

1-16. MNEMONICS

The mnemonics used in the schematics, block diagrams, wiring diagrams, truth tables, and the text are listed in Figure 7-1.

1-17. SIGNAL GENERATOR SPECIFICATIONS

Unless otherwise noted, the following performance is guaranteed over the specified environmental and ac power line conditions 20 minutes after turn-on. Table 1-1 lists the Generator specifications.

Table 1-1. 6062A Synthesized RF Signal Generator Specifications

| | |
|--|--|
| Warranted performance, 20 minutes after power-on within operating temperature range. | |
| FREQUENCY (9 1/2-Digit Display) | |
| RANGE | 0.1 to 2100.0 MHz in 4 bands; 0.1 to 244.99999 MHz, 245 to 511.99999 MHz, 512 to 1049.99999 MHz, 1050 to 2100.0 MHz. |
| RESOLUTION | 10 Hz from 0.1 to 1050 MHz, 20 Hz from 1050 to 2100 MHz. |
| ACCURACY | Same as reference (See REFERENCE). |
| REFERENCE (Internal) | The unit operates on an internal free-air 10-MHz crystal oscillator with an ageing rate of $<\pm 0.5$ ppm/month and $<\pm 10$ ppm for 25°C , $\pm 25^{\circ}\text{C}$. Internal reference signal (10-MHz) available at rear connector, level >0 dBm, terminated in 50-ohms. |
| REFERENCE (External) | Accepts 1-, 2-, 2.5-, 5-, or 10-MHz signal. Level of 0.3 to 4.0 Vpp into 50-ohms termination. |
| AMPLITUDE (3 1/2-Digit Display) | |
| RANGE (Indicated) | +16 (+16 peak with AM enabled) to -137 dBm, from 0.1 to 1049.99999 MHz. +13 (+13 peak with AM enabled) to -137 dBm, from 1050 to 2100 MHz. (Autoranging 6-dB step attenuator). |
| RESOLUTION | 0.1 dB ($<1\%$ or 1 nV in volts). Annunciators for dB, dBm, V, mV, μV , dB mV, and dB μV . |
| ACCURACY | ± 1 dB from +16 to -127 dBm from 1 to 1049.99999 MHz. * ± 1.5 dB from +13 to -127 dBm from 1050 to 2100 MHz. ± 2.0 dB from +16 to -127 dBm from 0.1 to .99999 MHz. * ± 1.5 dB at temperatures other than $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ |

INTRODUCTION AND SPECIFICATIONS

Table 1-1. 6052A Synthesized RF Signal Generator Specifications (cont)

| | |
|--|--|
| SOURCE VSWR | <1.5:1 below +1 dBm, <2.0:1 elsewhere. |
| SPECTRAL PURITY (CW ONLY) | |
| SPURIOUS | <-60 dBc for offsets greater than 10 kHz and frequencies from 0.1 to 1049.99999 MHz. <-54 dBc for offsets greater than 10 kHz and frequencies from 1050 to 2100 MHz. |
| NOTE | |
| Fixed frequency spurs are <-60 dBc or <-140 dBm whichever is larger. | |
| NOTE | |
| dBc refers to decibels relative to the carrier frequency, or in this case, relative to the signal level. | |
| HARMONICS | <-30 dBc for levels \leq +13 dBm and frequencies \geq 1 MHz, <-25 dBc elsewhere. |
| SUBHARMONICS | <-45 dBc for output frequencies from 1050 to 2100 MHz. |
| RESIDUAL FM (rms in 0.3- to 3-kHz band) | <12 Hz for 0.1 to 244.99999 MHz, <6 Hz for 245 to 511.99999 MHz, <12 Hz for 512 to 1049.99999 MHz, <24 Hz for 1050 to 2100 MHz. |
| RESIDUAL FM (rms in 0.05- to 15-kHz band) | <18 Hz for 0.1 to 244.99999 MHz, <9 Hz for 245 to 511.99999 MHz, <18 Hz for 512 to 1049.99999 MHz, <36 Hz for 1050 to 2100 MHz. |
| RESIDUAL AM (in 0.05- to 15-kHz Band) | <-60 dBc. |
| AMPLITUDE MODULATION (2-Digit Display) | |
| DEPTH RANGE | 0 to 99%. |
| RESOLUTION | 1%. |
| ACCURACY | $\pm(2\% + 4\%$ of setting) for internal rates to peak amplitude of +13 dBm for frequencies of 1 MHz to 2100 MHz. $\pm(3\% + 5\%$ of setting) for internal rates to peak amplitude of +13 dBm for frequencies of 0.1 to .99999 MHz. |

