

## SECTION 1 GENERAL INFORMATION

### 1-1. INTRODUCTION

The HP 8673G Operating Manual contains all the information required to install, operate, and test the Hewlett-Packard Model 8673G Synthesized Signal Generator. Figure 1-1 shows an HP 8673G Signal Generator with all of its externally supplied accessories.

The HP 8673G Operating Manual has four sections:

- Section 1, General Information
- Section 2, Installation
- Section 3, Operation
- Section 4, Performance Tests

The HP 8673G Service Manual, which is shipped with the instrument as Option 915 or ordered separately, has four sections:

- Section 5, Adjustments
- Section 6, Replaceable Parts
- Section 7, Manual Changes
- Section 8, Service

Additional copies of the Operating Manual or the Service Manual can be ordered separately through your nearest Hewlett-Packard office.

### 1-2. SPECIFICATIONS

Instrument specifications are listed in Table 1-1. These specifications are the performance standards or limits against which the instrument may be tested. Supplemental characteristics are listed in Table 1-2. Supplemental characteristics are not warranted specifications, but are typical characteristics included as additional information for the user.

### 1-3. SAFETY CONSIDERATIONS

This product is a Safety Class I instrument, that is, one provided with a protective earth terminal. The Signal Generator and all related documentation should be reviewed for familiarization with safety markings and instructions before operation. Refer to the Safety Considerations page found at the beginning of this manual for a summary of the safety information. Safety information for installation, operation, performance testing, adjustment, or service is found in appropriate places throughout this manual.

### 1-4. MANUAL UPDATES

*Manual Updates* provide information necessary to update the manual. The supplement is identified by the manual print date and part number, both of which appear on the manual title page.

### 1-5. DESCRIPTION

The HP 8673G Synthesized Signal Generator has a frequency range of 2.0 to 26.0 GHz (1.95 to 26.5 GHz overrange). The output is leveled and calibrated from +8 dBm to -100 dBm, depending on the frequency and options. For additional information, see Table 1-1. Frequency, output level, and all other functions except line switch can be remotely programmed via HP-IB.

Long-term frequency stability is dependent on the time base, either an internal or external reference oscillator. The internal crystal reference oscillator operates at 10 MHz while an external oscillator may operate at 5 or 10 MHz. The output of the Signal Generator is exceptionally flat due to the action of the internal automatic leveling control (ALC) loop.

The Signal Generator is compatible with HP-IB to the extent indicated by the following code: SH1, AH1, T5, TE0, L3, LE0, SR1, RL1, PP1, DC1, DT1, and C0. The Signal Generator interfaces with the bus via three-state TTL circuitry. An explanation of the compatibility code can be found in IEEE Standard 488 (1978), "IEEE Standard Digital Interface for Programmable Instrumentation" or the identical ANSI Standard MC1.1. For more detailed information relating to programmable control of the Signal Generator, refer to Remote Operation, Hewlett-Packard Interface Bus in Section 3 of this manual.

### 1-6. OPTIONS

#### 1-7. Electrical Options

**Option 004.** The Signal Generator's RF OUTPUT connector is located on the rear panel. Maximum output power is listed in Table 1-1.

**Option 008.** Option 008 provides +8 dBm leveled output power from 2.0 to 26.0 GHz.

**DESCRIPTION (cont'd)****1-8. Mechanical Options**

The following options may have been ordered and received with the Signal Generator. If they were not ordered with the original shipment and are now desired, they can be ordered from the nearest Hewlett-Packard office using the part numbers included in each of the following paragraphs.

**CAUTION**

*In the options below both English and metric screws are provided. If your instrument's frame is stamped with the word "Metric" or "M", use metric screws; otherwise use English screws. The use of incompatible screws will result in damage to the frame.*

**Option 006 (Chassis Slide Mount Kit).** This kit is extremely useful when the Signal Generator is rack mounted. Access to the internal circuits and components, or the rear panel is possible without removing the Signal Generator from the rack. The chassis Slide Mount Kit part number is 1494-0059. An adapter is needed if the instrument rack mounting slides are to be mounted in a non-HP rack. The slides without the adapter can be directly mounted in the HP system enclosures. The adapter part number is 1494-0061.

**Option 907. (Front Handle Kit).** Ease of handling is increased with the front panel handles. The Front Handle Kit part number is 5061-9689.

**Option 908 (Rack Flange Kit).** The Signal Generator can be solidly mounted to the instrument rack without handles, using the flange kit. The Rack Flange Kit part number is 5061-9677.

