

# 7000 SERIES SYNTHESIZED MICROWAVE SIGNAL SOURCE

The 7000 Series Signal Source is the ideal instrument for applications that require precise, stable and spectrally pure signal generation over a wide range of frequencies and power levels, but without complex modulation. Applications such as component characterization and up/down conversion for measurement or analysis. And 7000 Series instruments provide a stepped CW sweep capability to speed test and measurement operations or to let you explore performance around specific frequencies.

The 7000 Series of instruments is available in six models covering different frequency ranges from 10 MHz to 40 GHz. And all models use a two-loop, indirect synthesis technique to attain high resolution frequency with optimum accuracy, stability and spectral purity.

A digital keypad, self-illuminating push-buttons and entry menu prompts allow easy, front panel access to all of the power, features and functions

of the 7000 Series instruments, while the IEEE-488 bus gives you ATE compatibility.

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 instruments have achieved MTBF greater than 10,000 hours, and 7000 Series instruments meet MIL-T-28800E, Type III, Class 5, Style E specifications.

## FEATURES:

- Available in six frequency ranges
  - 10 MHz to 20.0 GHz
  - 10 MHz to 26.5 GHz
  - 10 MHz to 40.0 GHz
  - 2 GHz to 20.0 GHz
  - 2 GHz to 26.5 GHz
  - 2 GHz to 40.0 GHz

- 1 Hertz frequency resolution
- 1 Hz/GHz/day accuracy and stability
- Leveled output power from +10 to -130 dBm controllable in .01 dB increments
- Stepped CW digital (step and dwell) sweep of frequency
- 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
- MTBF greater than 10,000 hours



**Giga-tronics**

## MODEL 7000 SPECIFICATIONS

### ORDERING INFORMATION

#### MODEL NUMBERS AND FREQUENCY RANGES:

Model Number	Frequency Range
7000/.01 - 20	10 MHz to 20.0 GHz
7000/.01 - 26	10 MHz to 26.5 GHz
7000/.01 - 40	10 MHz to 40.0 GHz
7000/2 - 20	2 GHz to 20.0 GHz
7000/2 - 26	2 GHz to 26.5 GHz
7000/2 - 40	2 GHz to 40.0 GHz

#### AVAILABLE OPTIONS:

Option 11: Allows external time base of 5 MHz in addition to the standard 10 MHz.

Option 22: Moves the RF Output Connector from the instrument's front panel to its rear panel. This option may decrease maximum output power by as much as 2 dB.\*

#### AVAILABLE ACCESSORIES:

Accessory A001: Cable Kit consisting of 2 low loss cables (18 and 72 inch lengths) and 2 output connector adaptors (F-F and M-F)\*

Accessory A002: Instrument configured for standard rack mounting with chassis slides.

Accessory A003: Instrument configured for standard rack mounting without chassis slides.

Accessory A006: Extra extender board service kit (One furnished with each instrument).

Accessory A010: Extra operation and/or maintenance manuals (One furnished with each instrument; specify type of manual when ordering).

Note: See current Giga-tronics price list for possible new option and/or accessory availability.

### SPECTRAL PURITY

Harmonics (up to maximum frequency):  $< -55$  dBc, 0.05 to 40 GHz;  $< -25$  dBc ( $< -20$  dBc in instruments to 40 GHz), 0.01 to 0.05 GHz

Subharmonics: None in instruments to 20 or 26.5 GHz ( $< -55$  dBc, 20 to 40 GHz, in instruments to 40 GHz)

Nonharmonics:  $< -55$  dBc ( $< -49$  dBc, 20 to 40 GHz, in instruments to 40 GHz)

Power Line/Fan Rotation Related (dBc, CW Mode):

Frequency Range (GHz)	Offset from Carrier		
	$< 300$ Hz	300 Hz to 1 kHz	$> 1$ kHz
.01 to $< 2$	-45	-55	-55
2 to $< 8$	-50	-55	-55
8 to $< 20$	-45	-55	-55
20 to 26.5	-40	-50	-55
20 to 40	-39	-49	-49

Single-Sideband Phase Noise (dBc/Hz Noise Bandwidth, CW Mode, All Power Levels):

