

WR-109 WEATHER RADAR TEST SET

**X-BAND
MODEL**

The WR-109 Weather Radar Test Set is designed to test and calibrate the most advanced weather radar functions over the X-band frequency range (9.0 to 9.5 GHz)—the most widely used frequency band for airborne and marine weather radar.

The WR-109 combines an RF signal generator, programmable pulse generator, peak power meter and frequency counter into a single instrument. Each function is simultaneously triggered from a single pulse, further enhancing the power and convenience of the WR-109. A precise digital counter provides frequency resolution of ± 1 kHz, while superb spectral purity is achieved using phase-locked loop indirect synthesis techniques.

A digital keypad, self-illuminating push-buttons and entry menu prompts allow easy, front panel access to all of the WR-109's power, features and functions, while the IEEE-488 bus gives you ATE compatibility. Cable and coupler loss compensation is automatic via front panel controls.

For twelve years, Giga-tronics has provided thousands of reliable microwave test instruments to military and commercial customers for use in testing radar, electronic warfare, satellite and telecommunications systems. In design, manufacturing, installation and service applications, Giga-tronics test sets have achieved MTBF rates in excess of 10,000 hours. In addition to this heritage of reliability, the WR-109 meets MIL-T-28800 specifications and is backed by a 3 year warranty for both parts and labor.

FEATURES

- Simulates up to four targets simultaneously, and individually controls pulse width, pulse delay and amplitude of each
- Cable and coupler loss compensation via front panel control
- Built-in scintillation—fast pulse amplitude modulation for simulating turbulence, GCR (ground clutter return) and STC (sensitivity time curve)

- Display PRF and RF frequencies simultaneously
- Instantaneous and average PRF and PW measurement
- Easy operation control via front panel keypad
- IEEE-488 interface for ATE applications
- Self-illuminating push-buttons indicate which parameters and modes are in use
- Entry menu prompts guide you through initial set-ups as well as continued operation
- Store up to 10 front panel set-ups for quick and easy recall
- Synthesized RF output frequency
- Built-in amplitude, frequency and pulse modulation
- MTBF of greater than 10,000 hours
- The industry's *only* 3 year warranty



Giga-tronics

Tracking Counter/Generator Characteristics:

Frequency Range: 9,000-9,500 GHz
Frequency Resolution: 1 kHz
Frequency Tracking Accuracy:

Radar Transmitter Pulse Width	Maximum Error
2.0-30.0 μ s	± 20 kHz, ± 10 kHz Typical
0.5- 2.0 μ s	± 50 kHz
0.1- 0.5 μ s	± 1 MHz

Note: Accuracy independent of pulse repetition rate

Frequency Offset: ± 50 MHz (must be within frequency range)
Frequency Offset Resolution: 1 kHz

IF Range Output:

Frequency Range: 20 MHz to 250 MHz
Sweep Width: 0 to 20 MHz
Output Amplitude: -20 dBm to -120 dBm

Spectral Purity:

Harmonics: < -40 dBc
Spurious: < -45 dBc, greater than 1 kHz offset from the carrier
Single-Sideband Phase Noise: < -65 dBc, 1 Hz Noise Bandwidth, 10 kHz Offset

Output Power Characteristics:

Output Amplitude Range: -40 dBm to -140 dBm (at the output of a 20 dB cross guide coupler)
Output Amplitude Resolution: 0.1 dB
Output Amplitude Accuracy: ± 1 dB

Input Power Measurement:

Power Range: 1.2 to 150 Watts (direct)
12 to 1500 Watts (with a 10 dB cross guide coupler)
120 to 15,000 Watts (with a 20 dB cross guide coupler)
Input Power Accuracy: ± 0.5 dB, 800 to 15,000 Watts (with a 20 dB cross guide coupler)
 ± 1.0 dB, 120 to 800 Watts (with a 20 dB cross guide coupler)

Pulse Modulation Characteristics:

Target #1
Modes: Internal, External, Radar Trigger
Internal PRF: 10 Hz to 1 MHz
Internal Pulse Width: 0.1 μ s to 100 ms, 0.1 NM to 300 NM
Internal Radar Range: 0.1 μ s to 100 ms, 0.1 NM to 500 NM, referenced to the 50% point of the leading edge of the detected radar transmitter pulse.
External: TTL compatible, 10 Hz-1 MHz rate, ≥ 0.1 μ s wide, positive level for "RF on."
Input impedance is 50 ohms, nominal.
Radar Trigger: 50 Hz to 20 kHz rate, ≥ 0.1 μ s wide
Output Pulse Rise/Fall Time: < 50 ns
On/Off ratio: > 70 dB

Multiple Targets: Targets must be set sequentially

Target #2
Internal Pulse Width: 0.1 μ s to 100 ms, 0.1 NM to 300 NM
Internal Radar Range: 0.3 μ s to 100 ms, 0.3 NM to 500 NM, referenced to the 50% point of the leading edge of the detected radar transmitter pulse.

