Quick Reference Guide

HP 8590 E-Series and L-Series Spectrum Analyzer
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Introduction
This guide provides a quick reference for experienced spectrum analyzer users. Chapter 1 summarizes the front-panel features, and tells how to make a basic measurement and how to perform the self-calibration routines. Chapter 2 contains brief descriptions of the spectrum analyzer functions. Chapter 3 contains the remote programming codes. Appendices A, B, C, and D contain, helpful charts and tables. Appendix E contains diagrams of the key menus for the HP 8590 Series spectrum analyzers.


Guide Terms and Conventions
The six keys along the right side of the display are called softkeys. Their labels are displayed on the screen. The softkeys appear in shaded boxes in this guide. An example of a softkey is [FREQUENCY]. The labeled keys that are on the front panel of the spectrum analyzer are called front-panel keys. Pressing a front-panel key changes the softkey labels or initializes functions. The front-panel keys appear in unshaded boxes in this guide. An example of a front-panel key is [FREQUENCY].

Caution The input of the spectrum analyzer can be damaged easily. When using a line impedance stabilization network (LISN) device with the spectrum analyzer, disconnect the spectrum analyzer from the LISN device before changing either the switch position on, or the voltage to, the LISN device.

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General Safety Considerations

Caution  Caution denotes a hazard. I call attention to a procedure that,
if not correctly performed or adhered to, could result in damage
to or destruction of the instrument. Do not proceed beyond a
caution note until the indicated conditions are fully understood
and met.

Caution  The input of the spectrum analyzer can be damaged easily.
When using a line impedance stabilization network (LISN)
device with the spectrum analyzer, disconnect the spectrum
analyzer from the LISN device before changing either the switch
position on, or the voltage to, the LISN device.

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Getting Acquainted with the Spectrum Analyzer

This chapter provides an introduction to the spectrum analyzer’s front-panel features, an explanation of screen annotation, the procedure for making a basic measurement with the spectrum analyzer, and the procedure for performing self-calibration routines.

Front-Panel Features

The following section provides a brief description of front-panel features. Refer to Figure 1-1.

1. **Active function block** is the space on the screen that indicates the active function. Most functions appearing in this block can be changed with the knob, step keys, or number keypad.

2. **Message block** is the space on the screen where MEAS UNCAL and the asterisk (*) appear. If one or more functions are manually set (uncoupled), and the amplitude or frequency becomes uncalibrated, MEAS UNCAL appears. (Press AUTO COUPLE, then MEAS UNCAL, to recouple functions.) The asterisk indicates that a function is in progress.

3. **Softkey labels** are the annotation on the screen next to the unlabeled keys. Most of the labeled keys on the spectrum analyzer’s front panel (also called front-panel keys) access menus of related softkeys.

4. **Softkeys** are the unlabeled keys next to the screen.

5. **FREQUENCY, GAIN, and AMPLITUDE** are the three large dark-gray keys that activate the primary spectrum analyzer functions and access menus of related functions.
9 MARKER functions control the markers, read out frequencies and amplitudes along the spectrum-analyzer trace, automatically locate the signals of highest amplitude, and keep a signal at the marker position in the center of the screen.

10 WINDOWS functions turn on the windows display mode. They allow switching between windows and control the zone span and location. For the HP 8590 E-Series spectrum analyzers.

11 DATA keys, STEP keys and knob allow you to change the numeric value of an active function.

12 INPUT 500 is the signal input for the spectrum analyzer. INPUT 750 is the signal input for a 750 spectrum analyzer.

Caution: Excessive signal input will damage the spectrum analyzer input attenuator and the input mixer. The maximum power that the spectrum analyzer can tolerate appears on the front panel.

13 PROBE PWK provides the power for an active probe and other accessories.

14 CAL OUT provides a calibration signal of 300 MHz at -20 dBm. (The calibration signal amplitude for a 700 analyzer is 50 dBV.)

15 VOL-INTEN or INTENSITY.

The VOL-INTEN knob changes the brightness of the screen display, and the volume of the speaker if Option 105, 109, or 119 are installed. For the HP 8590 E-Series spectrum analyzers.

The INTENSITY knob changes the brightness of the screen display. For the HP 8590 E-Series spectrum analyzers.

16 100 MHz COMB OUT supplies a 100 MHz signal with harmonics up to 22 GHz for use as a reference signal. For the HP 8592L, HP 8593E, and HP 8594E only.

INSTRUMENT STATE functions affect the state of the entire spectrum analyzer. Self-calibration routines and special-function menus are accessed with these keys. The green [RESET] key resets the entire spectrum analyzer state and can be used as a "panic" button when you wish to return to a known state.

[COY] key prints or plots screen data. Use [COLOR], [DISPLAY], [GRAPH], and [MAGNIFICATION] before pressing [COPY].

CONTROL functions access menus that allow you to adjust the resolution bandwidth, adjust the sweep time, store and manipulate trace data, and control the instrument display.

Figure 1-1. Front-Panel Feature Overview
Screen Annotation

Figure 1-2 shows an example of screen annotation as it appears on the screen of the spectrum analyzer. Table 1-1 lists the screen annotation features numerically and refers to Figure 1-3.

Table 1-1. Screen Annotation

<table>
<thead>
<tr>
<th>Item</th>
<th>Feature</th>
<th>Item</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>detector mode</td>
<td>14</td>
<td>frequency offset</td>
</tr>
<tr>
<td>2</td>
<td>reference level</td>
<td>15</td>
<td>video bandwidth</td>
</tr>
<tr>
<td>3</td>
<td>time and date display</td>
<td>16</td>
<td>resolution bandwidth</td>
</tr>
<tr>
<td>4</td>
<td>screen title</td>
<td>17</td>
<td>center frequency start</td>
</tr>
<tr>
<td>5</td>
<td>RF attenuation</td>
<td>18</td>
<td>threshold</td>
</tr>
<tr>
<td>6</td>
<td>preamplifier gain</td>
<td>19</td>
<td>correction factors on</td>
</tr>
<tr>
<td>7</td>
<td>external keyboard entry</td>
<td>20</td>
<td>amplitude factors on</td>
</tr>
<tr>
<td>8</td>
<td>marker or signal track readout</td>
<td></td>
<td>function in-progress</td>
</tr>
<tr>
<td>9</td>
<td>measurement-uncalibrated or</td>
<td></td>
<td>trigger</td>
</tr>
<tr>
<td></td>
<td>function-uncalibrated or</td>
<td></td>
<td>messages</td>
</tr>
<tr>
<td></td>
<td>function-uncalibrated or</td>
<td></td>
<td>trace mode</td>
</tr>
<tr>
<td></td>
<td>function-uncalibrated or</td>
<td></td>
<td>video average</td>
</tr>
<tr>
<td></td>
<td>function-uncalibrated or</td>
<td></td>
<td>display line</td>
</tr>
<tr>
<td></td>
<td>function-uncalibrated or</td>
<td></td>
<td>amplitude offset</td>
</tr>
<tr>
<td></td>
<td>function-uncalibrated or</td>
<td></td>
<td>amplitude scale</td>
</tr>
<tr>
<td></td>
<td>function-uncalibrated or</td>
<td></td>
<td>active function block</td>
</tr>
</tbody>
</table>

Table 1-2 shows the different screen annotation codes for trace, trigger, and sweep modes.
Making a Basic Measurement

Basic measurements simply involve tuning the instrument to place a signal on the screen, then measuring the frequency and amplitude of the signal.

Caution: Do not exceed the maximum input power that is printed on the front panel of the spectrum analyzer.

Let's begin using the spectrum analyzer by measuring an input signal. Since the 300 MHz calibration signal (CAL-OUT) is readily available, we will use it as our input signal.

1. Turn the instrument on and press the green PRESET key.
2. Connect CAL-OUT to the spectrum analyzer INPUT 650 connector (on the front panel) using an appropriate BNC cable and a BNC-to-Type-N adapter.

Option 650 only: Use a 750 cable to connect CAL-OUT to the INPUT 750 connector.

Option 650 only: Connect the SMA (m) to SMA (m) cable to the spectrum analyzer input with an APC-5.5 connector. Connect the cable to CAL-OUT with the BNC-to-SMA adapter.

### Table 1-2

<table>
<thead>
<tr>
<th>Trace Mode</th>
<th>Trigger Mode</th>
<th>Sweep Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>W = clear-write</td>
<td>F = free run</td>
<td>C = continuous</td>
</tr>
<tr>
<td>M = maximum hold</td>
<td>L = fine</td>
<td>S = single sweep</td>
</tr>
<tr>
<td>M = minimum hold</td>
<td>V = video</td>
<td></td>
</tr>
<tr>
<td>V = view</td>
<td>E = external</td>
<td></td>
</tr>
<tr>
<td>S = store-blank</td>
<td>T = TV (Option 108 only)</td>
<td></td>
</tr>
</tbody>
</table>

3. Set the center frequency.

Press (FREQUENCY). CENTER appears on the left side of the screen, indicating that the center frequency function is active. The CENTER FREQUENCY softkey label appears in inverse video to indicate that center frequency is the active function. The space on the screen where CENTER appears is called the active function block. Functions appearing in this block are active: their values can be changed with the knob, step keys, or number and units keypad. Set the center frequency to 300 MHz by pressing 300 (MHz). The knob and step keys can also be used to set the center frequency.

Figure 1-3 shows the screen display of an HP 8560 Series Spectrum Analyzer with the center frequency set to 300 MHz. Spectrum analyzers with different frequency ranges will default to different frequency spans.
4. Set the span.

Press [SPAN]. SPAN is now displayed in the active function block, and SPAN softkey label appears in inverse video to indicate that span is active function. Reduce the span to 20 MHz by pressing the down or 20 [kHz].

5. Set the amplitude.

When the peak of a signal does not appear on the screen, it may be necessary to adjust the amplitude level on the screen. Press [AMPLITUDE]. The message REF LEVEL .0 dBm appears in the active function block, and the REF LEVEL softkey label appears in inverse video to indicate that the reference level is the active function. The reference level is the top horizontal line on the display and is set to 0.0 dBm. Changing the value of the reference level changes the amplitude level of the top horizontal line.

If desired, use the reference level function to place the signal peak on the screen using the knob, step keys, or number and units keypad.

6. Activate the marker.

You can place a diamond-shaped marker on the signal peak to find the signal's frequency and amplitude.

To activate a marker, press [MARKER] (located in the MARKER section of the front panel). The MARKER SIGNAL softkey label appears in inverse video to show that the marker is the active function. Turn the knob to place the marker at the signal peak.

You can also use [PEAK SEARCH], which automatically places a marker at the highest point on the trace.

Readouts of marker amplitude and frequency appear in both the active function block and in the upper-right corner of the display. Look at the marker readouts to determine the amplitude of the signal.
Performing Self-Calibration Routines

The self-calibration routines add offsets, called correction factors, to internal circuitry. The addition of the correction factors is required to meet frequency and amplitude specifications.

Warm-Up Time

To meet spectrum analyzer specifications:
1. The spectrum analyzer should be stored at a constant temperature, within the operating temperature range, for at least 2 hours.
2. Turn on the spectrum analyzer and allow the spectrum analyzer to warm up for 30 minutes.

Note: Perform the spectrum analyzer self-calibration routines only after the spectrum analyzer has met the specified warm-up time. Do not attempt to make any calibrated measurements until the spectrum analyzer self-calibration routines have been performed.

Self-Calibration Routines

The spectrum analyzer frequency and amplitude self-calibration routines are accessed by "FUNCTION/SET," "CALIBRATE," and "CALIBRATION.

Perform the following steps to self-calibrate the instrument:
1. Connect the CAL OUT connector to the INPUT 600 connector, using an appropriate cable. Option 001 or 011 only: Use a 75Q cable to connect CAL OUT to the INPUT 02 connector.
2. Press the following spectrum analyzer keys: CALIBR. The frequency and amplitude self-calibration routines take approximately 5 minutes to finish (3 minutes with Option 130); at which time the correction factors will be stored in the spectrum analyzer's memory but the data is lost when the spectrum analyzer is turned off.
3. To avoid losing the data when the spectrum analyzer is turned off, press STOR. STOR stores the data in the area of spectrum analyzer memory that is saved when the spectrum analyzer is turned off.
Performing the Tracking Generator Self-Calibration Routine
Option 010 or 011 Only

To meet the tracking generator specifications, allow the spectrum analyzer to warm up for 30 minutes after being turned on before attempting to make any calibrated measurements. Be sure to calibrate the spectrum analyzer and the tracking generator only after the spectrum analyzer has met operating temperature conditions.

Note: Since the CAL routine uses the absolute amplitude level of the spectrum analyzer, the spectrum analyzer amplitude should be calibrated prior to using CAL.

1. To calibrate the tracking generator, connect the tracking generator output to the spectrum analyzer input connector, using an appropriate cable.
2. Press the following spectrum analyzer keys: CAL, \textit{Calibration}, \textit{Frequency}, \textit{Frequency}, \textit{Frequency}. TO SIGNAL NOT FOUND will be displayed if the tracking generator output is not connected to the spectrum analyzer input.
3. Press \textit{Acquire} to save this data in the area of spectrum analyzer memory that is saved when the spectrum analyzer is turned off.

Self-Calibration Routine Problems

If the correction data has been corrupted or is obviously inaccurate, use \textit{Calibration} to retrieve the correction data that has previously been saved. To retrieve correction factor data, press CAL \textit{Calibration}. If the fetched correction data is corrupt, the following procedure can be used to set the correction data back to predetermined values:

1. Press \textit{Frequency}, \textit{Frequency}, \textit{Frequency}, \textit{Frequency}.
2. Perform the \textit{Calibration} routine. Be sure CAL OUT is connected to the spectrum analyzer input.

Note: Using \textit{Calibration} may cause the self-calibration routine to fail (the frequency span error may interfere with the spectrum analyzer routine that locates the 300 MHz calibration signal). If this occurs, press \textit{Frequency}, \textit{Frequency}, \textit{Frequency} before performing the \textit{Calibration} routine, or the \textit{Calibration} routine.

If the self-calibration routines cannot be performed, see the spectrum analyzer's HP 8920 E-Series and E-Series Spectrum Analyzers User's Guide.
Spectrum Analyzer Functions

This section lists the softkey and front-panel functions in alphabetical order. Next to each key label is a brief description of its function. For more detailed descriptions, refer to the HP 8590 E-Series and L-Series Spectrum Analyzer User's Guide. All softkeys are shown in the menu diagram in Appendix A of this guide. The functions accessed by [UNLISTED] and [UNLISTED] are not included in this listing.

Analyzer Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Determines the percent of amplitude modulation of the largest displayed signal and its two sidebands.</td>
</tr>
<tr>
<td>2.0</td>
<td>For HP 8592E, HP 8593E, HP 8593E, and HP 8596E only, locks onto harmonic band 0. Harmonic band 0 uses low-pass filtering instead of bandpass preselection. It has a specified tuning range of 0 to 2.5 GHz.</td>
</tr>
<tr>
<td>3.0</td>
<td>For HP 8592E, HP 8593E, HP 8593E, and HP 8596E only, locks onto harmonic band 1. Harmonic band 1 is preselected and has a specified tuning range of 2.76 GHz to 5.5 GHz.</td>
</tr>
<tr>
<td>4.0</td>
<td>For HP 8592E, HP 8593E, and HP 8596E only, locks onto harmonic band 2. Harmonic band 2 is preselected and has a specified tuning range of 6.6 to 12.5 GHz.</td>
</tr>
<tr>
<td>5.0</td>
<td>For HP 8592E and HP 8593E only, locks onto harmonic band 3. Harmonic band 3 is preselected and has a specified tuning range of 12.4 to 19.4 GHz.</td>
</tr>
<tr>
<td>6.0</td>
<td>For HP 8592E and HP 8593E only, locks onto harmonic band 4. Harmonic band 4 is preselected and has a specified tuning range of 19.1 to 22 GHz.</td>
</tr>
<tr>
<td>7.0</td>
<td>Allows a 6 dB resolution bandwidth of 9 kHz.</td>
</tr>
</tbody>
</table>
allows a 5 dB resolution bandwidth of 120 kHz.

For Option 150 only.
allows a 5 dB resolution bandwidth of 200 Hz.
exchanges the contents of the trace A register with the trace B register and puts trace A in view mode.
when ON is undefined, subtracts the data in trace B from the measured data in trace A.
copies trace A into trace C.
accesses the softkey menu for selecting screen title characters A through F.
For Option 160 only.
allows you to exit the correct-to-comb routine if you do not wish to add an offset frequency. HP 8595B only.

For Option 160 only.
displays the quasi-peak amplitude value of the marker.
calculates and displays a graph of the adjacent channel power (ACP) ratio as a function of channel spacing.
measures the power leakage into the adjacent channels and calculates the adjacent channel power ratio of both the upper and lower channels, with respect to the signal power.
measures the power leakage into the adjacent channels and calculates the adjacent channel power ratio of both the upper and lower channels, with respect to the reference channel.

For HP 8592B, HP 8594B, HP 8595B, or HP 8596B with Option 010 only.
activates internal (INT) leveling or external (EXT) leveling.

For HP 8595B, or HP 8591B with Option 010 or 011 only.
activates the automatic leveling control (ALC) function for internal (INT) leveling or external (XTAL or NT6) leveling.

Requires Option 009 for an HP 8590L or HP 8592L.
saves all the downloadable programs and key definitions that are in analyzer memory onto the memory card. If the downloadable program was stored using a prefix, the file name for the downloadable program consists of (prefix)(register number). If no prefix was specified, the data is stored with the file name d.(register number).
accessed by (CAL), accesses the menu for entering and editing the current amplitude-correction factors.
stores the current amplitude-correction factors table, when accessed by (CAL), in analyzer memory or on the memory card. When accessed by (CAL), recalls the amplitude-correction factors table from either analyzer memory or the memory card.
activates the reference level function and accesses the amplitude menu.
accesses the softkeys that change the amplitude units.

For the HP 8591E, HP 8592E, HP 8594E, HP 8595E, or HP 8596E only. Requires Option 101 or 201.
turns on the analog display mode. This is a digital implementation of an analog display, combining the advantages of both types of displays.

Option 091 only.
allows you to set the HP-IB address of the analyzer. The analyzer address is set to 18 by pressing 091.
turns the screen annotation on and off.

For Options 091 and 043 only.
starts the DLP editor function and allows the highlighted item from the catalog of analyzer memory to be appended to the end of the item that is currently in the analyzer's DLP editor memory.
Caution

To prevent damage to the input mixer, the power level at the input mixer must not exceed +30 dBm. To prevent signal compression, power at the input to the input mixer must be kept below -10 dBm.

Note

To protect the mixer from possible damage, 0 dB RP attenuation (no input power reduction to the mixer) can be selected only from the number/unit keypad.

sets the input attenuation in 10 dB increments.

couples the following functions: resolution bandwidth, video bandwidth, attenuation, sweep time, center-frequency step, video bandwidth, and video bandwidth to resolution-bandwidth ratio.

AUTO COUPLE

accesses the softkey menu of functions that can be coupled. (Coupled functions are functions that are linked: if one function is changed, the other function is changed.)

For Option 103 only.
exercises a quad-peak routine.

accesses the softkey menu used to control the auxiliary outputs and input.

AUX CTRL

accesses the softkey menu used for control of the auxiliary interface connector, accesses the comb generator function HP 85023I, HP 85025I, and HP 85056B only. Accesses demodulation functions Options 103 or 163, and it accesses tracking generator functions for Options 010 and 011.

copies trace B into trace C.

exchanges trace B and trace C. Trace B is set to the view mode.

subtracts the display line from trace B and places the result in trace B.

For HP 85050E, HP 85050B, HP 85065E, and HP 85065B only.

accesses the harmonic band menu and the band lock function.

Option 003 (B3-22 and parallel interface) only.
allows you to set the data transmission speed.

stores the amplitude data for trace A and removes it from the screen.

stores the amplitude data for trace B and removes it from the screen.

stores the amplitude data for trace C and removes it from the screen.

Requires Option 003 for on HP 85050E or HP 85050B.
deletes all the files from the memory card.

For HP 85050E, HP 85050B, HP 85065E, and HP 85065B only.
underlines ON locks the analyzer to the lowest frequency band (local oscillator harmonic number) containing the correct center frequency.

activates the resolution bandwidth function and accesses the softkeys that control the bandwidth functions.

accesses the softkey menus used for self-calibration, service-diagnostics, and service-calibration functions.

initiates an amplitude self-calibration routine.

retrieves stored self-calibration correction factors from the previous CAL STORES.

initiates a frequency self-calibration routine.

initiates both the frequency and amplitude self-calibration routines.

stores the correction factors from the last calibration.

Option 010 or 011 only.
performs absolute amplitude, vernier, and tracking peak
accesses a menu that has the cataloging functions for analyzer memory.

Requires Option 003 for an HP 8590E or HP 8592E.

catalogs the limits on the memory card.

displays the “on event” programming commands and their status. These commands include:

- ONEOS
- ONSWP
- TRIMATH
- ONCYCLE
- ONDELAY
- ONMXR
- ONREQ
- ONTIME

catalogs all of the saved data with the specified prefix from either the memory card or the analyzer memory.
displays the status of state and trace registers in analyzer memory.

Requires Option 003 for an HP 8590E or HP 8592E.
catalogs all of the states stored on the memory card.

Requires Option 003 for an HP 8590E or HP 8592E.
catalogs all of the traces stored on the memory card.
catalogs all of the variables saved in analyzer memory.

activates the center-frequency function to allow the selection of frequency that will be at the center of the screen.
changes the step size for the center frequency function.
allows you to enter a prefix that can be used for saving and recalling data to and from the memory card, and for cataloging by the prefix.
allows you to write a 53-character screen title across the top of the screen.

For HP 8528E, HP 8538E, HP 8548E, and HP 8598E only.
generates the best slope and offset adjustment to calibrate the YIG-tuned filter (YTF) for each harmonic band. Connect CMM OUT to the analyzer input.

Requires Option 003 for an HP 8590L or HP 8592L.

accesses the softkey menu that allows you to catalog, format, and delete data from a memory card.

Requires Option 003 for an HP 8590L or HP 8592L.

recalls into analyzer memory a display image saved on the memory card.

Requires Option 003 for an HP 8590L or HP 8592L.

recalls into analyzer memory a downloadable program (DLP) saved on the memory card.

Requires Option 003 for an HP 8590L or HP 8592L.

recalls into analyzer memory a state saved on the memory card.

Requires Option 003 for an HP 8590L or HP 8592L.

recalls into analyzer memory a trace saved on the memory card. Limit lines and amplitude correction factors can also be recalled.
catalogs all the programs and variables stored in analyzer memory.

Requires Option 003 for an HP 8590L or HP 8592L.
catalogs the amplitude correction factor files that are on the memory card.

Requires Option 003 for an HP 8590L or HP 8592L.

accesses a menu with the cataloging functions for the memory card.

Requires Option 003 for an HP 8590L or HP 8592L.
displays a catalog of the items stored on the memory card.

Requires Option 003 for an HP 8590L or HP 8592L.
catalogs all of the display images that are on the memory card.
catalogs all of the downloadable programs (DLPs) that are in analyzer memory or on the memory card.
allows the user to enter the channel bandwidth to set up the analyzer when using the measurement functions under the key.

measures the power in the channel bandwidth specified by the user.

allows the user to enter the channel spacing to set up the analyzer when using the measurement functions under the key.

clears the current screen title or prefix.

