

**HP 8566B/8568B Spectrum Analyzer  
Quick Reference**

Manual Part No. 5955-8970  
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## INTRODUCTION

The following pages are a compilation of all current HP 8566B/8568B programming codes. More information on each operation can be found in the HP 8566B/8568B Operating and Programming Manual. For comprehensive training in the remote operation of these analyzers, the HP 8566B + 24D/8568B + 24D Spectrum Analyzer Operation Course is offered at selected HP training centers.

### How to Use This Guide

The purpose of this guide is to provide quick reference to the experienced spectrum analyzer programmer.

To find a programming code which performs a particular function, first refer to the functional index which shows the programming codes grouped according to similar function. The key word and brief definition of each code are shown in this index. Once the desired key word is found, refer to the alphabetical listing of the programming codes for further key word definition and syntax information.

For further information on syntax, refer to the Notation Conventions and Syntax Conventions sections. Secondary key words are parameters appearing in capital letters within the argument of key words. Their definitions can be found in the Secondary Key Word Summary.

## Notation Conventions

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

<b>BOLD TYPE</b>	All characters appearing in bold type are key words and must appear exactly as shown.
<b>CAPITAL LETTERS</b>	All characters which are capital letters are secondary key words and appear within the key word syntax. They must appear exactly as shown and their meanings can be found in the Secondary Key Word Summary.
<>	Characters appearing in angular brackets are considered to be elements of the language being defined. Their meanings can be found in the section on syntax conventions unless otherwise specified with the keyword definition.
[ ]	Square brackets indicate that whatever occurs within the brackets is optional
	“or”: Indicates a choice of exactly one element from a list (e.g. <a> <b> indicates <a> or <b> but not both).
( )	Parentheses are used to clarify which elements are to be chosen from.
—	Indicates a space must be placed at the indicated location (e.g. <b>A</b> —<a> indicates there must be a space between the key word, <b>A</b> , and the element, <a>).
::=	“Is defined as” (e.g. <a>::=<b><c> indicates that <a> can be replaced by the series of elements, <b><c> in any statement where <a> occurs).
{ }	Integers appearing in braces indicate that the integer is transmitted to the analyzer as a single 8-bit byte.
●	Indicates that the programming code applies to the HP 8566B only.
■	Indicates that the programming code applies to the HP 8568B only.

## 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>
- <analyzer internal I/O bus>:: =  
ASCII decimal number from 0 to 63
- <analyzer memory address>:: =  
ASCII decimal number from 0 to 17,700
- <block data field>:: =  
<A-block data field>|<I-block data field>
- <command list>:: = any spectrum analyzer command
- <CR>:: = {13} (ASCII carriage return)
- <delimiter>:: = <CR>|<LF>|<ETX>|,|;
- <destination>:: =  
<trace label>|<variable identifier>|TRA|TRB|TRC
- <display memory address>:: =  
ASCII decimal number from 0 to 4095
- <EOI>:: = end or identify .
- <ETX>:: = {3} (ASCII end of text)
- <flow operand 1>:: =  
<variable identifier>|<numeric data field>
- <flow operand 2>:: =  
<variable identifier>|numeric data field>

<function label>:: =  
 2 – 12 ASCII characters defined in the FUNCDEF  
 statement

<I-block data field>:: =  
 #[<command list>END; (use when the length of the  
 command list is not known)

<integer>:: = integer number

<key number>:: =  
 integer 1 – 999 defined in KEYDEF statement

<length>:: = two 8-bit bytes specifying the length of the  
 command list

<LF>:: = {10} (ASCII line feed)

<message>:: = ASCII decimal number

<numeric data field>:: = <real>

<numeric data format>:: =  
 <real><CR><LF><EOI>

<operand 1>:: =  
 <trace label>|<variable identifier>|<numeric data  
 field>|TRA|TRB|TRC

<operand 2>:: =  
 <trace label>|<variable identifier>|<numeric data  
 field>|TRA|TRB|TRC

<real>:: = positive or negative real number

<string data field>:: =  
 <string delimiter><command list><string delimiter>

<string delimiter>:: =  
!"#\$%&'|/|:| = |@|\|~|^

<terminator>:: =  
DM| -DM|DB|HZ|KZ|MZ|GZ|MV|UV|SC|MS|US  
|<delimiter>

<trace destination>:: = <trace label>|TRA|TRB|TRC

<trace label>:: =  
2-12 ASCII characters defined in the TRDEF state-  
ment

<trace source>:: = <trace label>|TRA|TRB|TRC

<variable identifier>:: =  
2-12 ASCII characters defined in the VARDEF state-  
ment

## FUNCTIONAL INDEX

### FREQUENCY CONTROL

<b>CF</b>	Specifies center frequency
<b>CS</b>	Couples step size
<b>*FA</b>	Specifies start frequency
<b>*FB</b>	Specifies stop frequency
<b>FOFFSET</b>	Specifies frequency offset
<b>FS</b>	Specifies full frequency span as defined by instrument
<b>●KSQ</b>	Unlocks frequency band
<b>KSV</b>	Specifies frequency offset
<b>●KSt</b>	Locks frequency band
<b>■KS=</b>	Specifies resolution of frequency counter
<b>■MKFCR</b>	Specifies resolution of frequency counter
<b>SP</b>	Specifies frequency span
<b>SS</b>	Specifies center frequency step size

### INSTRUMENT STATE CONTROL

<b>IP</b>	Sets instrument parameters to preset values
<b>●KST</b>	Performs fast preset 2 – 22 GHz
<b>●KSU</b>	Performs external mixer preset
<b>KS(</b>	Locks save registers
<b>KS)</b>	Unlocks save registers
<b>●LF</b>	Presets 0 – 2.5 GHz
<b>RC</b>	Recalls previously saved state
<b>RCLS</b>	Recalls previously saved state
<b>SAVES</b>	Saves current state of the analyzer in the specified register
<b>SV</b>	Saves current state of analyzer in specified register
<b>USTATE</b>	Configures or returns configuration of user-defined states: ONEOS, ONSWP, TRMATH, VARDEF, FUNCDEF, TRDEF

\*Selected with instrument preset (IP)



## AMPLITUDE CONTROL

<b>AT</b>	Specifies input attenuation
<b>AUNITS</b>	Specifies amplitude units for input, output and display
<b>*CA</b>	Couples input attenuation
<b>E4</b>	Moves active marker to reference level
<b>*KSA</b>	Selects dBm as amplitude units
<b>KSB</b>	Selects dBmV as amplitude units
<b>KSC</b>	Selects dBuV as amplitude units
<b>KSD</b>	Selects voltage as amplitude units
<b>KSI</b>	Extends reference level range
<b>KSW</b>	Performs amplitude error correction routine
<b>KSX</b>	Incorporates correction data in amplitude readouts
<b>KSY</b>	Does not incorporate correction data in amplitude readouts
<b>KSZ</b>	Specifies reference level offset
<b>KSq</b>	Decouples IF gain and input attenuation
<b>KSw</b>	Displays correction data
<b>KS,</b>	Sets mixer level
<b>LG</b>	Selects log scale
<b>LN</b>	Selects linear scale
<b>MKRL</b>	Moves active marker to reference level
<b>ML</b>	Specifies mixer level
<b>RL</b>	Specifies reference level
<b>ROFFSET</b>	Specifies reference level offset

## BANDWIDTH CONTROL

<b>*CR</b>	Couples resolution bandwidth
<b>*CV</b>	Couples video bandwidth
<b>RB</b>	Specifies resolution bandwidth
<b>VB</b>	Specifies video bandwidth
<b>VBO</b>	Specifies coupling ratio of video bandwidth and resolution bandwidth

\* Selected with instrument preset (IP)

## SWEEP AND TRIGGER CONTROL

* <b>CONTS</b>	Selects continuous sweep mode
* <b>CT</b>	Couples sweep time
■ <b>KSF</b>	Measures sweep time
<b>KSt</b>	Continues sweep from marker
<b>KSu</b>	Stops sweep at active marker
<b>KSx</b>	Sets external trigger (eliminates auto-refresh)
<b>KSy</b>	Sets video trigger (eliminates auto-refresh)
<b>ST</b>	Specifies sweep time
<b>SNGLS</b>	Selects single sweep mode
* <b>S1</b>	Selects continuous sweep mode
<b>S2</b>	Selects single sweep mode
<b>TM</b>	Selects trigger mode: free run, video, line, external
<b>TS</b>	Takes a sweep
* <b>T1</b>	Sets trigger mode to free run
<b>T2</b>	Sets trigger mode to line
<b>T3</b>	Sets trigger mode to external
<b>T4</b>	Sets trigger mode to video

