The Wireless World

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HOW often has it been argued by supporters of broadcast advertising that there never could be any serious risk of abuse of the microphone for advertising purposes, since this would automatically result in turning away listeners and so destroying the advertising value of the station's publicity? Even if this argument may be a sound one in theory, in practice it does not seem to work.

For some reason the microphone appears to attract the type of advertiser who would find his announcements excluded from good-class newspapers and periodicals.

In America action is at last being threatened against owners of stations who sell time to undesirable advertisers. In one case it is a slimming preparation, regarded as dangerous by the medical profession, which has offended; in France the Government has taken action against stations which have been in the habit of broadcasting lurid details of crimes.

Unless proper control is exercised over broadcasting transmissions there seems to be no limit to the uses to which the microphone will be put, however offensive the nature of the broadcasts may be to self-respecting listeners.

When financial gain in the shape of revenue from advertising programmes is in question, then any advertiser and any publicity material seems to get access to the microphone.

And we need not restrict our investigation to America in the matter of advertising matter in bad taste, for there have been some deplorable examples in recent Continental programmes.

If we were confident that these broadcasts discouraged listeners so that the position became self-adjusting, we might feel less perturbed, but there does not appear to be enough evidence that unsavoury programmes mean the loss of listeners to reassure us on this point.

This brings us, of course, to the conclusion that broadcasting should be planned on a higher plane than the tastes of the majority of listeners would dictate.

Civilisation itself is based on a code of rules not always universally acceptable but, nevertheless, recognised to be in the best interests of humanity in general. Broadcasting wields an enormous influence for good or evil, and its responsibility is great. It should be subject to an even stricter code than would apply to any other means of approach to the public because of the wider dissemination of its programmes.

The Radio Show

Three Special Numbers

THE annual Radio Show opens to the public at Olympia on Wednesday, August the 14th. This year three special numbers of *The Wireless World* will be devoted to giving our readers a full account of everything of interest.

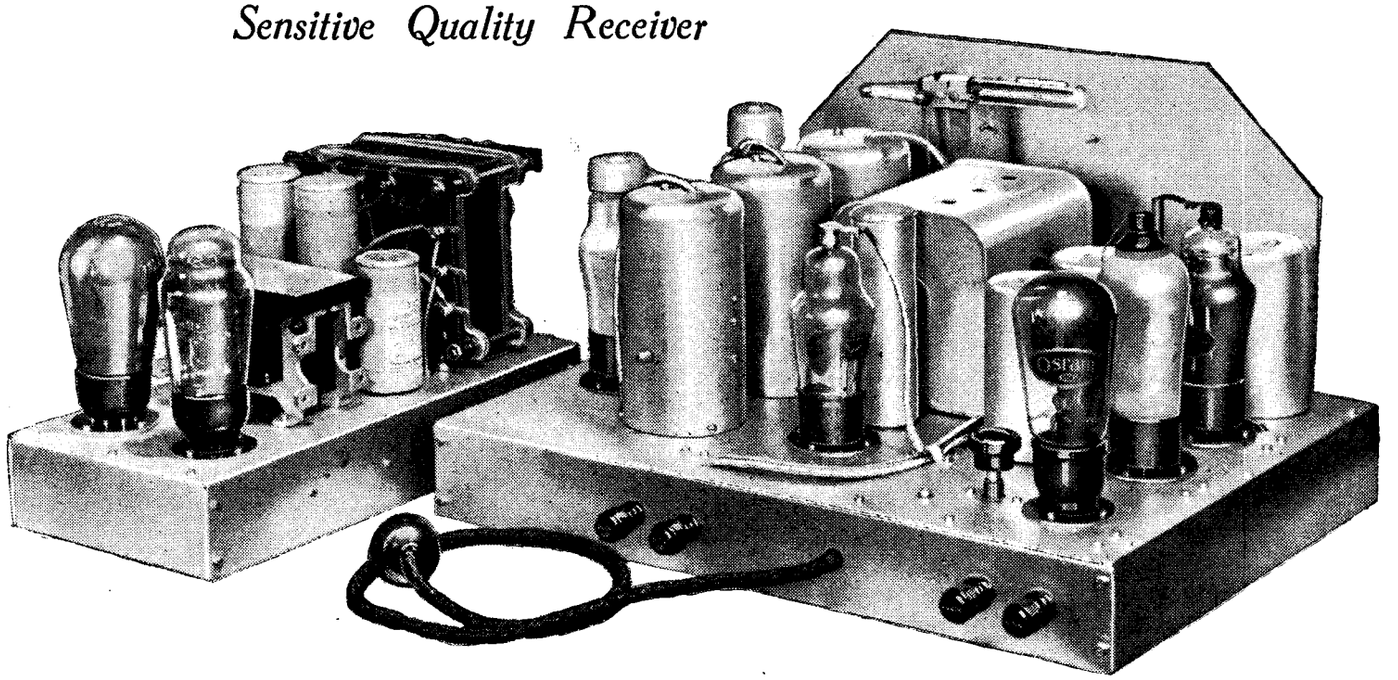
Next week's Special Issue will be a Show Forecast, giving a guide to the Stands and a general survey of the most important exhibits on which advance information is available.

