

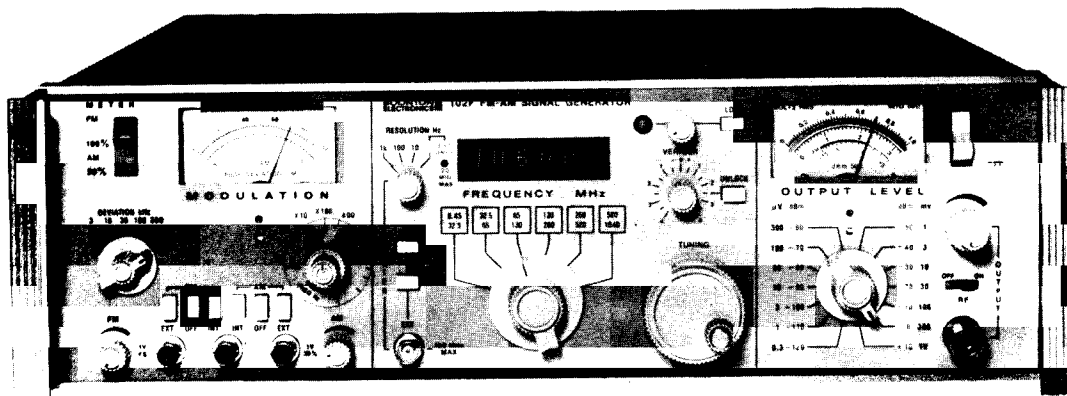
BOONTON

SIGNAL GENERATORS

FM/AM Signal Generator

Model 102F

- Frequency Range, 0.45 MHz to 520 MHz.
0.45 MHz to 1040 MHz, (Option -20).
- Output Level, -130 dBm to +13 dBm, (0.07 μ V to 1V into 50 Ω). To +19 dBm (2V), (Option S/36).
- Pulse Modulation, (Option -24).
- Low distortion, wide bandwidth AM and FM.
- Avionics specifications standard.
- Low sideband noise and low residual AM and FM.
- Wide AM bandwidth, low envelope distortion and controlled phase shift.



Description

The 102F Signal Generator gives high quality, versatile performance over a wide frequency range from 450 kHz to 520 MHz. Coverage can be extended to 1040 MHz with added internal range (Option -20). Unlike competitive generators, the specifications of the 102F from 520 MHz to 1040 MHz are not significantly degraded for such important parameters as frequency counter resolution, and AM and FM distortion and accuracy. All functions of the generator are applicable from 450 kHz to 1040 MHz. The 102F is manually tuned, but achieves the frequency accuracy, stability and resolution of a synthesizer by phase locking the master VFO to a high-stability internal frequency-reference. All circuits in the RF section are designed for low noise operation, the level of which closely approaches that of more expensive generators.

RF Output

The output level is switched in 13 steps of 10 dB from -120 dBm to +10 dBm. Settings between these steps and down to -130 dBm are made using the vernier variable control and are read on the output meter. The output system is also calibrated in volts into 50 Ω over the range of 0.07 μ V to 1 V. The S/36 option provides output levels to +19 dBm (2V).

Specifications

Frequency Ranges:

Band	Range (MHz)
1	0.45 - 32.5
2	32.5 - 65
3	65 - 130
4	130 - 260
5	260 - 520
6	520 - 1040 (Option -20)

Accuracy: \pm (Resolution + 1 ppm), 15-35°C after 1 hour warmup.

Internal Counter Resolution: Selectable; 10 Hz, 100 Hz, 1 kHz locked or unlocked, all frequencies.

Display: 6 digit LED.

Fine Tuning: (locked vernier) >20 ppm all frequencies

Stability: (unlocked) Bands 2-6, <10 ppm/10 min. after 2 hour warmup; Band 1, <1 kHz/10 min. after 2 hour warmup.

Internal Lock-Reference Oscillator

Frequency: 1 MHz.

Temperature Influence: \pm 1 ppm, 15-35°C.

Drift Rate: <0.05 ppm/h after 4 hours warmup, <2 ppm/year after 4 hours warmup.

External Lock-Reference Input: Rear panel BNC, 1 MHz

RF Output

Output Level: -130 dBm to +13 dBm (0.07 μ V to 1V into 50 Ω), to +19 dBm (2V) with Option S/36.

Attenuator: 13 steps, each 10 dB \pm 0.75 dB; plus variable 13 dB calibrated on output meter.

Accuracy: (includes uncertainties due to attenuator, 1040 MHz option, RF meter, and reverse-power protection).