## MARKER CONTROL

<b>E1</b>	Moves active marker to maximum signal detected
<b>E2</b>	Moves marker frequency into center frequency
<b>E3</b>	Moves marker or delta frequency into step size
<b>E4</b>	Moves active marker to reference level
● <b>KSK</b>	Moves active marker to next highest peak
<b>KSL</b>	Turns off average noise level marker
<b>KSM</b>	Returns average value at marker, normalized to 1 Hz bandwidth

\* Selected with instrument preset (IP)

● <b>KSN</b>	Moves active marker to minimum value detected
<b>KSO</b>	Moves marker delta frequency into span
■ <b>KS↓</b>	Continues sweep from marker
<b>KS↑</b>	Stops sweep at active marker
■ <b>KS=</b>	Specifies resolution of marker frequency counter
<b>KS{92}</b>	Enters DL, TH, M2, M3 in display units
<b>MA</b>	Returns marker amplitude
■ * <b>MCO</b>	Turns off marker frequency count
■ <b>MCI</b>	Turns on marker frequency count
<b>MF</b>	Returns marker frequency
<b>MKA</b>	Specifies amplitude of active marker
<b>MKACT</b>	Specifies active marker: 1, 2, 3, or 4
<b>MKCF</b>	Enters marker frequency into center frequency
<b>MKCONT</b>	Continues sweep from marker
<b>MKD</b>	Moves delta marker to specified frequency
<b>MKF</b>	Specifies frequency of active marker
■ <b>MKFC</b>	Counts marker frequency for greater resolution (See MKFCR)
■ <b>MKFCR</b>	Specifies resolution of marker frequency counter
<b>MKMIN</b>	Moves active marker to minimum signal detected
<b>MKN</b>	Moves active marker to specified frequency or center screen
<b>MKNOISE</b>	Returns average value at marker, normalized to 1 Hz bandwidth
<b>MKOFF</b>	Turns all markers, or the active marker off

\* Selected with instrument preset (IP)

<b>MKP</b>	Specifies marker position horizontally, in display units
<b>MKPAUSE</b>	Pauses sweep at marker for duration of specified delay time (in seconds)
<b>MKPK</b>	Moves active marker to maximum signal detected, or to adjacent signal peaks
* <b>MKPX</b>	Specifies minimum excursion for peak identification. Preset value is 6 dB
<b>MKREAD</b>	Specifies marker readout mode
<b>MKRL</b>	Moves active marker to reference level
<b>MKSP</b>	Moves marker delta frequency into span
<b>MKSS</b>	Moves marker frequency to center frequency step size
<b>MKSTOP</b>	Stops sweep at active marker
<b>MKTRACE</b>	Moves active marker to corresponding position on another specified trace
<b>MKTRACK</b>	Turns marker signal track on or off
<b>MKTYPE</b>	Sets marker type
* <b>MT0</b>	Turns off marker signal track
<b>MT1</b>	Turns on marker signal track
* <b>M1</b>	Turns off active marker
<b>M2</b>	Turns on active marker and moves it to center screen
<b>M3</b>	Turns on delta marker
<b>M4</b>	Turns on marker zoom

## COUPLING CONTROL

* <b>CA</b>	Couples input attenuation
* <b>CR</b>	Couples resolution bandwidth
* <b>CS</b>	Couples step size
* <b>CT</b>	Couples sweep time
* <b>CV</b>	Couples video bandwidth
* <b>VBO</b>	Specifies coupling ratio of video bandwidth and resolution bandwidth

\* Selected with instrument preset (IP)

## PRESELECTOR CONTROL

- **FPKA** Performs fast preselector peak and returns measured value of active marker
- **KSJ** Allows manual control of DAC
- **KS#** Turns off YTX self-heating correction
- **KS/** Allows manual peaking of preselector
- **KS=** Selects factory preselector setting
- **PP** Peaks preselector

## RF INPUT CONTROL

- **I1** Enables left RF input
- **\*I2** Enables right RF input

## EXTERNAL MIXING COMMANDS

- **KSU** Performs external mixer preset
- **KSv** Identifies signals for external mixing frequency bands

Additional external mixing commands can be found on page 58.

## DISPLAY CONTROL

- \* **ANNOT** Turns annotation on or off. Preset condition is on.
- AUNITS** Specifies amplitude units for input, output, and display
- DL** Specifies display line level in dBm
- DLE** Turns display line on and off
- \* **GRAT** Turns graticule on or off. Preset condition is on.
- KSg** Turns off CRT beam
- \* **KSh** Turns on CRT beam
- KSm** Turns off graticule
- \* **KSn** Turns on graticule
- KSo** Turns off annotation

\* Selected with instrument preset (IP)

*KSp	Turns on annotation
*LG	Selects log scale
LN	Selects linear scale
*LO	Turns off display line
TH	Specifies display threshold value
THE	Turns threshold on or off
*TO	Turns off threshold
TRGRPH	Dimensions and graphs a trace

## READING AND WRITING DISPLAY MEMORY

*DA	Specifies display address
DD	Writes to display
DR	Reads display and increments address
DSPLY	Displays the value of a variable on the analyzer screen
DT	Defines a character for label termination
DW	Writes to display and increments address
*D1	Sets display to normal size
D2	Sets display to full CRT size
D3	Sets display to expanded size
*EM	Erases trace C memory
GR	Graphs specified y values on CRT
*HD	Holds or disables data entry and blanks active function CRT readout
IB	Inputs trace B in binary units
KSE	Sets title mode
KS{ 39 }	Writes to display memory in fast binary
KS{ 125 }	Writes to display memory in binary
KS{ 127 }	Prepares analyzer to accept binary display write commands
LB	Writes specified characters on CRT
OP	Returns lower left and upper right vertices of display window

\*Selected with instrument preset (IP)

<b>PA</b>	Draws vectors to specified x and y positions
<b>*PD</b>	Turns on beam to view vector
<b>PR</b>	Draws vector from last absolute position
<b>PS</b>	Skips to next display page
<b>PU</b>	Turns off beam, blanking vector
<b>SW</b>	Skips to next control instruction
<b>TEXT</b>	Writes text string to screen at current pen location

## TRACE PROCESSING

<b>*A1</b>	Clear-writes trace A
<b>A2</b>	Max holds trace A
<b>A3</b>	Stores and views trace A
<b>A4</b>	Stores and blanks trace A
<b>B1</b>	Clear-writes trace B
<b>B2</b>	Max holds trace B
<b>B3</b>	Stores and views trace B
<b>*B4</b>	Stores and blanks trace B
<b>BLANK</b>	Stores and blanks specified trace register
<b>CLRW</b>	Clear-writes specified trace register
<b>KSj</b>	Stores and views trace C
<b>KS<sub>k</sub></b>	Stores and blanks trace C
<b>KS{39}</b>	Writes to display memory in fast binary
<b>KS{123}</b>	Reads display in binary units
<b>KS{125}</b>	Writes to display memory in binary units
<b>KS{126}</b>	Outputs every nth value of trace
<b>MOV</b>	Moves source to the destination
<b>MXMH</b>	Max holds the specified trace register
<b>TA</b>	Outputs trace A
<b>TB</b>	Outputs trace B
<b>TRDSP</b>	Turns specified trace on or off, but continues taking information
<b>VIEW</b>	Views specified trace register

\*Selected with instrument preset (IP)

## TRACE MATH

<b>AMB</b>	A - B into A
<b>AMBPL</b>	(A - B) + DL into A
<b>APB</b>	A + B into A
<b>AXB</b>	Exchanges A and B
<b>BL</b>	B - DL into B
<b>BML</b>	B - DL into B
<b>BTC</b>	B into C
<b>BXC</b>	Exchanges B and C
* <b>C1</b>	A - B off
<b>C2</b>	A - B into A
<b>EX</b>	Exchanges A and B
<b>KSG</b>	Turns on video averaging
* <b>KSH</b>	Turns off video averaging
<b>KSc</b>	A + B into A
<b>KSi</b>	Exchanges B and C
<b>KSI</b>	B into C
<b>TRMATH</b>	Executes trace math or user-operator commands at end of sweep
<b>VAVG</b>	Turns video averaging on or off

## OTHER TRACE FUNCTIONS

<b>AUNITS</b>	Specifies amplitude units for input, output, and display
<b>COMPRESS</b>	Compresses trace source to fit trace destination
<b>CONCAT</b>	Concatenates operands and sends new trace to destination
<b>DET</b>	Specifies input detector type
<b>FFT</b>	Performs a forward fast fourier transform
* <b>KSa</b>	Selects normal detection
<b>KSb</b>	Selects position peak detection
<b>KSd</b>	Selects negative peak detection
<b>KSe</b>	Selects sample detection
<b>MEAN</b>	Returns trace mean

