

Table 1-1. Specifications (1 of 3)

Electrical Characteristics	Performance Limits	Conditions
<b>Frequency</b> Range Resolution Switching	100 kHz to 990 MHz 10 Hz 150 ms	
<b>Spectral Purity</b> Spurious Signals: Harmonics ( <b>2425A only</b> ) Harmonics ( <b>2447A and above</b> ) Non-harmonics Sub-harmonics  Residual AM (in CW mode) (0.05 to 15 kHz Post Detection Noise Bandwidth)  Residual FM (in CW mode) (0.3 to 3 kHz Post Detection Noise Bandwidth)  Residual FM (in CW mode) (0.05 to 15 kHz Post Detection Noise Bandwidth)  SSB $\phi$ Noise (in CW mode): 20 kHz offset from carrier	<-25 dBc <-30 dBc <-60 dBc None  <-75 dBc  <7 Hz rms <2 Hz rms <4 Hz rms <7 Hz rms  <15 Hz rms <4 Hz rms <8 Hz rms <15 Hz rms  <-114 dBc/Hz <-126 dBc/Hz <-120 dBc/Hz <-114 dBc/Hz	$\leq +7$ dBm output levels $\leq +7$ dBm output levels  >5 kHz from carrier in CW mode  0.1 to 990 MHz  0.1 to 123.5 MHz 123.5 to 247 MHz 247 to 494 MHz 494 to 990 MHz  0.1 to 123.5 MHz 123.5 to 247 MHz 247 to 494 MHz 494 to 990 MHz  0.1 to 123.5 MHz 123.5 to 247 MHz 247 to 494 MHz 494 to 990 MHz
<b>Output</b> Level Range Resolution Absolute Level Accuracy <sup>1</sup> Level Flatness SWR Reverse Power Protection	+13 dBm to -127 dBm 0.1 dB $\leq \pm 1.0$ dB $\leq \pm 1.5$ dB $\leq \pm 1.0$ dB <2.0 <1.5 25W (max) 25V (max)	Into 50 ohms  123.5 to 990 MHz, +7 to -124 dBm 0.1 to 123.5 MHz, and <-124 dBm or >+7 dBm at 0.1 to 990 MHz  Output level setting of 0.0 dBm; frequencies from 0.1 to 990 MHz  >-5 dBm $\leq -5$ dBm  RF power to 990 MHz into RF OUTPUT connector dc voltage
<sup>1</sup> Absolute level accuracy includes allowances for detector linearity, temperature, flatness, attenuator accuracy, and measurement error.		

Table 1-1. Specifications (2 of 3)

Electrical Characteristics	Performance Limits	Conditions
<b>Amplitude Modulation</b> Depth <sup>2</sup>  Resolution Incidental Phase Modulation Indicator Accuracy <sup>2</sup> AM Rates: Internal External AM Distortion (internal rates)	0 to 99%  0 to 30%  1% <0.3 radian peak  ±2% (±4% of reading)  400 Hz and 1 kHz, ±3% 20 Hz to 40 kHz  <1.5% <3% <4%	Output levels of <+7 dBm; frequencies from 0.1 to 990 MHz  Output levels to +10 dBm; frequencies from 0.1 to 990 MHz  30% AM depth and internal rates  Depths <90% and internal rates, and levels <+7 dBm  1 dB bandwidth, ac coupled  0 to 30% AM 31 to 70% AM 71 to 90% AM
<b>FM Modulation</b> Maximum Peak Deviation ( $\Delta f_{pk}$ ): <sup>3</sup> Rates ≥25 Hz (ac mode) Rates ≥50 Hz (ac mode) Rates ≥50 Hz (ac mode) Rates ≥25 Hz (ac mode) Rates <25 Hz (ac mode) Rates <50 Hz (ac mode) Rates <50 Hz (ac mode) Rates <25 Hz (ac mode) Rates (dc mode)  Center Frequency Accuracy (dc mode)  Stability (dc mode) Resolution  Incidental AM  Indicator Accuracy <sup>3</sup>	99 kHz 50 kHz 99 kHz 99 kHz  4000 × Rate (Hz) 1000 × Rate (Hz) 2000 × Rate (Hz) 4000 × Rate (Hz)  99 kHz 50 kHz 99 kHz 99 kHz  ±500 Hz ±125 Hz ±250 Hz ±500 Hz  <10 Hz/hour  0.1 kHz 1 kHz  <0.1% <1% <5%  ±5% of reading	0.1 to 123.5 MHz (fc) 123.5 to 247 MHz (fc) 247 to 494 MHz (fc) 494 to 990 MHz (fc)  0.1 to 123.5 MHz (fc) 123.5 to 247 MHz (fc) 247 to 494 MHz (fc) 494 to 990 MHz (fc)  0.1 to 123.5 MHz (fc) 123.5 to 247 MHz (fc) 247 to 494 MHz (fc) 494 to 990 MHz (fc)  (FM not specified for $f_c - \Delta f_{pk} < 100$ kHz)  0.1 to 123.5 MHz (fc) 123.5 to 247 MHz (fc) 247 to 494 MHz (fc) 494 to 990 MHz (fc)  Deviations <10 kHz Deviations ≥10 kHz  <20 kHz peak deviation and internal rates: >500 kHz (fc) 200 to 500 kHz (fc) <200 kHz (fc)  At internal rates
<sup>2</sup> AM depth is further limited by the Indicator Accuracy specification. <sup>3</sup> FM deviation is further limited by the Indicator Accuracy specification.		

