Giga-tronics

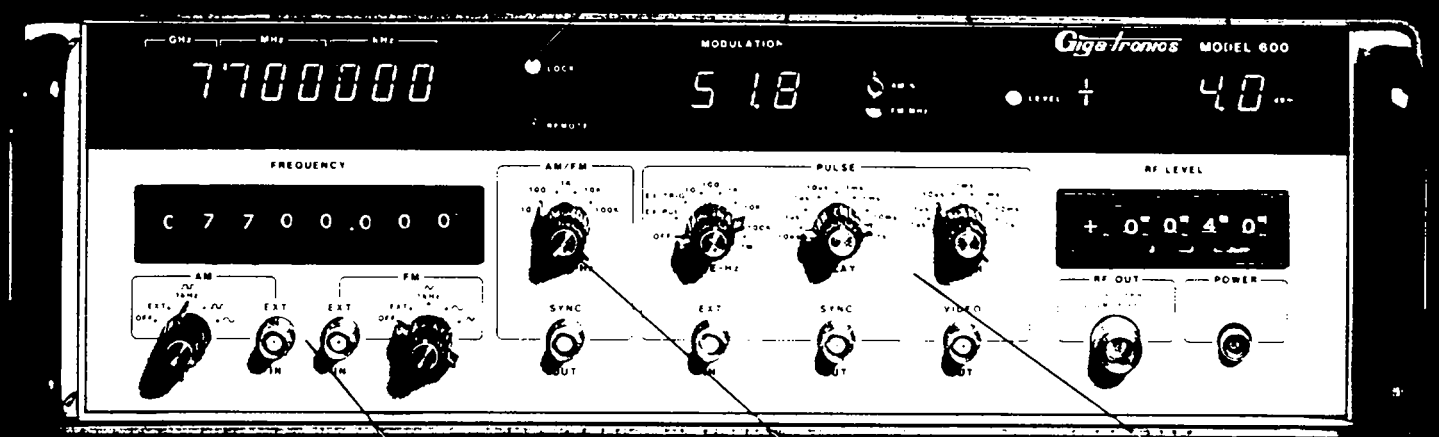
Indirect Synthesized Microwave

Single-band Signal Generators

Frequency Selection and Display
Easy-to-use leverswitches let you set desired frequency with 1 kHz resolution throughout the range of the instrument. The frequency display confirms frequencies set under remote control and may be blanked for security sensitive applications.

Operational Indicators
LED indicators assure the operator that output frequency is locked to the master reference, that output power is within tolerance at the requested level and when the instrument is under remote control. Readout of AM depth or FM deviation may be selected by front panel switch.

Output Power Selection and Display
Leverswitches set output power from at least +10dBm to -119dBm with 0.1 dB resolution. Display confirms power level set under remote control. Output power is delivered at a rugged type N front panel connector.



Amplitude and Frequency Modulation
Rotary switches allow selection of external or 3 modes of internal AM and FM. Vernier controls set depth of AM and FM deviation.

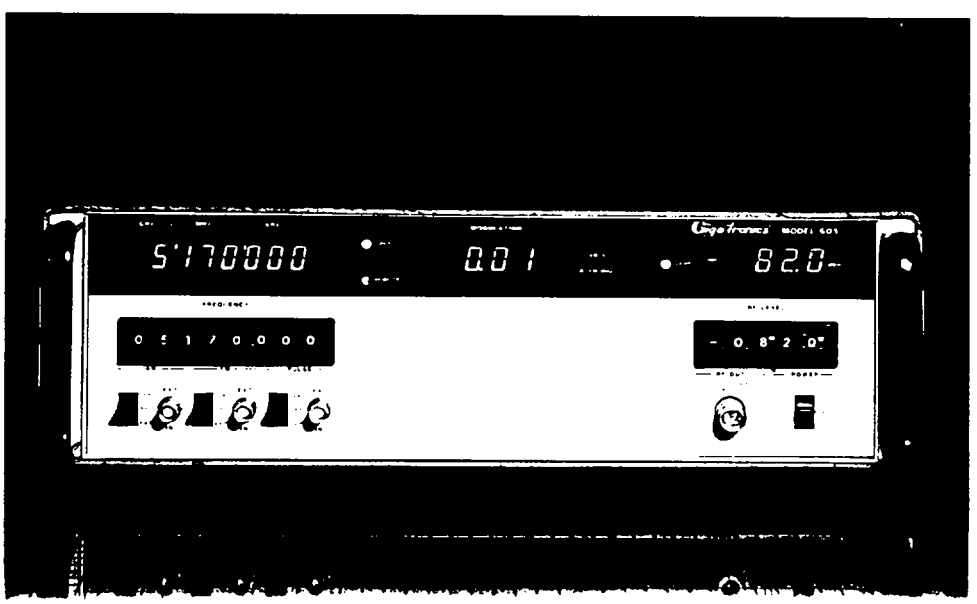
Internal AM/FM Rate Control
Built-in generator allows continuous control of internal AM and/or FM rate from 10 Hz to 100 kHz. Sync signal is supplied for synchronizing external equipment to AM or FM rate.

