Adams Russell Electronics
MICRO-TEL DIVISION

SG-811B

.01-18 GHz
MULTI-OCTAVE MICROWAVE
SIGNAL GENERATOR

FEATURES

- Expandable to 54 GHz
- 1 MHz Frequency Resolution
- Calibrated Output to -120 dBm
- Internal Pulse Generator with Delay and 70 dB On-Off Ratio minimum
- -60 dBc Harmonic Output
- All Sweeper Functions .01-18 GHz
- Swept Pulsed Output
- Full RF Shielding
- Removable-Remotable RF Unit to eliminate transmission line loss
- GPIB or TTL Control
- Accessory Frequency Synthesizer .01 to 54 GHz
- Signal Sample
- Ruggedized for field use — selected by NATO for shipboard service.

DESCRIPTION

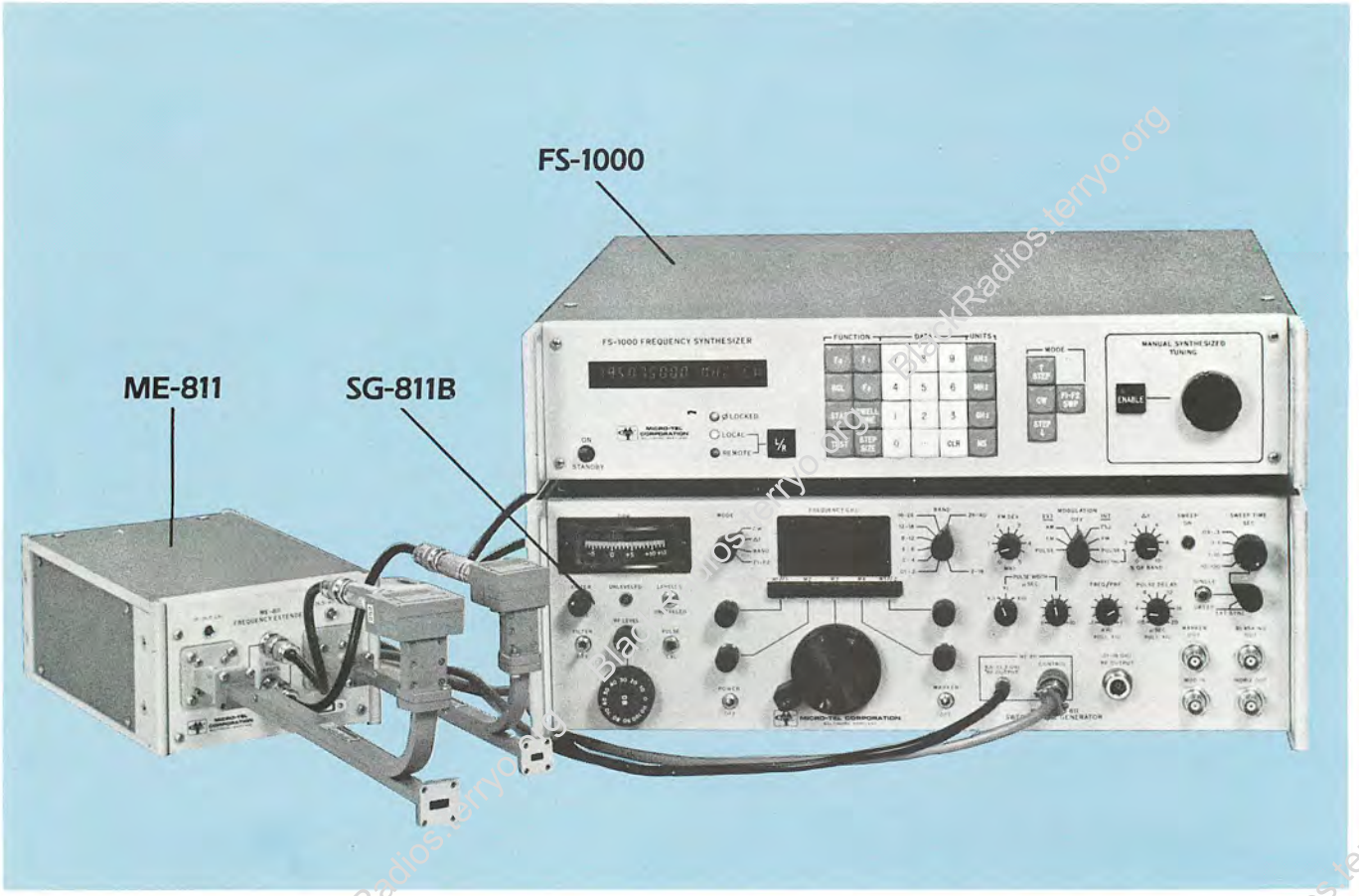
The SG-811 replaces six or more conventional signal generators and is completely self-contained in a rugged, light-weight enclosure. In addition to performing as a signal generator, the SG-811, uniquely, also provides all the functions of a modern microwave sweeper; i.e., F_1-F_2, ΔF, and uninterrupted multi-octave sweep from 2-18 GHz and from .01 to 2 GHz.

