

SPECIFICATIONS

| GENERAL | |
|-----------------------|--|
| RESOLUTION | Front panel keyboard input select 1 Hz to 1 GHz |
| MEASUREMENT TIME | 1 msec for 1 KHz resolution 1 sec for 1 Hz resolution |
| DISPLAY | 12 digit LED sectionalized |
| ACCURACY | ± 1 count \pm time base errors |
| TEST | Front panel selected diagnostics |
| SAMPLE RATE | Controls time between measurements variable from 100 msec typ. to 10 sec. Switchable Hold position holds display indefinitely. |
| RESET | Resets display to zero and initiates new reading |
| OFFSETS | Keyboard control of frequency offsets (standard) and power offsets (standard with power measurement Option 02). Displayed frequency (power) is offset by entering value to 1 Hz resolution (0.1 dB power). |
| OPERATION TEMP. | 0° C to 50° C |
| POWER | 100/120/220/240/VAC \pm 10% (selectable) 50 to 60 Hz, 60 VA typical |
| WEIGHT, NET | ~ 20 lbs. (9.07 kg) |
| WEIGHT, SHIPPING | ~ 25 lbs. (11.34 kg) |
| DIMENSIONS (HWD) | 3.5" x 16.75" x 14.0" (89 mm X 425 mm X 356 mm) |
| ACCESSORIES FURNISHED | Power Cord and Manual |

SPECIFICATIONS, continued

| BAND 1 | |
|--|---------------------|
| RANGE | 10 Hz to 100 MHz |
| SENSITIVITY | 25 mV rms |
| IMPEDANCE | 1 M Ω /20 pF |
| CONNECTOR | BNC (female) |
| MAX. INPUT LEVEL | 120 V rms * |
| DAMAGE LEVEL | 150 V rms * |
| * (Above 1 KHz max. input will decrease at 6 dB/octave down to 3.0 V rms.) | |

| BAND 2 | |
|------------------|---------------------|
| RANGE | 10 MHz to 1 GHz |
| SENSITIVITY | -20 dBm |
| DYNAMIC RANGE | 30 dB |
| IMPEDANCE | 50 Ω Nominal |
| CONNECTOR | BNC (female) |
| MAX. INPUT LEVEL | +10 dBm |
| DAMAGE LEVEL | +27 dBm |
| ACQUISITION TIME | < 50 msec |

| BAND 3 | |
|-------------------------------|---|
| RANGE | 1 GHz to 18 GHz (26.5 GHz for model 548) |
| SENSITIVITY | -30 dBm: 1 GHz-12.4 GHz -25 dBm: 12.4 GHz-18 GHz -20 dBm: 18 GHz-22 GHz -15 dBm: 22 GHz-26.5 GHz |
| DYNAMIC RANGE | 1 GHz to 12.4 GHz, 37 dB 12.4 GHz to 18 GHz, 32 dB 18 GHz to 22 GHz, 27 dB 22 GHz to 26.5 GHz, 22 dB |
| IMPEDANCE | 50 Ω Nominal |
| CONNECTOR | Model 575 - Precision type N, (female) Model 578 - SMA (female) |
| MAX. INPUT LEVEL | +7 dBm |
| DAMAGE LEVEL | 5 Watts (+37 dBm) |
| ACQUISITION TIME | ~ 250 msec Independent of frequency |
| AUTO AMPLITUDE DISCRIMINATION | (Automatic amplitude discrimination of two frequencies) 10 dB |
| FM MODULATION | 20 MHz P-P up to 10 MHz rate |
| VSWR | < 2.5:1 typical |
| FREQUENCY LIMIT | Keyboard control of desired limits (standard). Counter will measure largest signal within programmed limits. Signal outside operating band must be separated by at least 100 MHz from either limit. For signals more than 10 dB above desired signal, separation is typically 200 MHz |

| TIME BASE | |
|------------------|---|
| FREQUENCY | 10 MHz TCXO |
| AGING RATE | < 3×10^{-7} per month |
| SHORT TERM | < 1×10^{-9} rms for one second averaging time. |
| TEMPERATURE | < 2×10^{-6} 0° to + 50° C |
| LINE VARIATION | < 1×10^{-7} \pm 10% change. |
| WARM UP TIME | NONE |
| OUTPUT FREQUENCY | 10 MHz, square-wave, 1 V p-p minimum into 50 ohms. |
| EXT. TIME BASE | Requires 10 MHz, 1 V p-p minimum into 300 ohms. |