**Option 909 (Rack Flange and Front Handle Combination Kit).** This is a unique part which combines both functions. It is not simply a front handle kit and a rack flange kit packaged together. The Rack Flange and Front Panel Combination Kit part number is 5061-9683.

**1-9. Miscellaneous Options**

**Option 910.** Provides a service manual and an extra operating manual.

**Option 915.** Provides a service manual.

**Option 916.** Provides an extra operating manual.

**Option W30.** Provides two additional years of return-to-HP service. The first year of normal warranty is combined with this extended service to provide three full continuous years of HP service. All repairs of failures due to defects in materials or workmanship, are covered under this extended service. Repair services do not include routine preventative maintenance or periodic calibrations of the instrument.

**1-10. ACCESSORIES SUPPLIED**

The accessories supplied with the Signal Generator are shown in Figure 1-1.

a. The line power cable is supplied in several configurations, depending on the destination of the original shipment. Refer to Power Cables in Section 2 of this manual.

b. An additional fuse is shipped only with instruments that are factory configured for 100/120 Vac operation. This fuse has a 2A rating for reconfiguring the instrument for 220/240 Vac operation.

c. Two adapters are provided: APC-3.5(F) to TYP-N(F), HP Part No. 1250-1745 and APC-3.5(F-F), HP Part No. 1250-1749.

**1-11. EXTERNAL REFERENCE OSCILLATOR NOT SUPPLIED**

An external reference oscillator may be used in place of the internal reference oscillator. The performance of the external reference should at least match the specifications of the internal reference oscillator. In particular, the frequency should be within  $\pm 50$  Hz of 10 MHz. When using an external oscillator, microphonically generated or line related spurious signals may increase. SSB phase noise may also be degraded at some offsets from the carrier.

**1-12. ELECTRICAL EQUIPMENT AVAILABLE**

The Signal Generator has an HP-IB interface and can be used with any HP-IB compatible computing controller or computer for automatic systems applications.

The HP-IB Controller and various ROM's are needed to do the automated SRD Bias, YTM Tune, Flatness and ALC adjustment procedures. Specific equipment needed for automated adjustments are:

**ELECTRICAL EQUIPMENT AVAILABLE (cont'd)**

- Test Cassette HP Part No. 11726-10002
- HP 85F Controller
- 82903A 16K Memory Module
- 00085-15005 Advanced Programming ROM
- 00085-15002 Plotter/Printer ROM
- 00085-15004 Matrix ROM
- HP 3455A Digital Voltmeter
- HP 436A/HP 8485A Power Meter and Sensor

Although the test cassette is part of the HP 11726A Support Kit, it can be ordered separately through the nearest Hewlett-Packard office. The HP 11726A Support Kit is available for maintaining and servicing the Signal Generator. It consists of cables, adapters, termination, and prerecorded programs, extender boards and test extender boards.

The Synthesizer Interface Cable, part number 5061-5391, provides an interface to the HP 8349B Microwave Amplifier. This provides calibrated output level under control of the system-compatible Signal Generator. This cable (as well as the HP 8349B Microwave Amplifier), is required for use with the HP 83550 family of frequency multipliers. For more information, see paragraph 3-2, System Compatibility.

**1-13. RECOMMENDED TEST EQUIPMENT**

Table 1-3 lists the test equipment recommended for testing, adjusting and servicing the Signal Generator. Table 1-4 lists the test equipment recommended for Abbreviated Performance Tests. Essential requirements for each piece of test equipment are described in the Critical Specifications column. Other equipment can be substituted if it meets or exceeds the critical specifications.

**Table 1-1. Specifications (1 of 5)**

Electrical Characteristics	Performance Limits	Conditions
<p>Note: Specifications and characteristics apply after a 1-hour warm-up, over the temperature range 0–55°C (except specifications for harmonically related spurious signals and RF output level, which apply over the range 15–35°C) after an AUTO-PEAK operation has been performed. For additional information concerning the use of AUTO PEAK, refer to paragraphs 3-12 and 3-13. Specifications for output flatness and absolute level accuracy apply only when internal leveling is used.</p>		
<p><b>FREQUENCY</b> Range  Resolution  Accuracy and Stability Reference Oscillator: Frequency Aging Rate  Switching Time (for frequency to be within specified resolution and output power to be within 3 dB of set level)</p>	<p>2.0–26.0 GHz (1.95–26.5 GHz overrange)  1 kHz 2 kHz 3 kHz 4 kHz  Same as reference oscillator  10 MHz<sup>-10</sup> &lt;5 x 10<sup>-10</sup>/day  &lt;25 ms</p>	<p>2.0 to 6.6 GHz &gt;6.6 to 12.3 GHz &gt;12.3 to 18.6 GHz &gt;18.6 to 26.0 GHz  After warm-up (typically 24 hours in a normal operating environment)  AUTO PEAK disabled</p>
<p><b>SPECTRAL PURITY</b> Single-sideband Phase Noise 2.0–6.6 GHz</p>	<p>–58 dBc –70 dBc –78 dBc –86 dBc –110 dBc</p>	<p>1 Hz bandwidth 10 Hz offset from carrier 100 Hz offset from carrier 1 kHz offset from carrier 10 kHz offset from carrier 100 kHz offset from carrier</p>