Table 1-1. 6062A Synthesized RF Signal Generator Specifications (cont)

| | |
|------------------------|--|
| DISTORTION | <p><1.5% total harmonic distortion (THD) to 30% AM, <3% THD to 70% AM, <5% THD to 90% AM for frequencies of 10 to 1049.99999 MHz and peak amplitude <+13 dBm.</p> <p><3% THD to 70% AM, and <5% THD to 90% AM for frequencies of 1050 to 2100 MHz and peak amplitude < +13 dBm.</p> <p><3% THD to 30% AM, <5% THD to 70% AM, and <7% THD to 90% AM for frequencies of 0.1 to 9.99999 MHz and peak amplitude <6 dBm.</p> |
| BANDWIDTH (3 dB) | <p>20 Hz to 50 kHz. DC to 50 kHz by special function. (Note-- valid for RF frequency - Mod frequency \geq150 kHz)</p> |
| INCIDENTAL FM | <p><0.3 fm for internal rates, 30% or less AM, and frequencies from 0.1 to 1049.99999 MHz. <0.6 fm for internal rates, 30% or less AM, and frequencies from 1050 to 2100 MHz.</p> |

FREQUENCY MODULATION (3-Digit Display)

DEVIATION RANGES 0 to 999 Hz, 1 to 9.99 kHz, 10 to 99.9 kHz, and 100 to 400 kHz.

MAXIMUM DEVIATION

| Mod Rate | Max Dev | RF Frequency |
|------------------|---------|-----------------------|
| fm \geq .2 kHz | 400 kHz | 1050 to 2100 Mhz |
| | 200 kHz | 512 to 1049.99999 MHz |
| | 100 kHz | 245 to 511.99999 Mhz |
| | 200 kHz | 0.1 to 244.99999 Mhz |

| | | |
|------------|-----------------------|----------------------|
| fm <.2 kHz | Lower of above or: | |
| | 2 fm fo | 245 to 2100 MHz |
| | 2 fm(fo+800) | 0.1 to 244.99999 MHz |

Where: fm = mod frequency in kHz

fo = RF frequency in MHz
Deviation is in kHz

Specs apply where:

RF Frequency - Dev \geq 150 kHz
RF Frequency - Mod Rate \geq 150 kHz

RESOLUTION 3 digits.

ACCURACY \pm (7% + 10 Hz) for rates of 0.3 to 20 kHz. Does not include effects of Residual FM.

INTRODUCTION AND SPECIFICATIONS

Table 1-1. 6062A Synthesized RF Signal Generator Specifications (cont)

| | |
|---|--|
| DISTORTION | <1% THD for rates of 0.3 to 20 kHz. Does not include effects of Residual FM. |
| BANDWIDTH (3 dB)..... | 20 Hz to 100 kHz. (Note-- valid for RF Frequency - Mod Frequency \geq 150 kHz) |
| INCIDENTAL AM | <1% AM at 1 kHz rate, for the maximum deviation or 50 kHz, whichever is less. Valid for RF Frequency \geq 1 MHz. |
| PHASE MODULATION (3 digit display) | |
| DEVIATION RANGES | 0 to .099 rad, .100 to .999 rad, 1.00 to 9.99 rad, and 10.0 to 40.0 rad. |
| MAXIMUM DEVIATION | 20 rad from 0.1 to 244.99999 MHz. 10 rad from 245 to 511.99999 MHz. 20 rad from 512 to 1049.99999 MHz. 40 rad from 1050 to 2100 MHz. |
| RESOLUTION | 3 digits |
| ACCURACY | \pm (7% + .01 rad) at 1 kHz rate. Does not include effects of Residual FM. |
| DISTORTION | <1% THD for 1 kHz rate. Does not include effects of Residual FM. |
| BANDWIDTH (3 dB) | 20 Hz to 10 kHz. (Note-- valid for RF Frequency - Mod Frequency \geq 150 kHz) |
| INCIDENTAL AM | <1% AM at 1 kHz rate. |
| PULSE MODULATION (RF Frequencies from 10 to 2100 MHz) | |
| ON/OFF RATIO | 80 dB minimum |
| RISE & FALL TIMES | <15 nsec |
| LEVEL ERROR..... | for pulse widths \geq 50 nsec, power in the pulse within \pm 0.5 dB of measured CW level. |
| DUTY CYCLE (ext mod)..... | 0-100% |
| REP RATE (ext mod)..... | DC-16 MHz |
| INTERNAL MODULATION | internal rates, approx 50% duty cycle. |
| EXTERNAL PULSE MODULATION | The pulse input is TTL compatible and 50 ohm terminated with an internal active pull-up. It can be modeled as 1.2 V in series with 50 ohms at the pulse modulation input connector. The instrument senses input terminal voltage and turns the RF off when the terminal voltage drops below $1 \pm$ 0.1 V. Max allowable applied voltage, \pm 10V. |
| PULSE MODULATION (RF Frequencies <10 MHz) | |
| RISE & FALL TIMES..... | \leq 2 X period of RF Frequency. |

