HP 8719C, 8720C, and 8722A/C network analyzers

HP-IB Programming Reference

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HP-IB Commands

Introduction

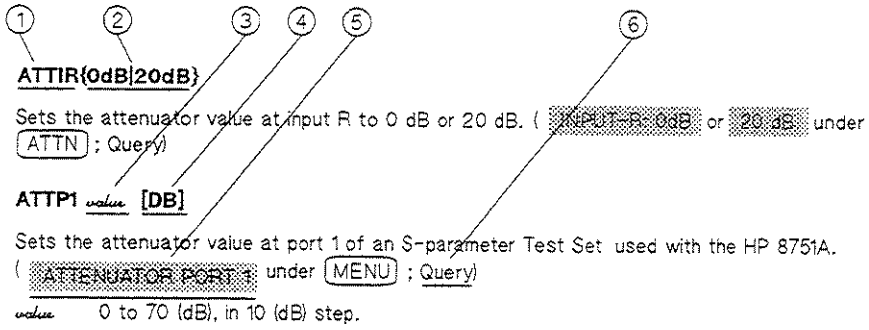
This reference provides a guide for the HP-IB operation of the network analyzer. Use this information as a reference to the syntax requirements and general function of the individual commands. The followis is a brief description of each chapter.

- Chapter 1 lists HP-IB commands in alphabetic order.
- Chapter 2 summarizes HP-IB commands according to the softkey labels.
- Chapter 3 describes the status byte register and other registers.
- Chapter 4 provides the codes of the front panel keys.
- Chapter 5 describes the calibration types, the standard classes, and the calibration coefficients.
- Error Messages lists error messages with explanations.

Refer to the *Reference Manual* for the details of each function, or to the *Service Manual* for detail of the service related functions.

For introductory programming material refer to the *BASIC Programming Guide* or the *QuickC Programming Guide*.

Notation



① Upper case bold characters represent the program codes which must appear exactly as shown with no embedded spaces. Upper and lower case characters are equivalent.

② Characters enclosed in the { } brackets are qualifiers attached to the root mnemonic. There can be no spaces or symbols between the root mnemonic and its appendage.

For example:

{ON|OFF} shows that either ON or OFF can be attached to the root mnemonic. AVERO{ON|OFF} means AVEROON or AVEROOFF.

{1-5} shows that the numeral 1, 2, 3, 4, or 5 can be attached to the root mnemonic. DELR{1-5} means DELR1, DELR2, DELR3, DELR4, DELR5.

③ A constant, a pre-assigned simple or complex numeric, or string variable transferred to the network analyzer. A space may be inserted between it and the root mnemonic.

④ Square brackets indicate that the enclosed information is optional.

⑤ Softkey or hardkey which has the same function.

⑥ "Query" indicates that the command can be queried.

Note

A semicolon (;) is the recommended terminator for each program command. A line feed can also serve as a terminator.

For example, either of the followings is acceptable.

```
OUTPUT Hp8720;"CHAN1; S11; LOGM;"
OUTPUT Hp8720;"CHAN1; S11; LOGM"
```

Query Commands

For instrument state commands, append the question mark (?) character instead of {ON|OFF} to interrogate the state of the functions. The network analyzer responds to the next controller ENTER operation with a "1" or a "0" to indicate On or Off, respectively.

For settable functions such as SCAL *value*, using SCAL? causes the network analyzer to respond to the next controller ENTER operation by sending the current function value then clearing the instrument entry area.

If a command that does not have a defined response is interrogated, the network analyzer sends a zero.

- Example of using a query command:

```
OUTPUT Hp8720;"SCAL?;"
ENTER Hp8720;Scale
PRINT Scale
```

Suffix

The following suffixes can be used as units:

Frequency:	Hz (default), kHz, MHz, GHz
Power:	dB (for dB or dBm)
Voltage:	V
Time:	s (default), ms, us (microseconds), ns, ps, fs
Phase:	no suffix (default is degrees)

If no suffix is used, the network analyzer assumes the default values for the instruction. Upper and lower case characters are equivalent.

Code Naming Conventions

The HP-IB Commands are derived from their front panel key titles (where possible), according to the naming conventions below.

Some codes require appendages (on, off, 1, 2, etc.). Codes that have no front panel equivalent are HP-IB only commands, and use a similar convention based on the common name of the function. Where possible, the HP 8719C, HP 8720C, and HP 8722 network analyzer commands are compatible with HP 8753 and HP 8510 Network Analyzer commands.

Table 1-1. HP-IB Code Naming Convention

Convention	For HP-IB Code Use	Example	
		Key Title	HP-IB Code
One word	First four letters	POWER START	POWE STAR
Two words	First three letters of first word and first letter of second word	ELECTRICAL DELAY SEARCH RIGHT	ELED SEAR
Two words in a group	First four letters of both	MARKER → CENTER	MARKCENT
Three Words	First three letters of first word, first letter of second word, and first 3 or 4 letters of third word	CAL KIT: 7mm CAL KIT: 3.5mm	CALK7MM CALK35MM

Reference

ADDRCONT *value* or PCB *value*

Sets the HP-IB address which the network analyzer uses to communicate with an external controller. (ADDRESS: CONTROLLER under LOCAL; Query)

value 0 to 30, *default* 21.

ADDRDISC *value*

Sets the HP-IB address which the network analyzer uses to communicate with an external disk drive. (ADDRESS: DISK under LOCAL; Query)

value 0 to 30, *default* 0.

ADDRPLOT *value*

Sets the HP-IB address which the network analyzer uses to communicate with a plotter. (ADDRESS: PLOTTER under LOCAL; Query)

value 0 to 30, *default* 5.

ADDRPOWM *value*

Sets the HP-IB address which the network analyzer uses to communicate with a compatible power meter. (ADDRESS: POWER MTR under LOCAL; Query)

value 0 to 30, *default* 13.

ADDRPRIN *value*

Sets the HP-IB address which the network analyzer uses to communicate with the printer. (ADDRESS: PRINTER under LOCAL; Query)

value 0 to 30, *default* 1.

ALC{ON|OFF}

Controls the automatic leveling control of the test port power. (ALC ON off under SYSTEM, SERVICE MENU; Query)

ALTAB

Alternates measurements of the A and B samplers between sweeps when making measurements that require both the A and B sampler for the specified measurement. See also CHOPAB. (ALTERNATE A and B under CAL, MORE.

ANAI

Measure and display the data at the auxiliary input.(AUXILIARY INPUT under MEAS).

ASEG

Selects measurement of all list frequency segments when using the LIST FREQ sweep mode. (ALL SEGS SWEEP under MENU, SWEEP TYPE MENU, LIST FREQ.

AUTO

Selects the scale/div value automatically to fit the trace data to the display. (AUTO SCALE under SCALE REF)

AVERFACT *value*

Sets the averaging factor. (AVERAGING FACTOR under AVG; Query)

value 1 to 999.

AVERO{ON|OFF}

Sets the averaging function on or off for the active channel. (AVERAGING on OFF under AVG; Query)

AVERREST

Resets and restarts averaging. (AVERAGING RESTART under AVG)

BACI *value*

Sets the background intensity of the display as a percent of the white level. (BACKGROUND INTENSITY under DISPLAY; Query)

value 0 to 100 (%).

BANDPASS

Selects the Bandpass mode for time domain transforms. (BANDPASS under SYSTEM, TRANSFORM MENU; Query)

BEEPDONE{ON|OFF}

Sets the operation completion beeper on or off. (`BEEP DONE on off` under DISPLAY; Query)

BEEPFAIL{ON|OFF}

Sets the limit fail beeper on or off. (`BEEP FAIL on off` under SYSTEM; Query)

BEEPWARN{ON|OFF}

Sets the warning beeper on or off. (`BEEP WARN on off` under DISPLAY; Query)

C0 *value*

Enters the constant term of the open circuit capacitor model value, C_0. (`C0` under CAL)

value 0 to 1000 (x 10^{-15} F).

C1 *value*

Enters the constant term of the open circuit capacitor model value, C_1. (`C1` under CAL)

value 0 to 1000 (x 10^{-27} F/Hz).

C2 *value*

Enters the constant term of the open circuit capacitor model value, C_2. (`C2` under CAL)

value 0 to 1000 (x 10^{-36} F/Hz^2).

C3 *value*

Enters the constant term of the open circuit capacitor model value, C_3. (`C3` under CAL)

value 0 to 1000 (x 10^{-45} F/Hz^2).

CAL1

Prepares for calibration. *HP 8510 compatibility.* (`CALIBRATE MENU` under CAL)

CALFCALF

Enter a calibration factors for a particular power meter sensor for a specific frequency. Used in conjunction with `POWLFREQ`. The same editing commands as used with the `LIST FREQ` mode apply, except that the command `CALFSEN` is used instead of `EDITLIST`.

CALIFUL2

Selects the full 2-port measurement calibration. (FULL 2-PORT under CAL; Query)

CALIRAI

Selects the response and isolation measurement calibration. (RESPONSE & ISOL'N under CAL; Query)

CALIRESP

Selects the response measurement calibration. (RESPONSE under CAL; Query)

CALIS111

Selects the 1-port measurement calibration at port 1. (S11 1-PORT under CAL; Query)

CALIS221

Selects the 1-port measurement calibration at port 2. (S22 1-PORT under CAL; Query)

CALITRL2

Selects the TRL*/LRM* 2-port measurement calibration. (TRL*/LRM* 2-PORT under CAL; Query)

CALK7MM

Selects the 7 mm calibration kit. (CAL KIT: 7mm under CAL; Query)

CALK35MM

Selects the 3.5 mm calibration kit. (CAL KIT: 3.5mm under CAL; Query)

CALKN50

Selects the 50 Ω type-N calibration kit. (N 50Ω under CAL; Query)

CALKTRLK

Selects the TRL* calibration kit. (CAL KIT: TRL* under CAL; Query)

CALKUSED

Selects the user defined calibration kit. (USER KIT under CAL; Query)

CALPOW *value*

Sets the power level to be controlled by a power meter calibration. (CAL POWER under CAL; Query)

value -20 to +20 (dBm).

CALZLINE

When defining a TRL-type calibration kit, sets the LINE standard as the impedance reference (as opposed to SYSTEM Z0 as set by the CALZSYST command). (CAL KIT under CAL; Query)

CALZSYST

When defining a TRL-type calibration kit, sets the SYSTEM Z0 value as the impedance reference (as opposed to the LINE standard as set by the CALZLINE command). (CAL KIT under CAL; Query)

CBRI *value*

Sets the color brightness in percent. See COLO below. (BRIGHTNESS under DISPLAY; Query)

value 0 to 100 (%).

CENT *value* [*suffix*]

Sets the center stimulus value. (CENTER, or CENTER under MENU; Query)

value Domain dependent (different units for Time, Frequency, and Power sweep)

suffix Refer to "Suffix".

CHAN1

Selects channel 1 as the active measurement channel. (CH 1; Query)

CHAN2

Selects channel 2 as the active measurement channel. (CH 2; Query)

CHOPAB

Simultaneously measures both samplers during a single sweep when making measurements that require both the A and B sampler output. See also ALTAB. (CHOP A and B under CAL, MORE.

CLAD

Completes specifying the class. (CLASS DONE (SPE'D) under CAL)

CLASS11{A|B|C}

Selects port 1 (S11) one-port calibration standard class as previously defined for S11{A|B|C}. ([S11] : OPEN, SHORT, or LOAD under CAL, when using the built-in 3.5mm calibration kit definition.)

CLASS22{A|B|C}

Selects port 2 (S22) one-port calibration standard class as previously defined for S22{A|B|C}. ([S22] : OPEN, SHORT, or LOAD under CAL, when using the built-in 3.5mm calibration kit definition.)

CLEA{1-5}

Clear the save/recall register 1-5. (CLEAR REG{1-5} under SAVE)

CLEARALL

Clears all five save/recall registers. (CLEAR ALL under SAVE)

CLEL

Clears the current frequency list. (CLEAR LIST YES under MENU)

CLES

Clears the status byte, the event status register, and the event status register B.

CLS

Clears the status byte, the event status register, and the event status register B.

COAD

Selects the electrical delay calculation based on a coaxial transmission line. (COAXIAL DELAY under SCALE REF)

COAX

Selects coaxial offsets (see also WAVE) while defining a standard during a calibration kit modification.

COLO{CH1D|CH1M|CH2D|CH2M|GRAT|TEXT|WARN}

Specifies the display element to change color. Channel 1: data, memory, limit lines; Channel 2: data, memory, and limit lines; the graticule, text, or warning messages. The color changes are accomplished by the commands CBRI, COLOR, and TINT. See those commands for more details. (CH1 DATA, CH1 MEM LIMIT LN, CH2 DATA, CH2 MEM LIMIT LN, GRATICULE, TEXT, WARNING under DISPLAY)

COLOR *value*

Specifies the saturation percent of the specified display format. See COLO above. (COLOR under DISPLAY; Query)

value 0 to 100 (%).

CONT

Continuous trigger. (CONTINUOUS under MENU; Query)

CONV1DS

Converts the data into inverse S-parameter values. (1/S under MEAS; Query)

CONVOFF

Turns off all parameter conversion operations. (OFF under MEAS; Query)

CONVYREF

Converts reflection data to its equivalent admittance values. (Y: Refl under MEAS; Query)

CONVYTRA

Converts transmission data to its equivalent admittance values. (Y: Trans under MEAS; Query)

CONVZREF

Converts reflection data to its equivalent impedance values. (Z: Refl under MEAS; Query)

CONVZTRA

Converts transmission data to its equivalent impedance values. (Z: Trans under MEAS; Query)

COPYFRFT

Copies the disk file titles into the register titles. (COPY FROM FILE TITLE under SAVE)

COPYFRRT

Copies the register titles into the disk file titles. (COPY FROM REG TITLES under SAVE)

CORR{ON|OFF}

Sets the error correction function on or off. (CORRECTION on OFF under CAL; Query)

COUC{ON|OFF}

Sets the channel coupling of stimulus values on or off. (COUPLED CH on OFF under MENU; Query)

CSWI{ON|OFF}

Enable/Disable continous switching of the Transfer Switch. (TEST SET SW on OFF under CAL, MORE; Query)

CWFREQ *value* [*suffix*]

Sets the frequency for the CW frequency mode and power sweep. When a LISFREQ list is being edited, this command sets the center frequency of the current segment and sets the span to 0 Hz. (CWFREQ under MENU; Query)

value Any frequency within the range and resolution of the network analyzer.

suffix Refer to "Suffix".

CWTIME

Selects the CW time sweep type.

DATI

Stores the active channel data to trace memory. (`DATA → MEM` under (DISPLAY))

DEBU{ON|OFF}

Turns the HP-IB command debug mode on or off. When on, the commands are scrolled through the top portion of the display. (`HP-IB DIAG on OFF` under (LOCAL))

DEFC

Returns all traces, lines, and text to the default colors. (`DEFAULT COLORS` under (Display))

DEFS *value*

Defines the number of the calibration standard to be modified. (`DEFINE STANDARD` under (CAL))

value 1 to 8.