Frequency Range (GHz)	Offset from Carrier				
	30 Hz	100 Hz	1 kHz	10 kHz	100 kHz
.01 to $< 2$	-60	-75	-80	-75	-100
2 to $< 8$	-65	-75	-80	-80	-105
8 to $< 20$	-60	-65	-75	-75	-100
20 to 26.5	-55	-65	-70	-70	-95
20 to 40	-54	-59	-69	-69	-94

Residual FM (Hz, rms; CW Mode):

Frequency Range (GHz)	Post-detection Bandwidth	
	.3 to 3 kHz	.05 to 15 kHz
.01 to $< 2$	30	200
2 to $< 8$	20	150
8 to $< 20$	40	300
20 to 26.5	60	450
20 to 40	80	600

### RF FREQUENCY PARAMETERS AND OPERATIONAL MODES

All variable RF frequency parameter values may be set via the GPIB or from the front panel by keyboard, digi-dial or up/down push-button entry.

#### CW OPERATION

Range: 0.01 or 2 to 20, 26.5 or 40 GHz (see Ordering Information)

Resolution: 1 Hz (2 Hz above 20 GHz in instruments to 40 GHz)

Accuracy and Stability: Identical to time base oscillator

Time Base (Internal): 10 MHz

Aging Rate:  $< 1 \times 10^{-9}$ /day after 72 hours continuous operation

Temperature Stability:  $< \pm 2 \times 10^{-10}/^{\circ}\text{C}$  (0 to  $+50^{\circ}\text{C}$ )

Time Base (External): 10 MHz (5 or 10 MHz, switchable, with Option 11)  $\pm 1 \times 10^{-6}$  or better

Switching Time:  $< 50$  msec (20 msec, typical) to within specified frequency accuracy

#### DIGITAL FREQUENCY SWEEP

A precision digital (step and dwell) frequency sweep acquires a lock at each discrete frequency step. Step size and dwell time are selectable.

Sweep Range: FA (minimum frequency of the instrument) to FB (maximum frequency of the instrument)

Step Size: Any increment within the instrument's frequency resolution

Dwell Time: May be set in 10 msec increments from approximately 10 msec to 200 sec

Accuracy and Stability: Same as in CW when locked at each step during dwell time

Sweep Mode: START/STEPS (FA  $\leq$  FI  $\pm$  (Step Size  $\times$  Number of Steps)  $\leq$  FB); Sweeps up or down from a preset start frequency (FI) through a preset number of frequency steps

Sweep Functions:

AUTO: Continuous recycle of preset sweep

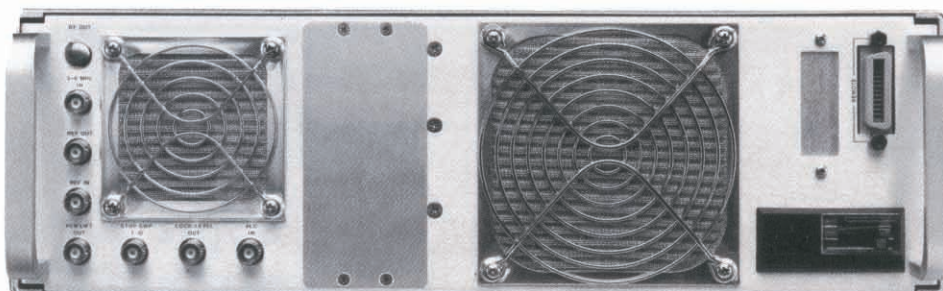
SINGLE: A single cycle of preset sweep or (with STOP activated) a single preset step, initiated by manual operation of a front panel push-button

EXT: A single cycle of preset sweep or (with STOP activated) a single preset step, initiated by each trigger from an external source

EXT STOP (External Step): A single step of a preset sweep initiated by each trigger from an external source

STOP/RESET: Stops sweep when activated by front panel push-button to allow manual tuning of frequency at any point in the sweep. Second depression of push-button resets sweep to initial conditions.

\* Not available for instruments to 40 GHz.



Model 7000 Rear Panel

## RF OUTPUT POWER PARAMETERS

All variable RF output power parameter values may be set via the GPIB or from the front panel by keyboard, digi-dial or up/down push-button entry.