Table 1-1. Specifications (3 of 3)

Electrical Characteristics	Performance Limits	Conditions
<p><b>FM Modulation (Cont'd)</b></p> <p>FM Distortion (Total Harmonic Distortion)<sup>4, 5</sup></p> <p>FM Rates: Internal External</p> <p><b>General</b></p> <p>Operating Temperature Range</p> <p>Storage Temperature Range</p> <p>Power Requirements Line Voltage</p> <p>Line Frequency</p> <p>Power Dissipation</p> <p>Conducted and Radiated Electromagnetic Interference</p> <p>Net Weight</p> <p>Dimensions Full Envelope: Height Width Depth</p>	<p>&lt;0.5%</p> <p>400 Hz and 1 kHz, ±3% dc to 50 kHz dc to 100 kHz</p> <p>0 to 55°C</p> <p>-55 to +70°C</p> <p>100, 120, 220, or 240 Vac, +5%, -10%</p> <p>48 to 440 Hz</p> <p>125VA maximum</p> <p>MIL STD 461B, FTZ 1115</p> <p>&lt;1.0 μV</p> <p>18.2 kg (40 lb)</p> <p>133 mm (5.25 in.) nominal 425 mm (16.75 in.) nominal 520 mm (20.5 in.) nominal</p>	<p>≥3 kHz peak deviations and at internal rates</p> <p>ac coupled, ±1 dB 20 Hz to 50 kHz ±3 dB</p> <p>Conducted and radiated interference is within the requirements of methods CE03 and RE02 of MIL STD 461B, and FTZ 1115</p> <p>Induced in a two-turn 2.5 cm (1 inch) diameter loop held 2.5 cm (1 inch) away from the front surface.</p> <p>NOTE: For ordering cabinet accessories, the module sizes are 5¼H, 1MW,17D.</p>
<b>Electrical Characteristics</b>	<b>Features</b>	
<p>HP-IB (IEEE 488) Capability: Interface</p> <p>Functions Controlled</p>	<p>Hewlett-Packard Interface Bus (HP-IB). HP-IB is Hewlett-Packard's implementation of IEEE Standard 488 (and the identical ANSI Standard MC1.1). The Signal Generator's compatibility with HP-IB is defined by the following list of interface functions: SH0, E1, AH1, T0, L2, SR0, RL1, PP0, DC1, DT0, and C0.</p> <p>All functions controlled from the front-panel with the exception of DISPLAY, DISPLAY in conjunction with SEQ, display Amplitude Offset, Backspace, COARSE TUNE, FINE TUNE, and display HP-IB ADRS are programmable with the same accuracy and resolution as in local operation.</p>	
<p><sup>4</sup>FM distortion only applies at deviations up to 25 kHz for 123.5 &lt; fc &lt;247 MHz, and 50 kHz for 247 &lt; fc &lt;494 MHz. Typical total FM distortion (harmonic and non-harmonic) is less than 1.5% for all specified deviations and external rates of dc to 100 kHz.</p>		
<p><sup>5</sup>Typically &lt;0.5% THD for peak deviations &gt;1 kHz and at internal rates.</p>		

Table 1-2. Supplemental Characteristics

Supplemental characteristics are intended to provide information useful in applying the instrument by giving typical, but non-warranted performance parameters.

