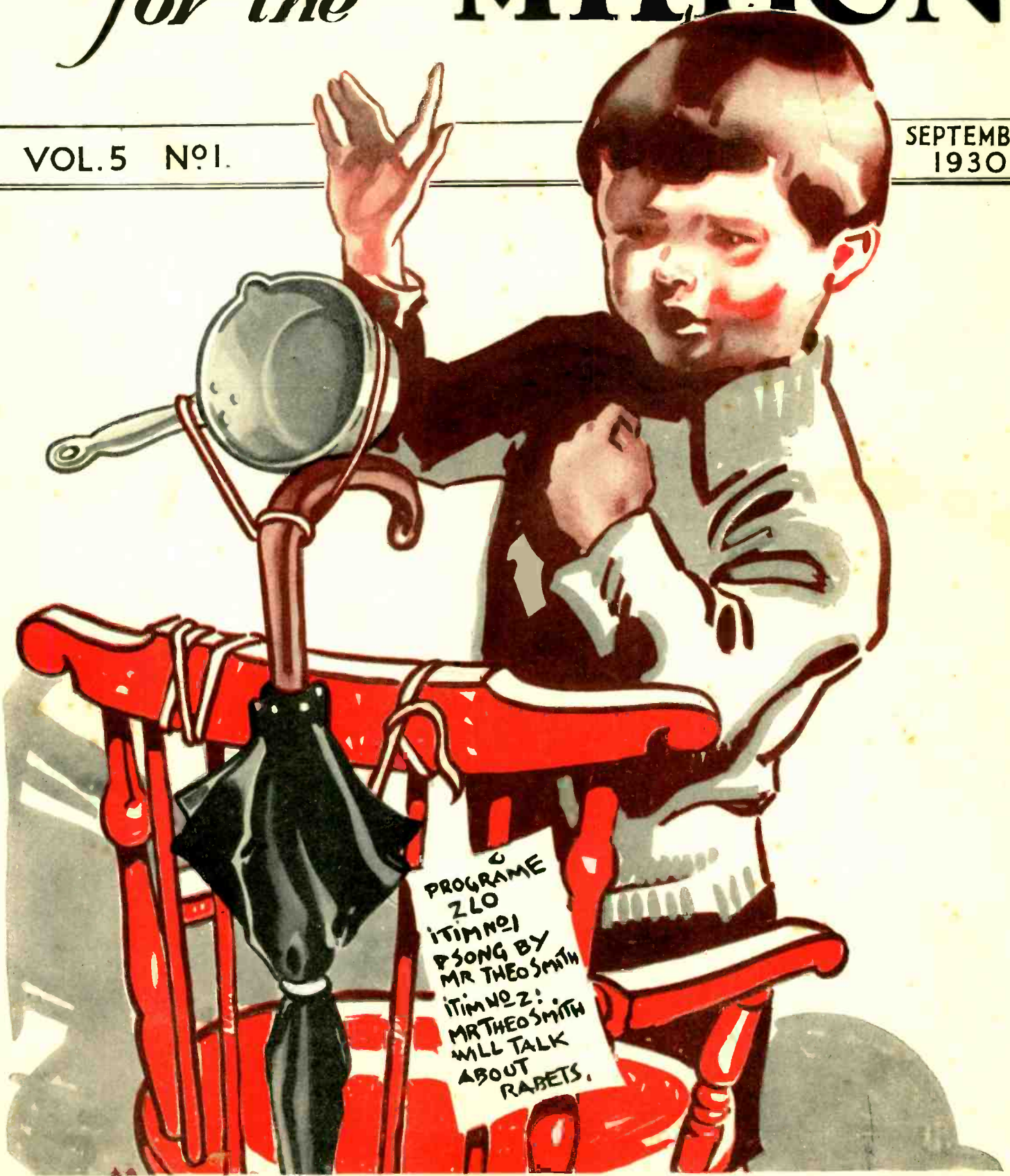
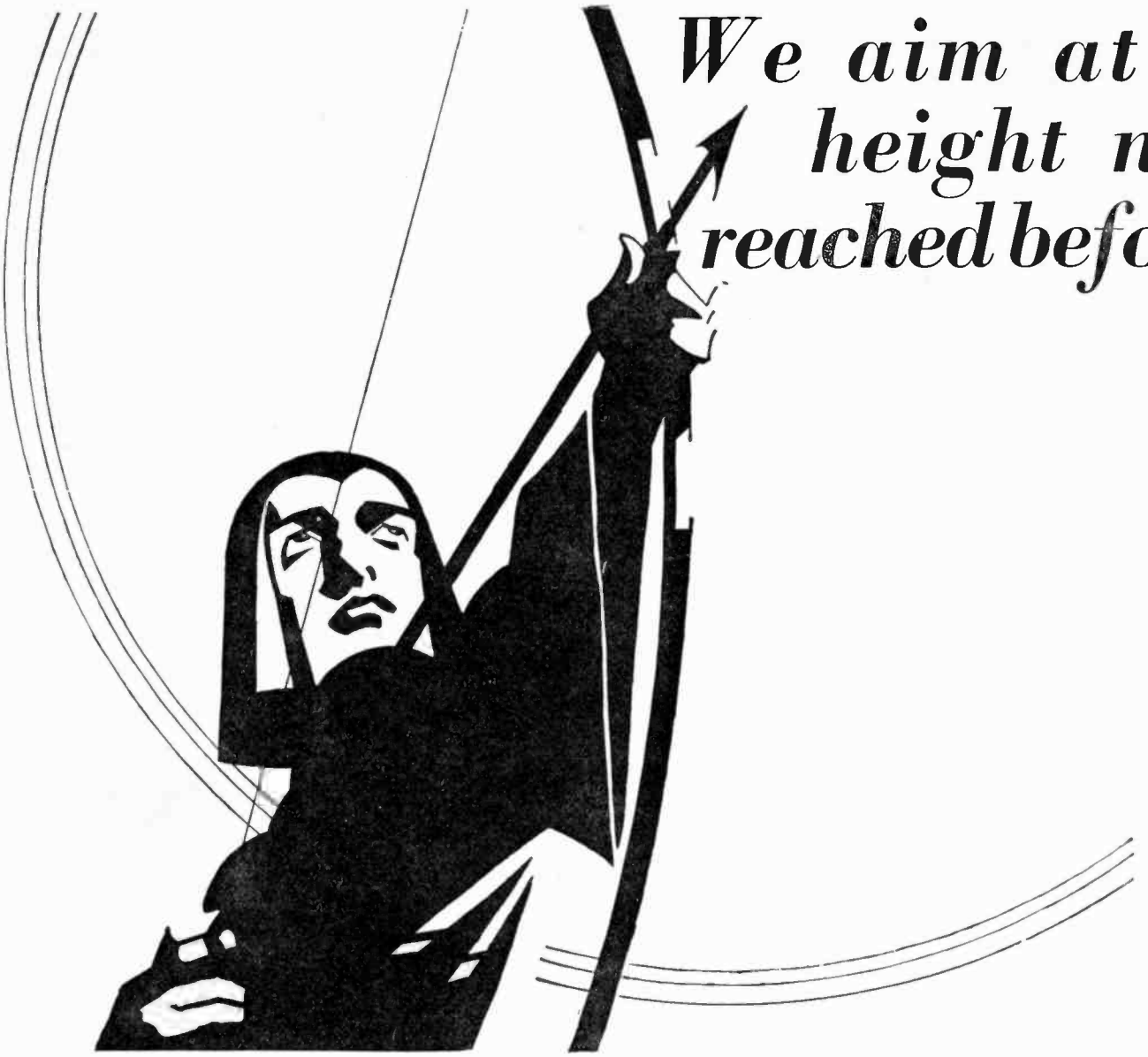
RADIO *for the* MILLION

Pearl & Moore
168, STRAND, LONDON, W.C.2.
PRICE 3D

VOL. 5 No. 1. SEPTEMBER 1930



THE RADIO OWNERS MAGAZINE



We aim at a height not reached before

When you replace an old valve with a new Mullard valve, you're putting in a better valve. You are aiming at, and achieving better radio. It is probable that the old valve is also a Mullard. Still it is definitely giving way to a better Mullard valve. Can you recall what radio was like in 1924 and 1925, before Mullard P.M. Filament Valves made radio a practicable and a listenable reality ?

There is safety in buying Mullard.

Mullard

THE · MASTER · VALVE

Advt —The Mullard Wireless Service Co., Ltd., Mullard House. Charing Cross Road, London, W.C.2.

RADIO for the MILLION

THE RADIO OWNER'S MAGAZINE

VOLUME 5—No. 1. **AUTUMN ISSUE 1930**

EDITORIAL.

RADIO progress has in the past presented such a multitude of revolutionary changes that many have put off the date of building their Radio receiver until design had crystallised, until the revolutionary changes so often foreshadowed in the stunt press had matured and become accomplished proven systems.

But of late we hear less of "cold valves," of marvellous inventions for the elimination of these necessary components and the like.

No more do the radio periodicals announce incredibly marvellous reflex circuits which shall revolutionise radio. No more loud-speaker crystal sets are announced with flourish of trumpets. In short, the public has learned to sort the grain from the chaff. They refuse to be led astray by any self-styled technician or to spend large sums on receivers embodying crank ideas.

Instead they spend their hard-earned savings on some proved design which emanates from the laboratory of a manufacturer whose reputation deters him from publishing any instructions which will reflect discreditably on his organisation.

"Radio for the Million," the pioneer sponsored constructors' paper, has from the first refused to court attention by the use of stunt circuits or extravagant claims.

And to-day the justice of their policy is being appreciated. The readers of "Radio for the Million," an ever-increasing circle of enthusiasts, are appreciative of the fact that, while untried crack-brained inventions are rigorously barred from its pages, every development which research and the scientific mind can devise is incorporated.

The result has been a series of receivers, the earliest of which are still delighting their builders. To-day "Radio for the Million" sets still embody the most modern practice; but progress, while still rapid, has become set in well-known channels.

The screened grid valve is here to stay. It achieves, without difficulty or complication, the end which neutralizing and kindred expedients unsuccessfully attempted to reach.

No development which can oust the screened grid valve from its present supremacy is even foreshadowed, no youthful inventor has even had the courage to stir newspaper reporters up to the point of free publicity by talking of what he will do.

In another department we find the reduction of low frequency stages to one almost standard. For modern valves, modern transformers, and the increased efficiency of modern H.F. stages renders more than one stage unnecessary except in special circumstances.

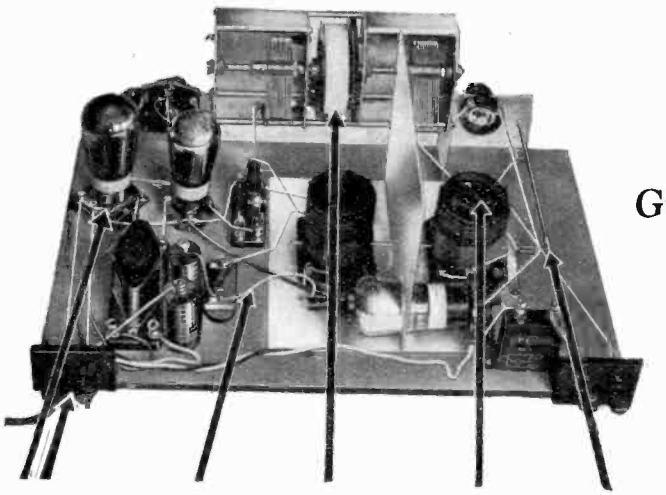
In all, we may say that the modern radio sets described in the present issue will be standard up-to-date productions for some time to come.

All can be operated from A.C. mains if so desired. All can be converted to operate from A.C. mains subsequent to the initial building if this should be desired.

No hesitation need be felt about building now. The design is even simpler than before, even more stable, and capable of retaining the up-to-date performance for a considerable period.

CONTENTS.

THE MULLARD 1931 ORGOLA



Provision for power valve, super power valve or pentode valve. Battery cord simplifying battery connections.

Shunt fed H.F. valve anode supply, maintaining the tuning condensers at low potential.

Single dial tuning with thumb adjustment for aerial tuning correction.

Rotary aerial coupler allowing adjustment of selectivity over wide limits.

Dual range coils operated by one control on the panel.

Gives—

High degree of selectivity.

Enormous amplification.

Life-like reproduction.

A new conception of simplicity.

Statistics prove that the three-valve set is still the most popular arrangement, and small wonder, since with modern high efficiency valves and carefully designed components a 3 valver employing a screened grid valve and smooth reaction control can put up an amazing performance and provide a fascinating variety of programmes on a winter's evening.

The most popular three-valve sets in the past have been " Radio for the Million " sets and in the present issue the new 3 valve set will more than fulfil the expectations of our enthusiastic readers.

All the conditions of simplicity have been carefully considered and complied with. There is no soldering, no drilling, no inaccessible connections and even less and simpler wiring than before.

Selectivity has been the subject of prolonged experiment and is of a higher degree than was previously thought possible with only two tuned circuits.

Tested at 7 miles from Brookmans Park, Turin was heard clear of both Regional and National transmitters, and there is incorporated a variable aerial coupling coil which enables this performance to be duplicated under widely varying conditions.

Simpler tuning has been devised also, for by means of the small black thumb ring on the left of the numbered tuning drum, the aerial circuit can be accurately adjusted to rectify any discrepancy which may arise from unusual aerial and earth conditions.

So that while single dial tuning is an important feature of the set, the circuits may be as accurately tuned as if two separate controls were employed.

And so through the whole gamut the set shows improvements, and new features which enhance the performance, simplify the building and operation and give selectivity to the limit, quality unbelievably good, range previously unequalled and sensitivity unparalleled.

You can build the 1931 Orgola, even if your previous mechanical experience has not yet taught you to drive a nail straight.

Theoretical circuit diagram of 1931 Orgola receiver.

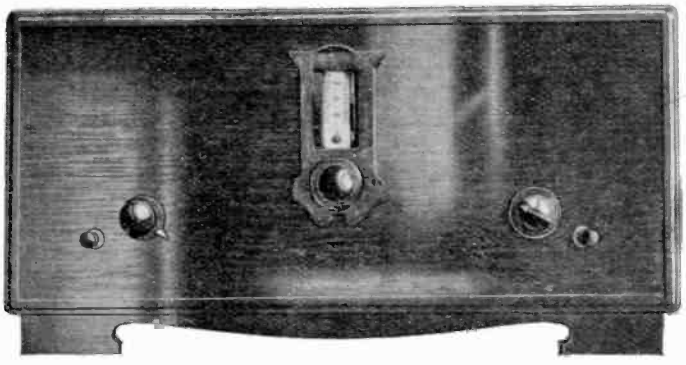
The A.C. Model is identical in operation, but minor alterations have been made in the wiring to accommodate the A.C. Valves.

A New 3 Valve Receiver With Remarkable Points

Costs Complete in Cabinet with Valves

£8 : 0 : 0

or with Pentode 12s. 0d. extra.

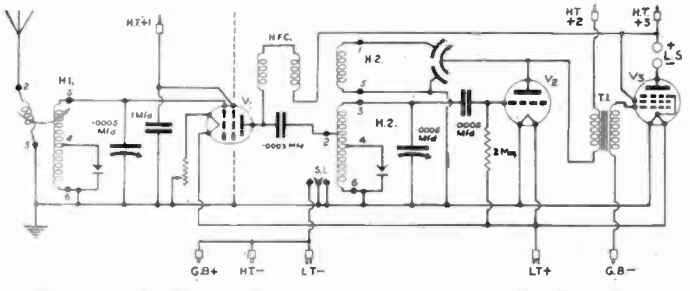


Progress in valve design proceeds at a pace unequalled by any previous scientific development. Such valves as are available to-day were undreamed of a few short years ago, and with valve progress must go hand in hand the design of components suitable for coupling the stages of the set. For instance, with every change in characteristics of screened grid valves, a change has to be made in the design of the coils associated with them. Thus the demands on the research department are constant and imperative, and ever calling for modification and improvement in the methods of coupling the valves within the set.

And in this connection " Radio for the Million " is proud and jealous of its reputation for painstaking design and attention to every improvement in valve design. Mullard valves have ever been the leaders in design, and " Radio for the Million " leads in design of receivers which utilise the marvellous characteristics of these valves to the full advantage.

But to avoid disappointment be sure that the instructions and the design are followed, for the valves are the heart of the set, and the components associated with the valves are only means of employing the valve to its full advantage. Just as the clutch, gear-box, and transmission of a motor car serve to transmit the energy from engine to back axle, so do the various inter-valve couplings serve to transmit energy from one valve to the next and ultimately to the loudspeaker.