Option only. Option 101 is recommended.

clears all of the pulse parameters in the gate utility.

For Option only.
clears the displayed quasi-peak amplitude and quasi-peak marker (represented by a diode symbol) from the analyzer screen.

erases any data previously stored in trace A and continuously displays any signals during the sweep of the analyzer.

erases any data previously stored in trace B and continuously displays any signals detected during the sweep of the analyzer.

erases any data previously stored in trace C and continuously displays any signals detected during the sweep of the analyzer.

allows the resolution of the marker counter to be selected manually or auto-coupled.

makes the auxiliary interface control line A output high or low (TTL).

makes the auxiliary interface control line B output high or low (TTL).

makes the auxiliary interface control line C output high or low (TTL).

makes the auxiliary interface control line D output high or low (TTL).

For HP 8594E, HP 8595E, and HP 8596E only.

turns the internal comb generator on or off.

Initiates a variety of tests to check the major functions of the analyzer.

accesses the softkey menu used for printer and plotter configuration, the time and date display functions, changing the current prefix, memory card configuration functions, disposing of user-defined variables and programs from analyzer memory, changing the analyzer address or the baud rate, displaying the installed options on screen, and changing the format of the MONITOR output. Pressing (CONF) places the analyzer in the local mode and clears any SQN error messages from the screen.

sets the functions in the screen so that they make the measurement at the end of every sweep.

Initializes the Fast Fourier Transform (FFT) function, puts the analyser in continuous sweep and performs an FFT at the end of each sweep.

Option or only.

Initiates an output of the screen data, without an external controller, to a previously specified graphics printer or plotter. The printer or plotter must have already been selected using (CONF) and either (PRINT) or (PLOTE). Use (PRINTE) to choose between printing and plotting.

Option or only.

changes between a printer and plotter.

When is underlined, correction factors are used and CURR appears on the display. When is underlined, correction factors are not used.

For HP 8594E, HP 8595E, or HP 8596E, allows you to select alternating current (AC) or direct-current (DC) coupling at the spectrum analyzer input.

Option only. Option is recommended.

automatically selects the optimum resolution bandwidth for an unmodulated pulse if the pulse width has been entered.
Option 105 only. Option 101 is recommended.

automatically selects the optimum sweep time if the pulse
repetition interval has been entered.

Option 106 only. Option 104 is recommended,
automatically selects the optimum video bandwidth if the gate
length has been entered.

changes the horizontal position of the signal on the analyzer
display. Press [TAKEOFF] if you want the analyzer to use this
position permanently.

changes the vertical position of the signal on the analyzer
display. Press [TAKEOFF] if you want the analyzer to use this
position permanently.

changes the display of the date from a month-day-year format
to a day-month-year format.

changes the amplitude units to dBm for the current setting (log
or linear).

changes the amplitude units to dBmV for the current setting
(log or linear).

changes the amplitude units to dBpV for the current setting
(log or linear).

accesses the factory-default correction factors. See the HP 8590
E-Series and L-Series Spectrum Analyzers User's Guide,
Chapter 7, for more information.

resets the analyzer configuration to the state it was in when
it was originally shipped from the factory and performs an
instrument preset.

restores the factory default values of the horizontal and vertical
synchronization constants for the rear panel MONITOR output.

Option 105 only. Option 101 is recommended.

accesses the time gate utility menu for coupling spectrum
analyser settings to the input pulse signal parameters.

Option 105 only. Option 101 is recommended.

accesses the menu for turning on and defining the gate, from
within the time gate utility.

Option 106 only. Option 101 is recommended.

accesses the menu for manipulating the time-domain window in
the gate utility.

allows you to delete an item from analyzer memory or a file
from the memory card.

deletes an amplitude-correction factor that was previously
selected by DELETE.

deletes the limit-line entry for the selected segment number.

Option 108 or 103 only.

accesses the softkeys controlling demodulation functions,
peak detection, threshold, and dwell time.

Option 108 or 103 only.

allows selection of amplitude (AM) or frequency (FM)
demodulation.

Option 108 or 103 only.

turns the AM or FM demodulation on and off.

selects the HP DeskJet 310 or 650C for color printing. Use this
function if you have one of these color printers. This softkey
can be accessed by pressing [CONF], then [SELECT].

selects the HP DeskJet 640 for color printing. Use this function
if you have this color printer. This softkey can be accessed by
pressing [CONF], then [SELECT].

selects between positive peak, sample, and negative peak
detection. Negative peak detection is only available with
Option 101.

selects between positive peak detection and sample detection.

accesses softkeys that include the SCALE softkey and limit
line functions. Activate the display line softkeys, threshold and
analog + display softkeys. It also allows title and prefix entry, as
well as control of the display graphics and screen annotation.


Requires Option 008 for the HP 85990L or HP 85992L.
saves the current analyzer display image on the memory card
for viewing or copying later.

displays the status of the auxiliary connector input (control line
1) on the analyzer screen (high = 1 or low = 0, in TTL).

accesses the softkeys 

Option 105 only. Option 104 is recommended.
exits the pulse parameter entry menu in the gate utility
assigning the current marker value to be the value of the
parameter being entered.

activates an adjustable horizontal line that is used as a visual,
reference line.

Option 108 or 109 only.
sets the dwell time for the marker passes, during which
demodulation can take place in nonzero span sweeps.

Option 105 only. Option 104 is recommended.
determines whether the gate triggers on the positive-going or
negative-going edge of the signal at the GATE TRIGGER INPUT.

allows you to edit the current limit-line table.

For Options 041 and 043 only.
starts the DLP editor function and allows the most recent item
that was being edited, in the DLP editor buffer, to be accessed
again.

allows you to edit the current limit-line tables.

allows you to view or edit the lower limit-line table.

allows you to view or edit the upper and lower limit-line tables
simultaneously.

allows you to view or edit the upper and lower limit-line tables
simultaneously.

allows you to view or edit the upper limit-line table.

selects upper or lower limit-line tables. It switches to the
limit-line table that is not currently being edited.

For Options 041 and 043 only.
accesses the menu of downloadable program (DLP) editor keys.

accesses the functions that set the spectrum analyzer resolution
bandwidth to the values required for electromagnetic
interference (EMI) testing. (EMI HARDWARE is only available
with Option 105.)

Pressing (Enter) which is also the ENTER key, terminates and
enters into the spectrum analyzer a numerical value.

Option 105 only. Option 104 is recommended.
accesses the menu for entering the value of the pulse repetition
interval (PRI).

Option 105 only. Option 104 is recommended.
accesses the menu used to define the edge of the pulse that will
be used as the time reference.

Option 105 only. Option 104 is recommended.
accesses the menu for entering the value of the pulse width.

Spectrum Analyzer Functions 2-12

Spectrum Analyzer Functions 2-13
allows you to dispose of the DLIPs, all traces defined by TRC and all VAREPS variables that are in spectrum analyzer memory.

allows you to purge all user state registers, all user trace registers, all node registers, all one-button traces, the editor buffer, all DLIP memory, and all microprocessor stack data.

Note: a program ignores the state of the STATES. So, even if STATES and TRACES are locked, they will still be erased by a program.

allows you to dispose of any data or programs stored on the memory card by formatting it.

allows you to purge all the user state registers 0 through 9.

allows you to purge all the user trace registers 0 through TRCMEM.

sets the screen dump to be compatible with an Epson LQ-670 compatible printer.

sets the screen dump to be compatible with an Epson MX30 compatible printer.

executes a programming command displayed in the screen title area of the spectrum analyzer.

returns the analyzer to the state it was in before the current catalog function was invoked.

removes the screen annotation left after pressing :TRAC.

**Option 105 only. Option 101 is recommended.**

activates the trigger condition that allows the next sweep to start when an external voltage (connected to EXT THD INPUT on the rear panel) passes through approximately 1.5 volts.

adds a positive or negative preamplifier gain value, which is subtracted from the displayed signal.

If the FFT mode is already active, pressing **Option 108** only activates the FFT markers. If the FFT mode is not active, then the FFT marker will be activated and the FFT annotation will be displayed but an FFT will not be performed.

accesses the menu of keys to initiate and evaluate a Fourier transform of the spectrum analyzer's displayed data.

exits the FFT mode and menu, returning the analyzer to normal operation.

allows the user to enter the stop frequency for the desired FFT span.

draws a zero-slope line between the coordinate point of the current segment and the coordinate point of the next segment.

**Option 108 or 109 only.**

adjusts the FM deviation display. The top graticule is the positive deviation set by FM GAIN. The bottom graticule is the negative deviation set by FM GAIN.

For HP 8596U and HP 8596R must have Option 003. Formats a card in logical interchange format (LIF).

activates the trigger condition that allows the next sweep to start as soon as possible after the last sweep.

allows the user to input a frequency offset value that is added to the frequency readout, to account for frequency conversions external to the spectrum analyzer.

activates the center-frequency or start-frequency function and accesses the menu that has the frequency functions.

changes the analyzer span to full span. For an HP 8596U, HP 8596E, HP 8596R, and HP 8596B only: span can be limited if harmonic band lock (**Option 103**) is set to ON.

**Option 102 only. Option 101 is recommended.**

accesses the menu of gate control functions and the entrance to the gate utility menus.
Option 106 only. Option 101 is recommended.
determines if the gate is enabled on the edge of the trigger input
or on a threshold level of the input signal.

Option 105 only. Option 101 is recommended.
sets the duration of the delay after an edge trigger before the
gate switch closes.

Option 105 only. Option 101 is recommended.
sets the duration of the gate.

Option 105 only. Option 101 is recommended.
turns on or off the gate for Option 106, the time-gated spectrum
analyser capability.

Option 105 only. Option 101 is recommended.
accesses the softkey functions used for Option 105, the
time-gated spectrum analyser capability. It creates related time
domain and frequency domain windows to set up the time gate
and make measurements.

accesses the softkey menu used for selecting screen title or
prefix characters A through L.

turns the screen graphics on and off.

...turns the graph marker ON or OFF for adjacent channel and
channel power measurements.

disactivates the active function and blanks the active function
text from the display. Not available for HP 8590A and
HP 8591A.

Option 091 or 092 only.
selects a black and white printer.

Option 091 or 092 only.
selects a black and white printer. Use this function if you
have a black and white HP DeskJet 540 printer. Press
[DISPLAY] and then select the (PRINT) softkey. Start printing by pressing
(_PRINT_) and (CONF).
Option 105 only. Option 101 is recommended.
returns to the main gate utility menu from within the gate utility.

Option 103 only.
performs a subset of the routine executed by pressing
and then displays a menu of quasi-peak softkeys.

Option 010 or 011 only.
allows the user to adjust the frequency of the
tracking-generator oscillator manually.

turns the selected marker on or off. One of the four markers
must first be selected by the key.

activates a second marker at the position of the first marker
and indicates the frequency and amplitude difference between
the two markers.

sets the start and stop frequencies to the values of the delta
markers. The start and stop frequencies will not be set if the
delta marker is off.

turns off all of the markers.

keeps the active marker at the requested amplitude on the
screen. Once activated, the marker remains at the amplitude
selected even if the signal frequency is changed.

functions exactly like the key. If the analyzer
is already in zero span, if the analyzer is not in zero span it
activates a marker which must be placed on the signal that will
have an FFT performed on it and must be pressed again.

changes the analyzer settings so that the frequency at the
marker becomes the center frequency.

changes the center-frequency step size to match the value of
changes the FFT stop frequency to whatever the current value of
the FFT marker frequency is.

changes the frequency at the middle of the FFT display to
whatever the current value of the FFT marker frequency is.

moves the active marker to the minimum detected amplitude
value.
For Option 103 only.
provides a function similar to a normal marker when making
quasi-peak measurements.

activates a single frequency marker at the center frequency on
the active trace.

Option 105 only. Option 101 is recommended.
activates a marker in the gate utility.

finds and displays the frequency and amplitude differences
between the highest and lowest trace points.

changes the analyzer settings so that the amplitude at the
active marker becomes the reference level.

changes the start frequency so that it is equal to the frequency
of the active marker.

changes the stop frequency so that it is equal to the frequency
of the active marker.

maintains the maximum level for each trace point of trace A.

maintains the maximum level for each trace point of trace B.

lets you change the maximum input mixer level in 10 dB steps.

turns off the measurement functions under the key and restores the analyzer to the state prior to initiating the
power measurement.

switches between the User Menu and the menu containing the
built-in measurement routines.

indicates that the DAV LOCK function is set to ON.
maintains the minimum level for each trace point of trace C.

turns on the marker counter when ON is underlined.

reads out the average noise level, referenced to a 1 Hz noise power bandwidth, at the marker position.

stops the analyzer sweep at the marker position for the duration of the dwell time.

selects the marker readout to be displayed in signal frequency, sweep time, the inverse of the sweep time, or the period which is the inverse of the frequency.

provides a list of the four available markers which is updated at the end of each sweep or when a marker is used.

assigns a marker to a trace.

moves the signal that is nearest to the active marker to the center of the screen and keeps the signal there.

accesses the marker control softkeys which select the type and number of markers and turn them on and off.

accesses the softkeys used for the transfer of marker information directly into other functions.

accesses the marker function softkeys.

accesses the softkey menu for selecting screen title or prefix characters M through E.

changes the softkey menus for the spectrum-analyzer mode and other modes of operation.

automatically places two markers at points N dB from the highest point on the highest displayed signal, and determines the frequency difference between the two markers.

For Options 091 and 092 only.

starts the DLP editor function, clearing the DLP editor memory to create a new item.

For HP 8591E, HP 8593E, HP 8594E, HP 8596E, or HP 8596E only.

switches the active window between the two displayed windows.

places the marker on the next highest peak. (Also see the softkey descriptions.)

moves the marker to the next peak to the left of the current marker.

moves the marker to the next peak to the right of the current marker.

subtracts trace B from trace A and adds the result to the display line. The result is displayed in trace A.

displays the display line and makes the display line function active. The trace data is normalized with respect to the display line even if the value of the display line is changed.

is displayed if key number 1 has not been defined by the user.

Options 101 and 102, or Option 301 only.

allows you to trigger on the NTSC video format.

allows the user to enter the percent of the power desired when using the occupied bandwidth measurement under the key.

integrates the power of the displayed spectrum and puts markers at the frequencies containing a selected percent of the power.

For HP 8591E, HP 8593E, HP 8594E, HP 8596E, or HP 8596E only.

activates the windows display mode and accesses the menu of window zone functions.

Option 061 or 093 only.

selects a color printer.

Options 101 and 102, or Option 301 only.

allows you to trigger on the PAL video format.
Options 101 and 102, or Option 301 only.

allows you to trigger on the PAL-M video format.
lets you choose between automatically or manually setting the
parameters used for the measurement functions under the
PEAK SEARCH key.
sets the minimum amplitude variation of signals that the marker
can identify as a peak.
accesses the same softkeys that are available when
PEAK SEARCH is pressed.
automatically places a marker on the highest amplitude of a
trace, displays the marker's amplitude and frequency.
selects which peaks will be listed in the peak table to include all
peaks, or to exclude the peaks that are either above or below
the display line.
switches the peak table sorting routine between listing the
peaks in order by descending amplitude or by ascending
frequency.
Option 041 or 043 only.
displays a list of up to ten signal peaks, that is updated at the
end of each sweep.
accesses the menu used to address the plotter and to select
plotter options.
Option 041 only.
changes the HP-IB address of the plotter.
Option 041 or 043 only.
selects the position of the plotter output.
Option 041 or 043 only.
allows the softkey labels to be plotted along with the analyzer
display.

Option 041 or 043 only.
accepts the menus used by Option 041 (HP-IB and Parallel
Interface) and Option 043 (RS-232 and Parallel Interface) to
select plotter options. See the COPY key for more information.
Front-Panel Key Access: CONFIG
Option 041 only.
allows you to select between HP-IB or parallel plotter ports.
Option 043 only.
allows you to select between serial or parallel plotter ports. The
SYNC key appears in this menu only when serial is
selected.
Option 041 or 043 only.
allows you to plot a full-page, half-page, or quarter-page output.
Option 041 or 043 only.
allows you to plot a full-page, half-page, or quarter-page output
to an HP LaserJet printer.
specifies a limit value for one coordinate point, so that a POINT
segment specifies a limit value for a single frequency or time.
accesses functions which make transmitter power
measurements.
determines the state of the spectrum analyzer when the
spectrum analyzer is powered on.

For HP 89280A, HP 89381, HP 89382, and HP 89384 only:
enables default preselector data for bands 1 through 4, to allow
maximum frequency response without peaking the preselct.
The CAL TYP routine should be performed before pressing
SPECTRUM

For HP 89280A, HP 89381, HP 89382, or HP 89384 only.
optimally centers the preselctor on a given signal for the most
accurate measurement of amplitude.

provides a convenient starting point for making most
measurements. The instrument preselctor performs a
processor test, but does not affect CAL data. Pressing PRESET
clears both the input and output buffers. Amplitude-correction
factors and limit-line testing is turned off.
allows the spectrum-analyzer mode only to be preset. Other operating modes will not be affected.

Option 041 or 043 only:
accesses the softkey functions that are used to address the printer, select a black and white print or a color print and reset the printer.

Option 041 only:
allows you to change the HP-1B address of the printer.

Option 041 or 043 only:
resets the printer, sets the printer to 60 lines per page, and skips line perforations.

Option 041 or 043 only:
accesses the menus used by Option 041 (HP-1B and Parallel Interface) and Option 043 (RS-232 and Parallel Interface) to select printer options. See the (COPY) key for more information.
Front-panel Key Access: [CONF]

Option 041 only:
allows you to select between HP-1B or parallel printer ports.

Option 043 only:
allows you to select between serial or parallel printer ports. The menu option softkey appears in this menu only when serial is selected.

Option 041 or 043 only:
allows the softkey labels to be printed along with the analyzer display.

Option 105 only. Option 101 is recommended.
accesses the gate utility menu for entering the pulse parameters: reference edge, pulse width, and pulse repetition interval.

clears the current amplitude-correction factors table.

turns the channel power graph ON or OFF. With the PWRSWAP ON, the channel power graph is calculated and displayed, and the numeric results are not displayed.

clears the current limit-line table from analyzer memory.

For HP 8590L and HP 8591V with Option O10 or O11.
HP 8590E, HP 8591E, HP 8590B, and HP 8591B with Option O10.
activates or deactivates the power-sweep function, which sweeps the output power of the tracking generator over the selected power-sweep range.

amplifies the video signal ten times (30 dB) in order to make an accurate measurement of a low quasi-peak signal.

Option 103 only:
accesses the menu of quasi-peak softkey functions and, if there is not an on-screen marker, places a marker on the highest on-screen signal.

accesses softkey menus that allow you to recall data from the memory card or analyzer memory.
replaces an amplitude-correction factors table from the current mass-storage device (analyzer memory or memory card).
replaces limit-line tables from the current mass-storage device (analyzer memory or memory card).

allows the reference level to be changed.
adds an offset value to the displayed reference level.

changes the analyzer's 3 dB resolution bandwidth. To recoup the resolution bandwidth, press [AUTO] so that AUTO is underlined. The resolution bandwidth can be changed using the step keys, the knob, or the numeric keypad.

Option 103 only.
returns the analyzer to the settings that were present when [AUTO] was pressed, displays the quasi-peak amplitude value and the quasi-peak marker if [AUTO] was pressed.
provides additional characters for the Change Title function.

backs all the current internal state and trace registers against further data storage.
accesses softkey menus that allow you to store state data, trace data, limit-line tables, and amplitude-correction factors on a memory card or in analyzer memory.

saves the current amplitude-correction factors table to the current mass-storage device (analyzer memory or memory card).

For Options 031 and 043 only.
passes the text from the DLP editor memory through the parser to execute as analyzer commands.

saves the current limit-line tables in the current mass-storage device (analyzer memory or memory card).

scales the vertical graticule divisions in logarithmic units when LOG is unblanked, or in linear mode.

triggers on the SCAM-L video formats. Requires Option 30L, or both Options 10L and 10K.

selects one of the four possible markers.

allows you to enter the amplitude value for the displayed limit-line segment or the current amplitude-correction point.

allows you to enter the delta amplitude value to create an upper and lower limit-line segment.

allows you to enter the frequency value for a limit-line segment or for an amplitude-correction point.

allows you to enter the amplitude value for the lower limit-line segment.

allows you to enter the middle amplitude value to create upper and lower limit-line segments.

allows you to create or edit an amplitude-correction factor data point.

allows you to select an already existing prefix of a cataloged file and changes the current prefix to this selected prefix.

allows you to create or edit a limit-line segment.

allows you to enter the time value for a limit-line segment. The time value is with respect to the analyzer's sweep time.

accesses the softkey menu used to select the limit-line type of line.

allows you to enter the amplitude value for the upper limit-line segment.

accesses several service calibration functions. The service calibration functions are designed for service use only. More detailed descriptions of the service functions are available in the service documentation. Service documentation can be obtained by ordering Option 618 through your HP Sales and Service office.

accesses several service diagnostic functions. The service diagnostic functions are designed for service use only. More detailed descriptions of the service diagnostic functions are available in the service documentation. Service documentation can be obtained by ordering Option 618 through your HP Sales and Service office.

accesses the softkeys for setting up black and white HP and Epson compatible printers.

accesses the softkeys for setting up color printers.

allows you to set the date of the real-time clock.

allows you to set the time of the real-time clock.

accesses the menu used to set up parameters specific to the power measurements.

changes the sweep control to single sweep if the analyzer is in the continuous sweep mode.

displays the number and description of the options installed in your analyzer, the instrument model number of the analyzer,
the last five digits of the analyzer's serial number, and the
firmware revision.
activates an FFT marker that must be put on a signal to verify
that it is not being displayed at the wrong frequency due to
aliasing.
initializes the fast Fourier transform (FFT) function.
sets the functions in the RANGE menu so that they make the
measurement on a single sweep.
draws a straight line between the coordinate point of the
current segment and the coordinate point of the next segment.
activates the SPAN function and accesses the frequency-span
functions.
finds the highest signal peak on-screen and activates the span
function.
Option 108, 109, or 301 only.
turns the internal speaker on and off.
sets the analyzer to the spectrum analyzer operating mode and
accesses the softkey function.
Option 108, 109, or 301 only.
adjusts the squelch level. The squelch level mutes weak signals
and passes strong signals.
Option 010 or 011 only. (Not available with HP 8590L.)
allows you to select between automatic and manual adjustment
of the tracking generator's switching attenuator.
Option 010 or 011 only.
offsets the displayed power of the tracking generator (SRC).
Option 010 or 011 only.
activates or deactivates the output power of the tracking
generator (SRC).
Option 010 or 011 only.
sets the frequency at the left side of the graticule.
requires Option 002 for the HP 8590L or HP 8592L.
saves the current analyzer state on the memory card.
saves the current analyzer state in the selected state register.
sets the frequency at the right side of the graticule.
accesses the softkey menu used for selecting screen title or
prefix characters S through X.
accesses the sweep-time menu and accesses the sweep-time
softkey functions.
switches the analyzer between the continuous-sweep mode and
the single-sweep mode.
Option 105 only. Option 101 is recommended.
delays the start of sweep with respect to the gate trigger edge
in the time domain window of the gate utility.
Option 010 or 011 only.
selects stimulus response (SR) or spectrum-analyzer (SA)
auto-coupled sweep line.
selects the length of time in which the analyzer sweeps the
displayed frequency span.
Options 101 and 102, or Option 301 only.
provides sweep triggering on the selected line of a video picture
field and accesses the softkey menu used to select the line
number of the video picture field and the type of video picture
frame.
changes the rear panel MONITOR output between normal
synchronization constants or the NTSC video compatible format.
changes the rear panel MONITOR output between normal
synchronization constants or the PAL Video compatible format.
Option 105 only. Option 101 is recommended.
changes the resolution bandwidth in the time domain window
of the gate utility.

