

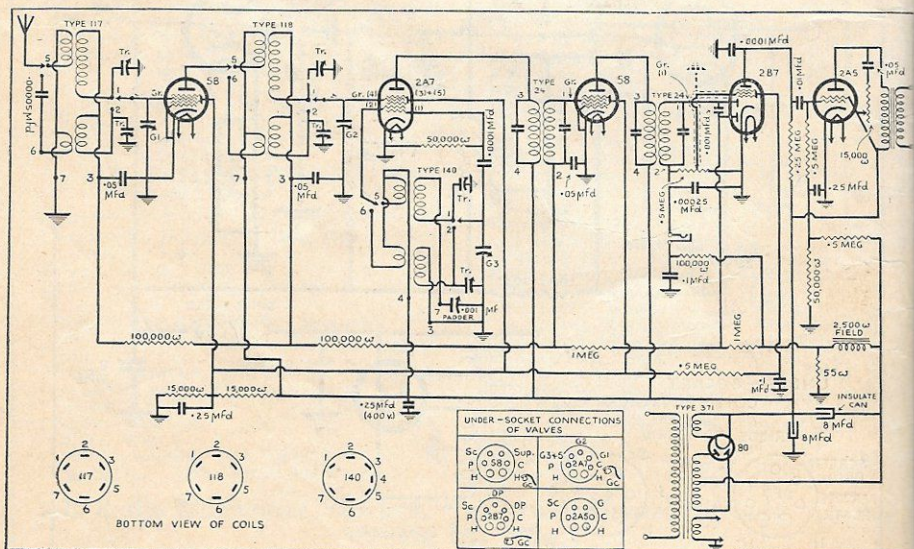


PROVIDING it is carefully built and aligned, this six-valve dual-waver will more than hold its own with any commercial set in its class. It is simple and comparatively cheap to build, and as well as being an exceptionally fine DX receiver on the broadcast band, shortwave stations all over the world can be brought in at overloading volume, and with excellent clarity.

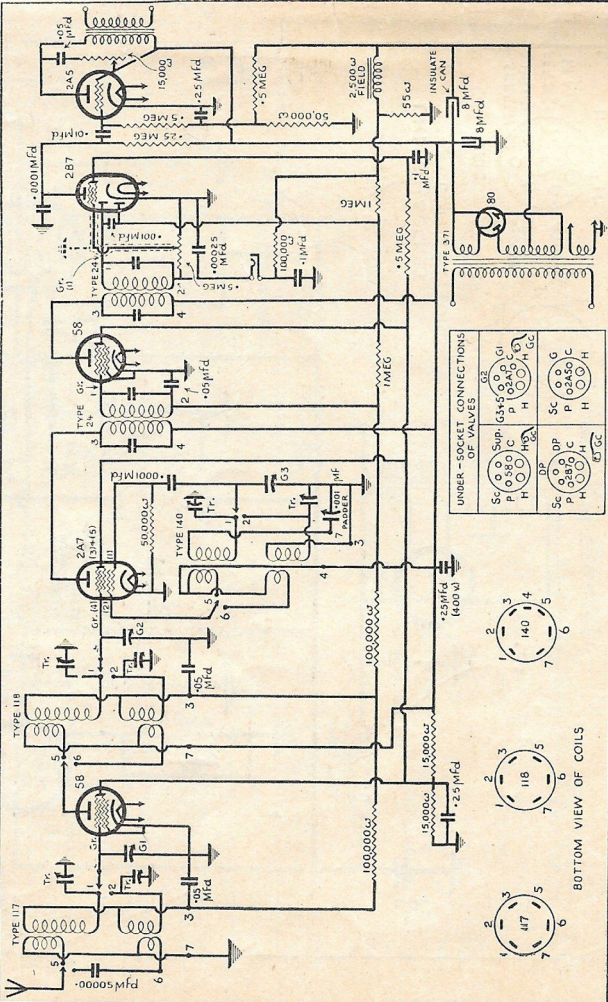
The circuit of the "Air King" (shown below) uses a 58 r.f. stage, giving high gain and excellent selectivity on both bands; a 2A7 mixer oscillator, a 58 i.f. amplifier, a 2B7 diode detector, first audio amplifier and A.V.C. control, a 2A5 output pentode, and an 80 rectifier.

