

## NEW WIDE-RANGE RF SOURCES

Several recent additions to the General Radio line of wide-range, general-purpose laboratory rf power sources should enhance an already excellent reputation for performance, versatility and dependability at a reasonable price. Two new vhf and uhf oscillators provide increased frequency coverage and improved modulation capability. Three new models of the power supplies offer regulated dc heater voltage for improved oscillator stability. The new oscillators and power supplies are packaged for quick, easy installation and use together, whether on the bench or in a relay rack.

The new oscillators have the low-noise sideband level essential in the local oscillator of a simple superheterodyne receiver using a wide-band single-sideband mixer. In the TYPE 1241 Het-

erodyne Detector (see page 24), the 1236 I-F Amplifier and the 874-MRAL Mixer are used with these oscillators to create a precision calibrated receiver. Typical sensitivity is  $-100$  dBm for a 3-dB meter deflection over residual noise with a 0.5-MHz bandwidth. The oscillators achieve both low noise and complete freedom from nonharmonic discrete spurious frequencies in their outputs through the use of high-Q tank circuits operated at high level in a fundamental-frequency mode.

### 56 to 500 MHz in One Band

The 1363 oscillator delivers power typically in excess of 150 mW from 56 to 500 MHz (see Figure 1a) and replaces the popular TYPE 1208-C. As a local oscillator in the 1241 Heterodyne Detector, it provides fundamental mixing

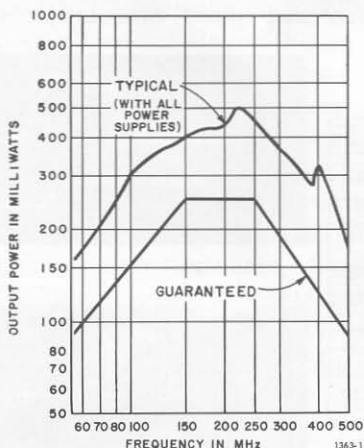


Figure 1a. Output power into a 50-ohm load for Type 1363 Oscillator.

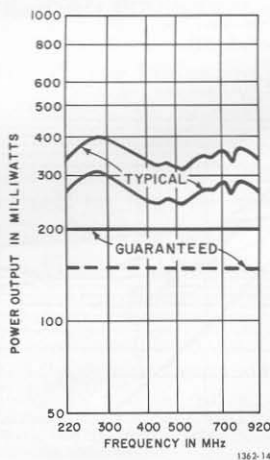
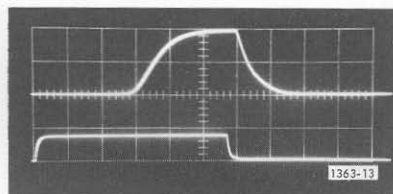
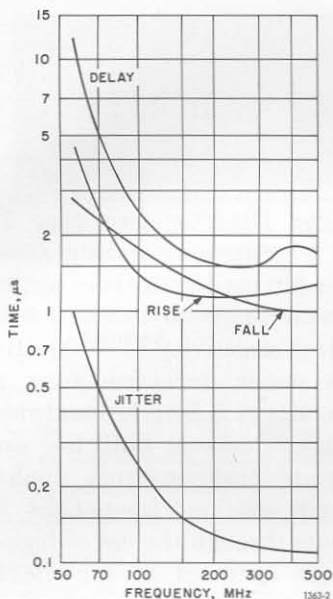
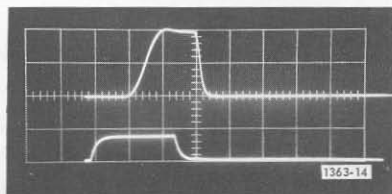


Figure 1b. Output power into a 50-ohm load for Type 1362 Oscillator.