Pulse Modulation
The RF output may be pulse modulated with an externally supplied pulse waveform or by an internally generated pulse with wide range, continuously variable delay and width. PRF of the internally generated pulse may be set by external trigger or by continuously variable internal PRF control. A T0 synchronizing pulse and the modulation envelope are supplied at front panel BNC output connectors.

Model 605

Model 605 generators provide additional cost saving for those applications requiring no modulation or where modulation waveforms are to be supplied from external sources. Fixed 1kHz rate internal AM, FM and pulse modulation are available in addition to the wideband external modulation operation.

As in the Model 600 instruments, the Model 605 may be individually amplitude, frequency or pulse modulated or simultaneously modulated by any combination of the three.



Series 600 Single-band Signal Generators

Best Performance, Best Price. Why buy less or pay more?

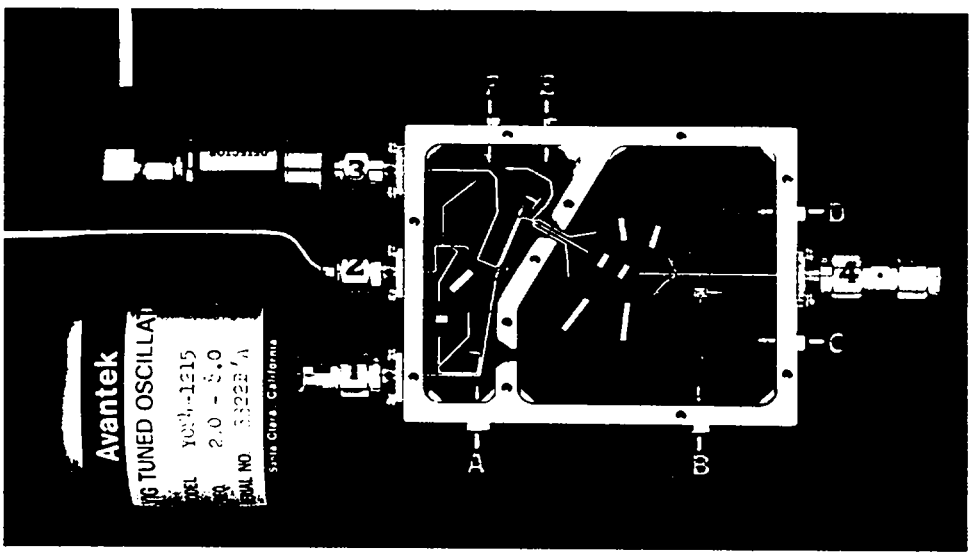
If you design, test or maintain single-band microwave components, sub-assemblies, or systems, you know the signal generator problem.

You have paid $5 to 15,000 for sources with poor frequency accuracy, stability and resolution, inadequate modulation capabilities and little or no remote programming. To that you may have added another $10,000 for microwave counters, power meters, modulators, etc. to monitor or control them.

Or, you have paid $35 to 40,000 for wide-band synthesized signal generators to get the accuracy and control that you need and a lot of frequency range that you do not.

Now, Giga-tronics Series 600 Single-Band Signal Generators provide the features that you need to accurately and economically perform your microwave design, test or maintenance function.

- The accuracy and stability of indirect synthesis with 1 kHz resolution throughout the frequency range that you need. No external counters or lock boxes to monitor or control it.
- Accurate, levelled output power, controlled in 0.1dB steps from +10 to -119dBm.
- Wide range, internal or external control of AM, FM and Pulse Modulation; individually or simultaneously.
- Remote control of all parameters via the IEEE-488 bus.
- Priced to obsolete the non-synthesized signal generators you've been using.



Microwave Signal Integrity

Of key importance to the high performance and reliability of Series 600 Single-Band Signal Generators is the simplicity of design which allows complete management and control of the microwave signal with a minimum number of components and power consuming transitions. The photo above illustrates the controlled RF path of a Series 600/2-8 instrument.

