

INSTRUCTIONS FOR  
**INSTALLING**  
*and*  
**OPERATING**



THE TYPE 400

**GENERAL RADIO**  
POWER AMPLIFIER  
AND  
PLATE SUPPLY

MANUFACTURED BY  
**GENERAL RADIO COMPANY**  
30 State Street,      -      -      Cambridge, Mass., U.S.A.

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# INSTALLATION

## AND

# OPERATION



### Placing the 400 Unit with Relation to Receiving Set

When used with a highly sensitive radio set the Power Amplifier should be located at least three and preferably five feet away. If used with a less sensitive receiver it may be found on trial that a smaller distance will be satisfactory. On the other hand, a much greater separation is not desirable. The attachment plug and cord, extended if necessary, should run to a lighting receptacle or wall outlet supplying 60-cycle current at a voltage from 110 to 115. This cord should be kept as far as practicable from all wires leading to the radio set, including antenna and ground.

### To Insert Tubes

Remove the cover of the instrument and insert a UX-213 or CX-313 Rectron tube into the socket which is below the snap switch. The two large prongs on the tube base must, of course, go into the two large holes in the socket. Do not attempt to use any other form of rectifying tube than the UX-213 or CX-313.

Insert a UX-171 or CX-371 amplifier tube into the other socket. The Power Amplifier is designed for this type of tube. The cover may now be replaced and the outfit will require no further attention except, of course, to operate the snap switch when the instrument is used.

### Making Connections to Set and Speaker

The necessary number of wires for carrying the plate potentials to the set may be run in the usual manner. The output or "phone" terminals of the radio receiver should be connected to the input terminals of the power amplifier by a two conductor telephone cord or a pair of twisted wires, which should be kept separate from the plate leads. A similar cord should be used to connect the output terminals of the Power Amplifier to the loudspeaker.

Under certain conditions an improvement in quality may be obtained merely by interchanging the two leads at the input terminal posts.

The majority of radio sets have either the positive or negative filament terminal connected to ground. This provides a sufficient grounding for the Plate Supply Unit. With sets wherein the filaments are not grounded and those employing an ungrounded loop it may be advisable to ground one side of the filament directly, or, if this is not desirable, to ground it through a condenser of from two to four MF capacity. This ground is unnecessary in many cases, but under certain conditions it is desirable in order to cut out a slight alternating current hum which might otherwise be perceptible in the loudspeaker. If the instrument is used merely as a power amplifier it may be desirable to ground the B- terminal.

The B- terminal of the Plate Supply Unit should, of course, be connected directly to the B- terminal of the radio set. As stated previously, there are three different B+ taps available. The detector tube and such amplifier tubes as are normally operated on detector tube voltage should be fed from the +45 volt tap of the unit. The amplifier tubes requiring a higher voltage may be connected to the +90 or +130 volt terminal. No specific rule covering all cases can be given. The best procedure is to try each of these high-voltage terminals and ascertain which one gives the better results. In general it may be said that sets employing more than four tubes fed from the high-voltage terminal will probably require connection to the +130 volt tap. It is, of course, necessary that the grids of the amplifier tubes be properly biased, especially when using the highest voltage terminal.

### Measuring Plate Voltages

A word of caution should be inserted here concerning the attempt to measure the voltages at the terminals of this unit. The ordinary voltmeter draws so much current that the increased load on the Unit lowers the voltage considerably so that the readings of such a meter are meaningless unless the current through the meter is known and taken into account. Accurate voltage measurements may be obtained by using a five milliamperere meter with a 100,000 ohm resistance connected in series with it. This constitutes a 500 volt-meter and draws only one milliamperere per 100 volts deflection which does not unduly lower the voltage reading.

Tests have shown that, on the average, with the UX-171 or CX-371 tube in circuit, the open-circuit voltage at the +45 volt terminal is about 50 and that it drops at a uniform rate of about 2.35 volts per milliamperere load

drawn from this terminal. The open-circuit voltage at the +90 volt terminal is about 118 and this drops at a uniform rate of approximately 3.57 volts per milliampere load drawn from this terminal. At the +130 volt terminal the open-circuit voltage is about 179. This undergoes an approximate drop of 2.92 volts for each milliampere load drawn from this high-voltage terminal.

When receiving relatively strong signals from a local broadcasting station it will frequently be found sufficient to connect the Power Amplifier into the circuits directly after the detector. On the other hand, in many cases a better quality of reception with desirable intensity will be produced by using one stage of audio amplification in the radio set prior to the Power Amplifier. Only in rare cases would it be desirable to attempt to use two stages of audio amplification in the radio set.

When properly installed the instrument should operate in a reliable and satisfactory manner. Care must be taken that the tubes of the radio set, both detector and amplifiers, are not overloaded and are properly biased. As stated previously, a reversal of the leads at the input terminals of the power amplifier may be necessary to stabilize this instrument properly.

It is possible to use either the type UX-112, UX-210, CX-212, or CX-310, tube as the power amplifier by the UX-171 or CX-371 tube is recommended for the best quality of reproduction.