**FREQUENCY**

**Accuracy and Stability:** same as internal time base.

**Time Base Characteristics:**

Characteristic	Standard Time Base	Option 001 Time Base
Aging Rate	±2 ppm/year	1 × 10 <sup>-9</sup> /day
Temperature	±10 ppm (0-55°C)	7 × 10 <sup>-9</sup> (0-55°C)
Line Voltage	—	2 × 10 <sup>-9</sup> (+5 to -10%)
Frequency	50 MHz	10 MHz
Time Base Reference Signal (Rear-Panel)	Available at a level of >0.15 Vrms into 50 ohms (output of 10, 5 or 1 MHz is selectable via internal jumper). If the Option 001 or another external reference is used, only that reference frequency is available as an output.	
External Reference Input (Rear-Panel)	Accepts any 10, 5 or 1 MHz (±0.002%) frequency standard at a level of >0.15 Vrms into 50 ohms.	

**Phase Offset:** Output phase is adjustable via HP-IB, or from the front-panel in nominal 1 degree increments.

**Frequency Underrange:** 10 kHz with uncalibrated output.

**MODULATION**

**(Amplitude and Frequency Modulation)**

**External Sensitivity:** 1V peak for indicated accuracy for ac signals or 1 Vdc when in dc FM mode.

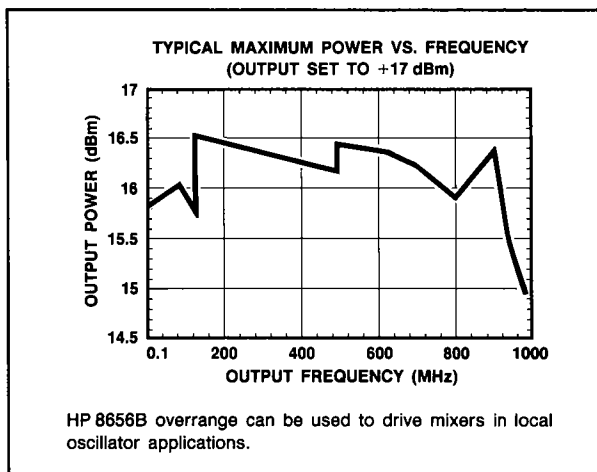
**External Modulation Input:** front-panel BNC; 600 ohms, dc-coupled; front-panel annunciators indicate application of 1V peak signal ±5%.

**Modulating Signal Output:** internal modulating signal is provided at the front-panel BNC connector nominally 1 Vpk into a 600 ohm resistive load.

**Simultaneous Modulation:** Internal/external: AM/FM, FM/AM, AM/AM, and FM/FM. Internal/internal: AM/FM.

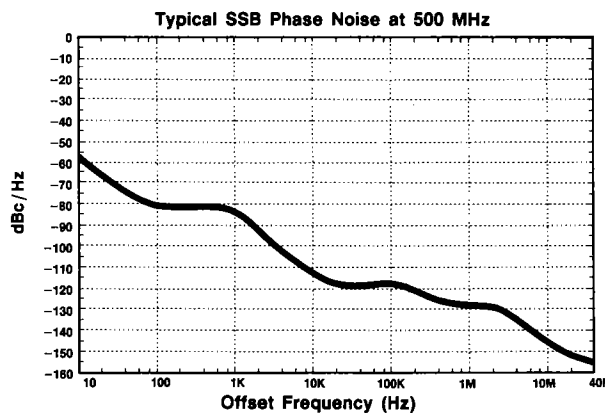
**OUTPUT**

**Impedance:** 50 ohms nominal.



Typical maximum power output versus frequency (output set to +17 dBm)