The issue of August 16th will be a complete Show Report, constituting a Stand-to-Stand record of the exhibition.

In the third Show Number, August 23rd, the technical staff of *The Wireless World* will review the Show, discussing new developments from a critical point of view.

The Wireless World
1936 Monodial AC Super

The Construction, Adjustment and Operation of a Highly Sensitive Quality Receiver



CONSIDERATIONS of theory underlying the design of this receiver were fully dealt with in the previous article, and in this instalment the construction of the set is discussed. The initial adjustments also receive full treatment, and a procedure has been developed which readily enables accurate trimming to be achieved.

THE components are assembled on two aluminium chassis, one for the receiver proper and the other for the output stage and mains equipment. No difficulty will be found in the mechanical construction, and with one or two minor exceptions the order in which the components are mounted is unimportant. The gang condenser, however, should be left to the last. When fitting the switches, fix each to the chassis by its nuts and bolts, but leave these quite loose; then insert the control rod, and only tighten the fixing nuts when this rod is in place. If this procedure is not adopted it will probably prove impossible to insert the rod. Before tightening the set screws on each switch, make sure that they all lie to the same side of the centre line. The control knob for the switches has a standard ¼in. bush, but as the shaft is of smaller diameter a liner is employed, and when inserting it into the knob it is important to see that the slit side of the liner is away from the grub screw, otherwise it will not grip the shaft.

When the components have been mounted, solder five long wires to the tags on the under side of the gang condenser, three for the fixed plates and two for the frame. Pass these wires through the holes provided in the chassis and secure the condenser.

The wiring should now be commenced, and will be found straightforward and devoid of pitfalls if the details given in the drawings and photographs are carefully followed. It is, however, of greater importance than is often realised to follow the design in the matter of the physical positions of the wires. The general run of the wiring is usually at least as important as the layout of components, for in these days of screened components changes in their positions usually affect the performance only by the changes in the wiring which necessarily follow.

The Wiring

Considerable effort has been expended upon obtaining an arrangement of the wiring which would meet the electrical requirements fully and yet be mechanically rigid and simple enough to depict clearly in a drawing. Although changes in certain leads will have no effect whatever upon the performance, alterations in others may easily cause instability or some other defect; consequently, a change in the wiring can be considered no more legitimate than a modification in the positions of the components. It is in order that the wiring of the original receiver may be closely followed that the practical wiring diagram is included in this article, and it is recommended that full use be made of it. Were the positions of the leads unimportant, there would be no reason for publishing such a diagram; the wiring could be perfectly well carried out from the circuit diagram alone, if it were important only that the correct points be joined together.

No. 16 gauge wire is used for the heater connections, and it is advised that these leads be first placed in position, since the wire is very stiff. It should, of course, be straightened by stretching it slightly. It is used also for a few other leads where special rigidity is advisable. The rest of the wiring is carried out with No. 18 or No. 20 wire, according to preference. No. 18 is preferable in many cases on account

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of its greater stiffness, but nothing larger than No. 20 should be used in the case of the screened leads.

It may be remarked that the screened leads are earthed by clamping them to the chassis by metal straps. Soldered connections to the metal braiding should not be made, for it has proved almost impossible to solder the braiding without charring the insulation, and a breakdown sooner or later is then almost a certainty. Such breakdowns are often intermittent and quite difficult to trace, so that it is as well to remove 90 per cent. of their possibility by refraining from soldering in such cases. Flex leads are fitted to the IF transformers. These should be cut to the correct length and pieces of screened sleeving pushed over them, the metal braiding just being allowed to pass inside the screening cans.