Just as important as the selection of components is the fitting of suitable valves. Sets designed to operate with the highly efficient Mullard valves can not be expected to duplicate this performance when other makes are substituted. For in the same way that an Austin Seven's engine would be unsuitable for driving a car through Rolls Royce transmission, so are valves of different make unsuitable for use in " Radio for the Million " sets, which, designed as they are for the most efficient valves available to the public, can not be expected to live up to their high operating standard if less efficient substitutes are employed.



Theoretical circuit diagram of 1931 " Orgola " Receiver.

Where to start.

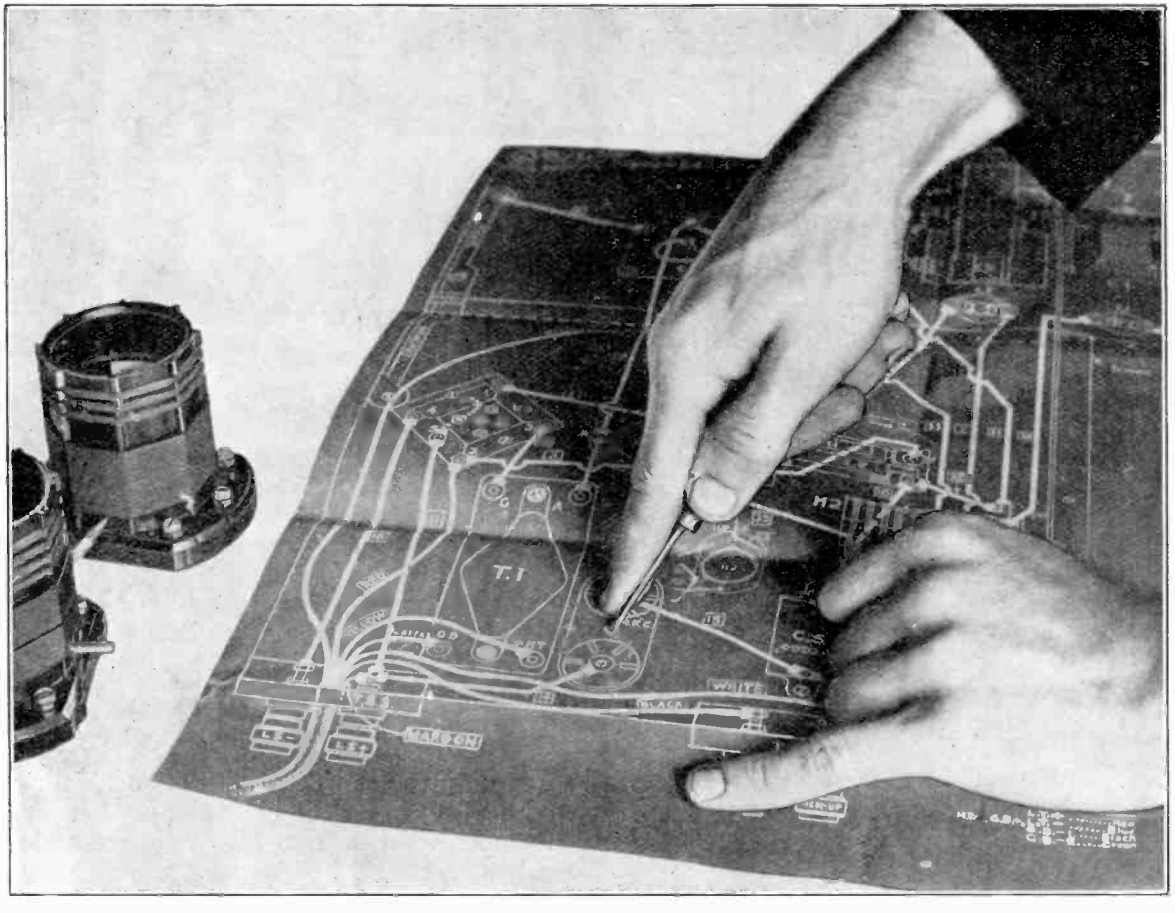
First procure the components, and make sure that the correct components have been obtained. Such a simple matter as a push-pull switch of incorrect type can cause the most baffling trouble.

Unbox the various components and, each having been identified with its position on the blue print, the fixing may be commenced.

position and lastly the variable condenser assembly. This order of fitting is the simplest, but the coils can be fitted last if it is preferred to do so. The wiring is simple and straightforward, and if the blue print and point to point wiring is followed step by step no mistake is possible.

A Point to note.

There is one point which should be observed :



Pricking through the blue print into the baseboard. This simple method ensures that the components will be accurately positioned.

The simplest way of accurately determining the position of each component is to place the blue print over the baseboard as a fretwork pattern would be placed, and then pierce through the fixing hole positions into the baseboard with a bradawl. The positions are then identical with the original and no discrepancy will be found in the subsequent wiring.

Having proceeded so far, all the components with the exception of the variable condenser assembly and screen should be screwed to the baseboard. The vertical screen is then secured in

if the battery cord is fitted before the rigid wiring is commenced a neater job will result, for not only is the wiring simplified slightly, but the threading of the flexible wires below the rigid wiring is avoided and the possibility of bending the neatly executed wiring is prevented.

How to straighten wire.

A slight digression from the course of our subject must be pardoned, but it is not inappropriate to describe a method of straightening the 18 s.w.g. wire for the wiring of the set. When bought, this wire is usually wound on a small

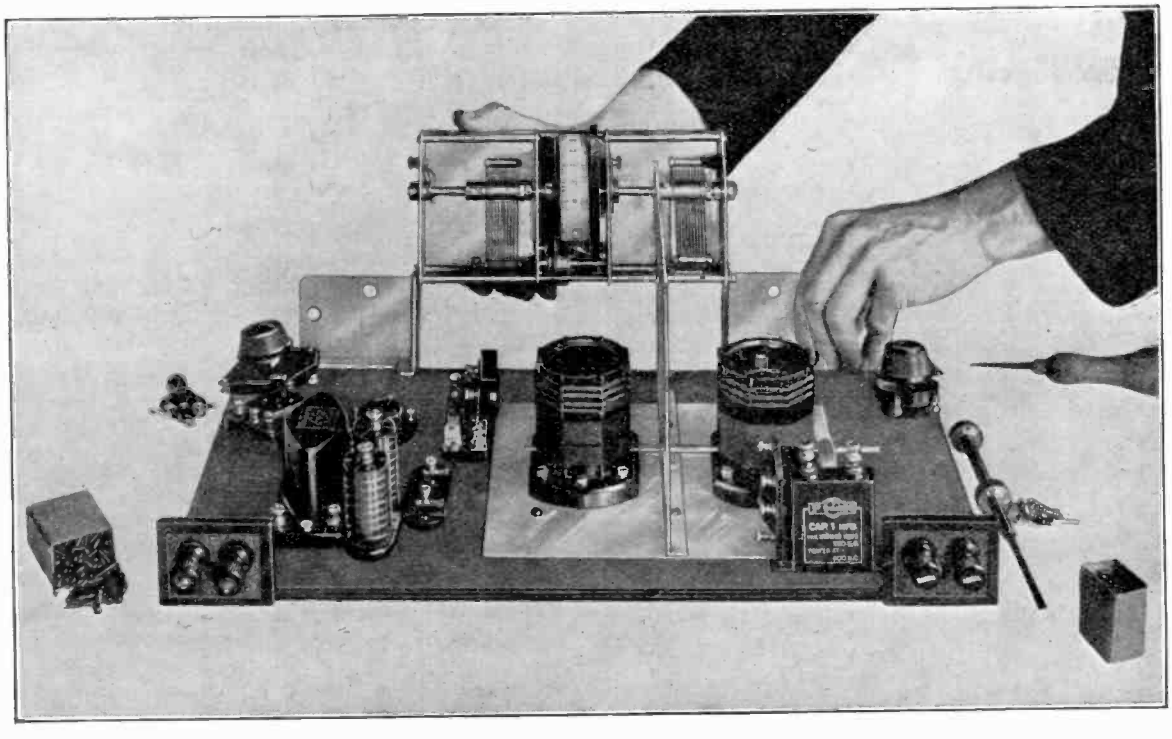
steel drum, and when unrolled presents a distinctly waved profile. To straighten every curve and corner with pliers is a task, which, judging by the sets which find their way to the editorial office, few builders care to tackle.

It is, however, an easy matter to straighten the wire if the following simple instructions are observed. Fix one end of the wire to a rigid support—a coat hook on the door or a stout nail driven into a firm bench or post, then unwind about ten feet of the wire. Grip the wire firmly and stretch it about one foot—the wire is soft and can be stretched quite easily. The wire will now be perfectly straight, true, and free from kinks, etc.

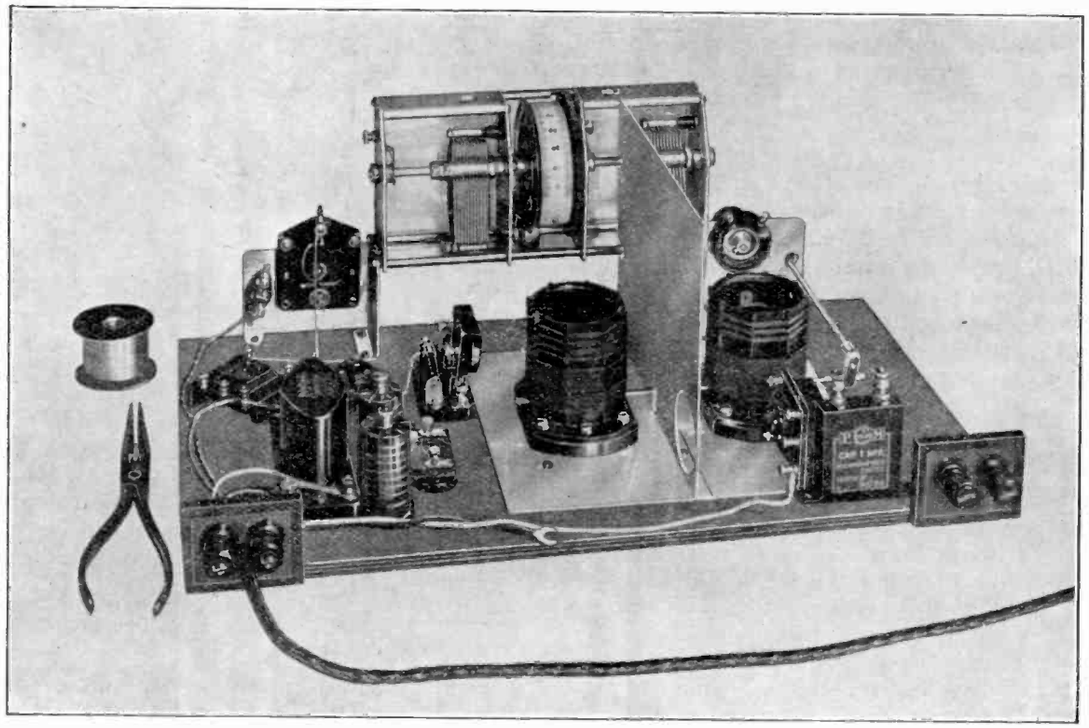
An afternoon's work.

The wire can now be cut into 18-in. lengths ready for the wiring, which can be made perfectly straight as in the much admired work of professional wiremen. The wiring should be completed by the most inexperienced builder in four hours, though an amateur by whom the set was built previous to publication, completed the receiver in 3 hours 25 minutes. On the completion of the wiring, a careful check must be made wire by wire to ascertain that no mistakes or omissions have been made, and, assured that all is as in the blueprint, a test can be made before the set is fitted into the cabinet. First fit the screened grid valve into valve holder V.1, the detector valve into valve holder V.2, and the output valve into valve holder V.3. If the output valve chosen is a pentode, a wire must be connected from terminal 5 of valve holder V.3 to the side terminal of the pentode. The choice of output valve is of course much dependent on circumstances. The ordinary power valve gives ample volume for the requirements of the average listener, but we would advise that the pentode valve be used, for in addition to the fact that it gives a big increase of signal strength—an increase almost equal to an additional stage of low frequency—it is capable of handling a much greater signal and so gives greater volume without distortion. At the same time its crisp clear quality is much admired by most listeners. However, the final choice rests with the constructor, and he it is who pays and must make his choice, for power valves, super power valves and pentodes can all be used in the output stage of this receiver.

Returning to the matter in hand, that is testing, the valves having been fitted the batteries must be connected.



2. Fixing the components. Note that the variable condenser is fitted last.



3. The battery cord fitted, and the wiring commenced. Be sure to follow the point to point wiring in the correct order.

Connecting Batteries.

First connect the L.T. battery, then the grid bias, and lastly the H.T. battery.

Always adhere to this order of connection, for it will prevent the accident of the set being switched on with the grid bias plugs disconnected. Remember also to switch the set off if at any time you wish to alter the position of a grid bias plug, for a valve may be ruined in a few minutes if operated without grid bias.

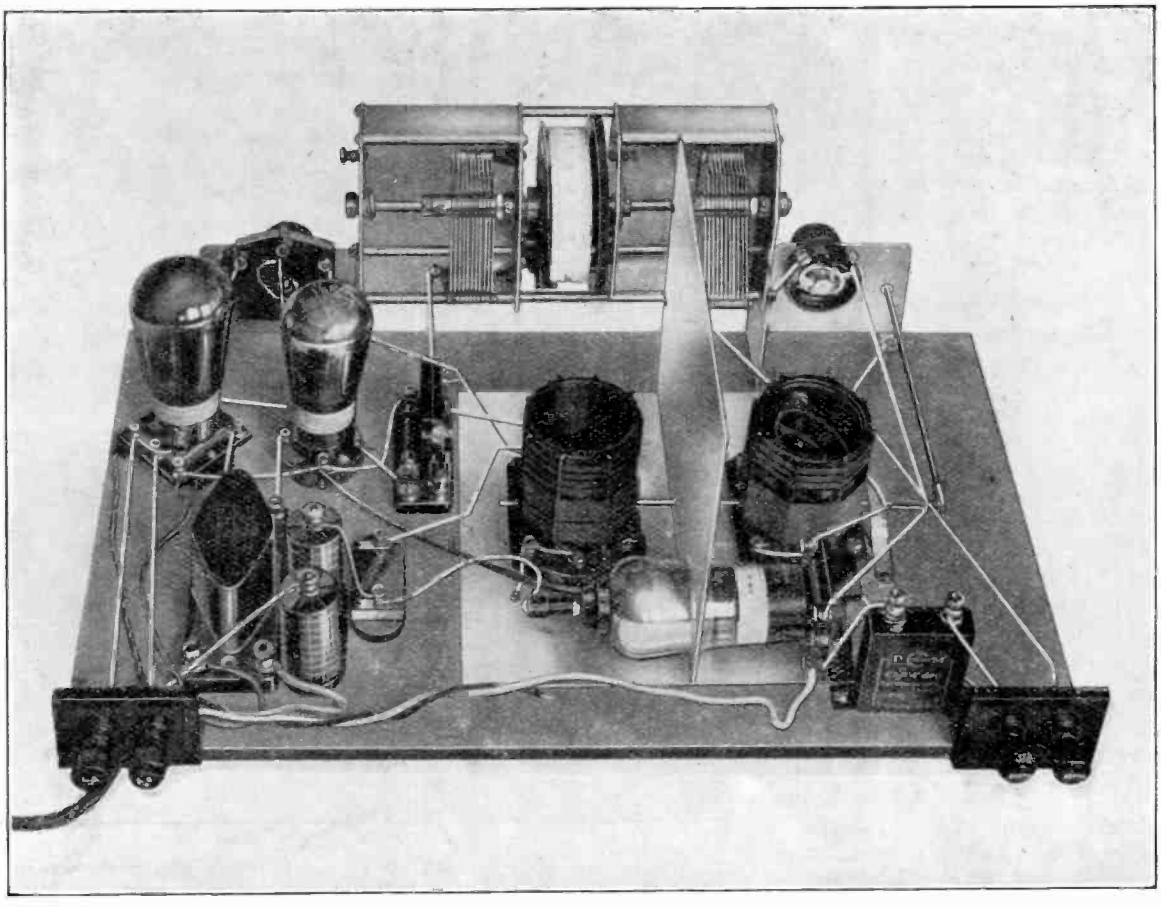
If aerial, earth and loud speaker are now connected the set may be switched on by pulling the on-off switch on the right side of the set and the usual howl should be heard when the reaction control is rotated in a clockwise direction.

Now examine the black cam at the bottom of the coils. When the cam is flat on the contact springs the coils are set for long waves ; when the edge of the cam is presented to the contact springs the coils are set for short waves.

Adjusting selectivity.

Adjusting the aerial rotor. Set this at 45 degrees to the aerial coil for the first test, and gradually adjust it to find the best position for your aerial-earth system, remembering that as the axis of the rotor becomes more nearly at right angles to the aerial tuning coil, so does the selectivity increase.