DELA

Selects the Delay format for the current measurement. (`DELAY` under (FORMAT); Query)

DELO

Sets the delta marker mode off. (`Δ MODE OFF` under (MKR); Query)

DELR{1-5}

Sets the indicated marker as the delta reference. (`Δ REF = 1` to `Δ REF = 5` under (MKR); Query)

DELRFIXM

Sets the user-specified fixed marker as the delta reference. (`AREF=Δ FIXED MKR` under (MKR); Query)

DEMO{AMPL|PHAS|OFF}

Selects transform demodulation to amplitude or phase demodulation, or off. Only has an effect on a CW time transform. (DEMOD: OFF, AMPLITUDE, PHASE, under SYSTEM, TRANSFORM MENU, WINDOW; Query)

DFLT

Returns the plotting parameters to the default values. (DEFAULT SETUP under COPY, PRINT/PLOT SETUPS)

DISCUNIT *unit number*

Specifies the disc unit in a multiple-disk drive for disk store/load. For example, in a two floppy disk drive, the left-hand drive is unit number 0, the right-hand is unit number 1. (DISK UNIT NUMBER under LOCAL)

DISCVOLU *volume number*

Specifies the volume number in a disk drive that allows multiple volumes for disk store/load. (DISK UNIT NUMBER under LOCAL)

DISM{ON|OFF}

Enable/disable the display of all markers that have been individually turned on below active marker area (upper right-hand corner of display). (DISP MKRS ON off under MKR FCTN, MARKER MODE MENU; Query)

DISPDATA

Displays a trace of the measured data. (DISPLAY: DATA under DISPLAY; Query)

DISPDATM

Displays traces of both the measured data and the memory data. (DATA and MEMORY under DISPLAY; Query)

DISPDDM or DIVI

Displays the trace of the results of the measured data divided by the memory data. (DATA/MEM under DISPLAY; Query)

DISPDMM or MINU

Displays the trace of the results of the measured data subtracted by the memory data. (`DATA-MEM` under DISPLAY; Query)

DISPMEMO

Displays the trace of the memory data. (`MEMORY` under DISPLAY; Query)

DIVI or DISPDDM

Displays the trace of the results of the measured data divided by the memory data. (`DATA/MEM` under DISPLAY; Query)

DONE

Completes the measurement of the selected standard class for a specific calibration type. (`DONE: <class label>` under CAL)

DOWN

Decrements the value in the active entry area. (Down arrow key in the ENTRY area.)

DUAC{ON|OFF}

Selects the dual channel display on or off. (`DUAL CHAN on OFF` under DISPLAY; Query)

EDITDONE

Completes editing the frequency list for the list sweep, the limit table, or the power meter sensor's cal factor table. (`DONE` under MENU, SYSTEM, or CAL)

EDITLIML

Begins editing the limit line table. (`EDIT LIMIT LINE` under SYSTEM)

EDITLIST

Begins editing the frequency list. (`EDIT LIST` under MENU)

ELED *value* [s]

Sets the electrical delay. (`ELECTRICAL DELAY` under SCALE REF; Query)

value Depends on network analyzer's frequency resolution. See Specifications.

ENTO

Turns off the active entry area.

ESB?

Returns the event status register B value.

ESE *value*

Enables specific bits of event status register. (Query)

value 0 to 32767 ($=2^{15}-1$).

ESNB *value*

Enables specific bits of event status register B.

value 0 to 32767 ($=2^{15}-1$).

ESR?

Returns the event status register value.

EXET

Executes the service test. (Under `SERVICE MENU` under (SYSTEM))

EXTMDATA{ON|OFF}

Enable/disable storage of error corrected data when a file is stored to disk. (`DATA ARRAY on OFF` under (SAVE), under `DEFINE, INIT, PURGE`)

EXTMFORM{ON|OFF}

Enable/disable storage of formated data when a file is stored to disk. (`FORMAT ARY on OFF` under (SAVE), under `DEFINE, INIT, PURGE`)

EXTMGRAP{ON|OFF}

Enable/disable storage of user graphics when a file is stored to disk. (`GRAPHICS on OFF` under (SAVE), under `DEFINE, INIT, PURGE`)

EXTMRAW{ON|OFF}

Enable/disable storage of raw data array(s) when a file is stored to disk. (DATA ARRAY on OFF under SAVE, under DEFINE, INIT, PURGE)

EXTTOFF

Enables the internal measurement trigger mode on, external trigger off. (TRIGGER: TRIG OFF under MENU; Query)

EXTTON

Enables the external measurement trigger on sweep mode. When triggered, one measurement sweep is executed. (EXT. TRIG ON SWEEP under MENU; Query)

EXTTPOIN

Enables the external measurement trigger on point mode. When triggered, one point is measured. (EXT. TRIG ON POINT under MENU; Query)

FIXE

Specifies a load type standard as fixed (as opposed to sliding or offset), when defining the standard during a calibration kit modification. (FIXED under CAL)

FORM1

Sets the format for data transfer to the network analyzer's internal format.

FORM2

Sets the format for data transfer to the IEEE 32-bit floating point.

FORM3

Sets the format for data transfer to the IEEE 64-bit floating point.

FORM4

Sets the format for data transfer to ASCII.

FORM5

Sets the format for data transfer to the IEEE 32-bit floating point, but with least significant byte of each point sent first, for compatibility with PC-DOS memory management.

FREO

Erases the frequency annotation on the display. Preset to turn on. (FREQUENCY BLANK under DISPLAY)

FRER

Continuous trigger (free run). (CONTINUOUS under MENU; Query)

FRES{ON|OFF}

Select Frequency Subset calibration on or off. (FRQ SUBSET ON off under CAL; Query)

FULP

Selects the full page plot. (FULL PAGE under COPY; Query)

FWDI

Selects forward isolation class for the calibration. (FWD ISOL'N ISOL'N STD under CAL)

FWDM

Selects forward match for the calibration. (FWD. MATCH THRU under CAL)

FWDT

Selects forward transmission for the calibration. (FWD. TRANS. THRU under CAL)

GATECENT *value* [*suffix*] *Option 010 installed.*

Set the time domain gate center time. (CENTER under SYSTEM, TRANSFORM MENU, SPECIFY GATE)

GATEO{ON|OFF} *Option 010 installed.*

Select time domain gate on or off. (GATE on OFF under SYSTEM, TRANSFORM MENU, SPECIFY GATE; Query)

GATESPAN *value* [*suffix*] *Option 010 installed.*

Set the time domain gate span time. (SPAN under SYSTEM, TRANSFORM MENU, SPECIFY GATE)

GATESTAR *value* [*suffix*] *Option 010 installed.*

Set the time domain gate start time. (START under SYSTEM, TRANSFORM MENU, SPECIFY GATE)

GATESTOP *value* [*suffix*] *Option 010 installed.*

Set the time domain gate stop time. (CENTER under SYSTEM, TRANSFORM MENU, SPECIFY GATE)

GATSMAXI *Option 010 installed.*

Set the time domain gate shape to maximum. (GATE SHAPE MAXIMUM under SYSTEM, TRANSFORM MENU, SPECIFY GATE, GATE SHAPE; Query)

GATSMINI *Option 010 installed.*

Set the time domain gate shape to minimum. (GATE SHAPE MINIMUM under SYSTEM, TRANSFORM MENU, SPECIFY GATE, GATE SHAPE; Query)

GATSNORM *Option 010 installed.*

Set the time domain gate shape to normal. (GATE SHAPE NORMAL under SYSTEM, TRANSFORM MENU, SPECIFY GATE, GATE SHAPE; Query)

GATSWIDE *Option 010 installed.*

Set the time domain gate shape to wide. (GATE SHAPE WIDE under SYSTEM, TRANSFORM MENU, SPECIFY GATE, GATE SHAPE; Query)

HOLD

Sets the trigger mode to hold the current measurement. (HOLD under MENU; Query)

IDN? or OUTPIDEN

Outputs the identification string, "HEWLETT PACKARD, 87aam,0,X.XX", where aam is the rest of the model number, X.XX is the firmware revision.

IFBW *value* [*suffix*]

Sets the IF bandwidth value. (IF BW under AVG; Query)

value 10 (Hz), 30 (Hz), 100 (Hz), 300 (Hz), 1000 (Hz), or 3000 (Hz).

suffix Refer to "Suffix".

INID

Initializes the disk (Logical Interchange Format, LIF). (INITIALIZE DISK under SAVE)

INPUCALC{01-12} *value*

Stores the measurement calibration error coefficient set real/imaginary pairs input via HP-IB into instrument memory. Refer to Chapter 5 for calibration array assignments. See also FORM commands.

value Complex number. (Data format: real, imaginary)

INPUCALK *value*

Input a calibration kit data into the USER CAL KIT definition, previously obtained by the OUTPCALK command. After inputting, the data can be saved in nonvolatile memory with the SAVEUSEK command. The user kit definition can then be invoked by the command CALKUSED.

value Block data. (Data format: FORM1 only, 714 bytes of binary data)

INPUDATA *value*

Inputs the error corrected data. The network analyzer will stop sweeping and display the data.

value Complex number. (Data format: real, imaginary)

INPUFORM *value*

Inputs formatted data. The network analyzer will stop sweeping and display the data.

value Complex number. (Data format: real, imaginary)

INPULEAS *value* **or LRN** *value*

Input a learn string, previously obtained by the OUTPLEAS command.

INPUPMCAL{**1**|**2**} *value*

Input a power meter calibration array, previously obtained by the OUTPPMCAL{1|2} command.

INPURAW{**1-4**} *value*

Inputs raw data. The network analyzer will stop sweeping and display the data.

value Complex number. (Data format: real, imaginary)

INSMNETA

Selects instrument mode as a network analyzer. (NETWORK ANALYZER under SYSTEM, INSTRUMENT MODE; Query)

INSMTUNR

Selects instrument mode as a tuned receiver. (TUNED RECEIVER under SYSTEM, INSTRUMENT MODE; Query)

INTE *value*

Sets the display intensity as a percent of the brightest setting. (INTENSITY under DISPLAY; Query)

value 0 to 100 (%).

ISOD

Completes the isolation part of the 2-port calibration. (ISOLATION DONE under CAL)

ISOL

Begins the isolation part of the 2-port calibration. (ISOLATION under CAL)

KEY *value*

Inputs the key code for a hardkey or a softkey on the front panel. This is equivalent to actually pressing a key. Refer to Chapter 4 for key codes.

value 0 to 49.

KITD

Ends the calibration kit modification process. (KIT DONE under CAL)

KOR?

Outputs a two byte key code or knob count. If the number is positive (two's complement), the number is a key code; if negative, the number is an encoded knob count. The knob count is decoded by clearing (set to zero) the first of the two bytes if bit 6 of the first byte is 0. The resulting combined value of the two bytes is the knob count, positive or negative depending on whether the knob was turned counterclockwise or clockwise, respectively.

LABEFWD{M|T} *string*

Defines the label for forward match or forward transmission class during modifying the calibration kit. (FWD. MATCH or LABEL: FWD. TRANS. under CAL)

string Up to ten characters long.

LABERES{I|P} *string*

Defines the label for response and isolation, or response class when modifying the calibration kit. (RESPONSE & ISOL'N or RESPONSE under CAL)

string Up to ten characters long.

LABEREV{M|T} *string*

Defines the label for reverse match or reverse transmission class during modifying the calibration kit. (REV.MATCH or REV.TRANS. under CAL)

string Up to ten characters long.

LABES11{A|B|C} *string*

Defines the label for S11A, S11B, or S11C class when modifying the calibration kit. (LABEL: S11A, S11B, or S11C under CAL)

string Up to ten characters long.

LABES22{A|B|C} *string*

Defines the label for S22A, S22B, or S22C class when modifying the calibration kit. (LABEL: S22A, S22B, or S22C under CAL)

string Up to ten characters long.

LABETRL{**L**|**R**|**T**} *string*

Defines the label for TRL LINE, REFLECT, or THRU class when modifying the calibration kit. (`LABEL: TRL* LINE OR MATCH`, `TRL* REFLECT`, or `TRL* THRU` under CAL)

string Up to ten characters long.

LABK *string*

Defines the calibration kit label when modifying the calibration kit. (`LABEL KIT` under CAL)

string Up to ten characters long.

LABS *string*

Defines the calibration standard label when modifying the calibration kit. (`LABEL STD` under CAL)

string Up to ten characters long.

LEFL

Sets the plot quadrant to left lower. (`LEFT LOWER` under COPY; Query)

LEFU

Sets the plot quadrant to left upper. (`LEFT UPPER` under COPY; Query)

LIMD *value* [*suffix*]

Sets the limits delta value from the specified middle value. (`DELTA LIMITS` under SYSTEM; Query)

value Format dependent.

suffix Refer to "Suffix".

LIMEDONE

Completes editing the limit table. (`DONE` under SYSTEM)

LIMIAMPO *value* [*suffix*]

Sets an amplitude offset value for limit testing. (`AMPLITUDE OFFSET` under SYSTEM; Query)

value Format dependent.

suffix Refer to "Suffix".

LIMILINE{ON|OFF}

Sets limit lines on or off. (LIMIT LINE on off under SYSTEM; Query)

LIMIMAOF

Sets the active marker value to the amplitude offset for limit testing. (MARKER → AMP. OFS under SYSTEM)

LIMISTIO *value* [*suffix*]

Sets a stimulus offset value for limit testing. (STIMULUS OFFSET under SYSTEM; Query)

value Domain dependent.

suffix Refer to "Suffix".

LIMITEST{ON|OFF}

Sets the limit testing on or off. (LIMIT TEST on off under SYSTEM; Query)

LIML *value* [*suffix*]

Sets the lower limit value for a limit testing segment. (LOWER LIMIT under SYSTEM; Query)

value Format dependent.

suffix Refer to "Suffix".

LIMM *value* [*suffix*]

Sets the middle value of delta limits. (MIDDLE VALUE under SYSTEM; Query)

value Format dependent.

suffix Refer to "Suffix".

LIMS *value* [*suffix*]

Sets the starting stimulus value of a limit testing segment. (STIMULUS VALUE under SYSTEM; Query)

value Domain dependent.

suffix Refer to "Suffix".

LIMT{FL|SL|SP}

Specifics the limit type as a flat line, sloping line, or single point segment. (LIMIT TYPE under SYSTEM; Query)

LIMU *value* [*suffix*]

Sets the upper limit value for a limit testing segment. (UPPER LIMIT under SYSTEM; Query)

value Format dependent.

suffix Refer to "Suffix".

LINFREQ

Activates a linear frequency sweep. (LIN FREQ under MENU; Query)

LINM

Displays the linear magnitude format. (LIN MAG under FORMAT; Query)

LINT{DATA|MEMO} *value*

Selects the line type of a trace for plotting. (LINE TYPE DATA or LINE TYPE MEMORY under COPY)

value 0 to 10.

LISFREQ

Activates the frequency list sweep mode. (LIST FREQ under MENU; Query)

LISV

Displays a tabular listing of all the stimulus values and their current measured values. (LIST VALUES under COPY)

LOAD{1-5}

Load the file associated with position {1-5} from disk. Requires pass control. To load a file by title, use the TITF{1-5} to first put the file name into the position 1-5 desired, then LOAD{1-5}. (LOAD FROM DISK under RECALL)

LOGFREQ

Activates log frequency sweep mode. (LOG FREQ under MENU; Query)

LOGM

Displays in log magnitude format. (LOG MAG under FORMAT; Query)

LOWPIMPU *Option 010 installed.*

Selects low pass impulse transform. (LOW PASS IMPULSE under SYSTEM, TRANSFORM MENU; Query)

LOWPSTEP *Option 010 installed.*

Selects low pass step transform. (LOW PASS STEP under SYSTEM, TRANSFORM MENU; Query)

MANTRIG

Triggers measurement at one point. (MANUAL TRG ON POINT under MENU; Query)

MARK{1-5} *value* [*suffix*]

Selects the active marker, and moves it to the specified stimulus value. (MARKER 1 to MARKER 5 under MKR; Query)

value Domain dependent.

suffix Refer to "Suffix".

