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A STANDARD SIGNAL GENERATOR FOR THE 900- TO 2000-MC RANGE

The new TYPE 1021-AW Standard-Signal Generator covers frequencies between 900 and 2000 megacycles, which include the important band of 960 to 1220 megacycles used for DME and safety beacon transmissions in aircraft navigation.

The total range covered by the popular TYPE 1021 line of signal generators is now 40¹- to 2000 megacycles, covered in three units, as shown in Figure 2.

The tuned circuit of the TYPE 1218-A Unit Oscillator, which was described last month, forms the basis of the TYPE 1021-AW 900-2000-Mc Standard Signal Generator shown in Figure 1. The new oscillator unit is shown at the right.

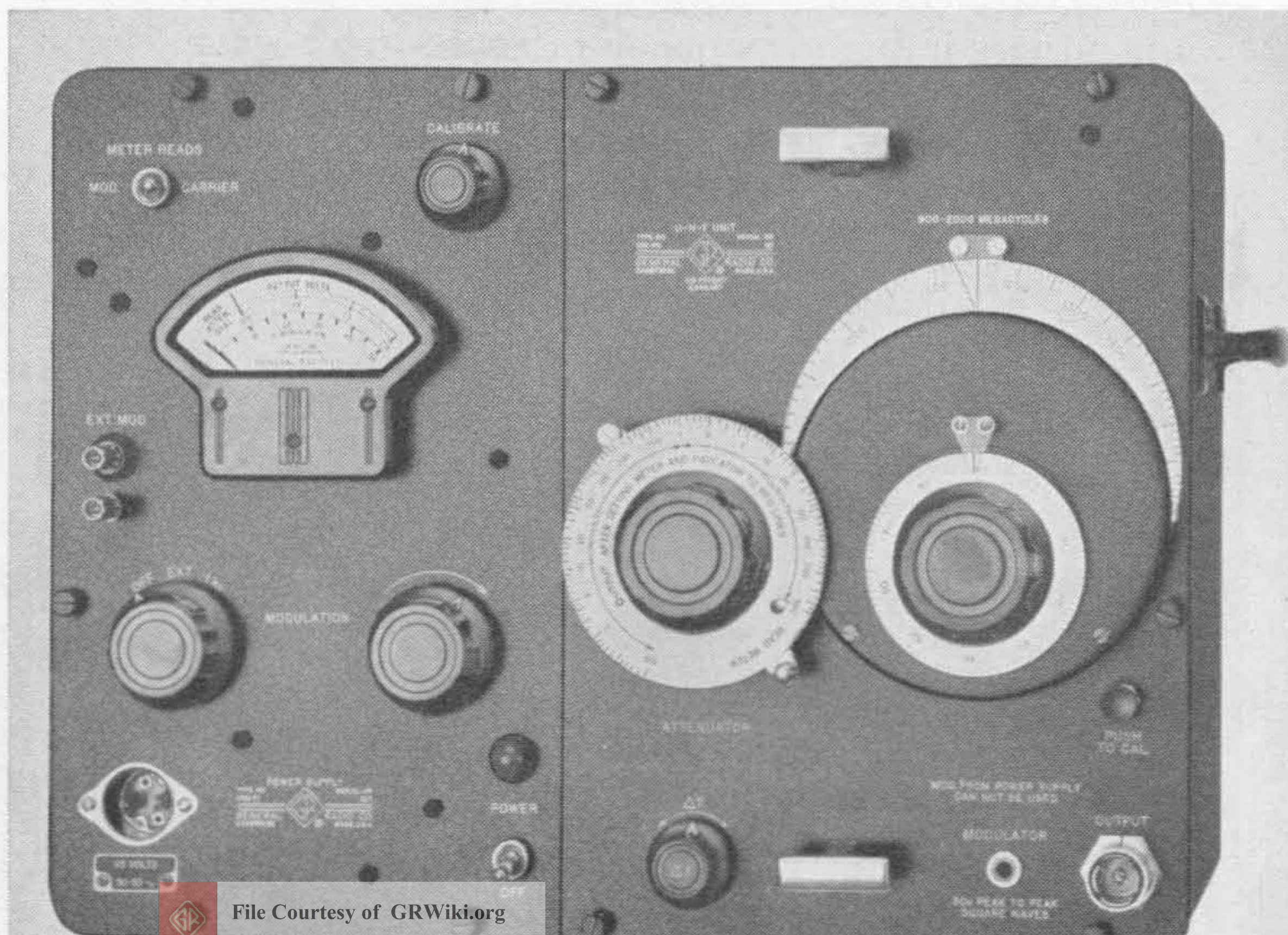
The power supply and the cabinet are the same as used already on two lower-frequency signal generators which were announced March 1950.² These two older oscillator units are tuned by wide range butterfly circuits.