\* Selected with instrument preset (IP)



<b>ONEOS</b>	Executes specified command(s) at end of sweep
<b>ONSWP</b>	Executes specified command(s) at start of sweep
<b>PDA</b>	Returns probability density of amplitude
<b>PDF</b>	Returns probability density of frequency
<b>PEAKS</b>	Returns number of peak signals
<b>PWRBW</b>	Returns bandwidth of specified percent of total power
<b>RMS</b>	Returns RMS value of trace in display units
<b>SMOOTH</b>	Smooths trace over specified number of points
<b>STDEV</b>	Returns standard deviation of trace amplitude in display units
<b>SUM</b>	Returns sum of trace element amplitudes in display units
<b>SUMSQR</b>	Squares trace element amplitudes and returns their sum
<b>TRDEF</b>	Defines user-defined trace
<b>TRGRPH</b>	Dimensions and graphs a trace
<b>TRPRST</b>	Sets trace operations to preset values
<b>TRSTAT</b>	Returns current trace operations
<b>TWNDOW</b>	Formats trace information for fast fourier analysis (FFT)
<b>VARIANCE</b>	Returns amplitude variance of trace

### USER-DEFINED COMMANDS

<b>*DISPOSE</b>	Frees memory previously allocated by user defined functions. Instrument preset disposes ONEOS, ONSWP, and TRMATH functions.
<b>FUNCDEF</b>	Assigns specified program to function label

\* Selected with instrument preset (IP)

<b>KEYDEF</b>	Assigns function label to softkey number (See FUNCDEF)
<b>KEYEXC</b>	Executes specified softkey
<b>MEM</b>	Returns amount of allocatable memory available for user-defined commands
<b>ONEOS</b>	Executes specified command(s) at end of sweep
<b>ONSWP</b>	Executes specified command(s) at start of sweep
<b>TRDEF</b>	Defines user-defined trace
<b>TRMATH</b>	Executes specified trace math or user-operator commands at end of sweep
<b>USTATE</b>	Configures or returns configuration of user-defined state: ONEOS, ONSWP, TRMATH, VARDEF, FUNCDEF, TRDEF
<b>*VARDEF</b>	Defines variable name and assigns real value to it. Preset reassigns initial value to variable identifier.

### PROGRAM FLOW CONTROL

<b>IF</b>	Compares two specified operands. If condition is true, executes commands until next ELSE or ENDIF statements are countered
<b>THEN</b>	No-operation function
<b>ELSE</b>	Delimits alternate condition of IF command
<b>ENDIF</b>	Delimits end of IF command
<b>REPEAT</b>	Delimits the top of the REPEAT UNTIL looping construct
<b>UNTIL</b>	Compares two specified operands. If condition is true, commands are executed following this command. If condition is false operands are executed following the previous REPEAT command.

\* Selected with instrument preset (IP)

## MATH FUNCTIONS

<b>ADD</b>	Operand 1 + operand 2 into destination
<b>AVG</b>	Operand is averaged into destination
<b>CONCAT</b>	Concatenates two operands and sends new trace to destination
<b>CTA</b>	Converts operand values from display units to measurement units
<b>CTM</b>	Converts operand values from measurement units to display units
<b>DIV</b>	Operand 1 / operand 2 into destination
<b>EXP</b>	Operand is divided by specified scaling factor before being raised as a power of 10
<b>LOG</b>	LOG of operand is taken and multiplied by specified scaling factor
<b>MIN</b>	Minimum between operands is stored in destination
<b>MOV</b>	Source is moved to destination
<b>MPY</b>	Operand 1 * operand 2 into destination
<b>MXM</b>	Maximum between operands is stored in destination
<b>SQR</b>	Square root of operand is stored in destination
<b>SUB</b>	Operand 1 - operand 2 into destination
<b>XCH</b>	Contents of the two destinations are exchanged

Operations on specific traces (A, B, and C) can be found in the Trace Math section.

\* Selected with instrument preset (IP)

## INFORMATION AND SERVICE DIAGNOSTICS COMMANDS

<b>BRD</b>	Reads data word at analyzer's internal input/output bus
<b>BWR</b>	Writes data word to analyzer's internal input/output bus
<b>ERR</b>	Returns results of processor test
<b>ID</b>	Returns the HP model number of analyzer used (HP 8566B or HP 8568B)
● <b>KSF</b>	Shifts YTO by intermediate frequency
■ <b>KSF</b>	Measures sweep time
<b>KSJ</b>	Allows manual control of DAC
■ <b>KSK</b>	Counts pilot IF at marker
■ <b>KSN</b>	Counts voltage-controlled oscillator at marker
● <b>KSQ</b>	Unlocks frequency band
<b>KSQ</b>	Counts signal IF
<b>KSR</b>	Turns frequency diagnostics on
■* <b>KSS</b>	Second LO frequency is determined automatically
■ <b>KST</b>	Shifts second LO down
■ <b>KSU</b>	Shifts second LO up
<b>KSf</b>	Recovers last instrument state at power on
<b>KSq</b>	De-couples IF gain and input attenuation
<b>KSr</b>	Sets service request 102
● <b>KS†</b>	Locks frequency band
■ <b>KS†</b>	Continues sweep from marker
<b>KSu</b>	Stops sweep at active marker
■ <b>KSv</b>	Inhibits phase lock
<b>KS<sub>w</sub></b>	Displays correction data
■ <b>KS=</b>	Specifies resolution of frequency counter
● <b>KS=</b>	Selects factory preselector setting
■ <b>KS&gt;</b>	Specifies preamp gain for signal input 1

\*Selected with instrument preset (IP)

■ <b>KS&lt;</b>	Specifies preamp gain for signal input 2
● <b>KS#</b>	Turns off YTX self-heating correction
● <b>KS/</b>	Selects manual preselector peak
<b>MBRD</b>	Reads specified number of bytes starting at specified address and returns to controller
<b>MBWR</b>	Writes specified block data field into analyzer's memory starting at specified address
<b>MRD</b>	Reads two-byte word starting at specified analyzer memory address and returns word to controller
<b>MRDB</b>	Reads 8-bit byte contained in specified address and returns byte to controller
<b>MWR</b>	Writes two-byte word to specified analyzer memory address
<b>MWRB</b>	Writes one-byte message to specified analyzer memory address
<b>REV</b>	Returns analyzer revision number
<b>RQS</b>	Returns decimal weighting of status byte bits which are enabled during service request

## OUTPUT FORMAT CONTROL

<b>DR</b>	Reads display and increments address
<b>DSPLY</b>	Displays value of variable on analyzer screen
<b>EE</b>	Enables front panel number entry
<b>KSJ</b>	Allows manual control of DAC
<b>KSP</b>	Sets HP-IB address
● <b>KSS</b>	Sets fast HP-IB
<b>KS{91}</b>	Returns amplitude error
● <b>KS{94}</b>	Returns code for harmonic number in binary

\* Selected with instrument preset (IP)

<b>KS{123}</b>	Reads display in binary units
<b>KS{126}</b>	Returns every nth value of trace
<b>LL</b>	Provides lower left x-y recorder output voltage at rear panel
<b>MA</b>	Returns marker amplitude
* <b>MDS</b>	Specifies measurement data size to byte or word. Preset condition is word.
<b>MDU</b>	Returns values of CRT baseline and reference level
<b>MF</b>	Returns marker frequency
<b>OA</b>	Returns active function
<b>OL</b>	Returns learn string
<b>OT</b>	Returns display annotation
<b>O1</b>	Selects output format as integers (ASCII) representing display units or display memory instruction words
<b>O2</b>	Selects output format as two 8-bit bytes
* <b>O3</b>	Selects output format as real numbers (ASCII) in Hz, volts, dBm, or seconds
<b>O4</b>	Selects output format as one 8-bit byte
<b>TA</b>	Outputs trace A
<b>TB</b>	Outputs trace B
* <b>TDF</b>	Selects trace data output format as O1, O2, O3, O4, A-block data field, or I-block data field. Preset format is O3.
<b>UR</b>	Provides upper right x-y recorder output voltage at rear panel

## SYNCHRONIZATION

<b>DONE</b>	Sends message to controller after preceding commands are executed
<b>TS</b>	Takes a sweep

\* Selected with instrument preset (IP)