MARKBUCK *value*

Moves the active marker to specified data point number.

value 0 to "number of points" −1.

MARKCENT

Changes the stimulus center value to the active marker value. (MARKER → CENTER under MKR FCTN)

MARKCONT

Interpolates between measured points to allow the markers to be placed at any point on the trace. (CONTINUOUS under MKR; Query)

MARKCOUP

Couples the marker stimulus values for the two display channels. (MARKERS: COUPLED under MKR; Query)

MARKDELA

Sets the electrical length so that the group delay is zero at the marker stimulus. (MARKER → DELAY under SCALE REF)

MARKDISC

Places markers only on measured trace points determined by the stimulus settings. (MARKERS: DISCRETE under MKR; Query)

MARKFAUV *value* [*suffix*]

Sets the fixed marker auxiliary value offset. (FIXED MKR AUX VALUE under MKR; Query)

value Format dependent.

suffix Refer to "Suffix".

MARKFSTI *value* [*suffix*]

Sets the fixed marker stimulus value offset. (FIXED MKR STIMULUS under MKR; Query)

value Domain dependent.

suffix Refer to "Suffix".

MARKFVAL *value* [*suffix*]

Sets the fixed marker position value offset. (FIXED MKR VALUE under MKR; Query)

value Format dependent.

suffix Refer to "Suffix".

MARKMAXI or SEAMAX

Moves the active marker to the maximum point on the trace. (MAX under MKR FCTN; Query)

MARKMIDD

Sets the middle value for the delta limit using the active marker value. (MIDDLE VALUE under SYSTEM)

MARKMINI or SEAMIN

Moves the active marker to the minimum point on the trace. (MIN under MKR FCTN; Query)

MARKOFF

Turns off all the markers and the delta reference marker. (ALL MKR OFF under MKR; Query)

MARKREF

Changes the reference value to the active marker's response value, without changing the reference position. (MARKER → REFERENCE under SCALE REF or MKR FCTN)

MARKSPAN

Changes the start and stop values of the stimulus span to the active marker and the delta reference marker. (MARKER → SPAN under MKR FCTN)

MARK{STAR|STOP}

Changes the stimulus start or stop value to the active marker value. (MARKER → START, MARKER → STOP under MKR FCTN)

MARKSTIM

While editing a limit segment, sets the stimulus value to the active marker value. (MARKER → STIMULUS under SYSTEM)

MARKUNCO

Allows the marker stimulus values to be controlled independently on each channel. (UNCOUPLED under MKR; Query)

MARKZERO

Puts a fixed reference marker at the present active marker position, and makes the fixed marker stimulus and response values at that position equal to zero. (MKR ZERO under MKR)

MAXF *value* [*suffix*]

Sets the maximum valid frequency of a standard being defined during a calibration kit modification. (MAXIMUM FREQUENCY under CAL)

value Frequency range of the network analyzer.

suffix Refer to "Suffix".

MEASA

Measures the absolute power amplitude at input A. (A under MEAS; Query)

MEASB

Measures the absolute power amplitude at input B. (B under MEAS; Query)

MEASR

Measures the absolute power amplitude at input R. (R under MEAS; Query)

MEASTAT{ON|OFF}

Calculates and displays the mean, standard deviation, and peak-to-peak values (ON), or does not display them (OFF). (STATISTICS under MKR FCTN, MARKER MODE MENU; Query)

MENU{AVG|CAL|COPY|DISP|FORM|MARK|MEAS|MRKF|RECA|SAVE|SCAL|STIM|SYST}

Specify display of the top level menu for each of the hard keys. Must be preceded by the MENUON command.

MENUON

Must precede the display of a particular menu (see MENU{ ... }).

MENUOFF

Turns off the display of the current menu (see MENU{ ... }).

MINF *value* [*suffix*]

Sets the minimum valid frequency of a standard being defined during a calibration kit modification. (MINIMUM FREQUENCY under CAL)

value Frequency range of the network analyzer.

suffix Refer to "Suffix".

MINU or DISPDMM

Displays the trace of the results of the measured data subtracted by the memory data. (DATA-MEM under DISPLAY; Query)

MODI1

Begins the modify calibration kit sequence. (MODIFY under CAL)

NEXP

Displays the next page of information in a tabular listing onto the display. (NEXT PAGE under COPY)

NOOP

The "no operation" command.

NUMG *value*

Triggers a user-specified number of sweeps, and returns to the hold mode. (NUMBER OF GROUPS under MENU)

value 1 to 999.

NUMR

Sets the number of power meter readings per point during a power meter calibration.

value 1 to 100.

OFLD

Specifies a standard as an offset load during a standard definition as part of a calibration kit modification. (SLIDING under CAL)

OFSD *value* [s]

Specifies the one-way electrical delay from the measurement (reference) plane to the standard when defining a standard during a calibration kit modification. (OFFSET DELAY under CAL)

value −10 (s) to 10 (s).

OFSL *value*

Specifies loss, due to skin effect, along a one-way length of transmission line offset for a standard when defining a standard during a calibration kit modification. (OFFSET LOSS under CAL)

value 0 to 1.0E+16 (Ω/s).

OFSZ *value* [ohm]

Specifies the characteristic impedance of a standard when defining a standard during a calibration kit modification. (OFFSET Z0 under CAL)

value 0.001 (ohm) to 1000 (ohm).

OMII

Omits the correction for isolation of a 2-port calibration. (OMIT ISOLATION under CAL)

OPC

Operation complete. Reports the completion of the next command received by setting bit 0 in the event status register, or by replying to the interrogation form of the command (OPC?).

OPEP

Lists the key parameters for both channel 1 and 2 on the display. (OPERATING PARAMETERS under COPY)

OUTPACTI

Outputs the active entry area function value, or the value of the last active function if the active entry area is off.

OUTPAPER

Outputs the smoothing aperature in stimulus units, rather than as a percentage.

OUTPCALC{01-12}

Outputs the active calibration set array of the active channel (Data format: real, imaginary). Refer to Chapter 5 for the calibration set array.

OUTPCALK

Outputs the active calibration kit. (Data format: FORM1, 714 bytes of binary data)

OUTPDATA

Outputs the error corrected data (Data format: real, imaginary).

OUTPERRO

Outputs the error message in the error queue (Data format: Error Number, "string" of no more than 50 characters).

OUTPFORM

Outputs the formatted trace data. Refer to the *BASIC Programming Guide* or the *QuickC Programming Guide* for a table of data formats, which depend on the current setting for display format.

OUTPIDEN or IDN?

Outputs the identification string, "HEWLETT PACKARD, 87aam,0,X.XX", where aam is the rest of the model number, X.XX is the firmware revision.

OUTPKEY

Outputs the key code of the last key pressed. An invalid key is outputted with 63, a knob turn with -1.

OUTPLEAS

Outputs the learn string, which contains the current instrument state of the network analyzer.

OUTPLIMF

Outputs the limit test results only for the failed points. (Data format: stimulus, result (0 for fail, −1 for no test), upper limit, lower limit; Form 4)

OUTPLIML

Outputs the limit test results for each point. (Data format: stimulus, result (1 for pass, 0 for fail, −1 for no test), upper limit, lower limit; This is always a Form 4, ASCII, transfer, regardless of the `FORM` command already set.)

OUTPLIMM

Outputs the limit test result for the maker position. (Data format: stimulus, result (1 for pass, 0 for fail, −1 for no test), upper limit, lower limit)

OUTPMARK

Outputs the active marker values. (Data format: marker value, marker aux. value, stimulus. Refer to Table 2-1 in the *Basic Programming Guide* or the *QuickC Programming Guide* for more information.)

OUTPMEMO

Outputs the memory data from the active channel. (Data format: real, imaginary)

OUTPMSTA

Outputs the marker statistics. (Data format: mean, standard deviation, peak to peak)

OUTPMWID

Outputs the results of the bandwidth search. (Data format: bandwidth, center, Q)

OUTPPLOT

Outputs the plot string. May be directed to a plotter or read into the computer. `PSOFT{ON|OFF}` (plot or print softkeys on or off) determines if softkey labels for the current menu are also plotted.

OUTPPMCAL{1|2}

Outputs a power meter calibration array.

OUTPPRIN

Outputs the print string. May be directed to a printer or read into the computer. `PSOFT{ON|OFF}` (plot or print softkeys on or off) determines if softkey labels for the current menu are also printed.

OUTPRAW{1-4}

Output the uncorrected data arrays for the active channel. (Data format: real, imaginary)

OUTPTITL

Outputs the display title for the active channel (less than 54 characters).

PCB *value* or ADDRCONT *value*

Sets the HP-IB address which the network analyzer uses to communicate with an external controller. This address must match that set on the SYSTEM CONTROLLER's interface in order for the USE PASS CONTROL capability to function properly. The default value, 21, is set for the HP 9000 series 200/300 computers. This should be set to 30 when using the HP 82335A Interface Card. (`ADDRESS: CONTROLLER` under LOCAL; Query)

value 0 to 30, *default* 21.

PHAO *value* [deg]

Adds or subtracts a phase offset. (PHASE OFFSET under SCALE REF; Query)

value −360 (deg) to +360 (deg).

P{DATA|MEM|GRAT|MKR|TEXT}{ON|OFF}

Selects whether data, memory, the graticule, marker(s), and/or text is to be plotted when using the PLOT command. (DEFINE PLOT under COPY; Query)

PENN{DATA|MEMO|GRAT|MARK|TEXT} *value*

Selects the pen number for data, memory, the graticule, marker(s), or text when using the PLOT command. (DEFINE PLOT under COPY; Query)

value 0 to 10.

PHAS

Displays a Cartesian format of the phase portion of the data, measured in degrees. (PHASE under FORMAT; Query)

PLOS{FAST|SLOW}

Sets the plotting speed to fast or slow. (PLOT SPEED under COPY)

PLOT

Plots the display to a graphics plotter. (PLOT under COPY)

POIN *value*

Sets the number of the data points per sweep. (NUMBER of POINTS under MENU; Query)

value For linear, log, power sweeps, or CW: 3, 11, 21, 51, 101, 201, 401, 801, 1601.
For list frequency sweeps, depends on frequency list entered.

POLA

Displays in polar format. (POLAR under FORMAT; Query)

POLMLIN

Displays the linear magnitude and the phase of the active polar marker. (LIN MKR under MKR FCTN; Query)

POLMLOG

Displays the logarithmic magnitude and the phase of the active polar marker. (LOG MKR under MKR FCTN; Query)

POLMRI

Displays a real and imaginary pair of the active polar marker. (Re/Im MKR under MKR FCTN; Query)

PORE{ON|OFF}

Sets the reference plane extension mode on or off. (EXTENSIONS on off under CAL; Query)

PORT1 *value*

Extends the reference plane for measurement of S_{11}, S_{21}, and S_{12}. (EXTENSION PORT 1 under CAL; Query)

PORT2 *value* [s]

Extends the reference plane for measurement of S_{22}, S_{12}, and S_{21}. (EXTENSION PORT 1 under CAL; Query)

POWE *value* [dBm]

Sets the source output level within a specified power range (see also PRAN). (POWER under MENU; Query)

POWLFREQ *value* [*suffix*]

Enter the frequency associated with a specific calibration factor for a particular power meter sensor. Used in conjunction with CALFCALF. The same editing commands as used with the LIST FREQ mode apply, except that the command CALFSEN is used instead of EDITLIST. See programming example in Chapter 2.

value Any value within the frequency range of the network analyzer.

suffix Refer to "Suffix".

POWS

Activates a power sweep mode. (POWER SWEEP under MENU; Query)

PRAN{01-12}

Selects a specific power range for test port power. Refer to the Specifications for the specific power level that can be selected using the POWE command.

PRES or *RST

Sets the network analyzer to the factory preset condition. (PRESET)

PRINALL

Copies the measurement display to the printer. (PRINT under COPY)

PRIC

Selects color printing. (COLOR under COPY; Query)

PRIS

Sets the print command to the default selection. (PRINT: STANDARD under COPY; Query)

PSOFT{ON|OFF}

Selects the plot or print softkey labels option on or off. Applies only when using the OUTPPLOT or OUTPPRIN commands.

PURG{1-5}

Removes the file associated with position {1-5} from disk. Requires pass control. To remove a file by title, use the TITF{1-5} first to put the file name into the position 1-5 desired, then PURG{1-5}. (STORE TO DISK under SAVE)

PWMC{ON|OFF}

Turn power meter calibration on or off. (PWRMTR CAL on OFF under CAL; Query)

PWMCAL

Begin the power meter calibration. (PWR METER CAL under CAL)

RAID

Completes the response and isolation calibration. (DONE RESP ISOL'N CAL under CAL)

RAIISOL

Selects the isolation class for the response and isolation calibration. (ISOL'N STD under CAL)

RAIRESP

Selects the response class for the response and isolation calibration. (RESPONSE under CAL)

REAL

Displays the real format of the measured data in Cartesian format. (REAL under FORMAT; Query)

RECA{1-5}

Recall the internal register {1-5}. RECA5 recalls the USER PRESET.

RECO

Recalls the previously saved color set. (RECALL COLORS under DISPLAY)

REFD

Completes the reflection part of the full 2-port calibration. (REFLECT'N DONE under CAL)

REFL

Begins the reflection part of the full 2-port calibration. (REFLECT'N under CAL)

REFP *value*

Sets the position of the reference line on the graticule of a Cartesian format. (REFERENCE POSITION under SCALE REF; Query)

value 0 to 10 (Div).

REFT

Recall file titles from disk. Requires pass control. (READ FILE TITLES under RECALL)

REFV *value* [*suffix*]

Changes the value of the reference line, moving the measurement trace correspondingly. (REFERENCE VALUE under SCALE REF; Query)

value Format dependent.

suffix Refer to "Suffix".

REIC

Begin the receiver calibration. (RECEIVER CAL under CAL)

RESC

Resumes the last measurement calibration sequence. (RESUME CAL SEQUENCE under CAL)

RESD

Turns off a tabular listing (OPEP or LISV) and returns the measurement display to the screen. (RESTORE DISPLAY under COPY)

RESPDONE

Completes the response calibration. (DONE: RESPONSE under CAL)

REST

Aborts the sweep in progress, then restarts the measurement. (MEASURE RESTART under MENU)

REVI

Selects the reverse isolation class for the calibration. (REV ISOL'N ISOL'N STD under CAL)

REVM

Selects the reverse match class for the calibration. (REV. MATCH THRU under CAL)

REVT

Selects the reverse transmission class for the calibration. (REV. TRANS. THRU under CAL)

RIGL

Draws a quarter-page plot in the lower right quadrant of the page. (RIGHT LOWER under COPY; Query)

RIGU

Draws a quarter-page plot in the upper right quadrant of the page. (RIGHT UPPER under COPY; Query)

RSCO

Resets the modified colors to the default colors. (RESET COLOR under DISPLAY)

S11

Selects the S-parameter test set for measurement of S_{11}. (Refl: FWD S11 under MEAS; Query)

S12

Selects the S-parameter test set for measurement of S_{12}. (Trans: REV S12 under MEAS; Query)

S21

Selects the S-parameter test set for measurement of S_{21}. (Trans: FWD S21 under MEAS; Query)

S22

Selects the S-parameter test set for measurement of S_{22}. (Refl: REV S22 under MEAS; Query)

SADD

Adds a new segment to a list frequency table, the limit line table, or power sensor table. (ADD under MENU)

SAV1

Computes and saves the 1-port calibration results. (DONE: 1-PORT CAL under CAL)

SAV2

Computes and saves the FULL 2-port calibration results. (DONE: 2-PORT CAL under CAL)

SAVC

Re-draws a trace using current error coefficient arrays.