It will be observed that when the rotor is altered it is necessary to readjust the ganging of the condensers by means of the thumb ring on the left side of the indicating drum. Having fixed on a position of the rotor which gives good selectivity and good signal strength the set can be slid into the cabinet from the back, the control knobs having been removed so that the spindles may pass through the holes provided for them.



4. The wiring completed. The few wires which have to be fitted are all easy to fix.

Connecting to D.C. Eliminator.

The 1931 Orgola is suitable for use with direct current eliminator without alteration.

It is, however, as well to verify that the eliminator contains series condensers for aerial and earth connections. If no such provision is made, cut the earth lead and insert a 2 mfd. condenser, and into the aerial a ·01 mfd. condenser.

Using Pick up with 1931 Orgola.

It will be noticed that no provision is made on the blueprint for using a pick-up ; this can, however, be fitted in the course of half-an-hour. The necessary components are :

1 Terminal mount (Junit)
2 Terminals marked " pick-up " (Belling Lee)
1 Switch, blue knob (Junit)
1 3-hole bracket (Jackson Bros.).

The terminal mount, to which the terminals are fitted, must be screwed to the baseboard next to that which carries the loud speaker terminals, and the switch fixed to the bracket which is screwed beneath the condenser assembly. Then connect a wire from the right-hand pick-up terminal to the right-hand terminal of the switch, and next a wire from the remaining switch terminal to grid of valve holder V.2.

The black lead of the battery cord is then connected to the remaining pick-up terminal and the arrangements are complete.

When fitting into the cabinet it will be necessary to drill one more $\frac{5}{8}$-inch hole in the cabinet front for this switch to project through.

Of course, the set fits the Orgola Radio Gramophone for which the manufacturers supply a mask to take the place of a panel.

Connecting the pick-up to the set.

When the set is used as radio-gramophone amplifier the right type of pick-up must be employed, and a volume control must in every case be used.

The choice of pick-up is important, for the receiver employs only one stage of low frequency, and many types are not sufficiently sensitive to operate successfully.

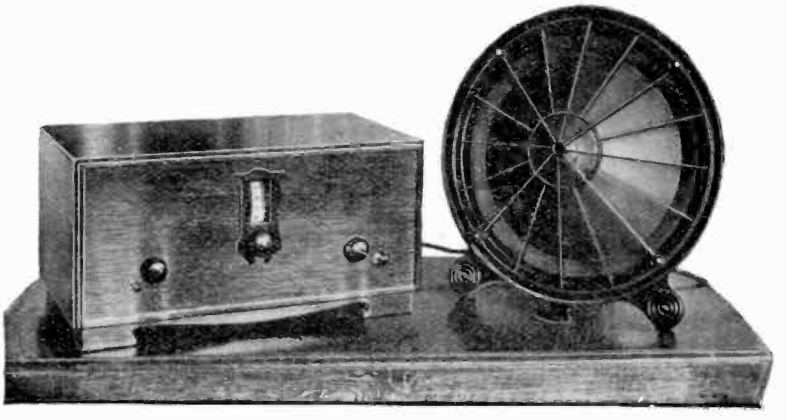
The most satisfactory pick-up for use with this set is, however, the "Varley" new pattern, across which must be connected a .5 megohm potentiometer. An Igranic Megostat is a suitable component.

The method of connection is as follows: leads from the pick-up to the outside terminals of the volume control. Leads from pick-up terminals of the set to one outside terminal of the volume control, and the other to centre terminal of the volume control.

Output Valves.

In the kit supplied it will be found that a P.M.2. power valve is supplied for V.3. In most instances this provides adequate power, at a minimum H.T. consumption. If more power is required a P.M. 252 or P.M. 22. valve can be obtained when purchasing the Kit from the dealer and paying the difference in cost between the P.M. 2. and the super-power or Pentode valve. If the slightly greater H.T. consumption can be excused the P.M. 22. Pentode will be more than worth the difference in cost for it gives an increase of signal strength and at the same time gives crisp clean quality at enormous volume.

This point will be more than emphasised if connected for gramophone reproduction, for it is here, more than on radio, that one wishes to have big volume.



The handsome all wood cabinet gives the set a distinction previously unattained with home constructors' sets.

Specified Components for the Mullard "1931 Orgola" Receiver (Battery Model).

1 Baseboard (18″×10″). Supplied with Cabinet.
1 Variable Condenser Assembly, type M (Jackson Bros.).
1 Pair of 1931 Orgola coils (Colvern or Gent).
1 Operating link for coils (Colvern or Gent).
1 Set of Screens (1931 Orgola) (Colvern or Gent).
1 H.F. Choke (Climax).
2 5-pin valve holders (Junit).
1 Anti-microphonic valve holder (Lotus).
1 Permacore Transformer (Mullard).
1 P.M. Combined grid condenser and leak holder, with .0003 mfd. condenser and 2 meg. leak (Mullard).
1 Differential reaction condenser, type 926 (Pye).
1 Set of terminals, Aerial, Earth, L.S. +, L.S. — (Belling-Lee).
1 Safety Anode Connector (Belling-Lee).
1 Seven-way Battery Cord (Orgola type) (Ward & Goldstone).
1 Switch (Black Knob) (Junit).
2 Terminal mounts (Junit).
1 1 mfd. Paper Condenser (Mullard).
1 .0003 mfd. fixed condenser (Mullard).
1 Rheostat, 15 ohms for 2-volt valves (Wright & Weare)
(or 50 ohms for 4-volt and 6-volt valves).
Sleeving, small reel of 18 SWG Tinned Copper wire, screws.

ALL THE ABOVE COMPONENTS WITH WIRE, SCREWS, ETC., 3 MULLARD 2 VOLT VALVES AND HANDSOME OAK CABINET CAN BE OBTAINED IN A COMPLETE KIT ... ... PRICE **£8. 0. 0.**

(The above price does not apply in the Irish Free State.)

Recommended Accessories.

	£	s.	d.
1 P.M. Loud Speaker (Model H) (Mullard)	4	7	6
or			
1 P.M. Loud Speaker (Model C) (Mullard)	2	10	0
1 P.M. H.T. Supply Unit (Mullard)	5	5	0
or			
1 Full-o-Power battery, 100-volt, size V.2 (Siemens)		13	0
or			
2 Full-o-Power batteries, 60-volt, size V.4 (Siemens), 13/6 each	1	7	0
1 Grid Bias Battery, 16-volt, type G.3 (Siemens)		3	0
1 Accumulator, say 30 amp.-hr. capacity (Exide), per 2v. cell		11	6

Specified Mullard Valves :

	2 Volt.	4 Volt.	6 Volt.	£	s.	d.
V.1.	P.M. 12	P.M. 14	P.M. 16	1	0	0
V.2.	P.M. 2D.X.	P.M. 4D.X.	P.M. 6D.		8	6
V.3.	P.M. 2 Power Valve	P.M. 4 Power Valve	P.M. 6 Power Valve		10	6
	P.M. 252 Super Power Valve	P.M. 254 Super Power Valve	P.M. 256 Super Power Valve		13	6
	*P.M. 22 Pentode	*P.M. 24 Pentode	*P.M. 26 Pentode	1	2	6

* *Recommended for maximum results.*

(*The above prices do not apply in the Irish Free State.*)

CALIBRATION CHART—1931 "ORGOLA" RECEIVER.

Medium Waves. Metres.	Dial Readings.
200	20
210	24
220	28
230	32·5
240	36·5
250	40
260	43
270	45·5
280	48
290	50·5
300	53
310	56·5
320	58·5
330	60·5
340	62·5

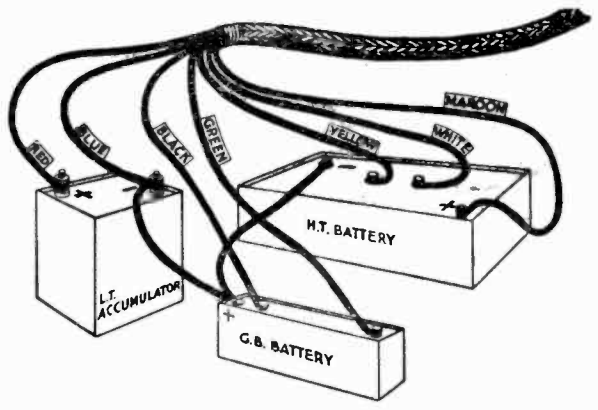
Medium Waves. Metres.	Dial Readings.
350	64·5
360	66·5
370	68
380	70
390	72
400	74
410	76
420	78
430	79·5
440	81
450	83
460	84·5
470	86
480	88
490	89·5

Medium Waves. Metres.	Dial Readings.
500	91·5
510	93
520	94·5
530	96
540	97
550	98·5

Long Waves. Station	Dial Readings.
Hilversum	43
Kalundborg	51
Eiffel Tower	63
5XX Daventry	78
Radio Paris	85
Huizen	94

Battery Connections 1931 "ORGOLA."

BLUE		LT-. HT-. GB+.
RED		LT+.
MAROON		HT + 100 to 150
WHITE		HT + 75
YELLOW		HT + 60
BLACK	Not used unless Gramophone pick-up is used.	GB - 1½
GREEN		GB - 6 to 22½



NOTE.—Obtain correct value for green from the instruction slip which accompanies your valve.

Paste this page into the lid of your receiver. All data regarding it is then to hand.

Tests at every point of the Compass.

Read How "Radio for the Million" tests the sets produced for you.

At Bristol.

Our first test was conducted in Bristol city in a low lying part near the river. The aerial used was of average height, but in common with most aerials erected in busy towns, it was almost dwarfed by neighbouring buildings and warehouses. In spite of this, however, the two Daventry transmissions, Cardiff and the two London stations (National and Regional), were received on the three valve set at very satisfactory volume in daylight. A Mullard "H" Speaker gave excellent reproduction whilst results with the model "C" were also very pleasing. Two volt valves, being the most popular types, were employed in the set and the strength of the transmissions were such as to enable us to predict that, after nightfall, a good number of stations would be obtained, an assumption which later was confirmed by subsequent tests.

As A.C. mains were available an opportunity was taken to connect up the A.C. model of the three valve set and the new Mains Unit. It had been expected from theory that the Mullard A.C. valves with their improved characteristics would give the A.C. set a bigger performance, and this theory was fully substantiated in practice. Stations previously a little on the weak side were now brought up to good speaker strength, and the quality of reproduction was, if anything, even better than before. That irritating hum so often present on mains sets was completely absent, as can be imagined when a late arrival at our test table asked, "What voltages are you using on your batteries?"

Having satisfied ourselves (and our small privileged audience), attention was turned to the four valve receiver. This left London with a set of four volt valves in the holders and these were used in the present test. "Two screened grid valves," said one of our friends, "You should get something with that set!" He was not disappointed. The two P.M.14's certainly pulled their weight. Daventry, London, Cardiff, Radio Paris, Berlin, Hilversum and many others were received at good speaker strength. For the sake of record it may be stated that approx. 150 volts H.T. was used, with a Mullard Pentode P.M.24 in the output stage. A feature favourably remarked upon was that although a powerful set, the volume was under full control and the strength of the reproduction could be reduced to a whisper or increased until it was almost impossible to hear oneself speak. Selectivity (the ability to cut out unwanted stations) was excellent, whilst the set was sensitive to a high degree—a most satisfactory performance.

A trial on the A.C. model of the four valve set brought our tests in Bristol to a close. Two Mullard S4VA screened grid valves, a 354V as detector, and a P.M.24 in the output made an excellent combination. Again the new mains unit was requisitioned to provide the H.T. and L.T., which it did without any trouble from hum or motor-boating. As to results, all the stations received on the previous sets were obtained on the Mullard speaker, but with that additional kick which only the two really efficient H.F. stages of a mains driven receiver can give. As an indication of the high standard of performance, we cannot do better than quote a remark made by an individual not connected with our tests, a resident from Paris. On hearing the four valve receiver bringing in at full speaker strength a well known continental station, he exclaimed, "If we had a radio like that in France I should be a buyer!"

At Exeter.

Although the West Country may be famous for its wonderful scenery and pleasant landscape, it certainly has an unenviable reputation for poor radio reception. In fact, it is often said that if you get a set to work in Devon and Cornwall, it will work anywhere. We were, accordingly, very anxious to ascertain the results of a test in the far west, and selected Exeter for the scene of our second trials.

Conditions as met the eye were certainly not encouraging. Brilliant sunshine from a clear blue sky, a dry soil, a hilly district—all factors which a radio engineer will tell you adversely affect reception. Added to this, our aerial was only about 25–30 ft. from the ground—one can usually do better than this in the country—and our earth was a long one of some 15–20 ft. We connected up the three-valve set complete with two-volt valves, and were prepared to juggle for results. 5XX Daventry was, however, immediately received at adequate strength for a very large room. Two French stations were also heard at moderate strength. Then switching over to the medium wave band, we were somewhat surprised to hear 5GB Daventry—a station which our friend on the spot told us was difficult to get, if receivable at all. Time did not permit an extended test, but we found out what we wished to get, a comparison with a known set. Our technical friend informed us that the performance of the set we were testing under the poor conditions mentioned above was fully equal to the Orgola operating in Winter time, We, and thousands of users all over the country know the Orgola is a very good three-valve set—in fact, one of the best in its class—and it was most interesting to have this confirmation of our opinion that the new three valver is an even better set.

Time for testing was limited, but we were able to try the four valve A.C. model. The performance we hardly expected to find as good as at Bristol, but nevertheless, it gave a very good account of itself under distinctly unfavourable conditions. In fact, our technical friend on the spot expressed an opinion, based on daylight results, that after nightfall quite a good selection of stations would be received. We ourselves formed the opinion that the three-valve set would satisfy the ordinary listeners' requirements, whilst the man who revels in distant listening would not be disappointed in the four-valve, especially if he possesses A.C. mains and can build the A.C. model.

At Birmingham.

For our tests at Birmingham in a residential part of the city we had what can truly be called an average aerial. One end was fastened to a mast some 34 ft. high ; the other attached to a point on the house about 20 ft. from the ground. The aerial was about 60 ft. in length, and the earth consisted of 15–18 ft. of copper wire, soldered on to a waterpipe.

The three-valve battery set was first connected up to a 2-volt accumulator and a 120-volt H.T. battery. In the afternoon 5XX and 5GB Daventry, London Regional and National, Manchester, Huizen and Hilversum were received very satisfactorily. London National (some 100 miles away) was at excellent strength—surprising in view of the fact that usually this station is difficult to receive at more than 60 to 80 miles from Brookmans Park. Selectivity was adequate to permit easy separation of the London Regional and Manchester stations whilst 5GB Daventry (Midland Regional) occupied only a small portion of the dial. On long waves two Dutch stations were well received, also Radio Paris, although on the latter a little interference from 5XX was experienced. A test after dusk produced a number of continentals at good volume and also some of the elusive English stations—Cardiff, Newcastle and another unrecognised.

The four-valve battery set was next put on test using the same 120 volt H.T. battery. The results from a large number of Home and foreign stations were very good, a big selection of continentals coming in after dusk. Selectivity was now sufficient to permit of separating Radio Paris and 5XX without any difficulty, whilst it was possible to receive all the usual long wave stations —Hilversum, Kalundborg, Motala, Radio Paris, Huizen, 5XX—at good volume in daylight. The test with 120 volts H.T. only showed that the set would give quite good all-round results with small H.T. batteries, but it was obvious that for really tip-top reproduction (and maximum amplification in the early stages of the receiver) a slightly higher voltage was desirable.

Unfortunately the mains were not A.C., but for purpose of the test it was arranged to use the smoothing circuit of the new Mains Unit on the D.C. supply so as to give some 150—160 volts for the maximum H.T. lead of the set. A very marked improvement resulted, and the general performance was such as to satisfy a most critical user.

Radio reception conditions were so much more encouraging than those in the West Country that, in spite of the fact we had no A.C. supply available, we could not resist a trial of the four-valve A.C. model. Accordingly, the 4-volt accumulator was connected to the filament heater leads and the smoothing circuit of D.C. mains referred to above employed as a source of H.T. Atmospherics had become a little troublesome, but no difficulty whatever was found in obtaining literally hosts of

stations. Actually, slowly tuning from beginning to end of the scale on the medium wave band brought in no less than 27 stations in not more than four minutes, including Cork, Dublin, German relays, etc. On long waves the performance was equally magnificent. It was obvious that a very large proportion of the theoretical stage gain per S4VA valve was being realised, and that to assist in keeping up this figure the various "H.F. stopper" devices were functioning very satisfactorily. As a matter of interest, it was decided to try the set without the by-pass condenser between anode of V4 and earth, without the Anti-mobo resistance in the anode supply to S4VA's and without earthing the case of the Mullard Permacore transformer. Volume immediately dropped to about a third, an annoying whistle crept in, and reproduction was generally poor. Proper earthing of the coil screens was also found most essential.