Option 105 only. Option 101 is recommended.
changes the sweep time in the time domain window of the gate
utility and re-scales the gate markers.

sets a lower boundary to the active trace. The threshold line
"clips" signals that appear below the line when this function is
on.

accesses the softkey menu used to set and display the real-time
clock.

finds the third-order intercept of the two highest amplitude
signals and the two associated distortion products.

accesses the trace softkeys that allow you to store and
manipulate trace information.

selects the softkey menu used for trace A, trace B, or trace C
functions.

sets up trace A for recalling previously saved trace data into
trace A or saving trace data from trace A.

sets up trace B for recalling previously saved trace data into
trace B or saving trace data from trace B.

sets up trace C for recalling previously saved trace data into
trace C or saving trace data from trace C.

begins the process used to save trace data, limit-line tables, or
amplitude-correction factors on the memory card.

accesses a softkey menu that allows you to select the item to be
stored in analyzer memory.

Option 010 or 011 only.
displays softkey menus for use with a built-in tracking
generator.

Option 010 or 011 only.
activates a routine that automatically adjusts the tracking
adjustment to obtain the peak responses of the tracking
generator on the spectrum-analyzer display.

accesses softkeys that let you select the sweep mode and trigger
mode.

Option 105 only. Option 101 is recommended.
activates a marker which indicates the time from the gate
trigger to the current marker position.

Options 101 and 102, or Option 301 only.
selects the line number of the video picture field.

Options 101 and 102, or Option 301 only.
selects the polarity of the modulation of the video format.

Options 101 and 102, or Option 301 only.
selects an even video field of an interlaced video format to
trigger on.

Options 101 and 102, or Option 301 only.
selects an odd video field of an interlaced video format to
trigger on.

Options 101 and 102, or Option 301 only.
selects a vertical interval to trigger on. Triggering occurs on the
next pulse edge.

Options 101 and 102, or Option 301 only.
allows the analyzer to trigger on NTSC, PAL, PAL-M, or
SECAM-L video formats.

Option 105 only. Option 101 is recommended.
switches between the time domain and frequency domain
windows in the gate utility.

accesses a menu available for your use for user-defined
programs and key functions.

'select the ratio between the video and resolution bandwidths.'
allows the time base digital-to-analog converter to be changed to verify that the time base performs to specification. (Preset) resets the time base to its original value. A pass code is required to access this function. VGF177 TIMEBASE SEL softkey function is not available for spectrum analyzers with Option 604 nor with HP 8560L Option 713.

For Option 130 only, changes the analyzer's post-detection filter from 30 Hz to 3 MHz in a 1, 5, 10 sequence.

activates the trigger condition that allows the next sweep to start if the detected RF envelope voltage rises to a level set by the display line.

holds and displays the amplitude data that is in the trace A register.

holds and displays the amplitude data that is in the trace B register.

holds and displays the amplitude data that is in the trace C register.

changes the amplitude units to volts.

changes the amplitude units to watts.

For HP 8591B, HP 8593B, HP 8594B, HP 8595B, or HP 8596B only, turns off the windows display mode and returns to the normal full-sized instrument display.

accesses the softkey menu used for selecting the characters Y, Z, underscore (_), #, space, or for clearing the screen title.

Option 105 only. Option 104 is recommended. zeros the value of the delta marker to establish a new reference.

changes the frequency span to zero and turns off marker track if it is on.

For HP 8591B, HP 8593B, HP 8594B, HP 8595B, or HP 8596B only.

allows the zone markers to be moved in frequency without changing the zone span.

For HP 8591B, HP 8593B, HP 8594B, HP 8595B, or HP 8596B only.

searches for the next frequency peak outside and to the left of the zone markers on the upper window trace and then moves the zone so that it is centered around the new peak.

For HP 8591B, HP 8593B, HP 8594B, HP 8595B, or HP 8596B only.

searches for the next frequency peak outside and to the right of the zone markers on the upper window trace and then moves the zone so that it is centered around the new peak.

For HP 8591B, HP 8593B, HP 8594B, HP 8595B, or HP 8596B only.

allows the span of the zone markers to be changed without changing the center frequency.

For HP 8591B, HP 8593B, HP 8594B, HP 8595B, or HP 8596B only.

switches between the split-screen window display and a full size display of the window that is currently active.
Programming Commands

Introduction
The following pages are a compilation of all current programming commands for the HP 8590 Series spectrum analyzers. More information on each command can be found in the HP 8590 E-Series and L-Series Spectrum Analyzers and HP 8591C Cable TV Analyzer Programmer's Guide. This chapter contains the following sections:

- How to Use This Chapter
  - Notation Conventions
  - Syntax Conventions
- Functional Index
- Programming Codes
- The summary of the characters and secondary keywords (reserved words)
How to Use This Chapter

This chapter is intended for experienced spectrum analyzer programmers. To find a programming code that performs a particular function, refer to the "Functional Index," which groups the commands according to function. Once the desired command is found, refer to the alphabetical listing of the programming codes for further keyword definition and syntax information. For further information on syntax, refer to "Notation Conventions," "Syntax Conventions," and "Characters and Secondary Keywords (Reserved Words) Summary."

Notation Conventions

The following symbols and type styles found in this guide denote the following:

**BOLD TYPE**: All characters appearing in bold type are key words and must appear exactly as shown.

**CAPITAL LETTERS**: All characters that are capital letters are secondary keywords and appear within the keyword syntax. They must appear exactly as shown, and their meanings can be found in "Characters and Secondary Keywords (Reserved Words) Summary."

< >

Characters appearing in angular brackets are considered to be elements of the language being defined. Their meanings can be found in the section "Syntax Conventions" unless otherwise specified with the keyword definition.

[]

Square brackets indicate that whatever occurs within the brackets is optional.

|

The "|" symbol indicates a choice of exactly one element from a list (for example, `<a>|<b>` indicates `<a>` or `<b>`, but not both).

()

Parentheses are used to clarify the group from which elements are to be chosen.

- -

Indicates that a space must be placed at the indicated location (for example, `-<a>` indicates there must be a space between the keyword `-` and the element `<a>`).

::=

Defines the element. For example, `<a>::=<b>` indicates that `<a>` can be replaced by the series of elements `<b>` in any statement where `<a>` occurs.

{}

Braces indicate that whatever occurs within the braces can be included zero or more times.
Syntax Conventions

A-block data field::= 
   #A<length><command list> (use when the length of the command list is known).

A-block data format::= 
   #A<length><command list>.

Character::= 
   abcdefghijklmnopqrstuvwxyz

Character string::= 
   List of characters

Command list::= 
   Any spectrum analyzer command or list of commands separated by semicolons.

CR::= 
   Carriage return.

data byte::= 
   One 8-bit byte containing numeric or character data.

delimiter::= 
   "," | @ = "# % ; " &

destination::= 
   (TRAP/TP/TPC)<user-defined trace>-<user-defined variable>-<predefined variable>-<trace range>.

display unit::= 
   Within screen or graticule coordinates. Screen coordinates are (Xmin, Ymin)=(-40,-23), (Xmax, Ymax)=(471,233). Graticule coordinates are (Xmin, Ymin)=(0,0), (Xmax, Ymax)=(600,500).

ED::= 
   End or identify.

3.4 Programming Commands
Functional Index

AMPLITUDE

AT Specifies RF input attenuation.

ADJUNITS Specifies amplitude units for input, output, and display.

COUPLE Selects direct-current (dc) coupling or alternating-current (ac) coupling. HP 85042E, HP 85043E, or HP 85046B only.

INZ Specifies the value of input impedance expected at the active input port.

LG Specifies the vertical graticule divisions as logarithmic units, without changing the reference level.

LN Specifies the vertical graticule divisions as linear units, without changing the reference level.

ML Specifies the maximum signal level that is applied to the input mixer for a signal that is equal to or below the reference level.

NRL Sets the normalized reference level.

PP Performs a preselector peak. HP 85023E, HP 85024E, HP 85052E, or HP 85046B only.

PREAMPG Subtracts a positive or negative preamplifier gain value from the displayed signal.

RESETRL Reads the reference level to its instrument preset level.

RL Specifies the amplitude value of the reference level.

OFFSET Offsets all amplitude readouts without affecting the trace.

AUTO COUPLING

AUTO Couples the active functions automatically.
### AUXILIARY CONTROL

- **CNTLA** Sets the control line A of the auxiliary interface high or low.
- **CNTLB** Sets the control line B of the auxiliary interface high or low.
- **CNTLC** Sets the control line C of the auxiliary interface high or low.
- **CNTLD** Sets the control line D of the auxiliary interface high or low.
- **CNTLI** Returns a "1" when the interface control line I of the auxiliary interface is high, and "0" if the line is low.
- **COMB** Turns on or off the comb generator. HP 8590A, HP 8595E, or HP 8596E only.
- **DEMOD** Turns the demodulator on or off, and selects between AM, FM, or quasi-peak demodulation. Option 108, 103, or 301 only.
- **FMGAIN** Sets the total FM frequency deviation for full screen demodulation. Option 108, 103, or 301 only.
- **MEASURE** Determines the type of measurement: signal analysis, stimulus response, or signal normalization. Option 010 or 011 only.
- **NRL** Sets the normalised reference level.
- **RLPOS** Selects the position of reference level.
- **SPEAKER** Turns on or off the internal speaker. Option 108, 103, or 301 only.
- **SQLCH** Sets the squelch level. Option 108, 103, or 301 only.
- **SRCALC** Selects internal or external leveling for the tracking generator. Option 010 or 011 only.
- **SRCAT** Attenuates the source output level. Option 010 or 011 only.
- **SRGNORM** Subtracts trace B from trace A, adds the display line, and sends the result to trace A.
- **SRCPOFS** Offsets the source power level readout. Option 010 or 011 only.
- **SRCPSTP** Selects the source-power step size. Option 010 or 011 only.
- **SRCPSPW** Selects sweep range of the source output. Option 010 or 011 only.
- **SRCPWR** Selects the source power level. Option 010 or 011 only.

### SRCTK
- Adjusts tracking of source output with spectrum-analyzer sweep. Option 010 or 011 only.

### SRCTKPK
- Adjusts tracking of source output with spectrum-analyzer sweep. Option 010 or 011 only.

### SWFCEL
- Selects a stimulus-response or spectrum-analyzer auto coupled sweep time. Option 010 or 011 only.

### BANDWIDTH
- **RB** Specifies the resolution bandwidth.
- **WAVG** Turns on or off video averaging.
- **VB** Specifies the video bandwidth.
- **VBR** Specifies coupling ratio of video bandwidth to resolution bandwidth.

### CALIBRATION
- **AMPCOR** Applies amplitude corrections at specified frequencies.
- **AMPLEN** Returns the number of frequency-amplitude correction factors that have been entered.
- **CAL** Initiates self-calibration routine.
- **CNFP** Performs the confidence test.
- **CORREX** Returns a "1" if the correction factors are on, a "0" if they are off.
- **CRTPOS** Specifies the horizontal position of the text and graticule on the spectrum analyzer's display.
- **CRTVPOS** Specifies the vertical position of the text and graticule on the spectrum analyzer's display.
COMMAND TRIGGER

ONGCIE  Executes the list of spectrum analyzer commands periodically.
ONDELAY  Executes the list of spectrum analyzer commands after the time
          value has elapsed.
ONEOS  Executes the list of spectrum analyzer commands after the end
          of the sweep.
ONMSK  Performs the list of spectrum analyzer commands when the
          sweep reaches the marker position.
ONMSKH  Executes the list of spectrum analyzer commands whenever the
          value or the units of the active marker are changed.
ONFWRUP  Executes the list of spectrum analyzer commands once on
          power up.
ONSRQ  Executes the list of spectrum analyzer commands whenever a
          service request occurs.
ONSWP  Executes the list of spectrum analyzer commands at the
          beginning of the sweep.
ONTIME  Executes the list of spectrum analyzer commands at the
          specified time.
WAIT  Suspends all spectrum analyzer operation for the specified time
          duration.

CONFIGURATION

BAIDRATE  Specifies the baud rate of a spectrum analyzer with Option 023
          installed in it.
CAT  Returns the catalog information of either spectrum analyzer
     memory or the memory card.
DATSMODE  Sets the format for displaying the real-time clock.
DISPOSE  Frees spectrum analyzer memory that was previously allocated
          for user-defined operands.
FORMAT  Formats the memory card. HP 8590L or HP 8590L requires
          Option 003.

FLTPRT  Directs the plotter output to HP-IB or parallel ports for
          Option 041. Directs the plotter output to RS-232 or parallel
          ports for Option 043.
POWERON  Selects the spectrum analyzer's power on state.
PRESX  Specifies or changes the prefix used in save and recall
          operations.
PRINPT  Directs the printer output to HP-IB or parallel ports for
          Option 041. Directs the printer output to RS-232 or parallel
          ports for Option 043.
SDATE  Sets the date of the real-time clock.
STIME  Sets the time of the real-time clock.
SYNO  Selects either the horizontal and vertical synchronizing
      constants, or the synchronization rate for the internal monitor
      of the spectrum analyzer and the video signal that is output to
      the MONITOR OUTPUT connector.
TIME  Sets the time and date of the real-time clock.
TIMEF  Turns on or off the display of the real-time clock.

ANLPLY  Turns on or off the Analog+ display mode. Option 101 or 301
          only.
ANNOT  Turns on or off the screen annotation.
DA  Accesses the current address of the display list.
DP  Defines the level of the display line in the active amplitude units
    and displays the display line on the spectrum analyzer
    screen.
DOTDEN  Sets the dot density value in the Analog+ display mode. Option
          101 or 301 only.
DISPLAY  Displays the value of a variable on the spectrum analyzer
          screen.
GRAT  Turns on or off the gratific.
HD
Disables data entry via the spectrum analyzer numeric keypad, knob, or step keys.

PREFX
Specifies the prefix.

TH
Clips signal responses below the threshold level.

TITLE
Allows entry of a screen title.

FREQUENCY

CF
Specifies center frequency.

FA
Specifies the start frequency.

FB
Specifies the stop frequency.

FOFFSET
Specifies the frequency offset for all absolute frequency readings such as center frequency.

SS
Specifies center-frequency step size.

GRAPHICS

GLIBOX
Clears a rectangular area on the spectrum analyzer display.

CLRDEF
Erases user-generated graphics and text.

DA
Accesses the current address of the display list.

DRAWBOX
Draws a rectangular box on the spectrum analyzer display.

DT
Defines any character as a label terminator.

GSTPLOT
Initiates output of the spectrum analyzer display to a plotter.

GSTPRTNT
Initiates output of the spectrum analyzer display to a printer.

GR
Graphs the given y coordinate while incrementing the x coordinate by 1.

LB
Writes text at the current pen position.

FA
Moves the pen to a vector location on the spectrum analyzer screen relative to the reference coordinates (0, 0).

PD
Instructs the spectrum analyzer to plot vectors on the spectrum analyzer screen until a PD command is received.

PR
Moves the pen to a new plot location on the spectrum analyzer screen relative to the current coordinates in display units.

PRINT
Prints screen data.

PRI
Specifies the HP-IB address of the printer.

PU
Instructs the spectrum analyzer not to plot vectors on the spectrum analyzer screen until a PD command is received.

TRXT
Writes text on the spectrum analyzer screen at the current pen position.

TRGPH
Graphs a compressed trace.

INFORMATION

ACTV
Returns a "0" if the given function is not active, a "1" if it is active.

BT
Places the state of a bit in the destination.

BIT
Returns the state of a bit.

CLS
Clears all status bits.

HAE
Returns a "0" if a device or option is not installed.

ID
Returns the spectrum analyzer model number.

MD
Returns values for the spectrum analyzer's baseline and reference level.

OP
Returns the coordinates of the lower-left and upper-right corners of the spectrum analyzer display.

PARSTAT
Returns parallel port status.

PWRUPNT
Returns the number of milliseconds that have elapsed since the spectrum analyzer was turned on.

REV
Returns the date code of the firmware revision number in MMDD format.

RQS
Sets a bit mask for service requests.

SER
Returns the serial number suffix of the spectrum analyzer.

SRQ
The SRQ command is used by an external controller to simulate interrupts from the spectrum analyzer.

Programming Commands

3-12 Programming Commands
### STB
Returns to the controller the decimal equivalent of the status byte.

### INPUT and OUTPUT
#### EE
Sends the controller the values entered on the spectrum analyzer numeric keypad by the operator.

#### EK
Allows data entry with the front-panel knob when the spectrum analyzer is under remote control.

#### ENTER
Allows the spectrum analyzer to receive data from other devices on the HP-IB.

#### EF
Sends values entered on the spectrum analyzer number keyboard to the present active function value.

#### OA
Returns the value of the active function.

#### OL
Transmits information to the controller that describes the state of the spectrum analyzer when the OL command is executed.

#### OUTPUT
Allows the spectrum analyzer to send data to other devices on the HP-IB.

#### RELHPB
Releases spectrum analyzer control of the HP-IB.

#### TA
Returns trace A amplitude values from the spectrum analyzer to the controller.

#### TB
Transfers trace B amplitude values from the spectrum analyzer to the controller.

#### TDF
Formats trace information for return to the controller.

#### TRA TRB TRC
Controls trace data input or output.

### LIMIT LINES
#### LIMDEL
Deletes all segments in the current limit-line table.

#### LIMDISP
Controls when the limit line (or limit lines) are displayed.

#### LIMFAIL
Returns a "0" if the last measurement sweep of trace A is equal to or within the limit line bounds.

#### LIMEFT
Selects how the limit-line segments are placed on the spectrum analyzer display: according to frequency, or according to the sweep time setting of the spectrum analyzer.

#### LIMHI
Allows you to specify a fixed trace as the upper limit line.

#### LIMLINES
Outputs the current limit-line table definitions.

#### LIMOLO
Allows you to specify a fixed trace as the lower limit line.

#### LIMMIRROR
Reflects the current definition about the amplitude axis at the largest frequency or the largest sweep time in the definition.

#### LIMMODE
Determines whether the limit-line entries are treated as upper amplitude values, lower amplitude values, or upper and lower amplitude values, or mid-amplitude and delta values.

#### LIMREL
Specifies the current limit lines as fixed or relative.

#### LIMSEG
Adds new segments to the current frequency limit line in either the upper limit line or the lower limit line.

#### LIMSEG T
Adds new segments to the current sweep time limit line in either the upper limit line or the lower limit line.

#### LIMITTEST
Compares trace A with the current limit-line data.

#### SEGDEL
Deletes the specified segment from the limit-line tables.

#### SENTER
Enters the limit-line data in either the upper and lower limit-line tables or the mid and delta table for limit lines based on frequency.

#### SENTERT
Enters the limit-line data in either the upper and lower limit-line table or the mid and delta table for limit lines based on sweep time.

### MARKER
#### MDS
Specifies measurement data size as byte or word.

#### MF
Returns the frequency (or time) of the on-screen active marker.

#### MKA
Specifies amplitude of the active marker.

#### MKACT
Specifies the active marker.

#### MKACTV
Makes the current active marker the active function.

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*Programming Commands* 3-14

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*Programming Commands* 3-15
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MKBW</td>
<td>Returns the bandwidth at the specified power level relative to an on-screen marker (if present) or the signal peak (if no on-screen marker is present).</td>
</tr>
<tr>
<td>MKCP</td>
<td>Sets the center frequency equal to the marker frequency and moves the marker to the center of the screen.</td>
</tr>
<tr>
<td>MKCONT</td>
<td>Resumes the sweep after execution of a MKSTOP command.</td>
</tr>
<tr>
<td>MKD</td>
<td>Activates the delta marker.</td>
</tr>
<tr>
<td>MCDLMDRE</td>
<td>Selects if the marker amplitude values are shown as relative to the reference level or relative to the display line.</td>
</tr>
<tr>
<td>MKF</td>
<td>Specifies the frequency value of the active marker.</td>
</tr>
<tr>
<td>MKFC</td>
<td>Turns on or off marker frequency counter.</td>
</tr>
<tr>
<td>MKFCR</td>
<td>Sets the resolution of the marker frequency counter.</td>
</tr>
<tr>
<td>MKNM</td>
<td>Moves active marker to minimum signal detected.</td>
</tr>
<tr>
<td>MKNR</td>
<td>Activates and moves the marker to the specified frequency.</td>
</tr>
<tr>
<td>MKNOISE</td>
<td>Displays the average noise level at the marker.</td>
</tr>
<tr>
<td>MKOFF</td>
<td>Turns off either the active marker or all the markers.</td>
</tr>
<tr>
<td>MKP</td>
<td>Places the active marker at the given x-coordinate.</td>
</tr>
<tr>
<td>MKPAUSE</td>
<td>Pauses the sweep at the active marker for the duration of the delay period.</td>
</tr>
<tr>
<td>MKPX</td>
<td>Positions the active marker on a signal peak.</td>
</tr>
<tr>
<td>MKPX</td>
<td>Specifies the minimum signal excursion for the spectrum analyzer's internal peak identification routine.</td>
</tr>
<tr>
<td>MKREAD</td>
<td>Selects the type of active trace information displayed by the spectrum analyzer marker readout.</td>
</tr>
<tr>
<td>MKRL</td>
<td>Sets the reference level to the amplitude value of the active marker.</td>
</tr>
<tr>
<td>MKSP</td>
<td>Sets the start and stop frequencies to the values of the delta markers.</td>
</tr>
<tr>
<td>MKSS</td>
<td>Sets the center-frequency step-size to the marker frequency.</td>
</tr>
<tr>
<td>MKSTOP</td>
<td>Stops the sweep at the active marker.</td>
</tr>
<tr>
<td>MKTBL</td>
<td>Turns on or off the marker table.</td>
</tr>
<tr>
<td>MCTYBE</td>
<td>Changes the type of the current active marker.</td>
</tr>
<tr>
<td>M4</td>
<td>Activates a single marker on the trace and enables the knob to change the position of the marker. The active function is then set to span.</td>
</tr>
<tr>
<td>PXDLMDRE</td>
<td>Selects the signal peaks that are displayed in the peak table.</td>
</tr>
<tr>
<td>PXKRES</td>
<td>Returns the x-axis coordinates of the peaks in the peak table.</td>
</tr>
<tr>
<td>PXKSORT</td>
<td>Selects how the signal peaks listed in the peak table are sorted.</td>
</tr>
<tr>
<td>PXTBL</td>
<td>Turns on or off the peak table.</td>
</tr>
<tr>
<td>MATH</td>
<td></td>
</tr>
<tr>
<td>ABS</td>
<td>Places the absolute value of the source values in the destination.</td>
</tr>
<tr>
<td>ADD</td>
<td>Adds the sources and sends the sum to the destination.</td>
</tr>
<tr>
<td>AVG</td>
<td>Averages the source and the destination.</td>
</tr>
<tr>
<td>BIT</td>
<td>Returns the state of a bit.</td>
</tr>
<tr>
<td>BITN</td>
<td>Returns the state of a bit.</td>
</tr>
<tr>
<td>CTN</td>
<td>Converts the source values from measurement units to the current absolute amplitude units and stores the result in the destination.</td>
</tr>
<tr>
<td>CTM</td>
<td>Converts the source values to measurement units and places the result in the destination.</td>
</tr>
<tr>
<td>DIV</td>
<td>Divides source 1 by source 2 and places the result in the destination.</td>
</tr>
<tr>
<td>EXP</td>
<td>Places the exponential of the source in the destination.</td>
</tr>
<tr>
<td>INT</td>
<td>Places the greatest integer that is less than or equal to the source value into the destination.</td>
</tr>
</tbody>
</table>
LOG
Takes the logarithm (base 10) of the source, multiplies the result by the scaling factor, then stores it in the destination.

