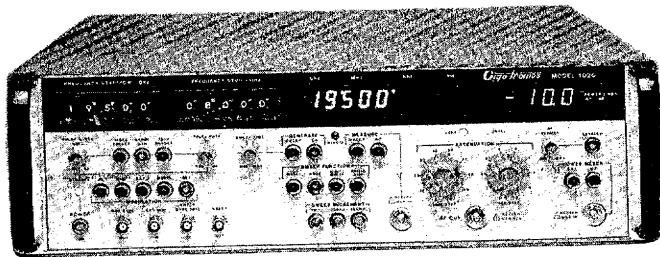


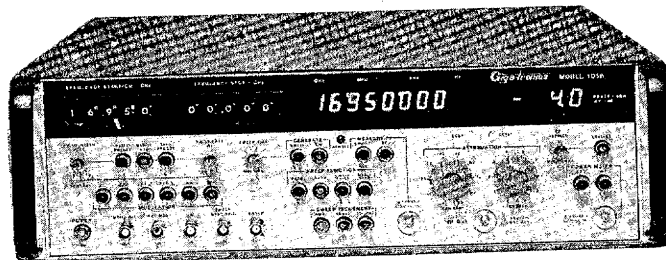
# Multi-function Products

Multi-band



RF/Microwave Model 1026

Multi-band



RF/Microwave Model 1018

**Stimulus, frequency measurement and power measurement instruments** are the most important and commonly used tools for R & D, production test, maintenance and calibration applications. In applications involving RF and microwave frequencies, the stimulus instrument is a signal generator or sweeper, the frequency measurement instrument is a counter or spectrum analyzer and the power measurement instrument is a power meter or scalar network analyzer. The choice of instrument in each category is normally dependent on the type of device being developed, tested, maintained or calibrated, the complexity of tests to be performed and the resources available for purchasing test equipment.

**Giga-tronics multi-function products** provide the convenience and economy of three instruments (signal generator, frequency counter and power meter) in one general purpose package costing very little more than the signal generator alone.

The signal generators contained in Giga-tronics multi-function products are multi-band synthesized instruments with full range, high resolution control of output power and both internal and external modulation capability; the same capabilities found in the Giga-tronics Series 900 Multi-band Signal Generators.

A microprocessor controlled two-loop indirect synthesizer produces accurate, stable, high resolution frequencies over the range of 2 to 26GHz, using four fundamental YIG-tuned output oscillators in bands of 2 to 8, 8 to 12, 12 to 18 and 18 to 26GHz. No frequency multipliers are used. The 2 to 8 and 8 to 12GHz bands downconvert to provide output frequencies below 2GHz. Harmonics are filtered within each band. Each output oscillator is phase-locked to a high stability

crystal time base to provide the most accurate, stable, spectrally pure frequencies available from any RF or microwave signal source.

Specially designed signal control modules, in which amplitude and pulse modulation are controlled, combine with a precision output attenuator and permanent internal storage of correction factors to provide precise control of output power levels from +10 to -119dBm with 0.1dB resolution.

Operating in their frequency counter mode, Giga-tronics multi-function instruments utilize the synthesized frequencies produced by the signal generator as the local oscillator for a completely automatic RF and microwave frequency counter. The counter is capable of measuring any unknown frequency within the instrument's frequency range, be they CW frequencies or pulse modulated frequencies with pulse widths as narrow as 100nsec. The unknown frequency may be displayed as a direct readout of the frequency itself or the frequency by which it differs from a pre-selected reference frequency. The accuracy of the frequency measurements is the same as the instrument's crystal controlled time base and measurement resolution is 100Hz in the direct measurement mode, 10Hz in the offset measurement mode.

The external power measurement capability of Giga-tronics multi-function instruments is provided by a wide frequency range (50MHz to 26GHz) crystal detector that allows accurate CW power measurement over a range of -30dBm to +10dBm, independent of whether the instrument is operating in the frequency generation or measurement mode.

