WESTINGHOUSE

LOW GRID CURRENT AMPLIFIER TUBE

TYPE RJ-550

INSTRUCTIONS

Westinghouse Electric & Manufacturing Company

East Pittsburgh Works, East Pittsburgh, Pa.

I. L. 1945

DESCRIPTION

The RJ-550 is an amplifier tube of the high vacuum type. It was designed primarily as a low grid current type amplifier tube but may be used also as a general purpose amplifier. The filament is oxide coated, is of rugged construction and is designed to give long life.

This tube is for the same general purpose as the RJ-553 tube. The RJ-550 tube has on the average about 25% more grid current than the RJ-553, each at their test points. The RJ-553 tube may be used at higher plate current than the RJ-550. For many applications of amplifying photo tube currents, the RJ-550 is recommended from the standpoint of economy. Where conditions warrant the use of a very long life tube with grid current somewhat lower than the RJ-550, the RJ-553 is recommended.

Ratings:

Maximum Plate Voltage d-c. (volts)	220
Maximum Average Current d-c. (milliamperes)	12
Maximum Crest Voltage (volts)	325
Maximum Crest Current (milliamperes)	20
Recommended Plate Voltage d-c. (volts)	45 to 115
Recommended Plate Voltage r.m.s. (volts)	45 to 115
Maximum Ambient Temperature	70°C. (160°F.)

Operating Conditions and Characteristics of an Average Tube:

Filament Voltage (volts)	2.5
Filament Current (amperes)	.92
Plate Voltage (volts)	95.
Plate Current (milliamperes)	6.0
Grid Voltage (volts)	—5 for d-c. filament —6.25 for a-c. filament
Grid Current (microamperes)	.01 (maximum)
Amplification Factor	8.5
Plate Resistance (ohms)	5150
Mutual Conductance (micromhos)	1650

INSTALLATION

See outline drawing Figure 1 for basing connections and overall dimensions. Socket style 766732 may be used. The tube is based in the new industrial base No. 411.

The base is made from very high quality moulded material. Socket style 766732 is also made of this high grade material. When this tube is used to amplify very small currents, it is necessary that the socket be made of very high resistance material and that the entire grid circuit be as well insulated. Ordinary grades of sheet and moulded materials are not sufficiently good. The resistance between socket contacts

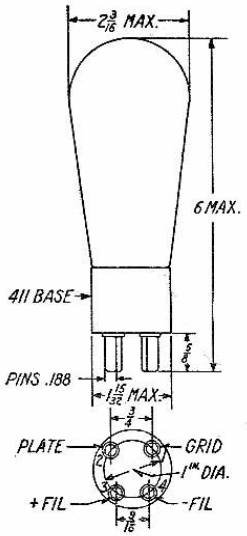


FIG. 1—TYPE RJ-550 TUBE AND BASE DIMENSIONS

should be at least several thousand megohms. Some materials are very good when dry, but very poor when moist. For reliable operation, all voltages must remain constant. In many cases, either a-c. or d-c. may be used to supply voltage to the different electrodes.

The characteristics shown in this leaflet are typical and it must be understood that individual tubes will vary from these values, some being higher and some lower. If, therefore, the purchaser wishes to design a circuit in which it is desirable to replace tubes interchangeably and without circuit adjustment, it is recommended that further information be obtained from the Sales Office which supplied the tubes, to determine whether the circuit provides for necessary variation from tube to tube.

OPERATION

When this tube is used either to measure very small currents or in a calibrated device, it should be operated at approximately its normal working condition for several hours unless it has been used recently, in which case a few minutes of operation may be sufficient for the plate current to reach a constant value. For very careful measurements, the most difficult problem is to keep the voltages constant. If the tube is to be used in a calibrated circuit, greater accuracy may be obtained if a variable grid bias is

