

# OPERATING INSTRUCTIONS

## FOR

### TYPE 664-A

### THERMOCOUPLE

**CAUTION** The input voltage should never exceed 7 volts. The heater will burn out at an input of about 10 volts. The input terminal is the terminal marked AC in the sketch.

**INSTALLATION** For best results the thermocouple should be mounted in a hole cut in the case of a shielded oscillator. Leads connected to the input terminal AC may be as long as desired. The DC lead from the junction should be kept away from strong high-frequency fields, and, connection to it should be made in such a manner as to avoid circulating currents in the junction. The output leads should be very short for work at high frequencies. Above 100 Mc, it is even desirable to remove the binding posts. It should be remembered that while the voltage may be accurate at the terminals, the inductance of even very short leads may cause serious trouble.

**ACCURACY** The heater consists of 0.002" carbon wire. It has a resistance of approximately 200 ohms and a computed inductance of approximately 6 cm

(0.006 uh), giving a reactance of 40 ohms at 1000 Mc with a corresponding computed error in resistance of 2%. Computed skin effect and estimated error due to capacity of insulating bead are negligible. As yet no independent check has been made on the accuracy at high frequencies. Until means can be found for making such a check, no guarantee can be made.

**CALIBRATION AND USE** Carbon wire has been used for the heater to insure perfect freedom from the magnetic effects often present in metallic alloys and also to provide a relatively high voltage range. These were gained at the expense of the other features; carbon has a very bad temperature coefficient of resistance and is not very permanent. For this reason frequent calibration is necessary. A convenient way of doing this consists of connecting the heater through a condenser to an oscillator, calibrating the couple each time it is used by plugging a d-c source in at the output terminals and setting the dc for an equal output deflection.

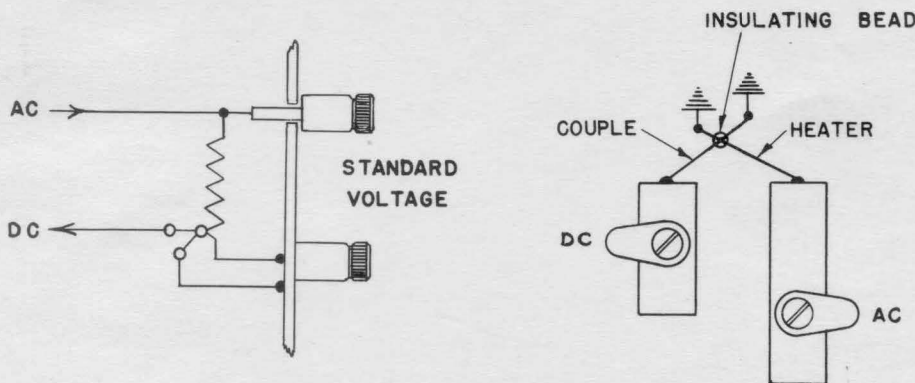


FIGURE 1. (Left) Wiring diagram of the voltage standard showing the arrangement of output terminals. (Right) Sketch of the interior, showing the heater and couple terminals

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