Quick Reference

HP 71450B/1B/2B Optical Spectrum Analyzers

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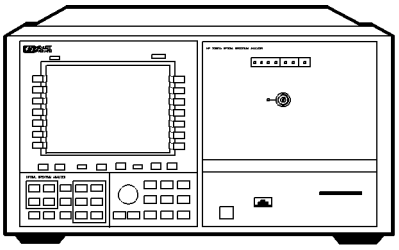
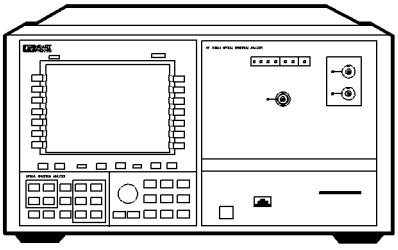


HP 71450B/2B
OPTICAL SPECTRUM
ANALYZER SYSTEM



HP 71451B
OPTICAL SPECTRUM
ANALYZER SYSTEM

dkb40

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Menu Maps

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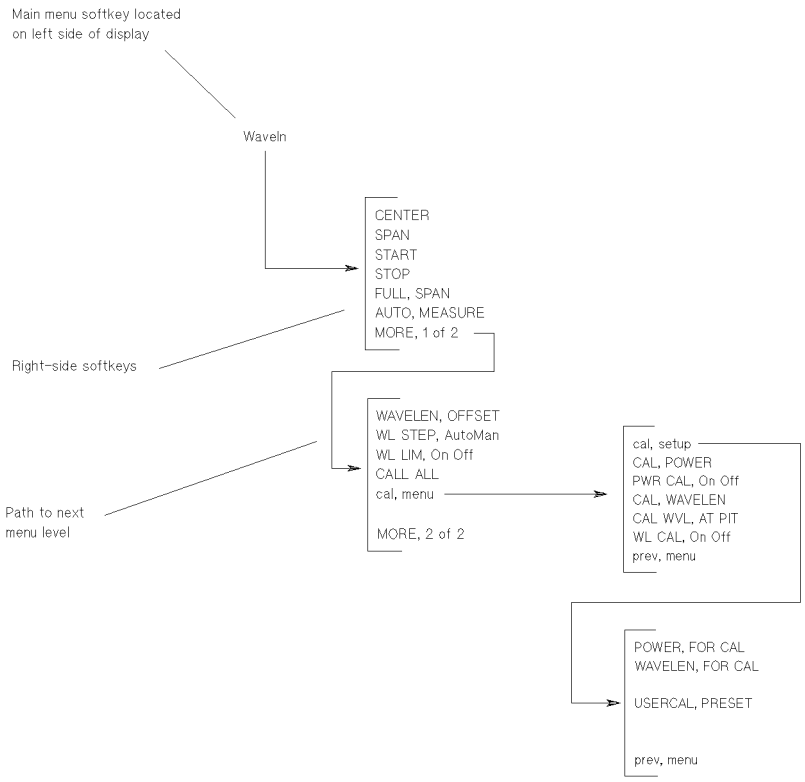
Menu Maps

The menu maps that are in this guide graphically represent the softkey menus that are located under the (MENU) and the (USER) keys. Maps for each left-side softkey are shown in alphabetical order. Menu maps contain the following features:



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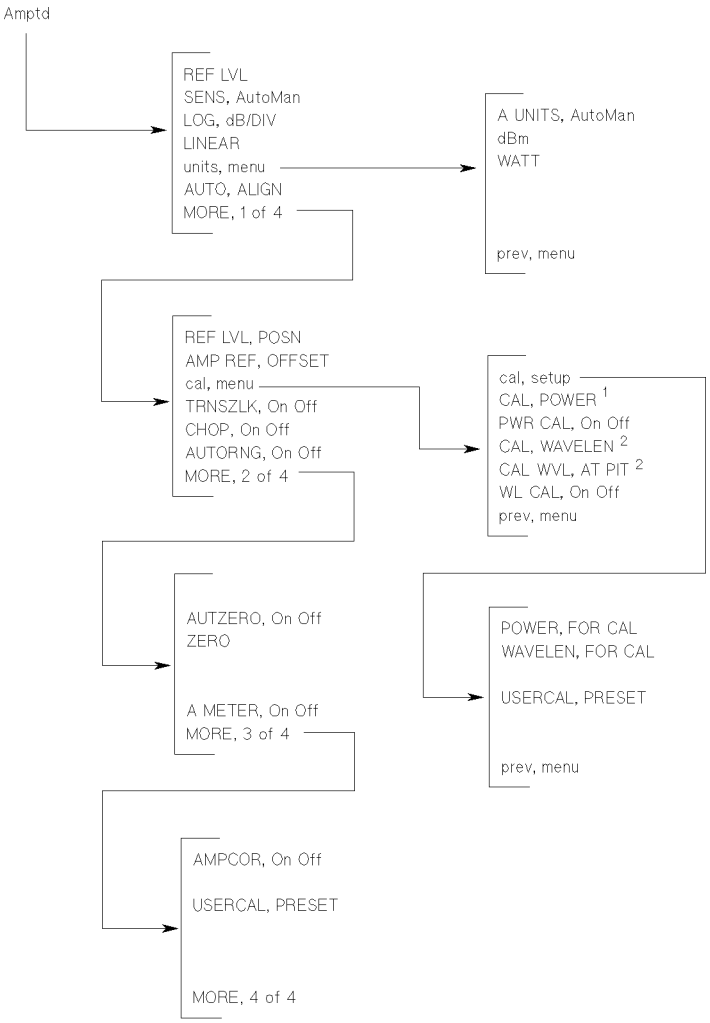
Amptd Menu



[1] Softkey displayed only in OSA and POWER METER instrument modes.

[2] Softkey displayed only in OSA instrument mode.

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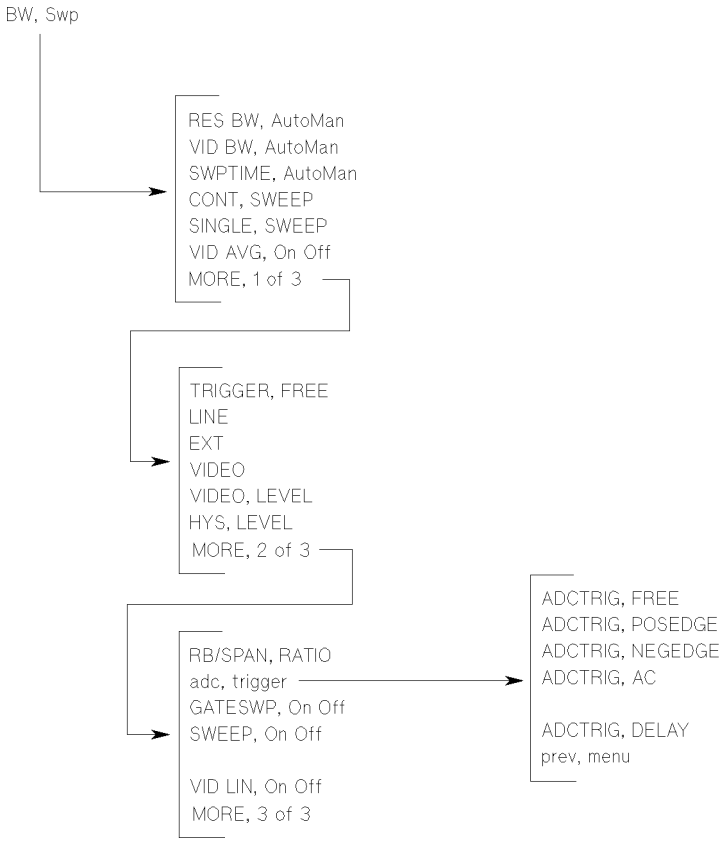
BW, Swp Menu



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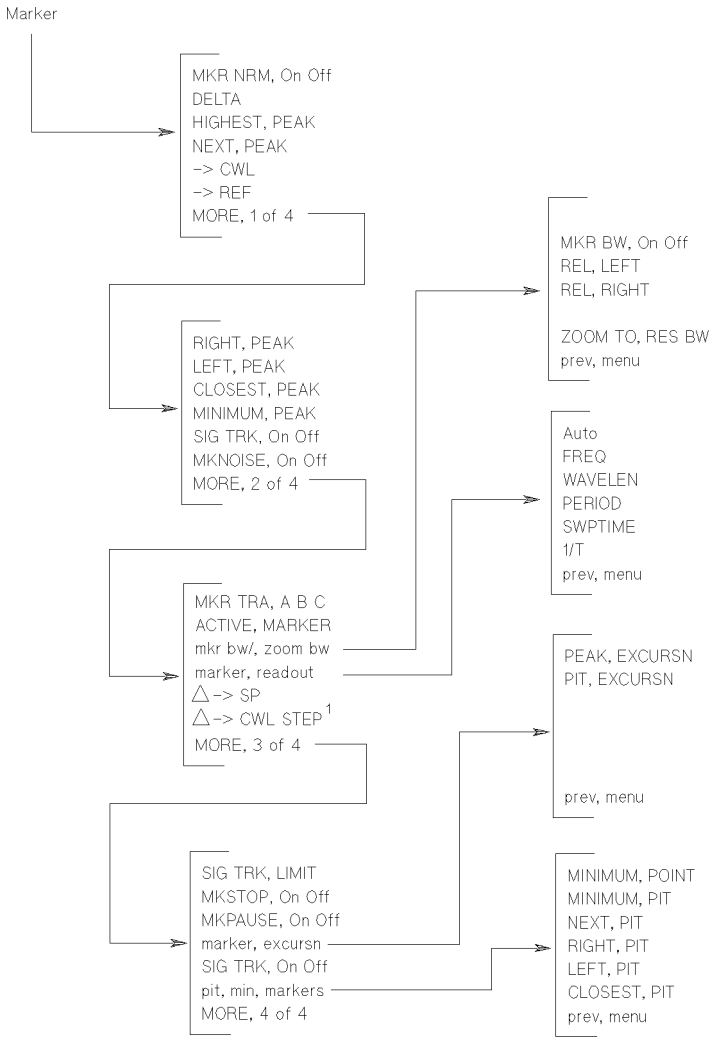
Marker Menu



[1] Softkey appears only if delta markers are on.

