OPERATING INSTRUCTIONS

for

TYPE 583-A OUTPUT-POWER METER

1 INTRODUCTION.

1.1 PURPOSE. The Type 583-A Output-Power Meter (Figure 1) gives a direct indication of the power output of audio-frequency circuits, and can be used to test amplifiers, transformers, oscillators, filters, and similar networks. The Output-Power Meter can also be used to measure the effect of load impedance on power delivered, and the characteristic impedance of telephone lines, phonograph pickups, oscillators, and similar equipment can be found by determination of the impedance that gives maximum power output. In the testing of radio receivers, the Output-Power Meter is very useful as an output indicator for standard selectivity, sensitivity and bandwidth tests; an auxiliary decibel scale is furnished on the meter for this purpose.

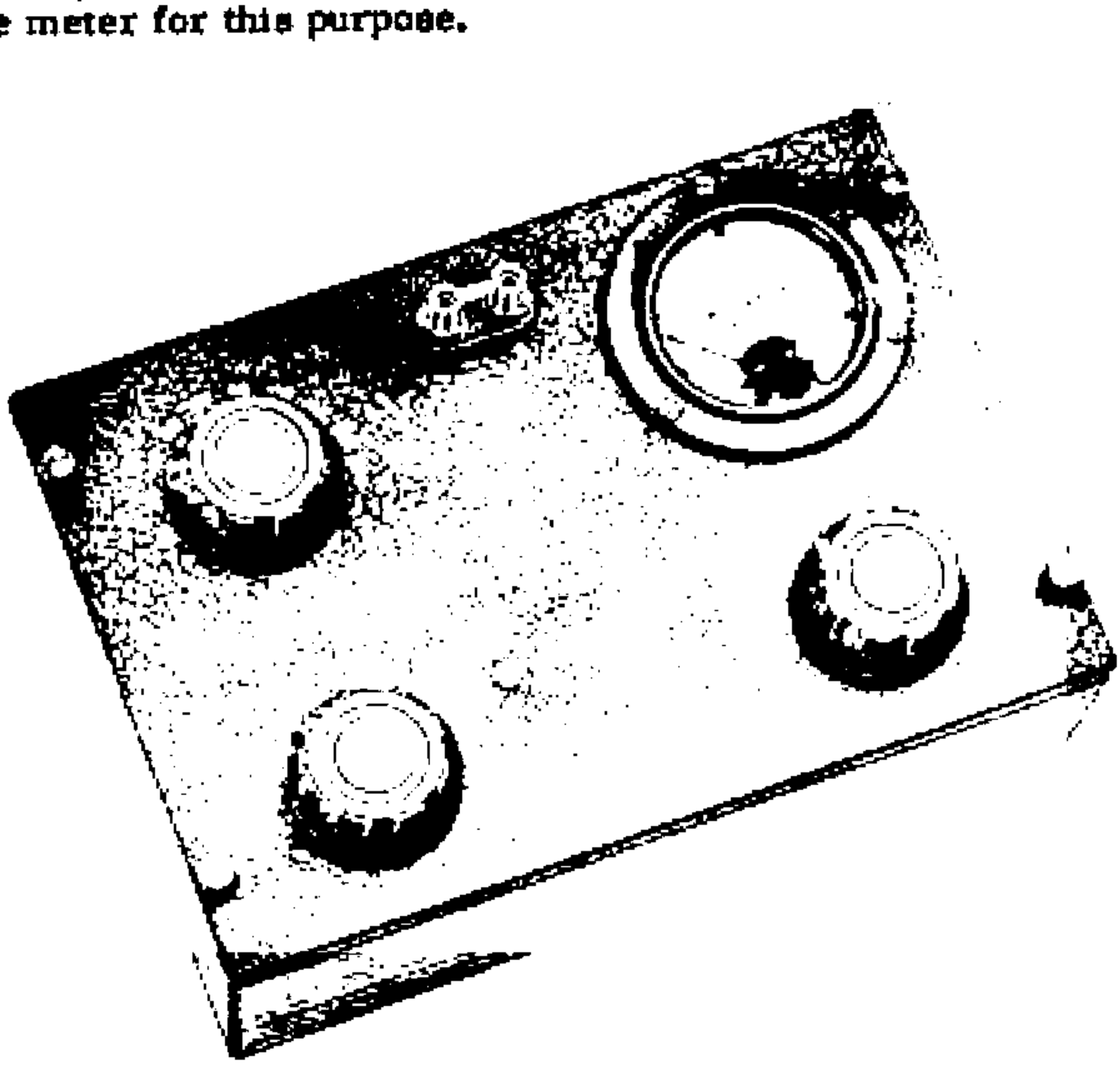

Figure 1. Type 583-A Output-Power Meter.

1.2 DESCRIPTION.

1.2.1 GENERAL. (See Figure 2.) The Output-Power Meter is functionally an adjustable load impedance, with a voltmeter calibrated directly in watts dissipated in the load. The input is actually connected through a multitap transformer and a resistance network to the output meter.