In external appearance and in operation the three oscillator units shown in Figure 2 are very much the same. They all are triode oscillators with slow-motion drives and large direct-reading frequency dials. Output can be adjusted from 1 μ v to 1 volt with the second

¹ The range of the v-h-f model, TYPE 1021-AV has been extended down to 40 Mc in order to include television i-f frequencies. See page 4.

² Eduard Karplus, Ervin E. Gross, "A Standard-Signal Generator for Frequencies Between 50 and 920 Mc," *General Radio Experimenter*, Vol. XXIV, No. 10, 1950.

Figure 1. Panel View of the Type 1021-AW Standard-Signal Generator.



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large dial on the front panel, which controls the coupling in a calibrated mutual-inductance-type attenuator. The output level and the output impedance are established by a diode voltmeter and a termination resistor as shown schematically in the lower part of Figure 3. The output meter, which is located in the power-supply compartment, can be calibrated in terms of an accurately known 60-cycle voltage.

Modulation

Unlike the two lower-frequency generators, which are amplitude modulated by sinusoidal voltages, the new high-frequency unit is designed for amplitude modulation by square waves from an external source. Square-wave modulation, which effectively eliminates incidental frequency modulation, has many advantages in high-frequency measure-

ments, and, in addition, is particularly desirable in this generator, which has a high-Q tuned circuit between the oscillator and the attenuator.

Tuning

The frequency-determining element of the oscillator is a quarter-wave line between plate and grid of a pencil-type triode, and output from the oscillator is obtained by a coupling loop located in the movable shorting plunger of the line. The attenuator must be coupled to an element that carries high current