A point worth noting was that on none of the sets did 5GB Daventry interfere with long wave reception.

At Manchester.

Our location selected for testing in the Manchester district lay 5 miles from the city, in a south easterly direction. The aerial was somewhat larger than usually recommended—actually totalling a hundred feet. A long aerial, of course, does not assist us in getting high selectivity, especially when so near the local station, nor for that matter does it help us much in getting distant stations, since the extra capacity causes trouble in maintaining true ganging of the tuning condensers, and it should be obvious that without accurate tuning of each stage, sensitivity would be very poor. Manchester city has mostly D.C. mains, but fortunately, a supply of A.C. was available here at 240 volts 50 cycles, and we were able to employ the new mains unit for H.T. supply.

The three-valve battery model was first given a run, whilst daylight still held, as we were anxious to learn if the receiver would tune down to the Leeds transmission satisfactorily. As a matter of fact, this station some 40 miles away, was obtained at very fair strength on the Mullard "H" speaker—not a bad achievement when it is remembered that the Leeds transmitter is only 130 watts power (1/200 the power of Daventry). London (261·3 m.), the relays on 288·5 m (bubble and squeak !), Dublin, Langenberg, 5GB and 5XX Daventry, Radio Paris, Hilversum, Kalundborg, etc., were also received clear of Manchester in daylight. After dusk quite a good selection of stations was possible.

Next the A.C. model was put on, still using the new mains unit for H.T. supply, but in addition now also providing the four-volt supply for the A.C. valves. Results were again very satisfactory and no trouble was experienced from mains hum.

The four-valve battery model came next on our list for trial and was soon in operation with the mains unit as a source of H.T. For L.T. purposes, a 4-volt accumulator was employed. The two H.F. stages soon began to prove their worth. For instance, London Regional, on 356·3 metres, although quite close to Manchester's wavelength (378 m.) was obtained at full speaker strength with only a slight trace of interference from the local situated 5 miles away. Continentals and English stations rolled in one after the other at full volume, especially good performance being put up on Toulouse, a German station (Stuttgart) and Dublin—all close to Manchester's wave. On long waves all the usual stations came in very well, sufficient in fact to overload the output valve. Once again a check was made on tuning down to the Leeds transmission which was obtained satisfactorily at the bottom end of the tuning scale.

The final test was made on the four-valve A.C. model, this, as in the case of the three-valve A.C. set, being provided with H.T. and L.T. from the new mains unit.

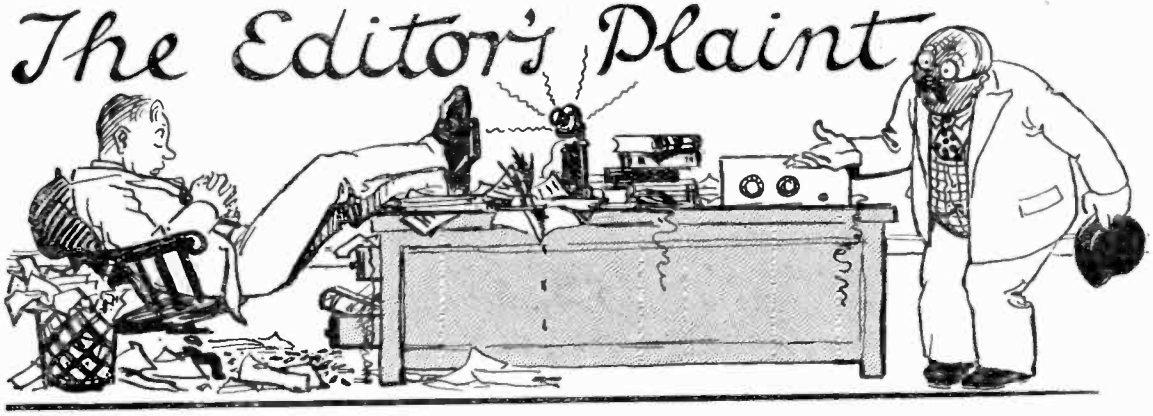
As in our last test at Birmingham, the results were extremely gratifying, and no difficulty was experienced in receiving a very large number of stations including half-a-dozen French, numerous German, several each English, Italian, and Spanish, as well as such a distant transmission as Algiers in Northern Africa. As regards the latter, since this station works on 364 metres, some interference was experienced from the adjacent London Regional station on 356·3 metres, but nevertheless it was very intriguing to listen to weird native Arabian music and language from the Dark Continent. Altogether a most instructive evening.

At Newcastle.

To gain information as to the performance of our sets in the North of England we chose as our test centre the Newcastle district. We were fortunate in being able to conduct our experiments under conditions such as often meet the radio user in the North—the outskirts

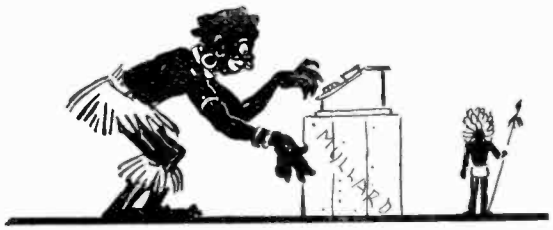
(*Continued on page 30.*)

The Editor's Plaint



Pity the Editor and his staff, worried from morning till night by visitors from Wigan, Oswaldtwistle, and Chorlton-cum-Hardy, each with some ingeniously complicated mechanical invention for accomplishing some simple task, which most probably progress has rendered quite unnecessary in modern sets.

And the letters to be answered would puzzle the saints to reply to patiently. A native of Africa once wrote to " Radio for the Million " regarding



Some super crystal gazing outfit.

a crystal set which he believed to be some apparatus for divining the future, some super crystal gazing outfit, and another man wrote and said the selectivity was so sharp he could not cut out London ! These are only two and perhaps not the most entertaining of the amusing letters we receive every day.

A highly indignant constructor once wrote and, with abundant adjectives, described his disappointment when his " Master Three " would not work. He had, he informed us, examined every connection with scrupulous care, checked and re-checked every terminal, cleaned all the connections, had the valves tested, bought a new H.T. battery, and still it would not work.

One of our highly-trained technical correspondents dictated a lengthy reply, covering all the faults which might be the cause of such a baffling trouble No pains were spared in carefully enumerating the points which were to be examined, no iota of procedure was omitted in order that this irate constructor should be assisted in the tracing of this mysterious fault. Seventy-two hours elapsed and an epistle arrived, by comparison with which the previous letter was a model of polite old-world courtesy.

The . . . set was no XX !!! — good. The designer was a X X X ! ? ! ! ! X X X ! and the writer announced his intention of calling on us with his X X X X piece of apparatus.

Preparations were accordingly made to receive our disappointed reader. Lint and bandages were acquired in wholesale quantities in case the fault should prove too baffling for immediate

Exchanging words of encouragement.

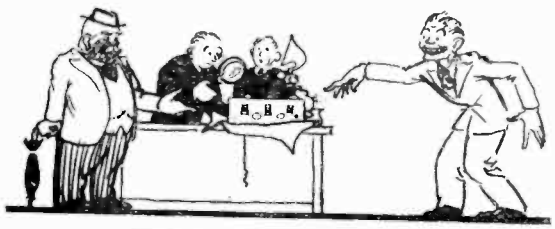
cure. Mirror scale galvanometers were set up, delicate instruments prepared in readiness for the fatal day which should test our personnel to the utmost.

Every instrument was prepared, soft answers were hastily rehearsed for the turning away of wrath. Everything was ready for the final judgment. The staff crept softly about, exchanging words of encouragement and help.

At last he arrived, bearing the offending set beneath his arm. With dramatic movement and lowering brow he placed it upon a desk and hissed through his teeth, " See if you can find anything about that which is not as your specification."

In dramatic silence the parcel was unwrapped and the stubborn instrument disclosed.

The technician gazed awhile in preliminary examination, and as he did so his jaw dropped, he goggled, his nervous finger quaveringly pointed towards a valve holder and he burst into shrieks of idiot laughter, peal upon peal. The anti-climax had proved too much for our highly-strung expert. His nervous system, fed on midnight oil and an occasional microfarad, was unequal to the strain, and while he was led



Shrieks of idiot laughter.

shrieking from the room to be fitted with a strait-jacket, we politely drew our difficult client's attention to the fact that all the valve holders were reversed, the grid sockets being where the anode sockets should have been.

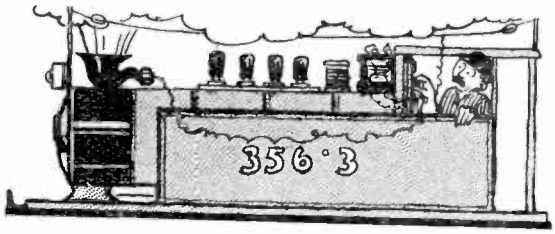
As a well-known radio advertiser says, " What a life ! "

Other days pass, long, peaceful days, when naught is heard but the drone of the dictaphone, dictating " We judge from your remarks that you

Long, peaceful days.

have omitted, etc.," the steady click of type-writers hammering out a message of hope to bewildered constructors and the snores of the editor as, retired to his sanctum to ponder on the value of some late development, his mighty brain betrays him into sleep.

But never for long can such peaceful days continue. Soon all is astir in endeavouring to solve the problem of the fan who wrote, " My friend said the screened grid valve was shedding



A new steam engine.

its coat, and there are a few grey flakes on the glass side, is this any detriment ? " Or the puzzled enthusiast who indited the following : " Out of the regional stations 5 GB is very good, but the rest are somewhat cloudy owing to what appears to be a very high pressure of steam blowing off through the speaker, which previously did not occur."

My friends, we ask you, has some innocent blundered upon a new system which is to relegate to the scrap heap the familiar boiler of the steam engine ? Are we at the brink of some mighty

67 Stations on a " Master 2."

discovery which is to throw our thousands of stokers on the dole ?

Are we to—well, don't ask us, we don't know. Before the revolutionary news could reach us the trouble stopped, through replacing the six-months-old H.T. battery, we believe—oh, well !

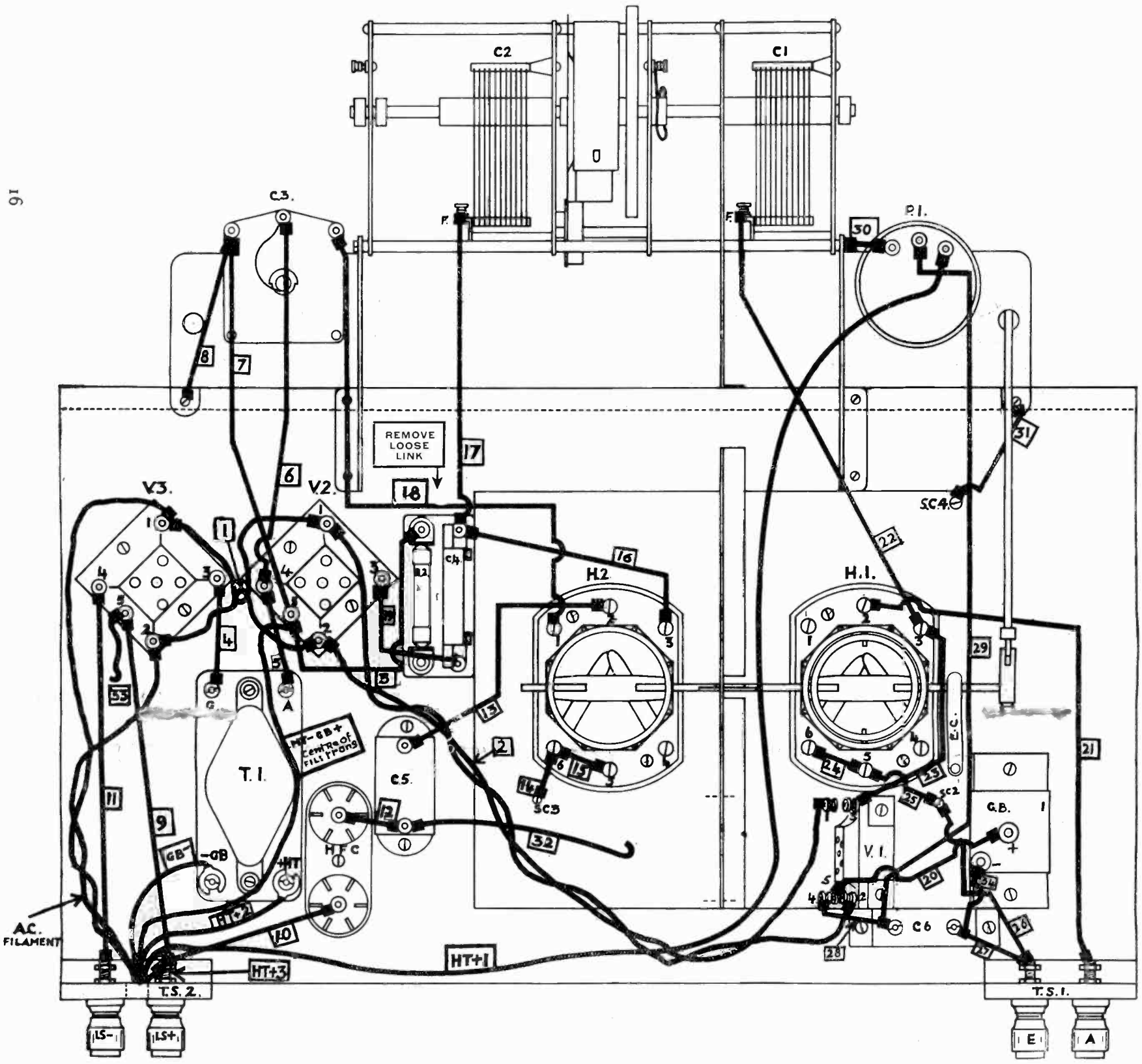
Science will never know now how high-pressure steam can be generated in loud speakers, and the writer had to forgo his dream of reading a learned paper on the subject before the Physical Society.

Once a Scotsman sent a coupon, clipped from an Aberdeen paper and posted from India.

Some people write to say they get 67 stations on the " Master 2 " receiver, others can't hear a whisper on an " Orgola 6." Some write to blame us, others to praise us, but if you have any trouble, write at once, that's what we are here for—what a life !

Pearl & Moore
168, STRAND, LONDON, W.C.2.

The Mullard 1931 "Orgola" Receiver modified for use with Mullard A.C. Valves.



POINT TO POINT WIRING INSTRUCTIONS FOR THE 1931 "ORGOLA" RECEIVER FOR USE WITH A.C. MAINS.

WIRE No.

1 Using red and black twin flexible wire connect terminal 1 on valve holder V.3 to terminal 1 on valve holder V.2, also terminal 2 on valve holder V.3 to terminal 2 on valve holder V.2.

2 Using red and black twin flexible wire connect terminal 1 on valve holder V.2 to terminal 1 on valve holder V.1, also terminal 2 on valve holder V.2 to terminal 2 on valve holder V.1.

3 Connect terminal 5 of valve holder V.2 to further left hand terminal on grid leak and condenser holder.

4 Connect terminal G of transformer T.1 to terminal 3 of valve holder V.3.

5 Connect terminal A of transformer T.1 to terminal 4 on valve holder V.2.

6 Connect terminal 4 of valve holder V.2 to centre terminal of condenser C.3.

7 Connect left hand terminal of condenser C.3 to terminal 5 of valve holder V.2.

8 Connect left hand terminal of condenser C.3 to left hand fixing screw of condenser assembly.

9 Connect terminal 5 of valve holder V.3 to terminal L.S.+ on terminal strip T.S.2.

10 Connect terminal L.S.+ on terminal strip T.S.2 to nearer terminal on H.F. choke H.F.C.

11 Connect terminal 4 of valve holder V.3 to terminal L.S.— on terminal strip T.S.2.

12 Connect further terminal of H.F. choke, H.F.C. to nearer terminal of condenser C.5.

13 Connect further terminal of condenser C.5 to terminal 2 on coil H.2.

14 Connect terminal 6 of coil H.2 to fixing screw Sc.3.

15 Connect terminal 6 of coil H.2 to terminal 5 on coil H.2.

WIRE No.