MEAN
Returns the mean value of the given trace in measurement units.

MEANTH
Returns the mean value of the given trace above the threshold, in measurement units.

MN
Compares source 1 and 2, point by point, and stores the lesser of the two in the destination.

MNPOS
Returns a value, which is the x-axis position (in display units) of the minimum amplitude values in trace A, trace B, trace C, or user-defined trace.

MOD
Stores the remainder from the division of source 1 by source 2 in the destination.

MPY
Multiplies the sources, point by point, and places the results in the destination.

MAX
Compares source 1 and source 2, point by point, storing the greater value of each comparison to the destination.

PA
Sums the probability distribution of amplitude in the destination trace with the amplitude distribution function of the source trace.

PDF
Increments an element of the destination trace whenever the corresponding element of the source trace exceeds a threshold.

RMS
Returns the root mean square value of the trace in measurement units.

SQRT
Places the square root of the source into the destination.

STDDEV
Returns the standard deviation of the trace amplitude in measurement units.

SUB
Subtracts source 2 from source 1, point by point, and sends the difference to the destination.

VARIANCE
Returns the amplitude variance of the specified trace, in measurement units.

MEASURE/USER
ACP
Performs the adjacent channel power measurement.

ACPBW
Allows you to specify the channel bandwidth used for the adjacent channel power (ACP) adjacent channel power extended (ACP-E), and channel power (CHP) measurements.

ACPCONT
Changes the spectrum analyzer's sweep mode to continuous sweep, and then performs the previous power measurement at the end of every sweep.

ACP3E
Performs the adjacent channel power extended measurement.

ACPG
Determines if the adjacent channel power (ACP) graph function is enabled or disabled.

ACPGF
Computes and displays an adjacent channel power (ACP) graph.

ACPMK
Determines if the graph marker function is enabled or disabled for the adjacent channel power (ACP) graph.

ACP3AR
Determines if the spectrum analyzer settings used for the adjacent channel power (ACP), adjacent channel power extended (ACP3E), channel power (CHP), or occupied bandwidth (OBW) measurement are set manually or automatically.

ACP30LM
Changes the spectrum analyzer's sweep mode to single sweep, performs a take sweep (TS), and then performs the previous power measurement.

ACFP
Performs a discrete Fourier Transform on the source trace array and stores the result in the destination array.

ACF3AR
Performs a Fast Fourier Transform (FFT) on the signal on which the marker is placed.

ACF30LM
Indicates if the FFT results are valid.

ACF30NTS
Performs a Fast Fourier Transform (FFT) continuously on the current signal.
FTMKR  Activates the FFT marker and displays the FFT annotation on the spectrum analyzer display.
FTMK  Changes the FFT mid-screen frequency of the spectrum analyzer to the frequency of the FFT marker.
FTMS  Changes the FFT stop frequency of the spectrum analyzer to the frequency of the FFT marker.
FTOFF  Exits the Fast Fourier Transform (FFT) measurement and FFT settings.
FTPCTAM  Turns on or off the percent AM measurement.
FTPCTAMR  Returns the percent of amplitude modulation.
FTSNGLS  Changes the spectrum analyzer's sweep mode to single sweep mode (if necessary), and then performs a Fast Fourier Transform (FFT) on trace A.
FTSTAT  Returns the status of the spectrum analyzer's FFT measurement function.
FTSTOP  Sets the FFT stop frequency of the FFT measurement.
MBAOFF  Turns off the current measurement and clears the display.
NDB  Specifies the distance (in dB) from the signal peak for the N dB points measurement (NDBPNT).
NDBPNT  Turns on or off the N dB points measurement.
NDBPNT  Returns the bandwidth measured by the N dB points measurement (NDBPNT).
O BW  Performs the occupied bandwidth measurement using the value for occupied bandwidth percent (OBWPCT).
OBWPCT  Specifies the percent of total power that is to be used in calculating the occupied bandwidth (OBW).
PCTAM  Turns on or off the percent AM measurement.
PCTAMR  Returns the percent AM measured by the percent AM measurement (PCTAM).
PWHPW  Computes the bandwidth around the trace center, which includes signals whose total power is a specified percentage of the total trace signal power.

TOI  Turns on or off the third-order intermodulation (TOI) measurement.
TOR  Returns the highest third-order intermodulation product measured by the third-order intermodulation measurement (TOI).

MODE

MODE  Returns a "0" if the mode of operation is spectrum analysis. A number other than "0" is returned if the operating mode (also called "personality") is other than spectrum analysis.

OPERATOR ENTRY

DN  Reduces the active function by the applicable step size.
EE  Enables front-panel number entry.
EK  Enables front-panel knob control.
EP  Enters parameter from front panel.
HD  Holds or disables entry and blanks active function readout.
UP  Increases the active function by the applicable step size.

PLOTTER

GETPLOT  Initiates output of the spectrum analyzer display to a plotter. GETPLOT is meant to be used within a downloadable program.
PLOT  Initiates output of the spectrum analyzer display to a plotter.

PRESET

IP  Performs an instrument preset.
LP  Performs an instrument preset to the base band (band 0). HP 85951, HP 85952, HP 85953, or HP8966G only.
POWBRON  Selects the state the spectrum analyzer will be in when it is turned on: 1= (instrument preset) or LAST state.
RESTR  Resets the reference level to instrument preset value.
PRINTER
GETPRNT Initiates output of the spectrum analyzer display to a printer.
GETPRNT is meant to be used within a downloadable program.
PRINT Initiates output of the spectrum analyzer display to a printer.

PROGRAM FLOW
ABORT Stops the execution all user-defined functions and reads the
instructs the operation for the next command received.
IF IFTHENELSE/ENDIF forms a decision and branching
construct.
REPEAT /UNTIL forms a looping construct.
RETURN Stops the operation of a user-defined command and returns
program operation to the point where the user-defined function
was called.
WAIT Suspends all spectrum analyzer operation for the specified time
duration.

RECALL or SAVE
CAT Displays directory information from either the specified or the
current mass storage device.
LOAD Loads a file from the memory card. HP 8596L or HP 8596L
requires Option 003.
MSI Allows you to specify the current mass storage device.
PREFIX Specifies the prefix.
PS data Protects all of the spectrum analyzer’s user state and trace
registers from being changed.
PURGE Deletes the specified file from the current mass storage device.
RCLS Recalls spectrum analyzer state data from one of the nine state
registers in spectrum analyzer memory.
RCLT Recalls previously saved trace data, amplitude factors, or
limit-line data from the trace registers in spectrum analyzer
memory.

SAVEE Saves the currently displayed instrument state in spectrum
analyzer memory.
SAVET Saves the selected trace data and state information, amplitude
correction factors, or limit-line tables in spectrum analyzer
memory.
SAVRCLF Specifies either a save or recall operation.
SAVRCLN Specifies the number to append to the prefix for a save or recall
operation, and initiates the transfer of data.
SAVRCLDF Specifies the data to be transferred: trace A, trace B, trace C,
downloadable program, amplitude correction factors, limit line,
or state.
STOR Stores data on a RAM card. HP 8596L or HP 8596L requires
Option 003.
SPAN Sets the frequency span of the spectrum analyzer to full span.

Programming Commands
SPZOOM  Places a marker on the highest on-screen signal (if an on-screen marker is not present), turns on the signal track function, and activates the span function.

SWEEP
CONTS  Sets the spectrum analyzer to the continuous sweep mode.
GATE  Turns on or off the time-gating. Option 105 only.
GATECTL  Selects between the edge and the level mode for Option 105, the time-gated spectrum analysis capability. Option 105 only.
GC  Presets Option 105, the time-gated spectrum analysis capability. Option 105 only.
GD  Sets the delay time before the gate opens. Option 105 only.
GDGATEPAR  Clears the pulse parameters for a time-gate measurement by setting the pulse parameters to 0. Option 105 only.
GDRVGDEL  For the frequency window only, GDRVGDEL sets the time delay from when the gate trigger occurs to when the gate is opened. Option 105 only.
GDRVGLEN  Adjusts the gate length in both the time and frequency windows. Option 105 only.
GDRVTP  Turns on or off the gate in the frequency window. Option 105 only.
GDRVGTIM  Activates the gate trigger marker, and places it at the given value. Option 105 only.
GDRVPR  Enters the specified value as the pulse repetition interval. Option 105 only.
GDRVWID  Enters the specified value as the pulse width. Option 105 only.
GDRVWBF  Couples or uncouples the resolution bandwidth to the specified pulse width. Option 105 only.
GDRVREFE  Allows you to enter the position (in time) for a reference edge. Option 105 only.
GDRVNT  Couples or uncouples the sweep time to the pulse repetition interval. Option 105 only.

GDRVSMP  Makes the window (either the time or frequency window) that is currently not the active window, the active window. Option 105 only.
GDRVSMP  Allows you to specify the delay from the edge of the gate trigger until the sweep is started in the time window. Option 105 only.
GDRVSMP  Specifies the sweep time for the time domain window of the gate utility. Option 105 only.
GDRVSMP  Turns on or off the gate utility. Option 105 only.
GDRVSMP  Couples or uncouples the video bandwidth to the gate length. Option 105 only.
GDRVSMP  Sets the length of time the gate is open. Option 105 only.
GDRVSMP  Sets the polarity (positive or negative) for the gate trigger. Option 105 only.
GDRVSMP  Specifies the time in which the spectrum analyzer sweeps the displayed frequency range.

SYNCHRONIZATION
DONE  Allows you to determine when the spectrum analyzer has started to execute all commands prior to and including DONE.
TS  Starts and completes one full sweep before the next command is executed.

TRACE
AMB  Subtracts trace B from trace A and sends the result to trace A during every sweep of the spectrum analyzer.
AMBPL  Subtracts trace B from trace A, adds the display line value to the difference, and sends the result to trace A during every sweep of the spectrum analyzer.
AXE  Exchanges trace A and trace B.
BLANK  Blank's trace A, trace B, or trace C and stops taking new data into the specified trace.
DML  Subtracts display line from trace B and places the result in trace B.

BTC  Transfers trace B into trace C.

BXC  Exchanges trace B and trace C.

CLRW  Clears the specified trace and enables trace data acquisition.

DET  Selects the spectrum analyzer detection mode.

IB  Provides a method for putting values into trace B.

MERGE  Merges the source trace into the specified area of the destination trace.

MINH  Updates trace G elements with minimum level detected.

MOV  Copies the source values into the destination.

MXMH  Updates trace elements with maximum level detected.

PKPOS  Returns a value, which is the index of the maximum value in trace A, trace B, trace C, or user-defined trace.

TA  Returns trace A data.

TB  Returns trace B data.

TRA TRB TRC  Controls trace data input and output.

TRCMEM  Returns a nonnegative integer that indicates the total number of trace registers available for SAVE and RCL.

TRDFF  Creates a user-defined trace.

TRDSP  Turns on or off the display of trace A, B, or C without clearing the trace.

TRGRPH  Displays a compressed trace on the analyzer.

TRPFRSP  Sets the trace operations to their preset values.

TRSTNT  Returns the states of traces A, B, and C: clear write, blank, view, minimum hold, or maximum hold.

TWINDOW  Creates a window trace array for the Fast Fourier Transform (FFT) function.

VAVG  Enables the video-averaging function, which averages trace points to smooth the displayed trace.

VIEW  Displays trace A, trace B, or trace C, and stops taking new data into the viewed trace.

TRACE MATH

APB  Adds trace A to trace B and sends the result to trace A.

CLRZVG  Restarts video averaging.

COMPRESS  Reduces the number of trace elements while retaining the relative frequency and amplitude characteristics of the trace data.

CONGAT  Combines two traces.

FFT  Calculates Fast Fourier Transform.

LINFILL  Fills linear interpolated data into the specified trace data points of a destination trace.

MIRROR  Displays the mirror image of a trace.

PEAKS  Sorts signal peaks by frequency or amplitude, stores the results in the destination trace, and returns the number of peaks found.

SMOOTH  Smooths the trace according to the number of points specified for the running average.

SUM  Returns the sum of the amplitudes of the trace elements in measurement units.

SUMSQ  Returns the sum of the squares of the amplitude of each trace element.

TRMATH  Executes a list of spectrum analyzer commands at the end of each sweep.

XCH  Exchanges traces.

TRIGGER

ONESO  Performs the command list at the end of sweep.

OHNSWP  Performs the command list at beginning of sweep.

SNGLS  Selects single-sweep mode.
**TM**
Specifies trigger mode.

**TS**
Begins a new sweep.

**TVLINE**
Sets the line number of the horizontal line of video on which to trigger. Options 101 and 108, or Option 201 only.

**TVSFRM**
Specifies type of video frame to trigger on. Options 101 and 108, or Option 201 only.

**TVSTIND**
Selects the triggering for NTSC, PAL, PAL-M, and SBCAM-L formats. Options 101 and 108, or Option 201 only.

**TVSYNC**
Selects between negative and positive triggering for video frame format. Options 101 and 108, or Option 201 only.

**USER-DEFINED**

**ABOUT**
Aborts all user-defined functions.

**ACTDEF**
Creates a user-defined active function.

**DISPOSE**
Deletes user-defined functions.

**ERASE**
Clears trace A and trace B, disposes of the contents of the user memory, and resets the state registers and the spectrum analyzer to the instrument preset state.

**FUNCCDEF**
Defines a routine consisting of spectrum analyzer commands, assigns the routine a label, and stores the routine and its label in spectrum analyzer memory.

**KEYCLR**
Clears softkeys 1 through 6.

**KEYCMD**
Allows you define the function and label of a softkey. The softkey label is updated whenever a softkey is pressed.

**KEYDEF**
Assigns a label and user-defined function to a softkey.

**KEYENO**
Allows you to activate inverse video mode or underline part or all of the softkey label.

**KEYEXEC**
Executes the specified, previously defined softkey.

**KEYLNL**
Replaces a softkey without changing its function.

**MEM**
Returns the amount of spectrum analyzer memory available.

**MENU**
Selects and displays the softkey menus on the spectrum analyzer screen.

**RETURN**
Returns from a user-defined function.

**SAVEMENU**
Saves menu 1 under the specified menu number.

**TRDF**
Declares a user-defined trace.

**USTATE**
Transmits information that has been stored in the spectrum analyzer by the user.

**VARDF**
Creates a user-defined variable and assigns it a value.

**WINDOWS**

**WINNEXT**
Makes the window that is currently not the active window, active.

**WINOFF**
Turns off the windows display.

**WINON**
Activates the windows display mode.

**WINZOOM**
Expands the size of the active window so that it fills the entire spectrum analyzer display.

**ZMCKNT**
Positions the zone marker at the specified frequency.

**ZMICNL**
Places the zone marker at the next signal peak that is left of the zone marker's current position.

**ZMCNR**
Places the zone marker at the next signal peak that is right of the zone marker's current position.

**ZMCSPAN**
Allows you to change the width of the zone marker.
ACPPAR(L,0(1)|F);  
Determines if the spectrum analyzer settings used for the adjacent channel power (ACP), adjacent channel power extended (ACPE), channel power (CHP), or occupied bandwidth (OBW) measurement are set manually or automatically. If ACPPAR is set to 0, the spectrum analyzer settings are set manually. If ACPPAR is set to 1, the spectrum analyzer settings are set automatically.  
Query response: (0|1)<CR><LF><EOI>.

ACPSINGLE;  
Changes the spectrum analyzer's sweep mode to single sweep, performs a tone sweep (TS), and then performs the previous power measurement (occupied bandwidth, adjacent channel, adjacent channel extended, or channel power).  
Query response: <numeric data format>.

ACSPSR(L,<number>),(H,K,Z,M,F,J,T,Q)|F);  
Allows you to specify the frequency spacing between channels.  
Query response: <numeric data format>.

ACTDEF, <function name>,<delimiter>,<active function area label>,<delimiter>,<preset value>, <STEP|NON|HIGH|LOW|DB|DBM|V|ABS|2|INT>,<delimiter>,<command list>,<user-defined function>,<delimiter>|F);  
Creates a user-defined active function.  
<function name>: = 2 to 11 ASCII characters representing the function name.  
<active function area label>: = ASCII characters representing the label for the active function area.  
<preset value>: = <number>|<user-defined variable>).  
Query response using <name>: <numeric data format>.  
Query response using ACTDEF <function name>: <A-block data format><CR><LF><EOI>.
AMPERE:

- active function?

  Returns a "0" if the given function is not active, a "1" if it is active.
  Query response: <number data format>.

ANLPLUS..ON/OFF):{X:10}?;

  Turns on or off the Analog+ display mode. Option 101 or 301 only.
  Query response: ON/OFF <CR> <LF> <EOI>.

ANNOY..ON/OFF):?;

  Turns the display annotation on or off.
  Query response: ON/OFF <CR> <LF> <EOI>.

APB:

  Adds trace A to trace B and sends the result to trace A.
  Query response: <number data format>.

ATT..<number>[DB];AUTO[UP/DN][EP]?

  Specifies the RF input attenuation. Default unit is dB.
  Query response: <numeric data format>.

ATNTR..<DBM>[DBM][DBUV]W[WL]?

  Specifies the amplitude units for input, output, and display for the current
  amplitude setting (log or linear).

AUTO:

  Automatically couples the active functions.

AVG.<destination>,<source>,<ratio>;

  Computes the average value of the source and the destination according to
  the following algorithm: Average = (first-destination) * ratio
  <ratio> = <number> <user-defined variables> <predefined variables>
  <predefined function> <trace element>.

AXR:

  Exchanges trace A and trace B.
BAUDRATE(\{number\}, \{BP\});

Specifies the baud rate of a spectrum analyzer with Option 623 (the RS-232 interface) installed in it.
Query response: \{numeric data format\}.

BIT\{destination\}, \{source\}, \{bit number\};

Places the state of the bit ("0" or "1") in the destination.
<destination> ::= \{user-defined variable\}\{predefined variable\}\{trace element\};
<source> ::= \{user-defined variable\}\{predefined variable\}\{predefined function\}\{trace element\}\{number\};
<bit number> ::= \{user-defined variable\}\{predefined variable\}\{predefined function\}\{trace element\}\{number\}.

BITF\{source\}, \{bit number\};

Returns the state ("1" or "0") of a bit.
<source> ::= \{number\}\{predefined variable\}\{user-defined variable\}\{predefined function\}\{trace element\}
<bit number> ::= \{number\}\{predefined variable\}\{user-defined variable\}\{predefined function\}\{trace element\}.

BLANK\{TRA\}\{R\};

Clears trace A, trace B, or trace C and stops taking new data into the specified trace.

BML;

Subtracts the display line from trace B and sends the result to trace B.

BTC;

Transfers trace B to trace C.

BXC;

Exchanges trace B and trace C.

CAL\{ON\}\{OFF\}\{STORE\}\{FETCH\}\{PREZ\}\{AMP\}\{ALL\}\{TRT\}\{DST\}\{DUMP\}\{INIT\};

Controls the calibration routine.

CAT\{\{MIN\}\{\{MAX\}\}\{\{INT\}\{CARD\}\}\{\{REG\}\{PREFIX\}\{ON\}\}\};

Returns directory information from the specified mass storage device. The a, d, i, l, s, and t parameters denote data types and are used for cataloging the memory card. The a, d, i, l, s, and t data types represent the following:
\(a\) = amplitude correction factor data.
\(d\) = downloadable program.
\(i\) = display image file.
\(l\) = link line table.
\(s\) = instrument state.
\(t\) = trace data and instrument state.

"Reg," "prefix," or "on" parameters are used for cataloging spectrum analyzer memory only. "Reg," "prefix," and "on" represent the following:
\(reg\) = catalogs the state and trace registers.
\(prefix\) = catalogs the spectrum analyzer memory items by the prefix.
\(on\) = catalogs the on-event items in spectrum analyzer memory.

Note that the data type, reg, prefix, or on is followed by the asterisk. The asterisk acts as a wild card. To catalog the memory card contents or all of spectrum analyzer memory, omit the first parameter and use only the asterisk. If INT or CARD is not specified, CAT returns directory information from the current mass storage device.

CF\{\{MIN\}\{\{MAX\}\}\{\{INT\}\{CARD\}\}\{\{UP\}\{DN\}\{EP\}\}\};

Specifies the center frequency. Default unit is Hz.
Query response: \{numeric data format\}.

CHP;

Performs the channel power measurement.

CHPGR\{\{MIN\}\{\{MAX\}\}\};

Determines if the channel power graph function is enabled or disabled.
CLEAVG;
   Restarts video averaging.
CLEBOX(x1),<y1>,<x2>,<y2>[(A/F)];
   Clears a rectangular area from x1,y1 to x2,y2 on the spectrum analyzer
display. You can specify whether the annotation or the traces are to be
cleared by specifying an "A" for the annotation plane or a "F" for the
trace plane. If you do not specify the annotation or trace plane, both the
annotation and trace planes are cleared.
   <x1> := positive integer in <display units>.
   <y1> := positive integer in <display units>.
   <x2> := positive integer in <display units>.
   <y2> := positive integer in <display units>.

CLRDSIP;
   Erases user generated graphics
CLAW_(TRA|TRD|TRG);
   Clears the specified trace and enables trace data acquisition.
CLS;
   Clears all status bits.

CNF;
   Performs the confidence test.
CMDERRQ;
   Returns a list of illegal commands to the remote port, then clears all illegal
commands from the spectrum analyzer.

CNTLA,(OFF|ON)];[(01)];
   Makes the control line A of the auxiliary interface high or low. CNTLA ON
sets control line A high, CNTLA OFF sets the control line low.
query response: (ON|OFF)<CR><LF><EOI>.

CNTLB,(OFF|ON)];[(01)];
   Makes the control line B of the auxiliary interface high or low. CNTLB ON
sets control line B high, CNTLB OFF sets the control line low.
query response: (ON|OFF)<CR><LF><EOI>.

CNTLC,(OFF|ON)];[(01)];
   Makes the control line C of the auxiliary interface high or low. CNTLC ON
sets control line C high, CNTLC OFF sets the control line low.
query response: (ON|OFF)<CR><LF><EOI>.

CNTLD,(OFF|ON)];[(01)];
   Makes the control line D of the auxiliary interface high or low. CNTLD ON
sets control line D high, CNTLD OFF sets the control line low.
query response: (ON|OFF)<CR><LF><EOI>.

CNTAX;
   Returns a "1" if pin 5 of the auxiliary interface is high, a "0" if the line is
low.
query response: (01)<CR><LF><EOI>.

COMM_(OFF|ON)];[(01)];
   Turns the comb generator on or off. HP 8592A, HP 8593E, or HP 8596E only.

COMPRESS,:(trace destination),:(trace source),
   (AVG|RMS|NEG|POS|EMP|PKA|K|PKFT)
   Compresses the trace source to fill the trace destination according to the
specified compression algorithm.

