CHAPTER SIX

Radio Receiver Construction

The receivers described in this chapter can, for the most part, be constructed with a few inexpensive hand tools. Whether one saves anything over purchasing a factory built receiver depends upon several factors (see *chapter 19*). In any event, there is the satisfaction of constructing one's own equipment, and the practical experience that can be gained only by actually building apparatus.

After finishing the wiring job it is suggested that one go over the wiring very carefully to check for errors before applying plate voltage to the receiver. If possible, have someone else check the wiring after you have gone over it yourself. Some tubes can be damaged permanently by having screen voltage applied when there is no voltage on the plate. Electrolytic condensers can be damaged permanently by hooking them up backwards (wrong polarity). Transformer, choke, and coil windings can be burned out by incorrect wiring of the high voltage leads. Most any tube can be damaged by hooking up the elements incorrectly; no tube can last long with plate voltage applied to the control grid.

Before starting construction it is suggested that one read the chapter on *Workshop Practice*.

SIMPLE TWO-TUBE AUTODYNE

A simple yet versatile receiver of modest cost is illustrated in figures 1, 2, and 3. The receiver uses an autodyne detector and one stage of impedance coupled a.f. to give good earphone volume on all signals. The circuit is quite simple, as inspection of figure 4 will disclose.

The receiver uses 6.3-volt tubes, which may be supplied heater power from either a small 6.3-volt filament transformer or a regular 6-volt auto battery. For regular home use a transformer is recommended, but the provision for use with a battery permits

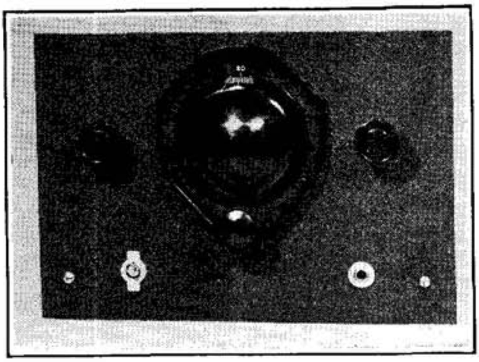

Figure 1.
SIMPLE TWO-TUBE AUTODYNE RECEIVER.
This receiver is inexpensive to build and has excellent weak signal response. While not as selective as more elaborate receivers, it makes a good set for the newcomer's first receiver.

semi-portable operation. This makes the receiver a good one for a beginner, as it can be used as a portable or emergency receiver later on should one decide to build or buy a more elaborate receiver.

Plate voltage is supplied from a standard, medium-duty 45-volt B battery. Such a battery, costing only a little over a dollar, will last over a year with normal use, as the B current drain of the receiver is only a few milliamperes. This voltage is sufficient for good performance of the receiver, because the full plate voltage is supplied to the detector as a result of the use of a choke (CH_1) instead of the usual plate resistor in the plate circuit of the detector. Also, the *amplification* of the 6C5 is practically as great at 45 volts as at the full maximum rated voltage of 250 volts. The maximum undistorted power output of the a.f. stage is considerably less at 45 volts, but as it is more than sufficient to drive a pair of phones, there is no point in using higher plate voltage. For these reasons a single B battery was decided upon in preference to an a.c. power pack, because the battery is not only much less expensive but permits portable operation.

When wired as shown in the diagram, the receiver should not be used with higher plate voltage, because the screen potentiometer is across the full plate voltage, and also because the $1\frac{1}{4}$-volt bias on the 6C5 is not sufficient for higher plate voltage.

The receiver can be built for about $12, including B battery and midget filament transformer, provided inexpensive components are chosen.

While the receiver will operate on 10 meters and a 10 meter coil is included in the coil table, the receiver is designed primarily for 20-, 40-, and 80-meter operation. No matter how well constructed, an autodyne receiver is not particularly effective on 10 meters, especially on phone. No provision was made for 160-meter operation, as the receiver does not have sufficient selectivity to distinguish between several very loud phone signals in the same part of the band.

For 20-, 40-, and 80-meter operation the receiver compares favorably with the most expensive when it comes to picking up weak, distant stations, especially on c.w. However, loud local signals have a tendency to block it, and therefore more trouble will be experienced with QRM than with a superheterodyne.