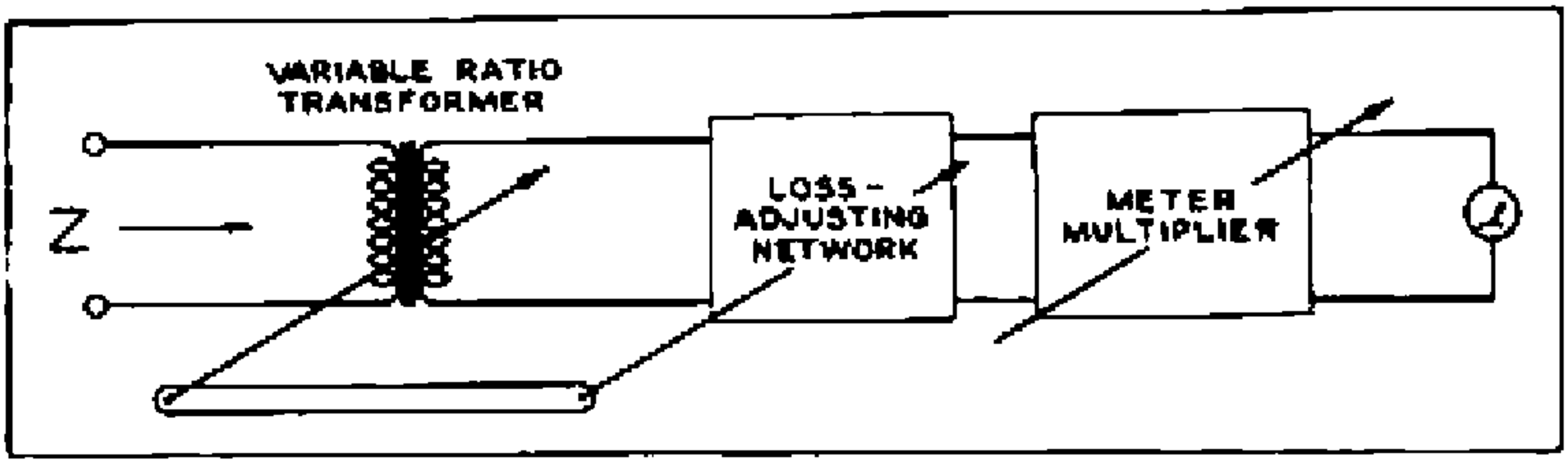

Figure 2. Schematic Diagram of Type 583-A Output-Power Meter.

1.2.2 CONTROLS AND CONNECTIONS. The following controls and connections are on the front panel of the instrument:

Name	Type	Function
none	jack-top binding posts(2)	Output from circuit under test should be connected here. Post marked G is ground.
IMPEDANCE OHMS	10-position selector switch	Product of these settings equals load impedance.
MULTIPLIER	4-position selector switch	Forty steps, from 2.5 to 20,000 ohms, are available.
MULTIPLIER DECIBELS	4-position selector switch	Selects power range.

2 OPERATION. To measure the power that a circuit can deliver into a given impedance, simply connect the circuit output terminals to the Output-Power Meter input terminals, set the load impedance to the desired value, and determine the power output from the meter indication and the meter MULTIPLIER (DECIBELS) switch setting.

The Output-Power Meter can also measure the internal impedance of the circuit under test, since that impedance equals the impedance into which maximum power is delivered.

You may want to know the loss in a transformer working from a source. In such an application, determine the maximum output from the source, then insert the transformer between the source and the Output-Power Meter and determine the maximum output from the transformer. The difference in the two readings on the db (upper) scale equals the loss in the transformer.

3 ACCURACY OF MEASUREMENT.

3.1 GENERAL. The Output-Power Meter is not intended to be a precision instrument, and the uses for which it is designed usually do not justify precision methods. It combines convenience and wide range with a reasonable degree of accuracy, and permits high accuracy over a somewhat smaller range.

3.2 POWER ERROR. The error in full-scale power reading does not exceed 0.5 decibel between 150 and 2500 cycles, nor does it exceed 1.5 decibels at 20 and 10,000 cycles. The average error at 30 and 5000 cycles is 0.3 decibel. Somewhat larger errors occur at the high and low ends of the useful frequency range. At 20 and 10,000 cycles the average error is 0.6 decibel.

3.3 IMPEDANCE ERROR. Between 150 and 3000 cycles the impedance error does not exceed 7 percent. The average error at 30 and 5000 cycles is 8 percent. At frequency extremes the impedance error increases, and the average error at 20 and 10,000 cycles is 20 percent.

Figure 3 shows power output plotted against load resistance for a generator with an internal impedance of 500 ohms. An analysis of the accuracy figures with reference to this curve shows that errors are negligible over most of the frequency range.