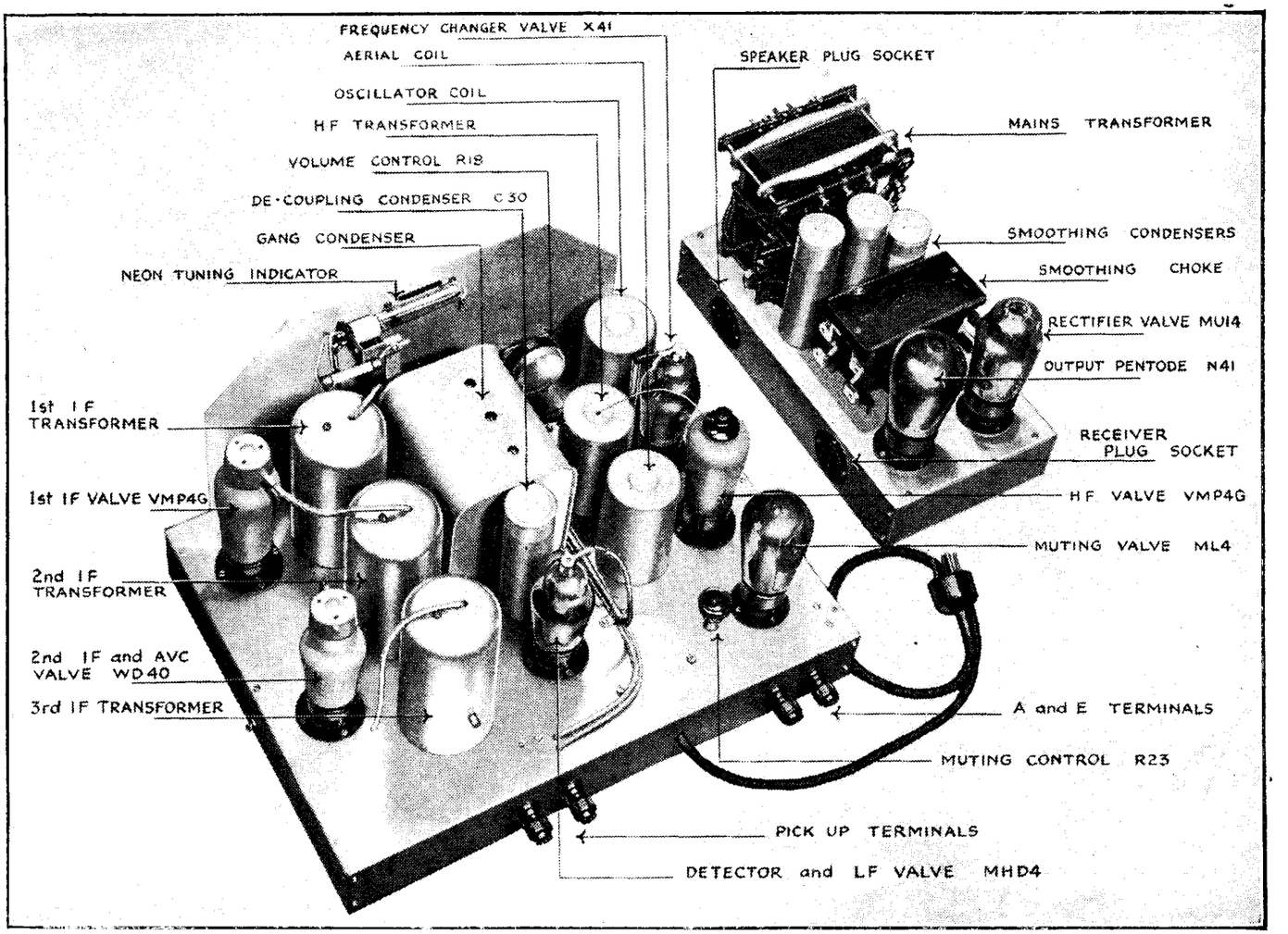
currents, and the longer the leads the greater the chance of unwanted coupling between different circuits. The case is similar with resistances, particularly those joined in the anode or grid circuit of a valve.

The Initial Adjustments

If these points be borne in mind, and the wiring plan carefully followed, there is no reason to anticipate difficulty in getting the receiver to function, and the set should operate perfectly as soon as the necessary initial adjustments have been made. When setting up the set, insert all valves *except the muting valve* and switch on. After allowing a short time for the valves to warm up, check over the voltages and currents and make sure that they are reasonably in accordance with the figures in the accompanying table. They are unnegligible, and 15 per cent. is not serious, particularly if they are consistent. If one circuit shows a high voltage accompanied by a low current, however, then it must be taken as an indication of a probable fault in that circuit—a valve, resistance, or condenser being the probable cause, or else a mistake in the wiring. It may be remarked that the resistances R24, R25, and R26 in the voltage divider dissipate a fair amount of heat, and the fact that they are hot to the touch is no indication of anything amiss.