The chassis consists of a 6x9 inch Masonite "presdwood" top and $1\frac{3}{4}$-inch back of the same material. These are fastened to two pieces of wood which form the sides of the chassis. The wooden sides are $1\frac{3}{4}$ inch high, $\frac{3}{4}$ inch thick, and are 6 inches long, *including* the Masonite back. The whole thing is held together with wood screws as may be seen in figures 2 and 4, and a 7-inch by 11-inch metal front panel is attached to the chassis by means of wood screws sunk in the wooden end pieces of the chassis.

Inexpensive wafer sockets are used. Because the thickness of the chassis would make it necessary to drill holes large enough to take the whole tube base if the sockets were mounted below the chassis as is customary

COIL TABLE
For Two-Tube Autodyne

All coils wound with no. 22. d.c.c. on standard 1½-inch forms

80 M.	29 turns close wound; cathode tap 1½ turns from ground
40 M.	16 turns spaced 1¾ inches; cathode tap 1½ turns from ground
20 M.	7 turns spaced 1¼ inches; cathode tap 1½ turns from ground
10 M.	4 turns spaced 1¼ inches; cathode tap 1 turn from ground

Figure 2.
BACK VIEW OF THE TWO-TUBE AUTODYNE.
The chassis is made of wood and Masonite wall board. The "shield hat" for the grid leak and condenser hide most of the main tuning condenser.

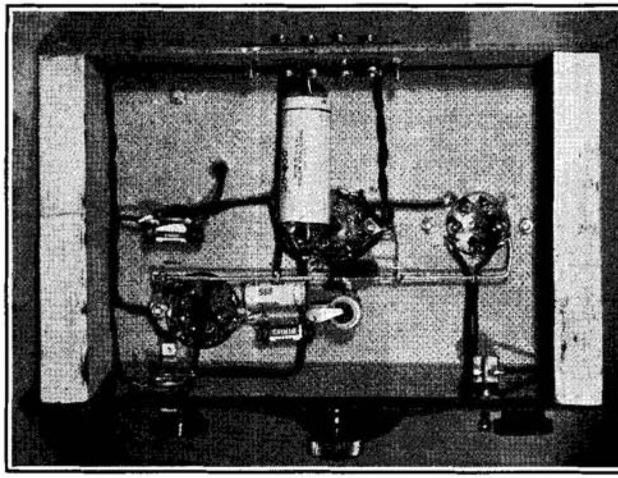

Figure 3.
UNDER-CHASSIS VIEW OF TWO-TUBE AUTODYNE.
The construction of the chassis and placement of components is clearly illustrated. If desired the phone jack may be mounted on the back of the chassis.

with metal chassis, the sockets are mounted on *top* of the chassis. This is clearly illustrated in the photographs.

Correct connection of the socket terminals can be assured by referring to the socket connections for the 6J7 and 6C5 in *Chapter 5*. Bear in mind that these are bottom views of the sockets, with the socket facing you the same as when soldering to the terminals from the underside of the chassis.

Connections for filament and plate power are made by means of a terminal strip which is mounted over a hole cut in the back of the chassis. If you do not have the proper tools for cutting out a long, rectangular hole, four separate holes about 3/8 inch in diameter will take the terminal screws and lugs. If desired, the terminal strip can be replaced by four Fahnestock clips screwed directly to the back of the chassis.

The phone jack is shown mounted on the front panel, along with a toggle switch in the B plus lead. If mounted on the metal front panel, the phone jack must be insulated from the panel by means of fiber washers to prevent shorting the plate voltage. The jack

Figure 4.
WIRING DIAGRAM OF TWO-TUBE AUTODYNE.
By substituting a 6S7 for the 6J7 and a 6L5-G for the 6C5, the receiver can be run economically from dry cells for heater power. Only 4½ volts is required, and three no. 6 dry cells will give over 150 hours life.

C_1—15-$\mu\mu$fd. midget variable
C_2—100-$\mu\mu$fd. midget variable
C_3—100-$\mu\mu$fd. smallest size mica condenser
C_4—0.25-μfd. tubular, 400 v.
C_5—.0005-μfd. midget mica
C_6—.01-μfd. tubular, 400 v.
R_1—3 meg., ½ watt
R_2—50,000 ohm pot.
R_3—0.25 meg., ½ watt
R_4—0.5 meg., ½ watt
BC—1¼-volt bias cell
CH—300 or more hy., 5 ma.
L_1—See coil table