**The Giga-tronics extras** further confirm your decision to select a Giga-tronics multi-function instrument as the answer to your

signal generation, frequency measurement and power measurement requirements.

The signal generator features two modes of **digital sweep** capability. In the digitally controlled, unlocked mode, the synthesizer's reference loop is disabled and the microprocessor, controlling a digital to analog converter, moves each YIG-tuned output oscillator through its frequency range in pre-selected increments at rates as fast as 1msec/increment. In the digitally controlled step and lock mode, the synthesizer's reference loop remains active and acquires a lock at each incremental frequency before stepping on to the next. Sweep rates, variable from approximately 10msec/increment to 10sec/increment, provide sufficient time to observe, adjust or record test results at precise frequencies throughout the sweep range. In either digital sweep mode, step increments of 1, 10 or 100MHz can be set from the instrument's front panel (any increment within the instrument's frequency resolution via the **IEEE 488 bus**).

Since the external power meter operates independently of signal generation and frequency measurement, it can make **simultaneous frequency and power measurements** or directly read and **display power difference (gain or loss)** between the signal generator's output and any output of the device being tested. And, the external power meter, in conjunction with the signal generator's digital sweep and memory storage, provides **automatic cable calibration** and compensation for losses in the output cable being used.

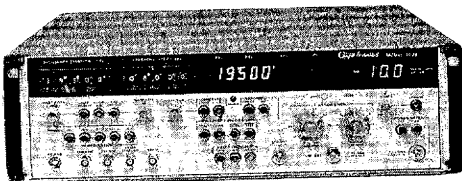
**Economy.** What could be more economical than an RF/Microwave synthesized signal generator, CW and pulsed RF frequency counter and CW power meter for the price of the signal generator alone?

## Multi-function Products — RF/Microwave

### Series 1000

#### Features

- Synthesized Signal Generator
- .05 or 2 to 12, 18 or 26GHz
- 1MHz or 1kHz Resolution
- +10 to -119dBm Output
- 0.1dB Resolution
- AM, FM, Pulse and Scan Modulation
- External Frequency Counter
- CW or Pulsed RF
- External Power Meter
- Output Cable Calibration
- IEEE 488 GPIB



Model 1026

Giga-tronics produces two general purpose, multi-band, multi-function products; the Model 1026 and the Model 1018. Each is a multi-band, synthesized, RF/microwave, CW and digitally swept signal generator. Each is a full range, automatic, RF/microwave, CW or pulsed RF frequency counter. Each is a wide range, RF/microwave, CW power meter.

Each of the instruments generates accurate stable, spectrally pure frequencies with resolution of 1MHz or 1kHz, each produces high powered, leveled output signals with 0.1dB resolution and  $\pm 1$ dB accuracy to 18GHz ( $\pm 2$ dB above 18GHz) and each can be swept throughout its frequency range in a digitally controlled continuous, or step and lock mode.

To further enhance its full modulation capabilities, the scan modulator is optionally available in the Model 1018. Scan modulation provides digitally characterized, DC coupled scan or AC coupled amplitude modulation, to greater than 40dB depth, for complex simulation applications requiring independent and simultaneous control of pulse and amplitude modulation.

Each instrument can measure unknown, external RF and microwave frequencies, either CW or pulsed RF, and display them directly or as an offset from a predetermined reference. Measurement resolution is 100Hz for direct readings; 10Hz for offset readings. Accuracy is the same as the instrument's time base.

The external power measurement capability

Frequency Range (GHz)	MULTI-BAND			SINGLE-BAND			FREQ EXTENDERS
	TEST SETS	SOURCES See p. 24	SIG GENs See p. 16	SWEEPERS See p. 6	SOURCES See p. 26	SIG GENs See p. 18	
.01							
.05							
2							
6							
12							
18							
26							
33							
40							
50							
60							
75							

of the Models 1026 and 1018 provides a good power meter for general purpose measurements. It also adds two important signal generator features that are unique to Giga-tronics instruments. With the signal generator output connected to a UUT and the UUT's output connected to the power meter, the instrument's power display will directly indicate power difference (gain or loss) between the UUT's input and output.

