

# Crystal Receiver and Two-stage Amplifier

Perfect Reception of Local Station on the Loudspeaker

(By "Megohm")

**S**EVERAL requests have been received from novices for complete instructions dealing with the assembly of a crystal set with two amplifying valves, and the following is accordingly presented. Very fine reception of the local station is assured with a carborundum fixed crystal and an amplifier such as this. Some listeners are receiving concerts on the headphones from long distances with such a set, but there is no guarantee for long distance, as much depends upon the location of the receiver. This set is primarily to give full loud-speaker volume from a near station, and with good components and reasonable care in construction, will give volume and quality equal to many expensive valve sets, and indeed will excel many in quality of tone.

Those who are best satisfied with real music from the local station, combined with a minimum amount of attention, will find this set very well suited to their needs. Many listeners, no doubt, who have previously listened-in with headphones and a crystal, will find it an opportune time to convert the set into something larger and more entertaining, so far as the whole family is concerned.

Explanation will be given as fully as possible so that the new constructor, who is handy with tools, may successfully build his first set.

The materials and components to be purchased are as follows approximate prices being given.

## MATERIALS REQUIRED.

|                                                   |           |             |
|---------------------------------------------------|-----------|-------------|
| 3-16in. Ebonite Panel, 14 by 6ins.                | 7         | 6           |
| Variable Condenser, .0005..                       | 14        | 0           |
| Dial for same                                     | 1         | 3           |
| Carborundum Cartridge Crystal                     | 7         | 6           |
| Ferranti AF3 Transformer..                        | 27        | 6           |
| Audio Transformer, large, good make, 5 to 1 ratio | 17        | 6           |
| Rheostat, 30 ohms                                 | 3         | 6           |
| 2 Valve holders, American                         | 4         | 6           |
| 8 Terminals                                       | 2         | 2           |
| 3 Pin Terminals for panel                         | 1         | 0           |
| 2 Sockets, 1 Pin                                  | 1         | 0           |
| 1lb. 20's enamelled wire                          | 1         | 3           |
| Baseboard, connecting wire, screws, etc           | 5         | 0           |
|                                                   | <b>£4</b> | <b>13 2</b> |

## PANEL AND BASEBOARD

The panel is best made of ebonite, though some constructors now use three-ply wood for the purpose. Ebonite or formica imparts a smart appearance to any set, and is well worth the extra cost, especially on account of the high insulating properties. The length of the panel must equal that of the baseboard, which is conveniently 14 inches, though it could be slightly less at the expense of unnecessarily crowding the components. Fourteen inches wide and six inches high, then, is to be the size of the panel.

The baseboard is constructed of 3in. rimu, 14 by 7 inches, with a 1 by 3in. strip projecting along under the front edge and a similar strip under each end to serve as battens. A small diagram is given of the method of screwing the panel to the front edge of baseboard with strip underneath finishing flush at the front. The woodwork may be polished up with shellac dissolved in methylated spirits and rubbed on with a cotton rag.

The question of providing a cover or cabinet or not, is left to the wishes of the constructor.

## TUNING ARRANGEMENTS.

The aerial tuning condenser should have a maximum capacity of .0005 microfarads, and a tuning-coil to suit this will have 54 turns of 20's standard wire gauge enamelled wire, either wound with turns close together on a 2in. diameter cardboard or ebonite tube, or wound with a slight space between each turn and supported only by strips of celluloid, as has been described in this column several times recently. If the set is not specially for long-distance work the close winding will be quite suitable.

Those who already have a crystal set and wish to dismantle it, may have a suitable coil ready for use. The coil is placed behind the condenser, not less than an inch away.

ing, the wire cut with six inches to spare, then threaded down through one hole and out through the next. This finishes the operation of making the coil.

In connection with the aerial tuning coil, the best results are not always obtained by connecting the aerial to the top of the coil, and it is a good idea at the outset to try connection the aerial terminal to, say, the 18th turn from the bottom or earth end. The crystal connection may also be tried at this point instead of at the top. The condenser must, in every case, be connected to the extreme ends of the coil. The above idea is more important if it is proposed to attempt long-distance reception.

## DRILLING THE PANEL.

Few holes are required in the panel. The various parts should be placed in about the position shown.

is attached that plugs into either of the sockets 1 and 2. The object of this is to provide a switch so that the crystal alone can be used when desired.

To use the crystal the plug is inserted in the socket marked C on panel, and 'phones or speaker are connected to panel terminals 4 and 5. When not required, the A battery may be turned off at the rheostats, and the B battery it a dry one, by removing the wander-plug.

Holes for the three panel terminals are drilled not less than 1 1/2 inches apart.

Having made the baseboard and drilled the panel, the latter may be screwed in position by four half-inch brass screws in the holes along the bottom edge. Brass and not iron screws must be used in all radio work. It is a good idea to arrange

ranti) are now screwed in place and between them are screwed down the two valve holders, noting carefully the position for the connections P, G, and positive (plus) and negative (minus). Constructors are recommended to adopt American valve holders only, because British and other valves can all be obtained with Yankee bases, but if British holders are adopted, American valves cannot be used without an adaptor or the changing of the holder to one of the American type. The Klossner UX is suitable for amplifiers, but requires the connections soldering.