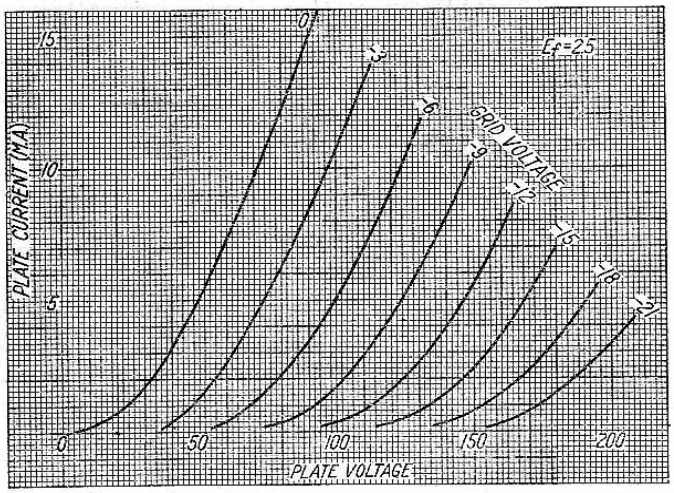


FIG. 2—PLATE CHARACTERISTIC

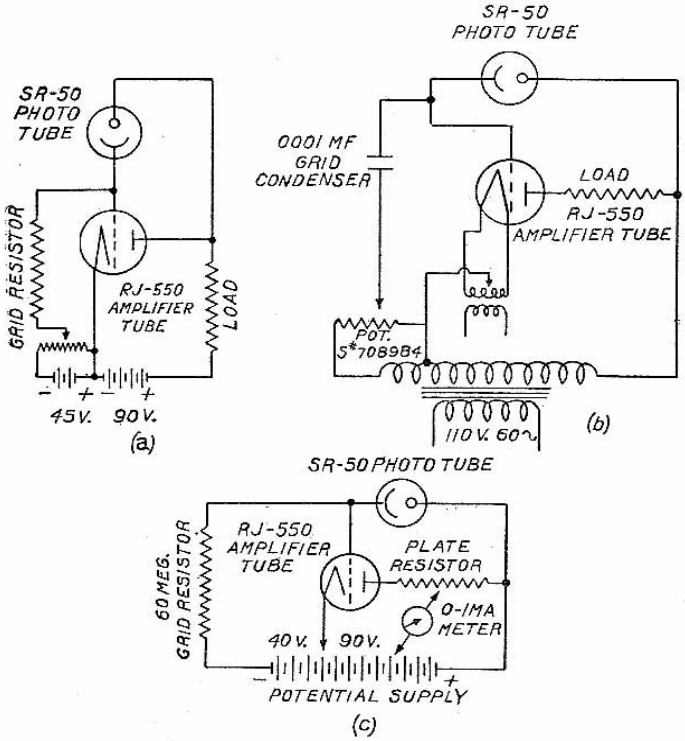
provided so that the plate current may be set to a predetermined value with a known input condition. Additional information may be obtained from the characteristic curves of figures 2, 3 and 4. The curve of figure 5 shows how the plate current varies in a typical case with ambient temperature with circuit constants as shown in the diagram of figure 6. This change in plate current is due to a change in grid current with a change in ambient temperature. For design purposes, the following statement may be considered. "The tubes when measured at a plate voltage of 95, a grid bias of −5 and with a 30 megohm grid resistor should not vary more than one milliampere in plate current over the temperature range from 0°C. to 70°C. from the value obtained at 25°C. (room temperature)."

The grid current increases almost directly proportionately to increase in negative grid bias. It is, therefore, very desirable to keep the negative grid bias as low as is practical so long as it is sufficient to keep electrons from flowing to the grid. Usually, 2 to 3 volts negative is sufficient. Where very small grid currents are necessary, it is better to operate at quite low plate voltage so that the negative grid bias may be kept relatively small.

Grid resistances or impedances of 10 to 50 megohms are generally used for commercial applications. Values much higher than these may be used for experimental use and certain special applications.