Table 1-1. 6062A Synthesized RF Signal Generator Specifications (cont)

LEVEL ERROR.....for pulse widths ≥ 10 X period of RF Frequency, power in the pulse will be within ± 0.5 dB of the measured CW level.

Other specifications are the same as for the 10 to 2100 MHz range.

NON-VOLATILE MEMORY

50 instrument states are retained for typically 2 years, even with the power mains disconnected.

REVERSE POWER PROTECTION

PROTECTION LEVEL up to 25 watts from a 50 ohm source. up to 25 VDC. Instrument output is AC coupled.

TRIP/RESET Flashing RF OFF annunciator indicates a tripped condition. Pushing RF ON/OFF button will reset instrument. Protection is provided when instrument is off.

IEEE-488

INTERFACE FUNCTIONS SH1, AH1, T5, TE0, L3, LE0, SR1, RL1, PPO, DC1, DT1, CO, and E1.

MODULATION SOURCE

INTERNAL 0.4 or 1 kHz, $\pm 3\%$ for 20 to 30°C; add $\pm 0.1\%/^{\circ}\text{C}$ outside this range.

EXTERNAL $\pm 5\text{V}$ max.; 1V peak provides indicated modulation index. Nominal input impedance is 600 ohms.

MODES Any combination of AM and FM or $\emptyset\text{M}$, internal or external, may be used. If external AM and FM or $\emptyset\text{M}$ are enabled, the modulation input Z will drop to approximately 560 ohms. Pulse modulation is completely independent and can be used in conjunction with any other form(s) of modulation.

GENERAL

TEMPERATURE
 Operating 0 to 50°C (32 to 122°F).
 Non-Operating -40 to 75°C (-40 to 167°F).

HUMIDITY RANGE
 Operating 95% to 30°C, 75% to 40°C, 45% to 50°C.

ALTITUDE
 Operating Up to 10,000 ft.

VIBRATION
 Non-Operating 5 to 15 Hz at 0.06 inch, 15 to 25 Hz at 0.04 inch, and 25 to 55 Hz at 0.02 inch, double amplitude (DA).

INTRODUCTION AND SPECIFICATIONS

Table 1-1. 6062A Synthesized RF Signal Generator Specifications (cont)