## SERVICE REQUEST

<b>KSr</b>	Allows service request 102
● <b>KS{43}</b>	Allows service request 140 and 102
<b>RQS</b>	Returns decimal weighting of status byte bits which are enabled during service request
<b>R1</b>	Resets service request 140
<b>R2</b>	Allows service request 140 and 104
* <b>R3</b>	Allows service request 140 and 110
<b>R4</b>	Allows service request 140 and 102
<b>SRQ</b>	Sets service request if operand bits are allowed by RQS

SRQ	COMMAND	BIT	DEFINITION
102	R4	1	units key pressed
102	● KS{43}	1	frequency limit exceeded
104	R2	2	end of sweep
110	R3	3	hardware broken
120	RQS	4	command complete - input buffer empty
140	all	5	illegal command
1xx	-	6	universal HP-IB service

## PLOTTER OUTPUT

<b>LL</b>	Provides lower left x-y recorder output voltage at rear panel
<b>PLOT</b>	Plots CRT. Scaling points, P1 and P2 must be specified and must be compatible with plotter.
<b>P1x</b>	Represents first x-axis scaling point to be specified in PLOT command
<b>P1y</b>	Represents first y-axis scaling point to be specified in PLOT command
<b>P2x</b>	Represents second x-axis scaling point to be specified in PLOT command
<b>P2y</b>	Represents second y-axis scaling point to be specified in PLOT command
<b>UR</b>	Provides upper right x-y recorder output voltage at rear panel

\*Selected with instrument preset (IP)

## MEMORY INFORMATION

*EM	Erases trace C memory
KSz	Sets display storage address
KS	Writes to display storage
MEM	Returns amount of allocatable memory available for user-defined commands, in bytes

## TRACKING GENERATOR APPLICATION

■ *KSS	Second LO frequency is determined automatically
■ KST	Shifts second LO down (necessary for HP 8444A-059 operation in spans <1 MHz)
■ KSU	Shifts second LO up

## OPERATOR ENTRY

EE	Enables front panel data number entry
EK	Enables DATA knob
EP	Enables manual entry into specified command
*HD	Holds or disables data entry and blanks active function CRT readout
KS	Shifts front panel keys

\*Selected with instrument preset (IP)



## Programming Codes

### A

**ADD\_<destination>,<operand 1>,<operand 2>;**  
Adds the operands and sends the sum to the destination.

**AMB\_ON|OFF;**  
Subtracts trace B from trace A and sends the result to trace A.

**AMBPL;**  
Subtracts trace B from trace A, adds the display line value to the difference, and sends the result to trace A.

**ANNOT\_ON|OFF|?**  
Turns the display annotation on or off. IP turns on the annotation.  
Query response: ON|OFF

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

**AT[\_(<real>[DB])|UP|DN|EP|?];**  
Specifies the RF input attenuation. Default units are DB.  
Query response: <numeric data format>

**AUNITS\_V|DBM|DBMV|DBUV|?;**  
Specifies the amplitude units for input, output and display.

**AVG\_<destination>,<operand 1>,<average count>;**  
Computes the average value of the operand and the destination according to the following algorithm:  
$$((N - 1)\langle\text{destination}\rangle + \langle\text{operand 1}\rangle) / N$$
  
where N is the specified average count  
<average count>:: = integer which selects the counter value

**AXB;**

Exchanges trace A and trace B.

**A1;**

Clear-writes trace A. Selected with IP.

**A2;**

Updates each element of trace A with the maximum level detected.

**A3;**

Stores and views trace A.

**A4;**

Stores and blanks trace A.

**B**

**BL;**

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

**BLANK\_(TRA|TRB|TRC);**

Stores and blanks the specified trace register.

**BML;**

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

**BRD\_<analyzer memory address>;**

Reads the two-byte word at the analyzer's internal input/output bus, at the specified address.

**BTC;**

Transfers trace B to trace C.

**BWR\_<analyzer internal I/O bus>, <message>;**

Writes a two-byte word to the analyzer's internal input/output bus, at the specified address.

<message>:: = ASCII decimal number representing a two-byte word

**BXC;**

Exchanges trace B and trace C.

**B1;**

Clear-writes trace B.

**B2;**

Updates each element of trace B with the maximum level detected.

**B3;**

Stores and views trace B.

**B4;**

Stores and blanks trace B. Selected with IP.

**C**

**CA;**

Couples the RF input attenuator. Selected with IP.

**CF[\_(<real>[HZ|KZ|MZ|GZ])|UP|DN|EP|?];**

Specifies the center frequency. Default units are Hz.

Query response: <numeric data format>

**CLRAVG;**

Sets the average counter to 1.

**CLRW\_(TRA|TRB);**

Clear-writes the specified trace register.

**COMPRESS\_<destination>,<source>,(AVG|POS|NEG|NRM|PK-PIT|PK-AVG|SMP)**

Compresses the trace source to fit the trace destination according to the specified compression algorithm.

<destination>::=<trace label>

<source>::=<trace label>

**CONCAT\_<trace destination>,<trace operand>,<trace operand>;**

Concatenates the trace operands and sends the new trace array to the destination.

<trace operand>:: = <trace label>|TRA|TRB|TRC

**CONTS;**

Selects continuous sweep mode. Selected with IP.

**CR;**

Couples the resolution bandwidth. Selected with IP.

**CS;**

Couples the center frequency step size. Selected with IP.

**CT;**

Couples the sweep time. Selected with IP.

**CTA\_<destination>,<operand>;**

Converts the operand values from display units to dBm.

<destination>:: = <variable identifier>

<operand>:: = <variable identifier>

**CTM\_<destination>,<operand>;**

Converts the operand values from dBm units to display units.

<destination>:: = <variable identifier>

<operand>:: = <variable identifier>

**CV;**

Couples the video bandwidth. Selected with IP.

**C1;**

Turns off the A – B into A function. Selected with IP.

**C2;**

Subtracts trace B from trace A and sends the result to trace A.

## D

**DA**<display memory address>;

Specifies the analyzer display memory address.

[**DA**<display memory address>;]**DD**<binary value><binary value>

Writes the specified 8-bit-binary bytes into the specified analyzer display memory address.

<binary value>::8-bit binary number

**DET\_POS|NEG|NRM|SMP|?**;

Selects the specified analyzer input detection.

Query response: POS|NEG|NRM|SMP

**DISPOSE\_**<operand>;

Frees memory previously allocated by the specified operand. DISPOSE ALL clears all operands. IP disposes ONEOS, ONSWP, and TRMATH functions.

<operand>:: = <variable identifier>|<trace label>|<function label>|ONEOS|ONSWP|TRMATH|<key number>|ALL

**DIV\_**<destination>,<operand 1>,<operand 2>;

Divides operand 1 by operand 2 and sends the result to the destination.

**DL\_**(<real>[DM|MV|UV])|UP|DN|EP|?);

Specifies a display line level that is displayed on the CRT. Default units are dBm.

Query response: <numeric data format>

**DLE\_ON|OFF|?**;

Turns the display line on or off.

Query response: ON|OFF

**[TS;]<command list>;DONE;**

This command is a synchronizing function that sends a 1 to the controller after the command list has been executed. If a TS (take sweep) precedes the command list, execution of the command list begins after the sweep is completed.

**[O1|O2|O3|O4;][DA<display memory address>;]DR;**

Returns the contents of the specified analyzer display memory address.

The contents are formatted and each DR increments the display address by 1.

**DSPLY\_<variable identifier>,<field width>.<decimal places>;**

Displays the current value of a variable on the analyzer screen.

<field width>:: = integer specifying the total number of characters displayed

<decimal places>:: = integer specifying the number of digits to the right of the decimal point

**DT<character>;**

Establishes a character for label termination or for title (KSE) entry termination.

<character>:: = any ASCII character

**[DA<display memory address>;]DW[<real><terminator>]**

Writes the value in the entry to the specified display memory address and increments the address by 1. This operation can also be done via the front panel using KS|.

**D1;**

Sets the display to normal size. Selected with IP.

**D2;**

Sets the display to full CRT size.

**D3;**

Sets the display to expanded size.

## E

### **EE;**

Allows the operator to make an entry to the DATA buffer with the DATA number/units front panel keyboard.

### **EK;**

Allows the operator to change the active function value with the front panel DATA knob.

**IF\_<flow operand 1>, (GT|LT|EQ|NE|GE|LE), <flow operand 2>[THEN]<command list>[ELSE<command list>]ENDIF;**

Compares flow operand 1 to flow operand 2. If the condition is true, the command list is executed. Otherwise, commands following the next ELSE or ENDIF statements are executed.