The initial adjustments are chiefly to the ganging, and although this may quite well be carried out without additional equipment, it is more easily done if a calibrated oscillator, which need not be modulated, be available. Assuming that such an oscillator can be used, set it at 465 kc/s, insert a condenser in series with its high potential output lead, and connect it between the

IDENTIFYING THE PRINCIPAL COMPONENTS



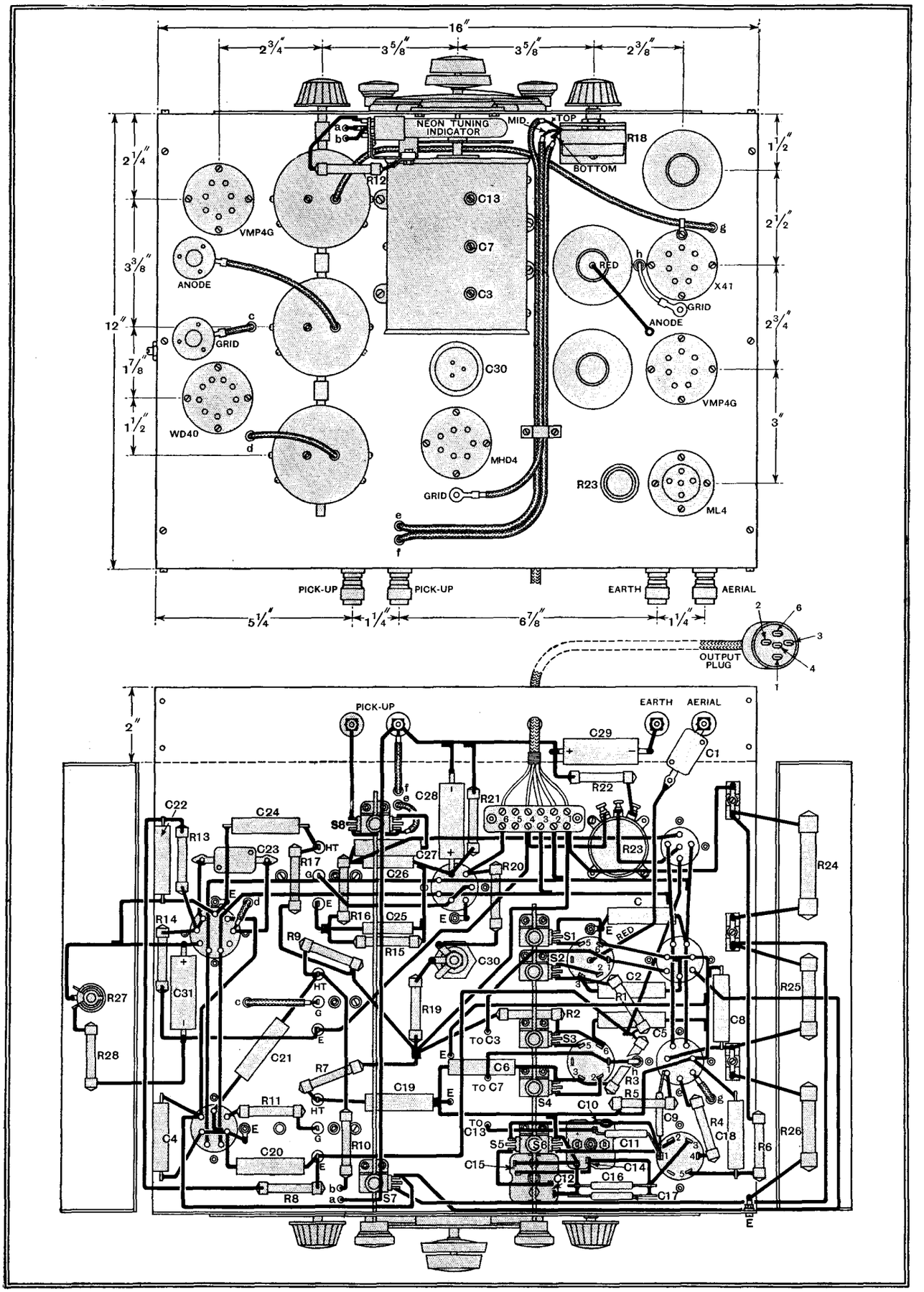
In this view of the apparatus the chief components can readily be seen. The three IF transformers are mounted in a row and the selectivity can be varied by means of a shaft passing through them.