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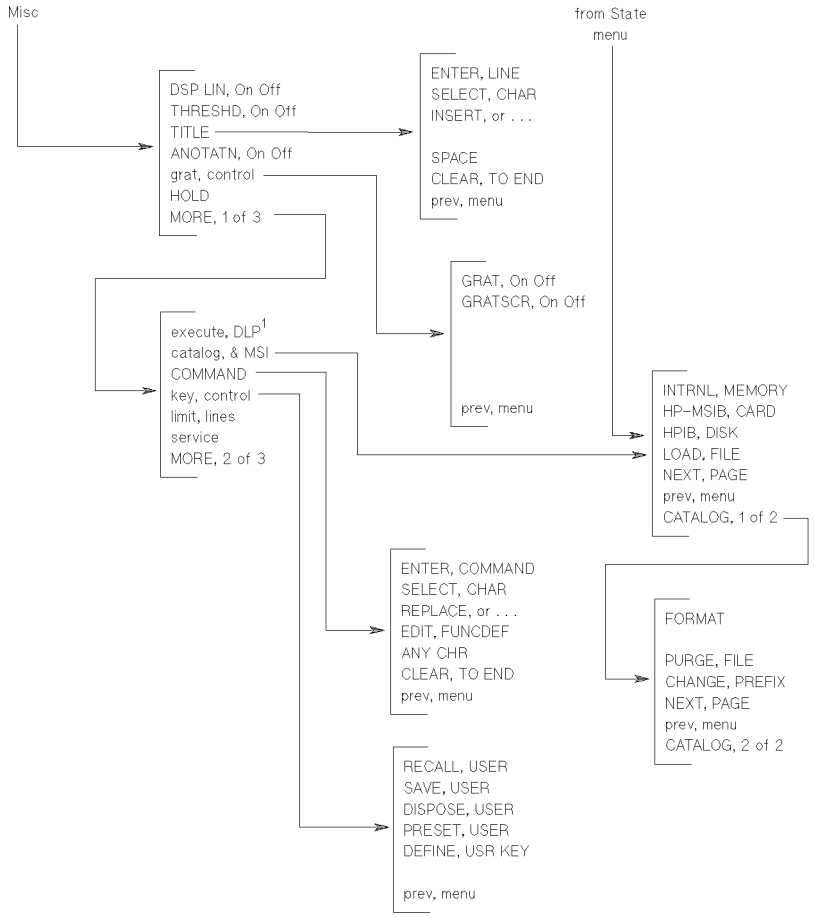
Misc Menu



[1] Use of this softkey is not recommended. Run DLPs through the USER menu.

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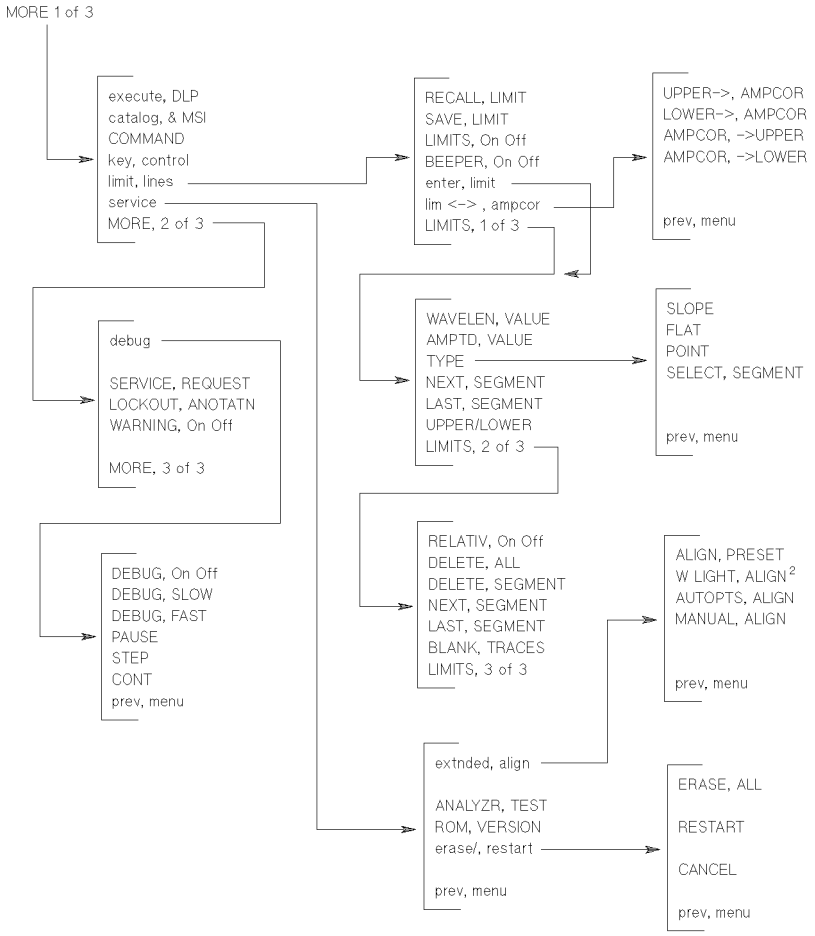
Misc menu (cont'd)



[2] Softkey displayed only on Option 002 instruments.

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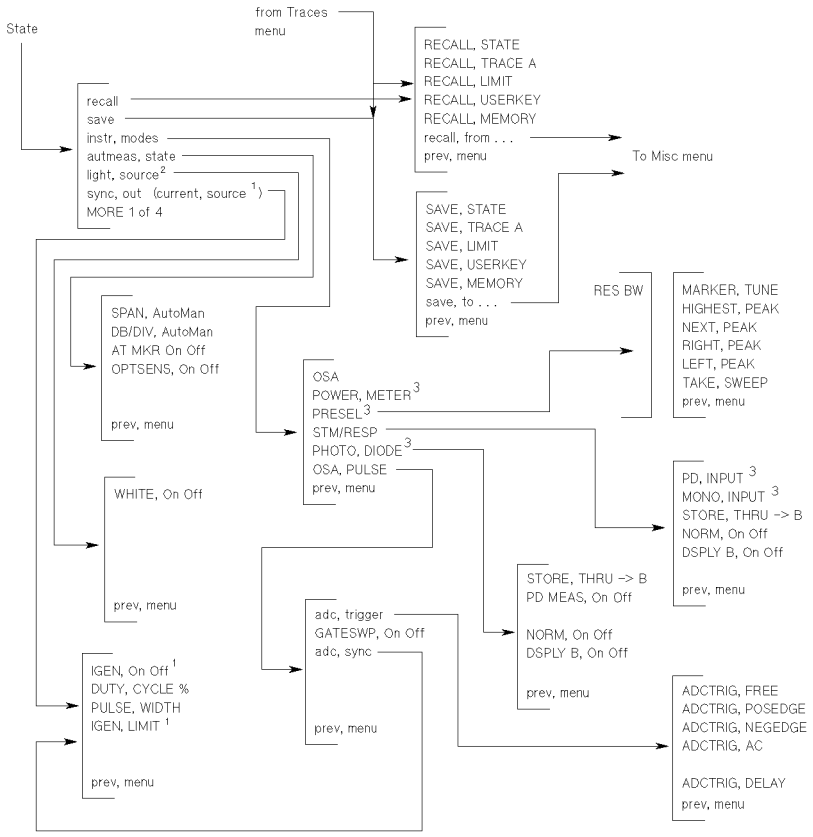
State Menu



[1] Softkey displayed only on Option 001 instruments.

[2] Softkey displayed only on Option 002 instruments.

[3] Softkey displayed only on HP 71451A instruments.

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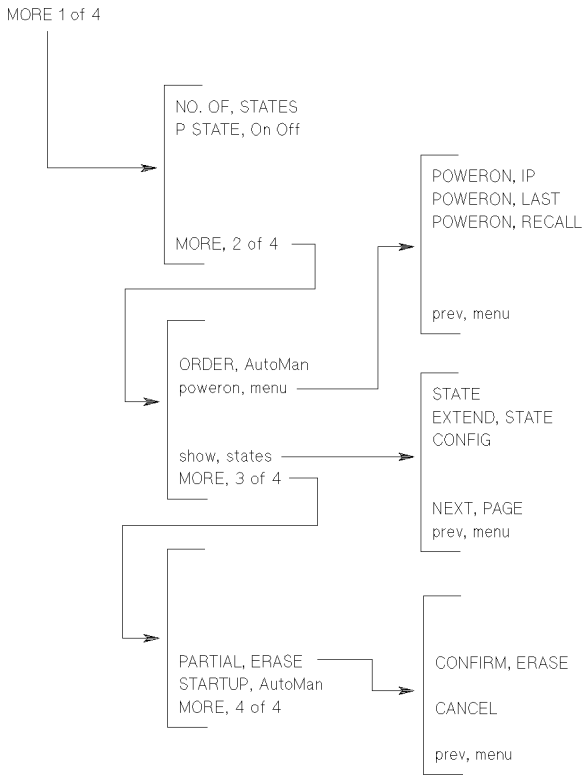
State menu (cont'd)



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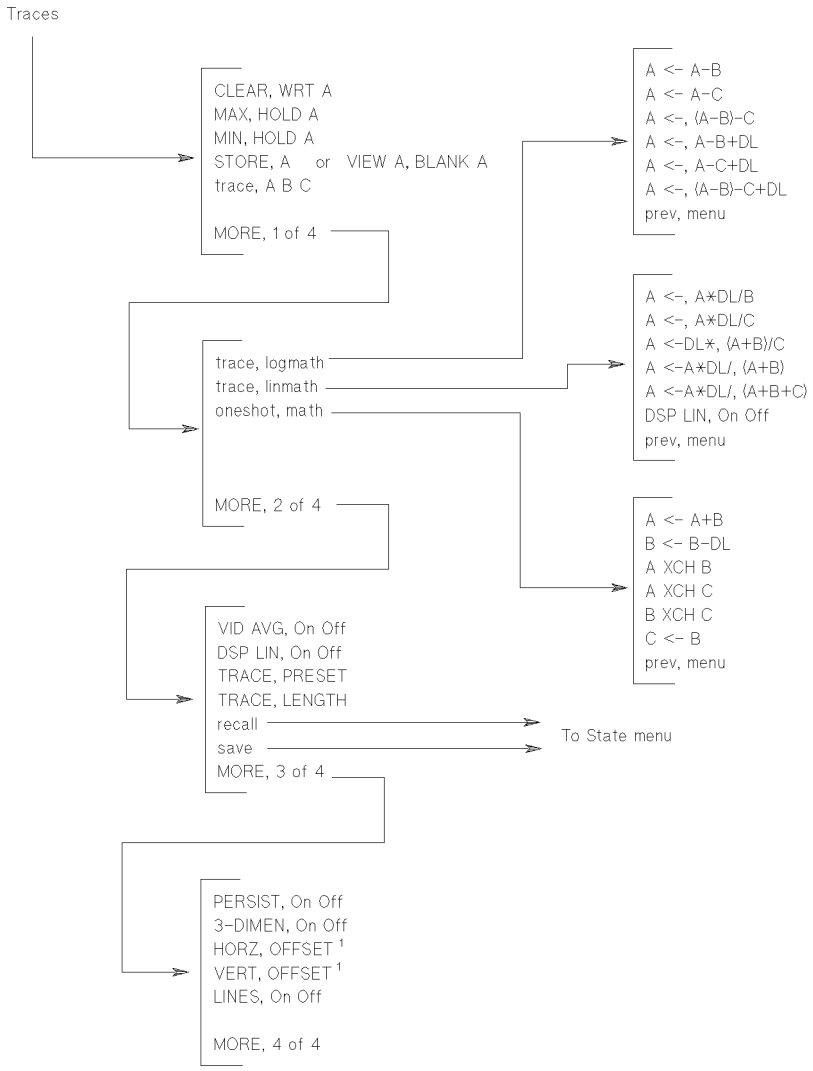
Traces Menu



[1] This softkey appears when "3-DIMEN On Off" is turned on.