**SPECTRAL PURITY**



Typical SSB φ Noise, f<sub>c</sub> = 450 MHz

Table 1-3. Recommended Test Equipment (1 of 3)

Instrument	Critical Specifications	Recommended Model	Use <sup>1</sup>
AM/FM Test Source (required for modulation analyzer verification)	Range: 10 MHz to 400 MHz Residual AM <sup>2</sup> FM Flatness: $\pm 1\%$ (dc to 250 kHz) Peak Deviation: to 100 kHz	HP 11715A	P
Attenuator, Fixed	Attenuation: 6 dB Frequency Range: 10 MHz to 990 MHz SWR: <1.2	HP 8491A Option 006	P
Attenuator, Fixed	Attenuation: 20 dB Frequency Range: 10 MHz to 990 MHz SWR: <1.2	HP 8491A Option 020	A
Controller, HP-IB	HP-IB compatibility as defined as IEEE Standard 488 and the identical ANSI Standard MC1.1: SH0, E1, AH1, T4, TE0, L0, LE0, SR0, RL0, PP0, DC0, DT0, and C1, 2, 3, 28.	Use any HP controller and HP-IB Interface to implement HP-IB functional checks	T
DC Power Supply	Output: 0-25 V Current: 500 mA	HP 6215A	P, A
Digital Multimeter	Accuracy: $4\frac{1}{2}$ digit, $\pm 0.05\%$ of reading $\pm 3$ Ranges: 20 mV to 30 Vdc and 2 Vac Sensitivity: 100 $\mu$ V	HP 3466A or HP 3455A (see Table 1-4)	P, A, T
Distortion Analyzer	Distortion Range: <0.1% Range: 25 Hz to 25 kHz	HP 339A or HP 8903A (see Table 1-4)	P, T
Frequency Counter	Range: 10 MHz Resolution: 1 Hz	HP 5328A Option 031 or HP 5328A Options 001 and 031 (see Table 1-4)	A
Frequency Counter	Range: 990 MHz Resolution: 10 Hz	HP 5328A Option 031	T
Loop Antenna 2.5 cm (1 in.)	To ensure measurement accuracy, no substitution is possible. Fabrication depends upon machining and assembling to close tolerances.	HP 08640-60501	P
Low-Noise Amplifier	Input/Output Impedance: 50 ohms Frequency Bandwidth: 1 kHz to 1 MHz Noise Figure: <3 dB Gain: $40 \pm 1$ dB	HP 08640-60506 Requires 19-25 Vdc Power Supply	P
Measuring Receiver and Sensor Module	Frequency Range: 150 kHz to 990 MHz Input Level: -127 to +13 dBm RF Power: 0.2 dB Tuned RF Level: 0.36 dB RSS Referenced to -10 dBm input	HP 8902A and 11722A	P, A, T
<sup>1</sup> A = Adjustments; P = Performance Tests; T = Troubleshooting. <sup>2</sup> The residual AM specification of both the HP 8901A Modulation Analyzer and HP 11715A AM/FM Test Source are stated in a 50 Hz to 3 kHz bandwidth. In order to assure the validity of the residual AM measurement in the bandwidths stated for the HP 8656B Signal Generator (namely, 50 Hz to 15 kHz) the combined performance of both the HP 8901A and HP 11715A must be verified to be better than 0.022% rms for the 50 Hz to 15 kHz bandwidth. See paragraph 4-7, step 4, for the verification procedure.			

Table 1-3. Recommended Test Equipment (2 of 3)