The resistances and many of the condensers employed are fitted with wire ends of lengths varying from 1½in. to 3in. In many cases they are longer than necessary, and where this is so they should be cut short. Remember that the leads to a by-pass condenser are carrying HF or IF

likely to agree exactly, for they will be affected not only by the permissible variations in resistances, valves, transformers, and mains, but by the accuracy of the meter used and the value of its internal resistance. Variations of about plus or minus 10 per cent., therefore, are usually

grid (top cap WD40) of the second IF valve and the chassis. Loosen the IF transformer coupling nearly to minimum by turning the control knob in an anti-clockwise direction almost as far as it will go. Then trim the third IF transformer primary circuit (top trimmer, rear can) for

HOW TO WIRE UP THE RECEIVER UNIT



Full details of the wiring and layout of components are shown in these drawings. It is important that the layout of the wiring should be followed closely if unwanted couplings are not to be introduced.

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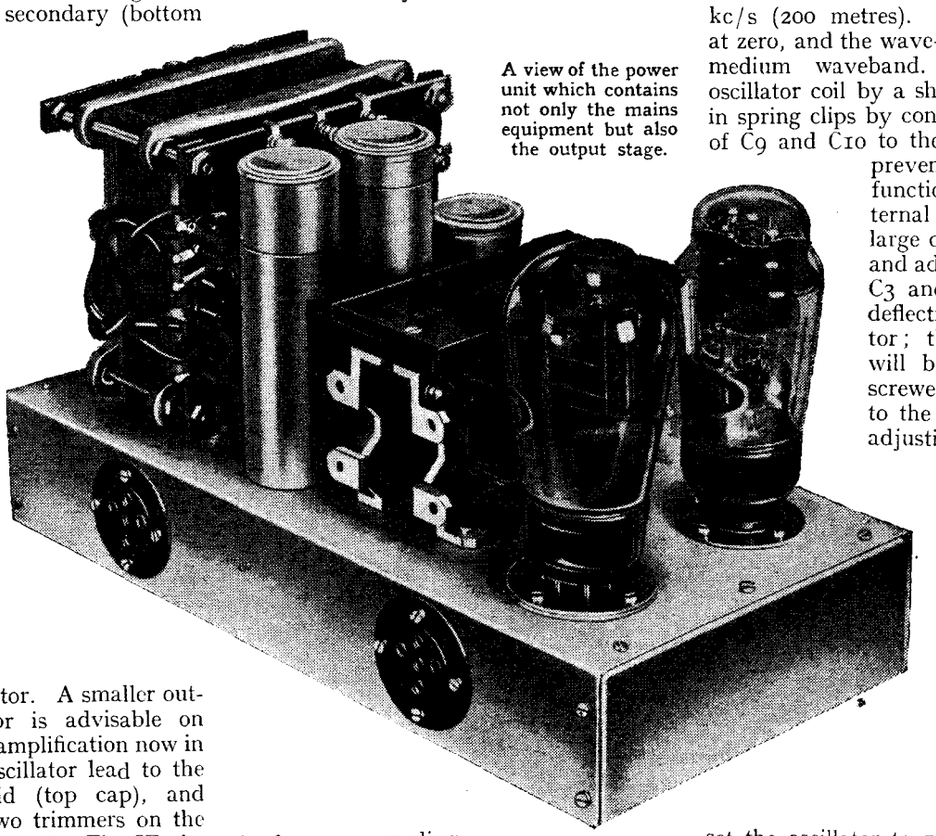
maximum response as indicated by maximum deflection on the neon tuning indicator. Then trim the secondary (bottom trimmer, rear can) for maximum volume from the loud speaker if the oscillator be modulated. If it is not modulated the setting can usually be determined by the appearance of a slight hiss at resonance, while the tuning indicator will drop back very slightly.

