

INSTRUCTION MANUAL
FOR
MODEL 6300 TERMALINE[®]
THERMAL WATTMETER

Bird Electronic Corporation
Cleveland 39, Ohio

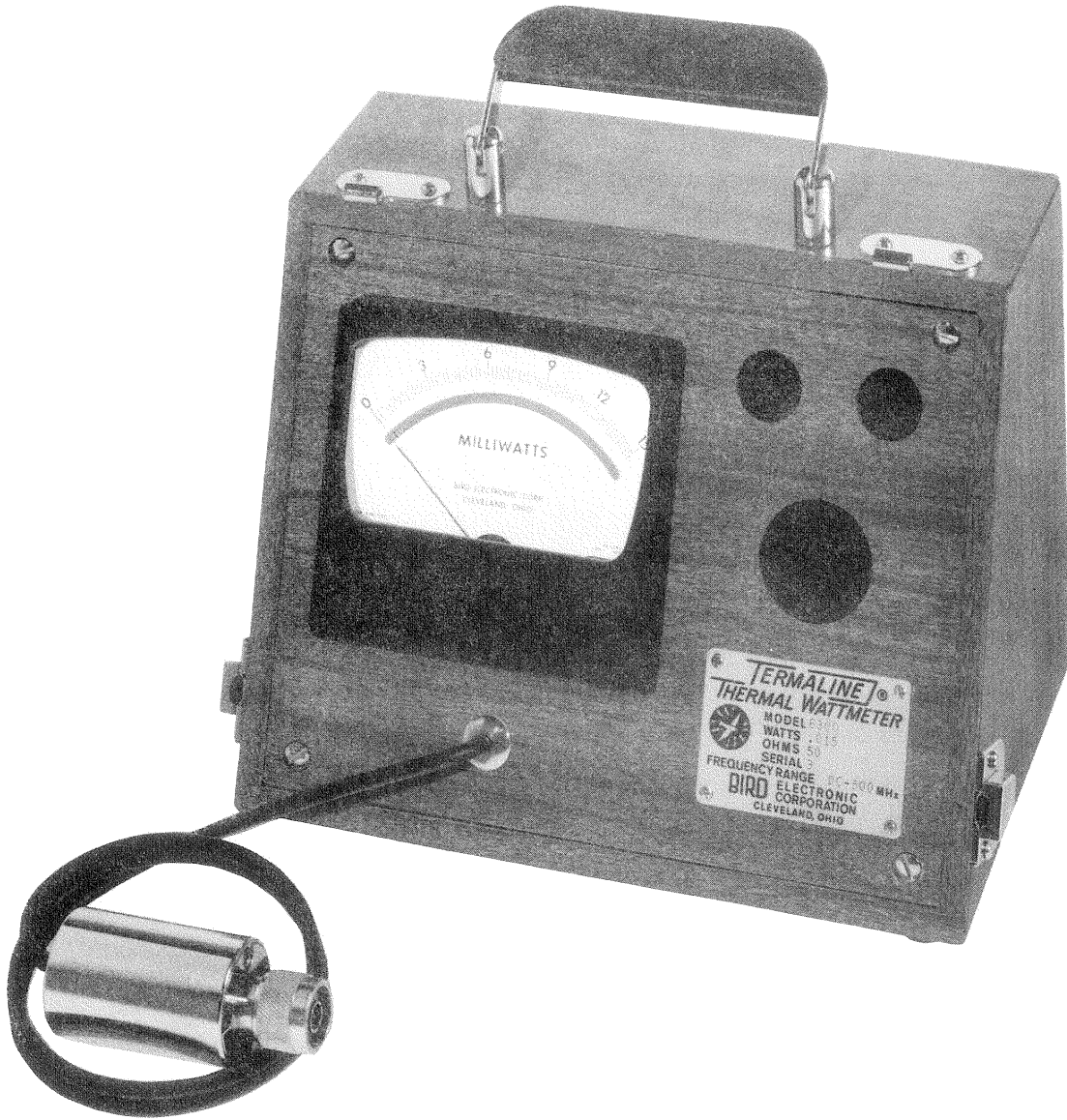


Fig. 1 View of Model 6300 Thermal Wattmeter

Model 6300 Thermal Wattmeter

Summary of Characteristics

Power Range	15 Milliwatts Full Scale
Input Impedance	50 Ohms
Input VSWR	1.10 Max.
Input Connector	Male "N"
Ambient Temperature	+20°C to +35°C
Frequency	DC - 500 MHz*
Frequency Deviation	±2% (Exclusive of Mismatch Loss)
D.C. Calibration	±2% of Full Scale
Meter	4-1/2" Mirror-Backed Taut-Band Millivoltmeter.
Thermocouple	Insulated UHF Vacuum Type
Zero Drift Adjust	Not Required
External Power Source	Not Required

* Except for the frequency range from 0.1 Hz to 25 Hz.

Model 6300 Thermal Wattmeter

Section I - General Description

The Model 6300 Thermal Wattmeter is a termination type instrument that will read true RMS values, regardless of waveform. It basically consists of a vacuum thermocouple (sometimes known as a thermal converter) and a sensitive D.C. Millivoltmeter. The current to be measured passes through the heater, causing a rise in temperature of the heater wire and generating a D.C. voltage in the thermo-junction proportionate to the temperature rise. The output generated is measured on a millivoltmeter calibrated directly in milliwatts.

Since the thermo-electric E.M.F. is dependent on the heating effect of the current being measured, the instrument may be calibrated on D.C. and the same calibrations will hold for A.C.

The high frequency performance of thermocouples is limited mainly by the skin effect of the heater, which increases with frequency and also with the diameter of the heater wire. By using specially designed thermocouples the frequency response can be made relatively constant from DC to 500 MHz.

Section II - Theory of Operation

The vacuum thermocouple has for many years been utilized as a highly accurate A.C. - D.C. transfer standard in A.C. measuring instruments. It is generally accepted as the most accurate means of accomplishing this measurement.