The same capability can calibrate the output cable being used. Connect the cable from the signal generator's output directly to the power meter input. The signal generator will sweep once through its frequency range, store cable loss information in memory and, thereafter, automatically correct its output power to compensate for cable loss at any frequency and deliver calibrated, leveled power directly at the UUT.

For more detailed information...



Series 900/1000 Brochure No. 4 on Information Request Card

# Specifications & Operating Performance

## MODEL NUMBER

1018, 1026

## SIGNAL GENERATOR SPECIFICATIONS

### FREQUENCY CHARACTERISTICS

Range (GHz):

Model 1018  
Model 1026

.05 2 8 12 18 26

Note: Option 02 deletes all frequencies below 2GHz, either model

Option 12 deletes all frequencies above 12GHz, either model

Option 18 deletes all frequencies above 18GHz, Model 1026

Resolution: 1MHz (1kHz with Option 03)

Settable Frequency Parameters:

All CW frequencies

Sweep start (F1) and sweep stop (F2)

### CW Operation

Frequency Accuracy: Same as time base

Frequency Stability: Same as time base

Time Base (Internal): 10MHz,  $<1 \times 10^{-6}$ /year ( $<1 \times 10^{-9}$ /day with Option 06)

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

Time Base Output: Buffered 10MHz, derived from internal or external time base

### Digital Sweep Operation

Sweep Method: Continuous unlocked or step and lock

Sweep Mode and Limits

Start/Stop Sweep: F1 to F2: Minimum frequency  $\leq F1 < F2 \leq$  maximum frequency

Sweep Functions: Automatic recycle, single sweep, single step and triggered single sweep or single step

Step Size: 1, 10 or 100MHz via the front panel; any increment within the instrument's resolution via the IEEE 488 bus

Sweep Time: Approx 1msec/step to 1 sec/step (continuous unlocked method); approx 10msec/step to 10sec/step (step and lock method)

Pen Lift Output: TTL low during retrace

Sweep Sync Trigger In: TTL low to initiate

Sweep Output: 0 to +10V, proportional to frequency between set limits

### SPECTRAL PURITY

Harmonics, Subharmonics:  $<-55$ dBc

Spurious (Nonharmonics):  $<-55$ dBc

Power Line/Fan Related:  $<-55$ dBc

( $>600$ Hz offset),  $<-45$ dBc (100Hz-600Hz offset),  $<-38$ dBc ( $<100$ Hz offset)

SSB Phase Noise (dBc/Hz Noise BW, CW mode)

Frequency Band (GHz)	100Hz	1kHz	10kHz	100kHz
.05-2	-70	-72	-75	-97
2-8	-78	-80	-78	-102
8-12	-75	-77	-75	-100
12-18	-70	-74	-75	-95
18-26	-70	-70	-75	-95

### OUTPUT CHARACTERISTICS

Maximum Levelled Output

Model 1018: +3dBm (+8dBm with Option 08)

Model 1026: +5dBm (+10dBm with Option 10)

Attenuation Range 0 to 119dB, Model 1018; 0 to 99dB, Model 1026

Vernier Level Adjustment Range: 20dB

Resolution: 0.1dB

Accuracy:  $\pm 1$ dB (to 18GHz),  $\pm 2$ dB (18 to 26GHz)