16 Connect terminal 3 of coil H.2 to further right hand terminal on grid condenser and leak holder.

17 Connect further right hand terminal of grid condenser and leak holder to terminal F (fixed vanes) on condenser C.2.

18 Connect terminal 1 of coil H.2 to right hand terminal of condenser C.3.

19 Connect terminal 3 of valve holder V.2 to nearer terminal of grid condenser and leak holder.

20 Connect terminal 5 of valve holder V.1 to terminal — of grid bias cell.

21 Connect terminal A on terminal strip T.S.1 to terminal 2 of coil H.1.

22 Connect terminal 3 of coil H.1 to terminal F (fixed vanes) on condenser C.1.

23 Connect terminal 3 of valve holder V.1 to terminal 3 of coil H.1.

24 Connect terminal 6 of coil H.1 to terminal 5 on coil H.1

25 Connect terminal 5 of coil H.1 to fixing screw Sc.2.

26 Connect fixing screw Sc.2 to terminal E on terminal strip T.S.1.

27 Connect terminal E on terminal strip T.S.1 to right hand terminal of condenser C.6.

28 Connect left hand terminal of condenser C.6 to terminal 4 of valve holder V.1.

29 Connect middle terminal of potentiometer P.1 to left hand terminal of fixed condenser C.6.

30 Connect left hand terminal of potentiometer P.1 to bracket fixing screw of condenser assembly.

31 Connect right hand screw of condenser assembly to fixing screw Sc.4.

32 Take 5 ins. of insulated flexible wire, bare both ends; connect one end to nearer terminal of condenser C.5 and to the other end fix the safety anode connector, which connects to the top terminal of the screened grid valve.

WIRE No.

33 (Only required with 4-pin Pentode.) Take about 2 ins. of insulated flexible wire, bare both ends and fix one end to terminal 5 of valve holder V.3; the other end should be connected to the side terminal of the Pentode when this is fitted.

34 Connect right hand terminal of condenser C.6 to — terminal of grid cell G.B.

POWER LEADS.

L.T. .. Take about 2 feet heavy twisted twin flexible wire 23/36, and bare both ends of each extremity. Connect one extremity to terminals 1 and 2 on valve holder V.3. The other end will be attached to terminals marked "4v" on the P.M. filament heater transformer.

H.T.+1 Take about 3 feet of insulated flexible wire, and bare both ends. Attach one end to right hand terminal of potentiometer P.1.

H.T.+2 Take about 3 feet of insulated flexible wire, and bare both ends. Attach one end to terminal +H.T. on transformer T.1.

H.T.+3 Take about 2 feet of insulated flexible wire, and bare both ends. Connect one end to terminal L.S.+ on terminal strip T.S.3.

G.B.— Take about 2 feet of black flexible wire and remove the insulation at both ends. Connect one end to terminal—G.B. on transformer R.1 and at the other end fit a black wander plug marked G.B.—2. (10½ to 12v.).

H.T.— G.B.+ Centre of Filament. Take about 4 feet flexible wire. Connect one end to nearer screw of left-hand panel bracket.

Specified Components for the Mullard "1931 Orgola" Receiver. A.C. Model.

	£ s. d.
1 Baseboard (18"×10"). Supplied with Cabinet ...	
1 Variable Condenser Assembly, type M (Jackson Bros.)	1 5 0
*1 Pair of 1931 Orgola coils (Colvern or Gent) ...	17 0
1 Operating link for coils (Colvern or Gent) ...	1 6
1 Set of Screens (1931 Orgola) (Colvern or Gent) ...	2 9
1 H.F. Choke (Climax)	6 6
3 5-pin valve holders (Junit) at 1s. 9d. each	5 3
1 Permacore Transformer (Mullard)	19 6
1 P.M. Combined grid condenser and leak holder, with .0003 mfd. condenser and 2 meg. leak (Mullard)	6 0
1 Differential reaction condenser, type 926 (Pye) ...	4 6
1 Set of terminals, Aerial, Earth, L.S. +, L.S. — (Belling-Lee)	2 0
1 Safety Anode Connector (Belling-Lee)	6
2 Terminal mounts (Junit) at 8d. each	1 4
1 mfd. Paper Condenser (Mullard)	2 6
1 .0003 mfd. fixed condenser (Mullard)	1 9
1 Potentiometer 50,000 ohms. (Burne Jones)	7 6
1 1½ volt grid cell, type G.T. (Siemens)	9
Sleeving, small reel of 18 SWG Tinned Copper wire, screws, flex (approx.)	1 9
TOTAL	£5 6 1

*The same type as in battery model.

Specified Valves for 1931 Orgola A.C. Model.

V.1 —S4VA. £1 5s. 0d. V.2.—354V. 15s. 0d. V.3.—P.M. 24. £1 2s. 6d.

Recommended Accessories.

	£ s. d.
1 P.M. Loud Speaker, Model "H" (Mullard)...	4 7 6
or 1 P.M. Loud Speaker, type K	6 15 0
1 Grid Bias Battery, 16 volt type G.3 (Siemens), 3s. 0d. each (1 or 2 according to valve used for V.4)	3 0
1 1931 Orgola cabinet (Kabilok or Camco) ...	19 6
1 Orgola Junior Power Supply Unit	6 4 3

(*The above prices do not apply in the Irish Free State.*)

Continued from page 23.

Connect further left-hand terminal of grid condenser and leak holder to terminal 1 of valve holder V.3.

Connect terminal 5 of valve holder V.3 to terminal 2 of valve holder V.3.

Operating Orgola Four from D.C. Mains.

No alterations to the set are necessary if the set is to be operated from a D.C. H.T. eliminator. It is, of course, necessary to connect a 2 mfd. condenser in the earth lead and also a .01 mfd. condenser in the aerial lead. Some eliminators incorporate these necessary components, but it is as well to make sure before connecting the set to the eliminator.

Of course, the set is the battery model and must incorporate the battery valve type of coil, and have the filaments operated by a low tension battery.

The all-power type of D.C. eliminator is rarely satisfactory with this type of set, and we strongly recommend the user who has D.C. supply to run the filaments from a battery.

For Signal Strength.

If signal strength is the main consideration, and the quality not required to be better than the ordinary leaky grid rectification allows, the grid condenser may be increased to .0003 mfd. and a two megohm grid leak fitted.

A Final Word About Operating The Set.

The operation of the set is simple and it can be successfully worked by the veriest tyro, yet it is as well to know how each control operates and its exact function.

Looking at the panel of the receiver, on the extreme left will be seen the trimmer condenser. The function of this control is to enable one to match exactly the aerial circuit to the remaining stages. It will be found with the majority of aerial-earth systems that it is necessary to start at the zero end of the tuning scale with this condenser full out; that is, turned in an anti-clockwise direction, and as the tuning dial is turned towards the higher numbers, and the higher wavelengths, to turn gradually the trimmer in a clockwise direction to maintain signals at the maximum strength.

Of course, the more powerful stations will be received at overpowering volume even if the trimmer is not used.

THE 1931 ORGOLA AC MODEL

To operate any set direct from A.C. mains involves the alteration of the filament circuits, to feed the A.C. valves, the provision of an A.C. H.T. eliminator, and, of course, the inclusion within the set of A.C. valves.

In the case of the 1931 Orgola, the components, etc., have been so arranged that the minimum of alteration is required, and it will be found that the diagram on the next page enables the set to be built without more difficulty than would be found in the building of the battery-operated set.

Connect the supply unit as follows:—

A.C. Filament leads — to the outer terminals 4 v.

H.T. +1 to H.T. +1 on unit.

H.T. +2 to H.T. +2 on unit.

H.T. +3 to H.T. +3 on unit.

G.B. — to G.B. battery — 15 v.

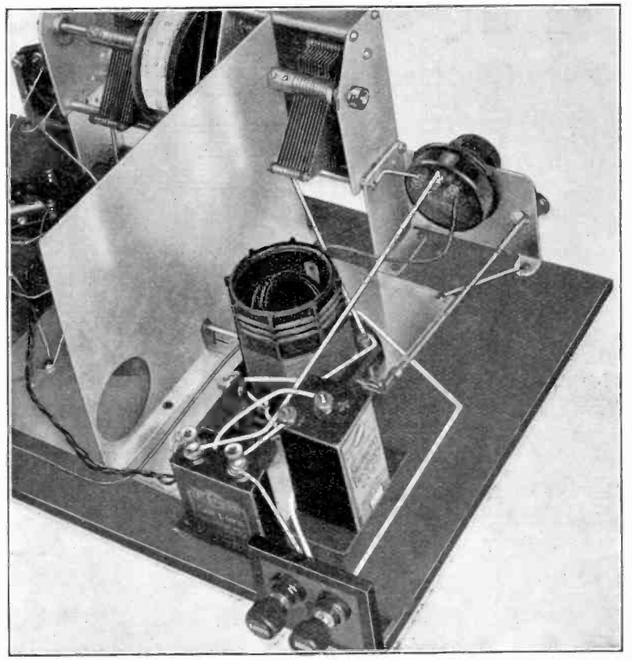
H.T. —, G.B. +, Centre of fil. — To H.T. — on unit to centre of fil. and G.B. +.

The building instructions for the battery-operated set should be read and the operation of the receiver followed in the same manner, for apart from the fact that the A.C. valves give a higher amplification than their battery-operated equivalents, the operation is exactly the same down to the dial readings, which are virtually identical in each case.

One point only must receive additional attention. The grid cell which is seen on the right of the set must be renewed after about six months' use.

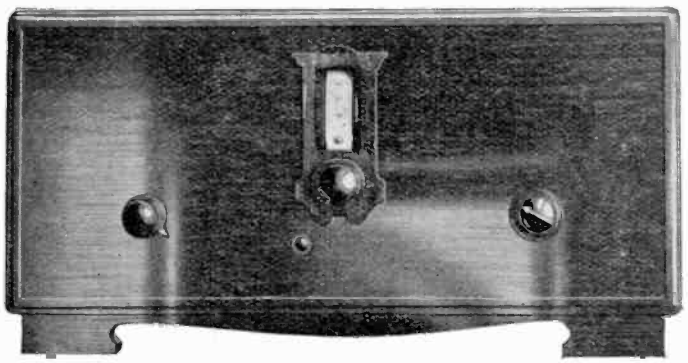
For power supply the Orgola Junior Power Unit should be used, this unit providing all power required, at the correct potentials.

While it is not impossible that the set will work with other units, if the most is to be obtained from the set, the specified apparatus should certainly be used.



The High Frequency end of the receiver, where the chief difference in the wiring is to be seen,

MULLARD ORGOLA 4



A Revolutionary Receiver.

Brings distant Stations in like the local, without the use of reaction, or fiddling with delicate controls.

FOR BATTERY OR A.C. OPERATION

A select knowledgeable band of radio enthusiasts have always demanded apparatus which is just a little better than that of their neighbours, and for these discerning fans we have designed the " Orgola " 4. It is a new four-valve receiver employing two screened grid high-frequency stages, operated by one control, power grid rectification, and power or pentode output so arranged that a 300-volt pentode may be employed as output valve if desired.

While primarily designed for all electric operation, it can be used as a battery-operated set if the correct coils and the extra connections are made.

The selection of a suitable circuit for such a set was a matter of much deliberation, for big volume with a high standard of quality was an essential.

The points considered.

A review of modern methods of rectification showed that the power grid system was unequalled, but unless fed with a moderately large signal the full benefit could not be obtained from the arrangement.

It naturally followed that only one stage of low frequency amplification could be usefully employed if the large signals fed to the detector were to be utilised to the full.

So the low frequency amplifier of this receiver has been designed to operate with one transformer-coupled stage, the transformer being shunt fed by resistance and condenser to deflect the rather large detector anode current from the primary of the transformer.

Since the employment of reaction would not give the best quality, two highly efficient screened grid high-frequency stages were necessary.

High frequency couplings.

The design of high-frequency stages for modern A.C. valves is by no means simple. The enormous magnification makes the selectivity problem ever

more acute than has been the case in the past and it has been found that the only satisfactory method of coupling these valves is by means of tuned transformers, which are accordingly specified.

Screening is a problem which has been tackled in a new way. Box type screens which enclose the whole tuned circuit, while eminently satisfactory when factory built, are not so happily situated when built by amateurs, for the difficulty of making perfect joints for the screen is more real than apparent—and for this reason the difficulties have been overcome in a new way.

The condenser assembly has incorporated in it the static screens necessary to prevent capacity feed back between stages, while a screen cover and base encloses each tuned transformer to eliminate inductive and capacity coupling between them.

Simplest design.

The whole layout presents the simplest 2-H.F. stage receiver ever placed before the public. The entire apparatus is built, without any crowding, on an 18 in. by 10 in. baseboard. The wiring is less than is seen in the average 3-valve set, and the control even simpler than most 3-valve sets, for tuning stations is only a matter of turning one tuning control and adjusting the volume regulator.

The high standard of quality is maintained even on the most distant stations, since no reaction arrangements are incorporated.

The complete receiver gives in fact the performance you have long desired, ample range without fiddling with reaction, higher degree of selectivity without unduly critical control, and superb quality.

With all these features the receiver passes all " Radio for the Million " building requirements. There is no soldering, no drilling or difficult wiring to perform, every terminal is accessible and every wire can be fitted without difficulty.

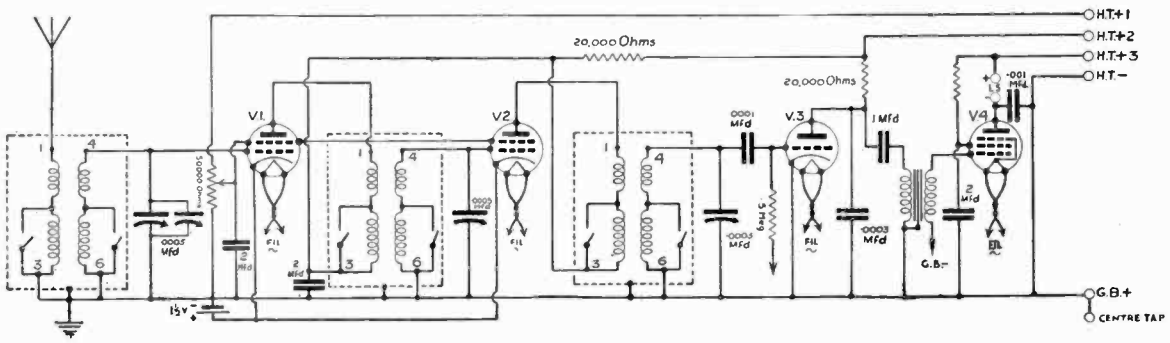
In short, the " Orgola 4 " is without doubt the simplest four-valve receiver ever devised and at the same time the most efficient.

How to start building.

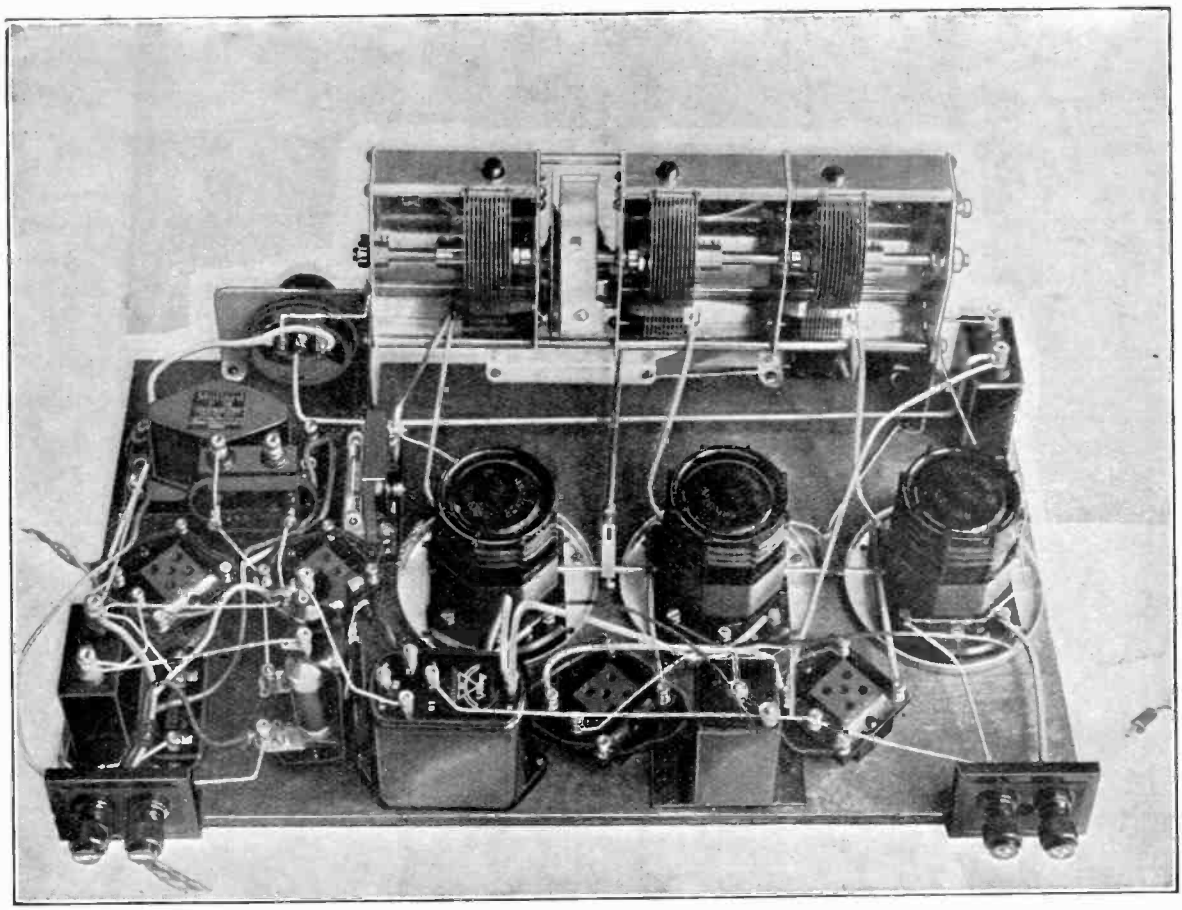
The first step is, of course, the laying out of the various components. This should be done with some care, since if the screens and coils are not fixed in line, there may be difficulty experienced in making the wave change switch rod operate satisfactorily.