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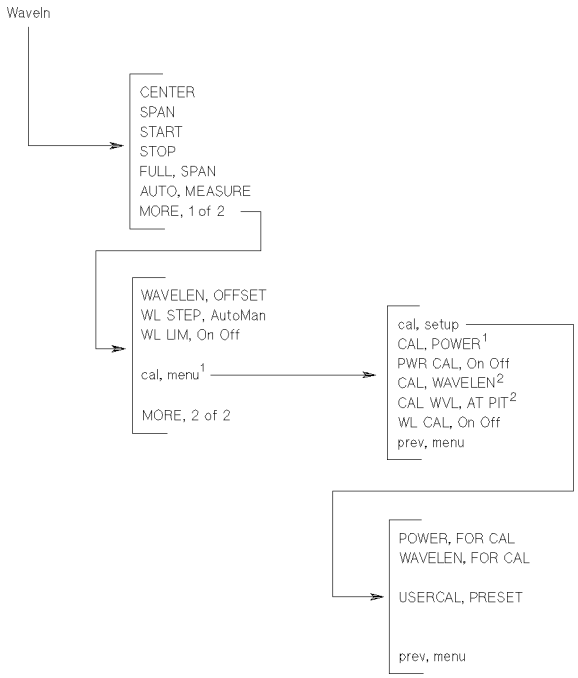
Waveln Menu



[1] Softkey displayed only in OSA and POWER METER instrument modes.

[2] Softkey displayed only in OSA instrument mode.

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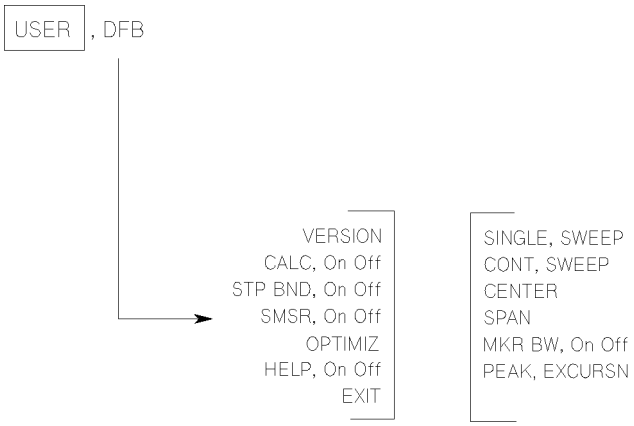
(USER) Menu's DFB Advanced Measurement Program



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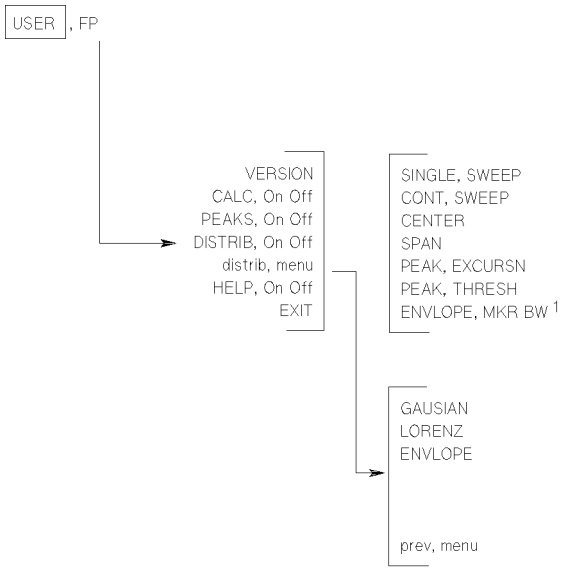
(USER) Menu's FP Advanced Measurement Program



[1] Softkey displayed only when envelope distribution is selected.

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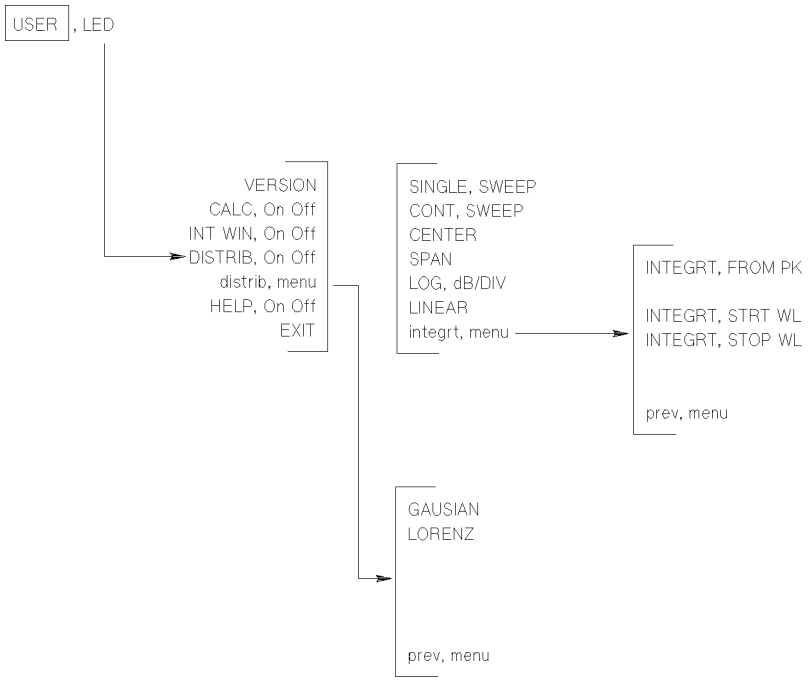
(USER) Menu's LED Advanced Measurement Program



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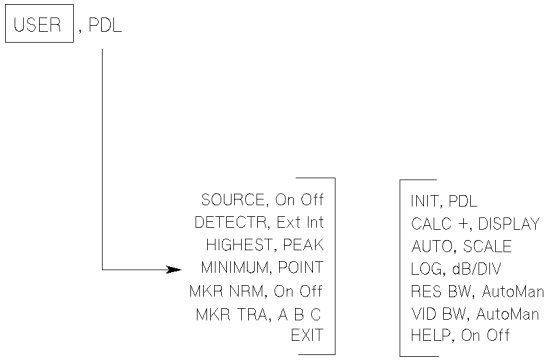
(USER) Menu's PDL Advanced Measurement Program

This program is available on HP 71451B (HP 70951B) instruments as Option 003.



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Optical Spectrum Analyzer Functions

This chapter contains an alphabetical listing of all optical spectrum analyzer softkeys, hardkeys, front-panel indicator lights, and front- and rear-panel input and output connectors. A brief description has been provided for each item listed. If applicable, the related programming command that performs the same (or nearly the same) function has also been provided.

For more detailed information on softkeys or hardkeys, refer to the *HP 71450B/1B/2B Optical Spectrum Analyzer Reference*.

(Backspace) Backspaces the cursor while entering text or displays previous softkey menus.

(Up) (Down) Increases or decreases active parameter values.

(Delta) (custom-keypad key) Activates the `Marker` menu's `DELTA` function.

`1/T` Configures marker readouts to show marker position as the inverse of the marker sweep-time position.

`3-DIMEN On Off` Views the 3-dimensional display. Related command: THREED

`A <- A-B` Subtracts trace B from trace A point by point, then stores the results in trace A. Related command: AMB

`A <- A+B` Adds trace A and trace B point by point, then stores the results in trace A. Related command: APB

`A <- (A-B)-C` Subtracts both trace B and trace C from trace A, then stores the results in trace A. Related command: AMBMC

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`A <- A-B+DL` Subtracts trace B from trace A point by point, adds the value of the display line, then stores the results in trace A. Related command: AMBPL

`A <- A-C` Subtracts trace C from trace A point by point, then stores the results in trace A. Related command: AMC

`A <- A-C+DL` Subtracts trace C from trace A point by point, adds the value of the display line, then stores the results in trace A. Related command: AMCPL

`A <- A*DL/(A+B)` Divides the display line by the sum of traces A and B and then multiplys the result by trace A. Related command: ADAPBTL

`A <- A*DL /(A+B+C)` Divides the display line by the sum of traces A, B, and C and then multiplys the result by trace A. Related command: ADAPBPCTL

`A <- A*DL/B` Multiplies trace A by the display line value, then divides the result by trace B. The results are stored in trace A. Related command: ADBTL

`A <- (A-B)-C+DL` Subtracts both trace B and trace C from trace A, then adds the display line. The results are stored in trace A. Related command: AMBMCPL

`A <- A*DL/C` Multiplies trace A by the display line value, then divides the result by trace C. The results are stored in trace A. Related command: ADCTL

`A <- DL*(A+B)/C` Multiplies the sum of traces A and B by the display line. Then, this result is divided by trace C. The final results are stored in trace A. Related command: APBDCTL

`A METER On Off` Displays the power level of the trace point currently being measured at the optical spectrum analyzer's input. Related command: AMETER

`A UNITS AutoMan` Selects the display units for the amplitude scale. Related command: AUNITS

`A XCH B` Exchanges the contents of trace A and trace B registers. Related command: AXB

`A XCH C` Exchanges the contents of trace A and trace C registers. Related command: AXC

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ACT Front-panel indicator light that turns on whenever the optical spectrum analyzer is being displayed.

`ACTIVE MARKER` Selects the active marker.

`adc sync` Presents a menu for synchronizing an external signal with pulse modulation capability with the optical spectrum analyzer's analog-to-digital converter.

ADC SYNC OUT Rear-panel output connector that allows the user to synchronize an event, external to the instrument to the instrument data acquisition.