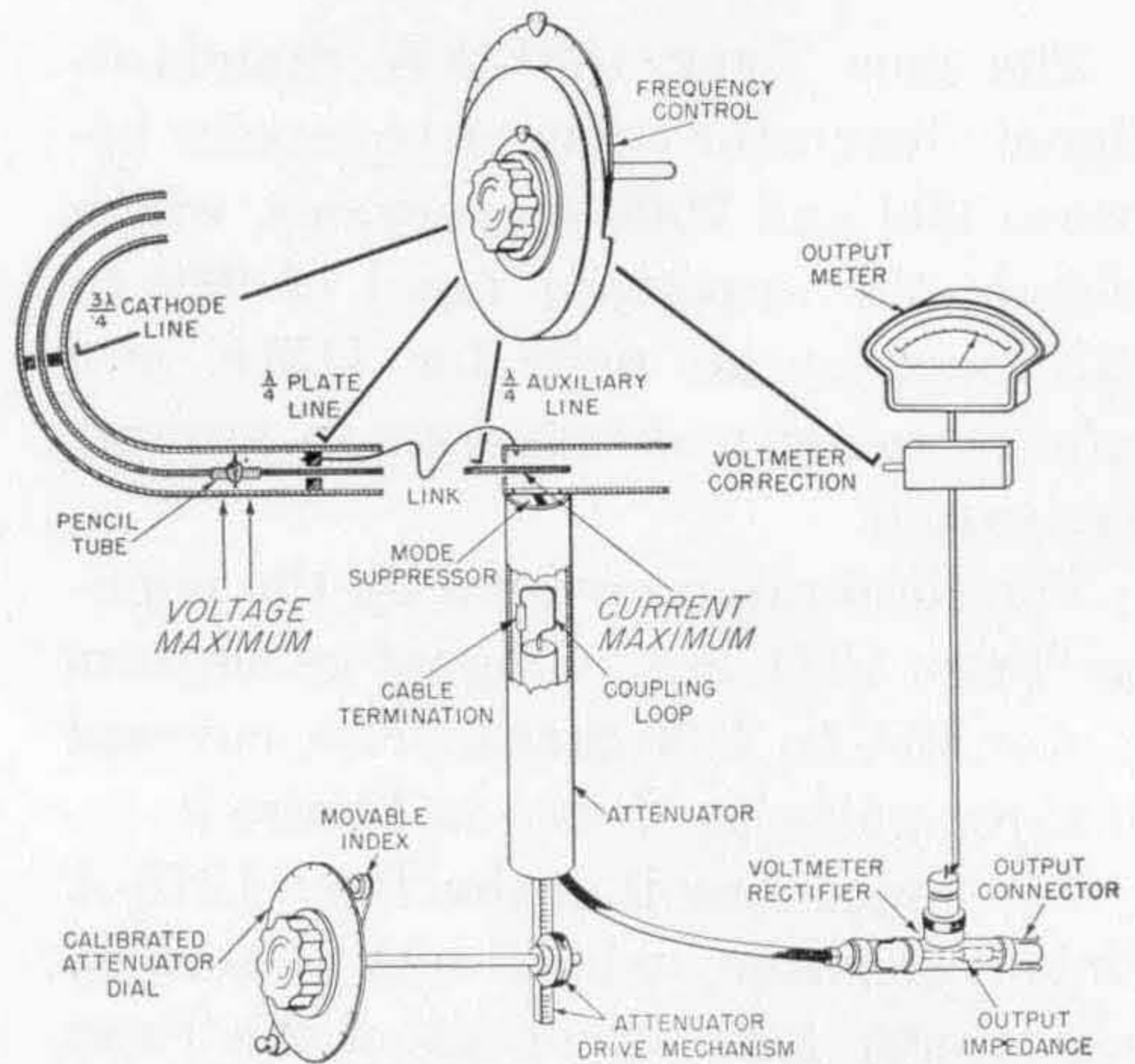
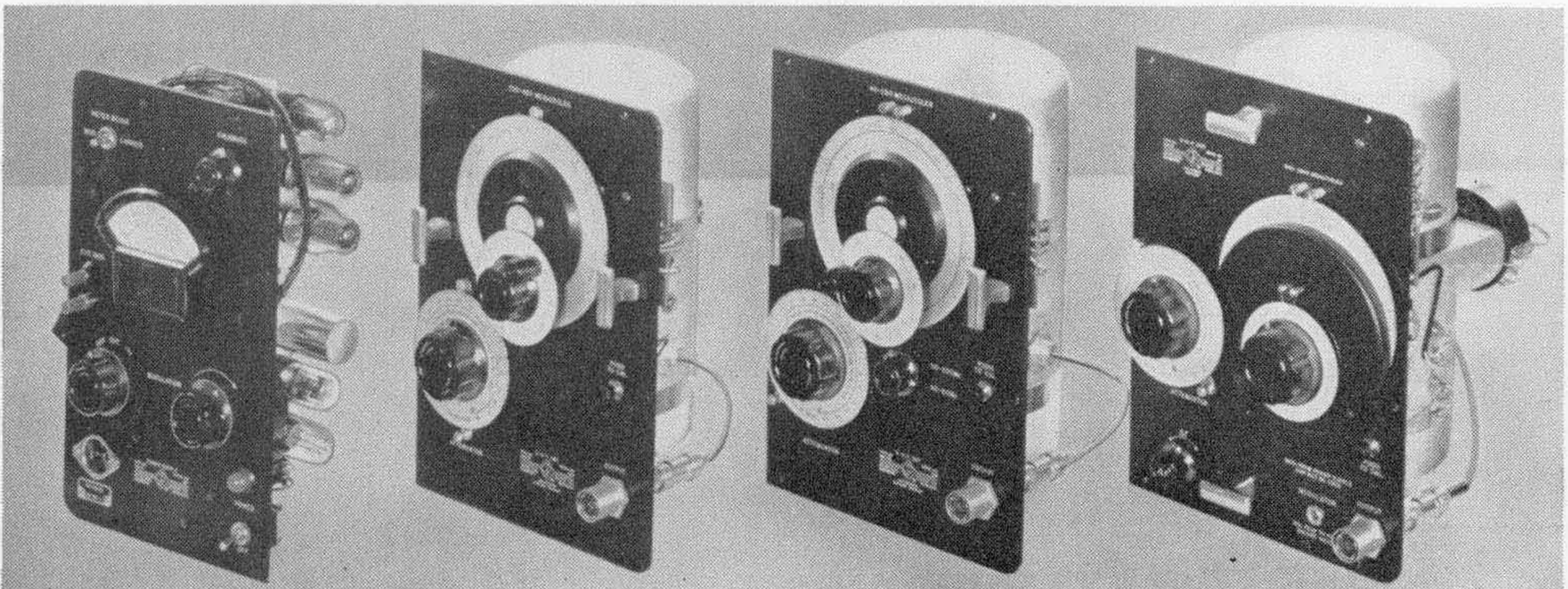


Figure 3. Functional schematic diagram of the new oscillator unit, Type 1021-P4.

at all frequencies and is stationary in space. This is made possible by a quarter-wave circuit with movable center

Figure 2. View of the power supply unit and the three oscillator units that make up the Type 1021 series of signal generators. Oscillator units are interchangeable mechanically.





conductor as shown schematically in the upper part of Figure 3. This auxiliary circuit is electrically coupled to the oscillator by a link line and ganged to it by joining the movable center conductor to the movable short circuit of the oscillator.