Attenuation Range: 0 to -63 dB attenuation referenced to the highest amplitude of any of the four targets in .25 dB steps. Minimum RF Signal level of Target #2 is -140 dBm (with a 20 dB cross guide coupler).

Target #3

Internal Pulse Width: 0.1 μ s to 100 ms, 0.1 NM to 300 NM
Internal Radar Range: 0.5 μ s to 100 ms, 0.5 NM to 500 NM, referenced to the 50% point of the leading edge of the detected radar transmitter pulse.

Attenuation Range: 0 to -63 dB attenuation referenced to the highest amplitude of any of the four targets in .25 dB steps. Minimum RF Signal level of Target #3 is -140 dBm (with a 20 dB cross guide coupler).

Target #4

Internal Pulse Width: 0.1 μ s to 100 ms, 0.1 NM to 300 NM
Internal Radar Range: 0.7 μ s to 100 ms, 0.1 NM to 500 NM, referenced to the 50% point of the leading edge of the detected radar transmitter pulse.

Attenuation Range: 0 to -63 dB attenuation referenced to the highest amplitude of any of the four targets in .25 dB steps. Minimum RF Signal level of Target #4 is -140 dBm (with a 20 dB cross guide coupler).

External AM Characteristics:

Modulation Rate: 10 Hz to 10 kHz
Input Sensitivity: 1 V p-p for 50% ($\pm 10\%$) modulation at 1 kHz rate.
Modulation Depth: 0 to 90%
Input Impedance: 600 ohms, nominal. AC coupled

External FM Characteristics:

Modulation Rate: 10 Hz to 100 kHz
Deviation: 0.1 to 5 MHz, peak
Input Sensitivity: 2 V p-p for 5 MHz ($\pm 10\%$) peak deviation
Input Impedance: 50 ohms, nominal

Scintillation:

TURBULENCE
Number of patterns: Up to 8 independent turbulence patterns can be stored in EPROM.
Pattern Size: 64 range bins by 256 azimuth bins. The 64 range bins are automatically repeated 4 times to fill the 256 range bins by 256 azimuth bins.
TURB 1: Adjustable, ± 32 dB from the output power setting.
Amplitude Resolution: .25 dB
TURB 2: 63 dB in 0.25 dB increments
STC (sensitivity time curve):
Number of Patterns: Up to 32 independent STC patterns can be stored in EPROM.
Pattern Size: 256 range bins by 1 azimuth bin. This data is repeated 255 times to fill the remaining azimuth bins.
Amplitude Range: 63 dB in .25 dB increments

Inputs:

SCINT RST (scintillation pattern reset): (rear panel) TTL pulse synchronizes turbulence patterns on the radar screen.
PRF/PW SYNC IN: (rear panel) 50 ohm TTL pulse, gates internal PRF counter to read the specific pulse rates and widths within a radar burst transmission.
REF IN: (rear panel) 10 MHz $\pm 1 \times 10^{-6}$ or better, 1.5V p-p, automatically overrides internal time base.

Outputs:

DISCR (discriminator out): Sensitivity is 0.1 V/MHz ($\pm 10\%$), Rise/Fall Time is 50 ns, typical.
DET OUT (detector out): Detected radar transmitter signal .05 up to +1.5V (into a 50 ohm load)
SYNC OUT (scope sync out): Positive pulse simultaneous with radar transmitter in track mode, internal PRF generator in internal mode or external trigger in external mode.
SPEC AN (spectrum analyzer out): (rear panel) Attenuated sample of radar transmitter and return signal.
REF OUT: (rear panel) Buffered 10 MHz, 2V p-p, into 50 ohms derived from internal or external time base.
IF SWP RAMP OUT: 0-6V ramp

Environmental:

Operating Temperature Range: 0 to 50°C
Amplitude Calibration Valid: $25 \pm 10^\circ$ C
Relative Humidity: 0 to 90%, non-condensing

General Specifications:

Primary Power Source: 100/115/230 VAC, 50-400 Hz, < 200 W
Net Weight: 45 lb. (20.4 kg)
Width: 16.75 in. (42.5 cm)
Depth: 20.00 in. (50.8 cm)
Height: 5.25 in. (13.3 cm)