The Microwave Signal

1 The microwave signal from a high quality YIG tuned output oscillator is connected directly to a specially designed control module.
2 A portion of the microwave signal is coupled to the reference mixer to close the output loop and lock the output signal to the master reference.
3 Another portion of the signal is coupled to the levelling detector to close the levelling loop and maintain the output at the desired level.
4 The microwave output signal is directed to the output connector through the 10dB step attenuator.

The Control Signals

A One control signal controls levelling, fine attenuation (in 0.1dB increments) and amplitude modulation.

Pulse modulation is controlled outside of the RF levelling loop to allow independent control of pulse modulation while simultaneously controlling amplitude modulation. The pulse modulation control signal is directed to one of three paths (B, C or D) which also provide harmonic filtering of the output signal.

B Pulse modulation and harmonic filtering from 2 to 3.2 GHz.
C Pulse modulation and harmonic filtering from 5.2 to 8 GHz.
D Pulse modulation and harmonic filtering from 3.2 to 5.2 GHz.
E The reciprocal of the pulse modulation signal controls proper termination of the output signal during "pulse off" periods.
F Harmonic suppression control for the reference coupler signal.

New dimensions in microwave signal generation.

The Accuracy, Stability and Spectral Purity of Indirect Synthesis

Giga-tronics Series 600 instruments use a newly developed, microprocessor controlled indirect synthesis technique to control frequency, stability and signal purity. These key parameters determine the adaptability of a microwave signal generator to applications involving the testing of surveillance receivers, doppler radars and many other sensitive devices. The design technique which phase locks the YIG oscillator output to a high stability 10 MHz crystal oscillator, and careful attention to the subsequent handling of the YIG output signal, provides the optimum combination of precise frequency control, switching speed and spectral purity for the most critical applications.

The High Powered, Precisely Controlled Output Signal

The design of the RF path and calibrated control of output power are perhaps the most important characteristics of a good microwave signal generator. Giga-tronics Series 600 Signal Generators utilize a specially designed control module and high quality, low loss step attenuators to provide at least 10 milliwatts (+10dBm) of output power. They can deliver sufficient test signal power to the device being tested, even through the sometimes complex switching paths of ATE systems.

General Specifications

Display: Frequency, 7 or 8 digits (dependent on Model No.); Power, four digits and sign; Modulation, 3 digits.
Remote Interface: IEEE STD 488-1978 — All front panel controls except power on/off and modulation vernier controls. Preset front panel or internal vernier values selectable via the bus.
Operating Temperature Range: 0 to 50°C
Warm-up Time (to meet all specifications): 20 minutes, maximum.
Environmental: Complies with MIL-T-28800C, Type III, Class 5, Style E
Power: 100/120/220/240 VAC ±10%, 50-400 Hz, 100W.
Weight and Dimensions:

	Net	Packed for Air Shipment
Width:	16.75 in. (42.5 cm.)	23 in. (58.4 cm.)
Depth:	18.00 in. (45.6 cm.)	25 in. (63.4 cm.)
Height:	5.25 in. (13.3 cm.)	12 in. (30.4 cm.)
Volume:	.92 cu. ft. (.0280 cu.m.)	3.99 cu. ft. (.1128 cu.m.)
Weight (Nom):	40 lbs. (18.2 kg.)	48 lbs. (21.8 kg.)

Available Options

Option 05: High Stability Time Base, 1 x 10^{-9}/day

Accessories Included

1 ea. Operation and Maintenance Manual
Pt. No. 304AM04500
1 ea. Extender Board Service Kit
Accessory No. A007
1 ea. Power Cord, 6 ft.
Pt. No. WMP0-03006
1 set Test Data

Available Accessories

Rack Mount with Chassis Slides
Accessory No. A002
Rack Mount with no Chassis Slides
Accessory No. A003

Other Giga-tronics Equipment

In addition to the Single-Band Signal Generators specified in this brochure, Giga-tronics manufactures a complete line of Wide-Band Synthesized Microwave Test Sets, Signal Generators and Sweeping Signal Generators which operate from 50 MHz to 12, 18 or 26 GHz and a line of Frequency Extenders to 40 or 60 GHz. If you have wide-band or millimeter applications, ask for the brochures which cover these instruments.

Special Configurations

In many instances, we find that standard equipment needs some special modification or reconfiguration to best adapt it to a particular application. Often times these special requirements do not become apparent until a program is well under way. We, at Giga-tronics, willingly work with you, both before and after the sale, to assure the compatibility of our Signal Sources to your requirement in the most economical way.