Metering

Since the resonant frequency of the diode-type output indicator is only twice the maximum frequency of the signal generator, a frequency correction for the voltmeter error is required. The correction, which varies from about 10% at 1000 Mc to 30% at the high end of the frequency range, is obtained automatically by the potentiometer mounted on the rear end of the main shaft.

Stability

Tuning a 1000-Mc oscillator to produce an audio beat note requires high precision, and maintaining the beat note requires unusual stability. The sliding contacts of the new oscillator perform well under these critical conditions. Compared to tuning systems which depend on close mechanical spacings, the new oscillator is remarkably free from noise modulation caused by microphonics and vibrations. A variable resistor in the grid circuit of the oscil-

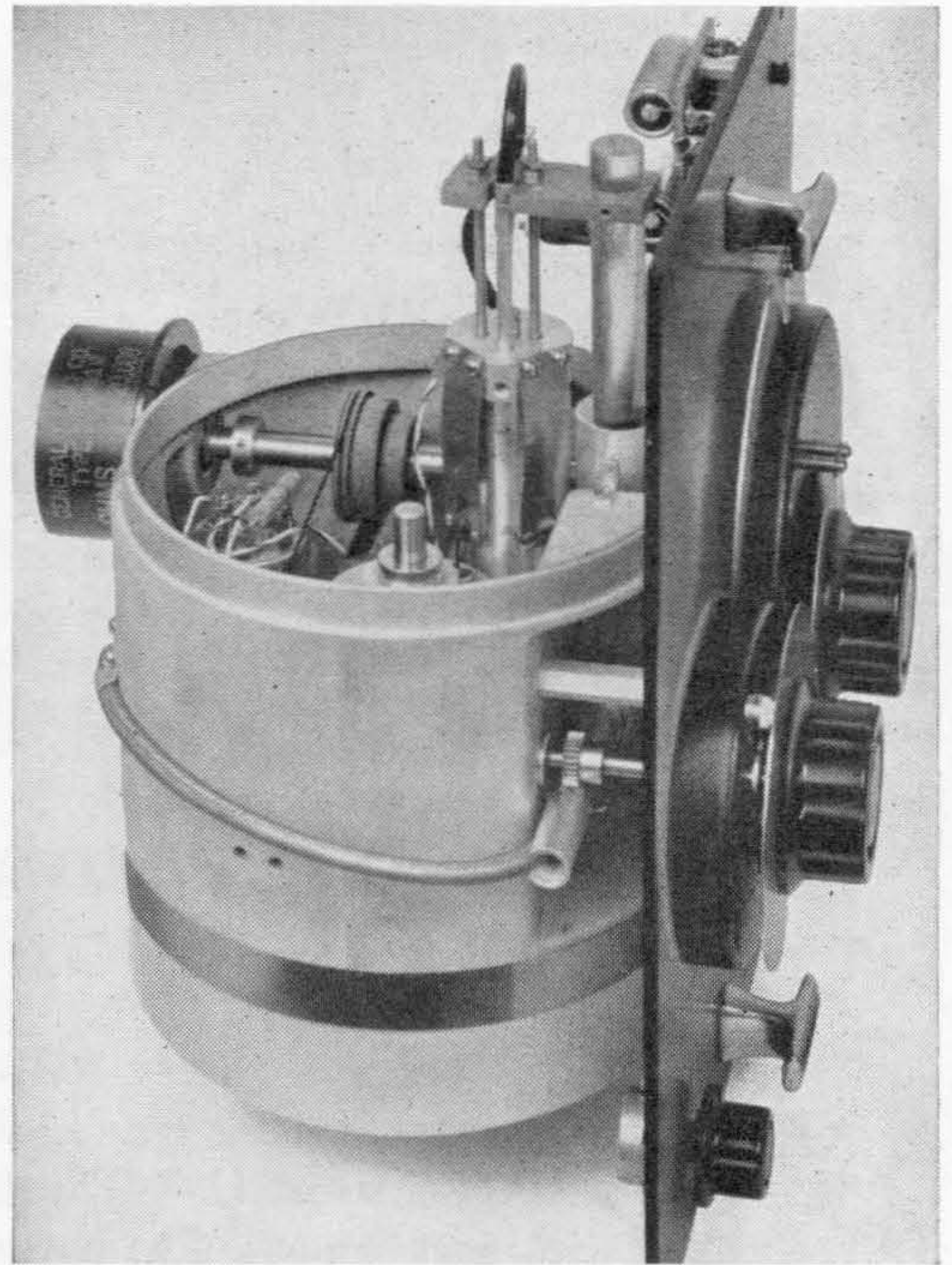


Figure 4. Interior view of the oscillator unit with shield cover removed.

lator tube is used for fine frequency adjustment. The heater voltage is rectified and filtered to reduce modulation by power frequency components.