Six trimmers are provided for lining up the set on both bands, and a padder of .001 mfd. is incorporated for broadcast alignment. None is required for the shortwave band. The three pairs of coils are housed in single cans and the leads are taken out to numbered terminals on the base, making the assembly as simple as that of a broadcast set.

Volume is controlled by a .5 megohm potentiometer used as load resistor for the diode detector. A pick-up jack is provided for reproducing records. Tone is controlled by a 15,000 ohm potentiometer connected in series with a .05 mfd. condenser across the primary of the speaker input transformer.



The circuit of the Exelrad dual-wave "Air-King."



UNDER-SOCKET CONNECTIONS OF VALVES

Sc P H	Sup. 0580 C	G ₂ G ₃ +5 02A7 C	G ₁ H G _c
Sc P H	DP 0287 C	SC P H	G 02A50 C H



BOTTOM VIEW OF COILS

The Bias Arrangements.

The two 58's and the 2A7 are back-biased, their cathodes being earthed and a minimum negative bias applied to the grids in the following way: A speaker field of 2500 ohms is connected in series with a 55 ohm resistor in the negative leg of the power supply. The total current taken by all the valves, amounting to approximately 62 mls, passes from earth through this resistor and the field back to the most negative point—the centre-tap of the high tension winding.

The total voltage drop across the combined resistance of 2555 ohms is, by Ohm's Law, 160 volts. By simple proportion the negative voltage at the junction of the resistor and field is roughly -3 volts, that required for the minimum bias of the three valves in question. This potential is supplied through a 1 megohm decoupling resistor to the A.V.C. diode plate of the 2B7, and hence is present on the grids of all the controlled valves.

Bias from the output pentode is taken off from the junction between the 15,000

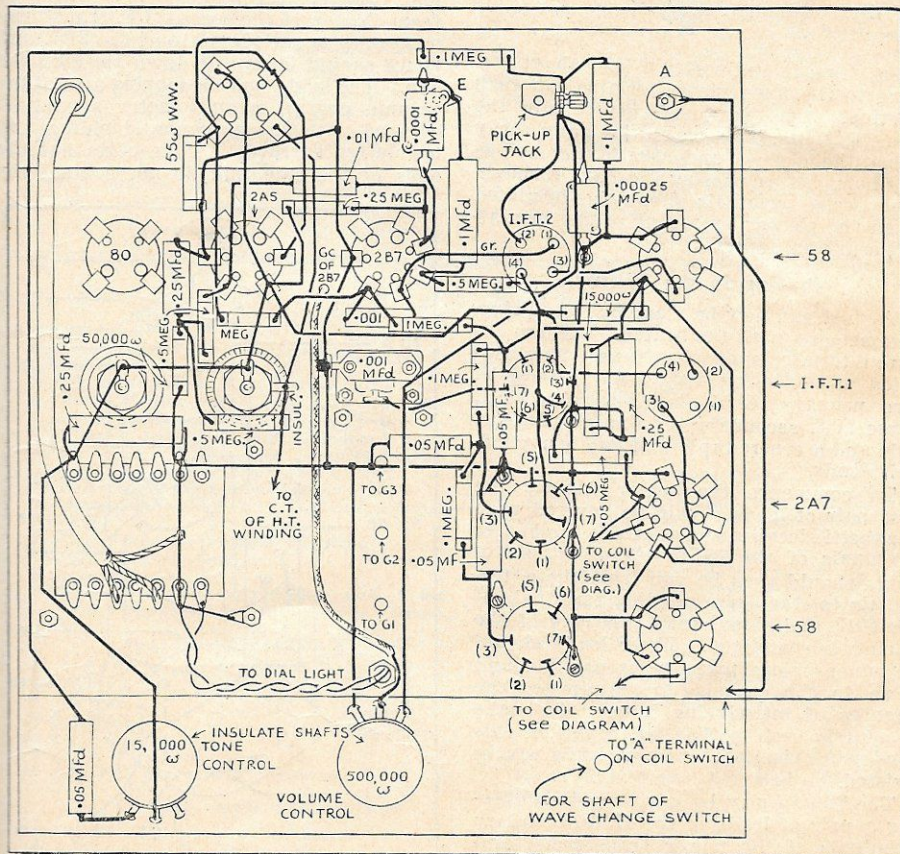
ohm and .5 megohm resistor connected across the 55 ohm resistor and field. Again by proportion, this equals—

