



Power Input: 85 watts from 115-volt, 60-cycle line.

Mounting: TYPE 1110-A Relay Rack; TYPE 1110-P1 (attached to 1110-A by cable) small metal cabinet.

Accessories Supplied: Line connector cord and TYPE 1110-P1 Multivibrator Unit with connecting cable.

Accessories Required: Head telephones.

Dimensions: 1110-A Panel (length) 19 x (height) 8 $\frac{3}{4}$; behind panel, (length) 17 $\frac{1}{4}$ x (height) 8 $\frac{3}{8}$ x (depth) 14 inches. 1110-P1 (length) 9 $\frac{1}{4}$ x (height) 5 $\frac{1}{4}$ x (depth) 5 $\frac{1}{4}$ inches.

Net Weights: TYPE 1110-A assembly, 40 pounds; TYPE 1110-P1 Multivibrator Unit 7 $\frac{1}{2}$ pounds.

Type	Code Word	Price
1110-A Interpolating Frequency Standard*	RAVEN	\$725.00

*U.S. Patent 2,012,497.

Licensed under patents at the American Telephone and Telegraph Company and under patents and patent applications of G. W. Pierce.

Note: The method of frequency measurement described in the foregoing article was also discussed in a paper by J. K. Clapp entitled "Frequency Measurement by Sliding Harmonics," which appeared in the October, 1948, issue of the *Proceedings of the Institute of Radio Engineers*. — EDITOR.

A LOW-FREQUENCY MULTIPLIER FOR THE VACUUM-TUBE VOLTMETER

The TYPE 1800-P3 Multiplier extends the range of the TYPE 1800-A Vacuum-Tube Voltmeter to 1500 volts for both d-c and low-frequency a-c measurements. This multiplier plugs into the binding posts on the panel of the voltmeter. For d-c use the multiplier consists of a fixed resistance voltage divider giving a 10:1 reduction in the voltage applied to the voltmeter, while for a-c measurements a capacitance-resistance voltage divider is used.

The multiplier is not intended for use at frequencies above 5 megacycles. For



**View of the Type 1800-P2
Low-Frequency Multiplier.**

higher frequencies the TYPE 1800-P2 Multiplier¹ is recommended.

SPECIFICATIONS

Multiplier Ratio: DC, 10:1 ± 1 per cent for all TYPE 1800-A Voltmeters.

AC, Adjustable to 10:1 ± 0.5 per cent. A multiplier ordered with a TYPE 1800-A Voltmeter is adjusted at 1500 cycles and 15,000 cycles to that voltmeter at our factory. When the multiplier is ordered for use with a TYPE 1800-A Voltmeter already in the hands of the user, the necessary adjustments can be made by the user. If these adjustments are not made, an additional error of ± 5 per cent is possible.

Input Impedance: DC, 10 megohms.

AC, 10 megohms parallel resistance; 10 μ f parallel capacitance.

Frequency Error: 20 — 20,000 c ± 2 per cent.
20 kc — 5 Mc ± 4 per cent.

Waveform Error: As with the TYPE 1800-A Voltmeter, the deviation from r-m-s reading can be as large as the percentage of harmonics present in the signal, but the error will not necessarily be the same as that of the voltmeter used without the multiplier because of the different impedance presented to the voltmeter by the multiplier.

Dimensions: 5 x 2 x 2 inches.

Net Weight: 8 ounces.

Type	Code Word	Price
1800-P3 Low-Frequency Multiplier	ABEAM	\$25.00

¹"A Voltage Multiplier for the Vacuum-Tube Voltmeter," *General Radio Experimenter*, May, 1948.