R-F Filtering

The power supply leads are filtered by small inductors imbedded in Carbonyl powder.

SPECIFICATIONS

Frequency Range: 900–2000 Mc

Circuit: Grid separation triode oscillator. Line sections with sliding contact shorts are used to tune plate and cathode.

Frequency Control: A 6" dial with direct-reading frequency calibration over 200°. Slow-motion drive, 8 turns.

Frequency Calibration Accuracy: $\pm 1\%$.

Frequency Drift: Under 0.1% per day.

Output Voltage: Continuously adjustable from 0.5 μ v to 1.0 volt open circuit.

Output Impedance: 50 ohms $\pm 10\%$.

Output Voltage Accuracy: Over-all accuracy of output voltage is better than $\pm 20\%$.

Modulation: Square-wave modulation from 100–10,000 cycles with external modulator. 30 volts peak to peak is required. 10,000-ohm input impedance.

Leakage: Stray fields and residual output voltage cannot be detected with a receiver having 2 μ v sensitivity.

Terminals: TYPE 874 Coaxial Terminals are provided.

Power Supply: 115 or 230 volts, 50 to 60 cycles, power input approximately 50 watts.

Tubes: One TYPE 5675 u-h-f medium-mu triode (pencil tube) in 1021-P4; one each 6X5GT, 6K6GT, Amperite 6-4; two OC3.

Accessories Supplied: one TYPE 874-R22 3-foot Patch Cord (50 Ohms); one TYPE 874-C58 Coaxial Cable Connector; one TYPE 874-PB58 Panel Connector; one TYPE CAP-35 Power Cord, and one telephone plug.

Other Accessories Available: Not supplied, but available on order are TYPE 874-GF 20-db Attenuator Pad; TYPE 874-GG 10-db Attenuator Pad; TYPE 874-K Coupling Capacitor;

and TYPE 1000-P7 Balanced Modulator.

Mounting: The aluminum cabinet has a black wrinkle finish. The left-hand side houses the TYPE 1021-P1 Power Supply; the right-hand side houses the TYPE 1021-P4 U-H-F- Unit. Panels are black crackle-finished aluminum.

Dimensions: (Height) $14\frac{3}{8}$ × (width) $20\frac{1}{4}$ × (depth) $10\frac{9}{16}$ inches, over-all.

Net Weight: $37\frac{1}{2}$ pounds.

Type		Code Word	Price
1021-AW	Standard-Signal Generator, 900-2000 Mc....	EAGLE	\$845.00
1021-P4	Oscillator Unit only *	EXALT	650.00

* The oscillator unit, TYPE 1021-P4, is available separately for those who use a single power supply and cabinet with interchangeable oscillators.

U. S. Patent Nos. 2,125,816 and 2,548,157.

40- TO 50-MC ADDITION TO RANGE OF TYPE 1021-AV STANDARD-SIGNAL GENERATOR

For some time, orders for TYPE 1021-AV Standard-Signal Generators and for TYPE 1021-P3 Oscillator Units have been filled with instruments that cover 40 to 50 megacycles in addition to the previous range of 50 to 250 megacycles. The range switch and the second calibration of the main dial of the new TYPE 1021-P3B Oscillator Unit can be

seen in Figure 1. Most of the commonly used i-f frequencies in television receivers lie in the new range.

To obtain the added range, two 35 μmf capacitors are connected across the high-voltage points of the butterfly-type tuning circuit. The capacitors are mounted on two curved arms which can be seen in Figure 2. The arms are moved up and down by a cable actuated by the new panel switch. With this added capacitance, the minimum frequency of the butterfly circuit is changed from 50 to 40 Mc, and good output can be obtained over a small part of the tuning range. At higher settings, losses in the added capacitance increase rapidly.

Figure 1. Panel view of the Type 1021-P3B Oscillator Unit.