The simplest way is, of course, to prick through the blue print on to the baseboard and thus determine the position of the main components at least ; it is better to make sure in this way that all are in the precise position, for surprising though it may seem, a change in position of some of the low frequency wiring may at times completely alter the operating characteristics of the receiver.

Fit the coils and the bases of the screen first. This is best done by pricking through the cross in the centre of the coil, and fixing the base in this position by a screw through the centre hole. The base can then be revolved with the fingers until the fixing holes of the screen bases are in line with those in the coil, making sure that the correct sides of the coils are nearest to the front.



Circuit diagram of " Orgola 4 " Receiver for A.C. operation. The alteration of a few wires, and the fitting of different coils makes it suitable for use with battery type valves.



A view of the receiver which will materially assist when the wiring is undertaken.

The coils are exactly similar, and it is only by the numbers marking the terminals that the correct position can be found.

The rest of the components can then be fitted with the exception of the variable condenser assembly. This particular component must be fitted correctly or difficulty may be experienced in fixing the set into the cabinet. Proceed in the following manner ; first fix the right hand support bracket and the centre bracket to the baseboard. Fit the trimmer condenser to the right hand bracket and fix Wire No. 1, then fit the remaining support bracket to the correct end of the condenser, slip the condenser into position and secure by the fixing nuts and the screws which hold the free support bracket.

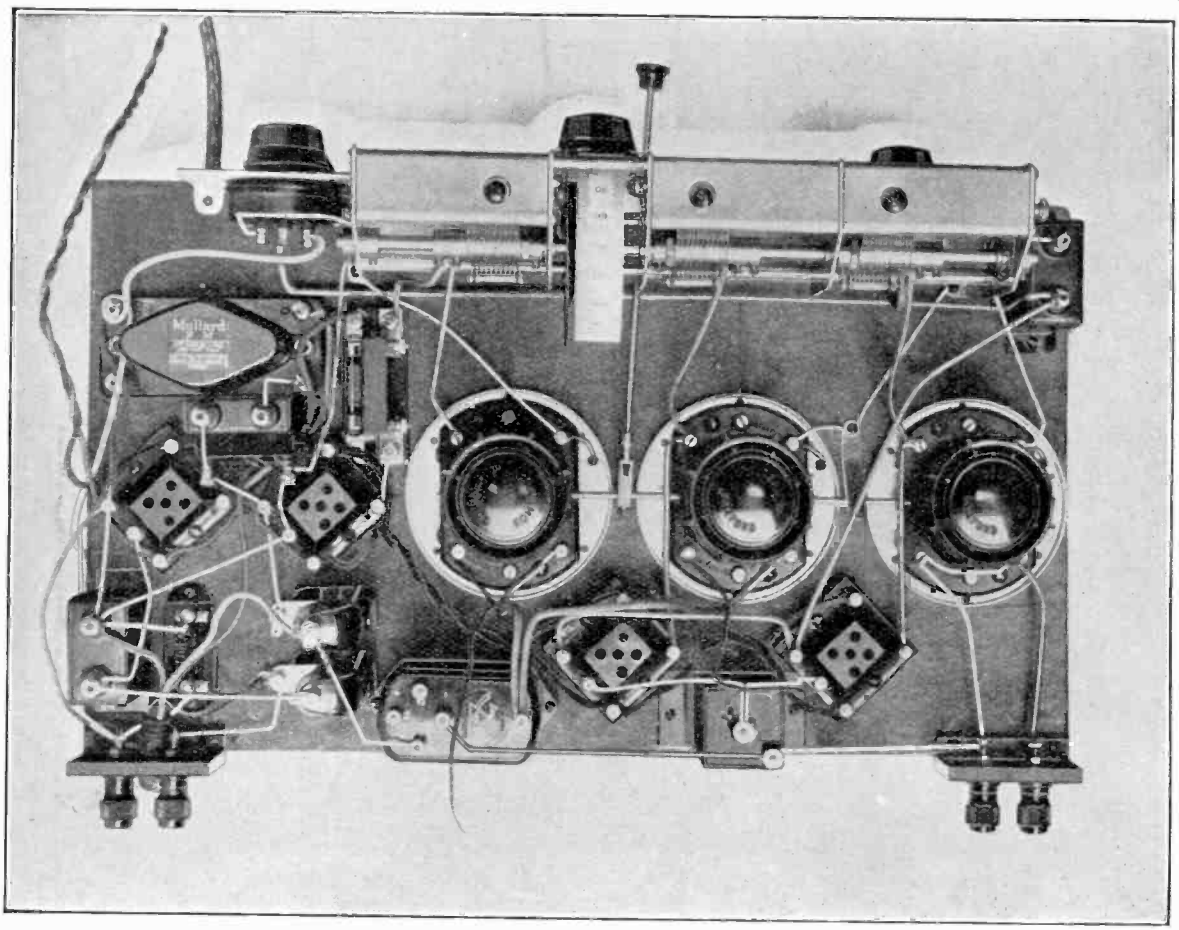
Commencing the wiring.

The set is now ready for wiring. As a considerable portion of the wiring is in close proximity to metal screens, etc., these wires should be covered with insulated sleeving, and in order to make the recognition of these wires easier, a star is printed by the side of the number on each wire which has to be insulated. Don't shirk this little extra work, it may cost valves if you " chance it." When fitting the wires to the coil terminals, see that they are made a little slack so that they may be bent to fall in the slots of the cover when this is put in position.

Check the wiring.

After completing the wiring, check it over carefully—a mistake or omission can easily take place and it is better to discover this before, rather than after hours have been spent in wondering why the set won't go.

Presuming that all appears in order, we proceed to the testing.



Another view of the Orgola 4, which shows all details in pictorial form.

The next step is the connecting of the set to the power supply ; if the low voltage output valve (P.M.24) is to be used, the Orgola Junior Power Supply Unit should be used. This is connected as follows :—

Twisted filament leads to 4v. A.C. terminals.
Blue lead to the centre of filament winding, H.T.— and then to G.B.— 1½.
Green lead to G.B.— 15v.
Red lead to G.B.+.
Maroon lead to H.T.+3.
Yellow lead to H.T.+2.
White lead to H.T.+1.
Black lead not used unless gramophone is required.

The valves should now be fitted, Aerial, Earth, and Loudspeaker connected, and the set is ready to switch on.

Don't expect to hear the set operate at once, for the A.C. valves take an appreciable time to warm up. The operating point is usually preceded by a slight hum, which dies away as the heaters attain the correct temperature.

Now adjust the controls on the eliminator. First H.T.+1 ; this should be about ¾ of its travel towards the maximum end. Second H.T.+2 ; this must be at the maximum position.

Turn the volume control on the right hand of the panel to the maximum (clockwise) position and try round the dial. Having picked up a fairly weak transmission, re-adjust H.T.+1 control until signals are at the maximum strength. If, however, this control is moved too much towards the maximum end, the receiver may oscillate or motorboat violently.

Adjusting the condensers.

Next try the set for foreign stations on the short wavelengths, and having found a very weak transmission about 95° on the scale, adjust the small black compensating knobs on C.2 and

C.3 until these last two condensers are exactly in step. This should be done with the trimmer all in (turned clockwise). It will be found that the volume control has to be used on most stations or the signals become overpowering.

In fact the signal strength is so enormous that two or three stations will be received if 8 ins. of stiff wire is connected to the aerial terminal instead of the aerial itself. On one occasion Rome was heard at good loudspeaker strength with ten inches of wire for an aerial.

Of course with such a set the best results will be obtained on a relatively short aerial, say 50 to 60 feet of wire, and with bigger aerials the enormous magnification may spoil selectivity.

If very great volume is required without distortion a P.M.24A 300-volt pentode output valve may be used in the receiver. No changes have to be made in the receiver but a higher voltage eliminator must be used.

The Orgola H.T. Supply Unit described in "Radio for the Million," Vol. 4, No. 3 is the Unit required and since this Unit does not incorporate low tension filament supply, a Mullard filament transformer of suitable voltage must be procured.

Connecting the set if P.M.24A 300-volt pentode is to be used.

Replace R.2 with a resistance of 50,000 ohms and connect the leads as follows.

White lead.

To H.T.+2 on the Orgola H.T. Supply Unit (published in Vol. 4, No. 3 of Radio for the Million.)

Yellow lead to H.T.+3 on the Orgola H.T. Supply Unit.

Maroon lead to H.T.+4 on the Orgola H.T. Supply Unit.

Blue lead to H.T.—on the Orgola H.T. Supply Unit, centre terminal of Mullard filament transformer and G.B.—1½.

Green lead to G.B.—24.

Red lead to G.B.+.

and the twisted filament leads to the outer terminals of the filament transformer.

The operation and adjustment is exactly as in the previous case.

Read this before building the battery type.

Fit the Junit switch in the left-hand hole of bracket SB.

To complete the wiring for battery model alter wire 47 as follows:—

Connect left-hand terminal of potentiometer P.1 to top terminal of battery switch.

Omit wires 43, 44, 45, 46 and connect a wire from H.T. — on antimobo A.M.1 to terminal E on terminal strip T.S.1.

Continued on page 18.

Specified Components for the Mullard Orgola Four Receiver. A.C. Model.

	£ s. d.
1 Baseboard (18"×10" supplied with cabinet.)	
1 Condenser Assembly, type 3DM (Jackson Bros.)	1 14 0
1 Set of coils (Orgola Four) (Colvern)	1 17 6
(*State whether for A.C. or Batteries when ordering.*)	
1 Operating link for coils (Colvern)	1 6
1 Set of screens (Colvern)	10 6
1 50,000 ohms Potentiometer (Burne-Jones) ...	7 6
1 Trimmer Condenser, type 929 (Pye)	4 0
4 5-pin valve holders (Junit) at 1s. 9d. each ...	7 0
1 Permacore Transformer (Mullard)	19 6
1 Combined grid leak and condenser holder (Mullard)	2 6
1 .0001 mfd. fixed condenser (Mullard)... ...	1 9
1 .5 meg. leak (Mullard)	1 9
2 2 mfd. Paper condensers (Mullard) at 3s. 6d. each	7 0
1 1 mfd. Paper condenser (Mullard)	2 6
1 .001 mfd. fixed condenser (Mullard)	1 9
1 .0003 mfd. fixed condenser (Mullard)	1 9
2 Wire-wound resistance 20,000 ohms and 5,000 ohms at 5s. each. (If P.M.24A 300v. pentode is to be used 20,000 and 50,000 ohms) (Mullard)	10 0
2 Wire-wound resistance holders (Varley) at 2s. 6d. each	5 0
1 Anti-Mobo Unit (Varley)	9 6
2 Terminal mounts at 8d. each (Junit)	1 4
1 Set of terminals, Aerial, Earth, L.S.+, L.S.— (Belling-Lee)	2 0
1 1½-volt grid bias cell, type G.T. (Siemens) ...	9
1 Seven-way Battery Cord (Orgola 4 type) (Ward & Goldstone)	3 6
2 Safety Anode Connectors (Belling-Lee) at 6d. each	1 0
2 Wander plugs, 1 red, 1 black (Lissenin) at 2d. each	4
Sleeving, small reel of wire, screws, etc.	1 6
	£8 15 5

BATTERY OPERATED KIT COMPLETE WITH OAK CABINET, WIRE, SCREWS, etc., AND TWO P.M.12 VALVES, ONE P.M.2D.X. VALVE, ONE P.M.22 PENTODE VALVE.

Price £13. 12. 6.

(*The above prices do not apply in the Irish Free State.*)

Recommended Accessories.

	£ s. d.
1 P.M. Loud Speaker, Model "H" (Mullard) ...	4 7 6
or 1 P.M. Loud Speaker, type K...	6 15 0
3 H.T. dry batteries, 50 volt each, type V.6 (Siemens), £1 5s. 0d. each	3 15 0
1 Grid Bias Battery, 16 volt type G.3 (Siemens), 3s. 0d. each (1 or 2 according to valve used for V.4)	3 0
1 Accumulator, say 60 amp. hr. capacity (Exide) per 2 volt cell	17 6
1 Orgola 4 cabinet (Kabilok or Camco)	19 6

Specified Valves for the Mullard "Orgola" Four.

A.C. MODEL.

		£ s. d.
V.1.	S.4V.A.	1 5 0
V.2.	S.4V.A.	1 5 0
V.3.	354V.	15 0
V.4.	P.M.24, P.M.24A } Pentodes	1 2 6 / 1 7 6
	P.M.254, A.C.064 } Super Power Valves ...	13 6 / 16 0

BATTERY MODEL.

	2 volt.	4 volt.	6 volt.	£ s. d.
V.1.	P.M.12	P.M.14	P.M.16	1 0 0
V.2.	P.M.12	P.M.14	P.M.16	1 0 0
V.3.	P.M.2.D.X.	P.M.4.D.X.	P.M.5.D.	8 6
V.4.	P.M.22 Pentode	P.M.24 Pentodes	P.M.26 Pentode	1 2 6
		P.M.24A	... ...	1 7 6
	P.M.252 Super Power	P.M.254 Super Power	P.M.256 Super Power	13 6
			P.M.256A Super Power	13 6

(The above prices do not apply in the Irish Free State.)

CALIBRATION CHART. MULLARD "ORGOLA" 4 RECEIVER.

Medium Waves. Metres.	Dial Readings.
200	12
210	17·5
220	22·5
230	27
240	31
250	34·5
260	38
270	41
280	44
290	47·5
300	51
310	54
320	56·5
330	59
340	62
350	64

Medium Waves. Metres.	Dial Readings.
360	66·5
370	68
380	70·5
390	73
400	75
410	77
420	78·5
430	80·5
440	81·5
450	83
460	85·5
470	88
480	89·5
490	91
500	92
510	93·5

Medium Waves. Metres	Dial Readings.
520	95
530	97
540	98·5
550	99·5

Long Waves. Station.	Dial Reading.
Hilversum	34
Kalundborg	44
Eiffel Tower	55
5XX Daventry	65
Berlin	73
Radio Paris	79
Huizen	86

MULLARD "ORGOLA" 4.

Battery Cord.
Battery operated model.

WHITE (HT+1)	80V
YELLOW (HT+2)	120V
MAROON (HT+3)	150V
	Or more according to type of valve fitted.
GREEN (GB-)	GB-
	See instructions on valve slip.
RED (LT+)	
BLUE (LT-HT-GB+)	
BLACK	Only used if pick-up facilities are required.

Power Leads.
A.C. Model.

	Connection on Orgola Junior Power unit.
A.C. FILAMENT	4V TERMINALS
WHITE	HT+1
YELLOW	HT+2
MAROON	HT+3
GREEN (GB-)	See instructions on valve slip and add 3½ V. to instructed voltage.
RED (GB DETECTOR)	+ of G.B. Battery.
BLUE (HT-GB+)	*HT-GB1½
Centre of filament winding.	and centre of filament winding.
BLACK	Only used if pick-up facilities are required.

** G.B. + has to be inserted into socket 1½ in order to obtain positive bias for the detector valve.*

Supplying 160v. output at 30 m.a., with centre tapped 4v. winding for A.C. valves.

Statistics show that only 15 per cent. of radio users possessing electric facilities from A.C. supply use them for operating their radio receivers. This is astonishing, even dumbfounding, news to anyone who has a knowledge of the advantages to be gained from electric operation.

Negligible running costs.

Cost of upkeep cannot enter into the matter at all, for an all-electric set operated from the Orgola Power Supply Unit would consume no more than 25 to 30 watts, and assuming that the set is operated on an average 10 hours per week, the bill for electric current would be one-fourth of a unit. The cost of a unit varies with the district from 1d. to 6d., so that the cost of operating would vary between ¼d. and 1½d. per week, only a minute fraction of the cost of L.T. battery charging, and H.T. battery replacements.

One can only assume that this neglect of opportunity is because sufficient publicity has not been given to the advantage of electric operation.

Again, for this small current consumption one can employ a large power output valve, ensuring greater volume without distortion, and the more efficient A.C. valves, which alone give greater signal strength owing to their higher degree of efficiency. In short, the only conceivable objection is the initial cost of the power unit.