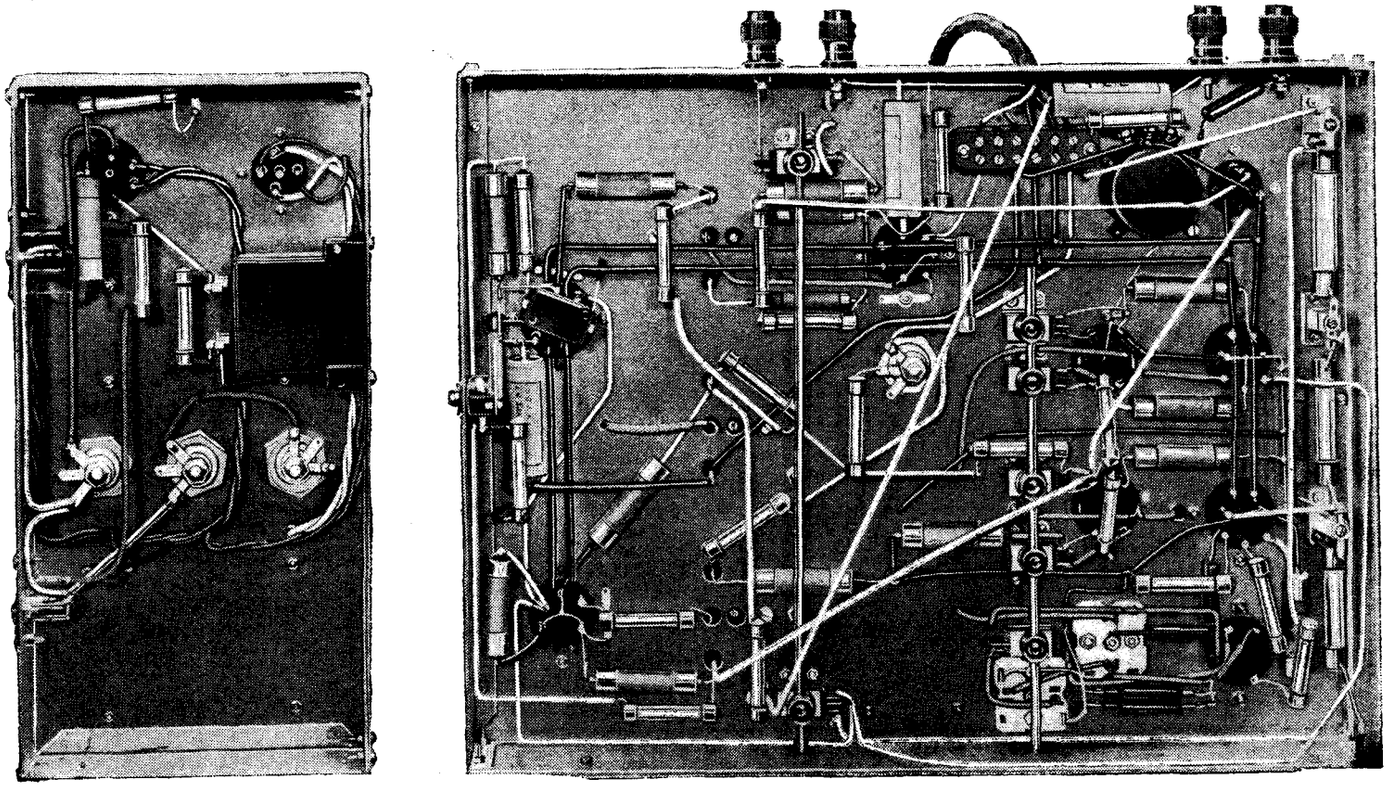
Having adjusted these two circuits, transfer the oscillator high potential lead to the first IF valve grid and adjust first the secondary (bottom trimmer) and then the primary (top trimmer) of the second transformer (middle can) for maximum deflection of the indicator. A smaller output from the oscillator is advisable on account of the greater amplification now in use. Next clip the oscillator lead to the frequency-changer grid (top cap), and similarly adjust the two trimmers on the first transformer (front can). The IF circuits are now all tuned to 465 kc/s, and should require no further attention. It is worth taking some pains to secure precision of setting of the trimmers, for the adjacent channel selectivity depends entirely upon the accuracy of adjustment. As a safeguard, therefore, it is advisable to check the adjustment of each trimmer before proceeding farther, but this time the oscillator can be left connected to the frequency-changer.



A view of the power unit which contains not only the mains equipment but also the output stage.