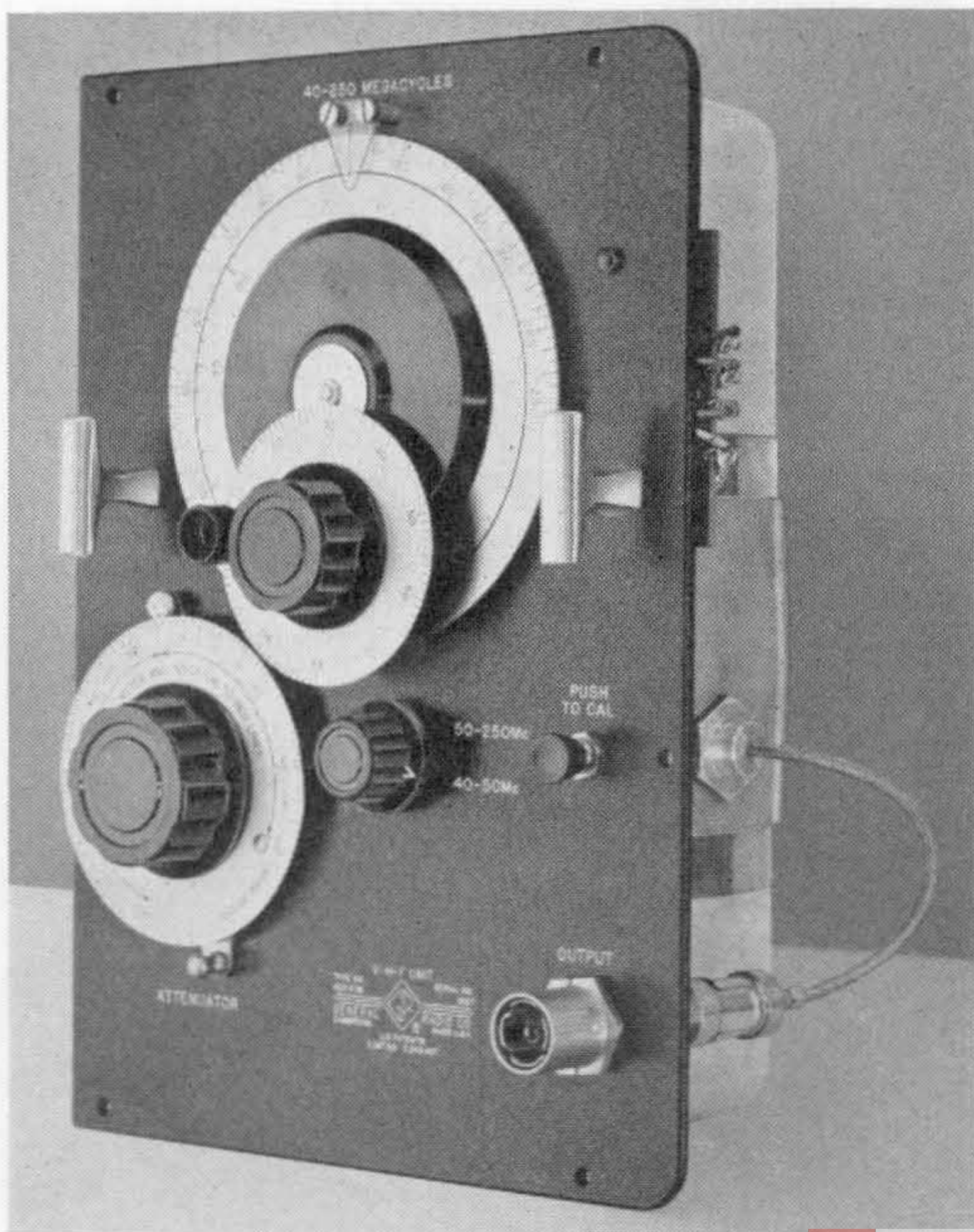
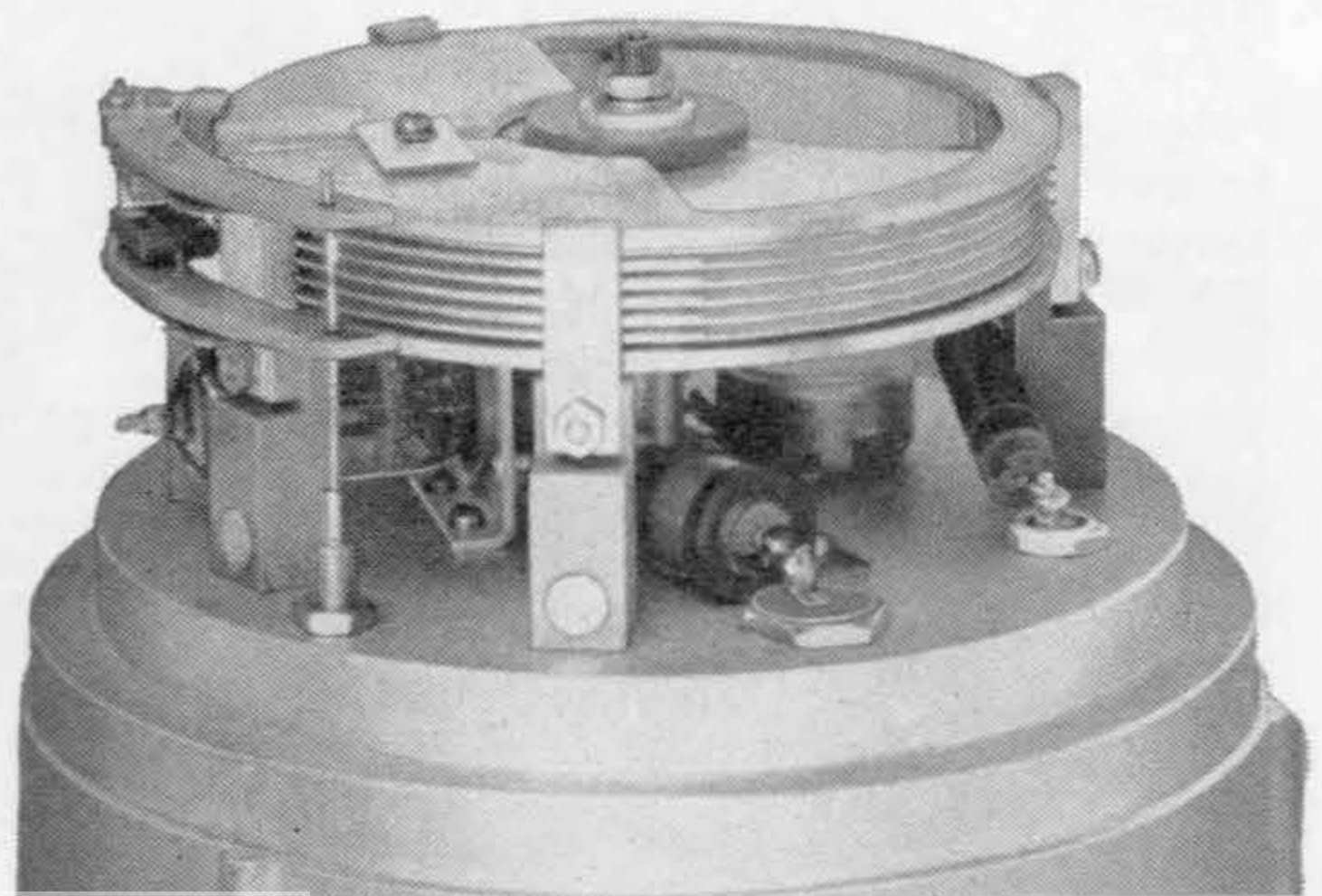