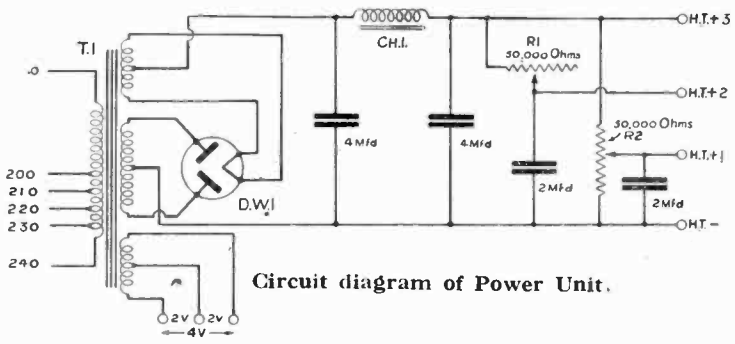
This objection we can proudly claim to have laid low, for at the price of £6 4 3 the Orgola Junior Power Unit, supplying H.T. current and A.C. for heater supply, strikes a new low level, and at the same time incorporates only the most efficient components. Every attention has been paid to safe operation and easy building.

The case, which complies with the I.E.E. regulations governing such apparatus, precludes the possibility of the unit being connected to the mains while the cover is removed. At the same time, all controls can be operated from outside the case.

While primarily intended to operate the 1931 Orgola and the Orgola 4, the power unit is suitable for running any set which does not require more power than it is able to deliver.

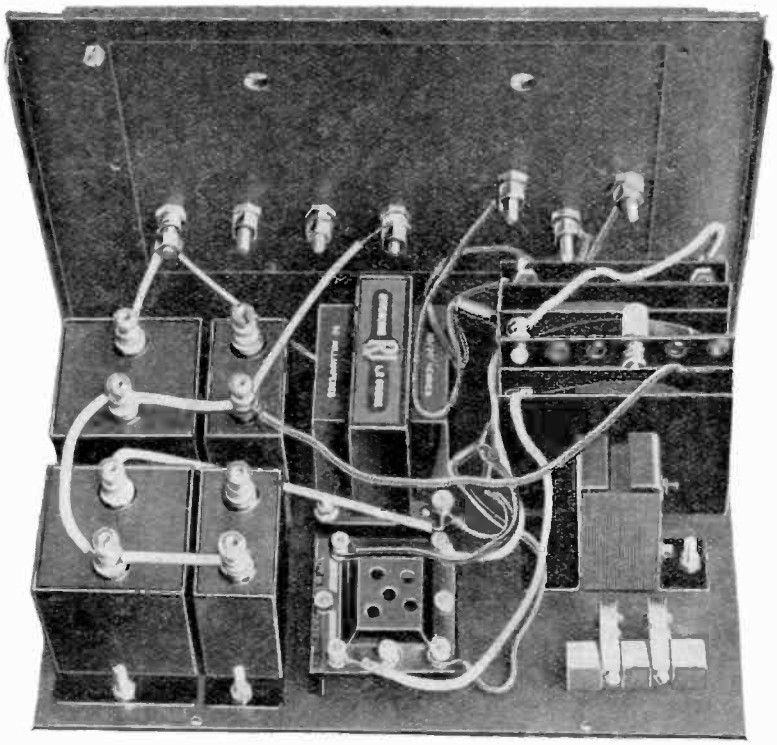
In order that stable potential may be provided for the screen of screened grid valves, a variable potentiometer has been incorporated. A second variable control has also been provided, and the maximum output arranged to provide the maximum allowable with the type of valves recommended for the Orgola, Orgola Master 3, and sets in this issue of "Radio for the Million."

Highly efficient smoothing has been provided and no trace of hum will be heard if the unit is built according to the specification.



Circuit diagram of Power Unit.

Again "Radio for the Million" building specifications have been complied with. There is no soldering, no drilling or building in awkward corners. Every part is straightforward and simple, perhaps the simplest piece of apparatus described in the issue.



The wiring partially completed. The next step is to connect wires Nos. 10, 11, 12, 13 to the terminals on the panel, before fitting the variable resistances.

How to build.

It will be seen that the base and panel of the eliminator is in one piece and that the base is pierced for the fixing screws which are supplied with it. The two long thin screws are for fixing the valve holder; all the remaining screws are of the same size and length so that no error can be made in the fixing of the remaining components.

Fix the components down, inserting the screws from underneath so that there will be no projection on the outside of the box. Secure all the components to the base but leave the fixing of the two variable resistances until part of the wiring has been completed.

Commence the wiring with the coloured leads from the transformer, securing the maroon leads under the A.C. filament terminals, the yellow lead under the centre filament terminal and so on until wire No. 9 has been reached. At this point fit the two variable resistances and then complete the wiring. Make a very careful check on each wire before inserting the valve, for a mistake may cause damage to the transformer and other associated apparatus.

The simplest way is to fit a length of wire to terminals HT+3, HT+2, HT+1, and HT−, and bend them out of the way while the variable resistances are fitted; if this method is followed, no difficulty will be experienced in fixing any of the wires to their appropriate terminals.

Particular care must be exercised in the fitting of the next two wires, which complete the unit, for they connect the mains to the transformer T. 1. The most suitable wire is 18 SWG tinned copper wire covered with sleeving, the loop of which must be carefully bent so that there is no fear of contact to the metal base.

Safety switch connections.

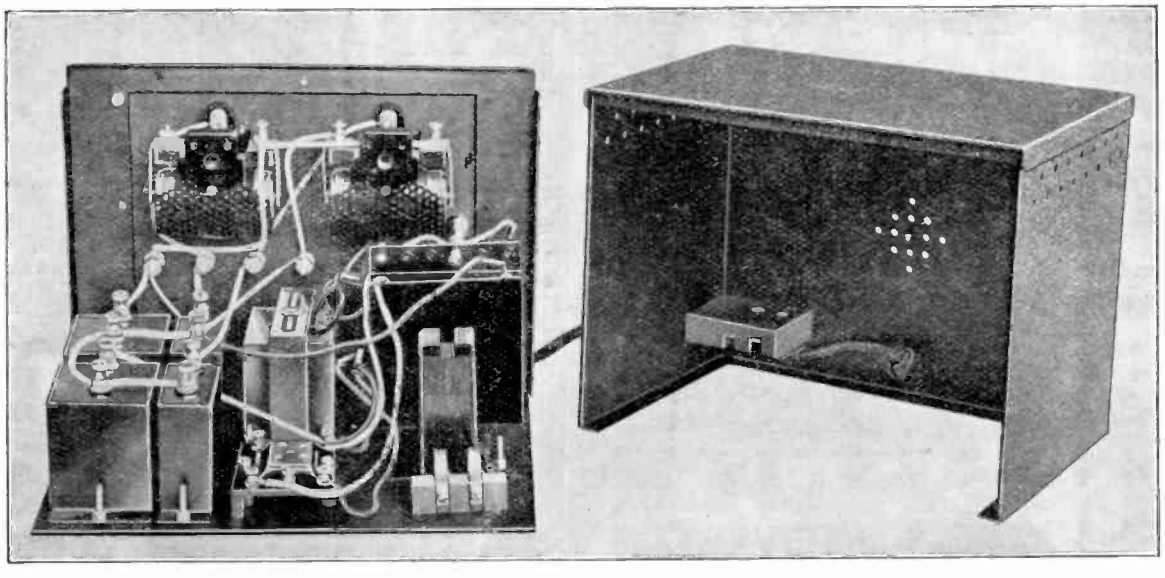
The two leads from the safety switch are connected, one to the O terminal and the other to the appropriate terminal on the tapped strip of the transformer. Thus, if the user's electric supply is 230 volts the terminal and remaining wire should be secured to the 230 volt eyelet. If there is any doubt about the voltage of the supply, it can usually be read on the electric light meter.

Before testing, the case must be screwed together. To do this slide the panel and baseboard carefully into the top shelf, gently pushing back to engage the safety connections at the back. Fix a few of the screws to hold it in position and proceed with the test.

After experiments have been made to find the best position for the control of H.T.1, select the best position for the control of H.T.2. If, however, this control is pushed too much towards maximum, reaction will be fierce and difficult to control.

If these instructions are carefully followed, perfect adjustment will be obtained without need of a voltmeter. If an Orgola old style or Orgola M.3 is to be used with the power unit, exactly the same process should be followed.

Master 3, Master 3 Star, Nelson de Luxe and other Radio for the Million sets with the exception of the Orgola Senior, can be operated from this Unit.



The wiring completed. Before fitting the case together it is necessary to connect leads from the safety contacts on the base to the power transformer.

A word of advice here. If the voltage at the H.T. terminals is measured without a set connected, the readings will be abnormally high, so remember if you have a suitable moving coil meter and wish to test the voltage, do so while a set is connected to it and operating.

To connect a 1931 Orgola follow the instructions given with the set, and adjust as follows. Set the control of H.T.1 about the centre, and the control of H.T.2 towards the minimum end, and operate the controls with reaction at zero. Tune in a weak transmission and adjust the control of H.T.1 until the set is giving the greatest volume, remembering that if the control is moved too much towards maximum, the set may break into oscillation.

Earthing the case.

In some circumstances a certain degree of hum is introduced into the reproduction if the case of the unit is not earthed, and apart from this fact, most power supply companies require that the cases of such apparatus must be earthed.

Accordingly a terminal has been fitted to the rear of the case.

A wire must be connected from the earthing terminal to any convenient earthed point.

Do not neglect this precaution for in certain rare instances it is possible to receive a dangerous shock through ignoring this point.

How to connect the "Orgola" or S.G.P. Master Three Receiver to the Power Unit.

S.G.P.M3.		Orgola.
H.T. +1	...	White lead to H.T. +1.
H.T. +2	...	Yellow lead to H.T. +2.
H.T. +3	...	Maroon lead to H.T. +3.
H.T. —	...	Blue H.T. — to H.T. —.

How to connect the Orgola A.C. Model.

L.T. ... Connect the filament leads, one to each of the 4 v. terminals of power unit.

H.T. +1	to	H.T. +1.
H.T. +2	to	H.T. +2.
H.T. +3	to	H.T. +3.
H.T. —& Centre tap	to	Centre of filament supply and H.T. —.

Connect grid bias as recommended in instructions for the set.

How to connect the Master Three or Master Three Star.

Begin by fitting a third H.T.+ lead; to do this remove wire 20 from the Master Three, or wire 21 from the Master Three Star.

A new length of flex should now be fitted to terminal + H.T. on transformer T (or Master Three Star T.2) which becomes the H.T. +2 lead.

The lead which was previously H.T. +2 becomes H.T. +3. The H.T. leads can now be joined to the corresponding terminals of the unit.

Converting sets for A.C. Operation.

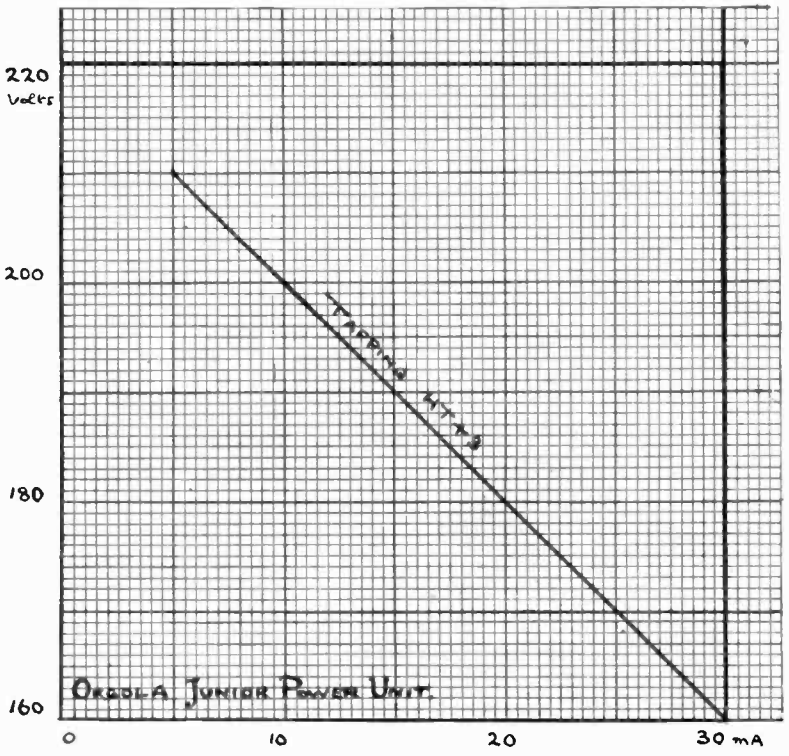
It is inadvisable in most cases to convert old sets designed for battery operation, to take A.C. Valves; in many cases they are quite unsuitable.

Run the H.T. supply from the mains by all means, but if complete electric operation is desired, it is much better to build a set which has been designed to operate with the more efficient A.C. Valves.

The output curve for this unit only holds good when the specified components are used. Any deviation from the listed components is strongly to be discouraged, as not only will the output be altered, but also a possibility of unsatisfactory working introduced.

To use this graph, find the total anode current of the valves to be used, either from published information or the valve characteristic curve, and follow the line corresponding to the total up to the curve.

The horizontal line which meets both our load line and the curve, shews the maximum available voltage at this load.

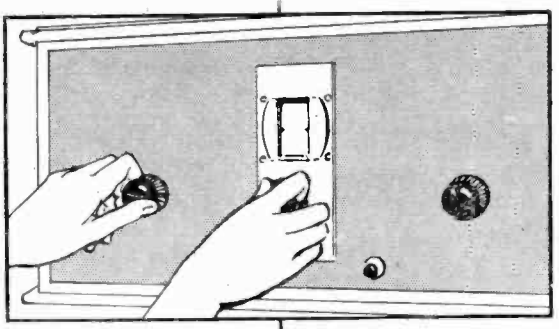


Specified Components for the Mullard Orgola Junior Power Unit.

	£ s. d.
Case complete with panel, flex, terminals, nuts and bolts (H. Clarke & Co.)	1 4 6
Transformer (for Orgola Junior Power Unit) (Climax)...	1 5 0
Valve Holder (Junit)	1 9
Hypercore Choke (R.I.)	17 6
2 4-mfd. Paper Condensers at 5s. 6d. each (Mullard)	11 0
2 2-mfd. Paper Condensers at 3s. 6d. each (Mullard)	7 0
2 Potentiometers 50,000 ohms (type EP66) at 10s. 6d. each (Varley)	1 1 0
DW.1 Rectifier Valve (Mullard)	15 0
Sleeving and small reel of 18 SWG Tinned Copper wire (approx.)	1 6
	£6 4 3

(The above prices do not apply in the Irish Free State.)

HOW TO TUNE



Tuning is an art, and so the experts often tell the neophyte. Yet it is an art to be acquired with the most modest practice, for, by comparison, the manipulation of knife and fork are difficult tasks.

The real difficulty about tuning is that so few of us appreciate what really happens when the controls are turned ; we know perhaps that when the dials are in a certain position we shall hear one station and when in another we shall hear an alternative, but few of us appreciate what the actual function is.

In the main, tuning is a question of bringing a circuit into resonance at the wavelength of the station we wish to receive. This all sounds very difficult, but it is in fact quite simple.

The first point to appreciate is that each circuit, if there be more than one, must be accurately tuned. For example, if one is tuning an Orgola Master 3, first the aerial condenser must be tuned till the signal is at its loudest, and then the process must be repeated with the H.F. condenser, the reaction control afterwards being adjusted to give the volume required.

More difficult, however, is the tuning for stations which you have never heard. Let us, for instance, suppose that it is desired to receive Toulouse and that station has never been heard previously. Turn each dial in a clock-wise direction, one degree each at a time, that is, with the left hand turn the Aerial one degree and with the right hand the H.F. condenser one degree, and so on, at the same time advancing the reaction control almost up to the oscillation point. If the tuning is done slowly and carefully, the station cannot fail to be heard if conditions are favourable.

Once having received the station, log the dial readings so that the performance can be repeated more readily on a second occasion.

It is useless to turn the dials wildly in the hope of catching a station somewhere. The chances are 1,000 to 1 against the required station being found, and very much against any station being found at all.

It is possible to explore the whole scale in the same manner, by tuning in a powerful station at one end of the dial, and working a degree at a time over the whole scale. A note can then be made of the dial readings at which stations are received.

In the case of the " Orgola " receiver or the 1931 Orgola, the process is slightly different, although the actual effect is the same. The two tuning condensers are, of course, coupled together and move equally when the control is operated, but, due to a slight damping exercised on the first coil by the aerial and earth, the position for maximum signal strength is not always identical for each condenser, so an additional control on the left of the panel, known as a trimmer condenser, is provided. This enables the condensers to be matched exactly. In the 1931 Orgola the black thumb ring on the left of the numbered drum enables the first condenser to be moved independently of the second.