SAVT

Computes and saves the TRL*/LRM* 2-port calibration results. (DONE: TRL*/LRM* under CAL)

SAVUBINA

Stores appropriate files to disk as binary files. (DISK FILE FORMAT under SAVE, STORE TO DISK, DEFINE STORE, INIT,DEFINE,PURGE)

SAVUASCI

Stores appropriate files to disk as ASCII files (CITIFile). Note: only specific data and calibration files are formatted as CITIFile; the instrument state file, calibration kit file and others are always stored as binary. (DISK FILE FORMAT under SAVE, STORE TO DISK, DEFINE STORE, INIT,DEFINE,PURGE)

SAVE{1-5}

Save the current instrument state in internal register {1-5}.

SAVEUSEK

Stores the currently active calibration kit into the user kit memory. (SAVE USER KIT under CAL)

SCAL *value* [*suffix*]

Changes the response value scale per division of the graticule. (SCALE/DIV under SCALE REF; Query)

value Format dependent.

suffix Refer to "Suffix".

SCAP{FULL|GRAT}

Selects the normal full size scale for plotting, or a plot where the graticule is expanded to P1 and P2 of the plotter. (SCALE PLOT under [COPY])

SDEL

Deletes a segment from the list frequency table, the limit line table, or power sensor table. (DELETE under [MENU] for list frequency table, under [SYSTEM] for limit line table, or under [CA] for power sensor table)

SDON

Completes editing a segment of the list frequency table, the limit line table, or power sensor table. (SEGMENT DONE under [MENU])

SEAL

Searches the trace for the next occurrence of the target value to the left of the marker. (SEARCH LEFT under [MKR FCTN])

SEAMAX or MARKMAXI

Moves the active marker to the maximum point on the trace. (MAX under [MKR FCTN]; Query)

SEAMIN or MARKMINI

Moves the active marker to the minimum point on the trace. (MIN under [MKR FCTN]; Query)

SEAOFF

Turns off search function. (Applicable when tracking on (TRACK{ON|OFF}.)(SEARCH: OFF under [MKR FCTN]; Query)

SEATARG *value* [*suffix*]

Places the active marker at a specified target point on a trace. (TARGET under [MKR FCTN]; Query)

value	Format dependent.
suffix	Refer to "Suffix".

SEDI *value*

Determines a segment of the list frequency table, limit line table, or power sensor table to be modified. (SEGMENT, EDIT under MENU for list frequency table, under SYSTEM for limit line table, or under CA for power sensor table); Query)

value Depends on table type.

SETF *Option 010 installed.*

Sets the frequency range of the network analyzer to conform with the Low Pass mode requirements (harmonically related frequency points). (SET FREQ LOW PASS under CAL and SYSTEM, TRANSFORM MENU)

SETRREFL

When defining a TRL-type calibration kit, sets the REFLECT class to established the measurement reference plane. (CAL KIT under CAL; Query)

SETRTHRU

When defining a TRL-type calibration kit, sets the THRU class to established the measurement reference plane. (CAL KIT under CAL; Query)

SETZ *value* [ohm]

Sets the characteristic impedance used by the network analyzer in calculating measured impedance with the Smith chart markers and conversion parameters. (SET ZO under CAL; Query)

value 0.001 (ohm) to 1000 (ohm).

SING

Makes a single measurement sweep, then sets the hold mode. (SINGLE under MENU)

SLID

Sliding load measurement done. (SLIDING LOAD DONE under CAL)

SLIL

Specifies a standard as a sliding load during a standard definition as part of a calibration kit modification. (SLIDING under CAL)

SLIS

Sliding load is set and ready to measure. (SLIDE is SET under CAL)

SMIC

Displays a Smith chart format. (SMITH CHART under FORMAT; Query)

SMIMGB

Displays the complex admittance values of the active marker position on a Smith chart. (G+jB MKR under MKR FCTN; Query)

SMIMLIN

Displays the linear magnitude value and the phase of the active marker position on a Smith chart. (LIN MKR under MKR FCTN; Query)

SMIMLOG

Displays the logarithmic magnitude value and the phase of the active marker on a Smith chart. (LOG MKR under MKR FCTN; Query)

SMIMRI

Displays the values of the active marker on a Smith chart as a real and imaginary pair. (Re/Im MKR under MKR FCTN; Query)

SMIMRX

Displays the complex impedance values of the active marker on a Smith chart in rectangular form. (R+jX MKR under MKR FCTN; Query)

SMOOAPER *value* [pct]

Changes the value of the smoothing aperture as a percent of the span. (SMOOTHING APERTURE under AVG; Query)

value 0.05 (%) to 20 (%).

SMOOO{ON|OFF}

Sets the smoothing function to on or off. (SMOOTHING on off under AVG; Query)

SOFR

Display the firmware revision in the active entry area. (Under SERVICE MENU under SYSTEM; Query)

SPAN *value* [*suffix*]

Sets the stimulus span. If a list frequency segment is being edited, sets the span of the segment. (SPAN or SPAN under MENU; Query)

value Domain dependent.

suffix Refer to "Suffix".

SPECFWDM *A*[,*B*[,*C*[,*D*[,*E*[,*F*[,*G*]]]]]]

Enters the standard numbers for the forward match (THRU) class. (FWD MATCH under CAL)

A, *B*, *C*, *D*, *E*, *F*, *G* 1 to 8.

SPECFWDT *A*[,*B*[,*C*[,*D*[,*E*[,*F*[,*G*]]]]]]

Enters the standard numbers for the forward transmission (THRU) class. (FWD TRANS under CAL)

A, *B*, *C*, *D*, *E*, *F*, *G* 1 to 8.

SPECRESI *A*[,*B*[,*C*[,*D*[,*E*[,*F*[,*G*]]]]]]

Enters the standard numbers for the response and isolation class. (RESPONSE & ISOL'N under CAL)

A, *B*, *C*, *D*, *E*, *F*, *G* 1 to 8.

SPECRESP *A*[,*B*[,*C*[,*D*[,*E*[,*F*[,*G*]]]]]]

Enters the standard numbers for the response calibration. (RESPONSE under CAL)

A, *B*, *C*, *D*, *E*, *F*, *G* 1 to 8.

SPECREVM *A*[,*B*[,*C*[,*D*[,*E*[,*F*[,*G*]]]]]]

Enters the standard numbers for the reverse match (THRU) calibration. (REV MATCH under CAL)

A, *B*, *C*, *D*, *E*, *F*, *G* 1 to 8.

SPECREVT *A*[,*B*[,*C*[,*D*[,*E*[,*F*[,*G*]]]]]]

Enters the standard numbers for the reverse transmission (THRU) class. (REV. TRANS. under CAL)

A, *B*, *C*, *D*, 1 to 8.
E, *F*, *G*

SPECS11A *A*[,*B*[,*C*[,*D*[,*E*[,*F*[,*G*]]]]]]

Enters the standard numbers for the $S_{11}A$ class. (SPECIFY: S11A under CAL)

A, *B*, *C*, *D*, 1 to 8.
E, *F*, *G*

SPECS11B *A*[,*B*[,*C*[,*D*[,*E*[,*F*[,*G*]]]]]]

Enters the standard numbers for the $S_{11}B$ class. (S11B under CAL)

A, *B*, *C*, *D*, 1 to 8.
E, *F*, *G*

SPECS11C *A*[,*B*[,*C*[,*D*[,*E*[,*F*[,*G*]]]]]]

Enters the standard numbers for the $S_{11}C$ class. (S11C under CAL)

A, *B*, *C*, *D*, 1 to 8.
E, *F*, *G*

SPECS22A *A*[,*B*[,*C*[,*D*[,*E*[,*F*[,*G*]]]]]]

Enters the standard numbers for the $S_{22}A$ class. (SPECIFY: S22A under CAL)

A, *B*, *C*, *D*, 1 to 8.
E, *F*, *G*

SPECS22B *A*[,*B*[,*C*[,*D*[,*E*[,*F*[,*G*]]]]]]

Enters the standard numbers for the $S_{22}B$ class. (S22B under CAL)

A, *B*, *C*, *D*, 1 to 8.
E, *F*, *G*

SPECS22C *A*[,*B*[,*C*[,*D*[,*E*[,*F*[,*G*]]]]]]

Enters the standard numbers for the $S_{22}C$ class. (S22C under CAL)

A, *B*, *C*, *D*, 1 to 8.
E, *F*, *G*

SPECTRLL *A*[,*B*[,*C*[,*D*[,*E*[,*F*[,*G*]]]]]]

Enters the standard numbers for the TRL* LINE OR MATCH class. (`TRL* LINE OR MATCH` under CAL)

A, *B*, *C*, *D*, 1 to 8.
E, *F*, *G*

SPECTRLR *A*[,*B*[,*C*[,*D*[,*E*[,*F*[,*G*]]]]]]

Enters the standard numbers for the TRL* REFLECT class. (`TRL* REFLECT` under CAL)

A, *B*, *C*, *D*, 1 to 8.
E, *F*, *G*

SPECTRLT *A*[,*B*[,*C*[,*D*[,*E*[,*F*[,*G*]]]]]]

Enters the standard numbers for the TRL* THRU class. (`TRL* THRU` under CAL)

A, *B*, *C*, *D*, 1 to 8.
E, *F*, *G*

SPLD{**ON**|**OFF**}

Sets the dual channel display mode: a full-screen single graticule display (OFF), or a split display with two half-screen graticules (ON). (`SPLIT DISP on off` under DISPLAY; Query)

SSEG *segment number*

Selects measurement of a specific segment number among all of the list frequency segments when using the `LIST FREQ` sweep mode. (`SINGLE SEG SWEEP` under MENU, `SWEEP TYPE MENU`, `LIST FREQ`.

SRE *value*

Service request enable. The *value* is the mask which enables specific bits in the status byte for generating an SRQ.

STAN{**A-G**}

Measures the calibration standard in the current standard class. (`OPEN`, `SHORT`, `THRU`, `LOAD`, etc. under CAL)

STAR *value* [*suffix*]

Defines the start stimulus value. If a list frequency segment is being edited, sets the start of the segment. (START or SEGMENT START under MENU; Query)

value Domain dependent.

suffix Refer to "Suffix".

STB?

Reads the status byte.

STDD

Completes the current standard definition. (STD DONE (DEFINED) under CAL)

STDTARBI

Defines the standard type an arbitrary impedance load. (ARBITRARY IMPEDANCE under CAL; Query)

STDTDELA

Defines the standard type as transmission line of specified length. (DELAY/THRU under CAL; Query)

STDTLOAD

Defines the standard type as LOAD (termination). (LOAD under CAL; Query)

STDTOPEN

Defines the standard type as an OPEN. (OPEN under CAL; Query)

STDTSHOR

Defines the standard type as a SHORT. (SHORT under CAL; Query)

STEPSWP{ON|OFF}

When on, forces the linear sweep to stepped sweep on every point (as opposed to "swept" sweep). (STEP SWP on OFF under CAL; Query)

STPSIZE *value* [*suffix*]

When editing a list frequency segment, set step size. (STEP SIZE under MENU)

STOP *value* [*suffix*]

Defines the stop value of the stimulus. If a list frequency segment is being edited, sets the stop frequency of the segment. (STOP or STOP under MENU; Query)

value Domain dependent.

suffix Refer to "Suffix".

STOR{**1-5**}

Store the file associated with position {1-5} to disk. Requires pass control. To store a file by title, use the TITF{1-5} first to put the file name into the position 1-5 desired, then STOR{1-5}. (STORE TO DISK under SAVE)

SVCO

Saves the modified color set. (SAVE COLORS under DISPLAY)

SWEA

Selects automatic sweep time, in which the sweep time is set to the fastest possible for a given frequency range, number of points, and IF bandwidth.

SWET *value* [*suffix*]

Sets the sweep time manually. (SWEEP TIME under MENU; Query)

value 2 ms to 86400 s

suffix Refer to "Suffix".

SWR

Selects the SWR display for the active channel. (SWR under FORMAT; Query)

TAKRS

Take a receiver calibration sweep. (TAKE RCVR CAL SWEEP under CAL, RECEIVER CAL)

TALKLIST

Puts the network analyzer in talker/listener HP-IB mode. (TALKER/LISTER under LOCAL)

TERI *value* [ohm]

Specifies the (arbitrary) impedance of the standard. (TERMINAL IMPEDANCE under CAL)

value 0 to 10000 (ohm).

TESS?

Outputs the test set identifier: 1 for an S-parameter test set, or 0 for none.

TIMDTRAN{ON|OFF} *Option 010 installed.*

Turns time domain transform on or off.

TINT *value*

Adjusts the hue of the chosen attribute. See COLO above. (TINT under DISPLAY; Query)

value 0 to 100.

TITF{1-5} *string*

Title the file associated with position {1-5} for subsequent disk access. Used in conjunction with LOAD, STORE, and PURG to put a file name into the position 1-5 as desired. (TITLE FILES under SAVE)

string up to 8 alphanumberic characters, first character must be alphabetic.

TITL *string*

Sends the string to the title area on the display. (TITLE under DISPLAY; Query)

string up to 53 characters.

TITR{1-5} *string*

Title the internal register associated with position {1-5}. Used in conjunction with SAVE and RECALL. (TITLE REGISTER under SAVE)

string up to 8 alphanumberic characters, first character must be alphabetic.

TRACK{ON|OFF}

Tracks the search at the specified target value with each new sweep. (TRACKING on off under MKR FCTN; Query)

TRAD

Completes the transmission part of the full 2-port calibration. (TRANS. DONE under CAL)

TRAN

Begins the transmission part of the full 2-port calibration. (TRANSMISSION under CAL)

TRIG

HP-IB trigger. Puts network analyzer into hold.

TRLL1

Begin and complete the port 1 LINE class measurement part of the TRL*/LRM* 2-port calibration. (LN/MATCH 1 under CAL, TRL*/LRM* 2-PORT)

TRLL2

Begin and complete the port 2 LINE class measurement part of the TRL*/LRM* 2-port calibration. (LN/MATCH 2 under CAL, TRL*/LRM* 2-PORT)

TRLR1

Begin and complete the S11 REFLECT class measurement part of the TRL*/LRM* 2-port calibration. (S11 REFL under CAL, TRL*/LRM* 2-PORT)

TRLR2

Begin and complete the S22 REFLECT class measurement part of the TRL*/LRM* 2-port calibration. (S22 REFL under CAL, TRL*/LRM* 2-PORT)

TRLT

Begin and complete the THRU class measurement part of the TRL*/LRM* 2-port calibration. (THRU under CAL, TRL*/LRM* 2-PORT)

UP

Increments the value in the active entry area. (Up arrow key in the ENTRY area.)