Frequency (MHz)	RF Output-Level Accuracy (dB)		
	+13 to -10 dBm	-10 to -50 dBm	-50 to -130 dBm
0.45-260	\pm 1.5	\pm 1.75	\pm 2.25
260-520	\pm 2.0	\pm 2.25	\pm 2.75
520-1040	\pm 2.5	\pm 2.75	\pm 3.25

Level Flatness: (Includes 1040 MHz option -20 and reverse power protection), 0.45-520 MHz, \pm 0.75 dB max. variation across each band (\pm 1 dB, Option -24); 520-1040 MHz, \pm 1.5 dB.

Impedance: (Includes 1040 MHz option -20) 50 Ω . 0.45-520 MHz, SWR <1.5:1 at levels below 0 dBm; 520-1040 MHz, SWR <1.75:1 below 0 dBm.

Reverse Power Protection: 50 W. Externally replaceable RF fuse in output connector. Fuse value 0.8 W.

Leakage: <1 μ V induced in a 2 turn, 1 inch diameter loop 1 inch from any surface as measured by a 50 Ω receiver.

RF Interrupt: >40 dB isolation (at 0 dB on output meter).

Spectral Purity

(at settings between 0 dB and -10 dB on output meter at all settings of output attenuator):

Harmonics: >30 dBc, 5-520 MHz, >25 dBc, 0.45-5 MHz, >25 dBc, 520-1040 MHz (Option -20).

SIGNAL GENERATORS

FM/AM Signal Generator

Model 102F (Continued)

Spurious Output:

Sub Harmonics: none, 0.45-130 MHz; >40 dBc, 130-520 MHz; >25 dBc, 520-1040 MHz (Option -20).

Non-harmonically Related: >30 dBc, 0.45-32.5 MHz; none, 32.5-520 MHz; none, 520-1040 MHz (Option -20).

Residual AM: >80 dBc (30 Hz-15 kHz BW), >85 dBc (300 Hz-3 kHz BW).

Residual FM: (averaged RMS).

Frequency Range	Bandwidth	
	300 Hz to 3 kHz	30 Hz to 15 kHz
450 kHz to 130 MHz	< 7 Hz	<15 Hz
130 MHz to 520 MHz	<10 Hz	<20 Hz
520 MHz to 1040 MHz (Option -20)	<20 Hz	<40 Hz

SSB Total Noise: (Includes both phase and amplitude noise in a 1 Hz bandwidth at a 20 kHz offset from the carrier).

450 kHz to 130 MHz, >138 dBc

130 MHz to 260 MHz, >135 dBc

260 MHz to 520 MHz, >130 dBc

520 MHz to 1040 MHz, >124 dBc (Option -20)

SSB Total Noise Floor: (Includes both phase and amplitude noise in a 1 Hz bandwidth).

450 kHz to 1040 MHz, -146 dBc, typical.

Modulation

Types: Internal AM and FM, External AM and FM and pulse, (Option -24), Simultaneous AM and FM or pulse and FM.

Internal Modulation Sources

Fixed Frequencies: 0.4, 1 kHz.

Accuracy: $\pm 3\%$.

Distortion: <0.03% thd.

Variable Frequency Range: 20 Hz to 20 kHz in 3 ranges.

Accuracy: $\pm 15\%$ of setting.

Distortion: <0.2% thd, 20 Hz-100 Hz, <0.05% thd, 100 Hz-20 kHz.

Output: Nominal 1 V RMS into 600 Ω at front panel.

Amplitude Modulation

(at settings between 0 dB and -10 dB on output meter at all settings of output attenuator).

Depth: 0 to 100%, 0.45-1000 MHz.

Ranges: 30%, 100% full scale.

Accuracy: 0.45-520 MHz, $\pm (1\% \text{ AM} + 6\% \text{ rdg})$ to 80% AM. 520-1000 MHz, $\pm (1\% \text{ AM} + 9\% \text{ rdg})$ to 80% AM.

Bandwidth: DC to 50 kHz (3 dB BW); DC to 25 kHz (1.5 dB BW).

Distortion: (at 400 Hz and 1 kHz rates).

Below 520 MHz	520 MHz to 1000 MHz (Option -20)
< 1% thd at 30% AM	< 2% thd at 30% AM
< 3% thd at 80% AM	< 6% thd at 80% AM

Ext. Mod. Input: Nominal 1 V RMS into 600 Ω for 30% AM.