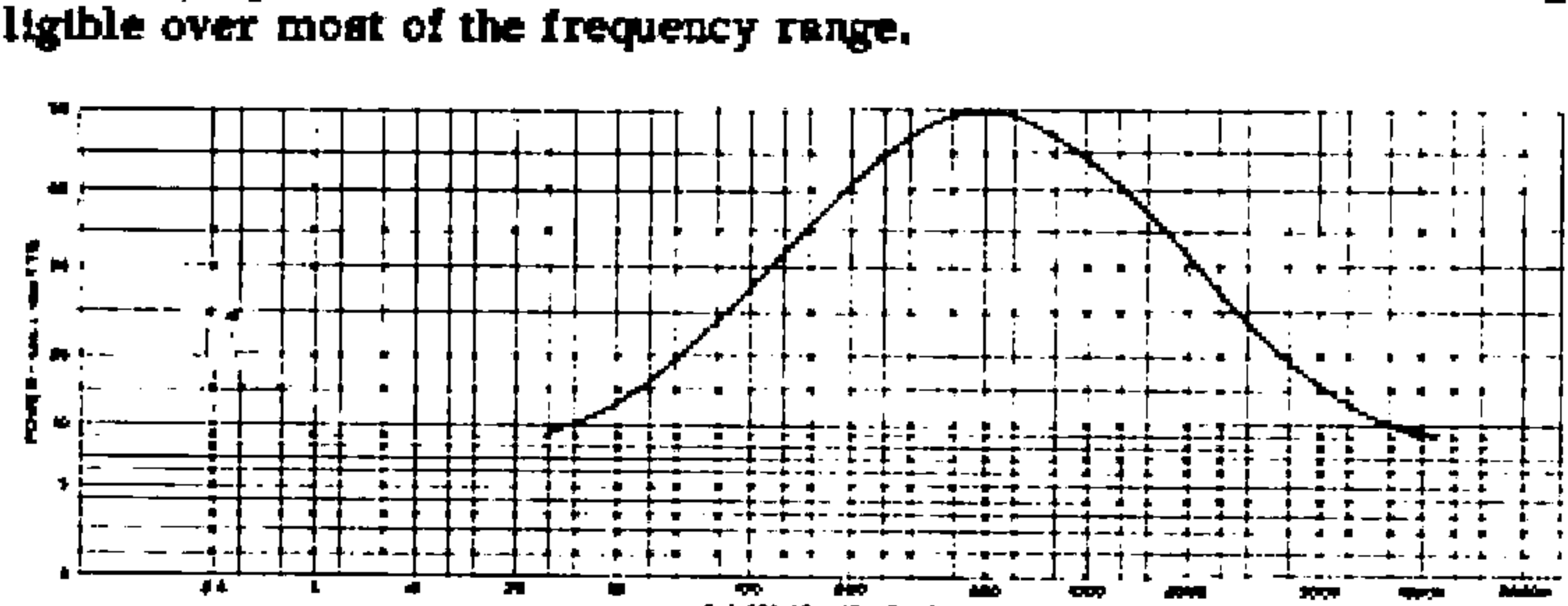

Figure 3. Power Output vs Load Resistance for a Generator with 500-ohm Internal Impedance.

3.4 WAVEFORM ERROR. The copper-oxide rectifier-type meter used in the instrument is calibrated in rms values for sinusoidal applied voltages, and nonsinusoidal voltages may cause errors, since the meter is not a true rms instrument. The degree of error depends on the magnitude and phase of the harmonics present, and will be small with waveforms normally encountered in communications.

3.5 REACTANCE ERROR. The Output-Power Meter is designed to work out of a resistive impedance, and will be subject to error when used in measurements on a highly reactive source. Unless the reactance is large enough to affect materially the power factor of the internal impedance of the circuit under test, this error is negligible.

3.6 DIRECT-CURRENT ERROR. When the current flowing through the Output-Power Meter has a d-c component, a slight error may occur. An error of from 2 to 3 percent results under the following circumstances:

IMPEDANCE MULTIPLIER Setting	DC
100	15 ma
10	50 ma
1.0	150 ma
0.1	500 ma

SPECIFICATIONS

Power Range: 0.1 to 5000 mw in four ranges. Auxiliary db scale on the meter reads from 0 to 17 db above 1 mw. With multiplier, total range is -10 to +37 db above 1 mw.

Impedance Range: 2.5 to 20,000 ohms. Forty discrete impedances, distributed approximately logarithmically, are obtained by a 10-step selector and 4-step multiplier.

Impedance Accuracy: Max error does not exceed 7% from 150 to 3000 cycles, 50% at 20 and 10,000 cycles.
Average error 5% at 30 and 5000 cycles, 20% at 20 and 10,000 cycles.

Power Accuracy: Max error, full-scale reading, does not exceed 0.5 db from 150 to 2500 cycles, 1.5 db at 20 and 10,000 cycles.
Average error 0.3 db at 30 and 5000 cycles, 0.6 db at 20 and 10,000 cycles.

Waveform Error: Nonsinusoidal voltages may cause error, since meter is not true rms indicator. With waveforms normally encountered in communications work, the error is not serious (refer to paragraph 3.4).

Mounting: Walnut cabinet, with aluminum panel.

Dimensions: Length 10 in., width 7 in., height 6 in., over-all.

Weight: 8½ lb.

GENERAL RADIO COMPANY

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