USEPASC

Puts the network analyzer in use pass control HP-IB mode. (USE PASS CONTROL under LOCAL)

VELOFACT *value*

Enters the velocity factor used by the network analyzer to calculate the equivalent electrical length. (VELOCITY FACTOR under CAL; Query)

value 0 to 10.

WAIT

Wait for a clean sweep.

WAVD *value*

Selects the electrical delay calculation based on a waveguide transmission line. The value is the waveguide cut-off frequency. (WAVEGUIDE DELAY under SCALE REF.)

WAVE

Selects waveguide offsets (see also COAX) while defining a standard during a calibration kit modification.

WIDT{ON|OFF}

Sets the bandwidth search feature (ON) or not (OFF). (BW MEASURE on OFF under MKR FCTN; Query)

WIDV *value* [*suffix*]

Sets the amplitude parameter that defines the start and stop points for a bandwidth search. (WIDTH VALUE under MKR FCTN; Query)

value Format dependent.

suffix Refer to "Suffix".

WINDMAXI *Option 010 installed.*

Set the time domain window shape to maximum. (`WINDOW: MAXIMUM` under SYSTEM, `TRANSFORM MENU`, `WINDOW`; Query)

WINDMINI *Option 010 installed.*

Set the time domain window shape to minimum. (`WINDOW: MINIMUM` under SYSTEM, `TRANSFORM MENU`, `WINDOW`; Query)

WINDNORM *Option 010 installed.*

Set the time domain window shape to normal. (`WINDOW: NORMAL` under SYSTEM, `TRANSFORM MENU`, `WINDOW`; Query)

WIND *value Option 010 installed.*

Set the time domain window shape pulse width value. (`WINDOW: NORMAL` under SYSTEM, `TRANSFORM MENU`, `WINDOW`; Query)

WINDUSEM{ON|OFF} *Option 010 installed.*

Use the current trace MEMORY as the time domain window shape. (`USE MEMORY on OFF` under SYSTEM, `TRANSFORM MENU`, `WINDOW`; Query)

***CLS**

Clears the status byte, the event status register, and the event status register B.

***ESE** *value*

Enables specific bits of event status register. (Query)

value 0 to 32767 ($=2^{15}-1$).

***ESR?**

Returns the contents of the standard event status register.

***IDN?**

Outputs the identification string, "HEWLETT PACKARD, 87aam,0,X.XX", where aam is the rest of the model number, X.XX is the firmware revision.

*OPC

Tells the network analyzer to set bit 0 (OPeration Complete bit) in the event status register when it completes all pending operations. (When used in Query form, the network analyzer will output a 1 when the operation is complete.)

Its use is enabled by issuing the command (`OPC;` or `OPC?;`) prior to an OPC'able command. For example, issuing `OPC;SING;` causes the OPC bit in to be set at the completion of the single sweep. Issuing `OPC?;` instead causes the network analyzer to output a 1 when the sweep is completed. Addressing the network analyzer to talk will then hold HP-IB traffic until the sweep is completed and the "1" has been accepted.

*PCB *value*

Sets the HP-IB address which the network analyzer uses to communicate with an external controller. (`ADDRESS: CONTROLLER` under (LOCAL); Query)

value 0 to 30, *default* 21.

*RST or PRES

Sets the network analyzer to the factory preset condition. ((PRESET))

*SRE *value*

Service request enable. The *value* is the mask which enables specific bits in the status byte for generating an SRQ.

*STB?

Reads the status byte.

*TST?

Executes an internal self-test and returns the test result(0 = pass, 1 = fail).

2

HP-IB Commands Summary

This appendix summarizes the HP-IB commands of the HP 8719C, 8720C, and 8722 according to the softkey labels.

Active Channel Block

CHAN1	CH 1
CHAN2	CH 2

Response Function Block

MEAS Key

S11	Refl: FWD S11 (A/R)
S21	Trans: FWD S21 (B/R)
S12	Trans: REV S12 (A/R)
S22	Refl: REV S22 (B/R)
ANAI	AUXILIARY INPUT
REST	MEASURE RESTART

Input Port Menu

AR	A/R
BR	B/R
AB	A/B
MEASA	A
MEASB	B
MEASR	R

Conversion Menu

CONVOFF	CONVERSION [OFF]
CONVZREF	Z: Refl
CONVZTRA	Z: Trans

CONVYREF	Y: Refl
CONVYTRA	Y: Trans
CONV1DS	1/S

(FORMAT) Key

LOGM	LOG MAG
PHAS	PHASE
DELA	DELAY
SMIC	SMITH CHART
POLA	POLAR
LINM	LIN MAG
REAL	REAL
SWR	SWR

(SCALE REF) Key

AUTO	AUTO SCALE
SCAL *value*	SCALE/DIV
REFP *value*	REFERENCE POSITION
REFV *value*	REFERENCE VALUE
MARKREF	MARKER → REFERENCE
ELED *value*	ELECTRICAL DELAY
PHAO *value*	PHASE OFFSET
COAD	COAXIAL DELAY
WAVD *cut_off freq.*	WAVEGUIDE DELAY

(DISPLAY) Key

DUAC{ON|OFF}	DUAL CHAN on OFF
DISPDATA	DISPLAY: DATA
DISPMEMO	MEMORY
DISPDATM	DATA and MEMORY
DISPDDM	DATA/MEM
DIVI	DATA/MEM *HP 8510 compatibility*
DISPDMM	DATA—MEM
MINU	DATA—MEM *HP 8510 compatibility*
DATI	DATA → MEM

Display More Menu

SPLD{ON|OFF}	SPLIT DISP ON off
BEEPDONE{ON|OFF}	BEEP DONE ON off
BEEPWARN{ON|OFF}	BEEP WARN on OFF
FREQ	FREQUENCY BLANK
TITL *"string"*	TITLE

Adjust Display Menu

INTE *value*	INTENSITY
BACI *value*	BACKGROUND INTENSITY
DEFC	DEFAULT COLORS
SVCO	SAVE COLORS
RECC	RECALL COLORS

Modify Colors Menu

COLOCH1D	CH1 DATA
COLOCH1M	CH1 MEM LIMIT LN
COLOCH2D	CH2 DATA
COLOCH2M	CH2 MEM LIMIT LN
COLOGRAT	GRATICULE
COLOWARN	WARNING
COLOTEXT	TEXT

Color Adjust Menu

TINT *value*	TINT
CBRI *value*	BRIGHTNESS
COLOR *value*	COLOR
RSCO	RESET COLOR

(AVG) Key

AVERREST	AVERAGING RESTART
AVERFACT *value*	AVERAGING FACTOR
AVERO{ON|OFF}	AVERAGING on OFF
SMOOAPER *value*	SMOOTHING APERTURE
SMOOO{ON|OFF}	SMOOTHING on OFF
IFBW *value*	IF BW

(CAL) Key

CORR{ON|OFF}	CORRECTION on OFF
FRES{ON|OFF}	FRQ SUBSET on OFF
RESC	RESUME CAL SEQUENCE
PWRMCAL	PWR METER CAL
REIC	RECEIVER CAL

CALIBRATE MENU

SETF	SET FREQ LOW PASS *Option 010 installed.*
CORROFF	CALIBRATE: NONE
CALIRESP	RESPONSE
CALIRAI	RESPONSE & ISOL'N
CALIS111	S11 1-PORT
CALIS221	S22 1-PORT
CALIFUL2	FULL 2-PORT
CALITRL2	TRL*/LRM* 2-PORT

Select Cal Kit Menu

CALK7MM	CAL KIT: 7mm
CALK35MM	3.5mm
CALKN50	N 50Ω
CALKTRLK	TRL*
CALKUSED	USER KIT
SAVEUSEK	SAVE USER KIT
MODI1	MODIFY

Calibrate More Menu

VELOFACT *value*	VELOCITY FACTOR
SETZ *value*	SET SYSTEM ZO
ALTAB	ALTERNATE A and B
CHOPAB	CHOP A and B
CSWI{ON|OFF}	TEST SET SW on off

Port Extensions Menu

PORE{ON|OFF}	EXTENSIONS on off
PORT1 *value*	EXTENSION PORT 1
PORT2 *value*	EXTENSION PORT 2

Response Cal Menu

STANA	SHORT *When 3.5 mm calibration kit selected.*
STANB	OPEN *When 3.5 mm calibration kit selected.*
STANC	THRU *When 3.5 mm calibration kit selected.*
RESPDONE	DONE: RESPONSE

As an example, the Response Cal Menu shows the various standards selected when using a 3.5 mm calibration kit. The standards for this menu and the Response and Isolation Cal Menu below are STANA, STANB, STANC, etc. through STANG.

Response and Isolation Cal Menu

RAIRESP	RESPONSE
RAIISOL	ISOL'N STD
RAID	DONE RESPONSE ISOL'N CAL

S11 and S22 1-Port Cal Menus

CLASS11A	[S11] : OPEN
CLASS11B	SHORT
CLASS11C	LOAD
CLASS22A	[S22] : OPEN
CLASS22B	SHORT
CLASS22C	LOAD
SAV1	DONE: 1-PORT CAL
STAN{A-G}	OPEN[M], OPEN[F], SHORT[M], SHORT[F], LOAD, and so on.
DONE	DONE: OPENS, DONE: SHORTS, or DONE: LOADS

Full 2-Port Cal Menus

REFL	REFLECT'N
TRAN	TRANSMISSION
ISOL	ISOLATION
CLASS11A	[S11] : OPEN
CLASS11B	SHORT
CLASS11C	LOAD
CLASS22A	[S22] : OPEN
CLASS22B	SHORT
CLASS22C	LOAD
REFD	REFLECT'N DONE
FWDT	FWD. TRANS. THRU
FWDM	FWD. MATCH THRU
REVT	REV. TRANS. THRU

REVM	REV. MATCH THRU
STAN{A-G}	OPEN[M], OPEN[F], SHORT[M], LOAD, THRU, and so on.
TRAD	TRANS. DONE
OMII	OMIT ISOLATION
FWDI	FWD. ISOL'N ISOL'N STD
REVI	REV. ISOL'N ISOL'N STD
ISOD	ISOLATION DONE
DONE	DONE: OPENS, DONE: SHORTS, or DONE: LOADS
TRLT	THRU
TRLR1	S11 REFL
TRLR2	S22 REFL
TRLL1	LN/MATCH 1
TRLL2	LN/MATCH 2

Modify Cal Kit Menu

DEFS *value*	DEFINE STANDARD
LABK *string*	LABEL KIT
KITD	KIT DONE

Define Standard Menus

STDTOPEN	OPEN
STDTSHOR	SHORT
STDTLOAD	LOAD
STDTDELA	DELAY/THRU
STDTARBI	ARBITRARY IMPEDANCE
C0 *value*	C0
C1 *value*	C1
C2 *value*	C2
C3 *value*	C3
TERI *value*	TERMINAL IMPEDANCE
FIXE	FIXED
SLIL	SLIDING
LABS *string*	LABEL STD
STDD	STD DONE (DEFINED)

Specify Offset Menu

OFSD *parameter*	OFFSET DELAY
OFSL *parameter*	OFFSET LOSS

OFSZ *parameter*	OFFSET ZO
MINF *parameter*	MINIMUM FREQUENCY
MAXF *parameter*	MAXIMUM FREQUENCY
COAX	COAX
WAVE	WAVEGUIDE
STDD	STD DONE (DEFINED)

Specify Class Menus

SPECS11A *value,value, ...*	SPECIFY: S11A
SPECS11B *value,value, ...*	S11B
SPECS11C *value,value, ...*	S11C
SPECS22A *value,value, ...*	SPECIFY: S22A
SPECS22B *value,value, ...*	S22B
SPECS22C *value,value, ...*	S22C
SPECFWDT *value,value, ...*	SPECIFY: FWD.TRANS.
SPECREVT *value,value, ...*	REV.TRANS.
SPECFWDM *value,value, ...*	FWD.MATCH
SPECREVM *value,value, ...*	REV.MATCH
SPECRESP *value,value, ...*	RESPONSE
SPECRESI *value,value, ...*	RESPONSE & ISOL'N
SPECTRLT *value,value, ...*	SPECIFY: TRL* THRU
SPECTRLR *value,value, ...*	TRL* REFLECT
SPECTRLL *value,value, ...*	TRL* LINE OR MATCH
CLAD	CLASS DONE (SPE'D)

Label Class Menus

LABES11A *string*	LABEL: S11A
LABES11B *string*	S11B
LABES11C *string*	S11C
LABES22A *string*	LABEL: S22A

LABES22B *string*	S22B
LABES22C *string*	S22C
LABEFWDT *string*	LABEL: FWD. TRANS.
LABEREVT *string*	REV.TRANS.
LABEFWDM *string*	FWD. MATCH
LABEREVM *string*	REV.MATCH
LABERESP *string*	RESPONSE
LABERESI *string*	RESPONSE & ISOL'N
LABETRLT *string*	SPECIFY: TRL* THRU
LABETRLR *string*	TRL* REFLECT
LABETRLL *string*	TRL* LINE OR MATCH

TRL*/LRM* OPTION Menu

CALZLINE	CAL ZO: LINE ZO
CALZSYST	SYSTEM ZO
SETRTHRU	SET REF.: THRU
SETRREFL	REFLECT

PWR METER CAL Menu

PWMC{ON|OFF}	PWRMTR CAL on OFF
CALPOW	CAL POWER
NUMR	NUMBER OF READINGS
CALFSEN	SET CAL FACTOR

RECEIVER CAL Menu

TAKRS	TAKE RCVR CAL SWEEP

(MKR) Key

MARK{1-5} *value*	MARKER 1 to 5
MARKOFF	all OFF
MARKZERO	MKR ZERO

Delta Marker Mode Menu

DELR{1-5}	Δ REF=1 to Δ REF=5
DELRFIXM	ΔREF=Δ FIXED MKR
DELO	Δ MODE OFF

Fixed Marker Menu

MARKFSTI *value*	FIXED MKR STIMULUS
MARKFVAL *value*	FIXED MKR VALUE
MARKFAUV *value*	FIXED MKR AUX VALUE

(MKR FCTN) Key

SEAOFF	SEARCH: OFF
SEAMAX	MAX
SEAMIN	MIN
SEATARG *value*	TARGET
TRACK{ON|OFF}	TRACKING on OFF
WIDV *value*	BANDWIDTH VALUE
WIDT{ON|OFF}	BW MEASURE on OFF

TARGET Menu

SEATARG *parameter*	TARGET
SEAL	SEARCH LEFT
SEAR	SEARCH RIGHT

BANDWIDTH Menu

WIDV *value*	WIDTH VALUE
WIDT{ON|OFF}	BW MEASURE on OFF

MARKER → MENU

MARKSTAR	MARKER → START
MARKSTOP	MARKER → STOP
MARKCENT	MARKER → CENTER
MARKSPAN	MARKER → SPAN
MARKREF	MARKER → REFERENCE
MARKDELA	MARKER → DELAY
MEASTAT{ON|OFF}	STATISTICS