`adc trigger` Presents a menu for synchronizing the optical spectrum analyzer to a pulsed light source. Related command: ADCTRG

`ADCTRIG AC` Selects external ADC triggering. The amplitudes measured on opposite edges are subtracted and the absolute value of the result becomes the trace amplitude value. Related command: ADCTRG AC

`ADCTRIG DELAY` Delays external triggering of the analog-to-digital converter (ADC) after the trigger edge. Related command: ADCTRGDLY

`ADCTRIG FREE` Selects internal triggering of the ADC. Related command: ADCTRG FREE

`ADCTRIG NEGEDGE` Selects external ADC triggering. Related command: ADCTRG NEGEDGE

`ADCTRIG POSEDGE` Selects external ADC triggering. Related command: ADCTRG POSEDGE

`ALIGN PRESET` Returns alignment to factory default settings. Related command: ALIGNPRST

`AMP REF OFFSET` Adjusts the displayed amplitude level, using a relative-amplitude offset value. Related command: ROFFSET

`AMPCOR ->LOWER` Copies amplitude-correction values into a lower limit-line table. Related command: CORTOLIM

`AMPCOR-> UPPER` Copies amplitude-correction values into an upper limit-line table. Related command: CORTOLIM

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AMPCOR On Off Turns on and off the use of amplitude corrections. Related command: AMPCOR

Amptd Presents a menu of softkeys that control the optical spectrum analyzer's sensitivity and amplitude scale.

AMPTD VALUE Enters the beginning amplitude value of the currently selected limit-line segment. Related command: LIMIAMP

ANALOG OUT Rear-panel output connector that provides a voltage equal to the photocurrent in the diode multiplied by the transimpedance value.

ANALYZR TEST Initiates a self-test routine. Related command: TEST

ANOTATN On Off Turns the displayed annotation on and off.

ANY CHR Enters any ASCII character as part of a programming command.

AT MKR On Off Allows the automatic measurement routine to execute on a unique signal in a multiple signal environment. Related command: AUTOMMKR

autmeas state Presents a menu which allows you to modify the automatic measurement routine.

Auto Determines the values measured by the marker.

AUTO ALIGN (custom-keypad key) Initiates an automatic alignment routine to ensure amplitude accuracy. Related command: AUTOALIGN

AUTO ALIGN Initiates an automatic alignment routine to ensure amplitude accuracy. Related command: AUTOALIGN

AUTO MEASURE Initiates an automatic measurement routine that searches for a signal and then centers and narrows the span around it. Related command: AUTOMEAS

AUTO MEASURE Initiates an automatic measurement routine that searches for a signal and then centers and narrows the span around it. Related command: AUTOMEAS

AUTO SCALE *HP 71451B Option 003 only* Automatically scales the amplitude of the displayed signal during a polarization dependent loss (PDL) measurement. Related command: PDLSCALE

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AUTOPTS ALIGN Runs an automatic alignment routine for the fiber positioner's tracking table. Related command: ALIGN

AUTORNG On Off Turns automatic ranging on and off. Related command: AUTORNG

AUTZERO On Off Turns off zeroing between traces. Related command: AUTZERO

B <- B-DL Subtracts the value of the display line from trace B, then stores the result in trace B. Related command: BML

B XCH C Exchanges the contents of trace B and trace C registers. Related command: BXC

BEEPER On Off Turns on and off an alarm for alerting you that a signal has crossed a displayed limit line. Related command: LIMIBEEP

BLANK A Prevents trace A data from being displayed. Related command: BLANK

BLANK B Prevents trace B data from being displayed. Related command: BLANK

BLANK C Prevents trace C data from being displayed. Related command: BLANK

BLANK TRACES Prevents the display of trace A, B, and C during creation or editing of limit lines. Related command: BLANK

BW, Swp Presents a menu for controlling instrument sweep, bandwidth, and triggering.

C <- B Places contents of trace B into trace C.

cal menu Presents a menu for performing user calibrations at a set wavelength and power level.

CAL POWER Performs a power calibration at a set wavelength.

cal setup Presents a menu for specifying the power and wavelength for user calibrations.

CAL WAVELEN Performs a wavelength calibration at a set wavelength and amplitude.

CAL WVL AT PIT Performs a wavelength calibration at a signal pit. Related command: CAL

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CALC + DISPLAY *HP 71451B Option 003 only** Calculates and displays the peak-to-peak polarization-dependent loss. Related command: PDLCALC

CALC On Off Turns the calculation of advanced-measurement program results on and off.

CANCEL Cancels the various memory-erase operations.

catalog & MSI Displays the contents of the currently selected user memory. Related command: CATALOG, DSPMODE CAT, and MEM

CENTER Specifies the wavelength displayed at center screen. Related command: CENTERWL

CENTER Specifies the wavelength displayed at center screen. Related command: CENTERWL

CHANGE PREFIX Changes the prefix attached to files when they are stored in memory. Related command: PREFX

CHOP On Off Turns "chop" mode on and off. Related command: CHOP

CLEAR TO END Deletes all characters from the cursor to the end of the data line.

CLEAR WRT A Continuously updates trace A with new data obtained from scanning the input spectra. Related command: CLRW

CLEAR WRT B Continuously updates trace B with new data obtained from scanning the input spectra. Related command: CLRW

CLEAR WRT C Continuously updates trace C with new data obtained from scanning the input spectra. Related command: CLRW

CLOSEST PEAK Moves the active marker to the closest signal peak. Related command: MKPK CP

CLOSEST PIT Moves the active marker to the closest signal pit. Related command: MKPK CPIT

COMMAND Accesses a menu for entering, editing, and executing short programming routines.

CONFIG Shows the configuration of the optical spectrum analyzer module in the modular measurement system (MMS). Related command: CONFIG and DSPMODE CONFIG

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CONFIRM DELETE Erases the contents of the limit-line table after DELETE ALL has been pressed.

CONFIRM ERASE Erases memory.

CONT Resumes operation of a halted program.

CONT SWEEP Sweeps the measurement range when the trigger conditions are met. Related command: CONTS

current source *Option 001 only* Presents a menu for controlling the pulsed current source.

CURRENT SOURCE Rear-panel connector that utilizes the same capability as the ADC SYNC OUT connector.

-> CWL Sets the center wavelength equal to the marker wavelength. Related Command: MKCWL

Δ ->CWL STEP Sets the center-wavelength step size equal to the difference between the reference and active marker wavelengths. Related command: MKSS

DB/DIV AutoMan Changes the amplitude scale used by the automatic measurement routine. Related command: AUTOMDB

dBm Selects amplitude units in decibels relative to 1 mW.

debug Accesses the program-debugging softkey functions.

DEBUG FAST Starts debugging the current DLP at a fast rate. Related command: DEBUG FAST

DEBUG ON Off Activates debugging of DLPs. Related command: DEBUG

DEBUG SLOW Starts debugging the current DLP at a slow rate. Related command: DEBUG SLOW

DEFINE USR KEY Places softkeys in the user menu. Related command: KEYDEF

DELETE ALL Erases any currently loaded limit lines. Related command: LIMIDEL

DELETE CHAR Deletes the character at the displayed cursor.

DELETE or... Displays the DELETE CHAR softkey for deleting characters from the text.

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DELETE SEGMENT Erases the selected limit-line segment. Related command: LIMISDEL

DELTA Displays a delta marker relative to a reference marker. Related command: MKD

DETECTR Ext Int Specifies the receive device to be either optical or electrical thus selecting optical-to-optical testing or optical-to-electrical testing. Related command: PDLDEV and PDL_DEV?

DFB Turns on the DFB advanced-measurement program. Related command: DFB_

DISPLAY Presents a menu for controlling system-level functions such as: HP-MSIB addressing, communication, and configuration.

DISPOSE USER Erases a file containing user-menu softkeys from memory.

distrib menu Displays a menu for selecting statistical distributions.

DISTRIB On Off Displays a power distribution trace.

DSP LIN On Off Positions a horizontal line on the display. Related command: DL

DSPLY B ON OFF Turns on and off the display of trace B.

DUTY CYCLE % Changes the duty cycle of the signal available at the rear-panel ADC SYNC OUT and CURRENT SOURCE connectors. Related command: IGENDTYCY

EDIT FUNCDEF Displays a user-defined function for editing.

ENTER COMMAND Allows commands to be executed from the front panel.

enter limit Displays the limit-line table for creating limit lines. Related command: LIMIEDIT, LIMILINE, and LIMISEG

ENTER LINE Enters a title created by the user on the display.

ENVLOPE Selects an envelope statistical distribution for the power distribution trace. Related command: FP_

ENVLOPE MKR BW Sets the Fabry-Perot laser envelope bandwidth amplitude. Related command: FP_MKBW

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ERASE ALL Erases all internal user memory.

erase restart Presents a menu for erasing internal memory.

ERR Front-panel indicator light that turns on whenever the optical spectrum analyzer has a problem.

execute DLP Lists all DLPs stored in internal memory alphabetically.

EXIT Turns off an advanced-measurement program. Related command: DFB_, FP_, LED_, and PDLEXIT

EXT Selects external triggering. Related command: TM EXT

EXT TRIG IN Rear-panel input connector that selects either external trigger mode or the gated sweep mode.

EXTEND STATE Lists module-level operating values for each module of the instrument. Related command: DSPMODE EXTEND

extnded align Presents a menu for adjusting the fiber-positioner's tracking table.

FLAT Determines limit-line interpolation.

FORMAT Erases, then initializes the currently selected memory. Related command: FORMAT

FP Turns on the Fabry-Perot (FP) advanced-measurement program. Related command: FP_

FREQ Configures marker readouts in frequency.

FULL SPAN Sets the measurement span to the limits of the optical spectrum analyzer. Related command: FS

GATESWP On Off Allows the gating of measurement data via the rear-panel EXT TRIG IN connector. Related command: GATESWP

GAUSIAN Selects Gausian statistical distribution for the power distribution trace.

grat control Presents a menu for controlling the displayed graticule.

GRAT On Off Turns the displayed graticule on and off. Related command: GRAT

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GRATSCR On Off Controls the positioning of the horizontal graticule lines. Related command: GRATSCRL

HELP On Off Displays on-line definitions.

HIGHEST PEAK Moves a trace marker to the highest detected signal peak. Related command: MKPK HI

(HOLD) Deactivates an active function to prevent accidental setting changes. Related command: HD

HOLD Deactivates an active function to prevent accidental setting changes. Related command: HD

HORZ OFFSET Sets the horizontal offset of 3-dimensional trace displays. Related command: THREEDH

HP-MSIB CARD Accesses memory on cards and other HP-MSIB devices. Related command: MSI

HPIB DISK Accesses an HP-IB external memory device connected via HP-IB to the system. Related command: MSI

HSWP IN OUT Rear-panel input and output connector for the high sweep (HSWP) signal.