All Giga-tronics signal generators may be controlled via the IEEE-488 Bus.

External ALC is provided to allow remote leveling with a standard negative output diode type detector, including adjustments for gain and offset calibration of the detector.

Internal time base output and external time base input. Whenever an external time base is applied, it automatically overrides the internal time base.

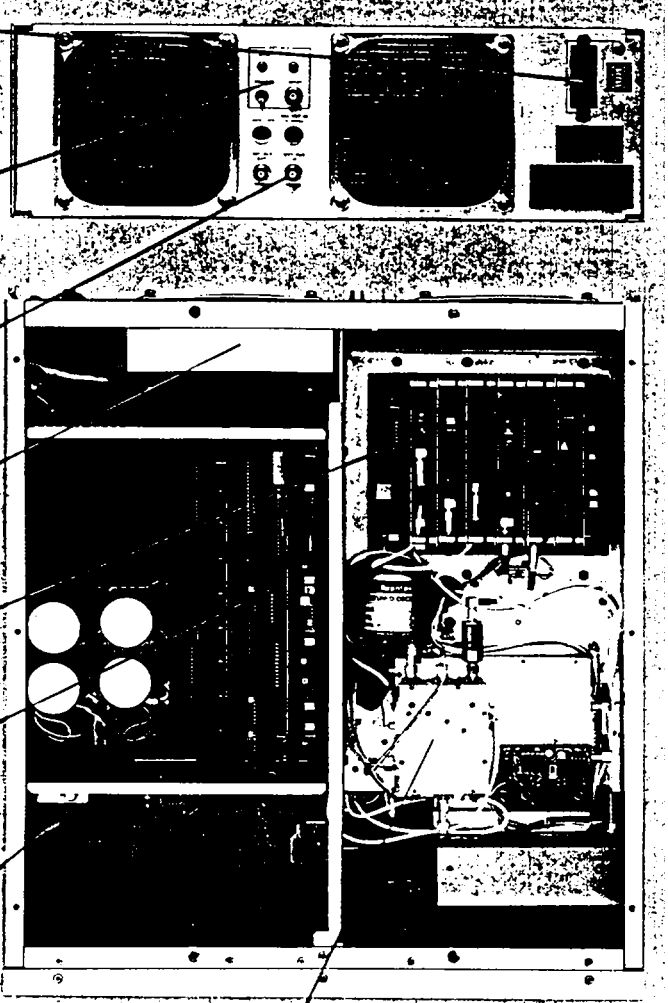
DC power for the instrument is provided by regulated power supplies housed in a heat sink assembly directly in the exhaust path of the cooling fan.

The microwave electronics; the phase lock loops and YIG driver are packaged on easy-to-service plug-in circuit assemblies.

The computer section processes information from the front panel or the interface bus to control the operation of the entire instrument.

The precision crystal controlled master reference oscillator establishes the accuracy and stability of the synthesized output signal.

The microwave deck contains the YIG oscillator, the specially designed microwave signal control module and the 10dB step attenuator.



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Of even more importance, each instrument is completely characterized and correction factors are stored in permanent memory to automatically compensate the output power for variations in the output detector, attenuator, etc. across the entire frequency range. Thus, output power is levelled and controlled and accurate to levels of -119dBm to satisfy even the most stringent requirements of in-channel tangential sensitivity testing.

Complex Signal Simulation

Many microwave signal generator applications require that the output signal be modulated to simulate dynamic operating conditions. Many times, more than one form of modulation is required for complete testing of a component, sub-assembly or system. Often, simultaneous combinations of modulations are required to completely verify the proper performance of complex devices.

Giga-tronics Series 600 instruments provide wide control of Amplitude Modulation, Frequency Modulation and Pulse Modulation. Each type of modulation is independently controlled and may be utilized individually for specific test requirements or in any combination for complete device performance verification under multiple modulation conditions. AM or FM is, of course, a requirement of most communication testing. Pulse modulation is essential to pulsed radar performance verification. Simultaneous pulse and FM are essential to chirping situations and simultaneous pulse and AM allow simulation of antenna scan patterns.