Along the back of the baseboard there is a strip of ebonite one inch wide, about eight inches long, holding six terminals. These strips should be raised above the baseboard by a small block of wood where the holding-screws are placed. Sometimes it is possible to purchase such strips with the terminals ready in place, otherwise it must be made. A similar strip 3 1/2ins. long holds the terminals for aerial (A) and earth (E) connections.

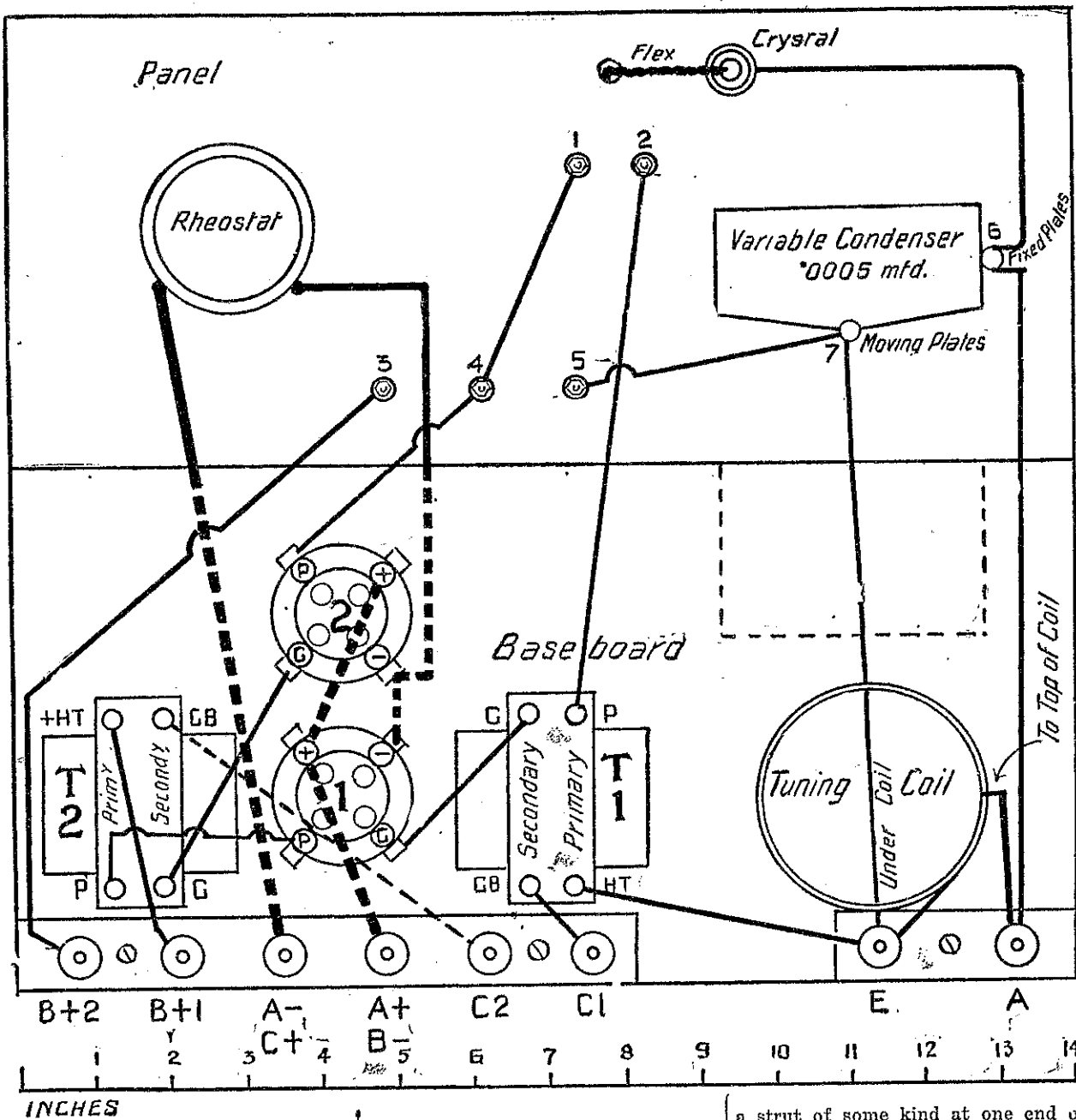
Audio transformers vary as to the way in which the terminals are marked, but the Ferranti are as shown on the diagram. Some are marked "IP, IS, OP, OS," standing for "in primary, in secondary, out primary, out secondary." In the case of the first transformer (T1) however, it is marked, the two primary terminals connect to socket 2 and the earth terminal respectively.