### **EM;**

Replaces trace C memory (3073-4095) with an end of memory word, 1044, and resets the display address to 3072. Selected with IP.

**IF\_<flow operand 1>, (GT|LT|EQ|NE|GE|LE), <flow operand 2>[THEN]<command list>[ELSE<command list>]ENDIF;**

Compares flow operand 1 to flow operand 2. If the condition is true, the command list is executed. Otherwise, commands following the next ELSE or ENDIF statements are executed.

### **ERR?;**

Queries the results of the processor test (which is performed during instrument turn-on) and returns a list of integer numbers to the controller.

### **EX;**

Exchanges trace A and trace B.

**EXP\_**<destination>,<operand 1>,<scaling factor>;  
The operand is divided by the specified scaling factor before being raised as a power of 10.  
<scaling factor>:: = <variable identifier>|<numeric data field>

**E1;**  
Moves the active marker to the maximum signal detected.

**E2;**  
Moves the active marker frequency into the center frequency.

**E3;**  
Moves the active marker frequency or the delta marker frequency into the center frequency step size.

**E4;**  
Moves the active marker to the reference level.

## F

**FA\_**(<real>[HZ|KZ|MZ|GZ])|UP|DN|EP|?);  
Specifies the start frequency. Default units are Hz.  
Selected with IP.  
Query response: <numeric data format>

**FB\_**(<real>[HZ|KZ|MZ|GZ])|UP|DN|EP|?);  
Specifies the stop frequency. Default units are Hz.  
Selected with IP.  
Query response: <numeric data format>

**FFT\_**<trace destination>,<trace source>,<window>;  
Performs a forward fast fourier transform on the source trace and sends the results to the destination trace.  
Before executing FFT, a trace window must be defined with the TWINDOW command, for proper formatting.  
(See TWINDOW.)  
<window>:: = <trace label>

**FOFFSET\_**(<real>[HZ|KZ|MZ|GZ])|EP|?);  
Specifies the frequency offset for all absolute frequency readouts such as center frequency. Default units are Hz.  
Query response: <numeric data format>



● **FPKA;**

Performs a fast preselector peak and returns the measured value at the active marker.

**FS;**

Selects the full frequency span as defined by the instrument.

**FUNCDEF\_<function label>, (<string data field>|<block data field>|?);**

Assigns the specified program to the function label.

After FUNCDEF is executed, the program is executed whenever the function label is encountered.

Query response: <A-block data format>

## G

**[D1|D2|D3;][DA<display memory address>;]GR<y-value>;**

Graphs successive y-values as amplitudes on the CRT, incrementing horizontal positions by 1 from left to right for each y-value specified. Trace starts at x = 0 position.  
<y-value>:: = <integer><delimiter>[y-value]

**GRAT\_ON|OFF|?;**

Turns the graticule on or off. IP turns on the graticule.

Query response: ON|OFF

## H

**HD;**

Holds or disables data entry and blanks the active function CRT readout. Selected with IP.

## I

**IB<entry>;**

Sends the specified entry into trace B beginning at display address 1025.

<entry>:: = exactly 2002, 8-bit binary bytes

**ID;**  
Returns the HP model number of the analyzer being used (HP 8566B or HP 8568B)

**IF\_<flow operand 1>, (GT|LT|EQ|NE|GE|LE), <flow operand 2>[THEN]<command list>[ELSE] <command list>ENDIF;**

Compares flow operand 1 to flow operand 2. If the condition is true, the command list is executed. Otherwise, commands following the next ELSE or ENDIF statements are executed.

**IP;**  
Sets instrument parameters to their preset values.

**I1;**  
Enables the left RF input.

**I2;**  
Enables the right RF input. Selected with IP.

## K

**KEYDEF\_<key number>, (<function label>[?]);**  
Assigns the previously defined function label (see FUNCDEF) to the specified softkey number. Once this command is executed, the command list assigned to the function label can be executed by pressing SHIFT, the key number, and the Hz on the front panel.  
Query response: <A-block data format>

**KEYEXC\_<key number>;**  
Executes the previously assigned softkey number. (See KEYDEF)

**KS;**  
Shifts the front panel key functions.

**KSA;**  
Selects dBm as amplitude units. Selected with IP.

**KSB;**  
Selects dBmV as amplitude units.

**KSC;**  
Selects dB $\mu$ V as amplitude units.

**KSD;**  
Selects voltage as amplitude units.

**KSE;**  
Sets the analyzer to title mode where characters called from the analyzer character set are displayed on the top line of the CRT. Up to 64 characters can be displayed.

● **KSF;**  
Shifts the YTO by the intermediate frequency.

■ **KSF;**  
Measures the sweep time.

**KSG[<average length>];**  
Turns on the video averaging.  
<average length>:: = real number representing the maximum number of sweeps executed for averaging.  
Default length is 100.

**KSH;**  
Turns off the video averaging. Selected with IP.

**KSI;**  
Allows the reference level to be extended up to +60 dBm.

● **KSJ\_<real><delimiter>**  
Allows manual control of the DACs. All delimiters set the following DACs to the same specified value:  
PLL 2 pre-tune  
span attenuator  
scan time  
auxiliary offset  
YTX DAC  
YTX pre-tune DAC

■ **KSJ** <real> (HZ|KZ|MZ|GZ|UP|DN|<CR>|<LF>|<ETX>|;|,)

Allows manual control of the DACs.

The terminators specify which DAC is to be set to the specified value:

HZ sets value of L.S. YTO DAC

KZ sets value of M.S. YTO DAC

MZ sets value of YTO DAC

GZ sets value of SCAN ATTEN

UP and DN step all DACs by power of 2

<CR>|<LF>|<ETX>|;|, set all DACs to the specified value.

● **KSK**;

Moves the active marker to the next highest peak.

■ **KSK**;

Counts the pilot IF at the marker.

**KSL**;

Turns off the average noise level marker. Selected with IP.

**KSM**;

Returns the average value at the marker, normalized to a 1 Hz bandwidth.

● **KSN**;

Moves the active marker to the minimum value detected.

■ **KSN**;

Counts the voltage-controlled oscillator at the marker.

**KSO**;

Moves the marker delta frequency into the frequency span.

**KSP**<integer>HZ;

Sets the analyzer's HP-IB address.

- **KSQ;**  
Unlocks the frequency band.
- **KSQ;**  
Counts the signal intermediate frequency.
- KSR;**  
Turns the frequency diagnostics on.
- **KSS;**  
Selects fast HP-IB I/O format.
- **KSS;**  
Automatically determines the second LO frequency.  
Selected with IP.
- **KST;**  
Performs a fast preset, 2 – 22 GHz.
- **KST;**  
Shifts the second LO down.
- **KSU;**  
Performs an external mixer preset.
- **KSU;**  
Shifts the second LO up.
- KSV**[\_(<real>[HZ|KZ|MZ|GZ])|EP?];  
Specifies the frequency offset for all absolute frequency readouts such as center frequency. Default units are Hz  
Query response: <numeric data format>
- KSW;**  
Performs an amplitude error correction routine.
- KSX;**  
Incorporates the correction data (see KSW) in amplitude readouts.

**KSY;**

Does not incorporate the correction data in amplitude readouts.

**KSZ**[\_(<real>[DM|MV|UV|])|EP|?];

Specifies the reference level offset. Default units are dB.  
Query response: <numeric data format>

**KSa;**

Selects normal detection. Selected with IP.

**KSb;**

Selects positive peak detection.

**KSd;**

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

**KSd;**

Selects negative peak detection.

**KSs;**

Selects sample detection.

**KSf;**

Recovers the last instrument state at power on.

**KSg;**

Turns off the CRT beam.

**KSh;**

Turns on the CRT beam.

**KSj**

Exchanges trace B and trace C.

**KSj;**

Views trace C.

**KS<sub>k</sub>**;  
Blanks trace C.

**KS<sub>l</sub>**;  
Moves trace B into trace C.

**KS<sub>m</sub>**;  
Turns off the graticule.

**KS<sub>n</sub>**;  
Turns on the graticule. Selected with IP.

**KS<sub>o</sub>**;  
Turns off the annotation.

**KS<sub>p</sub>**;  
Turns on the annotation. Selected with IP.

**KS<sub>q</sub>**;  
Decouples the IF gain and the RF input attenuation.

**KS<sub>r</sub>**;  
Sets service request 102.

● **KS<sub>t</sub>**;  
Locks the frequency band.

■ **KS<sub>t</sub>**;  
Continues sweeping from the marker.

**KS<sub>u</sub>**;  
Stops the sweep at the active marker when the analyze is in single sweep mode. (See S1 or SNGLS.)

● **KS<sub>v</sub>**;  
Identifies signals for external mixing frequency bands.