$$\frac{50,000}{500,000} \times \frac{160}{1} = -16 \text{ volts.}$$

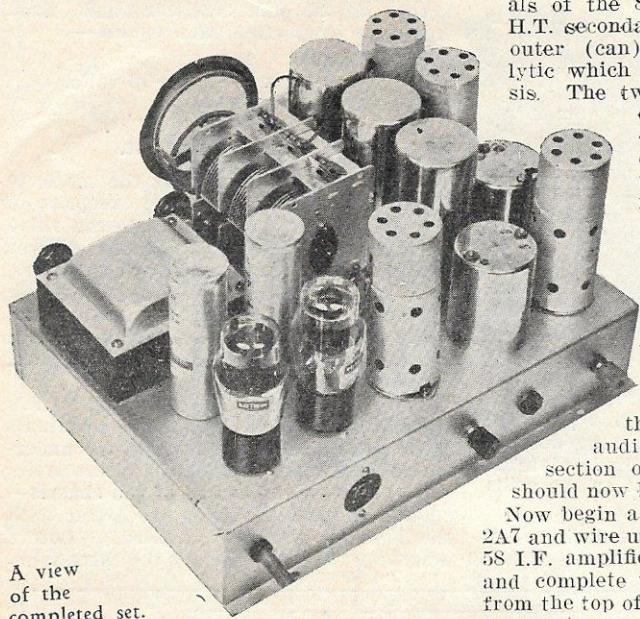
Assembling the Kit.

The first task in building the set is to mount all the parts, with the exception of the coil switch. These include the valve sockets and valve shield bases, power transformer, electrolytic filter condensers, coils and I.F. transformers, three-gang condenser, volume control potentiometer, aerial and earth terminals, pick-up jack, speaker socket, power cable bush and padder.

The valve sockets, coils and I.F.'s should be mounted so that the terminals face in the directions shown in the under-chassis diagram. One of the electrolytics—should be insulated from the latter with the bakelite washers supplied. Before mounting the gang, remove the three trim-



This diagram of the under-chassis wiring should be studied in conjunction with the sketch of the switch assembly.



A view of the completed set.

mers from it and solder a lead about 5in. long to the fixed plates terminal on each section. Also, do not forget to slip the four washers to support the gang away from the chassis underneath the mounting holes before passing the bolts through. The aerial terminals should be insulated from the chassis by means of the insulating washers supplied.

Putting in the Wiring.

A start can now be made on the wiring, commencing with the heaters. There are seven terminals on the transformer supplied with the kit, two 5-volt terminals, two primary terminals (230 volts a.c.), three H.T. secondary terminals (two outside and a centre-tap), and two heavy 2.5-volt leads.

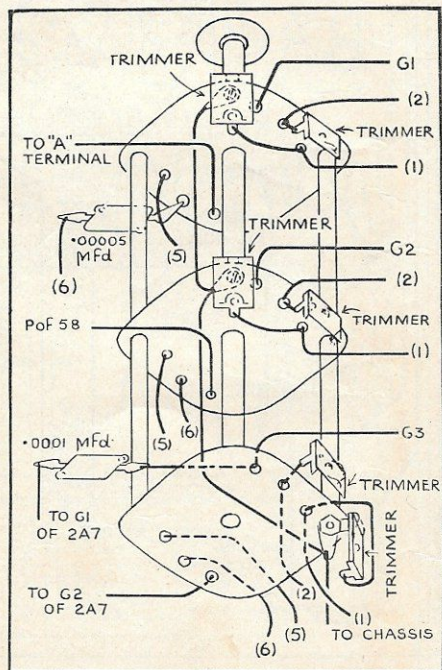
To commence the heater wiring, the last pair of leads should be covered with spaghetti sleeving and taken to the heater terminals of the 2A5. Another pair of leads should then be run from these terminals to the corresponding terminals of the 2B7, and so on, until this part of the wiring is completed. These leads should be run as close together as possible and close to the chassis to minimise the chances of introducing hum. To make absolutely certain that no trouble of this kind will arise, each pair of leads can be twisted.