60 MHz 2  $\mu s$ /div



500 MHz 1  $\mu s$ /div

Figure 2a. Typical rise time, starting delay, and jitter when the 1363 Oscillator is pulsed by the 1264 Modulating Power Supply, driven by a 1217-C Pulse Generator. Oscillograms show modulating and modulated pulse shapes at frequency extremes of the 1363.

for signal frequencies from 40 to 530 MHz. The basic wide-range tuner<sup>1</sup> consists of a variable inductor and a variable tuning capacitor, constructed as an integral unit. This fundamental-frequency LC oscillator circuit is inherently more stable than RC or beat-frequency circuits. In the new oscilla-

tor, we have increased the tuning range while reducing the number of wiping contacts from two to one by using a fixed network to suppress the unwanted resonance in the unused portion of the tuning inductor.

Other important circuit changes ensure compatibility with the 1264 power supply, making possible both square-wave and pulse modulation (Figure

<sup>1</sup> E. Karplus, "VHF and UHF Unit Oscillators," *General Radio Experimenter*, May 1950.

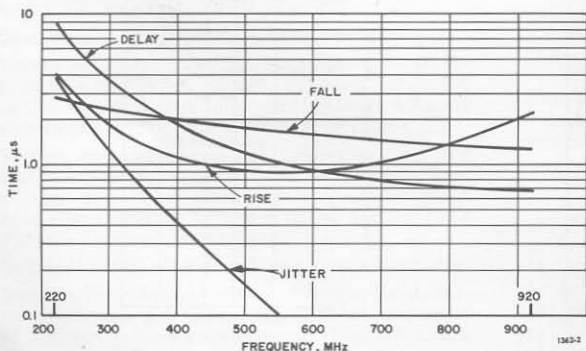
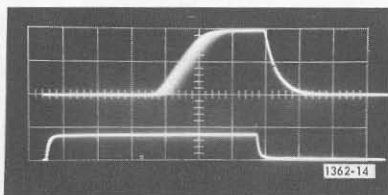
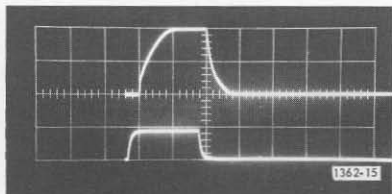


Figure 2b. Pulse characteristics of the 1362 Oscillator. Oscillograms showing modulating and modulated signals are at frequency extremes of the 1362.



220 MHz 2  $\mu s$ /div



900 MHz 2  $\mu s$ /div

2a). A front-panel output control is provided, and the rf output connector can be installed either on the front or at the rear of the instrument; the user can change the location in a few moments without any special tools. The GR874<sup>®</sup> output connector can be easily converted by means of GR874 adaptors to any popular coaxial connector series (BNC, C, N, TNC, OSM/BRM, Microdot, etc).

### 220 to 920 MHz in One Band

The 1362 Oscillator, with an output power typically in excess of 250 mW from 220 to 920 MHz (Figure 1b), supersedes two widely used oscillators, the 1209-CL and the TYPE 1209-C. The frequency range of the new oscillator includes the entire uhf aircraft communications band (220-406 MHz) and the uhf TV band (470-890 MHz), with margin to spare at the top end.\* The tuner is a noncontacting butterfly similar to that used in the earlier oscillators.<sup>1,2</sup>

The oscillator tube is the new planar triode Type Y-1266 developed by General Electric Company in close collaboration with General Radio (Figure 3). This tiny ceramic tube has both the low interelectrode capacitances required for wide tuning range and the stable cathode of high emission capability required for high power output. The cathode operates at a moderate temperature, ensuring long, trouble-free life. This tube has demonstrated its excellence in hundreds of recent production 1209 oscillators and in the high-performance TYPE 1026 Standard-Signal Generator.<sup>3</sup>

The output system is a waveguide-below-cutoff piston, calibrated over a range of 80 dB and adjustable from the

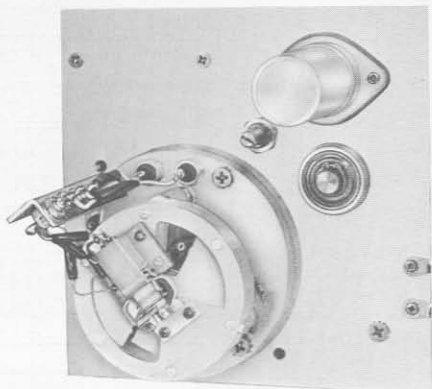


Figure 3. Interior view of the 1362 Oscillator showing new GE Y-1266 planar triode.

