

OPERATING INSTRUCTIONS

for

TYPE 857-A UHF OSCILLATOR

and

TYPE 857-P1 POWER SUPPLY



GENERAL RADIO COMPANY

CAMBRIDGE 39

MASSACHUSETTS

NEW YORK

CHICAGO

LOS ANGELES

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Form 615-F
November, 1952



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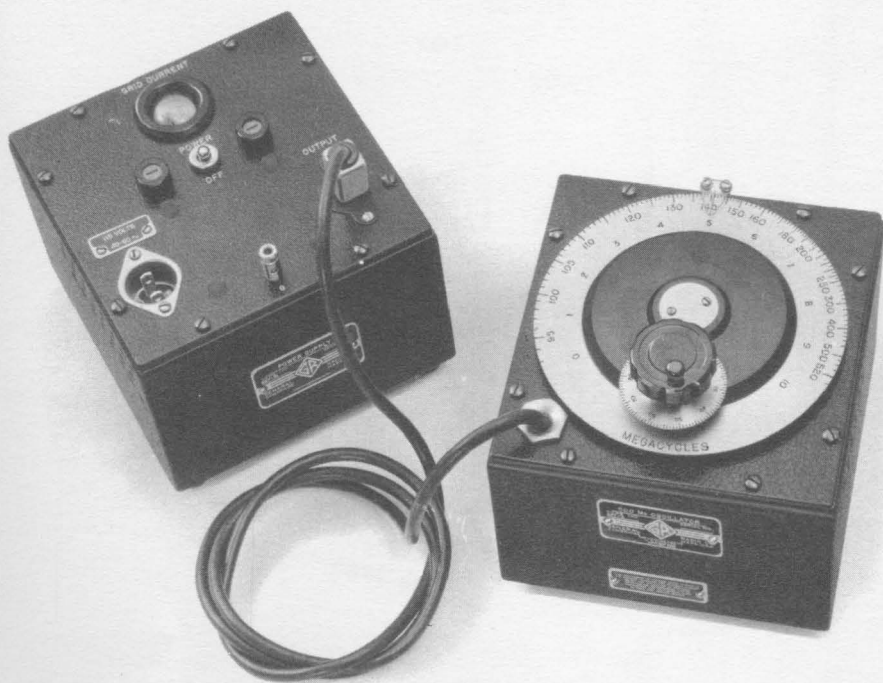
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FRONTISPIECE. Type 857-A UHF Oscillator and Type 857-P1 Power Supply

SPECIFICATIONS

Frequency Range: 100 Mc to 500 Mc.

Frequency Calibration: The frequency dial reads directly in megacycles with an accuracy of $\pm 1\%$. Replacement of the vacuum tube may cause a shift in the calibration. A trimmer capacitor is provided to compensate for variations in tube capacitance.

Output Power: Approximately 0.5 watt maximum.

Output Coupling: Adjustable from zero to maximum by rotating the output terminal or by moving it in or out. Wing nut locks jack in any desired position. Output terminal is a Type 874 Coaxial Connector.

Output Impedance: The output system, with its adjustable coupling, is adapted for use with coaxial lines. Maximum power can be delivered to load impedances in the range normally encountered in coaxial systems.

Power Supply: Filament and plate power is furnished by the Type 857-P1 Power Supply, which is mounted in a separate cabinet with connecting cord and plug. The plate

voltage supplied by this unit is fixed at the maximum value for safe operation of the tube. It operates from a 105- to 125-volt (or 210- to 250-volt) a-c line, 40 to 60 cycles. The power input is about 60 watts.

Oscillation Indicator: An electron-ray tube is provided in the Type 857-P1 Power Supply to indicate grid current and thus furnish an indication of oscillation.

Tubes: 316-A (oscillator); 6E5, 5Y3-GT (power supply). All are supplied.

Accessories Supplied: Line connector cord, a Type 874-C Cable Connector and spare fuses.

Mounting: Both oscillator and power supply unit are mounted in metal cabinets. Aluminum panels are finished in black crackle, cabinets in black wrinkle.

Dimensions: Oscillator, $6\frac{1}{8} \times 7\frac{5}{8} \times 7\frac{1}{4}$ inches, over-all; power supply, $5\frac{1}{2} \times 6\frac{5}{8} \times 6\frac{1}{8}$ inches, over-all.

Net Weight: Oscillator, 7 pounds; power supply, $9\frac{1}{2}$ pounds.