Figure 2. Interior view, showing the location of the two padding capacitors, which are switched into circuit for the 40- to 50-megacycle range extension.





While the 40- to 50-Mc range is readily installed in a new instrument, addition of the switch in older oscillators is not practical. This range can be obtained, of course, by shunting a 70- μf low-loss capacitor across the gap of the butterfly circuit. To preserve the original calibration, the mounting

screws of the butterfly circuit should not be disturbed, and clamps should be used to add the shunting capacitors.

SPECIFICATIONS

Same as for Type 1021-AV except:
Carrier Frequency Range: 40-250 Mc in two bands.

Type		Code Word	Price
1021-AV	Standard Signal Generator, 40 to 250 Mc....	EVENT	\$595.00
1021-P3B	Oscillator Unit only.....	EVOKE	\$400.00

U. S. Patent Nos. 2,125,816, 2,367,681 and 2,548,457.

THE TYPE 1803-B VACUUM-TUBE VOLTMETER

General Radio's moderately priced vacuum-tube voltmeter, the TYPE 1803-A¹, has proved to be a remarkably reliable and trouble-free instrument. Our service department records do not show a single instance of failure of one of these voltmeters during the one-year guarantee period. A new model now available, the TYPE 1803-B, combines the basic features of the older instrument with several new operating conveniences, which will still further widen its usefulness in the laboratory.

Years of experience with the TYPE 1800-A Voltmeter² have proved the desirability of having both a-c and d-c voltage ranges on a voltmeter, and so d-c ranges are an important new feature on the TYPE 1803-B. Another new feature is the inclusion of a 10:1 multiplier for audio and ultrasonic frequency a-c voltages, which is permanently attached to the voltmeter cabinet. The multi-

plier also provides convenient binding posts that can be used for a-c voltage measurements when the probe is suitably connected to the multiplier. In addition, storage space has been provided inside the cabinet for the probe cable.

A-C Voltage Measurement

The ranges provided are 1.5, 5, 15, 50, and 150 volts for full-scale deflection of the indicating meter.