The basic SG-811 covers 2-18 GHz with internally leveled output, but the addition of numerous options allows the user to configure the SG-811 to meet his specific requirements.

The SG-811 is ideal for test of broadband ECM equipment in laboratory, production, and field environments. The Remotable RF Unit is especially useful on antenna pattern ranges, as a signal source for evaluation of microwave receiving facilities, ground support for aircraft, and shipboard ECM systems test.

The FS-1000 Frequency Synthesizer, with internal micro-processor, converts the SG-811 to fully synthesized, digitally-controlled operation. It is described in a separate data sheet.

The ME-811 Frequency Extender is a companion unit to the SG-811 and provides coverage from 18-54 GHz. Option 11 allows the ME-811 to be connected directly to the SG-811 for DC power, leveling, and direct frequency readout on the tuning display while in the 18-54 GHz range A complete description of the ME-811 is provided on a separate data sheet. Pulse and synthesized operation is provided to 54 GHz.



REMOTE OPERATION
A standard feature is the Removable-Remotable RF Unit which contains all RF components including options when specified. The RF Unit is fully shielded and normally operates within the main-frame. For remote operation up to 200 feet (further on special order), the RF Unit is removed from the cabinet and connected to it by the RCC-811 Remote Control Cable. All functions operate normally with the RF Unit remoted.

OPTIONS

10 MHz to 2 GHz (Option 1A)
This option adds coverage from .01 to 2 GHz. Output from .01-18 GHz is from a single connector with manual switching at 2 GHz. The 2300 MHz off-set oscillator can be phase locked to the 5 MHz reference of the FS-1000 Frequency Synthesizer. Output power is reduced by approximately 1 dB when this option is included.

CALIBRATED OUTPUT ATTENUATOR (Option 2A)
This option offers a 100 dB output attenuator adjustable in 10 dB steps. The attenuator is controlled manually at the front panel or digitally through a rear panel connector. This option, in conjunction with the standard continuous control, offers a calibrated output to -120 dBm. Attenuator accuracy is better than ±4% of the setting at 18 GHz. Output power is reduced by 2 dB, or less, and the variation in leveled output increases to ±1.5 dB.

FILTERED OUTPUT (Options 3 or 3A)
The harmonic output of the YIG oscillators used in the SG-811 is -20 dBc. The addition of an automatically-tracked YIG filter reduces the harmonic output to -60 dBc. The filter has a nominal insertion loss of 5 dB, but can be switched out when not in use to reduce the Options 3 and 3A insertion loss to 1 dB. The filter is primarily for manually-tuned applications but will track the swept output at increased insertion loss. Option 3 covers 2-18 GHz; Option 3A covers 0.4-18 GHz.