front panel. As in the 1361 Oscillator,<sup>4</sup> it is keyed against rotation and can readily be reset to a previously determined position. Relocation of the output coupling loop relative to the butterfly and the use of aperiodic damping to suppress an interdigital rotor resonance result in minimum harmonic content and a very smooth output-versus-frequency characteristic at any setting of the output attenuator.

Leveled operation over the entire oscillator tuning range with a single setting of the output attenuator can be achieved by means of the 1263-C Amplitude Regulating Power Supply. This combination delivers 20 mW into 50 ohms (+13 dBm), either peak, with 1-kHz square-wave modulation, or cw. The level can be reduced as much as 20 dB if desired. Leveled performance is shown in Figure 4. Alternatively, new circuitry permits direct connection to

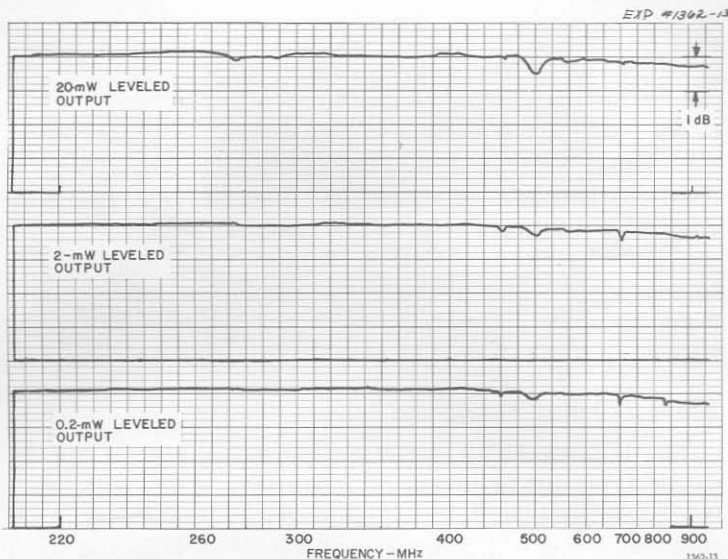
<sup>1</sup> *Ibid.*

<sup>2</sup> E. Karplus, "The Butterfly Circuit," *General Radio Experimenter*, October 1944.

<sup>3</sup> G. P. McCouch, "A New 500-MHz Standard-Signal Generator," *General Radio Experimenter*, March 1967.

<sup>4</sup> G. P. McCouch, "A New UHF Signal Source," *General Radio Experimenter*, March 1961.

\*The region below 220 MHz is covered by both the TYPE 1215 Oscillator (50-250 MHz, noncontacting tuner) and the new 1363. The region above 920 MHz is covered by the 1361 (450-1050 MHz) and the 1218 (900-2000 MHz).



**Figure 4.** Recordings showing leveled performance of a 1362 Oscillator powered by a 1263-C Amplitude-Regulating Power Supply.

the 1264-B Modulating Power Supply, making possible both square-wave and pulse modulation (Figure 2b). Full power output is delivered during the "on" period and the oscillator is completely cut off during the "off" period.

#### Improved Stability from New Power Supplies

The new power supplies offer a major improvement in frequency and amplitude stability as well as increased tube life, obtained by close regulation of heater as well as plate supply voltage. The advantages afforded by regulation of both supplies have been clearly established by some years' experience with the 1267-A Power Supply. Well regulated dc heater supplies have now been incorporated in the 1263-C Amplitude Regulating Power Supply and in the 1264-B Modulating Power Supply.

Recent redesign of the 1267 to a "B" model permitted us to maintain the excellent specifications of its predecessor while simplifying the regulators and introducing a dual primary power transformer so that a single model now

operates on either 115- or 230-V lines. In all three power supplies, the heater regulators are set to deliver 6.5 volts, thereby allowing 0.2 volt for the drop that occurs in the heater rf filters in the oscillators.