HYS LEVEL Defines the change in video-signal level required for video triggering. Related command: VTH

IGEN LIMIT *Option 001 only* Controls current limiting of the current source. Related command: IGENLIMIT

IGEN On Off *Option 001 only* Turns on or off and sets the value of the current source. Related command: IGEN

INIT PDL *HP 71451B Option 003 only* Initializes the polarization dependent loss (PDL) measurement procedure. Related command: PDLINIT

INSERT or... Displays the SELECT CHAR softkey for inserting characters into text.

(INSTR) Assigns the HP 70004A display's front-panel keys to selected master modules.

instr modes Selects the type of instrument operations performed by HP 71451A instruments. Related command: INSTMODE

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INSTR PRESET Resets the optical spectrum analyzer to a known preset state. Related command: IP

INT WIN On Off Displays the trace points used to calculate FWHM and power.

INTEGRT FROM PK Selects integration points based on amplitude level from peak response.

integrt menu Accesses a menu that selects the trace points for calculating FWHM and power.

INTEGRT STOP WL Sets the upper limit of integration points based on the ending wavelength.

INTEGRT STRT WL Sets the lower limit of integration points based on the starting wavelength.

INTRNL MEMORY Selects the optical spectrum analyzer's internal memory for memory operations. Related command: MEM and MSI

key control Accesses a menu for creating, saving, and recalling user-defined menus.

LAST SEGMENT Enters a limit-line segment at the end of the limit-line table. Related command: LIMIBOT

LCL Returns local front-panel control.

LED Turns on the LED advanced-measurement program. Related command: LED_

LEFT PEAK Moves a marker left on the display to the next signal peak. Related command: MKPK NL

LEFT PIT Moves a marker left on the display to the next signal pit. Related command: MKPK NLPIT

lim <-> ampcor Accesses a menu for loading and editing amplitude-correction values to and from limit-line tables.

limit lines Displays a menu for creating, editing, and displaying limit lines.

LIMITS On Off Turns on and off limit-line testing. Related command: LIMITEST

light source *Option 002 only* Presents a softkey for controlling built-in white-light source.

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LINE Triggers the sweep using the ac power-line voltage. Related command: TM LINE

LINEAR Selects a linear amplitude scale. Related command: LN

LINES On Off Turns on or off the interpolation of data between trace measurement points. Related command: LINES

LOAD FILE Recalls a file stored in memory. Related command: LIMIRCL, LOAD, RCLD, RCLS, RCLT, and RCLU

LOCKOUT ANOTATN Prevents the display of annotation. Related command: ANNOFF

LOG dB/DIV Selects a logarithmic amplitude scale. Related command: LG

LORENZ Selects a Lorenzian statistical distribution for the power distribution trace.

LOWER-> AMPCOR Stores a lower-limit line as amplitude-correction values for a specific wavelength range. Related command: LIMTOCOR

LSN Front-panel indicator light that turns on when the optical spectrum analyzer is receiving data or instructions over HP-IB.

MANUAL ALIGN Performs an (AUTO ALIGN) at specified wavelengths.

Marker Presents a menu for accessing and controlling trace markers.

marker excursn Presents a menu for defining peak and pit excursion.

marker readout Selects the measurement parameter indicated by the marker. Related command: MKREAD

MARKER TUNE Tunes the wavelength of the preselector. Related command: MKTUNE

MAX HOLD A Updates trace A with the maximum values from each successive sweep. Related command: MXMH

MEAS Front-panel indicator light that turns on when the optical spectrum analyzer sweeps the wavelength range and blanks during retrace.

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(MENU) Displays the optical spectrum analyzer's softkeys.

MIN HOLD A Updates trace A with the minimum values from each successive sweep. Related command: MINH

MINIMUM PEAK Moves a marker to the smallest displayed signal peak. Related command: MKPK MI

MINIMUM PIT Moves a marker to the smallest displayed signal pit. Related command: MKPK MIPIT

MINIMUM POINT Moves a marker to the lowest detected level on the trace. Related command: MKMIN

MK STOP On Off Stops the sweep at the marker. Related command: MKCONT

MKNOISE On Off Displays the rms noise level at the marker. Related command: MKNOISE

MKPAUSE On Off Pauses the sweep at the marker position. Related command: MKPAUSE

MKR BW On Off Measures the bandwidth of a signal. In the DFB advanced-measurement program, sets the amplitude at which the bandwidth value is measured. Related command: MKBWA

mkr bw zoom bw Accesses the marker bandwidth and zoom bandwidth softkeys.

MKR NRM On Off Displays an active marker on a trace. Related command: MKN and MKOFF

MKR TRA A B C Positions the active marker on trace A, B, or C. Related command: MKTRACE

MONO INPUT Selects the front-panel MONOCHROMATOR INPUT connector for stimulus-response measurements. Related command: SRINPUT NORMAL

MONOCHROMATOR INPUT Front-panel input connector that receives the input light for the HP 71451B optical spectrum analyzer. On an HP 71450B/2B, this connector is labeled OPTICAL INPUT.

MONOCHROMATOR OUTPUT Front-panel output connector serving as the external output of the monochromator on the HP 71451B optical spectrum analyzer.

NEXT PAGE Displays another page of screen data.

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(NEXT PEAK) Moves a displayed marker to the next-highest signal peak.

NEXT PEAK Moves a displayed marker to the next-highest signal peak. Related command: MKPK NH

NEXT PIT Moves displayed marker to the next-deepest signal pit. Related command: MKPK NHPIT

NEXT SEGMENT Selects the next row in the limit-line table for data entry. Related command: LIMINEXT

NO. OF STATES Reserves a number of instrument-state files for saving instrument states. Related command: NSTATE

NORM On Off Turns trace normalization on or off. Related command: NORM

(NORMAL ON/OFF) Places an active marker on the trace.

oneshot math Displays a menu of trace-math functions that are performed once per key press.

OPTICAL INPUT Front-panel input connector that receives the input light for the HP 71450B/2B optical spectrum analyzer. On an HP 71451B, this connector is labeled MONOCHROMATOR INPUT.

OPTIMIZ Ensures the DFB advanced-measurement program locates the laser's side modes.

OPTSENS On Off Optimizes the automatic measurement routine for sensitivity.

ORDER AutoMan Allows second order use of the diffraction grating modes or limits operation to the first order. Related command: GRATORDER

OSA Selects normal optical spectrum analysis.

OSA PULSE Places the optical spectrum analyzer in an operation mode that is optimized for making accurate fast pulse measurements. Related command: INSTMODE

P STATE On Off Protects the contents of instrument-state files. Related command: PSTATE

PARTIAL ERASE Erases all volatile contents of internal memory. Related command: PERASE

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PAUSE Pauses execution of a DLP during debugging. Related command: PAUSE

PD INPUT Selects the front-panel PHOTODETECTOR INPUT connector for stimulus-response measurements. Related command: SRINPUT DIODE

PD MEAS On Off Displays the power distribution of a photo diode. Related command: PDMEAS

PDL *HP 71451B Option 003 only* Runs the polarization dependent loss measurement program. Related command: PDL_

PEAK EXCURSN Defines a peak for marker peak-search functions. Related command: MKPX

(PEAK SEARCH) Places an active marker on the highest amplitude trace point.

PEAK THRESH Selects an amplitude window for measurement data when using the Fabry-Perot (FP) advanced-measurement program.

PEAKS On Off Displays which response peaks are used in measurement calculations.

PERIOD Configures marker readouts in period.

PERSIST On Off Simulates analog displays. Related command: PERSIST

PHOTO DIODE Selects instrument operation for testing photo-diode detectors.

PHOTODETECTOR INPUT Front-panel external input connector for the photodetector on the HP 71451B optical spectrum analyzer.

PIT EXCURSN Defines a pit for marker pit-search functions. Related command: MKPITX

pit,min markers Presents a menu of functions for locating signal pits and the minimum trace point.

(PLOT) Plots the display on a Hewlett-Packard plotter.

POINT Determines limit-line interpolation.

POWER FOR CAL Enters the light source's power level for user calibrations. Related command: CALPWR

POWER METER Selects instrument operation as a power meter.

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POWERON IP Specifies that the instrument be placed in its preset state whenever it is turned on. Related command: POWERON

POWERON LAST Specifies the instrument's state immediately after being turned on. Related command: POWERON

poweron menu Presents a menu for selecting the instrument's state after it is turned on.

POWERON RECALL Restores a specified state-register file each time the instrument is turned on. Related command: RCLS

PRESEL Selects instrument operation as a preselector.

PRESET USER Restores the default user-menu softkeys. Related command: KEYPST

prev menu Returns to the previously displayed softkeys.

PRINT Prints the display on a Hewlett-Packard graphics printer.

PULSE WIDTH Adjusts the pulse width of the rear-panel ADC SYNC OUT or CURRENT SOURCE connectors. Related command: IGENPW

PURGE FILE Erases files from default memory. Related command: DISPU

PWR CAL On Off Turns on and off the use of any user-calibration derived power correction offset. Related command: CALCOR

RB/SPAN RATIO Specifies the ratio between the resolution-bandwidth and span settings. Related command: RBR

recall Accesses a menu for recalling files from memory.

recall from... Presents a menu for cataloging and changing default memory.

RECALL LIMIT Loads a stored limit-line file into the limit-line table. Related command: LIMIRCL

RECALL MEMORY Loads non-ASCII DLP program data to internal memory. Related command: RCLD

RECALL STATE Sets the instrument state to the settings saved in a state file. Related command: RCLS

RECALL TRACE A Loads trace data from a file into trace A. Related command: RCLT

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RECALL USER Loads a set of user-defined softkeys into the (USER) menu. Related command: RCLU

RECALL USERKEY Loads a set of user-defined softkeys into the (USER) menu.

-> REF Sets the reference level equal to the marker amplitude. Related command: MKRL

(REF LEVEL) Sets the reference level.

REF LVL Specifies the reference level value at the reference-level position. Related command: RL

REF LVL POSN Changes the reference-level position. Related command: RLPOS

REL LEFT Positions the left-side marker for measuring the bandwidth of a signal. Related command: MKAL

REL RIGHT Positions the right-side marker for measuring the bandwidth of a signal. Related command: MKAR

RELATIV On Off Specifies relative or absolute limit-line values. Related command: LIMIREL

REPLACE or... Displays the SELECT CHAR softkey for replacing characters.

(RES BW) Manually sets the resolution bandwidth filtering.