SPECIFICATIONS, continued

| BAND 4 Used with 578/06 Counter and 590 Frequency Extension Kit | | | | | |
|---|--------------------|-----------|-----------|------------|-----------------|
| OPTIONS | 91 | 92 | 93 | 94 | 95 |
| SELECT BAND | 41 | 42 | 43 | 44 | 42 or 43 |
| Waveguide Band | K a | U | E | W | V |
| Range | 26.5-40 GHz | 40-60 GHz | 60-90 GHz | 90-110 GHz | 50 - 75 GHz |
| Sensitivity (typ) | -25dBm(-20dBm min) | -25 dBm | -25 dBm | -25 dBm | -25 dBm |
| Waveguide Size | Wr-28 | WR-19 | WR-12 | WR-10 | WR - 15 |
| Waveguide Flange | UG-599/U | UG-383/U | UG-387/U | UG-387/U | UG - 385/U |
| Max. Input (typ) | +5 dBm | +5 dBm | +5 dBm | +5 dBm | +5 dBm |
| Damage Level | +10 dBm | +10 dBm | + 10 dBm | +10 dBm | +10 dBm |
| Aquisition Time (typ) | < 2.5 sec | < 2.5 sec | < 2.5 sec | < 2.5 sec | < 2.5 sec |

EXAMPLE: If desired measurement is 60 – 90 GHz the required equipment is :
 Model 578 with Option 06 - Extended Frequency and
 Model 590 - Extended Frequency Cable Kit with
 Option 93 - Remote Sensor

| | |
|-------------------------------------|--|
| SOURCE LOCK | |
| FREQUENCY RANGE | 10 MHz - Max. capability of counter. |
| RESOLUTION | 10 kHz for phase lock freq. \geq 50 MHz 2.5 kHz for $<$ 50 MHz |
| ACCURACY | Equal to counter's Time Base |
| LONG TERM STABILITY | Equal to counter's Time Base |
| MIN. PHASE LOCK SIGNAL LEVEL | Equal to counter sensitivity |
| POLARITY | Automatically selected |
| BANDWIDTH | User select, 10 kHz, 2 kHz or 500 Hz, or automatically selects widest bandwidth capable of locking. |
| LOCK TIME (TYP) | |
| COARSE TUNE | 50 m sec + 1 counter acquisition time for source bandwidth greater than 100 Hz, Limited by source tuning speed below 100 Hz. |
| PHASE LOCK | 200 m sec |
| RECALLING STORED DATA | 1 counter acquisition + 100 m sec limited by source tuning speed. |
| OUTPUT DRIVE (MAX) | |
| COARSE TUNE OUTPUT | + 10 V into 5 K ohm min. |
| PHASE LOCK OUTPUT | \pm 10 V into 5 K ohm min for source gain constant $<$ 64 MHz/V, \pm 75 MA into 10 ohm max for source gain constant $<$ 3.2 MHz/MA, \pm 6 V into 5 K ohm min for source gain constant \geq 64 MHz/V, \pm 4.5 MA into 10 ohm max for source gain constant \geq 3.2 MHz/MA. |
| CAPTURE RANGE | |
| COARSE TUNE | Entire range of selected counter band limited by maximum output drive. |
| PHASE LOCK | Source gain constant X maximum output drive. |

