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ELECTRICAL MEASUREMENTS AND THEIR INDUSTRIAL APPLICATIONS

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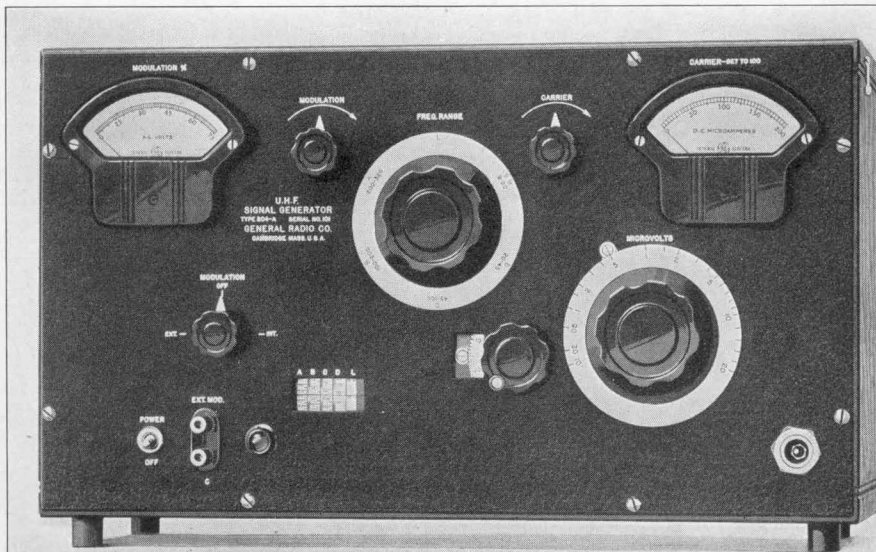
A SIGNAL GENERATOR FOR THE ULTRA-HIGH FREQUENCIES

● RESEARCH in radio transmission and reception at the ultra-high frequencies continues to foster an increased use of these frequencies for practical radio communication. In addition to their usefulness for television and frequency modulated transmissions, the ultra-high frequencies have an

increasing importance for civil and military aircraft communication and for commercial radio service.

Receiver measurements in the high- and ultra-high frequency ranges have been handicapped by lack of testing equipment, particularly signal generators. The TYPE 804-A U-H-F Signal Generator, shown in Figure 1, is designed for use at these frequencies.

FIGURE 1. Panel view of the TYPE 804-A U-H-F Signal Generator.



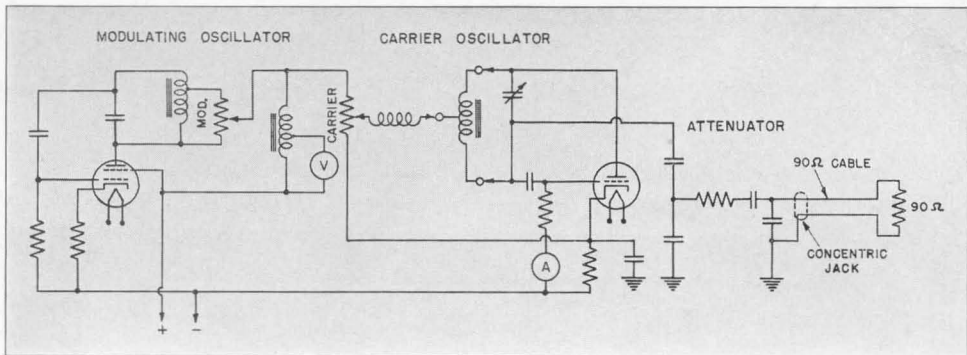


FIGURE 2. Schematic circuit diagram of the signal generator. The a-c power supply is not shown.

GENERAL PERFORMANCE

An important feature of this instrument is its capability of being set accurately to any frequency between 7.5 and 330 megacycles. This wide frequency range is covered by a worm-drive condenser and coil switching system, described below. The output voltage range is from 10 microvolts to 20 millivolts. Internal 400-cycle modulation is provided. An external source of modulating voltage can also be used.

Detailed specifications are given on page 5.

CIRCUIT

Both the carrier and modulating oscillators use a conventional Hartley circuit. Carrier level is indicated by a grid current meter, so arranged as to give an indication of oscillator amplitude. The carrier is modulated directly in the oscillator plate circuit, and modulation percentage is indicated by a rectifier-type voltmeter connected across

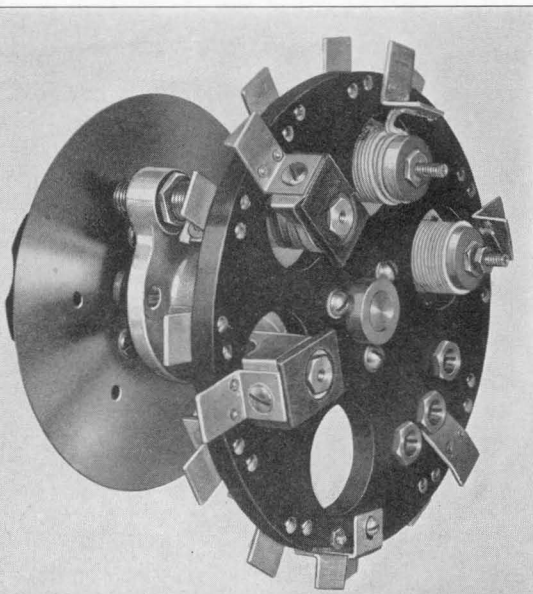
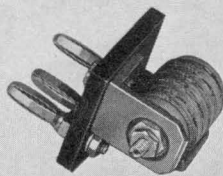


