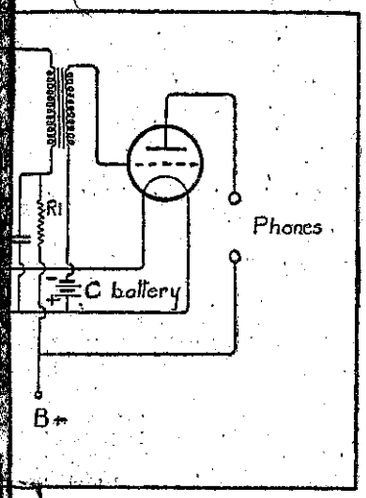
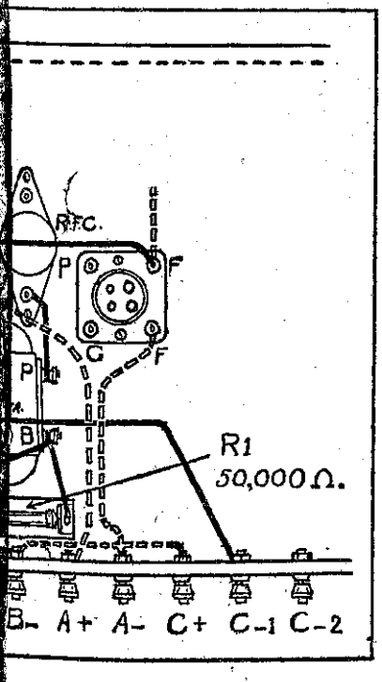
ential Two"

One" — By "CATHODE"



mended that this should be of a ratio ot greater than 3.5 to 1, although if t is not intended to add the second udio stage later on, it is permissible o use a transformer of higher ratio, ay, 5 to 1. Incidentally, in case anyone should be tempted to buy two ransformers of the one type in readiness for the addition of a second audio stage, it is well to mention that it is nadvisable to use two identical transformers in a two-stage amplifier owing to the danger of peaks being apparent in the output. The two transformers should differ either in make or type.

The filter circuit comprising a 50,000 ohm. plate feed resistance with a 2 mfd. by-pass condenser is intended to prevent back coupling between stages. With this included, there is practically no risk of encountering that distressing audio howl which has been becoming rather common of late. The precaution is perhaps unnecessary, unless a second audio stage is to be added, but there is no doubt that even with the single audio stage tone quality is likely to be improved by the inclusion of these components, which, after all, are not at all costly. It is not absolutely essential that the 50,000 ohm resistance should be wire-wound, although this type is recommended. A metallised cartridge type resistor can be used if cost is very much of a consideration. Avoid carbon resistors, however, as these almost invariably become very noisy after a little use. The 2 mfd. condenser need not have a very high voltage rating, the ordinary Mansbridge or low-voltage foil condensers being quite suitable.



Mounting the Components.

HAVING arrived at the stage of mounting the components, reference should be had to Fig. 2 to aid in the matter of locating them. The previously-mounted valve-holder and high-frequency choke have been drawn in in Fig. 2 as a guide to the situation of the four new components. It may be necessary to bend one or two of the existing wires in order to clear the new apparatus. The only wire which it is necessary to remove, however, is that which runs between the high-frequency choke and the phones (negative) terminal.

With the components firmly mounted, all that remains to be done is to do the additional wiring. As has already been mentioned, one of the existing wires must be removed, or, alternatively, it may be shortened so as to make connection between the H.F. choke and the transformer terminal marked "P" instead of between the chokes and the phones—terminal. Altogether there are eight new wires to be added. These can probably be put on most readily from the diagram, but may subsequently be checked from the following list of connections:—

(1) From H.F. choke to terminal marked "P" on transformer.

(2) From filament positive terminal on detector valve-holder to corresponding terminal on newly-mounted first audio valve-holder.

(3) From terminal marked "G" on transformer to grid terminal on new valve-holder.

(4) From filament negative terminal on new valve-holder to one side of condenser C1, thence to B negative terminal.

(5) From other side of condenser C1 to terminal marked "B" on transformer, thence to one side of resistance R1.

(6) From other side of resistance R1 to B positive terminal.

(7) From plate terminal on new valve-holder to phones negative terminal.

(8) From terminal marked "C" on transformer to C negative terminal.

It should be noted that some transformers carry different indicating letters to those shown. The terminal for connection to the succeeding grid is always marked "G" or "Grid." The letter "P," however, is sometimes replaced by the letter "A," the letter "B" by "H.T.," and the letter "C" by "G.B." Before going on to other matters it may be pointed out, too, that the wires shown in dotted lines are those already existing in the "Differential One" itself. Only the heavy black lines represent the new wiring. Comparison with the wiring diagram of the "One" will assist considerably if the constructor is not quite clear on any detail. The complete circuit diagram of the two-valver is also given in Fig. 3 for those who prefer to wire from a theoretical diagram.

Operating the Two-Valver.

THE receiver should now be in working order again and very much more powerful. The B voltage should now be increased to something in the region of 120 volts, although 90 volts or so will give good results if the higher voltage is not available. Provision has now been made, too, for the inclusion of a "C" or grid-bias battery. At present this need only be of 3 or 4½ volts, but a 9-volt battery will come in handy later on for the second audio valve. A new valve will have to be purchased unless a suitable one is on hand. This should be of the L.F. or small power variety, having an impedance between about 6000 and 9000 ohms and an amplification factor between 9 and 15.

If the constructor has faithfully followed instructions, he will now be in possession of a very nice little short-wave receiver. In case of handling it will be well-nigh unique, as the filter circuit in the plate lead to the detector valve is of great assistance in reducing both back coupling and our old enemy, "threshold howl." Amplification, while already considerable, is not so great as to render it impossible to listen with headphones. Thus, for

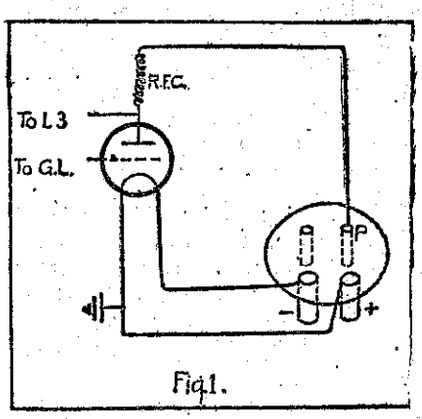


Fig1.

long-distance shortwave work, these can be donned and the very most made of the rather astonishing qualities of this little set. Then, for purposes of entertainment, the broadcast coil may be plugged in and the local station put on the loudspeaker.

To get good speaker volume on the outside stations, however, means using the reaction control, and, as this is a thing to be avoided as much as possible, it is recommended that, on the broadcast band, the receiver be used principally for the local station in the meantime. In two or three weeks will follow a description of the addition of a second audio stage and a screen-grid amplifying stage ahead of the detector. Then the constructor will have an excellent long-distance receiver for use both on the broadcast band and on short waves.