■ **KS<sub>v</sub>**;  
Inhibits the phase lock.

**KS<sub>w</sub>;**

Displays the amplitude error correction data.

**KS<sub>x</sub>;**

Sets the trigger mode to external, but eliminates the auto-refresh.

**KS<sub>y</sub>;**

Sets the trigger mode to video, but eliminates the auto-refresh.

**KS<sub>z</sub>;**

Sets the display storage address.

**KS,[\_(<real>[DM|MV|UV])|EP?];**

Specifies the mixer level. Default units are dBm.

<real>:: = integer multiple of 10.

Query response: <numeric data format>

● **KS=;**

Selects the factory preselector setting.

■ **KS= [\_(<real>[HZ|KZ|MZ|GZ])|EP?];**

Specifies the resolution of the marker frequency counter. Default units are Hz.

Query response: <numeric data format>

**KS(;**

Locks the save registers.

**KS);**

Unlocks the save registers.

**KS|;**

See DW.

■ **KS>[\_(<real>[DB])|EP?];**

Specifies the preamp gain for signal input 2. Default units are dB.

Query response: <numeric data format>



■ **KS**<[\_<real>{DB}|EP|?];

Specifies the preamp gain for signal input 1. Default units are dB.

Query response: <numeric data format>

● **KS**#;

Turns off the YTX self-heating correction.

● **KS**/;

Allows the preselector to be peaked manually.

**KS**{39}<display memory address><display write commands><terminator>

Writes to display memory in fast binary.

<display memory address>:: = two 8-bit binary bytes

<display write commands>:: = two 8-bit binary bytes

● **KS**{43}<terminator>

Sets SRQ 102 when the frequency limit is exceeded.

**KS**{91};

Returns the amplitude error.

(**DL**|**TH**|**M2**|**M3**);**KS**{92}<value><terminator>

Specifies the value of the display line, threshold, active marker, or the delta marker in display units.

<value>:: = integer in display units

● **KS**{94};

Returns the code for the harmonic number in binary.

(**O1**|**O2**|**O3**|**O4**);**DA**<display memory address>;**KS**{123};

Returns up to 1001 words of display memory beginning at the address specified.

**DA**<display memory address>;**KS**{125}<entry>;

Writes up to 1001 display memory words (two bytes per word), beginning at the address specified.

<entry>:: = up to 2002 eight bit binary bytes

**(01|02|03|04);DA**<display memory address>;**KS{126}**<N>;

Returns every Nth value of a trace.  
<N>:: = integer from 1 to 1001

**DA**<display memory address>;**KS{127}**<entry>;

Prepares the analyzer to accept binary display write commands, input as a part of 2 eight bit bytes.

<entry>:: = the number of pairs of bytes to be sent as a pair of 2 eight bit bytes.

## L

**LB**<character string><label terminator>;

Writes the specified characters on the CRT display. The first character appears at the current CRT beam position. (See PA and PR.)

<character string>:: = any ASCII character

<label terminator>:: = <ETX>|<character specified in DT command>

### ●LF;

Presets the analyzer 0 – 2.5 GHz.

**LG\_**[(<integer>[DB])|UP|DN|EP?];

Specifies the scale of the logarithmic display. Default units are dB. 10 dB per division is selected with IP.

Query response:: = <numeric data format>

A query response of zero indicates a linear scale.

### LL;

Provides the lower left recorder output voltage at the rear panel.

### LN;

Selects the linear scale.

**LOG\_<destination>,<operand 1>,<scaling factor>**

The log of the operand is taken, multiplied by the specified scaling factor and the result is sent to the destination.

**<scaling factor>:: = <variable identifier>|<numeric data field>;**

**L0;**

Turns off the display line.

## M

**[O1|O2|O3|O4:]MA;**

Returns the amplitude of the active marker.

**MBRD\_<analyzer memory address>,<number of bytes>**

Reads the specified number of bytes starting at the specified address and returns the bytes to the controller.

**<number of bytes>:: = ASCII decimal number indicating the number of bytes to be read**

**MBWR\_<analyzer memory address>(<string data field>|<block data field>);**

Writes the specified data field into the analyzer's memory starting at the specified address.

■ **MC0;**

Turns off the marker frequency counter. Selected with IP.

■ **MC1;**

Turns on the marker frequency counter.

**MDS\_B|W|?;**

Formats binary measurements by selecting the measurement data size as an 8-bit byte or a two-byte word.

IP sets the data size to word.

Query response: B|W

**MDU?;**

Returns the values of the CRT base line and reference level, in display units and measurement units.

**MEAN\_<trace label>|TRA|TRB|TRC;**

Returns the mean value of a trace in display units.

**MEM?;**

Returns the amount of allocatable memory available for user-defined commands in bytes. These commands include TRDEF, VARDEF, FUNCDEF, ONEOS, ONSWP, and TRMATH.

**[O1|O2|O3|O4;]MF;**

Returns the frequency of the active marker.

**MIN\_<destination>,<operand 1>,<operand 2>;**

Compares operand 1 and operand 2, point by point, and sends the lesser value of each comparison to the destination.

**MKA\_(<real>[DM])|EP|?;**

Specifies the amplitude of the active marker. Default units are dBm.

Query response: <numeric data format>

**MKACT[\_1|2|3|4|?];**

Establishes the number of the active marker. Up to four markers can be displayed at one time but only one marker can be active at any time.

Query response: 1|2|3|4

**MKCF;**

Moves the active marker to the center frequency.

**MKCONT;**

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

**MKD[\_(<real>[HZ|KZ|MZ|GZ ])|UP|DN|EP|?];**

Places a second marker the specified frequency from the active marker. Frequency may be positive or negative. Default units are Hz.

Query response: <numeric data format>

**MKF[\_(<real>[HZ|KZ|MZ|GZ])|EP|?];**

Specifies the frequency of the active marker. Default units are Hz.

Query response: <numeric data format>

■ **MKFC\_ON|OFF;**

Counts the marker frequency for a more accurate read-out of the marker frequency. The accuracy is determined by the MKFCR command.

■ **MKFCR[\_(<real>[HZ|KZ|MZ|GZ])|EP|?];**

Specifies the resolution of the marker frequency counter.

Query response: <numeric data format>

**MKMIN;**

Moves the active marker to the minimum signal detected.

**MKN[\_(<real>[HZ|KZ|MZ|GZ])|UP|DN|EP|?];**

Moves the active marker to the specified frequency. Default units are Hz.

Query response: <numeric data format>

**MKNOISE\_ON|OFF|?;**

Returns the average value at the marker, normalized to a 1 Hz bandwidth.

Query response: ON|OFF

**MKOFF[\_ALL];**

Turns all markers or the active marker off. Up to four markers can be displayed at one time. (See MKACT.)

**MKP\_<integer>|EP|?;**

Specifies the horizontal position of the marker, in display units.

<integer>:: = integer number from 0 to 1001.

Query response: <integer>

**MKPAUSE\_<delay time>|?;**

Pauses the sweep at the active marker for the duration of the delay time, in seconds.

<delay time>:: = real number from 0 to 1000 seconds

Query response: <delay time>

**MKPK[HI|NH|NR|NL];**

Moves the active marker to the maximum signal detected or to the next highest, next right, or next left signal detected. Marker defaults to maximum signal detected.

**MKPX\_(<real>[DB])|EP|?;**

Specifies the minimum excursion for peak identification. Default units are dB. IP selects 6 dB for minimum excursion.

Query response: <numeric data format>

**MKREAD\_FRQ|PER|SWT|IST|FFT|?;**

Specifies the marker readout mode.

Query response: FRQ|PER|SWT|IST|FFT

**MKRL;**

Moves the active marker to the reference level.

**MKSP;**

Moves the marker delta frequency into the frequency span.

**MKSS;**

Moves the marker frequency into the center frequency step size.

**MKSTOP;**

Stops the sweep at the active marker.

**MKTRACE\_TRA|TRB|TRC|?;**

Moves the active marker to the corresponding position on another trace.

Query response: TRA|TRB|TRC

**MKTRACK\_ON|OFF|?;**

Turns the marker signal track on or off.

Query response: ON|OFF

**MKTYPE\_PSN|FIXED|AMP|?;**

Specifies the type of active marker to be used.

Query response: PSN|FIXED|AMP

**ML\_(<real>[DM|MV|UV])|EP|?;**

Specifies the mixer level. Default units are dBm.

<real>:: = integer multiple of 10

Query response: <numeric data format>

**MOV\_<destination>,<operand 1>;**

Moves the operand to the destination.