Basically the vacuum thermocouple consists of two junctions, referred to as the hot and cold junctions. The hot junction is activated by a small heater, which carries the current to be measured. The temperature to which the junction is raised is proportional to the ambient temperature at which it started, plus the heat generated in the heater, I^2R , where R is the resistance of the heater wire. The second junction remains at ambient temperature, and since the effective thermo-electric E.M.F. produced is proportional to the difference in temperature between the two junctions, it is approximately proportional to I^2R . Thus, by measuring the thermo-electric E.M.F. on a suitable calibrated D.C. millivoltmeter, a direct indication is given of I^2 .

SECTION III - OPERATION

The Model 6300 Thermal Milliwattmeter is a portable instrument with no external power required for operation. There is no range switching or zero drift adjustments required.

Before applying power, check mechanical zero position of meter pointer and readjust if necessary. Make certain the power applied to the input of the Thermocouple Head does not exceed its rating of 15 milliwatts.

The input VSWR of the Thermocouple Head is normally less than 1.05 and will result in a very low mismatch loss if suitable 50-ohm connection is made to it.

An accurate D.C. calibration of this instrument will result in a Milliwattmeter with a frequency deviation up to 500 MHz of only $\pm 2\%$.

The RF signal being measured should always be well filtered and without significant modulation products. Harmonic signal should be at least 40 dB down from the fundamental being measured.

SECTION IV - MAINTENANCE

The Model 6300 Thermal Wattmeter should be relatively trouble free if properly used and reasonable care is taken in handling. Hard blows to the head or meter could result in permanent damage. The cable assembly should not be excessively distorted or stretched.

The Model 6300 is not field repairable and should be returned to the factory when work is required. Contact the Bird Electronic Corporation Customer Service department before returning.

CAUTION:

Do not apply more than 20 Milliwatts to the instrument or permanent damage to the thermocouple will result.

Bird Electronic Corporation
Cleveland 39, Ohio