MKR MODE MENU

MARKDISC	MARKERS: DISCRETE
MARKCONT	CONTINUOUS
DISM{ON|OFF}	DISP MKRS ON off
MARKCOUP	MARKERS: COUPLED
MARKUNCO	UNCOUPLED

Polar Marker Menu

POLMLIN	LIN MKR
POLMLOG	LOG MKR
POLMRI	Re/Im MKR

Smith Marker Menu

SMIMLIN	LIN MKR
SMIMLOG	LOG MKR
SMIMRI	Re/Im MKR
SMIMRX	R+jX MKR
SMIMGB	G+jB MKR

Stimulus Function Block

STAR *value*	START
STOP *value*	STOP
CENT *value*	CENTER
SPAN *value*	SPAN

MENU Key

POWE *value*	POWER
POIN *value*	NUMBER of POINTS
COUC{ON|OFF}	COUPLED CH on OFF
CWFREQ *value*	CW FREQ

Power Menu

PRAN{1-12}	RANGE 1 to RANGE 12

Sweep Time Menu

SWET *value*	SWEEP TIME MANUAL
SWETAUTO	SWEEP TIME AUTO

Trigger Menu

HOLD	HOLD
SING	SINGLE
NUMG	NUMBER OF GROUPS
CONT	CONTINUOUS
EXTTOFF	TRIGGER: TRIG OFF
EXTTON	EXT. TRIG ON SWEEP

EXTTPOIN	EXT. TRIG ON POINT
MANTRIG	MANUAL TRG ON POINT

Sweep Type Menu

LINFREQ	LIN FREQ
LOGFREQ	LOG FREQ
LISFREQ	LIST FREQ
CWTIME	CW TIME
POWS	POWER SWEEP
EDITLIST	EDIT LIST

List Sweep Menu

SSEG *segment number*	SINGLE SEG SWEEP
ASEG	ALL SEGS SWEEP

Edit List Menu

SEDI *segment number*	EDIT
SDEL	DELETE
SADD	ADD
CLEL	CLEAR LIST
EDITDONE	LIST DONE

Edit Segment Menu

STAR *value*	SEGMENT START
STOP *value*	STOP
CENT *value*	CENTER
SPAN *value*	SPAN
POIN	NUMBER of POINTS
STPSIZE *value*	STEP SIZE
CENT *value*;SPANO	CW
SDON	DONE

Instrument State Function Block

(SYSTEM) Key

LIMIT Menu

LIMILINE{ON|OFF}	LIMIT LINE on off
LIMITEST{ON|OFF}	LIMIT TEST on off
BEEPFAIL{ON|OFF}	BEEP FAIL on off
EDITLIML	EDIT LIMIT LINE

EDIT LIMIT LINE Menu

SEDI *segment number*	EDIT
SDEL	DELETE
SADD	ADD
DONE	DONE

Edit Segment Menu

LIMS *value*	STIMULUS VALUE
MARKSTIM	MARKER → STIMULUS
LIMU *value*	UPPER LIMIT
LIML *value*	LOWER LIMIT
LIMD *value*	DELTA LIMITS
LIMM *value*	MIDDLE VALUE
MARKMIDD	MARKER → MIDDLE
EDITDONE	DONE

LIMIT LINE OFFSETS Menu

LIMISTIO *value*	STIMULUS OFFSET
LIMIAMPO *value*	AMPLITUDE OFFSET
LIMIMAOF	MARKER → AMP. OFS

LIMIT TYPE Menu

LIMTSL	SLOPING LINE
LIMTFL	FLAT LINE
LIMTSP	SINGLE POINT

TRANSFORM MENU *Option 010 installed.*

TIMDTRAN{ON|OFF}	TRANSFORM on OFF
SETF	SET FREQ LOW PASS

LOWPIMPU	LOW PASS IMPULSE
LOWPSTEP	LOW PASS STEP
BANDPASS	BANDPASS

WINDOW Menu *Option 010 installed.*

WINDMAXI	WINDOW: MAXIMUM
WINDNORM	NORMAL
WINDMINI	MINIMUM
WIND *pulse width value*	
WINDUSEM{ON|OFF}	USE MEMORY on OFF
DEMOOFF	DEMOD: OFF
DEMOAMPL	AMPLITUDE
DEMOPHAS	PHASE

SPECIFY GATE Menu *Option 010 installed.*

GATEO{ON|OFF}	GATE on OFF
GATESTAR *value*	GATE: START
GATESTOP *value*	STOP
GATECENT *value*	CENTER
GATESPAN *value*	SPAN

GATE SHAPE Menu *Option 010 installed.*

GATSMAXI	GATE SHAPE MAXIMUM
GATSWIDE	GATE SHAPE WIDE
GATSNORM	GATE SHAPE NORMAL
GATSMINI	GATE SHAPE MINIMUM

INSTRUMENT MODE Menu

INSMNETA	NETWORK ANALYZER
INSMTUNR	TUNED RECEIVER

(LOCAL) Key

TALKLIST	TALKER/LISTENER
USEPASC	USE PASS CONTROL
DEBU{ON|OFF}	HP-IB DIAG on OFF
DISCUNIT *value*	DISK UNIT NUMBER
DISCVOLU *value*	VOLUME NUMBER

SET ADDRESSES Menu

ADDRPLOT *value*	ADDRESS: PLOTTER
ADDRPRIN *value*	ADDRESS: PRINTER
ADDRDISC *value*	ADDRESS: DISK
ADDRPRIN *value*	ADDRESS: PRINTER
ADDRCONT *value*	ADDRESS: CONTROLLER
ADDRPOWM *value*	ADDRESS: POWER MTR

(PRESET) Key

PRES	(PRESET)
RST*	(PRESET)

(COPY) Key

Copy Menu

PRINALL	PRINT
PLOT	PLOT
LISV	LIST VALUES
OPEP	OPERATING PARAMETERS

SELECT QUADRANT Menu

LEFU	LEFT UPPER
LEFL	LEFT LOWER
RIGU	RIGHT UPPER
RIGL	RIGHT LOWER
FULP	FULL PAGE

DEFINE PLOT Menu

PDATA{ON|OFF}	PLOT DATA ON off
PMEM{ON|OFF}	PLOT MEM ON off
PGRAT{ON|OFF}	PLOT GRAT ON off
PTEXT{ON|OFF}	PLOT TEXT ON off
PMKR{ON|OFF}	PLOT MKR ON off
SCAPFULL	SCALE PLOT [FULL]
SCAPGRAT	SCALE PLOT [GRAT]
PLOSFAST	PLOT SPEED [FAST]
PLOSSLOW	PLOT SPEED [SLOW]

CONFIGURE PLOT Menu

PENNDATA *pen number*	PEN NUM DATA
PENNMEMO *pen number*	PEN NUM MEMORY
PENNGRAT *pen number*	PEN NUM GRATICULE
PENNTEXT *pen number*	PEN NUM TEXT
PENNMARK *pen number*	PEN NUM MARKER
LINTDATA *pen number*	LINE TYPE DATA
LINTMEMO *pen number*	LINE TYPE MEMORY

PRINT/PLOT SETUPS Menu

PRIS	PRINT: STANDARD
PRIC	COLOR
DFLT	PEN NUM GRATICULE

(SAVE) Key

SAVE{1-5}	SAVE REG1 to REG5 (PRESET5)

CLEAR REGISTER Menu

CLEA{1-5}	CLEAR REG1 to REG5
CLEARALL	CLEAR ALL

TITLE REGISTER Menu

TITR{1-5} *alphanumeric string*	TITLE REG1 to REG5
COPYFRFT	COPY FROM FILE TITLE

STORE TO DISK Menu

STOR{1-5}	STOR FILE1 to FILE5

DEFINE, INIT, PURGE Menu

EXTMDATA{ON|OFF}	DATA ARRAY on OFF
EXTMRAW{ON|OFF}	RAW ARRAY on OFF
EXTMFORM{ON|OFF}	FORMAT ARRAY on OFF
EXTMGRAP{ON|OFF}	GRAPHICS ARRAY on OFF
INID	INITIALIZE DISK

DISK FILE FORMAT Menu

SAVUBINA	FORMAT: BINARY
SAVUASCI	ASCII

PURGE FILES Menu

PURG{1-5}	PURGE FILE1 to FILE5
REFT	READ FILE TITLES

TITLE FILES Menu

TITF{1-5}	TITLE FILE1 to FILE5
COPYFRRT	COPY FROM REG TITLES

(RECALL) Key

RECA{1-5}	RECALL REG1 to REG5 (PRESET5)

LOAD TO DISK Menu

LOAD{1-5}	LOAD FILE1 to FILE5
REFT	READ FILE TITLES

HP-IB ONLY Commands

ANAB
FRER
MARKBUCK *value*
PSOFT{ON|OFF}
KEY *value*
INPUDATA *value*
INPUFORM *value*
INPUUFORM *value*
INPURAW1 *value*
INPURAW2 *value*
INPURAW3 *value*
INPURAW4 *value*
INPUCALC{01-12} *value*
INPUCALK *value*
FORM1
FORM2
FORM3
FORM4
FORM5
OUTPCALC{01-12}
OUTPCALK
OUTPSTIM
OUTPDATA

OUTPERRO
OUTPFORM
OUTPLIMF
OUTPLIML
OUTPLIMM
OUTPMARK
OUTPMEMO
OUTPMSTA
OUTPMWID
OUTPRAW1
OUTPRAW2
OUTPRAW3
OUTPRAW4
OUTPTITL
ESB?
ESNB *value*
CLES
SAVC

IEEE 488.2 Common Commands

*IDN?
*RST
*TST?
*OPC
*OPC?
*CLS
*ESE *value*
*ESE?
*ESR?
*SRE *value*
*SRE?
*STB?
*PCB *value*

3

Status Reporting

Figure 3-1 shows the status reporting structure of the HP 8719C, 8720C, and 8722. Table 3-1, Table 3-2, and Table 3-3 describe the status bits of each register.

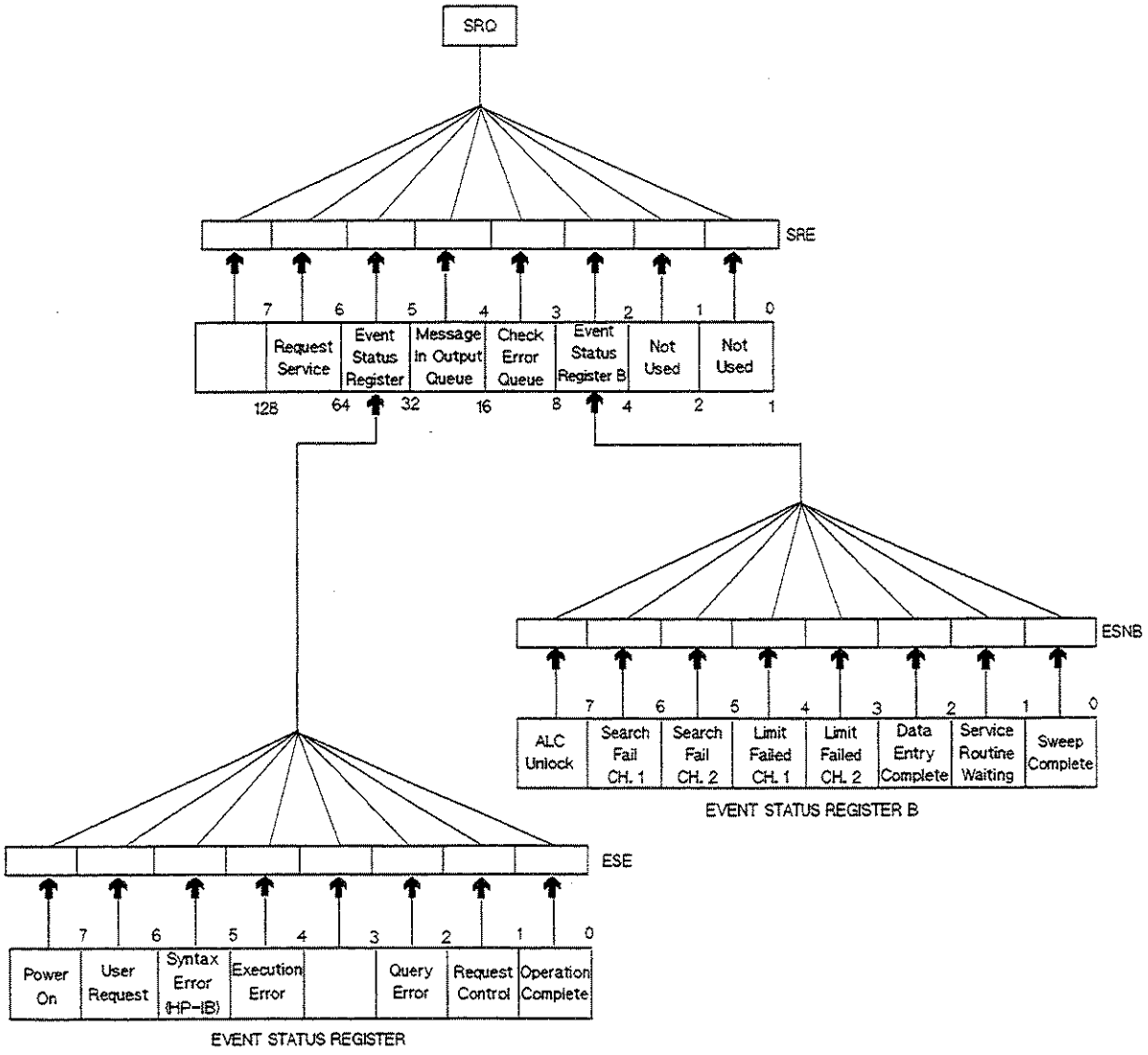


Figure 3-1. Status Reporting Structure

Table 3-1. Status Bit Definitions of the Status Byte (STB)

Bit	Name	Description
2	Check event status register B	One of the enabled bits in event status register B has been set.
3	Message in error queue	An error has occurred and the message has been placed in the error queue, but has not been read yet.
4	Message in output queue	A command has prepared information to be output, but it has not been read yet.
5	Check event status register	One of the enabled bits in the event status register has been set.
6	Request service	One of the enabled status byte bits is causing an SRQ.

Table 3-2. Status Bit Definitions of the Event Status Register (ESR)

Bit	Name	Description
0	Operation complete	A command for which OPC has been enabled and completed an operation.
1	Request control	The network analyzer has been commanded to perform an operation that requires control of a peripheral, and needs control of HP-IB. Requires the network analyzer to be in use pass control mode.
2	Query error	The network analyzer has been addressed to talk, but there is nothing in the output queue to transmit.
4	Execution error	A command was received that could not be executed. Commonly due to invalid operands, or operands sent in the wrong sequence.
5	Syntax error	An HP-IB command had incorrect syntax error (spelling or use).
6	User request	The operator has pressed a front panel key or turned the rotary knob. This bit is set regardless of whether the network analyzer is in remote or local.
7	Power on	A power on sequence has occurred since the last read of the register.