The 80 can now be wired up by soldering a pair of leads to the H.T. secondary terminals of the power transformer and thence to the plate terminals of the 80. Another pair of leads should be attached to the 5-volt terminals on the power transformer and taken to the filament termin-

als of the 80. The centre-tap of the H.T. secondary should be taken to the outer (can) terminal of the electrolytic which is insulated from the chassis. The two centre terminals of the electrolytics are then joined together and taken to one side, it does not matter which, of the 5-volt filament winding.

The wiring of the power pack filter should now be completed and the speaker plug wired up. Next, join the screens of the first four valves together, not forgetting to interpose a .5 megohm resistor between the screens of the 2B7 and the 58 I.F. amplifier. The audio system, i.e., the pentode section of the 2B7 and the 2A5, should now be wired up.

Now begin at the plate terminal of the 2A7 and wire up the first I.F. transformer, 58 I.F. amplifier, second I.F. transformer and complete the 2B7 wiring. The lead from the top of the second I.F. transformer goes to one diode plate of the 2B7, and hence should be pulled down through the can. The lead from the moving arm of the volume control potentiometer should be covered with copper gauze shielding and the latter earthed. Take care that the ends of the shielding do not contact the



A sketch of the dual-wave switch, showing the wiring.

bare wire where it emerges from the insulative covering.

Coils terminals not concerned with the wave-changing switch (e.g., "B+," and the A.V.C. terminals) can be wired, and lastly, the dual-wave switch with the six trimmers mounted on it can be bolted into position and wired up according to the diagram.

When wiring up the coils, note that all r.f. returns should be bonded together and connected directly to earth by means of a common earth line of 18 gauge tinned copper wire, running directly from the earth terminal. Also, one side of every trimmer should be connected to the main earth line, as shown in the sketch of the switch. The leads coming out from the top of the aerial and r.f. coil cans can now be connected as shown in the above-chassis photograph. Two of these leads are connected to the fixed plates terminals of the first two sections of the gang, while the other two are soldered to grid clips for putting over the grid caps of the first 58 and the 2A7. The dial light can then be wired by soldering a pair of twisted leads to the appropriate terminals on the power transformer, and the whole wiring should be given a thorough check-over. After this, the knobs can be fitted, the valves plugged in and the shields fitted over them, the speaker plugged in, the aerial and earth connected up, and the power switched on.

Watch the 80 for signs of a blue glow or flashes, either of which denotes overload. If these occur, the set should be

switched off immediately and not connected to the power again until the trouble has been located. If the rectifier filament glows a dull red, however, and the heaters are all alight, the set should be ready for lining up.

Lining Up the "Air King."

To line up the receiver, set the padder about half-way out, tune in a station on about 1400 k.c., and invert the chassis. Adjust the three broadcast trimmers (mounted on the dual-wave switch) for maximum response. Now swing the dial over to the other end of the band and tune in a station on about 600 k.c. Adjust the padder, and at the same time rock the tuning dial backwards and forwards over the station until the point of maximum volume is found.

The dial can now be re-set to 1400 k.c., and the aerial and r.f. trimmers given a final line-up. Do not touch the oscillator trimmer or the padder again, or the whole process will have to be repeated. During lining operations keep the volume turned well down so that slight changes will be more readily perceived. The I.F. trimmers can then be adjusted a fraction of a turn either way to give peak results. Do not touch the trimmer tuning the plate winding of the first I.F. transformer, however, or the lining will be thrown out.

On the shortwave band the three trimmers should be lined to give maximum response from a station on approximately 12 megacycles, such as the Paris station on 25.20 metres (11.90 megs.). The os-

(Continued on page 55.)