Flatness: Included in accuracy

### MODULATION CHARACTERISTICS

#### Pulse/Square Wave Modulation (PM)

Repetition Rate: Internal, 100Hz to 50kHz; external, 10Hz to 1MHz

Pulse Width: Internal, 0.1 to 10 $\mu$ sec; external, 0.1 $\mu$ sec to 100msec

On/Off Ratio:  $>60$ dB, Model 1018;  $>30$ dB, Model 1026

Rise/Fall Times:  $<25$ nsec

Overshoot, Undershoot and Ringing:  $\leq \pm 2$ dB

Settling Time (to within  $\pm 1$ dB):  $\leq 100$ nsec

Sync Output: Modulation waveform

#### Amplitude Modulation (AM)

(Model 1018 only. Also see Scan Modulation Option 07 Technical Bulletin)

Frequency Response (3dB points referenced 1kHz): 10Hz to 5kHz

Modulation Depth: 0 to  $>82\%$

Input Required: 1V, p-p, for 50% modulation at 1kHz rate

#### Frequency Modulation — Option 15

(Model 1018 only)

Rate: 10Hz to 1MHz

Deviation: 20MHz, p-p

Sensitivity: 3V, peak, for max deviation

Distortion:  $<5\%$  at 1MHz peak deviation and 100kHz rate

Incidental AM:  $<5\%$

### FREQUENCY COUNTER SPECIFICATIONS

#### Measurement Characteristics

Mode: CW or pulsed RF

Method: Direct or offset ( $\Delta F$ )

Range: 100MHz to 18GHz, Model 1018; 100MHz to 26GHz, Model 1026

Resolution: 100Hz, direct; 10Hz, offset

Sensitivity:  $>-30$ dBm, 0.1 to 8GHz;

$>-25$ dBm, 8 to 18GHz;  $>-18$ dBm, 18 to 26GHz

Time Base: Same as signal generator

Offset Range:  $\pm 500$ MHz

### POWER METER SPECIFICATIONS

#### Measurement Characteristics

Mode: Average CW

Method: Direct or referenced to signal generator output ( $\Delta P$ )

Range: 50MHz to 26GHz

External Power Measurement Range: -30 to +10dBm

Resolution: 0.1dB

Accuracy:  $\pm 1$ dB (-10 to +10dBm),  $\pm 2$ dB (-30 to -10dBm)

Power Meter Output: 0.5V  $\pm 10\%$ /dBm (+10V  $\pm 10\%$  at +10dBm and -10V  $\pm 10\%$  at -30dBm)

### GENERAL INFORMATION AND OPTIONS

Remote Interface: IEEE STD 488-1978 (RS-232 with Option 04)

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

Automatic Output Cable Calibration (See Technical Bulletin 09)

Frequency Extender Interface — Option 14

Rear Panel RF Output Connector — Option 22

Type N RF Output Connector (Instruments to 18GHz) — Option 23)

# Multi-function Product Options

Series  
1000

## Available Option Technical Bulletins

Information Request Card No.		
Technical Bulletin No.		
<b>Option</b>		
Scan Modulation	07	8
High Output Power	08	9
Cable Calibration	09	10
High Output Power	10	11
External FM	15	12
Fast Scan Modulation	17	13

Frequency Range (GHz)

Option No. ▶

.01 .05 2 6 8 10 12 18 26 33 40 50 60 75

.01

.05

2

6

8

10

12

18

26

33

40

50 60 75

	No Low Band (<2GHz)	Resolution: 1kHz	Interface: RS-232 in lieu of IEEE 488	Time Base: 1 x 10 <sup>9</sup> /day	Scan Modulation (See Technical Bulletin 07)	High Output Power (See Technical Bulletin 08)	Cable Calibration (See Technical Bulletin 09)	High Output Power (See Technical Bulletin 10)	Time Base: 5MHz External Input	No High Bands (>12GHz)	Interface: MATE (CII), Built-in TMA	Control Bus for Frequency Extender	External FM (See Technical Bulletin 15)	Resolution: 1Hz	Fast Scan Modulation (See Technical Bulletin 17)	No High Band (>18GHz)	Rear Panel RF Output	Type N RF Output Connector
02																		
03																		
04																		
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