be made. These are solonoid coils with a primary wound over one end separating the two windings by two or three layers of empire cloth or similar insultating material.

Commencing ½in. from the end, wind on 85 turns of the 24 DCC wire on each of the three formers. Fasten the ends of the wire by a soldering lug and small nut and bolt. A strip of empire cloth one inch wide is now wound around one end of each coil, directly above the last turn, on which the primary winding has to be wound. Wind on two or three layers of the empire cloth and fasten with a little secotine or celluloid cement. For the aerial coil wind on 30 turns tapped half-way of the 24 DCC wire. The two remaining coils wind on 30 turns centre-tapped of the 30 DCC wire. The centre tapping in each case can be a twist in the wire and after cleaning off the insulation a length of wire soldiered on. The two ends of all the coils can be easily fixed with a length of cotton. Give the whole a thin coating of celluloid solution and allow to dry. Small brass brackets bent twice and fixed to the coil former by small nuts and bolts hold the whole coil quite rigid. Arrange these supports so that the coil stands about 1in. from the bottom. All coils should be wound in the same direction.

Commercial coils of the type used for standard neutrodyne circuits may be used profitably.

The Assembly.

Now, drilling through the metal bottom of the screening boxes, mount the various components by screwing through into the baseboard. Immediately behind the variable condensers arrange the valve sockets as close to the right hand partition. This leaves more room for the coil, which should not be too close to either of the metal sides or bottom. A point to watch before fixing the valve sockets is to see that the contacts are not pushed down by the valve pins and touch the metal underneath. If this is likely to happen a small square of celluloid or thin ebonite will have to be fastened between the valve socket and the metal work. Many commercial varieties of neutralising condensers will be found to have a small fixing screw underneath which will need to be sunk in further to prevent a short to the metal screen.

The variable condensers will fasten the screen to the ebonite panel. Out of two small strips of ebonite make two terminal strips, one to hold three terminals and the other seven binding posts. Soldering lugs clamped under the small nuts is preferable to other methods of connecting to the various leads.

The strip holding three terminals has to be fixed directly behind the first screening compartment, and the other strip runs along the back behind the audio end. Reference to the diagram will indicate the positions for the two audio transformers and valve sockets. In the diagram will be seen a small resistance marked R2, and the value of this depends upon the valves to be used. Anyone can work this out by the following formulae and an example is given:—

$$\frac{V^1 - V^2}{C} = \text{Resistance in ohms.}$$

Where V^1 equals voltage of battery.

V^2 equals voltage required for the valves.

C equals total current taken by all the valves shown as amperes.

Example:—

V^1= 6 volt car battery.

V^2= 5.5 volt valves.

C = 5×.25 amperes. (Five is number of valves.)

$$\frac{6 - 5.5}{5 \times .25} = \frac{.5}{1.25}$$

= 4 ohms.

Therefore the value of resistance R^1 will have to be 4 ohms in this particular case and will have to be capable of carrying 1¼ amperes. In the case of amperites these have been worked out as per table.

The easiest way to do this is to obtain a 6-ohm resistance of fairly heavy construction, and use 4-6 or 2-3 of the total resistance. Dismantle the rheostat and unwind the wire that is not required, fixing a soldering lug at each end of the length of material on which the resistance is wound. Being light in weight, it is self-supporting, and will "stay put" when wired into the receiver.

Wiring the Receiver.

EVERYTHING is now ready to be wired up. Sundry crosses will be seen in the diagram. This indicates where a lead is fastened direct to the metal shield. Perhaps the easiest way to do this to aluminium is to fasten a soldering lug underneath a screw-head, and solder direct to this. Some builders may use variable condensers with metal end-plates, but even if this is the case, a wire must be connected between the condenser and coil, and run to the screen, and not depend upon the end-plate connection of the moving plates.

The radio frequency choke has not been mentioned previously, and if this component is to be made, details will be found in vol II, 23, or 250 turns of 30DCC wire on a 1-inch former, wound in sections, will prove quite suitable. However, numerous good commercially-made chokes are available.

INSULATED sleeving is preferable for wiring up this set, as thinner insulation is liable to break down when in constant contact with the metal work. As will be seen, the earth terminal is fastened direct to a bolt in the screen, and the two aerial terminals to the small primary coil wound with the 24-guage D.C.C. wire. One to the centre tap, and the other to the end nearest the grid end of the secondary coil. In the case of the other two coils, the centre tap of the primary runs to B+ 90, and one terminal of the .5-mfd condenser in each compartment. The remaining wiring is easily followed from the diagram.

Testing and Adjustment.

NOW comes the testing and adjustments after it has been wired up. Insert the five valves in their correct sockets. Valves having an impedance of between 6000 and 13,000 will be found best for the first four positions, and a power or semi-power valve for the final stage. Connect up the A battery, and make sure that all the valves light up when the speaker plug is inserted. Connect up the C battery, and try 22½ volts B on all the B+ terminals. It will be evident at a glance if anything is wrong.

Now, put on the full voltage, and try out the aerial. The chances are that loud howls will greet the builder. With a wooden or ebonite rod shaped as a screwdriver, adjust the two neutralising condensers. Make these adjustments with the receiver tuned to the station of the lowest wavelength it is desired to receive. Adjust until the receiver will not oscillate, wherever the dials are set. If difficulty is experienced to neutralise with the lid off, drill two holes in the lid directly over the tops of the neutralising condensers, and insert the insulated rod.

The writer has never had the slightest trouble to balance this set, and he has built quite a few of them exactly as described in this article. When once built and adjusted, it is a trouble-free set. Tonal qualities are excellent, with a marked absence of background noises due to slightly oscillating R.F. stages.

Components Necessary for Shielded Five.

- Three Screening boxes, 9 x 5 x 6 (approx.).
- 3 Ebonite formers, 3½in. x 2in. dia.
- ½lb. 24 S.W.G. copper wire, D.C.C.
- ¼lb. 30 S.W.B. copper wire, D.C.C.
- 3 Variable condensers, .0005 m.f.d.
- 1 x .0025 fixed condenser.
- 1 x .001 fixed condenser.
- 2 x .5 m.f.d. fixed condenser.
- 5 Valve sockets.
- 1 Rheostat 6-15 ohms.
- 2 Neutralising condensers.
- 1 R.F. choke.
- 2 Audio transformers.
- 12 Terminals.
- Panel, 21in. x 7in. x 3-16in.
- 1 Single circuit filament jack.
- Connecting wire and sleeving, etc.
- Baseboard, 22in. x 10in. x ½in.