**MPY\_<destination>,<operand 1>,<operand 2>;**

Multiplies the operands, point by point, and sends the result to the destination.

**MRD\_<analyzer memory address>;**

Reads the two-byte word at the specified memory address and returns it to the controller. The address must be an even number.

**MRDB\_<analyzer memory address>;**

Reads the 8-bit byte at the specified memory address and returns its ASCII equivalent to the controller.

**MT0;**

Turns off the marker signal track. Selected with IP.

**MT1;**

Turns on the marker signal track.

**MWR\_**<analyzer memory address>,<message>;

Writes a two-byte message, starting at the specified memory address.

<message>:: = ASCII decimal number representing two-byte word.

**MWRB\_**<analyzer memory address>,<message>;

Writes a one-byte message to the specified memory address.

<message>:: = ASCII decimal number representing one 8-bit byte

**MXM\_**<destination>,<operand 1>,<operand 2>;

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

**MXMH\_TRA|TRB;**

Updates each trace element with the maximum level detected.

**M1;**

Turns off all markers. Selected with IP.

**M2\_**<real>[HZ|KZ|MZ|GZ])|UP|DN|EP|?];

Moves the active marker to the specified frequency.

Default units are Hz.

Query response: <numeric data format>

**M3\_**<real>[HZ|KZ|MZ|GZ])|UP|DN|EP|?];

Places a second marker the specified frequency from the active marker. Frequency may be positive or negative. If no frequency is specified, the marker is placed on the active marker. Default units are Hz.

Query response: <numeric data format>



**M4**[\_(<real>[HZ|KZ|MZ|GZ])|UP|DN|EP|?];  
Moves the active marker to the specified frequency.  
Stepping up or down changes the frequency span.  
Default units are Hz.  
Query response: <numeric data format>

## O

**OA**;  
Returns the active function value.

**OL**;  
Returns the coded instrument state information to the controller in 80 8-bit binary bytes.

**ONEOS**<string data field>|<block data field>|?;  
Executes the specified command(s) at the end of every sweep.  
Query response: <A-block data format>

**ONSWP**<string data field>|<block data field>|?;  
Executes the specified command(s) at the start of every sweep.  
Query response: <A-block data format>

**OP?**;  
Returns the parameters which represent the dimensions of the lower left and upper right vertices of the analyzer display, in display units.

**OT**;  
Returns all CRT annotation as 32 strings. The strings are from 0 (null) to 64 characters long. Each string is terminated with a <CR><LF> and the last string is terminated with an EOI upon <LF>.

**O1**;  
Selects the output format as ASCII integers representing display units or display memory instruction words.

**O2;**  
Selects the output format as two 8-bit binary bytes.

**O3;**  
Selects the output format as real numbers in Hz, volts, dBm, or seconds. Selected with IP.

**O4;**  
Selects the output format as one 8-bit binary byte.

## P

**[D1|D2|D3;]DA<display memory address>;PA  
[PU|PD]<x position>,<y position>;**

Draws vectors to the specified x and y positions. PU and PD determine whether the vector(s) are displayed or blanked. As many x-y position pairs as desired may be entered.

<x position>:: = positive integer in display units

<y position>:: = positive integer in display units

**PD;**  
Turns on the beam to display the vector. (See PA.)  
Selected with IP.

**PDA\_<trace label>,<trace source>,<resolution>;**

Finds the probability density in amplitude of the specified trace source and sends the result to the destination which is a trace label.

<resolution>:: = real number in dB specifying the resolution of each trace point in the destination trace. If a linear scale is used, specify the resolution as the percent of the total number of trace elements (1000).

**PDF\_<trace label>,<trace source>;**

Finds the probability density in frequency of the specified trace source and sends the result to the destination which is a trace label. The TH command may be previously set to specify the minimum signal level of interest.

**PEAKS\_**<trace destination>,<trace source>,  
(AMP|FRQ);

Sorts the signal peaks in the source trace by amplitude or frequency and returns the number of peaks found to the controller. It also sends the sorted results to the destination trace.

**PLOT\_**P1x,P1y,P2x,P2y;

Plots the CRT display on any HP-IB plotter.

P1x and P1y:: = plotter dependent values that specify the lower left plotter dimension.

P2x and P2y:: = plotter dependent values that specify the upper right plotter dimension.

●**PP;**

Peaks the preselector.

[D1|D2|D3;]DA<display memory address>;PR[PU|PD]  
<x position>,<y position>;

Draws vectors relative from the last absolute position.

(See PA.) As many x-y position pairs as desired may be entered.

<x position>:: = positive or negative integer in display units

<y position>:: = positive or negative integer in display units

[DA<display memory address>;]PS;

Skips the display program from the specified address to the next page of display memory.

**PU;**

Turns off the CRT beam to blank a vector(s).

**PWRBW\_**(<trace label>|TRA|TRB|TRC),<percent of total power>;

Computes the combined power of all signal responses in the specified trace and returns the bandwidth of the specified percentage of the total power.

<percent of total power>:: = real number from 0 to 100

## R

**RB**[\_(<real>[HZ|KZ|MZ|GZ])|UP|DN|EP?];  
Specifies the resolution bandwidth. Default units are Hz.

Query response: <numeric data format>

**RC**\_<digit>;  
Recalls the previously saved state stored in registers 0 through 9.

<digit>:: = 0|1|2|3|4|5|6|7|8|9

**RCLS**\_<digit>;  
Recalls the previously saved state stored in registers 0 through 9.

<digit>:: = 0|1|2|3|4|5|6|7|8|9

**REPEAT**\_<command list>**UNTIL**<flow operand 1>,(GT|LT|EQ|NE|GE|LE),<flow operand 2>;  
Delimits the top of the REPEAT UNTIL looping construct. (See UNTIL.)

**REV**;;  
Returns the firmware revision number of the analyzer being used.

**RL**[\_(<real>[DM|MV|UV])|UP|DN|EP?];  
Specifies the reference level. Default units are dBm.  
Query response: <numeric data format>

**RMS**\_(<trace label>|TRA|TRB|TRC);  
Returns the RMS value of a trace, in display units.

**ROFFSET**[\_(<real>[DM|MV|UV])|EP?];  
Specifies the reference level offset. Default units are dBm.  
Query response: <numeric data format>

**RQS\_<integer>|?;**

Specifies a mask which allows the bits that are not masked for service request.

<integer>:: = ASCII decimal number, 0 – 255

Query response: returns the decimal weighting of the status byte bits which are enabled during a service request.

**R1;**

Resets service request 140 (illegal command).

**R2;**

Allows service requests 140 (illegal command) and 104 (end of sweep).

**R3;**

Allows service requests 140 (illegal command) and 11C (hardware broken). Selected with IP.

**R4;**

Allows service requests 140 (illegal command) and 102 (units key pressed or, for HP 8566B, frequency limit exceeded).

## S

**SAVES\_<digit>;**

Saves the current state of the analyzer in the specified state register.

<digit>:: = 1|2|3|4|5|6

**SMOOTH\_(<trace label>|TRA|TRB|TRC),<number of points>;**

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

<number of points>:: = integer between 1 and 31

**SNGLS;**

Selects single sweep mode.

**SP\_(<real>[HZ|KZ|MZ|GZ])|UP|DN|EP?];**

Specifies the frequency span. Default units are Hz.

Query response: <numeric data format>

**SQR\_<trace destination>,<trace source>;**

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

**SRQ\_<operand>;**

Sets a service request if the operand bits are allowed by RQS.

<operand>:: = integer from 0 to 255

**SS\_(<real>[HZ|KZ|MZ|GZ])|UP|DN|EP?];**

Specifies the center frequency step size. Default units are Hz.

Query response: <numeric data format>

**ST\_(<real>[SC|MS|US])|UP|DN|EP?];**

Specifies the sweep time per division. Default units are seconds per division.

Query response: <numeric data format>

**STDEV\_<trace label>|TRA|TRB|TRC;**

Returns the standard deviation of the specified trace amplitude, in display units.

**SUB\_<destination>,<operand 1>,<operand 2>;**

Subtracts operand 2 from operand 1, point by point, and sends the result to the destination.

**SUM\_<trace label>|TRA|TRB|TRC;**

Sums the amplitude of each trace element, and returns the sum to the controller.

**SUMSQR\_(<trace label>|TRA|TRB|TRC);**  
Squares the amplitude of each trace element, and returns the sum of the squares to the controller.