SPECIFICATIONS, continued

OUTPUT CONNECTOR

COARSE TUNE Rear panel BNC , female

PHASE LOCK Rear panel BNC , female

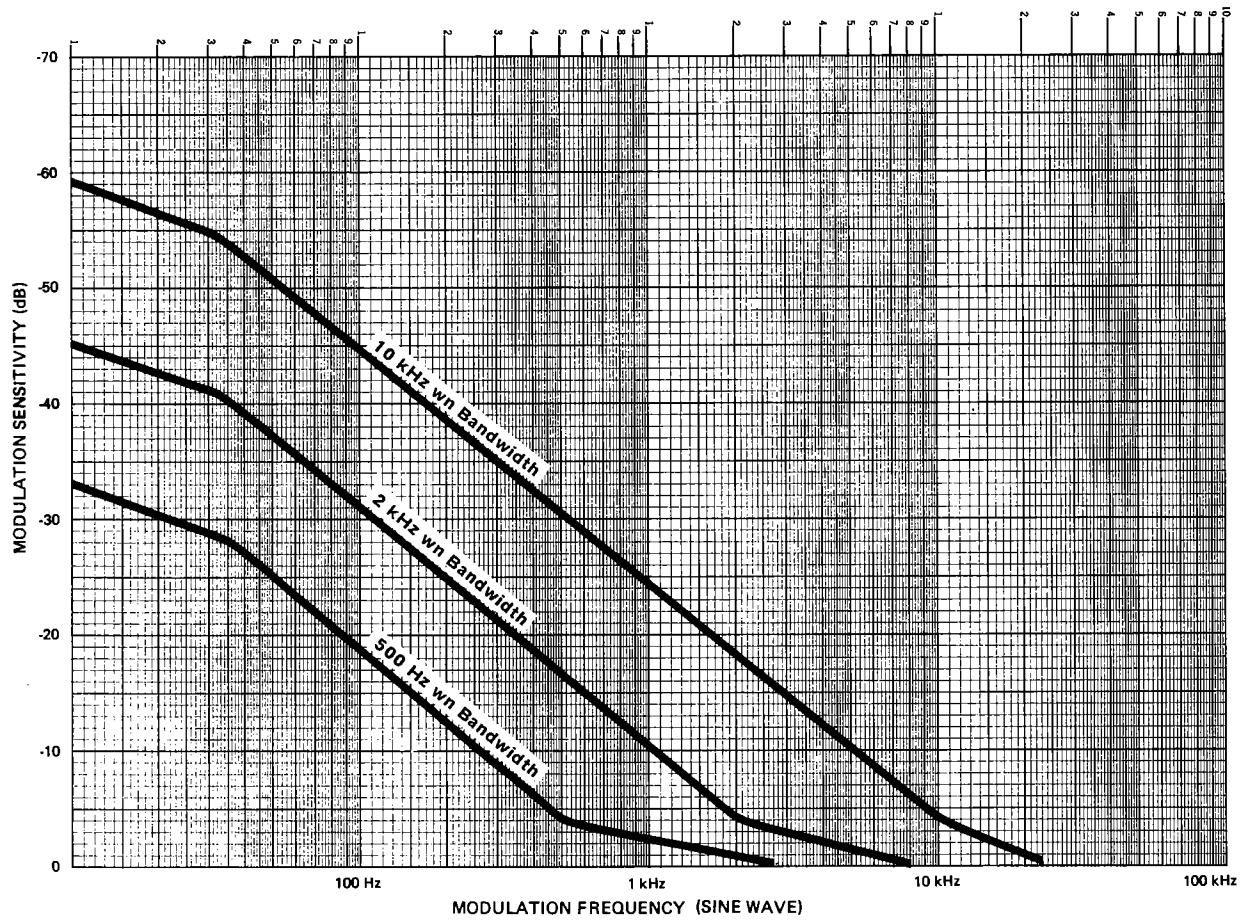
PHASE LOCKED SPECTRUM

NOISE FLOOR vs INPUT FREQUENCY :

The noise floor extends from the carrier to approximately the loop bandwidth. Beyond this the noise floor decreases 12 dB / bandwidth octave. The noise floor is the greater of :

1. NOISE FLOOR = -70 dBC / Hz
2. NOISE FLOOR = (20 log F -65) dBC / Hz
where F = Input frequency in GHz

NOISE REDUCTION vs MODULATION FREQUENCY :