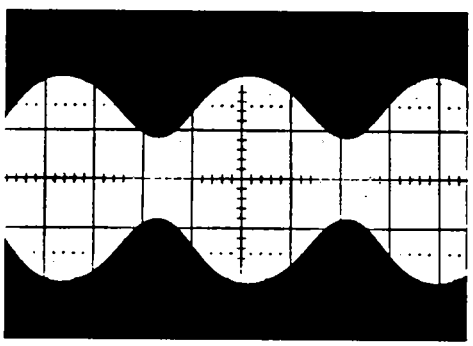
Regardless of the complexity of your modulation requirements, a Giga-tronics Series 600 Signal Generator will economically provide the stimulus that you need.

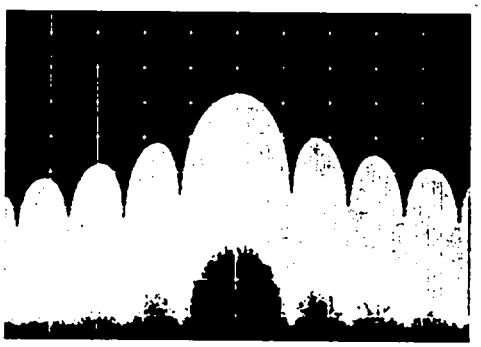
IEEE-488 Control

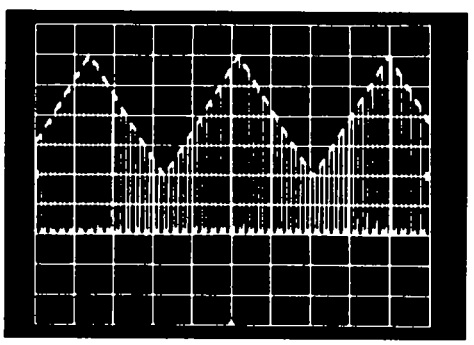
A serious shortcoming of economical single-band microwave signal generators of the past, those using reflex klystron or mechanically tuned cavity techniques, has been their inability to be remotely programmed. Giga-tronics Series 600 Single-Band Signal Generators, based in microprocessor controlled indirect synthesis technology, can easily be integrated into small bench-top systems or large ATE applications. All parameters of Series 600 instruments may be programmed via the IEEE-488 bus, including selection from two preset values of the analog vernier controls for setting internal AM and FM rates or internal pulse modulation rate, delay and width.

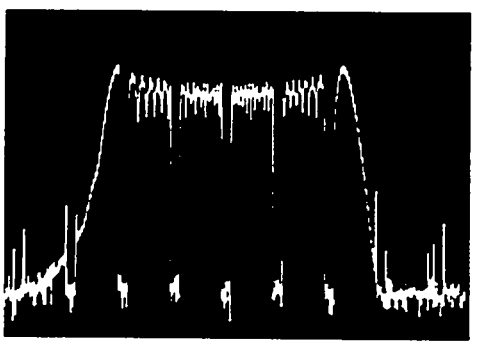
Product Integrity

Giga-tronics Series 600 Single-Band Signal Generators are designed to meet the requirements of MIL-T-28800C, Type III, Class 5, Style E for commercial test equipment. Each instrument is carefully constructed using the highest quality components. Each is burned-in for a minimum of 100 hours at elevated temperature to pinpoint and eliminate any source of marginal performance prior to extensive temperature testing (at 0, +25 and +50°C), characterization, calibration and final test. In short, Series 600 instruments are guaranteed to provide the same reliable performance that has marked the Giga-tronics Model 1026, 1018 and Series 900 wide-band synthesized signal generators as the best in the industry.









A Series 600 instrument to fit your application.

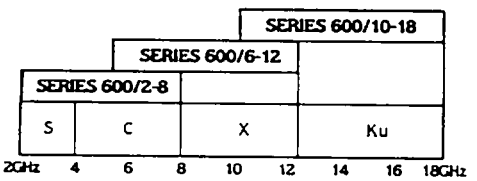
Frequency Range

Series 600 Single-Band Signal Generators offer a choice of frequency ranges that overlap the standard operational bands of microwave systems. Any single-band application in EW, Radar, Telecommunications or other microwave discipline will find a Series 600 instrument to meet its frequency requirements.

Series 600/2-8: Low-range instruments cover the entire S and C bands including many important 4 and 6 GHz communications applications.

Series 600/6-12: Mid-range instruments cover additional communications bands (6, 8 & 11 GHz) as well as C and X band radar applications.

Series 600/10-18: High-range instruments cover radar, communications and EW applications from X through Ku band.



Special Frequency Ranges: Straddle-band or stretch-band applications, not covered by one of the standard Series 600 instruments, can usually be economically covered by a special Series 600 instrument. Contact the Giga-tronics marketing department with your requirement.