FIGURE 3. Detailed view of the coil assembly. The mounting disc is of mycalex, the coil forms of polystyrene. A blank plug-in coil form (shown at the right) is provided, on which the user may wind a coil for operation at lower frequencies or for any particular band of frequencies. This coil corresponds to the L position on the range switch.



a portion of the modulating choke. Because the plate voltage of the carrier oscillator is held constant by a voltage regulating system, this meter is direct reading in modulation percentage, with a range of 0 to 60%. Both meters are the new fan-shaped models with open, easily read scales.

STABILITY

Through the use of a large tuning capacitance and a voltage-regulated power supply, good frequency stability has been achieved in the carrier oscillator. Since modulation is accomplished in the plate circuit of the oscillator, however, an appreciable degree of frequency modulation occurs when the oscillator is modulated. Allowance should be made for this in testing receivers designed to pass the relatively narrow audio-frequency band.

TUNED CIRCUIT

The tuned circuit is an outstanding feature of this generator. The entire oscillating circuit is compact and has unusually short leads. The condenser is a TYPE 755-A*, designed especially for ultra-high frequency work.

The main condenser dial has 1500 easily read divisions for a frequency spread of about 2.5:1, so that a setting can be made with a precision of considerably better than 0.1%. A frequency calibration is provided directly on the main drum dial. The absolute accuracy of this calibration is $\pm 2\%$.

The coil assembly is shown in Figure 3. Coils are mounted on a mycalex disc which is rotated from the panel. As each coil is moved into position, its silver contacts are engaged by brushes mounted on the condenser frame. These and the 955-type oscillator tube are shown in Figure 4. In the rear view of

the instrument, Figure 5, the entire assembly can be seen.

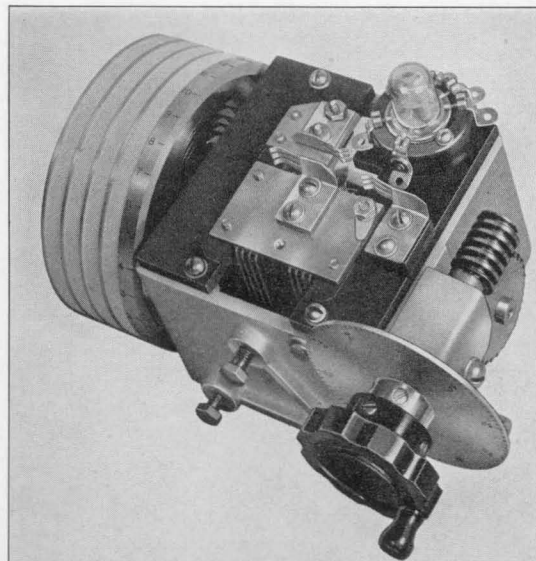
A blank plug-in coil form is furnished for the L position of the range switch. This can be wound by the user to operate at any desired frequency in or below the calibrated range of the instrument, or to cover a specific frequency band such as the intermediate frequencies used in television or frequency-modulated reception.

OUTPUT SYSTEM

The output of the TYPE 804-A U-H-F Signal Generator is continuously variable between 10 microvolts and 20 millivolts. The output is determined by the reading of the output meter and the setting of the attenuator dial.

The capacitive attenuator is shown in Figure 6. To obtain smooth operation, and to facilitate precise settings, the moving element is driven through a reduction gear train. The alignment screws shown in the photograph are so adjusted

FIGURE 4. Close-up view of the tuning condenser, showing the vacuum tube and the brushes which engage the contacts on the coil mounting. A direct-reading frequency calibration is provided on the drum dial. These scales are shown blank in the photograph.



*"A New Condenser for High-Frequency Circuits," *Experimenter*, Vol. XIV, No. 3, August, 1939.

