

The HRO

Amateur Communications Receiver

THE HRO receiver is a high-frequency super-heterodyne employing nine tubes, as follows:

First R.F.	58	or 6D6
Second R.F.	58	or 6D6
First Detector	57	or 6C6
High Frequency Oscillator	57	or 6C6
First I.F.	58	or 6D6
Second I.F.	58	or 6D6
Diode Detector, AVC, First Audio	2B7	or 6B7
Second Audio	2A5	or 42
Beat Frequency Oscillator	57	or 6C6

Unless otherwise specified, all models are equipped with 6.3-volt tubes, for either A.C. or battery operation. The $2\frac{1}{2}$ -volt tubes can be used if desired, since the two types are interchangeable, but the 6.3-volt tubes are to be preferred.

For A.C. operation, the receiver is adjusted to give best performance with the National type 697 AB power unit, which delivers 230 volts at 75 milliamperes, and 6.3 volts at 3.1 amperes.

The battery model, type HRO-B, is adjusted for maximum performance with a plate potential of 180 volts at a current drain of approximately 55 milliamperes. Normal operation from A.C. lines with the HRO-B can be secured by the employment of a National type No. 5886 power pack, a unit which, under load, delivers approximately 170 volts D.C. at 50 milliamperes and 6.3 volts A.C. at 3.1 amperes.

All voltage dividers, bias requirements, etc. are built into the receiver.

Other power units may be used provided they will fulfil these specifications closely, but it is important that an adequate heater supply be furnished to compensate for the voltage drop in the heater leads of the power supply cable.

The HRO receiver has been designed around and tested with RCA or Sylvania tubes; consequently, we can vouch for its performance only when these tubes are used.

Antenna

The input circuit of the HRO is arranged for operation with either the doublet type or the single-wire type of antenna. There are two input binding posts, marked "ANT" and "GND." When using a single-wire antenna, the lead-in should be connected to the antenna post and the short flexible lead, which is connected to the chassis near the ground post, should be clamped

under the "GND" terminal. An external ground connection may or may not be necessary, depending upon the installation. The ground is usually desirable when receiving wavelengths above 100 meters, but for wavelengths below 50 meters, the use of a ground may actually weaken signals. Doublet antenna feeders should be connected directly to the input terminals and the flexible ground connection, mentioned above, is not used at all.

The input impedance of the receiver varies over the total frequency range but averages about 500 ohms.

Output Circuit

The plate circuit of the output tube is brought to the output tip jacks located at the rear left-hand side. There is no output transformer in the receiver.

The speaker requirements are not at all critical, but tone quality will, of course, depend almost entirely upon speaker characteristics. A good magnetic speaker will be satisfactory, provided it is capable of carrying the plate current of the output tube (about 30 ma.). Many magnetic speakers will require a filter system, however, and such a filter may consist of a 1-to-1 transformer, or a 30-henry choke and a 1-mfd. condenser.

Dynamic speakers are, in general, superior to the magnetic types, but if these are used some provision must be made for field excitation, since this power cannot be obtained either from the receiver or the power unit. For this reason, the permanent magnet type of dynamic speaker is recommended, no field excitation being required. The output impedance of the HRO is 7000 ohms, and a dynamic speaker must, of course, have a suitable built-in coupling transformer of 7000-ohm input impedance.

A headphone jack is located on the front panel, just below and to the right of the "S"-meter. This jack is wired into the output of the pentode section of the 6B7. When the phones are plugged in, the signal input to the last tube is completely disconnected. It is important, however, that the plate circuit of the output tube be completed at all times. If the speaker is to be disconnected, a jumper must be inserted in the tip jacks to connect them together. If this precaution is neglected, the output tube may be seriously injured.