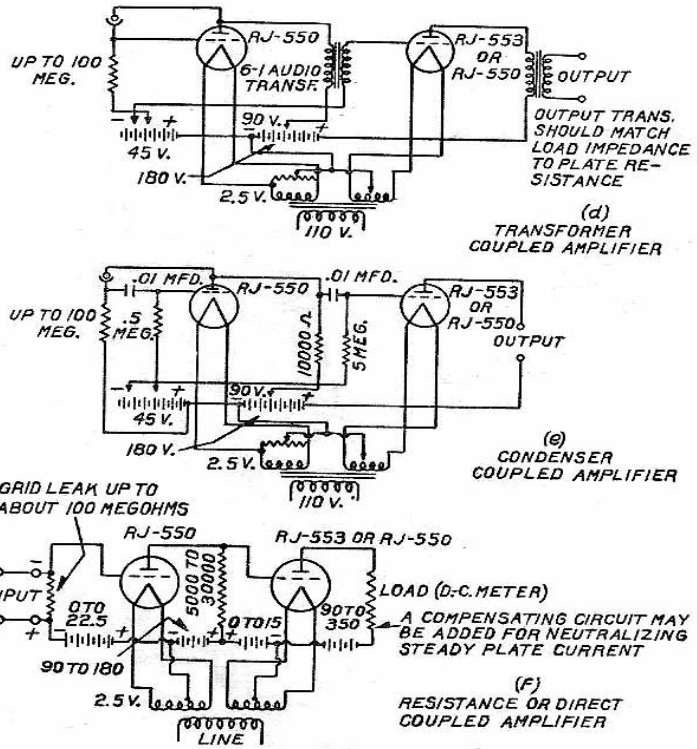
APPLICATIONS AND TYPICAL CIRCUITS

One of the most common uses for this tube is the amplification of photo tube currents. Many different circuits may be devised, a few of which are indicated. In some of these circuits, constants are given for the SR-50 photo tube. Other photo tubes are available for use in similar circuits, although the circuit constants may be different.



(a) - D-C. OPERATED UNIT
(b) - A-C: OPERATED UNIT
(c) - D-C. OPERATED UNIT WITH NEUTRALIZED PLATE CURRENT

Westinghouse manufactures many complete devices incorporating circuits similar to those shown. These devices are designed for specific application in many cases. For experimental purposes, the Photo Tube Amplifier Unit is available. It contains all of the sensitive circuit in a moisture and dust proof case and provides convenient mounting for the amplifier tube and photo tube. Information on complete apparatus or special circuits may be obtained through the nearest Westinghouse District Office.



IN GENERAL IT WILL BE NECESSARY TO USE BATTERIES FOR PLATE AND BIAS VOLTAGES AS RECTIFIED A-C. VOLTAGE WILL INTRODUCE UNDESIRABLE SLOW VARIATIONS, BUT UNDER CERTAIN CONDITIONS THE BATTERIES MAY BE REPLACED BY A RESISTANCE VOLTAGE DIVIDER FED FROM THE RECIFIER