RES BW AutoMan Manually sets the resolution bandwidth filtering. Related command: RB and RBR

RESTART Performs an automatic MMS configuration routine. Related command: STARTUP

RIGHT PEAK Moves a marker right on the display to the next signal peak. Related command: MKPK NR

RIGHT PIT Moves a marker right on the display to the next signal pit. Related command: MKPK NRPIT

RMT Front-panel indicator light that turns on when the optical spectrum analyzer is being controlled by a computer over the HP-IB.

ROM VERSION Displays the date code of the read-only memory (ROM). Related command: REV

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save Accesses a menu for saving traces, instrument states, limit-lines, and user menu files to memory.

SAVE LIMIT Stores the contents of the limit-line table in a limit-line file. Related command: LIMISAV and STOR

SAVE MEMORY Stores all non-ASCII, internal-memory, files to external memory. Related command: SAVED and STOR

SAVE STATE Saves the current instrument state in a file. Related command: SAVES and STOR

save to Presents a menu for cataloging or changing default memory. Related command: STOR

SAVE TRACE A Stores trace A in a file. Related command: SAVET and STOR

SAVE USER Stores the current menu of user softkeys in a file.

SAVE USERKEY Stores the current menu of user-defined softkeys in a file. Related command: SAVEU and STOR

SELECT CHAR Places selected characters at the displayed cursor.

SELECT SEGMENT Movers the limit-line editing field to the next limit-line segment.

(SENS) Sets the sensitivity.

SENS AutoMan Sets the sensitivity. Related command: SENS

serivce Presents a menu for obtaining knowledge about system parameters, module level parameters, and module HP-MSIB addresses.

SERVICE REQUEST Enables the service request mode.

show states Displays a menu for obtaining current instrument-state information.

SIG TRK LIMIT Sets the amplitude variation tolerated by the signal-tracking functions. Related command: MKTV

SIG TRK On Off Keeps a marked signal at the center of the display. Related command: MKTRACK

SINGLE SWEEP Initiates one sweep of the measurement range. Related command: SNGLS

SLOPE Determines limit-line interpolation.

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SMSR On Off Displays a trace showing the DFB laser's side mode used to calculate SMSR.

SOURCE On Off *HP 71451B Option 003 only* Turns on or off the internal white light source. Related command: PDLSRC and PDL_SRC?

SPACE Enters a space character.

Δ->SPAN Sets the measurement span equal to the wavelength separation of delta markers. Related command: MKSP

(SPAN) Sets the wavelength span.

SPAN Sets the wavelength span. Related command: SP

SPAN AutoMan Changes the wavelength span set by the automatic measurement routine. Related command: AUTOMSP

SRQ Front-panel indicator light that turns on when the optical spectrum analyzer has requested service from a computer over HP-IB.

(START) Sets the start wavelength.

START Sets the start wavelength. Related command: STARTWL

STARTUP AutoMan Controls the automatic MMS configuration that occurs when the instrument is turned on. Related command: STARTUP

State Presents a menu for instrument configuration and the saving and recalling of files.

STATE Lists the state of current measurement settings under operator control. Related command: DSPMODE STATE

STEP Executes DLP commands one at a time.

STM/RESP Selects instrument operation for performing stimulus-response measurements. Related command: MEASURE

(STOP) Sets the stop wavelength. Related command: STOPWL

STOP Sets the stop wavelength. Related command: STOPWL

STORE A Stores the trace in temporary memory.

STORE THRU->B Stores the calibration response into trace B. Related command: STORREF

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STP BND On Off Displays a trace showing the DFB laser's stop bandwidth.

SWEEP On Off Turns the sweep on and off. Related command: SWEEP

SWPTIME Configures marker readouts in sweep time.

SWPTIME AutoMan Sets the sweep time. Related command: ST

sync out Presents a menu for controlling an external pulsed current source.

TAKE SWEEP Updates the displayed trace in preselector mode.

THRESHD On Off Blanks traces below an amplitude threshold level. Related command: TH

TITLE Displays a menu used for writing messages on the display. Related command: TITLE

TLK Front-panel indicator light that turns on when the optical spectrum analyzer is sending data or instructions over HP-IB.

(TO CENTER) Moves the wavelength at the marker to center screen.

(TO REF LEVEL) Moves the amplitude at the marker to the reference level.

trace A B C Selects the active trace for writing, processing, or storing.

TRACE LENGTH Changes the number of trace points measured for traces A, B, and C. Related command: TRDEF

trace linmath Displays a menu of linear trace-math functions that are for use when the optical spectrum analyzer's amplitude scale is set to linear units.

trace logmath Displays a menu of logarithmic trace-math functions that are for use when the optical spectrum analyzer's amplitude scale is set to logarithmic units.

TRACE PRESET Resets trace functions to their default state. Related command: TRPST

Traces Presents a menu for controlling traces.

TRANS-Z IN Rear-panel input connector used in the photodetector instrument mode.

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TRIGGER FREE Selects free-run triggering. Related command: TM FREE

TRNSZLK On Off Locks the optical spectrum analyzer's internal transimpedance amplifier. Related command: TRNSZLOCK

type Selects the type of lines used for limit lines. Related command: LIMITYPE

units menu Selects the amplitude scale's units.

UPPER-> AMPCOR Stores an upper limit line as amplitude-correction values for a specific wavelength range. Related command: LIMTOCOR

UPPER LOWER Specifies whether the limit-line data is for upper or lower limit lines. Related command: LIMIHALF

(USER) Presents the (USER) menu.

USERCAL PRESET Erases all user calibration data. Related command: CAL

VERSION Displays an advanced-measurement program's version number.

VERT OFFSET Sets the vertical offset of 3-dimensional trace displays. Related command: THREEDV

VID AVG On Off Turns on video averaging. Related command: VAVG

VID BW AutoMan Manually sets the video bandwidth filtering. Related command: VB

VID LIN On Off Displays or hides video-trigger lines. Related command: VTDL

VIDEO Triggers zero-span sweeps using the input signal. Related command: TM VID

VIDEO LEVEL Specifies the trigger level for the video triggering. Related command: VTL

VIEW A Displays trace data that has been temporarily stored. Related command: VIEW

VIEW B Displays trace data that has been temporarily stored. Related command: VIEW

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VIEW C Displays trace data that has been temporarily stored. Related command: VIEW

W LIGHT ALIGN Runs an automatic alignment for the fiber positioner's tracing table using a broad spectra light source (600 nm to 1700 nm). Related command: ALIGN

WARNING On Off Displays or hides warning messages. Related command: WARNCTRL

WATT Selects linear amplitude units in watts.

WAVELEN Configures marker readouts in wavelength.

WAVELEN FOR CAL Enters the light source's wavelength for a user calibration. Related command: CALWL

WAVELEN OFFSET Offsets the wavelength annotation. Related command: WLOFFSET

WAVELEN VALUE Enters a wavelength value into the limit-line table. Related command: LIMIWL

WaveIn Displays a menu for changing wavelength settings and for performing automatic measurements.

WHITE On Off *Option 002 only* Turns on or off the internal white light source. Related command: LIGHT

WL CAL On Off Turns on and off the use of any user-calibration derived wavelength correction offset. Related command: CALCOR

WL LIM On Off Expands the wavelength range. Related command: WLLIMIT

WL STEP AutoMan Changes the center wavelength in increments. Related command: SS

X Used for entering values as a multiplier.

ZERO Increases amplitude accuracy by compensating for temperature drift. Related command: ZERO

ZOOM TO RES BW Views a signal in a 0 Hz span at the resolution bandwidth specified. Related command: ZOOMRB

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3

Programming Commands

The following pages are a compilation of all current programming commands for the optical spectrum analyzer. More information on each command can be found in the *HP 71450B/1B/2B Optical Spectrum Analyzer Programmer's Guide*.

This reference is intended for use by the experienced optical spectrum analyzer programmer.

To find a programming command that performs a particular function, refer to the "Functional Index," which groups the commands according to similar function. The command and a brief definition are shown in this index. Once the desired command is found, refer to the alphabetical listing for further command definition and syntax information.

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Notation Conventions

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

BOLD TYPE	All characters appearing in bold type are keywords and must appear exactly as shown.
CAPITAL LETTERS	All characters which are capital letters are secondary keywords and appear within the keyword syntax. They must appear exactly as shown, and their meanings can be found in the "Secondary Keyword Summary."
< >	Characters appearing in angular brackets are considered to be elements of the language being defined. Their meanings can be found in the section "Syntax Conventions" unless otherwise specified with the keyword definition.
[ ]	Square brackets indicate that whatever occurs within the brackets is optional.
|	"or": Indicates a choice of exactly one element from a list (for example, <a>|<b> indicates <a> or <b> but not both.
( )	Parentheses are used to clarify which elements are to be chosen from.
_	"underscore": Indicates that a space must be placed at the indicated location (for example, A_<a> indicates that there must be a space between the keyword A and the element <a>.
::=	"is defined as" (for example, <a> ::= <b><c> indicates that <a> can be replaced by the series of elements <b><c> in any statement where <a> occurs).
{ }	Curly brackets indicate that whatever occurs within the brackets can have 0 or more repetitions.

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Syntax Conventions

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

<**A-block data format**> is defined as #A<length><command list>.

<**amplitude unit**> is defined as DB | DBM | DBMV | DBUV | MV | UV | V | MW | UW | W.

<**character**> is defined as SP * - < = > @ ^ { | } ~ ! " # $ % & ' ( ) + , . / 0 1 2 3 4 5 6 7 8 9 : ; A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\ ] ? ` | a b c d e f g h i j k l m n o p q r s t u v w x y z _

<**character string**> is defined as a list of characters.

<**command list**> is defined as any optical spectrum analyzer command or list of commands separated by semicolons.

<**compatible function**> is defined as any optical spectrum analyzer command that operates on other functions, that is, contains *predefined function* in its syntax.

<**data byte**> is defined as an 8-bit byte containing numeric or character data.

<**delimiter**> is defined as ! | " | $ | % | & | ' | / | : | = | @ .

<**destination**> is defined as TRA|TRB|TRC|<user-defined trace>|<user-defined variable>|<predefined variable>|<trace range>.

<**digit**> is defined as 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9.

<**frequency unit**> is defined as HZ | KHZ | MHZ | GHZ.

<**I-block data field**> is defined as #I<command list>END; (use when the length of the command list is not known).

<**integer**> is defined as a positive or negative integer in the range of −32768 through +32767.

<**key label**> is defined as 2 to 11 characters long that is defined by the FUNCDEF command. Choice of characters A through Z and the underscore (_). The underscore should be used as the second or third character of the label. It is not recommended to omit the underscore.

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Note: The underscore used as the last character in a FUNCDEF label causes the optical spectrum analyzer to automatically use the <key label> as the title for a user-defined key.