RF SAMPLE (Option 4)
This option provides a signal sample from 2-18 GHz at a nominal level of -10 dBm for frequency counters, synthesizers and stabilizers. For output frequencies below 2 GHz, the 2-4 GHz oscillator is measured and offset by 2300 MHz to display or control signal frequency. This offset is automatic in the FS-1000 Synthesizer. Output power is reduced by approximately 1 dB when this option is included.

INTERNAL PULSE GENERATOR (Option 5)
Option 5 adds a self-contained pulse generator with adjustable pulse width from 0.1 to 100 usec, PRF from 100 to 10,000 Hz, and delay from .05 to 200 ms. Rise and fall times are less than 20 nanoseconds and the On-Off ratio is a minimum of 70 dB. The pulse generator pin diode has a nominal insertion loss of 3 dB and is switched out when not in use to reduce the option 5 insertion loss to 1 dB. Means are provided to calibrate the pulse output amplitude. A sync pulse, external triggering, and external pulsing are included.

DIGITAL CONTROL-GPIB
(Options 6 or 6A)
Option 6 adds parallel TTL control of frequency through a 50 pin rear panel connector. Option 6A provides GPIB control of Frequency, Power Output, and Mode. When operated with the FS-1000, Option 6A is generally not required since frequency, attenuation and some mode controls can all be controlled via the FS-1000 IEEE-488 interface.

PROTECTIVE COVER (Option 8)
The cover fits over the front of the unit to protect the front panel controls. It is held by snap catches and provides storage for the line cord, a waveguide-to-coax adapter, and several coax adapters.

FREQUENCY EXTENDER ME-811* (18-54 GHz)
The ME-811 is an external unit available in four models covering the 18-26.5 GHz, 26.5-40 GHz, 18-40 GHz and 40-54 GHz frequency ranges. Power output is 0dBm in K band (18-26.5 GHz), -3dBm in KA and (26.5-40 GHz) and -6dBm in U Band (40-54 GHz).
External couplers and detectors are available to provide external leveling even when remoted with the SG-811 RF head. The SG-811, ME-811 and FS-1000 combination provides the user with CW, AM, FM, Pulse, synthesized and swept signals from .01-54 GHz.

SYNTHESIZED FREQUENCY CONTROL FS-1000*
The FS-1000 converts the SG-811 to a microprocessor-controlled, synthesized signal generator over the full frequency range. Tuning is accomplished by a keyboard, external digital signals including GPIB, or manual optical encoder. Programmed sweeps and frequency selection can be entered by the keyboard. Residual FM is reduced to less than 50 Hz. Switching time is typically less than 30 milli-seconds. Resolution is 10 kHz or, optionally, 100 Hz. All manual functions of the SG-811 are retained, and the FS-1000 is easily connected or disconnected.

*For a complete description, see appropriate data sheet.

SPECIFICATIONS

Frequency Bands (GHz)	.01-2	2-18	2-4	4-8	8-12	12-18
Accuracy (MHz/%)	±20	±1%	±.5%	±.5%	±.5%	±.5%
Resolution (MHz)	1					
Resetability (MHz)	±2					
Stability (MHz/°C)	.4	2.5	.5	.5	1.0	1.5
Analog Output (Volts)	0 to +10					
External Control (Volts)	0 to +10					
Harmonic Output (dBc)	-20					
Harmonic Output with Options 3 and 3A (dBc)	-60 (.4 to 18 GHz)					
Non-Harmonic Output (dBc)	-20	-60	-60	-60	-60	-60
Residual AM-100 kHz BW (dBc)	-50					
Peak Residual FM-kHz	10	50	10	15	20	30
Leveled Power Output SG-811B mw (±1 dB)	16	12	15	15	15	12
Leveling - Max. Variation (±dB) (See Page 2 for effect of options on power output and leveling.)	.5	.7	.5	.5	.5	.5