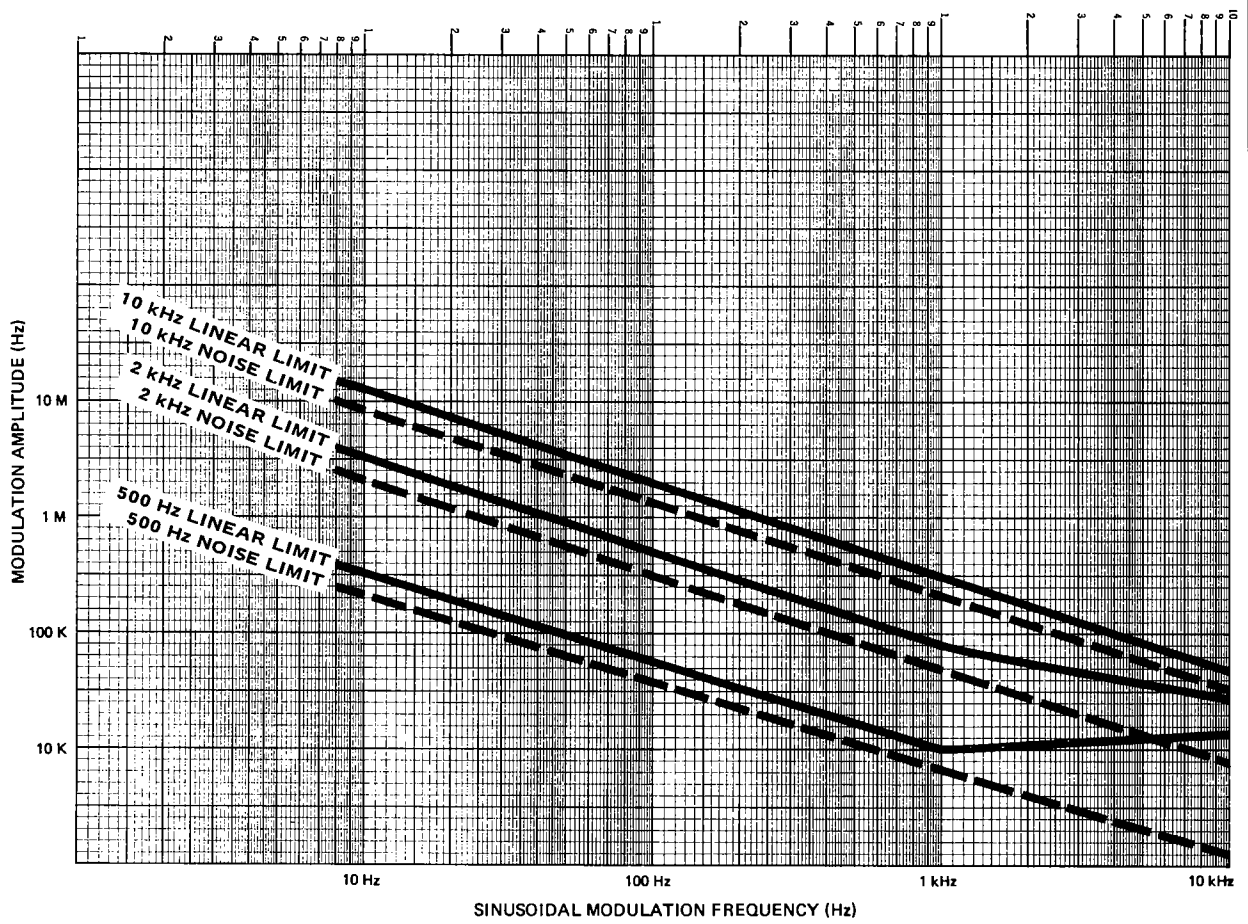


SPECIFICATIONS, continued

| | |
|--|---|
| SOURCE CHARACTERISTICS (required) | |
| COARSE TUNE INPUT : | |
| BANDWIDTH | 5 Hz minimum |
| TUNING SENSITIVITY | 10 MHz / V minimum 10 GHz / V maximum |
| PHASE LOCK (FM) INPUT : | |
| BANDWIDTH | 2 kHz minimum |
| TUNING SENSITIVITY : | |
| VOLTAGE DRIVEN INPUT | ± 2 MHz / V minimum ± 1000 MHz / V maximum |
| CURRENT DRIVEN INPUT | ± 0.1 MHz / mA minimum ± 50 MHz / mA maximum |

MAXIMUM FM

The counter will still frequency stabilize if maximum FM is exceeded, but accuracy and long term stability will not equal the counter's time base.



SPECIFICATIONS, continued

| OPTIONS | | | |
|---|-----------------------------|-----------------------------|--|
| 01 D TO A CONVERTER DAC will convert any three consecutively displayed digits into an analog voltage output on rear panel. | | | |
| 02 POWER METER 1 to 18/26.5 GHz will measure sine wave amplitude to 0.1 dBm resolution and display simultaneously with frequency. Power offset to 0.1 dB resolution, selectable from front panel. Option will not degrade the basic performance of the counter. | | | NOTE Power Meter and Source Locking cannot be active at the same time. |
| TIME BASE OSCILLATOR OPTIONS: | | | |
| | 03 | 04 | 05 |
| AGING RATE/24 HOURS (After 72 hour warm-up) | < 5 x 10 ⁻⁹ | < 1 x 10 ⁻⁹ | < 5 x 10 ⁻¹⁰ |
| SHORT TERM STABILITY (1 second average) | < 1 x 10 ⁻¹⁰ rms | < 1 x 10 ⁻¹⁰ rms | < 1 x 10 ⁻¹⁰ rms |
| 0° to +50°C TEMPERATURE STABILITY | < 6 x 10 ⁻⁸ | < 3 x 10 ⁻⁸ | < 3 x 10 ⁻⁸ |
| ± 10% LINE VOLTAGE CHANGE | < 5 x 10 ⁻¹⁰ | < 2 x 10 ⁻¹⁰ | < 2 x 10 ⁻¹⁰ |
| 06 EXTENDED FREQUENCY CAPABILITY – 578 Use in conjunction with model 590 Frequency Extension Cable kit and a remote sensor. | | | |
| 09 REAR INPUT | | | |
| 10 CHASSIS SLIDES | | | |