Table 3-3. Status Bit Definitions of the Event Status Register B (ESB)

Bit	Name	Description
0	Sweep or group complete	A single sweep or group has been completed since the last read of the register. Operates in conjunction with the SING or NUMG commands.
1	Service routine waiting or done	An internal service routine has completed an operation, or is waiting for an operator response.
2	Data entry complete	A terminator key has been pressed, or a value has been inputted to the network analyzer over HP-IB.
3	Limit failed, Ch 2	Limit test failed on channel 2.
4	Limit failed, Ch 1	Limit test failed on channel 1.
5	Search failed, Ch 2	A marker search was executed on channel 2, but the target value was not found.
6	Search failed, Ch 1	A marker search was executed on channel 1, but the target value was not found.
7	ALC unlock	The output power went unleveled at the beginning or end of a sweep. Data may be invalid.

4

Key Codes

Figure 4-1 shows the codes of the front panel keys for using the KEY HP-IB command.

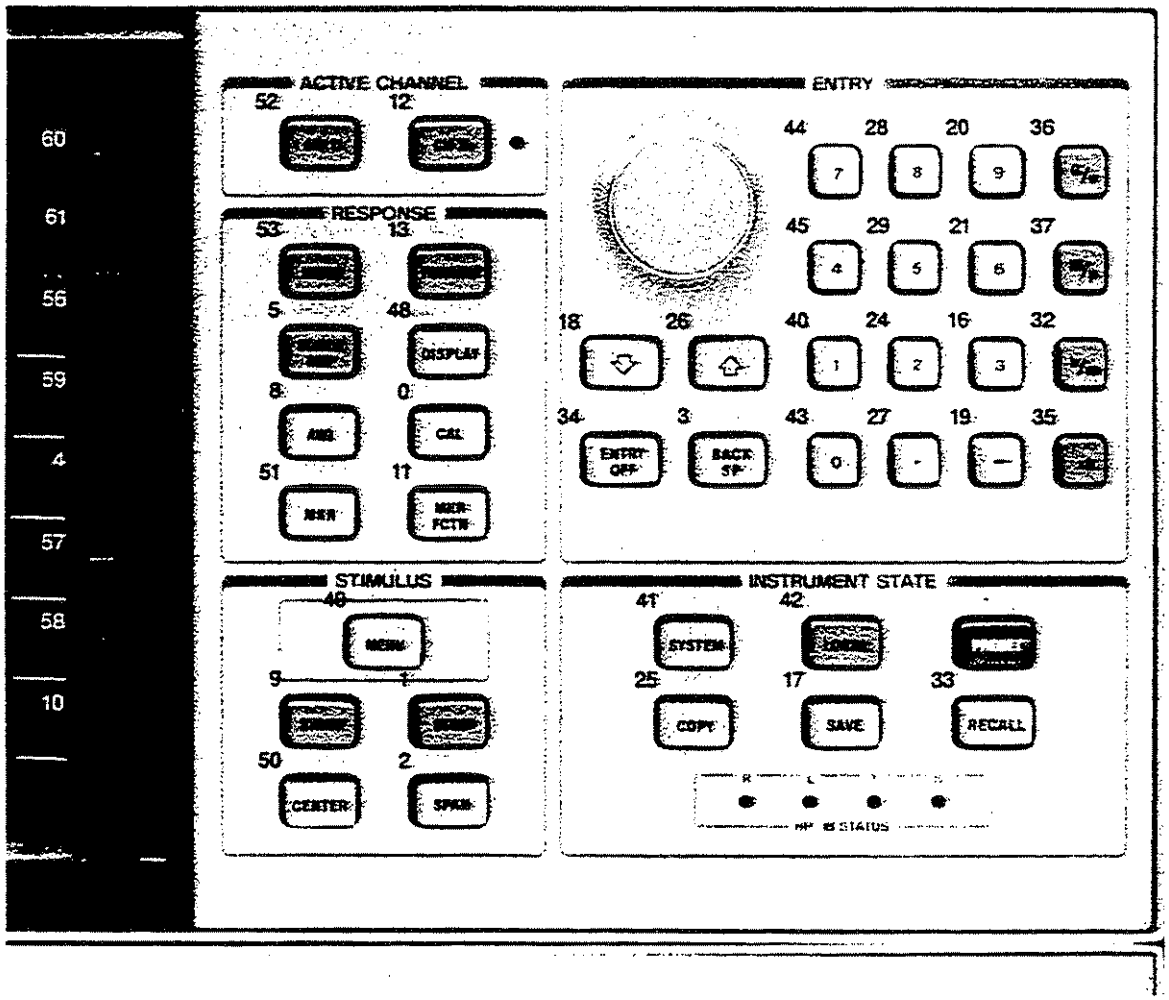


Figure 4-1. Key Codes

5

Calibration Types and Standard Classes, and Calibration Arrays

Table 5-1 lists which standard classs are required for each calibration type. Table 5-2 specifies where the calibration coefficients are stored for different calibration types.

Table 5-1. Calibration Types and Standard Classes

Class	Response	Response and Isolation	S_{11} 1-port	S_{22} 1-port	Full 2-port	TRL*/LRM* 2-port
Response:	•					
Response and isolation:						
Response		•				
Isolation		•				
Reflection:[1]					•	
S11A (opens)			•		•	
S11B (shorts)			•		•	
S11C (loads)			•		•	
S22A (opens)				•	•	
S22B (shorts)				•	•	
S22C (loads)				•	•	
Transmission:[1]					•	
Forward match					•	
Forward thru					•	
Reverse match					•	
Reverse thru					•	
Isolation:[12]					•	•
Forward					•	•
Reverse					•	•
TRL* THRU[2]						•
TRL* REFLECT[2]						•
TRL* LINE OR MATCH[2]						•

1 These subheadings must be called when doing Full 2-port calibrations.

2 These subheadings must be called when doing TRL*/LRM* 2-port calibrations.

Table 5-2. Calibration Array

Array	Response[1]	Response and Isolation[1]	1-port[1]	2-port[12]
1	E_R or E_T	E_X (E_D)[3]	E_D	E_{DF}
2		E_T (E_R)	E_S	E_{SF}
3			E_R	E_{RF}
4				E_{XF}
5				E_{LF}
6				E_{TF}
7				E_{DR}
8				E_{SR}
9				E_{RR}
10				E_{XR}
11				E_{LR}
12				E_{TR}

1 Meaning of first subscript: D=directivity; S=source match; X=crosstalk; L=load match; T=transmission tracking.

Meaning of second subscript: F=forward; R=reverse.

2 One path, 2-port cal duplicates arrays 1 to 6 in arrays 7 to 12.

3 Response and isolation corrects for crosstalk and transmission tracking in transmission measurements, and for directivity and reflection tracking in reflection measurements.

Error Messages

This chapter lists the error messages that may be displayed on the analyzer display or transmitted by the instrument over HP-IB. Each error message is accompanied by an explanation, and suggestions are provided to help in solving the problem. Where applicable, references are given to related sections of the Operation and Maintenance manuals.

When displayed, error messages are usually preceded with the word `CAUTION:`. That part of the error message has been omitted here for the sake of brevity. Some messages are for information only, and do not indicate an error condition. Two listings are provided: the first is in alphabetical order, and the second in numerical order.

In addition to error messages, instrument status is indicate by status notations in the left margin of the display. Examples are "*", "msH", and "P↓". Sometimes these appear in conjunction with error messages. A complete listing of status and notations and their meanings is provided in "Front and Rear Panel" in the *Reference Manual*.

ERROR MESSAGES IN ALPHABETICAL ORDER

68 ADDITIONAL STANDARDS NEEDED

Error correction for the selected calibration class cannot be computed without measuring the necessary standards.

31 ADDRESSED TO TALK WITH NOTHING TO SAY

An enter command was sent to the analyzer without first requesting data with an appropriate output command (such as `OUTPDATA`). The analyzer has no data in the output queue to satisfy the request.

20 AIR FLOW RESTRICTED: CHECK FAN FILTER

An inadequate air flow condition has been detected. Clean the fan filter. For most efficient cooling, the instrument covers should be in place. If the problem persists, troubleshoot the power supply.

60 ANALOG INPUT OVERLOAD

The maximum input voltage level to the rear panel AUX INPUT has been exceeded.

37 ANOTHER SYSTEM CONTROLLER ON HP-IB

Selection of SYSTEM CONTROLLER under [LOCAL] could not be accomplished because another System Controller is already connected on HP-IB.

83 ASCII: MISSING 'CITIFILE' statement

In reading an ASCII file from disk, the reserved word `CITIFILE` was not found.

84 ASCII: MISSING 'VAR' statement

In reading an ASCII file from disk, the reserved word `VAR` was not found.

85 ASCII: MISSING 'DATA' statement

In reading an ASCII file from disk, the reserved word `DATA` was not found.

86 ASCII: MISSING 'BEGIN' statement

In reading an ASCII file from disk, the reserved word `BEGIN` was not found.

13 AVERAGING INVALID ON NON-RATIO MEASURE

This error occurs only in single-input measurements using an auxiliary input signal or a service input. Sweep-to-sweep averaging is valid only for ratioed (S-parameter) measurements. Other noise reduction techniques are available for single input measurements. Refer to [AVG] Key in Chapter 4 for a discussion of trace smoothing and variable IF bandwidths.

34 BLOCK INPUT ERROR

The analyzer did not receive a complete data transmission. This is usually caused by an interruption of the bus transaction. Clear by pressing the (LOCAL) key or aborting the IO process at the controller.

35 BLOCK INPUT LENGTH ERROR

The length of the header received by the analyzer did not agree with the size of the internal array block. Refer to the HP-IB Programming Guide for instructions on using input commands.

74 CALIBRATION ABORTED

The calibration in progress was terminated due to change of the active channel.

63 CALIBRATION REQUIRED

A calibration set could not be found that matched the current stimulus state or measurement parameter. A calibration should be performed.

36 CHANGE HP-IB to SYST CTRL or PASS CTRL

A command (front panel or HP-IB) has been received that requests the network analyzer to take control of the HP-IB, but it is in TALKER/LISTENER mode. Change selection under (LOCAL).

10 CONTINUOUS SWITCHING NOT ALLOWED

An instrument state is set up such that continuous switching of the transfer switch would be necessary; a "testset hold" condition has been placed on the non-active channel.

3 CORRECTION CONSTANTS NOT STORED

The results of a service adjustment have not been stored in the network analyzer.

66 CORRECTION TURNED OFF

A major change to the stimulus values has forced error correction to be turned off.

64 CURRENT PARAMETER NOT IN CAL SET

The measurement paramter could not be found in a calibration set. Perform a calibration for that parameter.

17 DEMODULATION NOT VALID

The demodulation transform can only be performed when the sweep type is CW Time.

39 DISK HARDWARE PROBLEM

The disk drive is properly connected, but has returned a service related error message when accessed.

48 DISK IS WRITE PROTECTED

The write-protect feature on a disk has been enabled.

40 DISK MEDIUM NOT INITIALIZED

The floppy disk must be initialized in order to store files. Perform an initialization (INITIALIZE DISK under SAVE, STORE TO DISK, DEFINE, INIT, PURGE)

19 DISK MESSAGE LENGTH ERROR

The number of bytes transferred to or from the disk is inconsistent with the number specified in the previously sent disk command.

49 DISK WEAR-REPLACE DISK SOON

The floppy disk surface is wearing out; replace with a new disk to prevent data loss.

38 DISK: not on, not connected, wrong addrs

The disk drive does not respond to control. Verify power to the disk drive, and check the HP-IB connection between the analyzer and the disk drive. Ensure that the disk address address recognized by the network analyzer matches the HP-IB address set on the disk drive itself (LOCAL).

72 EXCEEDED 7 STANDARDS PER CLASS

When specifying a calibration class, an attempt has been made to exceed the maximum of 7 standards for a specific class.

42 FIRST CHARACTER MUST BE A LETTER

When titling a register or file, the first character must be a letter. Rename the register/file appropriately.

75 FORMAT NOT VALID FOR MEASUREMENT

A conversion to Y or Z parameters has been selected, and the format selected is Smith chart or SWR. In these formats, the conversion trace value is not consistent with the graphical display.

14 FUNCTION NOT VALID

The requested function is incompatible with the current instrument state.

46 ILLEGAL UNIT OR VOLUME NUMBER

The disk unit or volume number set in the analyzer is not valid. Refer to the disk drive operating manual.

47 INITIALIZATION FAILED

Disk initialization failed, usually due to a damaged disk.

32 INPUT ATTEMPTED WITHOUT SELECTING INPUT TYPE

An `INPU` command has not been received, but an attempt to transfer data occurred.

56 INSTRUMENT STATE MEMORY CLEARED

The five instrument state registers have been cleared from memory along with any calibration data or calibration kit definitions.

51 INSUFFICIENT MEMORY

The last front panel or HP-IB request could not be implemented due to insufficient memory space. See the chapter on memory allocation.

82 INSUFFICIENT MEMORY, PWR MTR CAL OFF

The memory allocation for power meter calibration arrays failed due to insufficient memory space. See the chapter on memory allocation.

2 INVALID KEY

An undefined softkey was pressed.

9 LIST TABLE EMPTY

The frequency list is empty. To implement list frequency mode, add segments to the list table.

18 LOW PASS MODE NOT ALLOWED

Low pass time domain mode is allowed only with 801 points or less.

71 MORE SLIDES NEEDED

At least five positions of the sliding load are required to complete the calibration.

69 NO CALIBRATION CURRENTLY IN PROGRESS

The RESUME CAL SEQUENCE softkey is not valid unless a calibration was previously in progress. Start a new calibration.

41 NO DISK MEDIUM IN DRIVE

No disk was found in the current disk unit. Insert a disk, or check the disk unit number stored in the analyzer.

45 NO FILE(S) FOUND ON DISK

No files of the type created by the analyzer store operation were found on the disk.

5 NO IF FOUND: CHECK R INPUT LEVEL

The first intermediate frequency (IF) for the R sampler was not detected during pretune. This signal must be present for phase lock and operation of the network analyzer.

76 NO LIMIT LINES DISPLAYED

Limit lines and have been enabled, but the format (polar, Smith Chart) is not valid with limit line displays.

15 NO MARKER DELTA - SPAN NOT SET

The MARKER → SPAN softkey function requires that delta marker mode be turned on, with at least two markers displayed.

70 NO SPACE FOR NEW CAL. CLEAR REGISTERS

The amount of available memory for storing calibration arrays has been exceeded. Clear one or more save/recall registers. (CLEAR REGISTER under (SAVE))

44 NOT ENOUGH SPACE ON DISK FOR STORE

The disk is full; purge files or replace with another disk.

54 NO VALID MEMORY TRACE

A request to display a memory or trace math operation has occurred, but a data trace has not been previously stored in memory. (See DATA → MEMORY under (DISPLAY).)

55 NO VALID STATE IN REGISTER

A request to recall an internal register has occurred, but an instrument state has not been previously saved. (See SAVE)

43 ONLY LETTERS AND NUMBERS ARE ALLOWED

When titling a register or file, only alphanumeric characters are allowed. Rename the register/file appropriately.

1 OPTIONAL FUNCTION; NOT INSTALLED

An attempt has been made to use an optional function for which that option has not been installed.

4 PHASE LOCK CAL FAILED

The phase lock calibration procedure failed; measurement data is questionable.

7 PHASE LOCK FAILURE

One of the phase lock loops has failed.

8 PHASE LOCK LOST

One of the phase lock loops has lost lock.