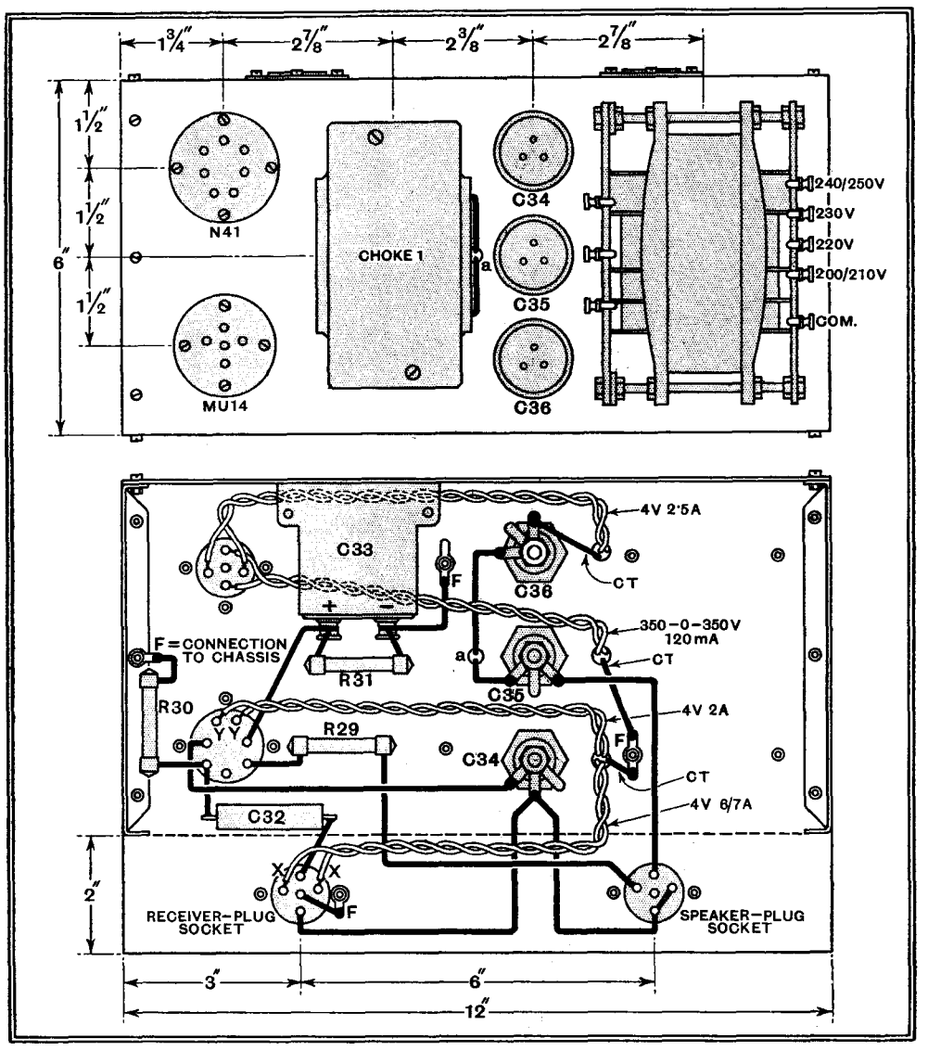
The next step is to adjust the ganging. Connect the oscillator to the aerial and earth terminals, preferably through an artificial aerial, but, if not, through a 0.0002 mfd. condenser, and set it at 1,500 kc/s (200 metres). Set the tuning dial at zero, and the wave-range switch for the medium waveband. Short-circuit the oscillator coil by a short lead terminating in spring clips by connecting the junction of C9 and C10 to the chassis. This will prevent the oscillator from functioning. Set the external oscillator to give a large output (0.1 – 1 volt), and adjust the trimmers on C3 and C7 for maximum deflection on the indicator; the trimmer on C3 will be nearly fully unscrewed. A large input to the set is necessary for adjusting in this manner, for the procedure depends upon grid current flowing in the HF or FC valves; the grid current causes a potential to appear on the AVC line and changes the current through the first IF valve, so operating the tuning indicator.

Having adjusted the two trimmers, set the oscillator to 1,400 kc/s and tune the set to this frequency by the tuning dial, again using the neon tube as an indicator of the precise setting. Now reduce the output of the oscillator well below the point at which the tube ceases to give an indi-



The wiring is clearly shown in these views of the receiver and power chassis. Note the initial sensitivity control R27, which projects through the side of the receiver chassis on the left in the illustration.