<**key number**> is defined as <integer> from 1 to 14|<trace element>|<predefined function>|<predefined variable>|<user-defined variable>.

<**lsb length**> is defined as <data byte> representing the least significant byte of a two-byte word that describes the number of bytes returned or transmitted.

<**msb length**> is defined as <data byte> representing the most significant byte of a two-byte word that describes the number of bytes returned or transmitted.

<**number**> is defined as <integer> | <real>.

<**power unit**> is defined as W | MW | UW | NW | PW.

<**predefined function**> is defined as an optical spectrum analyzer command that returns a number that can be operated on by other commands called *compatible functions*.

<**predefined variable**> is defined as the values of the following variables change depending on the current instrument settings. Each variable represents the value of the command function that has the same names as the variable.

CALPWR, DL, LG, MKA, MKACT, MKAL, MKAR, MKN, MKP, MKPAUSE, MKPX, MKT, MKTV, NSTATE, RB, RBR, RL, RLPOS, ROFFSET, SP, SS, ST, TH, VB, VTL.

<**real**> is defined as positive or negative real number.

<**source**>, <**source 1**>, and <**source 2**> are defined as TRA|TRB|TRC|<user-defined trace>|<user-defined variable>|<predefined variable>|<trace range>|<number>[<units>].

<**time unit**> is defined as S | MS | US.

<**trace element**> is defined as a value contained in one trace point of trace A, trace B, trace C, or user-defined trace. Values in <trace element> are defined by <trace range>.

<**trace range**> is defined as values contained in any trace data of trace A, trace B, trace C, or user-defined trace. The range is defined by TRDEF. The range of the element can be −32768 to +32767

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measurement units for logarithmic trace data; 0 to 10000 measurement units for linear trace data.

<**user-defined function**> is defined as 1 to 12 characters defined by the FUNCDEF or ACTDEF command. Choice of characters is A through Z, 0 through 9, and underscore (_); first character must be a letter and numbers must be preceded by the underscore. Using an underscore as the last character causes the label to be used as a key label in the USER menu.

<**user-defined trace**> is defined as 1 to 12 characters defined by the TRDEF command. Choice of characters is A through Z, 0 through 9, and underscore (_); first character must be a letter and numbers must be preceded by the underscore.

<**user-defined variable**> is defined as 1 to 12 characters defined by the VARDEF or ACTDEF command. Choice of characters is A through Z, 0 through 9, and underscore (_); first character must be a letter and numbers must be preceded by the underscore.

<**wavelength unit**> is defined as M | MM | UM | NM | PM | ANG.

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Functional Index

Active-Trace Processing Functions

A − B → A	AMB
A − C → A	AMC
A − B + DL → A	AMBPL
(A − B) − C → A	AMBMC
(A − B) − C + DL → A	AMBMCPL
A − C + DL → A	AMCPL
A + B → A	APB
A − C → A	AMC
A × DL / B → A	ADBTL
A × DL / C → A	ADCTL
A × DL / (A + B) → A	ADAPBTL
A × DL / (A + B + C) → A	DAPBPCTL
(A + B) × DL / C → A	APBDCTL
Automatic Measurement	AUTOMEAS
Automatic Measurement at Marker	AUTOMMKR
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B → C	BTC
B − DL → B	BML
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Delays ADC trigger	ADCTRGDLY
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Adjust fiber-positioner table	ALIGN
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Calibration Power	CALPWR
Calibration Wavelength	CALWL

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Calibration Functions (continued)	
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Trace Zeroing	AUTZERO
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Current Source: Output Limit	IGENLIMIT
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Current Source: Pulse Mode Pulse Width	IGENPW
Current Source: Current Control	IGEN

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Three Dimensional: Horizontal Display	THREEDH
Three Dimensional: Trace Control	THREED
Three Dimensional: Vertical Display	THREEDV
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Fabry-Perot Laser DLP	FP_
Fabry-Perot Laser Envelope Bandwidth Amplitude	FP_MKBW
Fabry-Perot Laser Threshold	FP_TH
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Position Left Power Integration Point	WLMKRL
Position Power Integration Points to Amplitude	AMPMKR
Position Right Power Integration Point	WLMKRR

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Character Height	CHEIGHT
Character Width	CWIDTH
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Display Marker	MK
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Limit Line: Test	LIMITEST
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Marker Functions

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Marker Functions (continued)

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Set reference marker frequency	MKDREFF
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Marker Normal	MKN
Marker Off	MKOFF
Marker Position	MKP
Marker Pause	MKPAUSE
Marker Peak	MKPK
Marker Peak Excursion	MKPX
Marker Pit Excursion	MKPITX
Marker Readout	MKREAD
Marker Span	MKSP
Marker Stop	MKSTOP
Marker to Center Wavelength Step Size	MKSS
Marker to Center Wavelength	MKCWL
Marker to Reference Level	MKRL
Marker Time	MKT
Marker Trace	MKTRACE
Marker Tracking	MKTRACK
Marker Tracking Variance	MKTV
Marker Tune	MKTUNE
Marker Type	MKTYPE
Marker Wavelength	MKWL
Zoom to Resolution Bandwidth	ZOOMRB

Math and Move Functions

A − B → A	AMB
A − C → A	AMC
A − B + DL → A	AMBPL
(A − B) − C → A	AMBMC
(A − B) − C + DL → A	AMBMCPL
A − C + DL → A	AMCPL
A + B → A	APB
A − C → A	AMC
A × DL / B → A	ADBTL
A × DL / C → A	ADCTL
A × DL / (A + B) → A	ADAPBTL
A × DL / (A + B + C) → A	ADAPBPCTL
(A + B) × DL / C → A	ADAPBPCTL

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Math and Move Functions (continued)

Absolute	ABS
Add	ADD
Amplitude Units	AMPU
Average	AVG
B → C	BTC
B – DL → B	BML
Bit	BIT
Compress	COMPRESS
Concatenate	CONCAT
Convert to Position Units	POSU
Divide	DIV
Exchange	XCH
Exchange Traces B and C	BXC
Exponent	EXP
Fast Fourier Transform	FFT
Integer	INT
Logarithm	LOG
Maximum	MXM
Mean	MEAN
Measurement Units	MEASU
Minimum	MIN
Modulo	MOD
Move	MOV
Multiply	MPY
Peaks	PEAKS
Power Bandwidth	PWRBW
Probability Distribution of Amplitude	PDA
Probability Distribution of Wavelength	PDWL
Root Mean Square	RMS
Smooth Trace	SMOOTH
Square Root	SQR
Standard Deviation of Trace Amplitudes	STDEV
Subtract	SUB
Sum	SUM
Sum of Square	SUMSQR
Trace A Exchange Trace B	AXB
Trace A Exchange Trace C	AXC
Trace Data Input and Output	TRA/TRB/TRC
Trace Window	TWNDOW
Variance	VARIANCE
Video Average	VAVG

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Memory Utility Functions

Catalog	CATALOG
Display Mode	DSPMODE
Dispose	DISPOSE
Erase Memory	ERASE
Format	FORMAT
Limit Line: Recall	LIMIRCL
Limit Line: Save	LIMISAV
Load	LOAD
Mass Storage Interface	MSI
Memory	MEM
Number of State Registers	NSTATE
Partial Erase	PERASE
Prefix	PREFX
Protect	PROTECT
Protect State	PSTATE
Purge File	PURGE
Recall "Down-Loadable" Programs (DLP)	RCLD
Recall State	RCLS
Recall Trace	RCLT
Recall User Keys	RCLU
Return Display-Mode Text	DSPTEXT
Save "Down-Loadable" Programs (DLP)	SAVED
Save State	SAVES
Save User Keys	SAVEU
Store File	STORE
Store Trace	SAVET
User State	USTATE

Polarization Dependent Loss (PDL) Functions (Option 003 only)

PDL: Auto-scale During Measurement	PDLSCALE
PDL: Calculate and Display PDL	PDLCALC
PDL: Display Revision Number	PDLREV
PDL: Initialize Measurement	PDLINIT
PDL: Light Source On/Off	PDLSRC
PDL: Query Detector Type	PDL_DEV?
PDL: Return Light Source Status	PDL_SRC?
PDL: Return Revision Number	PDL_REV?
PDL: Select Detector Type	PDLDEV
PDL: Start Measurement	PDL_
PDL: Terminate PDL Program	PDLEXIT

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Program-Control and Interrupt Functions

Abort	ABORT
Clear Status Byte	CLS
Debug	DEBUG
Done	DONE
Enter Via HP-IB	ENTER
If/Then/Elsif/Else/Endif	IF/THEN
On Marker Pause	ONMKR
On Menu Keypress	ONMENU
On User Keypress	ONUSER
On Window Recreation	ONWINDOW
Output Via HP-IB	OUTPUT
Pause	PAUSE
Release HP-IB	RELHPIB
Repeat/Until	REPEAT/UNTIL
Request Service Conditions	RQS
Return	RETURN
Service Request	SRQ
Status Byte	STB
Take Sweep	TS
Time Stamp	TIME
Wait	WAIT

Signal-Path Functions

Activate Transimpedance Input	XAMPSW
Continuous Sweep	CONTS
Optical Switch	OPTSW

Sweep and Trigger Functions

Select ADC trigger	ADCTRG
Delays ADC trigger	ADCTRGDLY
Sets ADC SYNC OUT status	ADCTRGSYN
Fetch	FETCH
Single Sweep	SNGLS
Sweep Control	SWEEP
Sweep Time	ST
Take Sweep	TS
Time-Gated Measurements	GATESWP
Trigger Mode	TM
Video Trigger Hysteresis	VTH
Video Trigger Level	VTL

Stimulus Response Measurements

Normaliation	NORM
Select optical input	SRINPUT

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Trace Data Input and Output

Fetch	FETCH
Load	LOAD
Measurement Data Size	MDS
Recall Trace	RCLT
Store File	STOR
Store Trace	SAVET
Take Sweep	TS
Trace Data Format	TDF
Trace Data Input and Output	TRA/TRB/TRC

Stimulus Response and Source Functions

A – B → A	AMB
A – C → A	AMC
Measure Mode	MEASURE
Store Reference	STORREF

User-Definition Functions

Active Function	ACTDEF
Active Parameter	ACTPARM
Clear User-Defined Keys	KEYCLR
Define Function	FUNCDEF
Define User-Defined Key	KEYDEF
Define User-Defined Variable	VARDEF
Define User Key Menus	USERKEY
Display Mode	DSPMODE
Load	LOAD
Memory	MEM
On-End-Of-Sweep	ONEOS
On Marker Pause	ONMKR
On Menu Keypress	ONMENU
On User Keypress	ONUSER
On Window Recreation	ONWINDOW
Prefix	PREFX
Preset User-Defined Keys	KEYPST
Readmenu	READMENU
Store File	STOR
Trace Define	TRDEF
User Error Report	USERERR
User-Key Lock	USERLOCK
User Message	USERMSG
User State	USTATE

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Wavelength Functions

Automatic Measurement	AUTOMEAS
Automatic Measurement of Final Span	AUTOMSP
Automatic Measurement sensitivity control	AUTOMOPT
Center Wavelength	CENTERWL
Center-Wavelength Step Size	SS
Convert Trace Position to Wavelength	WLUNITS
Diffraction Grating Order	GRATORDER
Full Span	FS
Limit Line: Wavelength	LIMIWL
Marker Bandwidth	MKBW
Marker Bandwidth Amplitude	MKBWA
Marker to Center Wavelength	MKCWL
Marker Tune	MKTUNE
Marker Wavelength	MKWL
Start Wavelength	STARTWL
Stop Wavelength	STOPWL
Wavelength Offset	WLOFFSET
Wavelength Span	SP
Wavelength Limit Range	WLLIMIT

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ABORT;
Stops execution of a user-defined function and returns control to the normal command input level.