CONCAT,:(trace destination),:(source 1),:(source 2);
   Concatenates source 1 and source 2 and sends the new trace array to the
   destination.

CONTS;
   Selects continuous-sweep mode.
CORRFX;
   Returns a "1" if the correction factors are on, a "0" if they are off.
query response: (01)<CR><LF><EOI>.

Programming Commands  3-37
COUPLE(_AC|DC|?);  
Selects direct-current (dc) coupling or alternating current (ac) coupling.  
Hp 5394B, Hp 5395B, or Hp 5398B only.  
Query response: (_AC|DC)<CR><LF><EOI>.

CRTPOS(_<number>_),(UP|DN);  
Specifies the horizontal position of the spectrum analyzer display.  
<position> := integer from 1 to 34.  
Query response: <numeric data format>.

CRTYPOS(_<number>_),(UP|DN);  
Specifies the vertical position of the spectrum analyzer display.  
<position> := integer from 10 to 68.  
Query response: <numeric data format>.

CTA.<destination>:=<source>;  
Converts the source values from measurement units to the current absolute  
amplitude units and stores the result in the destination.  
<destination> := <user-defined variable>,  
<source> := (<user-defined variable>[_<number>]<_predefined variable>[_<predefined function>].

GTM.<destination>:=<source>;  
Converts the source values to vertical measurement units and places the  
result in the destination.  
<destination> := <user-defined variable>,  
<source> := (<user-defined variable>[_<number>]).

DA(_<number>);  
Accesses the current address of the display list.  
Query response: <numeric data format>.

DATEMODE(_MDY|DMY|?);  
Allows the display of the real-time clock to be set in month-day-year format  
or day-month-year format.  

DEMOC(_AM|FM|QPD|ON|OFF);  
Turns the demodulator on or off, and selects between AM or FM  
demodulation for Option 102, 103, or 301. The QPD parameter is available  
with Option 103 only. Option 102, 103, or 301 only.  
Query response: (_AM|FM|QPD|ON|OFF).  

DET(_POS|SM|T|NEG);  
Selects the specified spectrum analyzer input detector mode. The negative  
(Neg) detector is available with Option 101 or 301 only. The negative  
detector enables negative peak detection in sweep times of less than or  
equal to 200 ms.  
Query response: (_POS|SM|T|NEG)<CR><LF><EOI>.

DISPOSE(_ALL|N|C|T|E|ND|L|ATE|ION|ECU|NG|MRR|K|CN|GR|Q|U|N|F|W|R|UP|P|O|N|S|W|P|ON|TIME|FORMAT|<user-defined traces|<user-defined variable>[_<user-defined function>[_<key number>];  
Frees spectrum analyzer memory that has been allocated previously for  
user-defined functions. DISPOSE ALL clears all operands.  
Query response: <key number> := 1 to 6, 601 to 1200.

DIV.<destination>:=<source 1>:=<source 2>;  
Divides source 1 by source 2 and places the result in the destination.  
Query response: <numeric data format>.

DL(_<number>:=(_DB|DBM));  
<AUTO>|<UP|<DN|<OFF|<ON);  
Specifies a display line level that is displayed on the spectrum analyzer  
display. Default unit is dBm.  
Query response: <numeric data format>.

DN;  
Reduces the active function by the applicable step size.

DONE(_?);  
Returns a "1" when all commands in a command string that was entered  
before DONE have been started.  
Query response: 1<CR><LF><EOI>.

DOZEN(_<number>:=?);  
Sets the dot density value to the Analog display mode. Option 101 or 301  
only.  
Query response: <numeric data format>.
DRAWBOX:<x1>,<y1>,<x2>,<y2>,<x thickness>,<y thickness>;

Draws a rectangular box from x1,y1 to x2,y2 on the spectrum analyzer display. The parameters x thickness and y thickness allows you to specify the thickness of the borders that enclose the box.

<x1> := positive integer in <display units>.
<y1> := positive integer in <display units>.
<x2> := positive integer in <display units>.
<y2> := positive integer in <display units>.
<x thickness> := positive integer in <display units>.
<y thickness> := positive integer in <display units>.

DSPX,<display variable>;<field width>,<decimal places>;

Displays the value of a variable on the spectrum analyzer screen.
<display variable> := <number>|<user-defined variable>|<predefined variable>|<predefined function>|<trace element>.
<field width> := an integer number.
<decimal places> := an integer number.

DT,<character>;

Defines any character as the label terminator. The label terminator is used for the LB command.

EE;

Sends values entered by the operator on the spectrum analyzer numeric keypad to the controller.

ER;

Allows data entry with the front-panel knob when the spectrum analyzer is under remote control.

ENTER,<CHIP address>,<K Mb>,<destination>;

Allows the spectrum analyzer to receive data from other devices on the BB-IB.
<CHIP address> := <number>|<user-defined variable>|<predefined variable>|<predefined function>|<trace element>.
K := Free field, ASCII real number format.
W := One byte binary.
<destination> := <trace element>|<user-defined variable>|<predefined variable>.

FP;

Sends values entered by the operator on the spectrum analyzer number keyboard to the current function.

ERASE;

Clears traces A and B, disposaces of the contents of the user memory, resets the internal state registers to the instrument preset state, and resets the spectrum analyzer.

EXP,<destination>,<source>,<scaling factor>;

The exponential of the source is placed in the destination. The EXP command is useful for converting log values to linear values.
<scaling factor> := <number>|<user-defined variable>|<predefined variable>|<predefined function>|<trace element>.

FA(1),<number>,[<range>],[<format>],[<exp>]);

Specifies the start frequency. Default unit is Hz.
Query response: <numeric data format>.

FB(1),<number>,[<range>],[<format>],[<exp>]);

Specifies the stop frequency. Default unit is Hz.
Query response: <numeric data format>.

FPT,<trace destination>,<trace source>,<window>;

Performs a Fast Fourier Transform on the trace source and sends the results to the trace destination. Before executing FPT, <window> must be defined with the WINDOW command.
<trace destination> := <TRACE|H*|T|<trace element>.
<trace source> := <TRACE|H*|T|<user-defined trace>.
>window := <TRACE|H*|T|<user-defined trace>.

PFDAUTO;

Performs a Fast Fourier Transform (FFT) on the signal on which the marker is placed.

PFTRACP;

Indicates if the FFT results are valid. If the input trace (trace A) has been clipped and the FFT results are not valid, a "0" is returned. If the input trace is not clipped, a "1" is returned.
Query response: (01)<CR><LF><EOB>.
FFTCNTS;
Perform a Fast Fourier Transform (FFT) continuously on the current signal.

FFTMARK;
Activates the FFT markers and displays the FFT annotation on the spectrum analyzer display.

FTIFM;
Changes the FFT mid-spectral frequency of the spectrum analyzer to the frequency of the FFT marker.

FTIFMFS;
Changes the FFT stop frequency of the spectrum analyzer to the frequency of the FFT marker.

FTIFOFF;
Edits the fast Fourier transform (FFT) measurement and FFT settings.

FTIFCMAM[0:9];
Turns on or off the percent AM measurement. Executing FTIFCMAM 0 turns off the percent AM measurement, executing FTIFCMAM 1 turns on the percent AM measurement. 
Query response: <numeric data format>.

FTIFCMART;
Returns the percent of amplitude modulation (AM). 
Query response: <numeric data format>.

FTIFCMG;
Changes the spectrum analyzer's sweep mode to single sweep mode (if necessary), and then performs a fast Fourier transform (FFT) on trace A.

FTIFSTAT;
Returns the status of the spectrum analyzer's FFT measurement functions. FTIFSTAT returns either a "0," a "1," or a "8" as follows:
0 = The spectrum analyzer is not performing an FFT measurement.
1 = The spectrum analyzer is performing an FFT measurement.
2 = The spectrum analyzer is not performing an FFT measurement but the FFT markers and FFT annotation are on.
Query response: (0/1/2)<CHR><LF><EOI>.

FTIFSTOP[0:9];
Sets the FFT stop frequency of the FFT measurement. 
Query response: <numeric data format>.

FMGAMM[0:9];
Specifies the full screen range for FM gain. Option 106, 109, or 301 only. 
Query response: <numeric data format>.

FPOFFSET[0:9];
Specifies the frequency offset for all absolute frequency readouts, such as center frequency. Default unit is Hz.
Query response: <numeric data format>.

FORMAT[<delimiter>;<label>];
Formats a memory card in the logical interchange format (LIF). 
<label>::0 to 6 characters.

FS;
Selects the full frequency span mode of the spectrum analyzer.

FNCDEF[<label>;<string data field>[<A-block data field>][<I-block data field>]]; 
Defines a routine consisting of spectrum analyzer commands, assigns the routine a label, and stores the routine and its label in the user memory.

GATE[OFFON];
Turns the gate on or off. Option 105 only.

GATECG[<EDGE>][<LEVEL>];
Selects between the edge and the level mode for time-gating. Option 105 only. 
Query response: (EDGE>LEVEL)<CHR><LF><EOI>.

GC;
Pretsets Option 106, the time-gated spectrum analysis capability. Option 105 only.

GDX[0:9];
Sets the delay time before gating occurs. Option 105 only. 
Query response: <numeric data format>.

Programming Commands 343
GDRVFILAR;
Clears the pulse parameters (pulse width, pulse repetition interval, and reference edge) for a time-gate measurement by setting the pulse parameters to 0. Option 105 required, Option 101 or 301 recommended.

GDRVGLER([L<]<number>[((US|MS|SC))[7)];
For the frequency window only, GDRVGLER sets the time delay from when the gate trigger occurs to when the gate is opened. Option 105 required, Option 101 or 301 recommended.
Query response: <numeric data format>.

GDRVGLEN([L<]<number>[((US|MS|SC))[7]);
Adjusts the gate length in both the time and frequency windows. Option 105 required, Option 101 or 301 recommended.
Query response: <numeric data format>.

GDRVGT([L<]<number>)[7];
Turns on or off the gate in the frequency window. Executing GDRVGT 0 turns off the gate, executing GDRVGT 1 turns on the gate. Option 105 required, Option 101 or 301 recommended.
Query response: (01)<CR><LF><EOI>.

GDRVGTIM([L<]<number>[((US|MS|SC))[7]);
Activates the gate trigger marker, and then places it at the given value in the time window. Option 105 required, Option 101 or 301 recommended.
Query response: <numeric data format>.

GDRVRPL([L<]<number>[((US|MS|SC))[7]);
Enteres the specified value as the pulse repetition interval. Option 105 required, Option 101 or 301 recommended.
Query response: <numeric data format>.

GDRVRWDL([L<]<number>[((US|MS|SC))[7]);
Enteres the specified value as the pulse width. Option 105 required, Option 101 or 301 recommended.
Query response: <numeric data format>.

GDRVBRW([L<>(US|MS|SC))[7]);
Couples or un couples the resolution bandwidth to the specified pulse width. Executing GDRVBRW 0 uncouples the resolution bandwidth to the specified pulse width, executing GDRVBRW 1 couples it. Option 105 required, Option 101 or 301 recommended.
Query response: (01)<CR><LF><EOI>.

GDRVRRE([L<]<number>[((US|MS|SC))[7]);
Allows you to enter the position (in time) for a reference edge. Option 105 required, Option 101 or 301 recommended.
Query response: <numeric data format>.

GDRVSRL([L<]>?[7];
Couples or uncouples the sweep time to the pulse repetition interval. Executing GDRVSRL 0 uncouples the sweep time and the pulse repetition interval, executing GDRVSRL 1 couples it. Option 105 required, Option 101 or 301 recommended.
Query response: (01)<CR><LF><EOI>.

GDRVSWAP;
Makes the window (either the time or frequency window) that is currently not the active window, the active window. Option 105 required, Option 101 or 301 recommended.

GDRVSWDL([L<]<number>[((US|MS|SC))[7]);
Allows you to specify the delay from the edge of the gate trigger until the sweep is started in the time window. Option 105 required, Option 101 or 301 recommended.
Query response: <numeric data format>.

GDRVSWM([L<]<number>[((US|MS|SC))[7]);
Specifies the sweep time for the time domain window for the gate utility. Option 105 required, Option 101 or 301 recommended.
Query response: <numeric data format>.

GDRVUTIL([L<>(US|MS|SC))[7]);
Turns on or off the gate utility. Executing GDRVUTIL 0 turns off the gate utility, executing GDRVUTIL 1 turns on the gate utility. Option 105 required, Option 101 or 301 recommended.
Query response: (01)<CR><LF><EOI>. 

Programming Commands
GDEVWVW(.{(K1)7});

Couples or uncouples the video bandwidth to the gate length. Executing GDEVWVW 0 couples the video bandwidth to the gate length, executing GDEVWVW 1 couples the video bandwidth to the gate length. Option 015 required. Option 010 or 301 recommended.
Query response: (2)4{(C1)<LF>(E0)>

GETPLOT([<x1>],[y1],[<x2>],[y2]);

Initializes output of the spectrum analyzer display to a plotter. GETPLOT is meant to be used within a downloadable program.
.<c1> = positive integer in <display units>.
.<y1> = positive integer in <display units>.
.<x2> = positive integer in <display units>.
.<y2> = positive integer in <display units>.

GETPRINT([DW|COLOR]MXB650QM[MXB650LG][QST06M][L650LG][D6COLOR]
DH540WDY640CL64[346666768]);

GETPRINT is meant to be used within a downloadable program. It
initializes output of the spectrum analyzer display to a printer.
GETPRINT or GETPRINT COLOR outputs the screen data in monochrome
format. GETPRINT or GETPRINT COLOR outputs the screen data in HP
PaintJet printer format. GETPRINTQ or GETPRINT MXB650Q outputs the screen data in Epson MXB650 small format. GETPRINTQ or GETPRINT MXB650LG outputs the screen data in Epson MXB650 large format. GETPRINTQ or GETPRINT QST06M outputs the screen data in Epson LQ570 small format. GETPRINTQ or GETPRINT QST06M outputs the screen data in Epson LQ670 large format. GETPRINTQ or GETPRINT QST06M outputs the screen data in DeskJet color. GETPRINTQ or GETPRINT QST06M outputs the screen data in DeskJet 5400 color.

GLY(<number>{[SC]MS<DS<UP>[D4][EP]77});

Sets the time length that the gating occurs. Option 015 only.
Query response: <numeric data format>.

GPL(NEG|POS){[DS]4};

Sets the polarity (positive or negative) for the gate trigger. Option 015.

GRL(<number>{<number>};

Graphs the given y coordinate while incrementing the x coordinate by 1.

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GRAT.{OFF|ON}[,].[(O)177];

Turns on or off the graphics.
Query response: (CN|OFF)<C1><LF><E07>.

HAVE.{HP|HP|HP|BA|HP|BA|RS|2232|RS|2232|AR|RS|2232|AR|CST|CPT|FMD|FMD|CST}|
OPEN|TV|TV|CPT|TAD|CST|GATE|BAND|IND|IND|FED};

Returns a "0" if the specified device is not installed. The HAVE parameters correspond to the following devices:

HPIB = HP-IB interface, Option 021 or HP-IB and parallel interface, Option 041.
HPIBA = HP-IB interface, Option 061.
HPIBA = HP-IB and parallel interface, Option 041.
RS232 = RS-232 interface, Option 023, or RS-232 and parallel interface, Option 043.
RS232 = RS-232 interface, Option 023, or parallel (Option 024).
TG = Tracking generator, Option 010 or 011.
PMD = PM demodulator, Option 102, 103, or 301.
QPD = Quad-peak detector, Option 103.
CST = Count-continuous. (The frequency counter is not available for
HP 6855L Option 013.)
OPEN = Precision frequency reference, Option 004.
TV = TV synch trigger, Option 102 or 301.
TVFICT = TV picture on analyzer display, Option 190.
PADC = Fast ADC, Option 101 or 301.
CARD = Memory card reader. (The memory card reader is available for the
HP 6509A or HP 6509A as Option 006. The memory card reader is
standard for the HP 6591E, HP 6590E, HP 6504E, or HP 6506E.)
GATE A = Time-gated spectrum analyzer capability, Option 106.
(Gate card)
GATE P = Time-gated spectrum analyzer capability, Option 106.
(Gate circuitry enabled on the CPU board)
BAND = Returns the number of frequency bands that the spectrum
analyzer has.
NEW = Narrow linewidths, Option 100.
Query Response: <numeric data format>.
HD,
Disables data entry via the spectrum analyzer numeric keypad, knobs, or step keys. The active function readout is blanked, and any active function is deactivated.

HIN(?);
Returns the harmonic number of the current harmonic band in which the spectrum analyzer is tuning. HIN returns a -1 if in multiband sweep. HP 85920E, HP 85930E, HP 85950E, or HP 85960E only.
Query response: <numeric data format>.

HINLOCK([--].<number>[,(][BP][ON][OFF][)]?);
Forces the spectrum analyzer to use only the selected harmonic. HP 85920E, HP 85930E, HP 85950E, or HP 85960E only.
Query response: (ON[OFF]<CR><LF><EOI>.

HINUNLK;
Unlocks the harmonic band. HP 85920E, HP 85930E, HP 85950E, or HP 85960E only.

III.<entry>;
Provides a method for reading or storing values into trace B.
<entry> ::= exactly 605, 8-bit binary bytes.

IDT?;
Returns the HP model number of the spectrum analyzer.
Query response: <character string><CR><LF><EOI>. The character string consists of the letters "HP," and the model number.

IP.<operand 1 >[,(][GT][EQ][NE][LT][GT][LT][]()]<operand 2>[THEN();]command list[ENDIF[;]]<command list[;]ENDIF[;]]
Compares the first operand to the second operand. If the condition is true, the command list is executed. Otherwise, commands following the next ELSE or ENDIF statements are executed.
<operand 1> ::= <number> | <user-defined variable> | <predefined variables> | <predefined function> | <trace element>.
<operand 2> ::= <number> | <user-defined variable> | <predefined variables> | <predefined function> | <trace element>.

INT.<destination>,<source>;
Places the greatest integer that is less than or equal to the source value into the destination.

INX.[(][6][8][5][0][EP][PA][;][)]?
Specifies the value of input impedance that is expected at the active input port.
Query response: (6075)<CR><LF><EOI>.

IP;
Performs an instrument preset.

KEYCLR;
Clears the user definitions for softkeys 1 through 6 (softkeys 1 through 6 are in menu 1).

KEYCMD.<key number>,<key press command string>,<menu label command string>;
Defines the function and label of a softkey, based on a condition. The softkey label is updated whenever a key is pressed.
<key press command string>::= <delimiter><command list><delimiter>.
<menu label command string>::= <delimiter><command list><delimiter>.

KEYDEF.<key number>[,(][<string data field>:]<user-defined function>;<delimiter><key label>:<delimiter>?,)
Assigns a label and user-defined function to a softkey.
Query response: <A-block data format> <character string> <CR><LF><EOI>.

KEYRENH.<key number>,<delimiter><key label><delimiter><inverse video condition>:<move enhancement condition>;
Activates part or all of the key label in the inverse video mode, or moves the underline from one section of the label to another.
<inverse video condition>::= <delimiter><command list><delimiter>.
<move enhancement condition>:: = <delimiter><command list><delimiter>.

KEYREX,<key number>;
Executes the specified defined key.
<key number>::= integer value from 1 to 6, or 601 to 1200.
KEYBL: <key number>,<delimiter><key label><delimiter>;
Replaces a key without changing its function.

LB:<character string><delimiter>;<
Writes text (label) at the current pen position using alphanumeric characters that have been specified in the character string.
<delimiter> specifies in UL command.

LF;
performs an instrument preset into base band (band 0). HP 85918L, HP 85912, HP 85916, or HP 85926 only.

LC: <number>[<USE[ON]|OFF] ][<format[UP|DP] ];
Specifies the size of the vertical graticule divisions as logarithmic units without changing the reference level. Default unit is db.
Query response: <numeric data format>. A query response of zero indicates a linear scale.

LIMDEL;
Deletes all upper and lower segments in the current limit-line table and presets all limit-line settings.

LIMDISP,(ON|OFF)(AUTO|UPPER|LOWER);?
Controls when the limit lines are displayed.
Query response: (ON|OFF)(AUTO|UPPER|LOWER)<CR><LF><EOI>

LIMFAIL(?)
Returns a *0* if the last measurement sweep is equal to or within the limit-line bounds.
Query response: (0|1)(B|S)<CR><LF><EOI>

0 Indicates the measurement sweep was within the limit-line bounds.
1 Indicates the measurement sweep failed the lower limit;
2 Indicates the measurement sweep failed the upper limit.
3 Indicates the measurement sweep failed both the lower and upper limits.
4 Indicates that no test was performed.

LIMFT: (TIME|FREQ|?);
Selects how the limit-line segments are defined: according to frequency, or according to the sweep time setting of the spectrum analyser.
Query response: (TIME|FREQ)<CR><LF><EOI>

LIMHL: (TRA|TRB|TRC)<trace range>[<user-defined trace>];
Allows you to specify a fixed trace as the upper limit line.

LIMLINE;
Outputs the current limit-line table definitions.
Query response: LIMHL:(<number>
of segments>,LIMHL:(ON|OFF),
[(INTERSECT|PERCENT) <frequency>]<time>,<upper value>,<lower value>,SLOPE,FLAT,POINT);[LIMIT HALF(UPPER|LOWER),
LIMNRM][LIMSET][<frequency>]<time>,<amplitude>,SLOPE,FLAT
|POINT];LIMIT3T:(ON|OFF),LIMDISP:(ON|OFF);<CR><LF><EOI>

LIMLO: (TRA|TRB|TRC)<trace range>[<user-defined trace>];
Allows you to specify a fixed trace as the lower limit line.

LIMMIRR;
Reflects the current definition about the amplitude axis at the largest frequency (for a limit line based on frequency) or the largest sweep time (for a limit line based on the sweep time) in the limit-line definition.