Table 1-1. Specifications (2 of 5)

Electrical Characteristics	Performance Limits	Conditions
<p><b>SPECTRAL PURITY (cont'd)</b></p> <p>&gt;6.6—12.3 GHz</p> <p>&gt;12.3—18.6 GHz</p> <p>&gt;18.6—26.0 GHz</p> <p>Harmonics</p> <p>Subharmonics and Multiples thereof</p> <p>For Option 008: Subharmonics and Multiples thereof</p> <p>Spurious Signals Nonharmonically Related</p> <p>Power line related and fan rotation related within 5 Hz below line frequencies and multiples thereof 2.0—18.6 GHz &gt;18.6—26.0 GHz</p>	<p>-52 dBc -64 dBc -72 dBc -80 dBc -104 dBc</p> <p>-48 dBc -60 dBc -68 dBc -76 dBc -100 dBc</p> <p>-46 dBc -58 dBc -66 dBc -74dBc -98 dBc</p> <p>&lt;-40 dBc</p> <p>&lt;-25 dBc &lt;-20 dBc</p> <p>&lt;-25 dBc &lt;-15 dBc</p> <p>&lt;-60 dBc &lt;-58 dBc</p> <p>&lt;-40 dBc &lt;-38 dBc</p>	<p>10 Hz offset from carrier 100 Hz offset from carrier 1 kHz offset from carrier 10 kHz offset from carrier 100 kHz offset from carrier</p> <p>10 Hz offset from carrier 100 Hz offset from carrier 1 kHz offset from carrier 10 kHz offset from carrier 100 kHz offset from carrier</p> <p>10 Hz offset from carrier 100 Hz offset from carrier 1 kHz offset from carrier 10 kHz offset from carrier 100 kHz offset from carrier</p> <p>Up to 26 GHz; output level at or below 0 dBm</p> <p>2.0 to 18.6 GHz 18.6 to 26.0 GHz</p> <p>2.0 to 26 GHz 18.6 to 26 GHz (1/2 and 3/4 subharmonics only)</p> <p>2.0 to 18.6 GHz &gt;18.6 to 26.0 GHz</p>
<p><b>RF OUTPUT</b></p> <p>Output Level:</p> <p>Standard Leveled Output</p> <p>Option 004 Leveled Output</p> <p>Option 008 Level Output</p>	<p>+8 dBm to -100 dBm +4 dBm to -100 dBm +1 dBm to -100 dBm</p> <p>+7 dBm to -100 dBm +2 dBm to -100 dBm -1 dBm to -100 dBm</p> <p>+8 dBm to -100 dBm</p>	<p>+15 to +35°C</p> <p>2.0 to 18.0 GHz 18.0 to 22.0 GHz 22.0 to 26.0 GHz</p> <p>2.0 to 18.0 GHz 18.0 to 22.0 GHz 22.0 to 26.0 GHz</p> <p>2.0 to 26.0 GHz</p>

Table 1-1. Specifications (3 of 5)