OPERATING INSTRUCTIONS
FOR
TYPE 857-A UHF OSCILLATOR
AND
TYPE 857-PI POWER SUPPLY

1.0 DESCRIPTION - TYPE 857-A UHF OSCILLATOR

1.1 FUNCTION

The Type 857-A UHF Oscillator is a convenient source of radio-frequency power for general laboratory use. It covers a frequency range from 100 Mc to 500 Mc and delivers a maximum output of approximately 0.5 watt.

1.2 CIRCUIT

Figure 1 is a complete circuit diagram.

1.3 TUNED CIRCUIT

The frequency-determining circuit is a butterfly, in which the capacitance and inductance are varied simultaneously. This circuit makes it possible to cover a wide frequency range with no switching and without moving electrical contacts. While the nominal frequency range is 100 to 500 Mc, the actual operating limits are 93 Mc and 525 Mc.

1.4 DIAL

The main tuning dial is calibrated directly in megacycles. The auxiliary slow-motion dial carries 100 divisions and covers the tuning range in about 10 revolutions. Revolutions of the auxiliary dial are indicated by the inner scale on the main dial.

1.5 VACUUM TUBE

The tube used in this oscillator is a Western Electric Type 316-A. It is shipped separately in the tube manufacturer's carton in order to avoid damage to the thoriated tungsten filament.

1.6 POWER SUPPLY

Power for filament and plate must be supplied externally. The Type 857-PI Power Supply is designed to operate with this oscillator and its use is recommended. This power unit includes an electron-ray tube to indicate oscillation. Other power sources can be used, however, and the power requirements are listed below.

Filament: 2.5 volts, 3.65 amperes
Plate: 350 volts, 50 milliamperes

For further information, see paragraph 3.2.

1.7 OUTPUT

Output is obtained at a coaxial jack in the side of the cabinet. The output coupling loop is adjustable with respect to the tuned circuit both in distance and orientation.

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

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2.0 DESCRIPTION - TYPE 857-P1 POWER SUPPLY

2.1 FUNCTION

The Type 857-P1 Power Supply is an a-c operated transformer-rectifier unit designed to furnish plate and filament power to the Type 857-A UHF Oscillator.

2.2 POWER INPUT

115 volts, 40 to 60 cycles. An input voltage of 230 can be used if the primary connections on the power transformer are changed. Total power demand from the line is 50 watts with the Type 857-A UHF Oscillator connected.

2.3 OUTPUT

2.5 volts ac, 3.65 amperes; and 350 volts dc, 50 milliamperes; when the load is a Type 857-A UHF Oscillator.

2.4 VACUUM TUBES

One 5Y3GT Rectifier; one 6E5 Electron-Ray Tube. Both are supplied and are shipped installed in their sockets.

2.5 INTERCONNECTING CABLES

A line-connector cord is supplied. The cable for connection to the oscillator is permanently attached to the oscillator unit.

3.0 INSTALLATION

3.1 TUBES

Install the Western Electric Type 316-A Tube in the oscillator unit securing it with the tube clamp. The power supply tubes are shipped in place.

3.2 POWER SUPPLY

3.21 Type 857-P1: Connect the power unit to the oscillator by means of the cord and plug arrangement supplied.

3.22 Other Power Supplies: When other power units are used, the grid lead of the oscillator should be connected to the center tap of the filament supply through a 1500-ohm resistor. A 10-milliamperere meter in this circuit will be found useful as an oscillation indicator. Although the highest allowable plate voltage for the tube is 450 volts at 30 watts plate dissipation, the tube will be damaged if this voltage is applied when the tube is not oscillating. For this reason it is recommended that the plate voltage be not more than 350 volts, which is safe for all conditions of operation.

4.0 OPERATION

4.1

Connect power supply to line and turn on switch.

4.2 OSCILLATION INDICATOR

The electron-ray tube in the Type 857-P1 Power Supply indicates the oscillator grid current. The eye of the tube is closed when oscillations occur and opens when no grid current flows. When a meter is used, the presence of grid current indicates oscillation.

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4.3 OUTPUT

Coupling to the load can be adjusted by turning the shield of the output jack between the two positions engraved MAXIMUM and MINIMUM. Further variation can be obtained by screwing the jack in or out through the metal housing. If the load is coupled too closely, oscillations will cease and the grid current will drop to zero, as indicated by the electron-ray tube or a meter.

5.0 MAINTENANCE

5.1 TUBE REPLACEMENT

When the oscillator tube is replaced, any change in calibration that has resulted from differences in tube capacitances can be compensated for by readjusting the rectangular-shaped trimmer condenser between plate and grid.