LIST OF PARTS

- 1—Steel chassis, to dimensions shown in sketch (Exelrad).
- 1—Power transformer (Exelrad 371).
- 1—Exelrad dual-wave coil kit, No. 335, comprising matched aerial, r.f., and oscillator coils, 3 gang condenser, 2-256 k.c. I.F., transformers, .001 mfd. padder, and 3-deck dual-wave switch.
- 1—Full-vision tuning dial (Crowe).
- 7—Wafer sockets, 2 7-pin, 3 6-pin, 2 4-pin (Exelrad).
- 4—Type 58 valve shields (Exelrad).
- 1—Open circuit jack.
- 3—Knobs.
- 2—Potentiometers, .5 megohm and 15,000 ohm (insulated) (Radiophone Frost, Erie).

FIXED RESISTORS.

- 2—15,000 ohm carbon (Erie)
- 2—50,000 " " "
- 3—100,000 " " "
- 1—.25 megohm " " "
- 3—.5 " " "
- 2—1 " " "
- 1—55 ohm wirewound (Exelrad).

FIXED CONDENSERS.

- 1—.00005 mfd. mica (T.C.C.).
- 2—.0001 " " "
- 1—.00025 " " "

- 1—.001 " " "
- 1—.01 " " "
- 4—.05 " tubular " "
- 2—.1 " " "
- 3—.25 " " "
- 2—8 mfd. wet electrolytics.

MISCELLANEOUS.

3 dozen 3-in. nuts and bolts; 2 dozen solder lugs; dial light; 10 yards hook-up wire (Henley); 1 yard flexible push-back; 1 foot flexible copper braiding; 1 yard 18 gauge tinned copper wire; length of 3-core power flex and plug; 4-pin speaker plug and cord; two terminals; 4 s.g. clips; large and small bushes (for power cable and aerial terminal).

EXTRAS REQUIRED

(Not included in kit).

VALVES.

- 1—2A7, 2—58, 1—2B7, 1—2A5, 1—80 (Raytheon, Radiotron, Ken-Rad, Mullard, Philips).

SPEAKER.

- 1—Dynamic speaker, 2500 ohm field, with input transformer to match single pentode (Magnavox).

2BL SYDNEY

at MID-DAY with

EXELRAD

"AIR KING" SUPERHET!

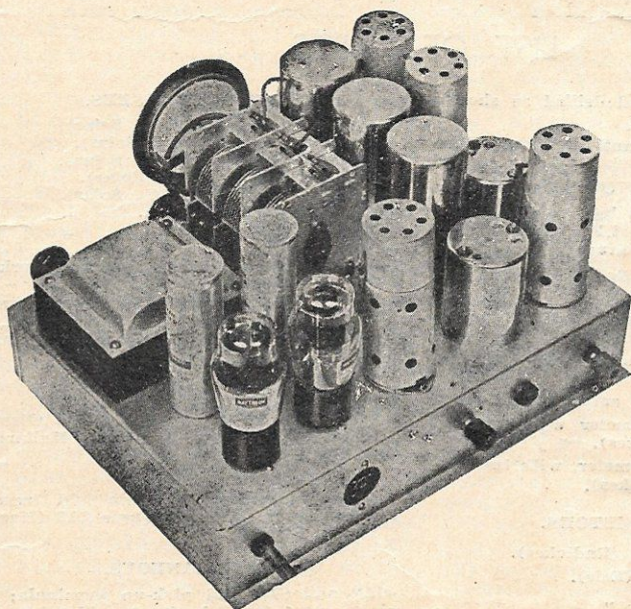
(Described on Page 48)

EXELRAD COILS

will *improve* the performance of any Radio

Build up your Kit using EXELRAD COMPONENTS. Every part is individually matched to standard and packed in sealed cartons.

You receive EXELRAD COMPONENTS in the same condition as they leave the factory.



Any set described in this issue will perform *better* if Exelrad parts are used—

Distributors:

TURNBULL & JONES LTD. (All Branches)

Agents:—FEARS, Wellington.

The example shown here was fitted with 6.3V valves:
6D6(RF),6A8,6D6(IF),6B8,42,80