26 PLOTTER: not on, not connected, wrong addrs

The plotter does not respond to control. Verify power to the plotter, and check the HP-IB connection between the analyzer and the plotter. Ensure that the plotter address recognized by the network analyzer matches the HP-IB address set on the plotter itself (LOCAL).

28 PLOTTER NOT READY-PINCH WHEELS UP

The plotter is not ready to plot; the paper has not been properly inserted or loaded.

6 POSSIBLE FALSE LOCK

Phase lock loop may have locked onto the wrong harmonic; measurement data is questionable.

78 POWER METER INVALID

The power meter has been identified by the network analyzer as one which is incompatible with the power meter calibration procedure.

79 POWER METER NOT SETTLED

The power meter readings have not stabilized in order to continue with the power meter calibration procedure.

80 POWER METER NOT FOUND

The power meter does not respond to control. Verify AC power to the power meter, and check the HP-IB connection between the analyzer and the power meter. Ensure that the power meter address recognized by the network analyzer matches the HP-IB address set on the power meter itself ([LOCAL]).

21 POWER SUPPLY HOT!

The power supply temperature has been sensed by the post regulator test or during self test. Turn off the network analyzer immediately, and contact your Hewlett-Packard Service Center.

24 PRINTER: not on, not connected, wrong addrs

The printer does not respond to control. Verify power to the printer, and check the HP-IB connection between the analyzer and the printer. Ensure that the printer address recognized by the network analyzer matches the HP-IB address set on the printer itself ([LOCAL]).

30 REQUESTED DATA NOT CURRENTLY AVAILABLE

The analyzer does not currently contain the data being requested. For example, this condition occurs when error term arrays are requested and no calibration is active.

81 SAVE FAILED. INSUFFICIENT MEMORY

Insufficient memory is available to save the current instrument state, which includes power meter calibration arrays, to internal memory. Reduce memory usage if possible, then repeat the measurements.

73 SLIDES ABORTED (MEMORY REALLOCATION)

Insufficient memory is available for sliding load measurements. Reduce memory usage if possible, then repeat the sliding load measurements.

61 SOURCE PARAMETERS CHANGED

Some of the stimulus parameters of the instrument state have been changed, due to a request to turn correction on. A calibration set for the current measurement parameter was found and activated. The instrument state was updated to match the stimulus parameters of the calibration state.

11 SWEEP TIME INCREASED

Sweep time is automatically increased to compensate for other instrument state changes. Some parameter changes that cause an increase in sweep time are narrower IF bandwidth, an increase in the number of points, and a change in sweep type.

33 SYNTAX ERROR

An improperly formatted or misspelled command was received over HP-IB.

52 SYSTEM IS NOT IN REMOTE

The analyzer is in local mode. In this mode, it will not respond to HP-IB commands with front panel key equivalents. It will, however, respond to commands that have no such equivalents, such as status requests.

57 TEST PORT OVERLOAD, REDUCE POWER

Whenever the power level at the "R" measurement sampler exceeds approximately +20 dBm, the source power level must be reduced.

58 TEST PORT OVERLOAD, REDUCE POWER

Whenever the power level at the "A" measurement sampler exceeds approximately +20 dBm, the source power level must be reduced.

59 TEST PORT OVERLOAD, REDUCE POWER

Whenever the power level at the "B" measurement sampler exceeds approximately +20 dBm, the source power level must be reduced.

50 TOO MANY SEGMENTS OR POINTS

Frequency list mode is limited to 30 segments and/or 1601 points.

16 TRANSFORM, GATE NOT ALLOWED

Transformation to time domain is not allowed for sweep types other than linear and CW.

77 WRONG DISK FORMAT, INITIALIZE DISK

The disk has not been formatted according to the Logical Interchange Format (LIF).

ERROR MESSAGES IN NUMERICAL ORDER

1 OPTIONAL FUNCTION; NOT INSTALLED

An attempt has been made to use an optional function for which that option has not been installed.

2 INVALID KEY

An undefined softkey was pressed.

3 CORRECTION CONSTANTS NOT STORED

The results of a service adjustment have not been stored in the network analyzer.

4 PHASE LOCK CAL FAILED

The phase lock calibration procedure failed; measurement data is questionable.

5 NO IF FOUND: CHECK R INPUT LEVEL

The first intermediate frequency (IF) for the R sampler was not detected during pretune. This signal must be present for phase lock and operation of the network analyzer.

6 POSSIBLE FALSE LOCK

Phase lock loop may have locked onto the wrong harmonic; measurement data is questionable.

7 PHASE LOCK FAILURE

One of the phase lock loops has failed.

8 PHASE LOCK LOST

One of the phase lock loops has lost lock.

9 LIST TABLE EMPTY

The frequency list is empty. To implement list frequency mode, add segments to the list table.

10 CONTINUOUS SWITCHING NOT ALLOWED

An instrument state is set up such that continuous switching of the transfer switch would be necessary; a "testset hold" condition has been placed on the non-active channel.

11 SWEEP TIME INCREASED

Sweep time is automatically increased to compensate for other instrument state changes. Some parameter changes that cause an increase in sweep time are narrower IF bandwidth, an increase in the number of points, and a change in sweep type.

13 AVERAGING INVALID ON NON-RATIO MEASURE

This error occurs only in single-input measurements using an auxiliary input signal or a service input. Sweep-to-sweep averaging is valid only for ratioed (S-parameter) measurements. Other noise reduction techniques are available for single input measurements. Refer to [AVG] Key in Chapter 4 for a discussion of trace smoothing and variable IF bandwidths.

14 FUNCTION NOT VALID

The requested function is incompatible with the current instrument state.

15 NO MARKER DELTA - SPAN NOT SET

The MARKER → SPAN softkey function requires that delta marker mode be turned on, with at least two markers displayed.

16 TRANSFORM, GATE NOT ALLOWED

Transformation to time domain is not allowed for sweep types other than linear and CW.

17 DEMODULATION NOT VALID

The demodulation transform can only be performed when the sweep type is CW Time.

18 LOW PASS MODE NOT ALLOWED

Low pass time domain mode is allowed only with 801 points or less.

19 DISK MESSAGE LENGTH ERROR

The number of bytes transferred to or from the disk is inconsistent with the number specified in the previously sent disk command.

20 AIR FLOW RESTRICTED: CHECK FAN FILTER

An inadequate air flow condition has been detected. Clean the fan filter. For most efficient cooling, the instrument covers should be in place. If the problem persists, troubleshoot the power supply.

21 POWER SUPPLY HOT!

The power supply temperature has been sensed by the post regulator test or during self test. Turn off the network analyzer immediately, and contact your Hewlett-Packard Service Center.

24 PRINTER: not on, not connected, wrong addrs

The printer does not respond to control. Verify power to the printer, and check the HP-IB connection between the analyzer and the printer. Ensure that the printer address recognized by the network analyzer matches the HP-IB address set on the printer itself ([LOCAL]).

26 PLOTTER: not on, not connected, wrong addrs

The plotter does not respond to control. Verify power to the plotter, and check the HP-IB connection between the analyzer and the plotter. Ensure that the plotter address recognized by the network analyzer matches the HP-IB address set on the plotter itself ([LOCAL]).

28 PLOTTER NOT READY-PINCH WHEELS UP

The plotter is not ready to plot; the paper has not been properly inserted or loaded.

30 REQUESTED DATA NOT CURRENTLY AVAILABLE

The analyzer does not currently contain the data being requested. For example, this condition occurs when error term arrays are requested and no calibration is active.

31 ADDRESSED TO TALK WITH NOTHING TO SAY

An enter command was sent to the analyzer without first requesting data with an appropriate output command (such as `OUTPDATA`). The analyzer has no data in the output queue to satisfy the request.

32 INPUT ATTEMPTED WITHOUT SELECTING INPUT TYPE

An INPU command has not been received, but an attempt to transfer data occurred.

33 SYNTAX ERROR

An improperly formatted or misspelled command was received over HP-IB.

34 BLOCK INPUT ERROR

The analyzer did not receive a complete data transmission. This is usually caused by an interruption of the bus transaction. Clear by pressing the [LOCAL] key or aborting the IO process at the controller.

35 BLOCK INPUT LENGTH ERROR

The length of the header received by the analyzer did not agree with the size of the internal array block. Refer to the HP-IB Programming Guide for instructions on using input commands.

36 CHANGE HP-IB to SYST CTRL or PASS CTRL

A command (front panel or HP-IB) has been received that requests the network analyzer to take control of the HP-IB, but it is in TALKER/LISTENER mode. Change selection under [LOCAL].

37 ANOTHER SYSTEM CONTROLLER ON HP-IB

Selection of SYSTEM CONTROLLER under [LOCAL] could not be accomplished because another System Controller is already connected on HP-IB.

38 DISK: not on, not connected, wrong addrs

The disk drive does not respond to control. Verify power to the disk drive, and check the HP-IB connection between the analyzer and the disk drive. Ensure that the disk address address recognized by the network analyzer matches the HP-IB address set on the disk drive itself ([LOCAL]).

39 DISK HARDWARE PROBLEM

The disk drive is properly connected, but has returned a service related error message when accessed.

40 DISK MEDIUM NOT INITIALIZED

The floppy disk must be initialized in order to store files. Perform an initialization (INITIALIZE DISK under [SAVE], STORE TO DISK, DEFINE, INIT, PURGE)

41 NO DISK MEDIUM IN DRIVE

No disk was found in the current disk unit. Insert a disk, or check the disk unit number stored in the analyzer.

42 FIRST CHARACTER MUST BE A LETTER

When titling a register or file, the first character must be a letter. Rename the register/file appropriately.

43 ONLY LETTERS AND NUMBERS ARE ALLOWED

When titling a register or file, only alphanumeric characters are allowed. Rename the register/file appropriately.

44 NOT ENOUGH SPACE ON DISK FOR STORE

The disk is full; purge files or replace with another disk.

45 NO FILE(S) FOUND ON DISK

No files of the type created by the analyzer store operation were found on the disk.

46 ILLEGAL UNIT OR VOLUME NUMBER

The disk unit or volume number set in the analyzer is not valid. Refer to the disk drive operating manual.

47 INITIALIZATION FAILED

Disk initialization failed, usually due to a damaged disk.

48 DISK IS WRITE PROTECTED

The write-protect feature on a disk has been enabled.

49 DISK WEAR-REPLACE DISK SOON

The floppy disk surface is wearing out; replace with a new disk to prevent data loss.

50 TOO MANY SEGMENTS OR POINTS

Frequency list mode is limited to 30 segments and/or 1601 points.

51 INSUFFICIENT MEMORY

The last front panel or HP-IB request could not be implemented due to insufficient memory space. See the chapter on memory allocation.

52 SYSTEM IS NOT IN REMOTE

The analyzer is in local mode. In this mode, it will not respond to HP-IB commands with front panel key equivalents. It will, however, respond to commands that have no such equivalents, such as status requests.

54 NO VALID MEMORY TRACE

A request to display a memory or trace math operation has occurred, but a data trace has not been previously stored in memory. (See DATA → MEMORY under (DISPLAY).)

55 NO VALID STATE IN REGISTER

A request to recall an internal register has occurred, but an instrument state has not been previously saved. (See SAVE)

56 INSTRUMENT STATE MEMORY CLEARED

The five instrument state registers have been cleared from memory along with any calibration data or calibration kit definitions.

57 TEST PORT OVERLOAD, REDUCE POWER

Whenever the power level at the "R" measurement sampler exceeds approximately +20 dBm, the source power level must be reduced.

58 TEST PORT OVERLOAD, REDUCE POWER

Whenever the power level at the "A" measurement sampler exceeds approximately +20 dBm, the source power level must be reduced.

59 TEST PORT OVERLOAD, REDUCE POWER

Whenever the power level at the "B" measurement sampler exceeds approximately +20 dBm, the source power level must be reduced.

60 ANALOG INPUT OVERLOAD

The maximum input voltage level to the rear panel AUX INPUT has been exceeded.

61 SOURCE PARAMETERS CHANGED

Some of the stimulus parameters of the instrument state have been changed, due to a request to turn correction on. A calibration set for the current measurement parameter was found and activated. The instrument state was updated to match the stimulus parameters of the calibration state.

63 CALIBRATION REQUIRED

A calibration set could not be found that matched the current stimulus state or measurement parameter. A calibration should be performed.

64 CURRENT PARAMETER NOT IN CAL SET

The measurement paramter could not be found in a calibration set. Perform a calibration for that parameter.

66 CORRECTION TURNED OFF

A major change to the stimulus values has forced error correction to be turned off.

68 ADDITIONAL STANDARDS NEEDED

Error correction for the selected calibration class cannot be computed without measuring the necessary standards.

69 NO CALIBRATION CURRENTLY IN PROGRESS

The RESUME CAL SEQUENCE softkey is not valid unless a calibration was previously in progress. Start a new calibration.

70 NO SPACE FOR NEW CAL. CLEAR REGISTERS

The amount of available memory for storing calibration arrays has been exceeded. Clear one or more save/recall registers. (CLEAR REGISTER under SAVE)

71 MORE SLIDES NEEDED

At least five positions of the sliding load are required to complete the calibration.

72 EXCEEDED 7 STANDARDS PER CLASS

When specifying a calibration class, an attempt has been made to exceed the maximum of 7 standards for a specific class.

73 SLIDES ABORTED (MEMORY REALLOCATION)

Insufficient memory is available for sliding load measurements. Reduce memory usage if possible, then repeat the sliding load measurements.

74 CALIBRATION ABORTED

The calibration in progress was terminated due to change of the active channel.

75 FORMAT NOT VALID FOR MEASUREMENT

A conversion to Y or Z parameters has been selected, and the format selected is Smith chart or SWR. In these formats, the conversion trace value is not consistent with the graphical display.

76 NO LIMIT LINES DISPLAYED

Limit lines and have been enabled, but the format (polar, Smith Chart) is not valid with limit line displays.

77 WRONG DISK FORMAT, INITIALIZE DISK

The disk has not been formatted according to the Logical Interchange Format (LIF).

78 POWER METER INVALID

The power meter has been identified by the network analyzer as one which is incompatible with the power meter calibration procedure.

79 POWER METER NOT SETTLED

The power meter readings have not stabilized in order to continue with the power meter calibration procedure.

80 POWER METER NOT FOUND

The power meter does not respond to control. Verify AC power to the power meter, and check the HP-IB connection between the analyzer and the power meter. Ensure that the power meter address recognized by the network analyzer matches the HP-IB address set on the power meter itself ([LOCAL]).

81 SAVE FAILED. INSUFFICIENT MEMORY

Insufficient memory is available to save the current instrument state, which includes power meter calibration arrays, to internal memory. Reduce memory usage if possible, then repeat the measurements.

82 INSUFFICIENT MEMORY, PWR MTR CAL OFF

The memory allocation for power meter calibration arrays failed due to insufficient memory space. See the chapter on memory allocation.

83 ASCII: MISSING 'CITIFILE' statement

In reading an ASCII file from disk, the reserved word `CITIFILE` was not found.

84 ASCII: MISSING 'VAR' statement

In reading an ASCII file from disk, the reserved word `VAR` was not found.

85 ASCII: MISSING 'DATA' statement

In reading an ASCII file from disk, the reserved word `DATA` was not found.

86 ASCII: MISSING 'BEGIN' statement

In reading an ASCII file from disk, the reserved word `BEGIN` was not found.