An important feature of the TYPE 1264-B Modulating Power Supply is the internal 1-kHz square-wave generator. A sample of the 1-kHz signal has been brought out to the modulation terminals for use in synchronizing oscilloscope sweeps; conversely, a synchronizing signal from an external oscillator may be injected here.

In the latest model of the 1264, it is much easier to set the 1-kHz frequency to the exact center of the narrow pass-band of a highly selective detector amplifier, and there is an order-of-magnitude improvement in the stability of the frequency once it is set.

The improved settability of the 1-kHz frequency has been achieved by means of a dual potentiometer with controlled backlash, operated from a single knob. The procedure is to tune with slight overshoot, then, as the con-

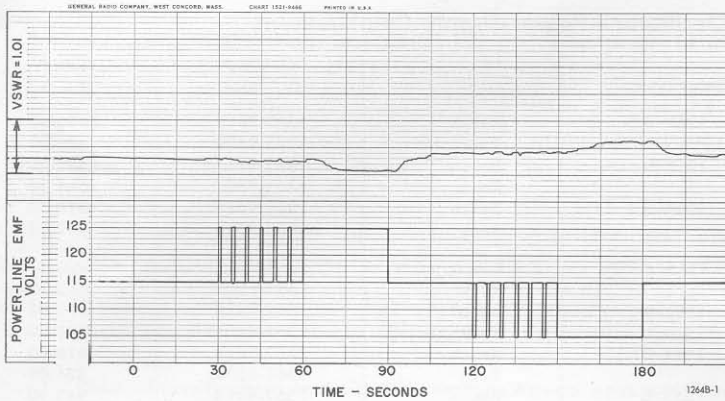


Figure 5. Stability of a 1218-B Oscillator — 1264-B Power Supply Combination used in a slotted-line recording system.

trol is backed up, only the vernier potentiometer comes into play over an arc of 40 degrees. This single control is far easier to use than is the conventional dual concentric knob coarse/fine combination.

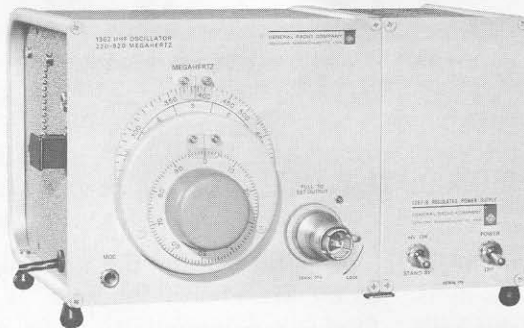
The stability against line voltage of a 1264-B used to power a 1218-B Oscillator in an expanded-scale SWR-measuring system<sup>5</sup> is shown in Figure 5. The 1264-B is also ideal for use with

other General Radio high-frequency oscillators as a source for conventional slotted-line measurements using the new high-stability 1234 Standing-Wave Meter.<sup>6</sup>

— G. P. McCouch

A brief biography of Mr. McCouch appeared in the March 1967 issue of the Experimenter.

<sup>5</sup> A. E. Sanderson, "A Slotted Line Recorder System," *General Radio Experimenter*, January 1965.  
<sup>6</sup> M. Khazan, "A High-Resolution SWR Meter", *General Radio Experimenter*, February 1968.



Type 1362 UHF Oscillator with Type 1267-B Regulated Power Supply.

Complete specifications for the instruments described in this article are given in General Radio Catalog T

Catalog Number	Description	Price in USA
1362-9701	1362 UHF Oscillator	\$395.00
1363-9701	1363 VHF Oscillator	395.00
1263-9703	1263-C Amplitude-Regulating Power Supply	550.00
1264-9702	1264-B Modulating Power Supply (115 V)	415.00
1264-9703	1264-B Modulating Power Supply (230 V)	415.00
1267-9702	1267-B Regulated Power Supply	195.00