LIMMODR: (UPPER|LOWER|UPLOW|DELT)),<sweep range>);
Determines whether the limit-line entries are treated as upper amplitude values, lower amplitude values, upper and lower amplitude values, or mid amplitude and delta values.
Query response: (UPPER|LOWER|UPLOW|DELT),<sweep range><CR><LF><EOI>

LIMREF: (OFF|ON)<CR><LF><EOI>
Specifies whether the current limit-lines are fixed or relative.
Query response: (OFF|ON)<CR><LF><EOI>
LIMSEG. <frequency>,<amplitude>,[(FLAT|SLOPE|POINT)];
    Adds new segments to the current frequency limit line in either the upper
    limit line or the lower limit line.
    <frequency>::=<{number}|{US|MS|SG}||trace element|<predefined function>|<user-
    defined variable>|)
    <amplitude>::=<{number}|{DB|DM}||trace element|<predefined function>|<user-
    defined variable>|)."}
LIMSEG,T. <time>,<amplitude>,[(FLAT|SLOPE|POINT)];
    Adds new segments to the current sweep time limit line in either the upper
    limit line or the lower limit line.
    <time>::=<{number}|{US|MS|SG}||trace element|<predefined function>|<user-
    defined variable>|)
    <amplitude>::=<{number}|{DB|DM}||trace element|<predefined function>|<user-
    defined variable>|)."}
LIMITST. (OPTION|YPLL|A4);
    Compares trace A with the current limit-line data.
    Query response: (OFF|ON)<GE><LF><EOB>.
LINFILL. <destination trace>,<starting value>,<number of elements>,<ending value>;
    Fills linear interpolated data into the specified trace data points of a
    destination trace. LINFILL uses the value of the starting value and the
    ending value to calculate the linear interpolation data (the values for ending
    value should be included in the interpolation or line). <number of elements> allow
    you to specify the number of trace data points that are "filled in" with linear
    interpolation data. The number of elements field includes the starting and
    ending elements.
    <destination trace>::=<{TRA|TRB|TRC}<user-defined trace>
    <starting value>::=<{number}|<predefined function>|<user-defined variable>
    <number of elements>::=<{number}|<predefined function>|<user-defined variable>
    <ending value>::=<{number}|<predefined function>|<user-defined variable>
    <predefined function>=(predefined function)."}

LOAD. <delimiter><character string> <delimiter>[:<destination>];
    Loads the data from the memory card. Use the destination (TRA, TRB, TRC), or
    <user-defined trace> when loading trace data. HP 6596L or HP 6596L
    requires Option 008.
    <destination>::=<{TRA|TRB|TRC}<user-defined trace>.
LOG. <destination>,<source>,<scaling factor>;
    Takes the logarithm (base 10) of the source, multiplies the result by the
    scaling factor, then stores it in the destination.
    <scaling factor>::=<{number}|<trace element>||predefined function>|<user-
    defined variable>|<user-defined variable>.
LSPAN. Changes the spectrum analyser's span to the previous span setting.
MDI,:(B|W)[P];
    Formats binary measurements by selecting the measurement data size as an
    8-bit byte (B) or a two-byte word (W).
    Query response: (B|W)<GR><LF><EOB>.
MDI];
    Returns values for the spectrum analyser's baseline and reference level.
    Query response: <number><number><number>,
    <number>,<DBM|DBMV|R|DBUV)<GR><LF><EOB>.
MEAN. <trace source>;
    Returns the mean value of a trace in measurement units.
    Query response: <numeric data format>.
MEAN2. <trace source>;
    Returns the mean value of a trace above the threshold, in measurement
    units.
    Query response: <numeric data format>.
MEASURER.

Determines what kind of measurements the spectrum analyzer makes: signal analysis (SA), stimulus response (SR), or signal normalization (NRM).

MEMF.

Returns the amount of unused spectrum analyzer memory available for user programs and variables.
Query response: <numeric data format>.

MENU<template><cnumber>?

Displays the selected softkey menu on the spectrum analyzer screen.
<menu number>: <integer value of 1, or 101 to 200.
Query response: <numeric data format>.

MERGE<template><destination trace>,<destination start>,<destination end>,<source trace>,<source start>

Merges the source trace into the specified area of the destination trace.
<destination trace>: = <trace source>,
<destination start>: = <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>,
<destination end>: = <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>,
<source trace>: = <trace source>,
<source start>: = <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>.

MFT<template>

Returns the frequency (or time) of the on-screen active marker.
Query response depends on the setting of TDF and MDS.

MIN<template><destination>,<source 1>,<source 2>

Compares the two sources, point by point, and sends the lesser value of each comparison to the destination.

MINH<template>

Updates each trace G element with the minimum level detected.

MINPOS<template><trace source>

Returns a value that is the y axis position (in display units) of the minimum amplitude value in trace A, trace B, trace C, or user-defined trace.
Query response: <numeric data format>.

MIRROR<template><trace destination>,<trace source>

Moves the mirror image of the source trace into the destination trace.

MKA<template><number>|(EXP|NUP|AUTO)|

Specifies the amplitude of the active marker (in the current amplitude units). When queried, MKA returns the marker amplitude independent of marker type.
Query response: <numeric data format>.

MKACT<template>(text)

Establishes the active marker. The active marker becomes marker number 1 after the MKACT command.
Query response: (1|2|3|4)<CR><LF><EOL>.

MKACTV

Makes the current active marker the active function.

MKBW<template><number>

Returns the bandwidth of the specified power level relative to an on-screen marker (if present) or the signal peak (if no on-screen marker is present).
Query response: <numeric data format>.

MKCP

Sets the center frequency equal to the marker frequency and moves the marker to the center of the screen.

MKCONT

Continues sweeping from the marker after the marker has been stopped. (See MSSTOP)

MKD<template><number>|(UP|DOWN|AUTO)|

Places a second marker at the specified frequency away from the active marker. Frequency value may be positive or negative. Default unit is Hz.
MKDLMODE(1)<CR><LF>:
When the marker table is turned on, MKDLMODE selects if the marker amplitude
values are shown as relative to the reference level (normal
mode) or relative to the display line (delta mode). If MKDLMODE is set to
0, the marker amplitude values will be relative to the reference level. If
MKDLMODE is set to 1, the marker amplitude values will be relative to the
display line.
Query response: (0|1)<CR><LF><EOB>
MKF(.-<number>)(<Hz|kHz|MHz|GHz>)<CR><LF>:
Specifies the frequency of the active marker. Default unit is Hz.
Query response: <numeric data format>
MKFQ(.-<option>)<CR><LF>:
Turns on or off the marker frequency counter.
MKFC(.-<number>)(<kHz|MHz|GHz>)<CR><LF>:
Sets the resolution of the marker frequency counter. Not available for the
HP 8590E, Option 713.
Query response: <numeric data format>
MKMIN:
Moves the active marker to the minimum value detected.
MKMIN(.-<number>)(<Hz|kHz|MHz|GHz>)<CR><LF>:
Activates and moves the marker to the specified frequency.
Query response: <numeric data format>
MKNOISE(.-<option>)<CR><LF>:
Returns the average value of 32 buckets around the marker, compensated
for detection mode, and normalized to a 1 Hz bandwidth.
Query response: (ON|OFF)<CR><LF><EOB>
MKOFF(.-ALL):<CR><LF>
Turns off either the active marker or, if the ALL parameter is specified, all of
the markers.
MKRX(<x coordinate>)<CR><LF>:
Moves the active marker to the given x-coordinate.
<x coordinate>::=-(<number>|-<predefined variable>|-<user-defined variable>)<CR><LF>
Query response: <numeric data format>
MKPAUSE(.-<number>)(<US|MS|CS|<EP|NP|UP|AUTO>)<CR><LF>:
Pauses the sweep at the active marker for the duration of the delay period.
Query response: <numeric data format>
MKPX(.-<number>)(<EP|NP|UP>)<CR><LF>:
Positions the active marker on signal peaks.
MKFD(.-<number>)(<EP|NP|UP>)<CR><LF>:
Specifies the minimum signal excursion for peak identification. Default unit
is dB.
Query response: <numeric data format>
MKKAD<CR><LF>:
Selects the type of active trace information to be displayed by the spectrum
analyser marker readout. The MKREAD parameters are as follows:
FRQ is marker frequency.
SWT is sweep time.
IST is inverse sweep time.
PER is period.
FFT is fast Fourier transform readout.
Query response: (FRQ|SWT|IST|PER|FFT)<CR><LF><EOB>
MKRL:<CR><LF>
Sets reference level to the same level as the active marker amplitude.
MKSP:<CR><LF>:
Sets the values of the start and stop frequencies to the same values as the
data markers.
MKCS:<CR><LF>:
Sets the center frequency step size to be the same as the marker frequency
(or frequency difference, if data markers are used).
MKSTOP;

Stops the sweep at the active marker.

MKTRACEx.(TRA[TRB][TRC])?

Moves the active marker to the corresponding position on another trace.
Query response: (TRA[TRB][TRC]<GR><LF><EOI>.

MKTRACEx.(OFF[ON])(X)(Y)?)?

Turns the marker signal track on or off.
Query response: (ON|OFF)<CR><LF><EOI>.

MKTYPEx.(PSN|AMP|FIXED|DEEPA)?

Specifies the type of active marker to be used.
Query response: (PSN|AMP|FIXED|DEEPA)<CR><LF><EOI>.

MLx(<number>)(DB|LM)<(DB|LM)(UP|DOWN)?

Specifies the maximum signal level that is applied to the input mixer for a signal that is equal to or below the reference level.
Query response: <numeric data format>.

MOD.<destination>,<source 1>,<source 2>;

Places the modulo (remainder) of the division of source 1 by source 2 in the destination.

MODE;

Returns a "0" if the mode of operation is spectrum analysis. A number other than "0" is returned if the operating mode is other than spectrum analysis.
Query response: <numeric data format>.

MOV.<destination>,<source>;

Copies the source into the destination.

MPx.<destination>,<source 1>,<source 2>;

Multiples the sources, point by point, and sends the result to the destination.

MSx.(CARD|NT)?

Allows you to specify the current mass storage device as the spectrum analyzer memory (INT) or a memory card (CARD).
Query response: (CARD|NT)<CR><LF><EOI>.

MXM.x.<destination>,<source 1>,<source 2>;

Comparing source 1 and source 2, point by point, and sends the greater value of each comparison to the destination.

MXMLx.(TRA[TRB])?

Updates the selected trace with the maximum level detected at each frequency.

Mx(<number>(HZ|KHZ|MHZ|GHZ)<(UP|DOWN)|AUTO)?

Moves the active marker to the specified frequency. Stepping up or down changes the frequency span. Default unit is Hz.
Query response: <numeric data format>.

NBRx.<number>?

Specifies the distance (in dB) from the signal peak for the N dB points measurement (NDBNT).
Query response: <numeric data format>.

NDPNTx.<(FR|HR)>

Turns on or off the N dB points measurement. Executing NDPNT 0 turns off the N dB points measurement, executing NDPNT 1 turns on the N dB points measurement.
Query response: (0|1)<CR><LF><EOI>.

NDBNT;

Returns the bandwidth measured by the N dB points measurement (NDBPT).
Query response: <numeric data format>.

NFl(<number>)(DB|LM)?

Sets the normalized trace data with respect to the display line.
Query response: <numeric data format>.

3.58 Programming Commands
OA[T]:
Sends the value of the active function to the controller.
Query response depends on the setting of TDF and RDS.

OBW:
Performs the occupied bandwidth measurement using the value for occupied bandwidth percent (OBWPTCT). For example, if OBWPTCT is set to 99 percent, OBW determines the 99 percent power bandwidth.

OBWPTCT(I数目>[I];)
Specifies the percent of total power that is to be used in calculating the occupied bandwidth (OBW).
Query response: <numeric data format>.

OLT[T]:
Returns the coded instrument state information to the controller in 202 8-bit bytes.

ONCYCLE(_time value>,<string data field>[I];)
ONCYCLE periodically executes the string data field. _time value> indicates how often the ONCYCLE command is executed.

ONDLY(_time value>,<string data field>[I];)
Executes the string data field after the time value has elapsed.
The time value represents the time left until event occurs.

ONEOS(_string data field>[A-block data field]>[I]);<block data field>)
Executes the contents of the data field after the end of sweep. The string data field should not include the take sweep command (TS).

ONMKR(_string data field>[I];)
Performs the string data field when the sweep reaches the marker position.
OUTPUT, <address>,<format>,<output data>

Allows the spectrum analyzer to send data to other devices on HP-IB, RS 232, or parallel interfaces.

<address>::=[([<predefined variable>|<user-defined variable>]>|<trace element>)]>|<delimiter>|<format>|<field width>|<decimal places>|<constant>|<expression>|<data field>

K = Outputs in free-field ASCII format with no terminator.
B = Outputs in free-field format with no terminator, but in a single 8-bit byte.
KB = Outputs in free-field ASCII with carriage return and line feed terminator.
KL = Outputs in free-field ASCII with line feed and an EOI terminator.
F = Outputs an ASCII number with the field width and decimal places specified. If a "0" follows the number representing decimal places, a carriage return and line feed will terminate the output.

<field width>::=integer number.
<decimal places>::=integer number.
<output data>::=(<predefined variable>|<user-defined variable>|<trace element>|<delimiter>|<format>|<field width>|<decimal places>|<constant>|<expression>|<data field>)

PA, PDI, PDU, PIE, PJ, PK

<coordinate> ::= x coordinate|y coordinate

A block of vectors is specified in the x and y coordinate systems. PU and PD determine whether the vectors are displayed.

<x coordinate>::=positive integer in <display units>
<y coordinate>::=positive integer in <display units>.
FDA.<trace destination>,<trace source>,<resolution>;
Replaces the destination trace with the amplitude distribution function of
the source trace.
<trace destination>::=<TRA|THD|THG><user-defined trace>.
<trace source>::=<TRA|THD|THG><user-defined trace>.

PDF.<trace destination>,<trace source>;
Increases an element of the destination trace whenever the corresponding
element of the source trace exceeds a threshold. This is useful for
constructing a frequency probability density function.
<trace destination>::=<TRA|THD|THG><user-defined trace>.
<trace source>::=<TRA|THD|THG><user-defined trace>.

PEAKS.<trace destination>,<trace source>,{AMP|FRQ}?;
Sorts the signal peaks that are in the source trace by amplitude or frequency
and then returns the number of peaks found to the controller. PEAKS also
sends the sorted results to the destination trace.
Query response: <numeric data format>.

PKDEMODE([x],[y],[z]);
Selects the signal peaks that are displayed in the peak table. The signal
peaks can be selected as follows: all the signal peaks (0), only the signal
peaks that are above the display line (1), or only the peaks that are below
the display line (-1).
Query response: (-1|0|1)<CR><LF><EOB>.

PKPOS.<trace source>?
Returns the z-axis position of the maximum value of the trace.
Query response: <numeric data format>.

PKRES.<number>?;
PKRES returns the z-axis coordinates of the peaks in the peak table.
<number>::=<number> from 1 to 10. <number> allows you to specify a
peak within the peak table. You do not have to specify <number>, but if
you do specify <number>, the number should be enclosed in brackets. For
example, "PKRES [1]".
Query response: <number>[<number>]<CR><LF><EOB>.

PKSORT([x],[y],[z]);
Selects how the signal peaks listed in the peak table are sorted: by
decreasing amplitude or by ascending frequency. Executing PKSORT 0 sorts
the peaks by decreasing amplitude; executing PKSORT 1 sorts the peaks by
ascending frequency.
Query response: (0|1)<CR><LF><EOB>.

PKTRBL([x],[y],[z]);
Turns on or off the peak table. Executing PKTRBL 0 turns off the peak table;
executing PKTRBL 1 turns on the peak table.
Query response: (0|1)<CR><LF><EOB>.

PKZERO;
Returns a "1" if the zero zoom routine (PKZOOM) found a valid signal,
otherwise a "0" is returned.
Query response: (0|1)<CR><LF><EOB>.

PKZOOM([x],[y],[z],[AMP|FRQ]?,<x>,<y>,<z>,<w>);
Automatically tunes the spectrum analyzer to the signal with the highest
amplitude level while narrowing the frequency span to the specified
frequency span.
Query response: <numeric data format>.

PLOT([x],[y],[z],[x],<x>,<y>,<z>,<w>);
Initiates a plotting output of the screen data to the remote interface. With
the appropriate HP-IIB commands, the HP-IIB can be configured to route the
data to an external plotter.
<number> ::= <number> that represents plotter dependent values that
specify the lower-left plotter dimension.
<number> ::= <number> that represents plotter dependent values that
specify the upper-right plotter dimension.
PECPRY(<number>);  
Setting the plot port to a port inconsistent with the installed hardware option is ignored. Select PECPRY 0 for an HP-IB port for either an Option 021 or Option 041.
0 = HP-IB port for Option 021 or Option 041
1 = serial port for Option 023
2 = parallel port for Option 024
3 = serial port for Option 043
4 = parallel port for Option 041 or Option 043

POWERON(;(IP);LAST)];
Selects the state that the spectrum analyzer will be in when it is turned on: the HP state (same state as when an instrument preset command is given) or last state (the state the spectrum analyzer was in when it was turned off). Query response: (IP);LAST;<GR><LF><EO>.

PP;
Peaks the preselector. HP 86590A, HP 85990A, HP 86950A, or HP 86960A only.
PR.[PD][PD][]<Cx coordinate>[;]<>y coordinate>[;]<y coordinate>;<yx coordinate>[;]<y coordinate>;
Specifies a new plot location on the spectrum analyzer screen relative to its current coordinates.
<cx coordinate>::=positive integer in <display units>.
<y coordinate>::=positive integer in <display units>.
PREAMP[<;]<number>[;]<xP];
Adds or subtracts the preamplifier gain from the displayed signal.
Query response: <numeric data format>.
PREFIX.<delimiter><prefix><delimiter>;
Specifies or changes the prefix used in save and recall operations.
<prefix>::=0 to 6 characters, a through z and the underscore (the underscore cannot be the first character of the prefix)

PRINT.<(FW)[COLOR][EXP][B][I][EX][ACL]<MX><(S)<M><MX><(S)<M><LQ><T><LQ><LQ><LQ>
<;X[OH][EO][EO][EO]>;
Initializes an output of the screen data to the remote interface. With appropriate HP-IB commands, the HP-IB can be configured to route the data to an external printer. PRINT, PRINTO, or PRINT PW outputs the screen data in monochrome format. PRINT1 or PRINT COLOR outputs the screen data in HP PaintJet printer format.

PRINTP.<<number>];
Setting the print port to a port inconsistent with the installed hardware option is ignored. Select PRINTP 0 for an HP-IB port for either an Option 021 or Option 041.
0 = HP-IB port for Option 021 or Option 041
1 = serial port for Option 023
2 = parallel port for Option 024
3 = serial port for Option 043
4 = parallel port for Option 041 or Option 043

PRINTDES.<<number>];
Allows you to set the HP-IB address of the printer.
Query response: <numeric data format>.

PSSTAT.<OFF>[OFF][OFF][OFF];
This command protects the state registers from being changed.
Query response: <ON><OFF><GR><LF><EO>.

PD;
Instructs the spectrum analyzer not to plot vectors on the spectrum analyzer screen until a PD is received.

PURGE.<delimiter><file name><delimiter>;
Deletes the file name from the current mass storage device.
<file name>::=a valid file name.
PWRBW <trace source>,<percentage>;

Computes the combined power of all signal responses in the source and returns the bandwidth that contains the specified percentage of the total power. Positions markers at both the beginning and the end of the interval.

<percentage> ::= {<number>|<user-defined variable>|<predefined variable>|<predefined function>|<trace element>}

Query response: numeric data format.

PWRTIME;

Returns the number of milliseconds that have elapsed since the spectrum analyzer was turned on.

RBW::<Hz|kHz|MHz|GHz> (EP|DN|UP|AUTO)?

Specifies the resolution bandwidth. Default unit is Hz.

Query response: numeric data format.

RCL1:<number>;

Recalls the previously saved state stored in registers 1 through 9.

<number> ::= (1|2|3|4|5|6|7|8|9)

RCLT..<trace destination>,<trace register>;

Recalls previously saved trace data and the corresponding instrument state when trace data is recalled. Recall limit line data or amplitude correction factors (not the trace or state data) when LIMITLINE or AMPCOR is used.

<trace destination> ::= (TRA|TRB|TRC|LIMITLINE|AMP|COR)<user-defined trace><trace range>.

<trace register> ::= integer from 0 to TRGMSM - 1.

RELHIB;

Discontinues spectrum analyzer control of HP-IB. Option 082 only.

REPEAT.<command list> UNTIL.<flow operand2> (GE|GT|LE|LT|EQ|NE|GE|LE|LT|EQ|NE|GE|LE|LT)

<flow operand2> ::= {<number>|<user-defined variable>|<predefined variable>|<predefined function>|<trace element>}

Repeat and UNTIL commands form a looping construct.

<flow operand1> ::= {<number>|<user-defined variable>|<predefined variable>|<predefined function>|<trace element>}

<flow operand2> ::= {<number>|<user-defined variable>|<predefined variable>|<predefined function>|<trace element>}

RESET;

Resets the reference level to its instrument preset value.

RETURN;

Stops the operation of a current user-defined command and returns program operation to the same point that the operation was at when the user-defined function was called.

REV?[?];

Returns the firmware revision number of the spectrum analyzer being used.

Query response: <number><LS><DP><EO> The number is in the YYYYYD format.

RL::<number> {{00|01|02|03|04|05|06|07|08|09|10|11|12|13|14|15}} (EP|DN|UP)?

Specifies the amplitude value of the reference level.

Query response: numeric data format.

RLPOS::<number> {EP|DN|UP|MP}

Selects the position of reference level.

Query response: numeric data format.

RMS..<trace source>;

Returns the root mean square value of the trace, in measurement units.

Query response: numeric data format.

ROFFSET::<number> {DP|BP}

Offsets all amplitude readings without affecting the trace.

Query response: numeric data format.

368 Programming Commands

Programming Commands 369
EQS(.[,number]>;P);
Sets a bit mask for service requests.
<number> ::= ASCII decimal number 0 through 63.
Query response: numeric data format. (Returns the decimal weighting of
the status byte bits that are enabled during a service request.)
SAVEENTRY[,menu number>;
Saves menu 1 under the menu number given.
<menu number> ::= integer value of 1, or 101 to 200.
SAVE[,state register>;
Saves the current state of the spectrum analyzer in the specified state
register.
<state register> ::= (123456789).
SAVE<TRACE,trace register>;
Saves trace data, limit-line data, or amplitude correction factors in the
selected register.
<trace source> ::= (TRAIL|TRC|LMLINE|AMP|COR|<user-defined
trace>);<trace range>.
<trace register> ::= integer from 0 to TRMEM - 1.
SAVECLF(SAVE,RECALL);
Specifies whether a save or recall operation is to be executed.
SAVECIN[,<register number>];<BP>;
Appends number to prefix for save and recall operations.
<register number> ::= integer number.
SAVECLW,TRAIL|TRC|LMLINE|AMP|COR;
Specifies the data to be transferred—trace A, trace B, trace C, downloadable
program, state, limit-line values, or amplitude correction factors.
SEGDEL[,<segment number>];
Deletes the specified segment from the limit-line tables.
<segment number> ::= <number>;<user-defined variable>.

SENDER, <frequency>, <upper or mid value>, <lower or delta value>, <segment type>;
Enter the limit-line data in the upper and lower limit-line table or the mid
and delta table for limit lines based on frequency.
<frequency> ::= <number> (H12 | H12M | MID | H12G) | <user-defined
variable> | <predefined variable> | <trace element>.
<upper or mid value> ::= <number> (UDB | DM) | <user-defined
variable> | <predefined variable> | <trace element>.
<lower or delta value> ::= <number> (LDB | DB0) | <user-defined
variable> | <predefined variable> | <trace element>.
<segment type> ::= (SLOPE|FLAT|POINT).

SENDRT, <time>, <upper or mid value>, <lower or delta value>, <segment
type>;
Enter the limit-line data in the upper and lower limit-line table or the mid
and delta table for limit lines based on sweep time.
<time> ::= <number> (H12NSSEC | <user-defined variable> | <predefined
variable> | <trace element>.
<upper or mid value> ::= <number> (UDB | DM) | <user-defined
variable> | <predefined variable> | <trace element>.
<lower or delta value> ::= <number> (LDB | DB0) | <user-defined
variable> | <predefined variable> | <trace element>.
<segment type> ::= (SLOPE|FLAT|POINT).

SER77;
Returns the last 5 digits of the serial number of the spectrum analyzer.
Query response: numeric data format.

SETDATE[,<date>[;7];
Sets the date of the real-time clock of the spectrum analyzer.
<date> ::= <number> in the YYYYMMDD format.
Query response: numeric data format representing YYMMDD.