For powerful stations the trimmer control need not be touched, but if the last ounce is wanted from the set, the additional fine control enables the circuits to be matched as accurately as if the circuits were independently operated.

The keynote of successful tuning is care. Operate the controls carefully and slowly and the business of finding stations is simple.

(Continued from page 12.)

of a populous city with trams and an electric railway not far away. Furthermore, the 240 volts A.C. supply available was of a somewhat low periodicity—40 cycles. As many owners know, the difficulties in producing a satisfactory hum-free mains unit increase as the mains periodicity gets lower. It is comparatively easy to design a unit suitable for 50—100 cycle mains, but even for a few cycles below the common 50 periods, it is necessary to have generous smoothing and a liberally designed transformer, or poor performance is the result. We, in consequence, made our first test on an A.C. set—the A.C. model of the three valve—using the Mullard " H " Speaker, which latter reproduces the low frequencies exceedingly well, and accordingly soon shows up any fault in the equipment. No appreciable hum was, however, to be heard, and we felt that the unit could be specified in full confidence as suitable for any mains with a frequency between 40 and 100 cycles.

Continuing our tests with the sets, Newcastle on 288·5 metres, some 4 miles away, came in extremely well, but in spite of its proximity, was quite easily cut out when receiving London on 261 metres. 5GB Daventry, 5XX, London Regional and National were also received at good strength in addition to a good number of continentals on long and medium waves. Our friends at Newcastle were much impressed by the " solid " yet simple design of the receiver and also what they termed " the ingenious method of arranging the trimmer on the tuning condenser." A member of our audience, unacquainted with the set, had little difficulty in producing, unaided, several stations at good strength, and it was quite clear that any person of average intelligence would quickly be able to secure good results, even if he had no previous experience in handling a radio set. The battery model of the three valve was next connected up to a 2-volt accumulator, and gave equally satisfactory results. Selectivity combined with good sensitivity was again a prominent feature.

Our third set for trial was the four-valve A.C. Once more the mains unit was called upon to provide the necessary H.T. and L.T., a 16-volt G.B. battery being used for bias. We had been given to understand that two H.F. sets were not popular in the North, and we were, therefore, interested to see the reaction of our friends when the latest design was put on the table. After a few minutes' trial they readily volunteered the information that such a two H.F. set would be most welcome in the North of England, and that the high selectivity possible was a feature which would be extremely useful in the Newcastle district, especially in view of the present overcrowded state of the ether and Newcastle's closeness to the continent. Spark interference from coast stations and shipping was reported by them as being reduced to a very reasonable limit. Of course, on a few stations, the interference was bad at times, but it certainly seemed that with a set of this design the interference problem is not nearly as bad as it has been in the past.

The last test was on the four-valve battery model. That which has just been said about the A.C. model also applies to this. Station after station came in at full speaker strength, and it would only be wearisome to attempt a list. Sound engineering design again received favourable comment, as also did the reserve of power which was turned to good account in maintaining the volume by an occasional touch of the controls on such distant stations as London Regional and National which fade badly in Newcastle.

In Scotland.

The problems of broadcast reception in Scotland are much different from those in England. For example, whilst some districts have a low or very low powered medium wave station for their main programme transmissions, others have to rely on 5XX Daventry for any programme at all. Round the Highlands and Border the nature of the surrounding country will often make it impossible to receive Glasgow or Aberdeen, whilst at the best of times, Dundee and Edinburgh (working on the British common wave of 288·5 metres) are quite hopeless at more than a few miles out. We, therefore, paid particular attention to finding out if the three-valve receiver using two-volt valves and the usual 120 volts H.T. would give adequate volume in the country. It had been proved to our satisfaction that the selectivity of the receiver is adequate for cutting out local transmissions when used near a broadcast station—and consequently if it should perform satisfactorily when right away from the locals then we could state the new set would be good for any locality but the worst of " blind spots." We chose Kelso as a desirable place for testing, and arrived by road in the evening with darkness covering the countryside. Now Kelso on the Tweed has hills on all sides with the Cheviots on the Border side. The local station is 5XX Daventry, some 300 odd miles away south. Medium wave stations can usually be received only at night time. Immediately on arrival about

10 p.m. on a mid-August evening, we put on the three-valve set and at once were able to report it was doing fine. In darkness, quite a fair number of medium wave stations, as well as four on long waves, were at sufficient strength for an ordinary room. Amongst these stations were 5GB Daventry (very good, but faded badly at times), Glasgow (very good), Langenberg (steady), etc. 5XX Daventry was at excellent strength, in spite of the fact that the aerial was laid through a workshop with metal all around, and not nearly as efficient as an ordinary listener would employ. A test next morning gave the same good results from 5XX and even 5GB Daventry was received at quite fair strength. Often this latter station cannot be had in daylight.

Before shutting down for the night we connected up the four-valve battery set. As we had expected from previous tests, the results from the weaker stations were now very much improved. A good number of stations were obtained, and there was no doubt in our minds that the four-valve battery receiver is an ideal set for the country. The same set of four-volt valves fitted in London before departure and still perfect after a 1,000 mile journey by rail and road, were employed in the test. The H.T. was such as is employed by many country users—about 120 volts from a dry battery—and the consumption in the present instance was under 12 milliamps.

Before going on to Glasgow, as already mentioned, we tried the three-valve set in daylight. The four-valve A.C. set was also put on, and although there was some local interference from an electrical source, results were very satisfactory. 5XX was at really excellent speaker strength, as also were half-a-dozen other long wave stations. Zeesen and 5XX were easily separated, although these were so close together in wavelength that they were inclined to heterodyne each other. 5GB Daventry was at full strength, and some good lunch time music was fully enjoyed by us. Evidently not so bad !

Unfortunately, owing to delay on the road, we did not reach Glasgow till late at night, but even so, made a quick test on the four-valve A.C. receiver. The local conditions and aerial were much better than at Kelso, and stations on long and medium waves just rolled in one after the other. Glasgow was not troublesome, and our Scottish friends said results were good—surely the hall mark of appreciation !

Based on our tests in country and town, we have no hesitation in saying that the three-valve battery or A.C. set will give really satisfactory reception in any part of the country.

For those who can purchase it, the four-valve set will give superb results, whilst to a Scotsman who has A.C. mains of standard frequency we say he cannot get a better receiver than the four-valve A.C. model.

Around London.

After return to London we made our final tests at a point some eight miles only from Brookman's Park. Connecting the three-valve battery set to a 40-foot aerial, the two London transmitters were easily separated, and Turin on 291 metres, also several other stations on the medium wave-band were clear of interference. On long waves five stations were at good strength. A test on the A.C. model produced similar highly satisfactory results. Truly a most gratifying performance, especially in view of the very close proximity of Brookman's Park.

The four-valve A.C. model next received attention, and was connected to the new mains unit. Results were extremely good, the extra H.F. stage fully justifying its inclusion in the set. Selectivity was better on both medium and long waves, and as confirmation of this it may be mentioned that Zeesen—the next station to 5XX and only 9 kilocycles away—was received with only a trace of the Daventry transmission audible during intervals. Sensitivity was very good indeed, and a large number of stations was obtained with really excellent volume and quality. A final test with the four-valve battery model showed that this was very little below the performance of the A.C. set. Station after station was again received on the speaker, and selectivity was of a very high order.

It is worth noting that the final as well as previous tests in other parts of the country were made using the same valves which were fitted prior to departure, and which were left in the holders—without any packing—for the whole of the journey. 1,500 miles by rail, road and sea, gentle (?) treatment by railway porters, fast travelling on Devon roads, bumping over Manchester streets in a traveller's car, dumping into the hold of the Edinburgh-London boat—none of these had any effect on the sturdy P.M. filament. Truly a marvellous tribute to the robustness and sound constructional design of the Mullard valve.

What users think of "Radio for the Million" sets.

Shorne,
Nr. Gravesend.

Dear Sirs,

I have had great pleasure in building your wonderful Master Three Star wireless set, and its achievement has been more than anyone would think, so much so that I had to build three more, and my local dealer for your goods tells me that he cannot get any more copies of the sets. As I have given one with each set, and still have several more orders coming in, I must ask you if it is possible to obtain any more copies. Having read that the B.B.C. want to get more members I determined to help, therefore I am doing all I can, and everyone who has the Mullard Master Three knows that it is the Poor Man's set, for it is so economical to run, and I love to see the surprise on their faces when they hear this remark: "National Programme from London." I also make them understand Mullard for good music and long life, so I try to serve your firm as well, as the Old Firm with a reputation which would not be lost at any cost. So if you can let me have a few copies I shall be extremely obliged.

I remain,
Yours faithfully,
L. V.

Knottingley,
Yorks.

In January of this year I made a six valve "Orgola" Senior receiver as per directions in RADIO FOR THE MILLION. *A very serious fault has arisen; briefly, the facts are these:*

1. I inserted (for safety) a 2-volt "Competa" fuse bulb in the negative H.T. lead. Until last week this was all right.

2. Last week a terrific thunderstorm broke over Knottingley and on switching on my set after it I found the bulb fused within about two minutes of my switching on. It was not fused when I switched on; seemingly everything was O.K.

Do you think the ·01 mfd. condensers (fixed) joining H.F. chokes to L.T.— and H.T.— have broken down and are letting direct H.T. through to H.T.— from H.T.+ 2, thus causing burning of the fuse. If so, my M'amp'meter should not read 0, should it?

However, these are the facts, and I am puzzled; I leave the solution confidently to your technical staff and shall appreciate your earliest reply. This is the finest set I have ever built; I can get nearly everything in Europe on it. I mention this to show how much I think of the circuit.

Yours faithfully,

Sefton Park, Liverpool.

Dear Sir. *9th July, 1930.*

I have just finished the Orgola Master Three after having had 12 months' faithful service from the Screened Grid H.F. Unit in conjunction with the Mullard Master Three Star.

I was very loath to part with such an excellent receiver, but have not been disappointed with the change; in fact, I am highly delighted to be the possessor of such a wonderful receiver.

I have so far built each receiver as produced each year, and each one surpasses the other and I am beginning to wonder how the present one is to be beaten.

The selectivity of the present receiver is really remarkable and the ease in which the stations roll in amazes one.

Perhaps you could enlighten me on the following as regards H.T. voltages for the following valves which I use:—P.M.2, P.M.12 and P.M.22. Is 108v, 125v and 150v respectively O.K. for the Maroon wander plug?

The receiver tunes in the Local Station, Liverpool, at 120 deg. and 5 GB can be heard at 180 deg., but seems below. As this seems to me to be due to my aerial, could you advise me as to the best way to adjust the reading so that they can be brought round?

Awaiting your reply, and congratulating you on such a Great Receiver.

Yours faithfully,
A. W.

Walton, Liverpool.

Dear Sirs, *26th May, 1930.*

I feel I must write and tell you how very delighted I am with the results from your "Orgola" set. I first made your Three Star set and thought this quite good, but when a purchaser came along for it I purchased your "Orgola" set and made it in just over two hours. This is only the second set I have put together. The results are just "a joy for ever." High and low notes are brought out to perfection, and if one could afford your loud speaker and H.T. mains eliminator I am sure the results would be equal, if not better, than some of the much more expensive electric sets. I hope to soon be in a position to have your mains eliminator so as to enable me to use the set through the electric light socket.

Yours faithfully,
R. H.

Dear Sirs, *Oldham.*

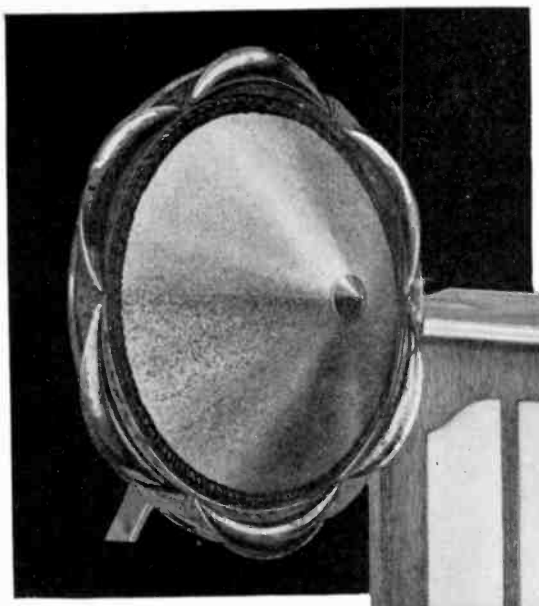
Having been a "Mullard" fan for this last few years, I have just built your S.G.P. in preference to the "Orgola," hoping to be able to utilise ultra short wave coils as in the Master Three and Three Star. Can such coils be purchased? I am more than satisfied with the performance on the medium and long waves, having logged over 40 stations all at FULL loud speaker strength. I feel sure if the coils mentioned can be purchased it will be well worth the cost, as I find you underestimate the performance of your receivers.

Wishing you every success in the future.

Yours sincerely,
H. W. W.

ALL COMMUNICATIONS REGARDING "RADIO FOR THE MILLION" MUST BE ADDRESSED TO THE EDITOR, 63, LINCOLN'S INN FIELDS, LONDON, W.C.2.

Printed by Waterlow & Sons Limited, London, Dunstable and Watford,
For the Publishers, Arks Publicity Ltd., 63, Lincoln's Inn Fields, W.C.2.



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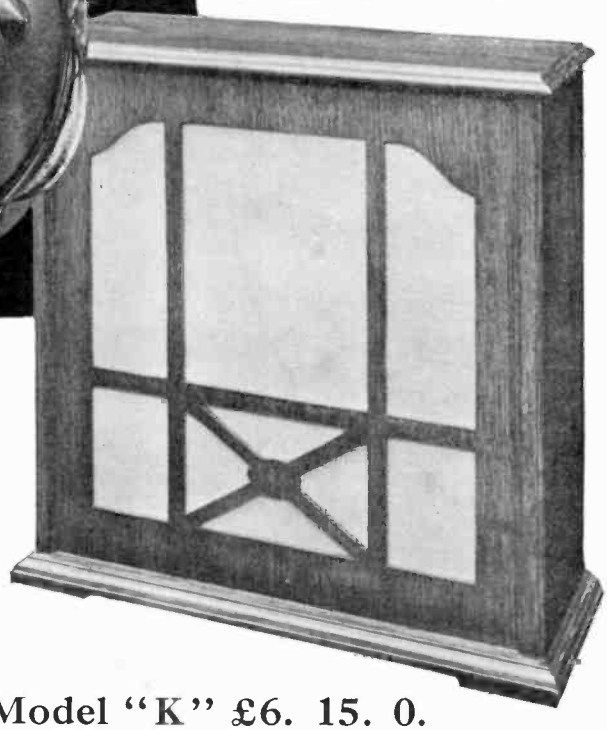

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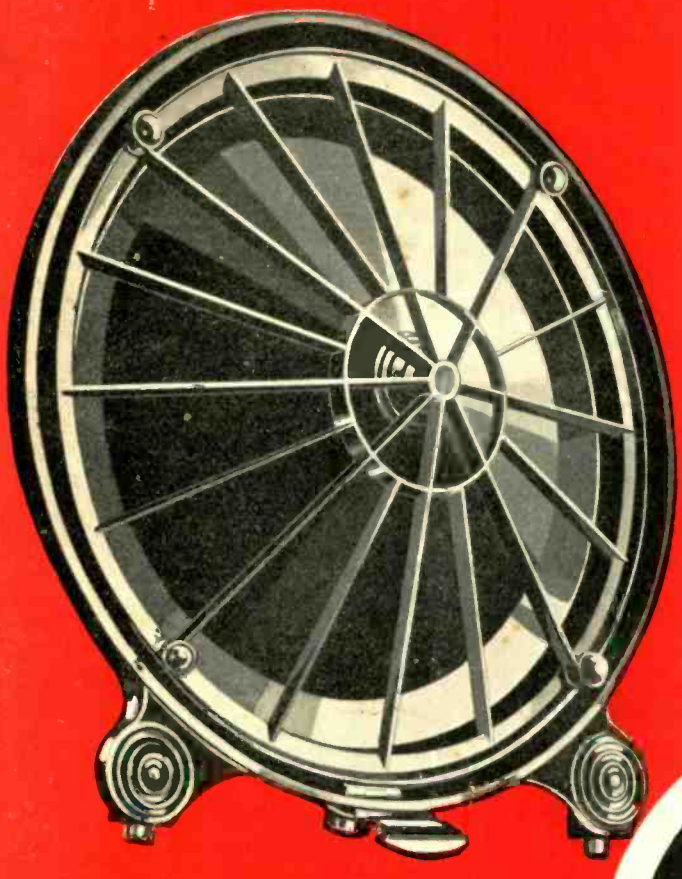

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