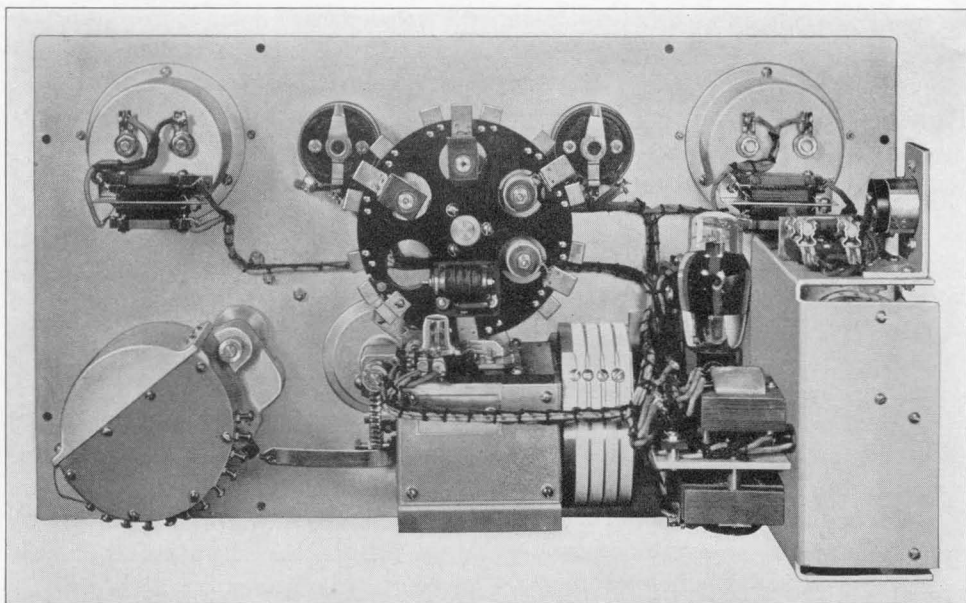
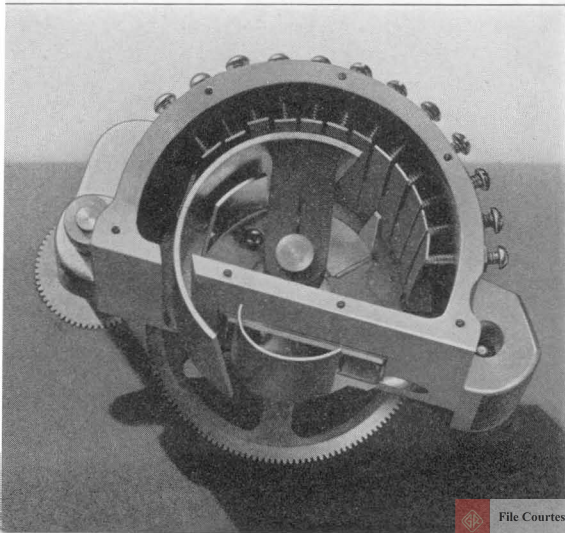


FIGURE 5. Rear view of the signal generator. The coils and condenser are shown in the center, the attenuator at the lower left, the power supply at the extreme right.

that the attenuator presents a constant capacitance to the oscillator circuit, thus eliminating changes in carrier frequency with attenuator setting.

Output voltages are obtained at the output jack at the lower right-hand

FIGURE 6. View of the attenuator with cover removed.



corner of the front panel. The voltage is developed across a 100- μmf condenser built into the attenuator housing. The output impedance, therefore, varies between 5 ohms at 320 Mc and 200 ohms at 8 Mc.

A 90-ohm concentric shielded cable with a 90-ohm terminating resistance is furnished. At high frequencies, the voltage at the end of the cable is substantially the same as that at the panel jack. A correction is supplied for use at low frequencies.

POWER SUPPLY

The power supply operates from the a-c line, 105 to 125 volts, 40 to 60 cycles, regulated to eliminate voltage fluctuations. As with most other General Radio instruments, a 210- to 250-volt winding is provided on the power transformer.

SPECIFICATIONS

Carrier Frequency Range: 7.5–330 Mc in five ranges — 7.5–22, 22–50, 50–120, 120–240, 240–330 Mc.

Frequency Calibration: Direct reading within 2%.

Output Voltage Range: 10 microvolts to 20 millivolts for frequencies between 7.5–120 Mc. Above 120 Mc, the maximum output is less.

Output System: 100 μ f output capacitance. 90-ohm cable with 90-ohm termination furnished.

Modulation: Continuously adjustable 0–60%. Internal: 400 cycles \pm 5%. External: Flat within 2 db from 200 to 20,000 cycles. Five and one-half volts are required for 50% modulation. The input impedance is 0.5 megohm.

Stray Fields: Stray fields will not be noticeable with receivers of less than 10 microvolts sensitivity.

Power Supply: 105–125 (or 210–250) volts, 40–60 cycles, 24 watts.

Tubes: 955, 6G6G, 6X5G, VR150.

Accessories Supplied: Three-foot output cable, 90-ohm impedance. Six-foot cable for line connection. One blank coil form for additional frequency range.

Mounting: Black crackle aluminum panel, walnut cabinet, hinged cover.

Dimensions: (Length) 19½ x (depth) 9 x (height) 11⅝ inches.

Net Weight: 32 pounds.

Type	Code Word	Price
804-A	DENSE	

INDUCTANCE MEASUREMENTS ON LOOP ANTENNAS

● **THE LOOP ANTENNA**, a familiar sight in the early days of factory-built receivers, is with us again. Completely encased, no longer the unsightly hat rack of 1924, it is now used in all portable receivers and many of the newer home models.

Today's loop is usually smaller than its progenitor, because today's receivers are more sensitive than yesterday's, but it still must be tuned. The tuning condenser for the modern loop is ganged with the other tuning condensers and, in order to make the tuning track with

FIGURE 1. Panel view of the coil comparator. For production testing, the main dial is locked at the standard setting and deviations are read on the LIMITS dial.