SETHMMS[,<time>[;P];
Sets the time of the real-time clock of the spectrum analyzer.
<time> ::= <number> in the HHMMSS format.
Query response: numeric data format, representing HHMMSS.
SMOOTHT.<trace source>,<number of points>;

Smoothes the specified trace according to the number of points specified for the running average.
<number of points>::<trace element>,<predefined function>,<predefined variable>,<user-defined variable>.

SNGLS;

Selects the single-sweep mode.

SPF.<number>[.HF|LF|MF|GND]<.EP|DN|UP>?

Changes the total displayed frequency range symmetrically about the center frequency.
Query response: <numeric data format>.

SPKR.<OFF|ON>0;1;

Turns the internal speaker on or off. Option 102, 103, or 301 only.

SPZOOM;

Places a marker on the highest on-screen signal (if an on-screen marker is not present), turns on the signal track function, and activates the span function.

SQLCH.<number>[.HF|LF|MF|GND]<.EP|DN|UP>?

Sets the squelch threshold by setting the squelch level.
Query response: <numeric data format>.

SQR.<destination>,<SOURCE>;

Computes the square root of the source and sends the result to the destination.

SRCALY<.INT|XTAL|MTR|EXT>?

Selects internal or external leveling for use with the built-in tracking generator.
Option 010 or 011 for the HP 8590L or HP 8591R. Use INT for internal leveling, XTAL for external leveling, MTR for external leveling with an HP meter.
Option 010 for the HP 8590B, HP 8594B, HP 8595B, or HP 8596B. Use INT for internal leveling, EXT for external leveling.
Query response: (INT|XTAL|MTR|EXT)<CR><LF><EOI>.

SRCAT<.number>[.DB][.EP][DN|UP][AUTO][ON]?;

Alternates the source output level. Option 010 or 011 only. Not available for HP 8590L.
Query response: <numeric data format>.

SRCNORM<.OFF|ON>0;1?

Subtracts trace B from trace A, adds the display line value to the difference, and sends the result to trace A during every sweep of the spectrum analyzer.
Query response: (ON|OFF)<CR><LF><EOI>.

SRCPOFS<.number>[.DB][.EP][DN|UP]?;

Offsets the source power level. Option 010 or 011 only.
Query response: <numeric data format>.

SRCPSTY<.number>[.DB][.EP][DN|UP][AUTO]?;

Selects the source power step size. Option 010 or 011 only.
Query response: <numeric data format>.

SRCPSWP<.number>[.DB][.EP][DN|UP][OFF|ON][OA]?;

Selects sweep range of source output. Option 010 or 011 only.
Query response: <numeric data format>.

SRCPWRL<.number>[.DB][.EP][DN|UP][OFF|ON][OA]?;

Selects the source power level. Option 010 or 011 only.
Query response: <numeric data format>.

SRCRL<.number>[.DB][.EP][DN|UP][OA]?;

Adjusts tracking of source output with spectrum-analyzer sweep. Option 010 or 011 only.
Query response: <numeric data format>.

SRCXPK;

Adjusts the tracking of source output with spectrum-analyzer sweep.

SRQ.<number>;

Used by an external controller to simulate service requests to the spectrum analyzer.
<number>::integer from 2 to 128.
SUM. <trace source>?

Returns the sum of the amplitudes of each trace element, in measurement units.
Query response: <numeric data format>.

SUMSQ. <trace source>?

Returns the sum of the squares of the amplitudes of each trace element, in measurement units.
Query response: <numeric data format>.

SWCPOL(SA|SR)(OA)?

Selects either a stimulus-response (SR) or spectrum-analyzer (SA) auto-coupled sweep line. Option 010 or 011 only.
Query response: (SA|SR)<CR><LF><SOH>.

SYNC . MODE (NORMAL|RTSG15|FAL15|LOAD15);

Selects either the horizontal and vertical synchronizing constants, or the synchronization rate for both the internal monitor of the spectrum analyzer and the video signal that is output to the MONITOR OUTPUT connector on the rear panel of the spectrum analyzer.

TA(?);

Transfers the 401 amplitude values of trace A to the controller.
Query response depends on the setting of TDF and MDS.

TBD(?);

Transfers the 401 amplitude values of trace B to the controller.
Query response depends on the setting of TDF and MDS.

TDF.(A|B|M|P)?;

Formats trace information for return to the controller.
TDF A = returns data as an A-block data field.
TDF B = enables binary format.
TDF I = returns I-block data field.
TDF M = returns values in <display units>.
TDF F = returns absolute measurement units.
Query response: (A|B|M|P)<CR><LF><SOH>.
TEXT.<delimiter><character string><delimiter>;<n
Writes text on the spectrum analyzer screen at the current pen location.

TRI(.]<<number>[DF][MM][A][U][T][R][E][D][F][N][U][P][Y]?)
Clip signal responses below the specified threshold level. Default unit is dBm. Default level is seven major divisions below the reference level.
Query response: <numeric data format>.

TIMEDATE(.<time date value>[?])
Sets the time and date for the spectrum analyzer's real time clock, in the YMDHMMSSS format.
<time data value>: <number> in the YMDHMMSSS format.

TIMEQ(.<OFF[ON]>.[01])?
Enables the display of the time and date on the spectrum analyzer screen.
Query response: (ON[OFF])[CR]<LF><EOI>.

TITLE.<delimiter><character string><delimiter>;
Allows entry of a screen title.

TM(.<FREE[VID][LINE][EXT][TV]>)?
Implements the selected trigger mode: free (FREE), video (VID), line (LINE), external (EXT), or television (TV). TV trigger is available with Options 101 and 103, or Option 301 only.
Query response: <FREE[VID][LINE][EXT][TV]>[CR]<LF><EOI>.

TOI(.<01>)?
Turns on or off the third-order intermodulation (TOI) measurement.
Executing TOI 0 turns off the measurement, executing TOI 1 turns on the measurement.
Query response: (01)[CR]<LF><EOI>.

TOIR?
Returns the intercept point for the highest third-order intermodulation product measured by the third-order intermodulation measurement (TOI).
Query response: <numeric data format>.

(TOPL[TR][TR][T]) [<<number>, [<number>], [<A-block data field>]]<I-block data field>]
Provides a method for returning or storing trace values.
Query response: (<number>, [<number>], [<A-block data format>], [I-block data format>, [<data byte>, <data byte>, <data byte>, RND], [CR]<LF><EOI>.

TRCMEM[?]
Returns the total number of registers available for SAVET and RCLT.
Query response: <numeric data format>.

TRRESP. .<ch> [.<trace length>];
Creates a user-defined trace.
<trace length>: [<user-defined variable>][<predefined variable>][<predefined function>][<trace elements>][<number>].
Query response: <numeric data format>.

TRSP. (.TRA[TR][HR][C][ON][OFF][I]0)
Controls the display of trace A, B, or C without clearing the trace (measurements can still be taken).

TRXREF. .<address>, <cx position>, <cy position>, <expanding factor>, <trace source>
Displays a compressed (see "COMPRESS") trace anywhere on the spectrum analyzer display. The x and y positions orient the trace positions.
<address>: = integer,
<cx position>: = integer from 0 to 4096,
<cy position>: = integer from 0 to 8192,
<expanding factor>: = integer from 0 to 100,
<trace source>: = (TRA[TR][HR][C][user-defined trace]).

TRMMAT(.<string data fields> [.<A-block data fields>] [.I-block data fields>]
Executes the specified trace math or user-operator commands at the end of a sweep. All spectrum analyzer commands except TS are allowed.

TRPST;
Sets trace operations to their preset values.
TRSYN?[?]:
Returns the status of traces A, B, and C to the controller.
Query response: (BLANK|CLEAR|VIEW|MAXMIN|A|BLANK|CLEAR|VIEW|MAXMIN|B|BLANK|CLEAR|VIEW|MIN|G)<CR><LF><BOF>.

TS;
Starts and completes one full sweep before the next command is executed.

TVLINC[<number>],[<UPDOWN>],[<B]\]<??>?
Sets the line number of the horizontal line of video on which to trigger.
Options 101 and 102, or Option 301 only.
Query response: <numeric data format>.

TVFRM[?<number>]<CR><LF><BOF>?
Selects the type of video frame to trigger on. Options 101 and 102, or Option 301 only.
Query response: EVEN|ODD|VERTICAL|<CR><LF><BOF>.

TVSTSD[?<number>]<CR><LF><BOF>?
Selects the triggering for NTSC, PAL, PAL-M, or SECAM-L formats. Options 101 and 102, or Option 301 only.

TVSYN[?<number>];
Selects the polarity of video modulation to trigger on. Options 101 and 102, or Option 301 only.

TWNDW<trace destination>,<UNIFORM|HANNING|FLATTOP>,<CR><LF><BOF>?
Formats trace information for fast Fourier analysis (FFT). The TWNDW command should be used to specify the window parameter for the FFT command.
UNIFORM: for FFT of transient signals and random noise. This window has the least frequency uncertainty.
HANNING: offers a compromise between the UNIFORM window and the FLATTOP window.
FLATTOP: for FFT of periodic signals. This window has the least amplitude uncertainty.

UP;
Increases the value of the active function by the applicable step size.

USTATE[<A-block data field>]<CR>?
Transmits information that has been stored in the spectrum analyzer by the user.
Query response: <A-block data format><CR><LF><BOF>.

VARDEF[<label>],[<preset values>];
Defines a variable name and assigns an initial value to it. IP reassigns the initial value to the variable name.
Query response: <initial value>:< predefined function>,< predefined variable>,< user-defined variable>,< number>.

VARIANCE[<trace source>];
Returns the amplitude variable of the selected trace, in measurement units.
Query response: <numeric data format>.

VAVG[<number>],[ON|OFF]<CR>?
Turns on or off the video averaging.
Query response: <number>: represents the maximum number of sweeps executed for averaging. Default length is 100.

VBIAS[<number>],[<112|103|102|101|OFF|AUTO>]<CR>?
Specifies the video bandwidth of the pel-detection filter.
Query response: <numeric data format>.

VBFIR[<number>],[<112|103|102|101|OFF|AUTO>]<CR>?
Specifies the value that is multiplied by the resolution bandwidth to determine the automatic setting of video bandwidth.
Query response: <numeric data format>.

VIEW[<THIRD]<CR>;
Displays trace A, trace B, or trace C, and stops taking new data into the viewed trace.

WAIT[<number>],[<MS|SEC>] ( <predefined variable>,<user-defined variable>,<predefined function>,<trace element> );
Suspends all spectrum analyzer operation for the specified time duration.
WINNEXT;
When using the windows display mode, you can use WINNEXT to select the upper or lower window as the active window.

WINOFF;
Turns off the windows display mode.

WINON;
Activates the windows display mode and the zone marker.

WINZOOM;
When using the windows display mode, you can use WINZOOM to either expand the size of the active window so that it fills the entire spectrum analyzer display, or display both the upper and lower windows on the spectrum analyzer display.

XCH <destination>,<destination>;
Exchanges the contents of the two parameters.

ZMKCNTR,<number>[(HZ|KHZ|MHZ|GHz)];
Positions the zone marker at the specified frequency.
Query response: <numeric data format>.

ZMKPKNL;
Places the zone marker at the next signal peak that is left of the zone marker's current position.

ZMKPKNR;
Places the zone marker at the next peak to the right of the zone marker's current position.

ZMKSPAN,<number>[(HZ|KHZ|MHZ|GHz)];
Allows you to change the width of the zone marker.
Query response: <numeric data format>.

---

### Characters and Secondary Keywords (Reserved Words) Summary

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<tr>
<th>Element</th>
<th>Description</th>
</tr>
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<tr>
<td>a</td>
<td>Amplitude correction factors.</td>
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<tr>
<td>A</td>
<td>Amp (unit) or A-block data field.</td>
</tr>
<tr>
<td>ABSHz</td>
<td>Absolute Hz (unit).</td>
</tr>
<tr>
<td>AG</td>
<td>Alternating current.</td>
</tr>
<tr>
<td>ALL</td>
<td>All.</td>
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<tr>
<td>AM</td>
<td>Amplitude.</td>
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<tr>
<td>AMP</td>
<td>Amplitude correction.</td>
</tr>
<tr>
<td>AMP50OR</td>
<td>Auto couple or set to automatic.</td>
</tr>
<tr>
<td>AVG</td>
<td>Average.</td>
</tr>
<tr>
<td>B</td>
<td>8-bit byte or binary format.</td>
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<tr>
<td>BOTH</td>
<td>Both odd and even frames trigger.</td>
</tr>
<tr>
<td>BW</td>
<td>Black and white.</td>
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<tr>
<td>CARD</td>
<td>Memory card.</td>
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<tr>
<td>CNT</td>
<td>Counter-lock.</td>
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<tr>
<td>COLOR</td>
<td>Color.</td>
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<tr>
<td>DB</td>
<td>Downconvertable programs.</td>
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<tr>
<td>DECIB</td>
<td>Decibel (unit).</td>
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<tr>
<td>DBC</td>
<td>Decibel millivolt (unit).</td>
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<tr>
<td>DBCV</td>
<td>Decibel micro volt (unit).</td>
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<tr>
<td>DC</td>
<td>Direct current.</td>
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<tr>
<td>DELTA</td>
<td>Delta.</td>
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<tr>
<td>DSP</td>
<td>Display.</td>
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<tr>
<td>DLF</td>
<td>Downloadable program.</td>
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<tr>
<td>DMM</td>
<td>Absolute decibel millivolt (unit).</td>
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<tr>
<td>DMY</td>
<td>Day, month, year format.</td>
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<tr>
<td>DN</td>
<td>Decrease parameter one step size.</td>
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<tr>
<td>DUMP</td>
<td>Damp.</td>
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<tr>
<td>EDGE</td>
<td>Triggers on the edge of the trigger input.</td>
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<tr>
<td>EP</td>
<td>Pluses program for data entry from spectrum analyzer front panel.</td>
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<tr>
<td>EQ</td>
<td>Equal to.</td>
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<tr>
<td>EVEN</td>
<td>Even video frame.</td>
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<tr>
<td>EXT</td>
<td>External trigger.</td>
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<tr>
<td>FADC</td>
<td>Fast analog to digital converter (ADG).</td>
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<tr>
<td>FETCH</td>
<td>Fetch.</td>
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<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>FFT</td>
<td>Fast Fourier transform.</td>
</tr>
<tr>
<td>FIXED</td>
<td>Fixed.</td>
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<td>FLAT</td>
<td>Flat.</td>
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<tr>
<td>PLATOP</td>
<td>Flat top filter window.</td>
</tr>
<tr>
<td>FM</td>
<td>Frequency modulation demodulator.</td>
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<tr>
<td>FMV</td>
<td>Frequency modulation detection.</td>
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<tr>
<td>FREE</td>
<td>Free run.</td>
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<tr>
<td>FREQ or FRQ</td>
<td>Frequency.</td>
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<tr>
<td>GATE</td>
<td>Gate.</td>
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<tr>
<td>GE</td>
<td>Greater than or equal to.</td>
</tr>
<tr>
<td>GHz</td>
<td>Gigahertz (unit).</td>
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<tr>
<td>GT</td>
<td>Greater than.</td>
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<tr>
<td>GHz</td>
<td>Gigahertz (unit).</td>
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<td>HANNING</td>
<td>Hanning filter window.</td>
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<td>HI</td>
<td>Highest.</td>
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<td>HPID</td>
<td>HP-IB.</td>
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<td>Hz</td>
<td>Hertz (unit).</td>
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<td>I</td>
<td>I-block data field.</td>
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<tr>
<td>I</td>
<td>Display image file.</td>
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<tr>
<td>INIT</td>
<td>Initialize.</td>
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<tr>
<td>INT</td>
<td>Internal or integer.</td>
</tr>
<tr>
<td>IP</td>
<td>Instrument preset.</td>
</tr>
<tr>
<td>IN</td>
<td>Inverse sweep time.</td>
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<tr>
<td>KC</td>
<td>Free field ASCII format with &quot;CHR&quot; an &quot;LF&quot; terminator.</td>
</tr>
<tr>
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<td>Free field ASCII format with &quot;CHR&quot; an &quot;LF&quot; terminator.</td>
</tr>
<tr>
<td>KHz</td>
<td>Kilohertz (unit).</td>
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<tr>
<td>KHz</td>
<td>Kilohertz (unit).</td>
</tr>
<tr>
<td>K</td>
<td>Kilometers (unit).</td>
</tr>
<tr>
<td>I</td>
<td>Limit line.</td>
</tr>
<tr>
<td>LAST</td>
<td>Last state.</td>
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<tr>
<td>LE</td>
<td>Less than or equal to.</td>
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<tr>
<td>LEVEL</td>
<td>Level gating.</td>
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<tr>
<td>LIMIT</td>
<td>Limit line.</td>
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<td>LINE</td>
<td>Line trigger.</td>
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<td>LOADIF</td>
<td>Loads the values for the horizontal and vertical position of the spectrum analyzer.</td>
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<tr>
<td>LOWER</td>
<td>Lower limit line.</td>
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<tr>
<td>LT</td>
<td>Less than.</td>
</tr>
<tr>
<td>M</td>
<td>Measurement units.</td>
</tr>
<tr>
<td>MA</td>
<td>Milliamper (unit).</td>
</tr>
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</table>

<table>
<thead>
<tr>
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<th>Description</th>
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<td>MDY</td>
<td>Month, day, year format.</td>
</tr>
<tr>
<td>MHz</td>
<td>Megahertz (unit).</td>
</tr>
<tr>
<td>MS</td>
<td>Millisecond (unit).</td>
</tr>
<tr>
<td>MTR</td>
<td>Meter.</td>
</tr>
<tr>
<td>MV</td>
<td>Millivolt (unit).</td>
</tr>
<tr>
<td>MW</td>
<td>Milliwatt (unit).</td>
</tr>
<tr>
<td>MZ</td>
<td>Megahertz (unit).</td>
</tr>
<tr>
<td>NE</td>
<td>Not equal to.</td>
</tr>
<tr>
<td>NEQ</td>
<td>Negative.</td>
</tr>
<tr>
<td>NH</td>
<td>Next highest peak.</td>
</tr>
<tr>
<td>NL</td>
<td>Next peak left.</td>
</tr>
<tr>
<td>NONE</td>
<td>No units.</td>
</tr>
<tr>
<td>NR</td>
<td>Next peak right.</td>
</tr>
<tr>
<td>NTSC or NTSC15</td>
<td>NTSC video format.</td>
</tr>
<tr>
<td>OA</td>
<td>Output amplitude.</td>
</tr>
<tr>
<td>ODD</td>
<td>Odd video frame trigger.</td>
</tr>
<tr>
<td>OFF</td>
<td>Turns off function.</td>
</tr>
<tr>
<td>ON</td>
<td>Turns on function.</td>
</tr>
<tr>
<td>P</td>
<td>Parameter unit.</td>
</tr>
<tr>
<td>PAL or PAL15</td>
<td>PAL video format.</td>
</tr>
<tr>
<td>PALM</td>
<td>PAL video format.</td>
</tr>
<tr>
<td>PER</td>
<td>Peak average.</td>
</tr>
<tr>
<td>PEP</td>
<td>Peak pit.</td>
</tr>
<tr>
<td>POINT</td>
<td>Point.</td>
</tr>
<tr>
<td>POS</td>
<td>Positive.</td>
</tr>
<tr>
<td>PON</td>
<td>Position.</td>
</tr>
<tr>
<td>RECALL</td>
<td>Recall operation.</td>
</tr>
<tr>
<td>RS322</td>
<td>RS-322 interface.</td>
</tr>
<tr>
<td>S</td>
<td>Drive.</td>
</tr>
<tr>
<td>SA</td>
<td>Signal analysis.</td>
</tr>
<tr>
<td>SAVE</td>
<td>Save operation.</td>
</tr>
<tr>
<td>SD</td>
<td>Seconds (unit).</td>
</tr>
<tr>
<td>SDRAM</td>
<td>SDRAM-1 video format.</td>
</tr>
<tr>
<td>SLOPE</td>
<td>Slope.</td>
</tr>
<tr>
<td>SMP</td>
<td>Sample detection mode.</td>
</tr>
<tr>
<td>SP</td>
<td>Space.</td>
</tr>
<tr>
<td>SR</td>
<td>Stimulus response.</td>
</tr>
<tr>
<td>STATE</td>
<td>State register.</td>
</tr>
<tr>
<td>STEP</td>
<td>Step key ability.</td>
</tr>
</tbody>
</table>
Spectrum Analyzer Error Messages

Error Messages

The spectrum analyzer can generate various messages that appear on its screen during operation to indicate a problem.

There are three types of messages: hardware error messages (H), user-created error messages (U), and informational messages (M).

- Hardware error messages indicate the spectrum analyzer hardware is probably broken. Refer to Chapter 9 in the HP 8590 B-Series and L-Series Spectrum Analyzers User's Guide for more information.

- User-created error messages appear when the spectrum analyzer is used incorrectly. They are usually generated during remote operation (executing programming commands using either a controller or the external keyboard).

- Informational messages provide information indicating the spectrum analyzer's progress within a specific procedure.

The messages are listed in alphabetical order on the following pages; each message is defined, and its type is indicated by an (H), (U), or (M).