Instrument	Critical Specifications	Recommended Model	Use <sup>1</sup>
Measuring Receiver and Sensor Module (Cont'd)	Amplitude Modulation: Rates <sup>3</sup> : 25 Hz to 25 kHz Depth: to 99% Accuracy: ±2% at 1 kHz Flatness: ±0.5% Demodulated Output Distortion: 0.3% for 50% depth; <0.6% for 90% depth Incidental $\Phi$ M: <0.05 radians for 50% depth at 1 kHz rate (50 Hz to 3 kHz bandwidth) Residual AM <sup>2</sup>  Frequency Modulation: Rates: 25 Hz to 25 kHz Deviation: to 99 kHz Accuracy: ±2% at 1 kHz Demodulated Output Distortion: <0.3% Incidental AM <sup>3</sup> : Residual FM: <8 Hz rms at 1300 decreasing linearly with frequency to <1 Hz rms for 100 MHz and below (50 Hz to 3 kHz bandwidth)	HP 8902A and 11722A	P, A, T
Mixer	Frequency: 0.2 MHz to 500 MHz Type: Double Balanced	HP 10514A	P
Oscilloscope	Vertical Sensitivity: 0.01 mV/div Bandwidth: 50 MHz Time/Div: .05 $\mu$ sec Input: Dual Channel	HP 1740A	A, T
Signal Source	Frequency: 50 to 300 MHz Level: -20 dBm	HP 8640B	A, T
Signature Analyzer	Provides preferred method for troubleshooting digital circuitry	HP 5005A	T
Spectrum Analyzer, RF	Frequency Range: 0.1 to 990 MHz Resolution Bandwidth: <1 kHz to 3 kHz	HP 8568A or HP 8558B/P/181T or (see Table 1-4)	P, A, T
SWR Bridge	Frequency Range: 5 MHz to 990 MHz Impedance: 50 ohms Directivity: >40 dB Test Connector: Type N male	Wilton 60N50	P
Test Oscillator	Level: 0.0 to 1 Vpk into 50 and 600 ohms Frequency: 25 Hz to 25 MHz	HP 651B	P, A, T
Wideband Amplifier	Gain: 20 or greater Frequency Range: 10 MHz to 990 MHz Impedance: 50 ohms Connector: Type N	HP 8447D Option 010	P

<sup>1</sup>A = Adjustments; P = Performance Tests; T = Troubleshooting.

<sup>2</sup>The residual AM specification of both the HP 8901A Modulation Analyzer and HP 11715A AM/FM Test Source are stated in a 50 Hz to 3 kHz bandwidth. In order to assure the validity of the residual AM measurement in the bandwidths stated for the HP 8656B Signal Generator (namely, 50 Hz to 15 kHz) the combined performance of both the HP 8901A and HP 11715A must be verified to be better than 0.022% rms for the 50 Hz to 15 kHz bandwidth. See paragraph 4-7, step 4, for the verification procedure.

<sup>3</sup>The incidental AM specification for the Signal Generator is not equivalent to the published specification of the Model 8901A Modulation Analyzer. In order to assure the validity of the incidental AM measurement, the incidental AM of the modulation analyzer must be verified to be less than 0.02% for the 300 Hz to 3 kHz bandwidth and 20 kHz peak deviation at internal rates. Refer to paragraph 4-9, step 18, for the verification procedures.

Table 1-3. Recommended Test Equipment (3 of 3)

Adapter	Quantity	Type	Recommended Model	Use <sup>1</sup>
Coaxial	1	BNC(f) to BNC(f)	HP 1250-0080	A, T
Coaxial	1	N(f) to BNC(m)	HP 1250-0077	A
Coaxial	3	N(m) to BNC(f)	HP 1250-0780	P, A, T
Probe	2	SMC(f) to RF Test Point	HP 1250-1598	A, T
RF	2	BNC(f) to SMC(f)	HP 08662-60075	P
RF	1	Connector: UG-21D/U Type N(m)	HP 11500A	P, A, T
RF	2	Connector: UG-21D/U Type N(m)	HP 11500B	P, A, T

<sup>1</sup>A = Adjustments; P = Performance Tests; T = Troubleshooting.

Table 1-4. Alternate Test Equipment

Instrument	Recommended Model	Suggested Alternative	Advantages of Alternative
Digital Voltmeter (DVM)	HP 3466A	HP 3455A	HP-IB* Compatible
Distortion Analyzer	HP 339A	HP 8903A	HP-IB* Compatible
Frequency Counter	HP 5328A Option 031	HP 5328A Options 001 and 031	HP-IB* Compatible
Spectrum Analyzer, RF	HP 8568A	HP 8558B/P/181T or HP 8554B/8552B/141T	Satisfies the requirements for testing the Signal Generator.

\*HP-IB is Hewlett-Packard's implementation of IEEE Standard 488 and the identical ANSI Standard MC1.1.