Modulation

Series 600 Single-Band Signal Generators offer wide range AM, FM and Pulse Modulation capabilities.

Model 600: All Model 600 instruments offer complete internal and external control of all modulation modes including built-in AM rate and depth control, FM rate and deviation control and Pulse Modulation rate, delay and width control.

Model 605: Model 605 instruments feature complete external AM, FM and Pulse Modulation capability and cost savings for those applications that do not require modulation or when modulating signals must be supplied from external sources.

Specifications & Operating Performance

Except as noted, the following specifications apply to both the Model 600 & Model 605.

		Model 600/2-8 / 605/2-8	Model 600/6-12 / 605/6-12	Model 600/10-18 / 605/10-18
FREQUENCY	Range	2 to 8 GHz	5.4 to 12.5 GHz	10 to 18 GHz
	Resolution	1kHz throughout the frequency range		
	Accuracy and Stability	Same as time base		
	Time Base (Internal)	10MHz, $<1x10^{-6}$/year rate ($<1x10^{-9}$/day with Option 05)		
	Time Base (External)	10MHz ± $1x10^{-6}$ or better; 0.5V, p-p, overrides internal time base		
	Time Base Output	Buffered 10MHz, 2V, p-p, into 50ohms, derived from int or ext time base		
SPECTRAL PURITY	Harmonics, Subharmonics	<-40dBc	<-40dBc	<-50dBc
	Spurious (Nonharmonics)	<-55dBc	<-55dBc	<-55dBc
	Power Line/Fan Related	<-45dBc	<-45dBc	<-45dBc
	SSB Phase Noise (1HzBW)	Typically less than -75dBc at 10kHz offset		
OUTPUT	Range	+10 to -119dBm		
	Resolution	0.1dB		
	Accuracy	± 2dB		
	Flatness	± 1dB		
	Output Impedance	50ohms, nominal		
	Output Connector	Type N		
	Source SWR	<2:1		
	External ALC	Negative Crystal Detector; gain and offset adjustments provided		
PULSE MODULATION	External — Pulse	TTL input, 10Hz-1MHz rep rate, >0.1μsec width, pos level = RF "on", BNC		
	— Trigger	(Model 600 only) +2V, 10Hz-1MHz, triggers delay and width set on Model 600		
	Internal — Square Wave	(Model 605 only) Fixed 1kHz rep rate		
	— Rep Rate	(Model 600 only) Variable, 10Hz to 1MHz, in 5 ranges		
	— Delay	(Model 600 only) Variable, 10nsec to 0.1sec, in 7 ranges		
	— Width	(Model 600 only) Variable, 50nsec to 0.1sec, in 6 ranges; >75% duty factor		
	Rise/Fall Times	<25nsec		
	On/Off Ratio	>80dB		
	Sync Output	(Model 600 only) +1V pulse into 50ohms, approx 50nsec wide, BNC		
	Video Output	(Model 600 only) TTL level modulation waveform		
AMPLITUDE MODULATION	External — Rate	10Hz to 100kHz, 3dB Points referenced to 1kHz, any waveform		
	— Depth	0 to 82% (0 to 20dB), min		
	— Sensitivity	1V, p-p, for 50% modulation at 1kHz rate		
	— Input Z	600ohms, AC coupled, BNC		
	— Distortion	<5% at 50% depth and 1kHz rate (sine wave)		
	Internal — Sine Wave	Fixed 1kHz rate, 0 to 82% depth		
	— Sine Wave	(Model 600 only) Rate variable, 10Hz-100kHz, in 4 ranges; 0-82% depth		
	— Square Wave	(Model 600 only) Rate variable, 10Hz-100kHz, in 4 ranges; 0-82% depth		
	Display Accuracy	± 10% at 50% depth and 1kHz rate		
FREQUENCY MODULATION	External — Rate	10Hz to 1MHz		
	— Deviation	± 5MHz, peak		
	— Sensitivity	2.5V, peak, for maximum deviation		
	— Input Z	50ohms, nominal, BNC		
	— Distortion	<5% at 500kHz rate at 5MHz peak deviation		
	Internal — Triangle	Fixed 1kHz rate; ± 5MHz, peak, deviation		
	— Triangle	(Model 600 only) Rate variable, 10Hz-100kHz, in 4 ranges; ± 5MHz, peak, dev		
	— Sine Wave	(Model 600 only) Rate variable, 10Hz-100kHz, in 4 ranges; ± 5MHz, peak, dev		
	Display Accuracy	± 10% at 3MHz deviation and 100kHz rate		