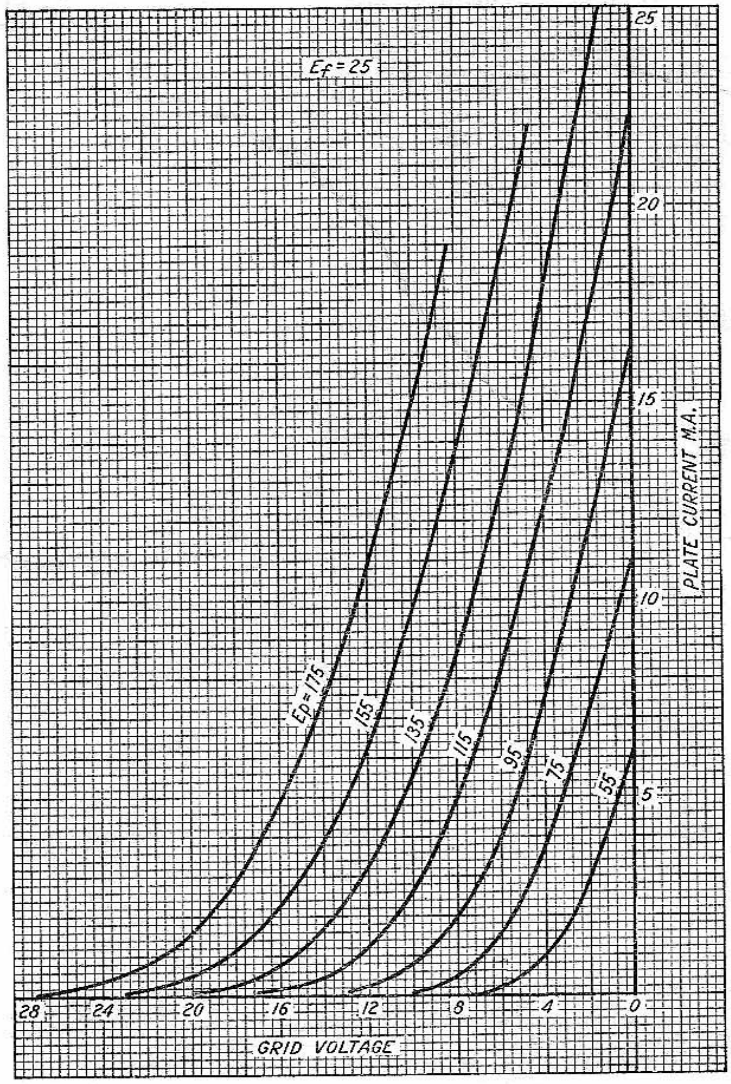


FIG. 3—MUTUAL CHARACTERISTIC

Westinghouse Low Grid Current Amplifier Tube

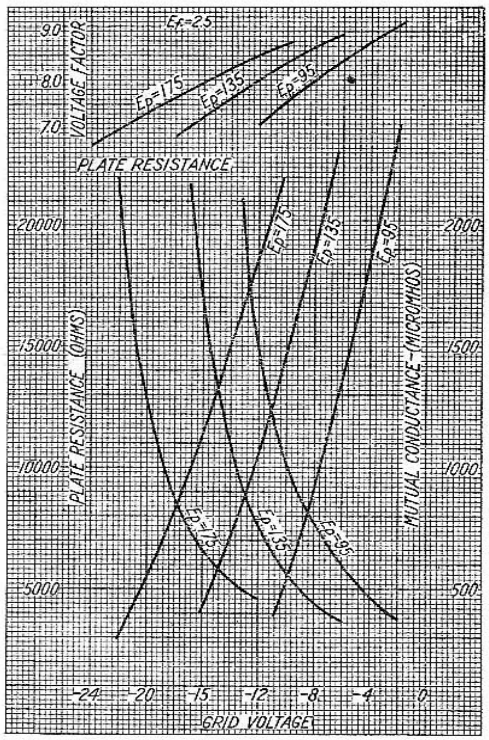


FIG. 4—AVERAGE CHARACTERISTICS

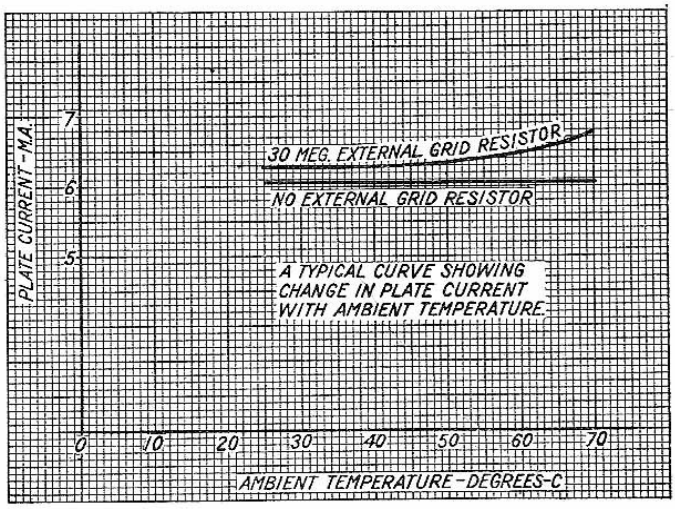


FIG. 5—AMPLIFIER TUBE

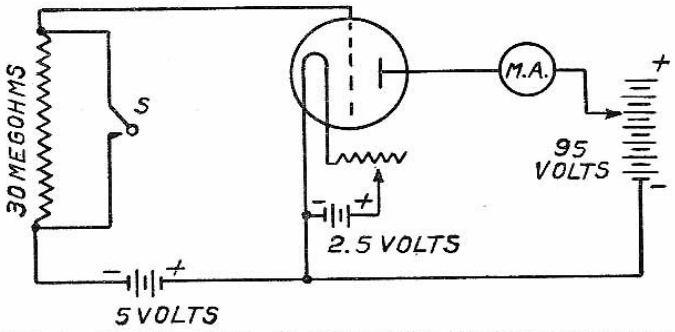


FIG. 6—CIRCUIT USED IN OBTAINING CHARACTERISTICS SHOWN IN FIG. 5

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