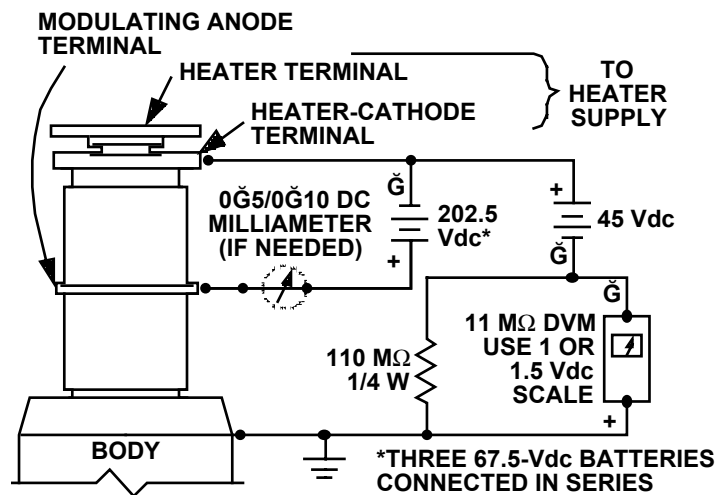


INTRODUCTION

This bulletin describes a simple method for determining vacuum quality in any klystron that is equipped with a modulating anode but does not have an integral VacIon[®] pump.

To perform this gas check, the klystron electron gun operates as a triode ionization gauge, as shown in the circuit diagram. The tube may be checked either while installed in its electromagnet or in its shipping container, provided the gun clamp is removed.



EQUIPMENT

The following equipment is required:

- 1 Digital Voltmeter (DVM)—11-M Ω resistance
- 1 110-M Ω , 1/4-W Resistor
- 1 45-V Battery
- 3 67.5-V Batteries
- 1 0–5 or 0–10 DC Milliammeter (not always needed)

Generally, a DVM is satisfactory. However, if a DVM having an input resistance other than 11 megohms is used, the 110-megohm (5×22 M Ω) metering resistance should be changed so the parallel resistance is about 10 megohms. Batteries are preferred over power supplies operating from an ac line, since they do not introduce ground loops or stray pickup. Because the current drain is low, the batteries should last almost their full shelf life.

PROCEDURE

Carefully make all circuit connections as shown in the diagram, keeping the connecting leads short. If the transmitter heater supply is to be used, disconnect the negative high-voltage supply lead from the klystron cathode. Next, warm up the DVM but do *not* apply heater voltage. The DVM reading should be near zero with very little needle fluctuation. (Body motion near the test circuit or tube may cause some meter fluctuation.) If there is an appreciable meter reading, check for leakage paths and/or clean the exposed ceramics with alcohol. When all circuit connections have been correctly made and leakage has been minimized, apply heater voltage and allow 5 to 15 minutes for the cathode to warm up. (Any small amount of leakage current that may be observed should just be subtracted from the total gas-current reading indicated on the DVM.)

While the heater and cathode are warming up, the DVM reading usually rises to a peak value, then reduces somewhat until it finally stabilizes. A stable reading below 0.01 microamperes (0.1 volt on the DVM) indicates an excellent vacuum within the klystron. The vacuum is considered satisfactory if the gas current is below 0.5 microamperes (< 5.0 volts on the DVM). When a DVM reading of 5.0 volts or more is obtained, the vacuum within the tube envelope is degraded; the tube should be put in service for several days to reduce the gas current below 0.5 microamperes.

If no detectable DVM reading is obtained, insert a 0–5 or 0–10 dc milliammeter in series with the 202.5-volt battery (three 67.5-volt batteries connected in series) between the cathode and modulating anode. Circuit elements other than the heater supply, the 202.5-volt battery, and the milliammeter may or may not be left connected, as desired. With the heater on, a normal tube produces a reading of from 1 to 4 milliamperes; in this case, the gas pressure in the tube is too low for the DVM to respond.

CAUTION

Never energize the heater for more than one-half hour without providing auxiliary forced-air cooling.

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