## WIRING-UP.

All is now ready for making the various connections, which may be made with square bus-bar wire or with tinned 18's round wire. The whole of this receiver may be wired up without soldering, unless the valve holders are of a pattern without terminals, in which case no attempt must be made to dispense with soldering. A pair of round-nosed pliers will be required in order to neatly twist a circular loop at the ends of each wire to be connected. This loop is then slipped over the top or bottom screw thread of the terminal and secured by the head or nut, as the case may be.

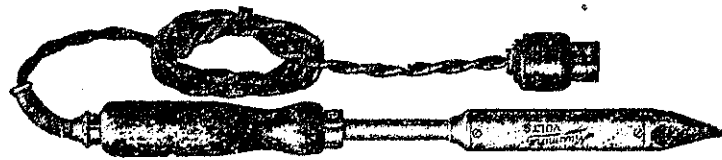
Commencing at the crystal, which will be a carborundum cartridge, if minimum trouble is desired, a loop is made on the end of the connecting wire, slipped over the thread, which is then placed in hole in panel and secured outside by the nut. The wire now continues to the outer end of the condenser and a loop is made to go over the screw thread connecting to the fixed plates. This having been secured by the nut, the wire continues to the back of the board and is bent downwards to be cut off and looped to the underside of A terminal, and at the same time the wire from the top end of the coil is cut off and the end well cleaned to loop over the same terminal, the nut then being screwed on very tightly.

A wire is now run from the back of panel terminal 5 to the moving plate connection of condenser, then continues under the coil or round the inner side, keeping it low, to loop round the E terminal under strip, and continue to one of the primary connections of transformer 1. The lower end of the tuning-coil is now connected to the E terminal and the securing nut tightly fastened, when the ebonite strip may be finally fixed



With regard to height, the condenser and rheostat centres should be just about half way. The condenser spindle should not be less than three inches from the nearest end, but the pattern of condenser will decide the position, which must be fixed before the position of the crystal can be determined, as the latter must be placed to clear the vanes of the condenser when they are at minimum position, or full out. A template is usually provided with condensers as

a strut of some kind at one end of the panel to assist in holding it upright. A short strip of wood can be cut at an angle at each end, screwed to the baseboard and the panel through a hole in the ebonite near the condenser. This having been done, components not already in the panel can be put into place. The two transformers T1 and T2 (Fer-



## ELECTRIC SOLDERING IRONS.

|               | (Post Free) |      |      |
|---------------|-------------|------|------|
| Radio Pattern | No. 10026   | 14/6 | 15/2 |
| Light Duty    | No. 10020   | 17/6 | 18/2 |
| Medium Duty   | No. 10022   | 21/- | 22/- |
| Heavy Duty    | No. 10027   | 25/- | 26/- |

Obtainable all stores, or write:

**McLEAN & ARCHBOLD**

New Zealand Agents.

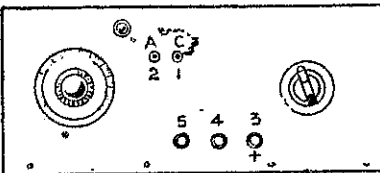
29 WILLIS STREET, Box 940. WELLINGTON.

## SILVERTOWN RADIO ACCESSORIES

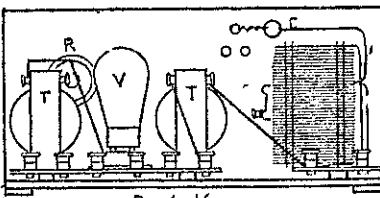
### BUY BRITISH GOODS

|                                   |                   |                                                 |                     |
|-----------------------------------|-------------------|-------------------------------------------------|---------------------|
| Interval transformers—            | 22/6 each         | Ebonite Panels, 24 x 7 x 3-16, 11/-             | 21 x 7 x 3-16, 9/6; |
| Straight line Condensers—         | .0005, 13/- each  | 19 x 7 x 3-16, 9/-                              |                     |
|                                   | .00025, 11/6 each | Filament Rheostats, 30 ohm and 6 ohm, 6/- each. |                     |
| Variable Condenser, Ebonite ends— | 9/6 each          | Antimicrophonic holders—                        | 3/- each            |
|                                   |                   | Silvertown Speakers, 70/- each                  |                     |

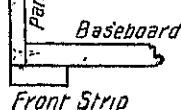
165 MANCHESTER STREET, CHRISTCHURCH.  
SILVERTOWN CO.,



Front Panel



Back View



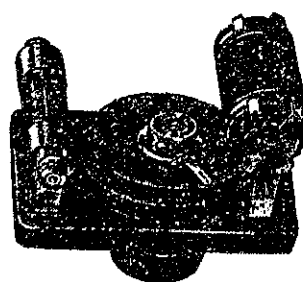
Front Strip

a guide to drilling in correct position the holes required for fixing. The Igranite rheostats have an outside indicator plate that serves as a gauge for drilling the fixing holes. The positions marked 1 and 2 at back of panel indicate two sockets that are let into the panel, and from the back of the crystal near by, a piece of flexible covered wire leads out through a hole in the panel. To the other end of the flex a split pin

## To Crystal Set Owners



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