| | | | |
|--|---|---------|---------|
| SHOCK | | | |
| Non-Operating | Bench handling per MIL T 28800C Class 5, Style E. | | |
| ELECTROMAGNETIC COMPATIBILITY | | | |
| COMPATIBILITY | The radiated emissions induce <3 uV (<1 uV of the Generator's output signal) into a 1-inch diameter, 2-turn loop, 1-inch from any surface as measured into a 50-ohm receiver. | | |
| Also complies with the following standards: | | | |
| CE03 of MIL-STD-461B (Power and interconnecting Leads), 0.015 to 50 MHz. | | | |
| RE02 of MIL-STD-461B (14 kHz to 10 GHz). | | | |
| FCC Part 15 (j), class A. | | | |
| CISPR 11. | | | |
| SIZE | | | |
| ..... | Width | Height | Depth |
| | 43 cm | 13.3 cm | 50.8 cm |
| | 17 in | 5.25 in | 20 in |
| POWER | | | |
| ..... | 100, 120, 220, 240V ac $\pm 10\%$, 47 to 63 Hz, <180 VA (<15 VA, with Option -130 installed, and the Generator turned off (standby)). | | |
| WEIGHT | | | |
| ..... | <15.7 kg (35 lbs). | | |
| OPTION -130 HIGH-STABILITY REFERENCE | | | |
| AGING RATE | | | |
| ..... | <$\pm 5 \times 10^{-10}$ /day, after 21 days continuous operation. | | |
| TEMPERATURE STABILITY | | | |
| ..... | <$\pm 2 \times 10^{-10}/^{\circ}\text{C}$ (Oven remains powered in standby). | | |
| OPTION -132 MEDIUM-STABILITY REFERENCE | | | |
| AGING RATE | | | |
| ..... | <$\pm 1 \times 10^{-7}$ /month after 5 days continuous operation. | | |
| TEMPERATURE STABILITY | | | |
| ..... | <$\pm 1 \times 10^{-7}/^{\circ}\text{C}$ (0 to 50 $^{\circ}\text{C}$) (no powered standby). | | |
| OPTION -651 LOW-RATE EXTERNAL FM | | | |
| MAXIMUM DEVIATION | | | |
| ..... | 9.99 kHz. | | |
| DROOP | | | |
| ..... | <15% on a 10-Hz square wave. | | |
| BANDWIDTH (3dB) | | | |
| ..... | 0.5 Hz to 100 kHz (typical). | | |
| MAX DC INPUT | | | |
| | ± 10 mV. | | |
| INCIDENTAL AM | | | |
| ..... | <1% AM at 1-kHz rate and deviation <10 kHz. | | |

Table 1-1. 6062A Synthesized RF Signal Generator Specifications (cont)

SUPPLEMENTAL CHARACTERISTICS

The following characteristics are provided to assist in the application of the Generator and to describe the typical performance that can be expected.

- FREQUENCY SWITCHING SPEED <100 mS to be within 100 Hz.
- AMPLITUDE SWITCHING SPEED <100 mS to be within 0.1 dB.
- AMPLITUDE RANGE Programmable from +17 to -147.4 dBm. Fixed-range, selected by special function, allows for more than 12 dB of vernier without switching the attenuator.
- AMPLITUDE ACCURACY..... ±2.0 dB from -127.1 to -137 dBm from 0.1 to 2100 MHz.
- NOISE (at 20-kHz offset) <-116 dBc/Hz from 0.10 to 244.99999 MHz.
<-122 dBc/Hz from 245 to 511.99999 MHz.
<-116 dBc/Hz from 512 to 1049.99999 MHz.
<-110 dBc/Hz from 1050 to 2100 MHz.

RESIDUAL FM (typical)

| Freq Range | .3 - 3 kHz | .05 - 15 kHz | CCIT |
|----------------------|------------|--------------|--------|
| 0.1 - 244.99999 MHz | 8 Hz | 12 Hz | 7 Hz |
| 245 - 511.99999 MHz | 4 Hz | 6 Hz | 3.5 Hz |
| 512 - 1049.99999 MHz | 8 Hz | 12 Hz | 7 Hz |
| 1050 - 2100 MHz | 16 Hz | 24 Hz | 14 Hz |

- EXTERNAL MODULATION Annunciators indicate when a 1V peak signal is applied, ±2%, over a 0.02- to 100-kHz band.
- IEEE All controls except the power switch and the internal/external reference switch are remotely programmable via IEEE-488 Interface (Std 488-1978). All status including the option complement are available remotely. The Store/Recall memory data may be transferred via an external controller. In talk-only, the appropriate commands are generated when the front panel step-up and step-down entries are made to control another 6062A, 6060A, 6060B, 6070A, or 6071A. (6070/71A only have FREQUENCY STEP.)
- FREQUENCY DRIFT <1 ppm/hr after 1 hour warmup at constant ambient temperature using internal free-air crystal.

PULSE MODULATION

- PULSE DELAY..... OFF/ON 80 nsec typ
ON/OFF 65 nsec typ