### RF OUTPUT POWER

Maximum Levelled Output: +10 dBm (in instruments to 40 GHz; +10 dBm, 0.01 to 20 GHz; +5 dBm, 20 to 35 GHz; +2 dBm, 35 to 40 GHz)

Incremental Level Range: -20 to +15 dBm

Resolution: 0.01 dB, entry and display to -99.99 dBm (display is 0.1 dB at  $\leq -100.0$  dBm)

Minimum Output Level: -130 dBm (-110 dBm in instruments to 26.5 or 40 GHz)

RF Off: Typically attenuates a 0 dBm signal to  $< -140$  dBm at the output connector

Output Accuracy (Internally Levelled, CW or frequency sweep mode, AM Off):  $\pm 1$  dB to 20 GHz,  $\pm 2$  dB to 40 GHz ( $\pm 0.1$  dB per 10 dB attenuation step)

Output Flatness: Included in accuracy

Output Switching Time: Typically  $< 1$  msec (20 msec with attenuator change)

Output Impedance: 50 ohms, nominal

Output SWR:  $< 2:1$

External Leveling: Output power may be externally leveled by positive or negative ZBS detectors or power meters

## GENERAL SPECIFICATIONS

Remote Interface: IEEE STD 488-1978—All

parameters except AC power on/off

Operating Temperature: 0 to 50°C

Environmental: Complies with MIL-T-28800E, Type III, Class 5, Style E

Power: 100/120/220/240 VAC  $\pm 10\%$ ,

50–400 Hz, 350 Watts, nominal

Weight and Dimensions:

	Net	Packed for air shipment
Width	16.75 in. (42.5 cm.)	24 in. (60.9 cm.)
Depth	24 in. (60.9 cm.)	31 in. (76.7 cm.)
Height	5.25 in. (13.3 cm.)	11.25 in. (28.6 cm.)
Volume	1.22 cu.ft. (.0345 cu.m.)	4.84 cu.ft. (.1372 cu.m.)
Weight	65 lb. (29.6 kg.)	80 lb. (36.3 kg.)

### SPECIAL FUNCTIONS

Special functions are available to the operator via a SHIFT key and the data entry keyboard.

STORE/RECALL: Stores up to 10 complete front panel set-ups of frequency, frequency sweep and output level in the instrument's non-volatile memory for recall at any time

ADRS: Allows setting of the instrument's IEEE 488 bus address via the data entry keyboard and displays it at the entry menu

LOCAL: Returns control of all parameters to the instrument's front panel

RESET: Initializes all parameters

ALT: Alternates between any two or more stored sweeps

ATTEN: Disables the step attenuator at any attenuator setting and lets it be operated over the incremental level range of -20 dB to the maximum power capability of the output oscillator

TEST: Initiates instrument's self test routines

ALC: Allows setting of external conditions of leveling (detector or power meter) or unleveled internal operation

MULT: Allows division of the instrument's frequency by any integer to provide proper signals for external frequency multipliers

OFFSET: Allows frequency readout to be offset from output frequency

SPECIAL: Allows user defined and/or future special functions and features

### INPUTS/OUTPUTS

All connectors are type BNC unless otherwise stated

#### Front Panel

RF OUT: Generator's RF output signal on type SMA connector (2.92 mm connector on instruments to 40 GHz) (see Option 22 for rear panel output)

SWP TRIG IN: TTL level,  $\geq 50$  nsec wide trigger input to initiate sweep or step.

RAMP OUT: 0 to +10 V ramp out, proportional to frequency between set sweep limits

#### Rear Panel

ALC IN: Signal input for remote leveling of output power by positive or negative polarity ZBS detectors or by applicable power meters. Range: 500  $\mu$ V to 2 V, loop bandwidth: 50 kHz, nominal (ZBS detector); 0.7 Hz, nominal (power meter), input impedance: 10 kohm, nominal

REF IN: External time base input signal, 10 MHz  $\pm 1 \times 10^{-6}$  or better, 0.5 to 5 V, p-p, overrides internal time base. Input impedance is 100 ohms, nominal

REF OUT: Buffered time base output, 10 MHz, 2 V, p-p, into 50 ohms, sine wave derived from internal or external time base

5–6 MHz IN: 2 V, p-p, input for controlling frequency of the signal generator. Input impedance is 50 ohms, nominal. Allows fine frequency resolution control from an external synthesized source

STOP SWEEP IN/OUT: TTL level signal input to stop frequency sweep or output to indicate that sweep has been stopped

LOCK/LEVEL OUT: TTL high indicating that frequency is phase-locked and output power is leveled

PENLIFT OUT: Low during sweep, high impedance during retrace