Experience has also shown that there is a demand for a multiplier to make it possible to measure voltages in excess of 150 volts, particularly over the audio-frequency range. This demand is

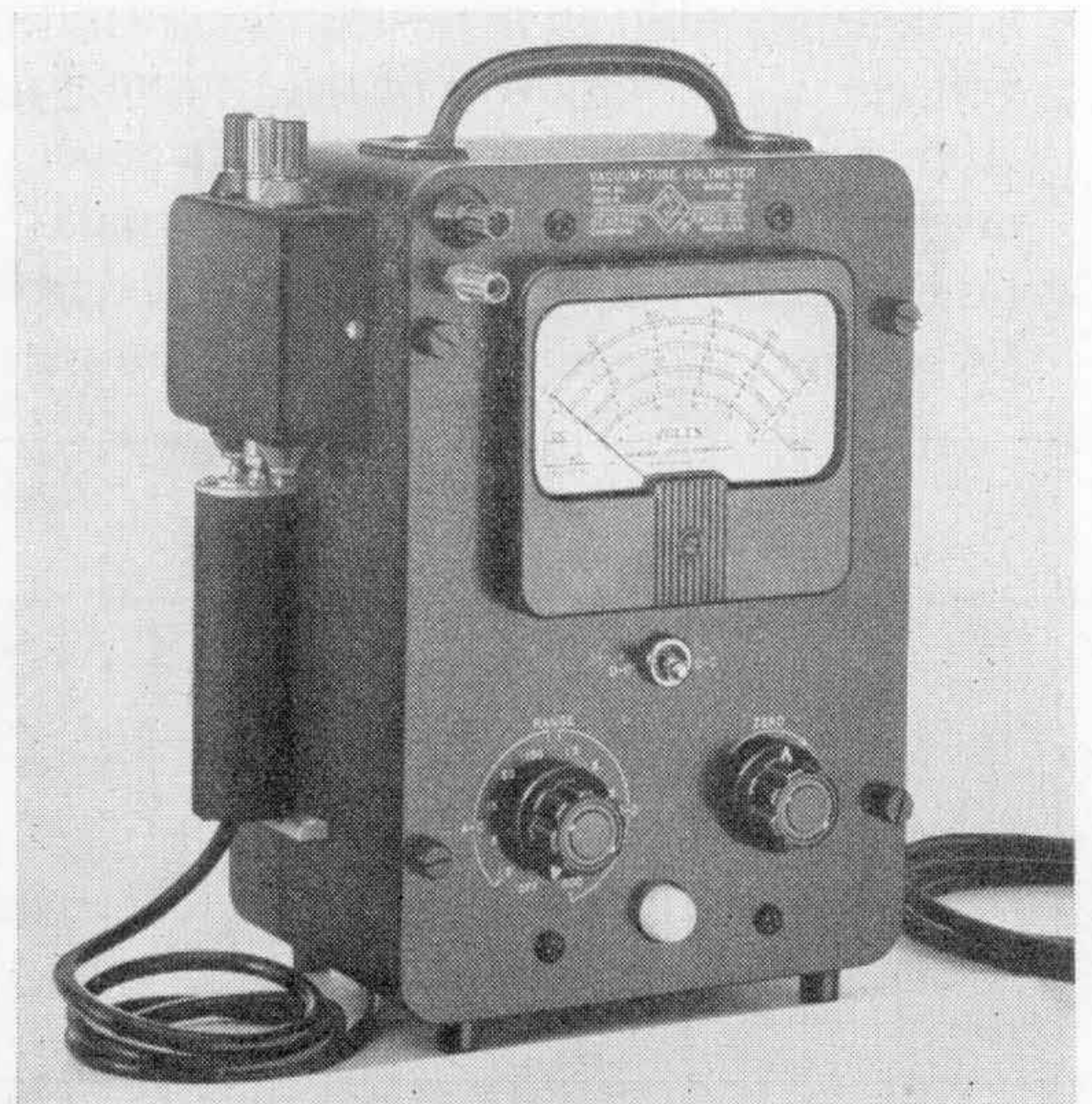


Figure 1. View of the Type 1803-B Vacuum-Tube Voltmeter.

¹C. A. Woodward, Jr., "The TYPE 1803-A Vacuum-Tube Voltmeter", *General Radio Experimenter*, Vol. XXIV, No. 11, April, 1951, pp. 1-5.

²C. A. Woodward, Jr., "A New Vacuum-Tube Voltmeter", *General Radio Experimenter*, Vol. XXII, No. 4, September, 1946, pp. 1-8.