6.0 ACCESSORIES AVAILABLE

A large selection of Type 874 Coaxial Elements is available to increase the utility of the oscillator. These accessories are part of a complete integrated line of measuring equipment for the determination of voltage, power and standing-wave ratio at v-h and u-h frequencies.

While the oscillator is primarily intended as a source of power for this measuring equipment, and for two other impedance measuring devices, the Type 1601-A V-H-F Bridge and the Type 1602-A U-H-F Admittance Meter, many of the coaxial elements serve as accessories to the oscillator to adapt it to various applications in the radio-frequency laboratory to substitute for more expensive equipment that is not always available.

Two of these applications are described in detail below, and others will suggest themselves after a study of the complete list of Type 874 Coaxial Elements. (See latest General Radio Catalog.)

Particularly useful are some of the small parts as connectors, cables, adaptors, terminations, attenuators and coupling units, which can be plugged together in various combinations for many different setups.

6.1 OSCILLATOR AS TELEVISION SIGNAL GENERATOR

In Combination with a Type 1000-P6 Crystal Diode Modulator and a Type 874-GF 20-db Fixed Attenuator the oscillator is a convenient source of television signals over its entire carrier-frequency range if video modulating voltage is available. The circuit arrangement is shown in Figure 3. The modulating voltage required can be obtained from a standard television receiver tuned to the local station.

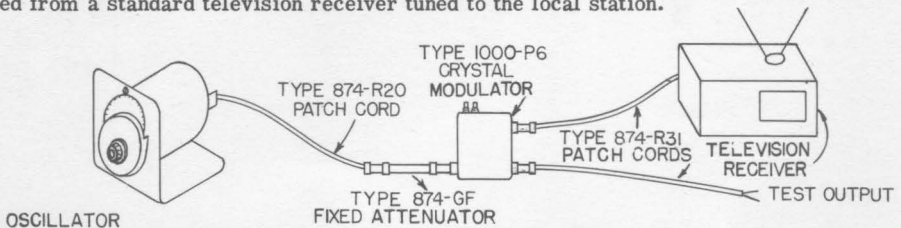


Figure 3. Functional Diagram of the Oscillator with Video Modulator to Form a Television Signal Generator.

Since the modulator is separated from the oscillator by an attenuator pad, amplitude modulation free from incidental-frequency modulation is obtained. The output is of the order of 10 millivolts.

6.2 OSCILLATOR AS FREQUENCY CONVERTER

Connected to a Type 874-MR Mixer Rectifier, the oscillator can provide the local signal in a heterodyne converter, to adapt a low-frequency communications receiver for use as a sensitive detector for v-h-f and u-h-f signals. This circuit is shown in Figure 4. Without additional tuning the conversion loss is approximately 12 db at an intermediate frequency of 30 Mc. The bandwidth of the communications receiver should be at least 20 kilocycles to allow for frequency fluctuations of the received signal and of the oscillator.

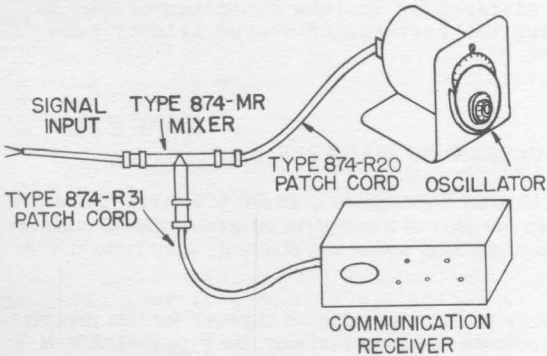


Figure 4. Functional Diagram of the Unit Oscillator and Mixer Rectifier Used as a Frequency Converter