HOW TO WIRE UP THE POWER UNIT



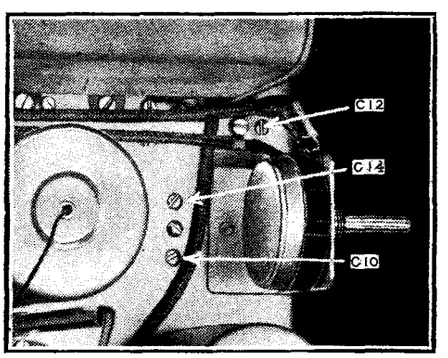
The details of the power unit are shown in these drawings. Few underbase components are fitted and the wiring is straightforward.

cation. Remove the short-circuit from the set oscillator, and adjust the trimmer on C13 for maximum response. The setting of this trimmer is quite critical. If more than one point of response be found, select the strongest, and this is most easily done by reducing the input until only one can be found.

The next step is to replace the short-circuit on the set oscillator, set the ganging oscillator to 600 kc/s (500 metres), and with a large output tune the set to it. Then reduce the oscillator output, remove the short-circuit from the set oscillator, and adjust C10 for maximum response. This setting is critical, and the output from the oscillator should be no more than is necessary to obtain an adequate deflection.

A return to 1,400 kc/s should now be made, and the trimmer on C13 adjusted exactly as described before. The setting found for it this time will probably be only very slightly different from the one found at first. This completes the medium-wave ganging, and it is now the turn of the long waveband. This is done in a similar manner to the medium, but there are fewer adjustments.

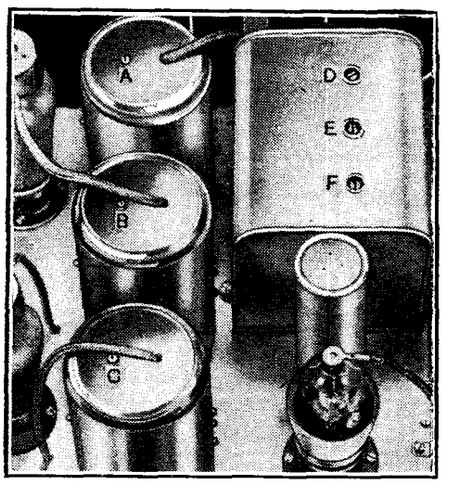
Set the oscillator to 300 kc/s (1,000 metres), and, of course, the wave-range switch to the long waveband, and stop the set oscillator from functioning. Tune the set to 300 kc/s by the main tuning control, using, of course, a large output from the oscillator. Reduce the input to the set, remove the short-circuit from the set oscillator, and adjust C12, being careful to keep the input to the set small enough for only the strongest response to be obtained. Replace the short-circuit on the set oscillator, adjust the external oscillator to give a large output at 160 kc/s (1,875 metres), and tune the set to it. Remove the short-circuit, reduce the input, and adjust C14. It may be found that varying this condenser has little effect. This is because the possible variation represents only a small proportion of the total capacity. In many cases it is hardly necessary to adjust this trimmer, and it is really included only to permit of compensation for variations in the capacities of the fixed portion of the padding.



The trimming condensers are readily adjusted by means of an insulated screwdriver. C10 is the medium wave and C14 the long wave padding condenser, while C12 is the long wave parallel trimming condenser.

The Muting Circuit

The ganging is now completed, and it only remains to adjust C3 to suit the actual aerial which is to be used. To do this, tune in a medium-wave station on as low a wavelength as possible, and adjust C3 for maximum response. The muting valve may now be inserted and its control R23 suitably adjusted to suit individual requirements. Experience has shown the ML4 valve to give the best control, but almost any triode will function quite well, and such a different type as the MH4 is very nearly as good. When R23 is fully rotated in a clockwise direction, no muting will be obtained, and when it is fully turned the opposite way, only strong signals will be audible. To adjust R23, tune the set to a point where the background is greatest, *the set being tuned to no signal*, and slowly turn R23 until



The trimmers on the gang condenser are here lettered D, E, and F, referring to the trimmers on the condenser sections C13, C7, and C3. The trimmers A, B, and C on the IF transformers are in every case primary trimmers on the 1st, 2nd, and 3rd transformers respectively.

silence is just, and only just, secured. It should then be found possible to tune from one end of the scale to the other with the stations suddenly appearing out of a dead silent background. With the set adjusted for maximum selectivity, muting will be obtained between channels in many cases, but not usually when this control is in the high-fidelity position. This is not important, for the same action which prevents muting prevents the sensitivity rising suffi-