	Range	Accuracy
Output Power Control		
Standard	20 dB Continuous	±0.2 dB
Option 2A	110 dB (10 dB steps	±4%
Reverse Power Protection	1 watt maximum	
Blanking Output	+10 volts; coincides with RF blanking at 20 dB	
Markers	3 provided; -15 volts	
RFI (dBm per cm^2)	-90	
Tuning Modes: Band	Sweeps entire range selected-5 markers.	
F_1-F_2	Sweeps between selected frequencies from .01-2 and 2-18 GHz-3 markers.	
ΔF	Sweeps 0-10% of band about any five selected frequencies.	
CW/Manual	Manually tune or preset five frequencies.	
Sweep Rate (Seconds)	.03 to 100	
Sweep Modes	Internal; External-Sync; Single Sweep.	
Horizontal Output (Volts)	-5 to +5 in each band	
Modulation	Frequency: .1-10 kHz; External/Internal AM: .1 volt/dB into 10K ohms FM: 3 volts peak-to-peak for 0 to ±5 MHz deviation Pulse (Option 5): .1-100 us pulse width; 70 dB on-off ratio 20 ns rise/fall; .05-200 ms delay External: +5 volts into 50 ohms	
Temperature (°C)	0 to 50	
Cooling	Convection	
Size (Inches)	5¼ x 17 x 18	
Weight (Pounds)	40	
Power Required	115/230 volts, 50-400 Hz	

ORDERING INFORMATION (Please see latest price list for prices.)

SG-811B	☐ Option R	Rack Mount
Microwave Signal Generator	☐ Option 1A	.01-2 GHz Coverage
1.9 to 18 GHz — 15 mw	☐ Option 2A	110 dB Output Attenuator
	☐ Option 3	60 dB Tracked Filter (1.9-18 GHz)
Remotable RF Unit	☐ Option 3A	60 dB Tracked Filter (.40-18 GHz)
	☐ Option 4	RF Sample
	☐ Option 5	Pulse Generator 70 dB On-Off Ratio
	☐ Option 6	Digital Frequency Control
	☐ Option 6A	Digital Control GPIB
	☐ Option 8	Protective Cover
Power Meter Offset	☐ Option 9	This option provides a front panel control to increase or decrease output power to compensate for cable loss or padding.
	☐ Option 11	Provision for 18-54 GHz Coverage (ME-811)
	☐ RCC-811	Cable for Remote RF Assembly
	☐ C-811	Fitted Fiberglass Carrying Case

FS-1000	☐ Option R	Rack Mount
Frequency Synthesizer	☐ Option 1	100 Hz Resolution
.01 to 18 GHz (to 54 GHz with ME-811)	☐ Option 2	Parallel BCD Control (replaces GPIB)
	☐ Option 3	Manual Tuning with Optical Encoder
	☐ RCC-1000	Cable for Remote RF Head (200 ft. max.)
	☐ C-1000	Fitted Fiberglass Carrying Case

ME-811K	☐ Option 1	External Power Supply
Frequency Extender	☐ Option 2A	K Coupler/Leveling Detector
18 to 26.5 GHz		
ME-811Ka	☐ Option 1	External Power Supply
Frequency Extender	☐ Option 2B	Ka Coupler/Leveling Detector
26.5 to 40 GHz		
ME-811K/Ka	☐ Option 1	External Power Supply
Frequency Extender	☐ Option 2A+B	K/Ka Couplers/Leveling Detectors
18 to 40 GHz		
ME-811U	☐ Option 1	External Power Supply (required)
Frequency Extender		
40-54 GHz	☐ Option 2	U Couplers/Leveling Detector

WARRANTY

All Micro-Tel Products are unconditionally warranted for a period of one year except for physical damage, provided the equipment is returned to the plant in Baltimore.

MICRO-TEL DIVISION 10713 Gilroy Road / Hunt Valley, Maryland 21030 / (301) 771-0077
ADAMS-RUSSELL ELECTRONICS CO., INC.

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