**SV\_<digit>;**  
Saves the current state of the analyzer in the specified state register.  
<digit>:: = 1|2|3|4|5|6

**[DA<display memory address>];SW;**  
Skips from the current address or the specified address to the next control word.

**S1;**  
Selects continuous sweep mode. Selected with IP.

**S2;**  
Selects single sweep mode.

## T

**[O1|O2|O3|O4];TA;**  
Returns 1001 trace amplitude values for trace A, beginning with the trace point most to the left.

**[O1|O2|O3|O4];TB;**  
Returns 1001 trace amplitude values for trace B, beginning with the trace point most to the left.

**TDF\_A|B|I|M|P?;**  
Formats trace information for return to the controller. IP selects O3 format.  
A:: = returns data as an A-block data field  
B:: = enables O2 or O4 format. See MDS for data size determination.  
I:: = returns data as an I-block data field  
M:: = enables O1 format  
P:: = enables O3 format  
Query response: A|B|I|M|P

**TEXT\_**<string delimiter><text><string delimiter>;  
Writes text on the spectrum analyzer screen at the current pen location.  
<string delimiter>:: = ! " | \$ | % | & | ' | / | : | = | @ | \ | ~ | ^  
(must match at beginning and end of text)  
<text>:: = alphanumeric ASCII characters 32 through 126

**TH\_**(<real>[DM|MV|UV])|UP|DN|EP?];  
Blanks signal responses below the specified threshold level. Default units are dBm. Default level is 9 major divisions below the reference level.  
Query response: <numeric data format>

**THE\_ON|OFF?**;  
Turns the threshold on or off.  
Query response: ON|OFF

**IF\_**<flow operand 1>,(GT|LT|EQ|NE|GE|LE),<flow operand 2>[**THEN**]<command list>[**ELSE**<command list>]**ENDIF**;  
Compares flow operand 1 to flow operand 2. If the condition is true, the command list is executed. Otherwise, commands following the next ELSE or ENDIF statements are executed.

**TM\_FREE|VID|LINE|EXT?**;  
Selects the trigger mode.  
Query response: FREE|VID|LINE|EXT

**TRDEF\_**<trace label>[,(<trace length>?)];  
Defines the name and length of a user-defined trace. Default trace length is 1001.  
<trace length>:: = integer from 0 to 1008  
Query response: <trace length>

**TRDSP\_**(TRA|TRB|TRC), (ON|OFF?);  
Turns the specified trace on or off but continues taking information.  
Query response: (TRA|TRB|TRC)(ON|OFF)



**TRGRPH\_**<display address>,<x position>,<y position>,<expanding factor>,(<trace label>|TRA|TRB|TRC)

Displays a compressed (see COMPRESS) trace anywhere on the spectrum analyzer display. The x and y positions orient the trace positions.

<x position>:: = integer from 1 to 1008

<y position>:: = integer from 1 to 1008

<expanding factor>:: = real

**TRMATH**<string data field>|<block data field>|?;

Executes the specified trace math or user-operator commands at the end of a sweep.

Allowable commands in TRMATH:

AMB, AMBPL, APB, AXB, BL, BML, TC, BXC, C1, C2, EX, KSG, KSH, KSC, KSi, KSI, MOV, MIN, SUB, SCH, ADD, SQR, MPY, CONCAT, DIV, CTM, LOG, CTA, EXP, AVG, MXM

Query response: <A-block data format>

**TRPRST;**

Sets trace operations to their preset values.

**TRSTAT;**

Returns the current trace states to the controller: clear-write, off, view, or blank..

**TS;**

Takes a sweep.

**TWINDOW\_<trace label>,(UNIFORM|HANNING|FLAT TOP);**

Formats trace information for fast fourier analysis (FFT). This trace label should be used as the <window> in 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.

**T0;**

Turns the threshold level off. Selected with IP.

**T1;**

Sets the trigger mode to free run. Selected with IP.

**T2;**

Sets the trigger mode to line.

**T3;**

Sets the trigger mode to external.

**T4;**

Sets the trigger mode to video.

## U

**REPEAT\_<command list>UNTIL<flow operand 1>,(GT|LT|EQ|NE|GE|LE),<flow operand 2>;**

Compares the operands and repeats the command list until the condition on the operands is true.

**UR;**

Provides the upper right x-y recorder output voltage at the rear panel.

**USTATE\_**<A-block data field>|?;

Configures or returns the configuration of the user-defined states: ONEOS, ONSWP, TRMATH, VARDEF, FUNCDEF, TRDEF.

Query response: <A-block data format>

## V

**VARDEF\_**<variable identifier>,<initial value>;

Defines a variable name and assigns an initial value to it. IP reassigns the initial value to the variable name.

<initial value>:: = <real>

**VAVG\_**<average length>|ON|OFF;

Turns the video averaging on or off.

<average length>:: = real and represents the maximum number of sweeps executed for averaging. Default length is 100.

**VB\_**(<real>[HZ|KZ|MZ|GZ])|UP|DN|EP|?];

Specifies the video bandwidth. Default units are Hz.

Query response: <numeric data format>

**VBO\_**(+|-)<integer>;

Specifies the ratio between the video bandwidth and the resolution bandwidth. For example, an entry of +1 sets the video bandwidth one bandwidth step higher than the resolution bandwidth.

**VARIANCE\_**(<trace label>|TRA|TRB|TRC);

Returns the amplitude variance of the specified trace.

**VIEW\_**TRA|TRB|TRC;

Stores and views the specified trace.

## X

**XCH\_**<destination>,<destination>;

Exchanges the contents of the destinations.

## Programming Codes Developed Too Late for Itemized Listings

- **CNVLOSS\_<real>[DB];**  
 Selects the reference level offset to amplitude calibrate the display for a mixer with a given conversion loss. Default units are dB.  
 <real>:: = real number from 0 to 60
- **EXTMXR;**  
 Performs an external mixer preset. Start frequency 18 GHz; Stop frequency 26.5 GHz.
- **FULBAND\_<digit>;**  
 Sets the start and stop frequencies for full waveguide bands.  
 <digit>:: = integer from 6 to 17 indicating the following:

Band	Frequency Range	Mixing Harmonic
6 (K)	18.0 – 26.5 GHz	6 +
7 (A)	26.5 – 40.0	8 +
8 (Q)	33.0 – 50.0	10 +
9 (U)	40.0 – 60.0	10 +
10 (V)	50.0 – 75.0	14 +
11 (E)	60.0 – 90.0	16 +
12 (W)	75.0 – 110.0	18 +
13 (F)	90.0 – 140.0	24 +
14 (D)	110.0 – 170.0	30 +
15 (G)	140.0 – 220.0	36 +
16 (Y)	170.0 – 260.0	44 +
17 (J)	220.0 – 325.0	54 +

- **HNLOCK[<digit>];**  
 Locks to the specified harmonic number to prevent multi-harmonic sweeps and to prevent tuning past the 2 GHz to 6.2 GHz L.O. tuning range.  
 <digit>:: = integer from 1 to 64
- **HNUNLK;**  
 Turns off the harmonic lock (see HNLOCK) allowing tuning over the entire analyzer input range.

● **IDSTAT?**;

Returns the completion status of the signal identifier.

Query response: 1 signal found

0 no signal found

-1 signal found but cannot be reached  
on locked harmonic

● **NSTART\_<digit>**;

Specifies the start harmonic for signal identification.

<digit>:: = integer from 5 to 64

● **NSTOP\_<digit>**;

Specifies the stop harmonic for signal identification.

<digit>:: = integer from 5 to 64

● **SIGDEL\_<integer>[DB]**;

Specifies the maximum amplitude difference allowed between a signal and its image for the pair to be recognized by the signal identification routine. Default units are dB.

<integer>:: = integer from 0 to 35 in steps of 5

● **SIGID**;

Identifies signals for external mixing frequency bands.

## Secondary Keyword Summary

ALL	all
AMP	amplitude
AVG	average detection
B	8-bit byte
DB	decibel (unit)
DBM	absolute decibel milliwatt unit
DBMV	decibel millivolt
DBUV	decibel microvolt
DELTA	delta
DM	absolute decibel milliwatt unit
DN	decrement the parameter
EP	enable parameter for front panel operator entry
EQ	equal
EXT	external
FFT	fast fourier transform
FIXED	fixed
FREE	free run
FRQ	frequency
GE	greater than or equal
GT	greater than
GZ	gigahertz (unit)
HI	highest
HZ	hertz
IST	inverse sweep time
KZ	kilohertz (unit)
LE	less than or equal
LINE	line, as in power line
LT	less than
MS	millisecond (unit)
MV	millivolts (unit)
MZ	megahertz (unit)
NE	not equal to
NEG	negative peak detection