Peak Incidental \emptyset M with AM: <0.2 rad. at 30% AM, 0.45-520 MHz; <0.4 rad. at 30% AM, 520-1040 MHz.

Peak Incidental FM with AM: Incidental \emptyset M x mod. rate.

Avionics: VOR bearing error <0.1°, 108-118 MHz.

Frequency Modulation

Deviation: 0-300 kHz peak at all frequencies. >1 MHz peak uncalibrated.

Ranges: 3, 10, 30, 100, 300 kHz peak full scale on true peak reading meter.

Accuracy: $\pm 7\%$, (400 Hz and 1 kHz rates) to 300 kHz peak deviation.

Bandwidth: DC to 200 kHz (unlocked), 50 Hz to 200 kHz (locked), 3 dB BW.

Distortion:

Band	1	2	3	4	5	6
Max. thd at: 100 kHz Peak Dev.	1.0%	1.0%	0.5%*	0.25%	0.15%	0.1%

*0.05% thd at 75 kHz peak dev., 88-108 MHz.

Ext. Mod. Input: Nominal 1 V RMS into 600 Ω for fs deviation.

Incidental AM with FM: <0.2% AM at 100 kHz deviation at 1 kHz rate.

Stereo Channel Separation: >50 dB, 50 Hz to 15 kHz rates.

Pulse Modulation (Option -24)

Carrier Frequency Range: 5 to 520 MHz (to 1040 MHz if Option -20 is installed).

Pulse Rise and Fall Times: <1.0 μ s.

Pulse Repetition Rate: DC to 250 kHz.

Minimum Pulse Width: 2 μ s.

Pulse ON/OFF Ratio: >50 dB, 5 to 520 MHz, >40 dB, 520 to 1040 MHz.

Pulse Input: TTL, +2.0 V min. into 1 k Ω , 5 V max.

Drive Pulse Leakage: >30 dB below RF carrier at maximum vernier output setting.

Pulse Modulation (Standard, Through AM Channel)

Carrier Frequency Range: 450 kHz to 520 MHz, 450 kHz (to 1040 MHz if Option -20 is installed).

Pulse Rise and Fall Times: <5 μ s.

Pulse Repetition Rate: DC to 50 kHz.

Minimum Pulse Width: 10 μ s.

Pulse ON/OFF Ratio: >40 dB, 450 kHz to 260 MHz; >26 dB, 260 to 520 MHz; >30 dB, 520 to 1040 MHz.

Frequency Counter

External Frequency Range: 5 Hz to 150 MHz.

Sensitivity: 100 mV.

Max. Input: 20 V RMS.

Input Impedance: 1 M Ω , 90 pF.

Resolution: 6 digit LED display.

Frequency Range	Resolution
5 Hz to 20 MHz	1 Hz, 10 Hz, 100 Hz, 1 kHz
20 MHz to 150 MHz	10 Hz, 100 Hz, 1 kHz

Internal Counter Reference Characteristics:

Accuracy: 1 ppm, 15°C to 35°C (after one hour warmup).

Drift: <1 ppm/year (after one hour warmup).

Frequency Setting Range: ± 5 ppm, internal manual adjustment.

External Counter Reference Input: 1 V p-p into 5 k Ω , 1 MHz.

Power Consumption: 40W; 100, 120, 220, 240 V $\pm 10\%$, 50 to 400 Hz.

Operating Temperature: 0° to 55°C.

Weight: Net 36 lbs (16.4 kg), shipping 44 lbs (20.0 kg).

Dimensions: 5.22 in (13.2 cm) high, 17.22 in (43.2 cm) wide, and 17.50 in (43.8 cm) deep.

Accessories Available:

102-3A Rack Mounting Brackets. L shaped brackets mount on both sides to adapt to a 19 inch rack.

954000 Attenuator Replacement Kit

954006 50 to 75 Ω Transformer. 125 kHz to 175 MHz, voltage ratio 0 dB ± 0.3 dB.

960000 Extender Card. Allows plug in boards in phase-lock section to be operated in elevated position for servicing.

964000 RF Fuse Conversion Kit

103-3A 50 to 300 Ω Balanced Transformer. 500 kHz to 110 MHz, voltage ratio 0 dB ± 0.75 dB.

Options:

-01 Rear panel type-N RF output connector with reverse power protection. Front panel output is removed.

-20 Additional frequency band, 520 MHz to 1040 MHz.

-24 Pulse modulation.

-S/36 RF Output +19 dBm (2V). Restricted AM depth above +13 dBm.