- LOCK OFF
  Indicates slow Y10 tuning. This message may appear if the spectrum analyzer is using default correction factors. If this message appears constantly, perform the CAL ERRQ routines to try to eliminate this message. A LOCK OFF appears briefly during the CAL ERRQ routine, during instrument press, or when the frequency value is changed; this is normal and does not indicate a problem. (U) and (H)

- ADC 3V FAIL
  Indicates a hardware failure. (H)

- ADC-GND FAIL
  Indicates a hardware failure. (H)
ADC-TIME FAIL
Indicates a hardware failure. (II) and (I)

CAL...
During the self-calibration routine, messages may appear on the display to indicate how the calibration routines are progressing. For example, sweep, freq, span, RC delay, FM coil, and atten can appear on the spectrum analyzer display. *LOCK OFF* appears briefly during the CAL FREQ self-calibration routine; this is normal and does not indicate a problem. (II)

CAL...
: done Press CAL STORE to save
Indicates that the self-calibration routine is finished and that you should press CAL STORE. (II)

CAL: cannot execute CAMP enter: 0 dB FREQAMP GAIN
The preamplifier gain should be set to 0 dB before the CAL AMPTD routine is performed. The preamplifier gain is set by using the CAL AMP TD. This message also sets SQ 110. (II)

CAL: DATA NOT STORED CAL AMP NEEDED
The correction factors are corrupt and cannot be stored. You need to perform the CAL FREQ & AMP TD routine before trying to store the correction factors. This message also sets SQ 110. (II)

CAL: FM SPAN SENS FAIL
The spectrum analyzer could not set up span sensitivity of the FM coil. (II)

CAL: GAIN FAIL
Indicates the signal amplitude is too low during the CAL AMP TD routine. This message also sets SQ 110. (II)

Cal harmonic >= 5.7 GHz NOT found
Indicates that the CAL YTF routine for an HP 8596E cannot find a harmonic of the 890 MHz calibration signal. If this happens, ensure that the CAL OUT connector is connected to the spectrum analyzer input, perform the CAL FREQ & AMP TD routine, and then perform the CAL YTF routine again. (II) and (I)

CAL: MAIN COIL SENS FAIL
The spectrum analyzer could not set up span sensitivity of the main coil. If this message appears, press [FREQUENCY], -37, [II], [CAL], [FREQUENCY], [FREQUENCY], [CAL], and perform the CAL FREQ routine again. (II)

CAL: NFW 200 Hz notch amp failed
Indicates that the 200 Hz resolution bandwidth is not the correct shape for the calibration routine. (II)

CAL: NFW 200 Hz notch failed
Indicates that the 200 Hz resolution bandwidth is not the correct shape for the calibration routine. (II)

CAL: NFW 200 Hz width failed
Indicates that the 300 Hz resolution bandwidth is not the correct bandwidth for the calibration routine. (II)

CAL: NFW gain failed
Indicates that one of the resolution bandwidths is not the correct amplitude for the calibration routine. (II)

CAL: NFW width failed
Indicates that one of the resolution bandwidths is not the correct width for the calibration routine. (II)

CAL: PASSCODE NEEDED
Indicates that the function cannot be accessed without the pass code. For the DEFAULT CAL DATA function, enter the pass code by pressing [FREQUENCY], -37, [II]. (II)

CAL: RES BW AMP FAIL
The relative insertion loss of the resolution bandwidth is incorrect. This message also sets SQ 110. (II)

CAL SIGNAL NOT FOUND
Indicates the calibration signal (CAL OUT) cannot be found. Check that the CAL OUT and the spectrum analyzer input connectors are connected with an appropriate cable. If the calibration signal cannot be found, press [FREQUENCY], -37, [II], [CAL], and perform the CAL YTF routine again. If the calibration signal still cannot be found, press [FREQUENCY], -37, [II], and perform the CAL FREQ or CAL FREQ & AMP TD self-calibration routines. This message also sets SQ 110. (II) and (I)

CAL SPAN SENS FAIL
The self-calibration span sensitivity routine failed. This message also sets SQ 110. (II)
CAL: USING DEFAULT DATA
Indicates that the calibration data is corrupt and the default correction factors are being used. Interruption of the self-calibration routines or an error can cause this problem. (U)

CAL TYP FAILED
Indicates that the CAL TYP routine could not be successfully completed. If this message appears, ensure that the CAL OUT connector (for the HP 85623E or 100 MHz COMB OUT connector (for the HP 85623B, HP 8563B, or HP 85685C) is connected to the spectrum analyzer input, perform the CAL PEOQ & AMPTD routine, and then perform the CAL TYP routine again. (U) and (H)

CAL: ZERO FAIL
The spectrum analyzer could not set up the tuning sensitivity of the main coil. If this message appears, press [FREQUENCY] - 97, [CAL], [CAL], [CAL], [CAL], [CAL], [CAL], [CAL], and perform the CAL PEOQ routine again. (H)

Cannot engage phase lock with current CAL PEOQ data
Indicates that the CAL PEOQ routine needs to be performed before phase locking can be turned on. (U)

Cannot reach N dW points
Indicates that the number of dW specified for the N dW PTS function is greater than the distance of the signal peak from the spectrum analyzer noise floor or peak threshold. (U)

Check trigger input
Indicates that the spectrum analyzer needs an external trigger signal to use the time-gating functions. Before using the time-gating functions, you should ensure there is a trigger pulse connected to the GATE TRIGGER INPUT connector on the rear panel of the spectrum analyzer and that the GATE OUTPUT is connected to the EXT TRIG INPUT connector. (U)

Comb harmonic at 0.0 GHz NOT FOUND
Indicates that the CAL TYP routine for the spectrum analyzer cannot find a harmonic of the comb generator at frequency displayed. If this happens, ensure that the 100 MHz COMB OUT connector (for an HP 85623B, HP 8563B, or HP 85685C) or the CAL OUT connector (for an HP 85685C) is connected to the spectrum analyzer input with a low-loss, short cable before the CAL TYP routine is performed. (U) and (H)

COMB SIGNAL NOT FOUND
The comb signal cannot be found. Check that 100 MHz COMB OUT is connected to the spectrum analyzer input. The comb generator is available with the HP 85623B, HP 8563B, or HP 85685C only. (U) and (H)

CMD ERR: ...
The specified programming command is not recognized by the spectrum analyzer. Press [EXIT] to clear. (U)

CONF: TEST FAIL
Indicates that the confidence test failed. If this happens, ensure that the CAL OUT connector is connected to the spectrum analyzer input, perform the CAL PEOQ & AMPTD routine, and then perform the confidence test again. This message also sets SRQ 110. (H) and (U)

EMPTY DLP MEM
Indicates that the user-defined items (user-defined functions, user-defined variables, user-defined traces, user-defined softkeys) and any personalities (for example, the HP 85715A CATV System Monitor Personality) in the spectrum analyzer's memory have been deleted. If the message is continuously displayed at power-up, it may indicate a hardware failure. See the spectrum analyzer's Service Guide for more information. (U)

Factory dip, not editable
Indicates that the downloadable program or variable that you have selected is not used by a "personality" and cannot be edited. A personality is a program that is manufactured by Hewlett-Packard and is available for use with the HP 8600 Series spectrum analyzer. An example of a personality is the HP 85715A CATV system monitor personality. (U)

FAIL: ...
An error was discovered during the power-up check. The 4-digit by 10-digit code indicates the type of error. Error codes are described in the spectrum analyzer's service guide. (U)

File type incompatible
Indicates that the selected file is not a display image file. The file name for a display image file is always preceded by an "L." (U)

FREQ UNCAL
If the FREQUENCY UNCAL message appears constantly, it indicates a wrong-tuning error. If this message appears constantly, perform the CAL FREQUENCY routine. FREQUENCY UNCAL appears briefly during the CAL FREQUENCY routine; this is normal and does not indicate a problem. (U) and (H) (U) and (H)
Function not available in current Mode
Indicates that the function that you have selected can only be used with the spectrum analyzer mode. You can use the [MODE] key to select the spectrum analyzer mode. (U)

Function not available with analog display
Indicates that the function that you have selected is not compatible with the Analog+ display mode. To use the function, you must first turn off the Analog+ display mode with [ANALOG+ OFF]. (U)

Gate card not calibrated
This message can indicate that either the CAL AMPTD routine needs to be performed before the time-gating functions can be used, or that something was connected to the GATE TRIGGER INPUT connector during the CAL AMPTD or CAL FREQUENCY & AMPTD routines. If your spectrum analyzer has an Option 105 installed in it, you should ensure that nothing is connected to the GATE TRIGGER INPUT connector when the CAL AMPTD or CAL FREQUENCY & AMPTD routines are performed. (U) and (H)

INTERNAL LOCKED
The spectrum analyzer's internal trace and state registers have been locked. To unlock the trace or state registers, press [DISCARD DATA] so that OFF is underlined. For remote operation, use [RESET OFF]. (U)

INVALID ACDEF:
The specified ACDEF name is not valid. See the ACDEF programming command. (U)

INVALID AMPCON: FREQ
For the AMPCON command, the frequency data must be entered in increasing order. See the description for the AMPCON programming command for more information. (U)

INVALID BLOCK FORMAT: IF STATEMENT
An invalid block format appeared within the IF statement. See the description for the IF THEN ELSE ENDIF programming command for more information. (U)

INVALID CARD
Indicates one of the following conditions: a card reader is not installed, the memory card is write-protected (check the position of the switch on the memory card), the memory card is a read-only memory (ROM) card, or a memory card has not been inserted. This message can also occur if remote programming commands for the memory card capability are executed with an HP 8550A or HP 8565A that does not have an Option 003. (U)

INVALID CARD: BAD MEDIA
Indicates the formatting routine (FORMAT) for the memory card could not be completed. See the description for INVALID CARD above for more information about the possible causes of this message. (U) and (H)

INVALID CARD: DATA ERROR
Indicates the data could not be retrieved from the memory card. (U) and (H)

INVALID CARD: DIRECTORY
Indicates the memory card has not been formatted. (U)

INVALID CARD: NO CARD
Indicates a memory card has not been inserted. (U)

INVALID CARD: TYPE
Indicates one of the following conditions: a card reader is not installed, the memory card is write-protected (check the position of the switch on the memory card), the memory card is a read-only memory (ROM) card, or a memory card has not been inserted. This message can also occur if remote programming commands for the memory card capability are executed with an HP 8550A or HP 8565A that does not have an Option 003. (U)

INVALID CHECKSUM: USTATE
The user-defined state does not follow the expected format. (U)

INVALID COMPARE OPERATOR
An IF/THEN or REPEAT/UNTIL routine is improperly constructed. Specifically, the IF or UNTIL operands are incorrect. (U)

INVALID DEF: FM or TV option only
Indicates that the selected option cannot be used until the appropriate option is installed in the spectrum analyzer. (U)
INVALID ENTER FORMAT
The enter format is not valid. See the appropriate programming command description to determine the correct format. (U)

INVALID <file name> NOT FOUND
Indicates that the specified file could not be loaded into spectrum analyzer memory or purged from memory because the file name cannot be found. (U)

INVALID FILENAME
Indicates the specified file name is invalid. A file name is invalid if there is no file name specified, if the first letter of the file name is not alphabetic, or if the specified file type does not match the type of file. See the description of the NAME command for more information. (U)

INVALID FILE: NO ROOM
Indicates that there is insufficient space available on the memory card to store the data. (U)

INVALID HP-IB ADRES/OPERATION
An HP-IB operation was aborted due to an incorrect address or invalid operation. Check that there is only one controller (the spectrum analyzer) connected to the printer or plotter. (U)

INVALID HP-IB OPERATION REN TRUE
The HP-IB operation is not allowed. (This is usually caused by trying to print, or plot when a controller is on the interface bus with the spectrum analyzer.) To use the spectrum analyzer print or plot functions, you must disconnect any other controllers on the HP-IB. If you are using programming commands to print or plot, you can use an HP BASIC command instead of disconnecting the controller. See the HP 6550B E-Series and L-Series Spectrum Analyzers and HP 6591C Cable TV Analyzer Programmer's Guide for more information. (U)

INVALID ITEM
Indicates an invalid parameter has been used in a programming command. (U)

INVALID KEYLABEL
Indicates that the specified key label contains too many characters. A key label is limited to 8 printable characters per label line. (U)

INVALID KEYNAME
The specified key name is not allowed. (The key name may have caused an underflow of the second character in the key name, or avoid beginning the key name with the following pairs of letters: LB, OA, QA, TA, TH, MA, ML, TL, OT, and DR. (U)

INVALID OUTPUT FORMAT
The output format is not valid. See the appropriate programming command description to determine the correct format. (U)

INVALID RANGE: Step < Start
Indicates the first trace element specified for a range of trace elements is larger than the ending trace element. When specifying a trace range, the starting element must be less than the ending element. For example, TRA(2,5) is legal but TRA(5,2) is not. (U)

INVALID REGISTER NUMBER
The specified trace register number is invalid. (U)

INVALID REPEAT MEM OFF
Memory overflow occurred due to a REPEAT routine. This can occur if there is not enough spectrum analyzer memory for the REPEAT UNTIL declaration, or if the REPEAT UNTIL declaration exceeds 647 characters. (U)

INVALID REPEAT NEXT LEVEL
The nesting level in the REPEAT routine is improperly constructed. This can occur if too many REPEAT routines are nested. When used within a downloadable program (U.P), the maximum number of REPEAT UNTIL statements that can be nested is 20. (U)

INVALID RS-232 ADRES/OPERATION
An RS-232 operation was aborted due to an invalid operation. (U)

INVALID SAVE REG
Data has not been saved in the specified state or trace register, or the data is corrupt. (U)
INVALID SCRMOVE
Indicates the spectrum analyzer may have a hardware failure. See the
spectrum analyzer's Service Guide for more information. (U)

INVALID START INDEX
Indicates that the first trace element specified for a range of trace elements is
not within the trace range of the specified trace. (U)

INVALID STOP INDEX
Indicates that the ending trace element specified for a range of trace elements is
not within the trace range of the specified trace. (U)

INVALID STORE DEST:
The specified destination field is invalid. (U)

INVALID TRACE:
The specified trace is invalid. (U)

INVALID TRACE NAME:
The specified trace name is not allowed. Use an underscore as the second
character in the trace name, or avoid beginning the trace name with the
following pairs of letters: LR, OA, OL, TA, TR, TR, MA, MP, TS, OT, and DR.
(U)

INVALID TRACENAME:
Indicates the specified trace could not be saved because the trace name is not
allowed. To avoid this problem, use an underscore as the second character in
the trace name, or avoid beginning the trace name with the following pairs of
letters: LR, OA, OL, TA, TR, TR, MA, MP, TS, OT, and DR. (U)

INVALID VALUE PARAMETER:
The specified value parameter is invalid. (U)

INVALID VARGIF:
The specified variable name is not allowed. To avoid this problem, use an
underscore as the second character in the variable label, or avoid beginning
the variable label with the following pairs of letters: LR, OA, OL, TA, TR, TR,
MA, MP, TS, OT, and DR. (U)

INVALID WINDOW TYPE:
The specified window is invalid. See the description for the TVNDW
programming command. (U)

LO UNLV
Indicates that the spectrum analyzer's local oscillator distribution amplifier is
not functioning properly. (U)

Marker Count Reduce SIGN
Indicates the resolution bandwidth to span ratio is too small to use the marker
count function. Check the span and resolution bandwidth settings. (U)

Marker Count Width RES BW
Indicates that the current resolution bandwidth setting is too narrow to use
with the marker counter function. The marker counter function can be in
narrow resolution bandwidths (bandwidths that are less than 1 kHz) with the
following procedure:
1. Place the marker on the desired signal.
2. Increase the resolution bandwidth to 1 kHz and verify the marker is on the
   signal peak.
3. If the marker is on the signal peak, the marker count function can be used:
   In either the 1 kHz resolution bandwidth or the original narrow resolution
   bandwidth setting. If the marker is not on the signal peak, it should be
   moved to the signal peak and the marker counter function should not be
   used with a resolution bandwidth setting of less than 1 kHz. (U)
MEAS UNCAL
The measurement is uncalibrated. Check the sweep time, span, and
bandwidth settings, or press AUTO CALIBRATE. (U)

MEMORY OVERFLOW/ERASE DLP MEM and reload
This message indicates that too many user-defined items (functions, variables,
key definitions), or downloadable programs have been loaded into spectrum
analyzer memory. If this message appears, use DLP MEMORY RESIZE and then
load the user-defined item or downloadable program into spectrum analyzer
memory. (U)

No card found
Indicates that the memory card is not inserted. (U)

No points defined
Indicates the specified limit line or amplitude correction function cannot be
performed because no limit line segments or amplitude correction factors
have been defined. (U)

OVEN COLD
Indicates that the spectrum analyzer has been powered up for less than 5
minutes. (The actual temperature of the precision frequency oven is not
measured.) (Option 004 only) (U)

PARAMETER ERROR:
The specified parameter is not recognized by the spectrum analyzer. See the
appropriate programming command description to determine the correct
parameters. (U)

PASSCODE NEEDED
Indicates that the function cannot be accessed without the pass code. (U)

POS-PR FAIL
Indicates the positive peak detector has failed. (U)

REF UNLOCK
Indicates that the frequency reference is not locked to the external reference
input. Check that the 10 MHz REF OUT connector is connected to the EXT
REF IN connector, or, when using an external reference, that an external 10
MHz reference source of sufficient amplitude is connected to the EXT REF IN
connector. (U) and (H)

Require 1 signal > PEAK EXCURSION above THRESHOLD
Indicates that the N 35 PTZ routine cannot locate a signal that is high enough
to measure. The signal must be greater than the peak excursion above the
threshold level to measure. (U)

Require 3 signals > PEAK EXCURSION above THRESHOLD
Indicates that the 3 AM routine cannot locate three signals that are high
each enough to measure. The signals must be greater than the peak excursion
above the threshold level to measure. (U)

Require 4 signals > PEAK EXCURSION above THRESHOLD
Indicates that the TOI routine cannot locate four signals that are high enough
to measure. The signals must be greater than the peak excursion above the
threshold level to measure. (U)

Required option not installed Some spectrum analyzer functions require
that an option be installed in the spectrum analyzer. See the description for
the function in the HP 8590 E-Series and L-Series Spectrum Analyzers User's
Guide for more information about which option is required. (U)

RES-BW NOISE FAIL
Indicates the noise floor level is incorrect at the indicated bandwidth. (H)

RES-BW SHAPE FAIL
Indicates the 3 dB bandwidth is not within specifications. (U)

RF PRESEL ERROR
Indicates that the preselctor peak routine cannot be performed. (H)

RF PRESEL TIMEOUT
Indicates that the preselctor peak routine cannot be performed. (H)

SAMPLE FAIL
Indicates the sample detector has failed. (H)

SETUP ERROR
Indicates that the span, channel bandwidth, or channel spacing are not set
correctly for the adjacent channel power or channel power measurement. (U)

Signal Not Found
Indicates the PEAK ZOOM routine did not find a valid signal. (U)

A-12 Spectrum Analyzer Error Messages
**SIGNAL CLIPPED**
Indicates that the current FFT measurement sweep resulted in a trace that is above the top graticule line on the spectrum analyzer display. If this happens, the input trace (trace A) has been “clipped,” and the FFT data is not valid. (U)

**Signals do not fit expected % AM pattern**
Indicates that the % AM routine cannot perform the percent AM measurement because the on-screen signals do not have the characteristics of a carrier with two sidebands. (U)

**Signals do not fit expected TOI pattern**
Indicates that the TOI routine cannot perform the third order intermodulation measurement because the on-screen signals do not have the characteristics of two signals and two distortion products. (U)

**SMPR UNLK**
Indicates that the sampling oscillator circuitry is not functioning properly. If this message appears, check that the external frequency reference is correctly connected to the EXT RFN INPUT. (U) and (II)

**SOFTKEY OVF**
Softkey setting exceeds the maximum number of levels. (U)

**SRQ**
The specified service request is active. Service requests are a form of informational message and are explained in Appendix A of the HP 8550 E-Series and L-Series Spectrum Analyzers User's Guide. (U)

**STEP' GAIN/ATN FAIL**
Indicates that the step gain has failed. (U)

**Step at marker not available with negative detection**
Indicates that the marker counter cannot be used when negative peak detection is selected. To use the marker counter, turn off negative peak detection with MARK ON/OFF. (U)

**TABL* FULL**
Indicates the upper or lower table of limit lines contains the maximum number of entries allowed. Additional entries to the table are ignored. (U)

**TO SIGNAL NOT FOUND**
Indicates the tracking generator output signal cannot be found. Check that the tracking generator output (RF OUT 600 or RF OUT 700) is connected to the spectrum analyzer input connector with an appropriate cable. (U)

**TV UNLV**
This message can indicate the following: that the source power is set higher or lower than the spectrum analyzer can provide, that the frequency span extends beyond the specified frequency range of the tracking generator, or that the calibration data for the tracking generator is incorrect. See “Stimulus-Response Measurements” in Chapter 4 of the HP 8550 E-Series and L-Series Spectrum Analyzers User's Guide for more information. (U)

**The maxy signal with valid N dB points**
Indicates the N dB PTS function has located two or more signals that have amplitudes within the specified dB from the signal peak. If this happens, you should increase the span of the spectrum analyzer so that only the signal that you want to measure is displayed. (U)

**Trace A is not available**
Indicates that trace A is in the store-blank mode and cannot be used for limit-line testing. Use MARK ON/OFF or MARK EXT to change trace A from the store-blank mode to the clear write mode, and then turn on limit-line testing. (U)

**UNDF KEY**
The softkey number is not recognized by the spectrum analyzer. (U)

**USING DEFAULTS self cal needed**
Indicates that the current correction factors are the default correction factors and that the CAL FREQ & AMPTD routine needs to be performed. For the HP 8520A, HP 8520B, HP 8520C, or HP 8520D, CAL TYP routine needs to be performed also. (U)

**Verify gate trigger input is disconnected before CAL AMPTD**
This message is meant to remind you that nothing should be connected to the 0.5GS TRIGGER INPUT connector on the spectrum analyzer's rear panel during the CAL AMPTD routine. (U)

**VTD-DW FAIL**
Indicates the video bandwidths have failed. (II)
Waiting for gate input...
Indicates that the spectrum analyzer needs an external trigger signal to use
the time-gating functions. Before using the time-gating functions, you should
ensure there is a trigger pulse connected to the GATE TRIGGER INPUT
connector on the rear panel of spectrum analyzer and that the GATE OUTPUT
is connected to the EXT TRIG INPUT connector. If you do not want to use the
time-gating functions, press [Preset]. (U)

YPF is not available
The YPF is only available for the HP 8592L, HP 8593E, HP 8595E, and
HP 8596E. (U)

AM, FM, and Pulsed RF Reference Charts

This appendix contains charts and graphs that are helpful when you are performing amplitude modulation, frequency modulation, or pulsed RF measurements.

Modulation information can easily be determined from the carrier signal and a
sideband.
The difference in amplitude between the two signals can be used to determine
percent of modulation. Markers read the frequency difference between the two
signals, which is equal to the modulating frequency. The following table and
graph help you to determine amplitude modulation information.

<table>
<thead>
<tr>
<th>% Modulation</th>
<th>Sideband Level below Carrier (dB)</th>
<th>Sideband Level below Carrier (dB)</th>
<th>% Modulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40</td>
<td>10</td>
<td>63</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
<td>30</td>
<td>0.3</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
<td>40</td>
<td>0.0</td>
</tr>
<tr>
<td>30</td>
<td>16.5</td>
<td>50</td>
<td>0.63</td>
</tr>
<tr>
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<td>14</td>
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A-16  Spectrum Analyzer Error Messages
Table B-2.
Carrier and First Sideband Charts for Calibrating Deviation

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<td>7th</td>
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<tr>
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<td>2nd</td>
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* I = modulation index
Figure B-2. Bessel Null Graph

Bessel functions for the first eight orders

Figure B-3. Loss in Sensitivity (Pulsed RF versus CW)
Cross Reference of Programming Command to Key Function

This appendix lists the programming commands alphabetically. Use the "Key" column to identify the command that is similar to front-panel or sofkey function.

Table C-1. Cross Reference of Programming Command to Key Function

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<td>Continuous Sweep Measurement</td>
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<td>ACFEXT</td>
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Figure B-4. RES BW Setting for Pulsed RF Computed from $t_2B = 0.1$
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### Table C-1.
Cross Reference of Programming Command to Key Function (continued)

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C-8 Cross Reference of Programming Command to Key Function
### Cross Reference of Programming Command to Key Function (continued)

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Cross Reference of Programming Command to Key Function
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Locating a Softkey

Use this appendix to locate a softkey. For each softkey listed, a corresponding front-panel key is listed. Pressing the front-panel key accesses the menu containing the desired softkey.

Table D-1. Softkey Locations

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D-12  Locating a Softkey

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### Key Menus

This chapter contains the key menu diagrams for the HP 8560 B-Series and L-Series spectrum analyzers. The menus are documented for the:

- HP 8560L
- HP 8561E
- HP 8560L
- HP 8565E
- HP 8594E
- HP 8595E
- HP 8590E

Each front-panel key is listed alphabetically. The softkeys accessed by a front-panel key are shown below the front-panel key.

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Note: Some of the softkeys in the key menus are model or option-specific and may not appear on your spectrum analyzer.
FOR RECALLING AND SAVING TO MEMORY CARD:
(that is, with CARD selected)

RECALL

FOR RECALLING AND SAVING TO ANALYZE MEMORY:
(that is, with INTERNAL selected)
B
EDGE POL POS NEG, 2-12
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ENTER REF EDGE, 2-13
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Export Read, 2-14
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