Electrical Characteristics	Performance Limits	Conditions
<b>RF OUTPUT (cont'd)</b>		
Absolute Level Accuracy		+15 to +35°C
2.0 – 6.6 GHz	±1.25 dB  ±1.00 dB ±1.50 dB ±1.70 dB ±2.00 dB ±2.00 dB plus ±0.1 dB per 10 dB step below -30 dBm	+10 dBm output level range (Highest) 0 dBm output level range -10 dBm output level range -20 dBm output level range -30 dBm output level range <-30 dBm output range
>6.6 – 12.3 GHz	±1.50 dB  ±1.25 dB ±1.75 dB ±1.95 dB ±2.25 dB ±2.25 dB plus ±0.1 dB per 10 dB step below -30 dBm	+10 dBm output level range (Highest) 0 dBm output level range -10 dBm output level range -20 dBm output level range -30 dBm output level range <-30 dBm output range
>12.3 – 18.6 GHz	±1.75 dB  ±1.50 dB ±2.10 dB ±2.30 dB ±2.70 dB ±2.70 dB plus ±0.2 dB per 10 dB step below -30 dBm	+10 dBm output level range (Highest) 0 dBm output level range -10 dBm output level range -20 dBm output level range -30 dBm output level range <-30 dBm output range
>18.6 – 26.0 GHz	±2.25 dB ±2.00 dB ±2.55 dB ±2.85 dB ±3.30 dB ±3.30 dB plus ±0.2 dB per 10 dB step below -30 dBm	+10 dBm range (Opt. 008) 0 dBm output level range -10 dBm output level range -20 dBm output level range -30 dBm output level range <-30 dBm output range
Remote Programming		
Output Level Resolution	0.1 dB	
For Option 008	0.1 dB	+7 to -100 dBm, plus 6 dB of overrange
Flatness		
	±0.75 dB ±1.00 dB ±1.25 dB ±1.75 dB	0 dBm range; +15 to +35°C 2.0 to 6.6 GHz 2.0 to 12.3 GHz 2.0 to 18.6 GHz 2.0 to 26.0 GHz
		(Min. to max. variation in power level across specified frequency limits is less than 2 times flatness spec.)
Output Level Switching Time (to be within ±1 dB of final level)	<25 ms	

Table 1-1. Specifications (4 of 5)

Electrical Characteristics	Performance Limits	Conditions
<b>DIGITAL SWEEP</b> Sweep Function Sweep Modes Step Size Sweep Width Dwell Time Markers	Start/Stop or $\Delta F$ (Span) Sweep Manual, Auto, Single Maximum 9999 frequency points per sweep; minimum step size equals Frequency Resolution Min: Frequency Resolution Max: 2.0 to 26.0 GHz Set from 1 to 255 ms per step 5 independent, fixed frequency markers set from front panel	Set directly or as number of points per sweep For Opt. 008, 16.0 to 26.0 GHz in AUTO only Resolution and accuracy are identical to RF output
<b>REAR PANEL AUXILIARY CONTROL CONNECTOR</b> 14-Pin Connector Input Required Outputs	<ul style="list-style-type: none"> <li>· Trigger Output</li> <li>· Stop Sweep Input</li> <li>· End Sweep Output</li> <li>· Trigger Sweep Input</li> <li>· Negative Z-axis Blanking</li> <li>· Service Function</li> <li>· Frequency Increment</li> <li>· Frequency Decrement</li> <li>· Blank Frequency Display</li> <li>· Recall Register 1</li> <li>· Sequential Register Recall</li> <li>· Ground</li> </ul> Contact closure to ground or 5 $\mu$ s, negative true TTL pulse 5 $\mu$ s negative true TTL pulse	(Internal debounce circuit available to debounce external inputs.)
<b>REMOTE PROGRAMMING</b>	Interface Functions: SH1, AH1, T5, TE0, L3, LE0, SR1, RL1, PP1, DC1, DT1, C0, E1	All functions HP-IB programmable, except LINE switch
<b>REAR PANEL CONNECTORS</b> Frequency Reference Output Sweep Output Tone Marker Output Z-Axis Blanking Marker Penlift 10 MHz Output 100 MHz Output	0.5 V/GHz 0 to +10V ramp, start to stop 5 kHz sine wave output Z-Axis control for CRT Compatible with devices that have penlift control 0 dBm (nominal) into 50 ohms 0 dBm (nominal) into 50 ohms	

Table 1-1. Specifications (5 of 5)

Electrical Characteristics	Performance Limits	Conditions
<p><b>GENERAL</b></p> <p>Operating Temperature Range</p> <p>Power Requirements:                      Line Voltage (100, 120, 220, or 240V)                      Power Dissipation</p> <p>Conducted and Radiated                      Electromagnetic Interference</p> <p>Net Weight</p> <p>Dimensions: Height                      Width                      Depth</p>	<p>0 to +55°C</p> <p>+5, -10%</p> <p>400 V · A maximum</p> <p>MIL-STD 461A-1968</p> <p>29 kg (64 lb)</p> <p>146 mm (5.7 in.)</p> <p>425 mm (16.8 in.)</p> <p>620 mm (24.4 in.)</p>	<p>48—66 Hz</p> <p>Conducted and radiated interference is within the requirements of methods CE03 and RE02 of MIL-STD 461A, VDE 0871, and CISPR publication 11.</p> <p>For ordering cabinet accessories, module sizes are 5-1/4H, 1MW, 23D.</p>