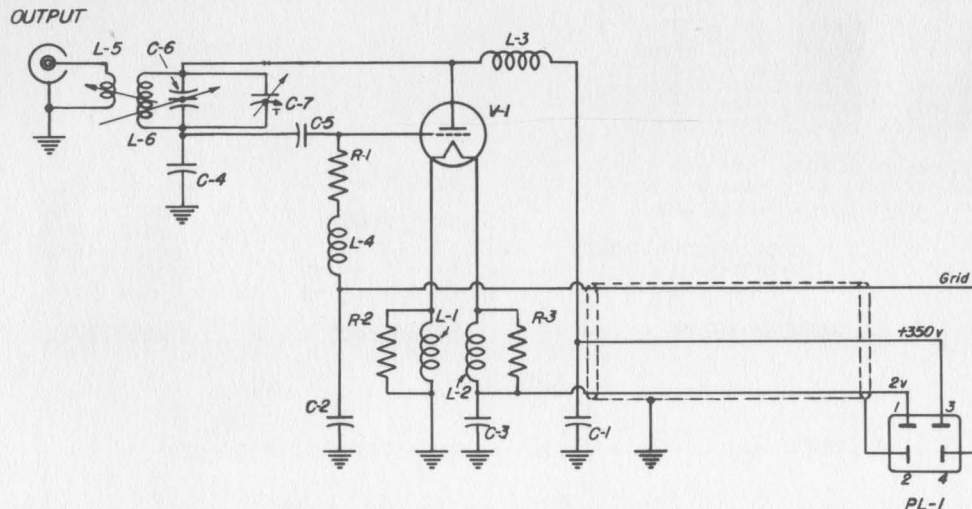


FIGURE 1. Wiring Diagram for Type 857-A UHF Oscillator

PARTS LIST

Resistors

R-1 = 3900 Ω
R-2 = 270 Ω
R-3 = 270 Ω

Tube

V-1 = WE 316-A

Condensers

C-1 }
C-2 } Built in.
C-3 }
C-4 }
C-5 = Approx. 20 μ f
C-6 = Part of Tuning System
C-7 = 857-804 Built in.

Inductors

L-1 = (Wound on R-2) 857-310
L-2 = (Wound on R-3) 857-310
L-3 = } ZCHA-9
L-4 = }
L-5 = Pickup Loop, 874-MA
L-6 = Part of Tuning System

Miscellaneous

PL-1 = CDMP-1275

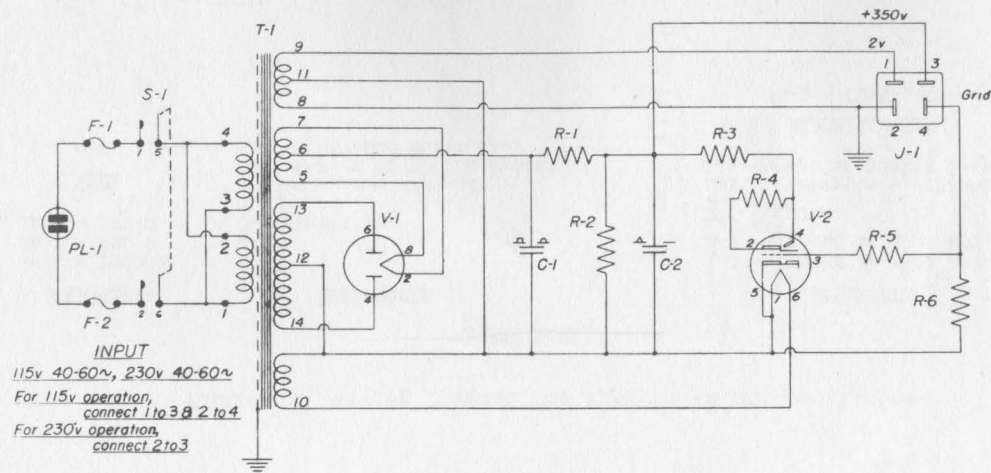


FIGURE 2. Wiring Diagram for Type 857-P1 Power Supply.

PARTS LIST

Resistors

R-1 = 650 Ω
R-2 = 110 k Ω
R-3 = 82 k Ω
R-4 = 1 M Ω
R-5 = 1 M Ω
R-6 = 1500 Ω

Condensers

C-1 = 2 x 20 μ f
C-2 = 2 x 20 μ f

Transformer

T-1 = 365-445

Tubes

V-1 = RCA Type 5Y3GT
V-2 = RCA Type 6E5

Miscellaneous

S-1 = SwT-333
J-1 = CDMS-1401-4
PL-1 = CDPF-562

For 115 v. 50-60 cycle input:

F-1 = 0.8 amp. Slow Blow 3AG GR FUF-1
F-2 = 0.8 amp. Slow Blow 3AG GR FUF-1

For 230 v. 50-60 cycle input:

F-1 = 0.4 amp. Slow Blow 3AG GR FUF-1
F-2 = 0.4 amp. Slow Blow 3AG GR FUF-1

For 115 v. 40 cycle input:

F-1 = 1.25 amp. Slow Blow 3AG GR FUF-1
F-2 = 1.25 amp. Slow Blow 3AG GR FUF-1

For 230 v. 40 cycle input:

F-1 = 0.6 amp. Slow Blow 3AG GR FUF-1
F-2 = 0.6 amp. Slow Blow 3AG GR FUF-1