ABS_<destination>,<source>;
Does a point-by-point absolute value of the source variable or trace and stores the result in the destination variable or trace.

ACTDEF_<function name>,<delimiter><text for active function readout> <delimiter>,<initial value>,(<wavelength unit>|ABSM|S|DBM|W|A|INT|STEP| <units>)<delimiter><user-defined function routine> {<user-defined function routine>}<delimiter>,<number>;
Stores a user-defined function, in internal memory, that operates like an active function.

ACTPARM(_(1|0))|[<line number>]?;
Turns the display of the active parameter area on or off.
<line number> ::= 0, 1, 2, 3, 4
Query response: <character string>

ADAPBTL(_(OFF|ON|0|1))|?;
Divide the display line by the sum of traces A and B and then multiply the result by trace A (A * DL / (A + B)).

ADAPBPCTL(_(OFF|ON|0|1))|?;
Divide the display line by the sum of traces A, B, and C and then multiply the result by trace A (A * DL / (A + B + C)).

ADBTL(_(OFF|ON|0|1))|?;
Multiply trace A by the display line value, then divide by trace B.

ADCTL(_(OFF|ON|0|1))|?;
Multiply trace A by the display line value, then divide by trace C.

ADCTRG (_(FREE|POSEDGE|NEGEDGE|AC))|?;
Selects the source of the ADC trigger.
Query response: FREE|POSEDGE|NEGEDGE|AC

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ADCTRGDLY(_(<number>[<seconds>]|_(EP|OA|DN|UP|AUTO|MAN))|?;
Delays ADC triggering.
Query response: <number>

ADCTRGSYN(_(AUTO|ON|OFF))|?;
Sets status of ADC SYNC OUT during active (non-free) ADC trigger modes.
Query response: AUTO | ON | OFF

ADD_<destination>,<source 1>,<source 2>;
Adds the sources and sends their sum to the destination.

ALIGN (_(AUTOPTS|MANUAL|WHITE))|?;
Adjusts fiber-positioner tracking table.
Query response: AUTOPTS|MANUAL|WHITE)

ALIGNPRST;
Sets the monochromator's alignment to the factory calibration values.

AMB(_(OFF|ON|0|1))|?;
Subtract trace B from trace A with each sweep.
Query response: 0|1

AMBMC(_(OFF|ON|0|1))|?;
Subtract both trace B and trace C from trace A (A-(B+C)).

AMBMCPL(_(OFF|ON|0|1))|?;
Subtract both trace B and trace C from trace A, then add the display line ((A-(B+C))+DL).

AMBPL(_(OFF|ON|0|1))|?;
Subtracts trace B from trace A, adds the display line value to the difference, and sends the result to trace A.
Query response: 0|1

AMC(_(OFF|ON|0|1))|?;
Subtracts trace C from trace A and sends the result to trace A.
Query response: 0|1

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AMCPL(_(OFF|ON|0|1))|?;
Subtract trace C from trace A, then add the display line ((A-C)+DL).

AMETER(_(OFF|ON|0|1))|?;
Enables a readout of the amplitude of the blank-ahead marker in the display's message area.
Query response: <number>

AMPCOR(_(<wavelength>[<wavelength unit>],<amplitude>[DB] {,<wavelength>[<wavelength unit>],<amplitude>[DB]}|OFF|ON))|?;
Applies amplitude-correction data at specified wavelengths.
Query response: <wavelength>,<amplitude> {L_F<wavelength>, <amplitude>}

AMPMKR_<number>(X|DB);
Positions the left and right power integration points to the value specified on either side of the peak.
May only be used with the LED_ downloadable command.

AMPU_<source>[,<reference trace>]|?;
Converts source value from measurement units to amplitude units based on the trace condition of the reference trace.
<source> ::= <number>[<amplitude unit>]|<predefined variable>| <user-defined variable>|predefined function>|<trace element>
<reference trace> ::= TRA|TRB|TRC|<user-defined trace>
Query response: <number>

ANNOFF;
Turns off all display annotation.

ANNOT(_(OFF|ON|0|1))|?;
Turns the display annotation on or off. IP turns on the annotation.
Query response: 0|1

APB;
Adds traces A and B, then sends the result to trace A.

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APBDCTL(_(OFF|ON|0|1))|?;
(A+B) * DL / C)

AUNITS(_(AUTO|MAN|DBM|W))|?;
Specifies the amplitude units for input, output, and display.
Query response: DBM|W

AUTOALIGN;
Automatically realigns the output fiber of the optical spectrum analyzer's monochromator with the output beam.

AUTOMDB(_(<number>[DB]|DN|UP|EP|AUTO|MAN))|?;
Sets vertical scale after the automatic measurement procedure.
Query response: <number>

AUTOMEAS;
Automatically zoom in on largest signal at optical spectrum analyzer's input.

AUTOMMKR(_(OFF|ON|0|1))|?;
Causes the automatic measurement routine to locate the closest signal to the current marker.
Query response: 0|1

AUTOMOPT(_(OFF|ON|0|1))|?;
Control sensitivity optimization during the automeasure routine.

AUTOMSP(_(<number>[<wavelength unit>]|DN|UP|EP|AUTO|MAN))|?;
Determines the final wavelength span set by the automatic measurement routine.
Query response: <number>

AUTORNG(_(OFF|ON|0|1))|?;
Determines whether automatic ranging is enabled (1) or disabled (0).
Query response: 0|1

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AVG_<destination>,<source>,<average ratio>;
Computes the average value of the source and the destination and places the value in the destination using the following:

$$new\ destination = \frac{(average\ ratio - 1)\,(old\ destination + source)}{average\ ratio}$$

<average ratio> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>

AXB;
Exchanges contents of trace A and trace B.

AXC;
Exchange contents of trace A and trace C.

BIT_<destination>,<source>,<bit number>;
Returns the specified bit of the source as a 0 or 1 in the destination.
<bit number> ::= <source>

BLANK_(TRA|TRB|TRC);
Stores and blanks the specified trace.

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

BP;
Send the "beep" command to the display.

BTC;
Transfers contents of trace B to trace C.

BXC;
Exchanges contents of trace B and trace C.

CAL_(ALL|WL|PWR);
Executes error-correction routines which calculate and apply offset values that compensate for instrument anomalies.

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CALCOR_(ALL|WL|PWR),(0|1|OFF|ON|?);
Enables or disables correction factors computed by the CAL command.
Query response: 0|1

CALDATA_(FIRST|SECOND)?;
Queries the optical spectrum analyzer for the factory supplied calibration data for the first or second grating order. The calibration data returned is determined by the INSTMODE setting.
Query response: <wavelength>,<amplitude>

CALPWR(_(<number>[DBM|<power unit>]|DN|UP|EP))|?;
Specifies the power of the calibration reference used by the CAL command.
Query response: <number>

CALWL(_(<number>[<wavelength unit>]|DN|UP|EP))|?;
Specifies wavelength used by calibration routine.
Query response: <number>

CATALOG?;
Returns the catalog in a condensed format.
Query response: <character string>{L_F<character string>}

CENTERWL(_(<number>[<wavelength unit>]|DN|UP|EP))|?;
Sets the center wavelength of measurement range.
Query response: <number>

CHEIGHT?;
Computes and returns the character height as a percentage of the window height.
Query response: <number>

CHOP(_(OFF|ON|0|1))|?;
The CHOP command enables the chop mode for sweeps greater than 40 seconds.
Query response: 0|1

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CLRDSP;
Removes all optical spectrum analyzer graphics from the display and its memory.

CLRW_(TRA|TRB|TRC);
Clear-writes the specified trace.

CLS;
Sets all bits in the status-byte register to 0.

COMPRESS_<trace destination>,<trace source>,(AVG|POS|SMP);
Stores a compressed copy of the source trace in a smaller destination trace according to the specified compression algorithm.
<trace destination> ::= <trace source> ::= TRA|TRB|TRC|<user-defined trace>|<trace range>

CONCAT_<trace destination>,<source 1>,<source 2>;
Concatenates source 2 to the end of source 1, then stores the new array in the destination.
<trace destination> ::= TRA|TRB|TRC|<user-defined trace>|<trace range>

CONFIG?;
Returns a series of ASCII strings, separated by carriage returns, indicating module model numbers and their corresponding MSIB addresses.
Query response: <character string>

CONTS;
Selects continuous sweep mode. Selected with IP.

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CORSEL(_(0|1|2|3))|?;
Selects which flatness correction table will be applied to the measurement data.
0 ::= Applies both diode and grating flatness correction tables.
1 ::= Applies only diode flatness correction table.
2 ::= Applies only grating flatness correction table.
3 ::= Applies no flatness correction tables.
Query response: 0|1|2|3

CORTOLIM_(UPPER|LOWER);
Transfers AMPCOR data to the specified limit line.

CWIDTH?;
Computes and returns the character width as a percentage of the window width.
Query response: <number>

DEBUG(_(OFF|ON|FAST|SLOW|0|1))|?;
Is a troubleshooting aid for locating faulty syntax in optical spectrum analyzer programs.
Query response: OFF|FAST|SLOW

DELETE;
Deletes currently selected graphics item from display and memory.

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DFB_[_(?|B|C|O|Q|Z)];
Starts the DFB_ (distributed-feedback) laser characterization measurement downloadable program.
Query response: <peak wavelength>,<wavelength offset>,<stop band>,<center offset>,<side mode suppression ratio (SMSR)>,<peak amplitude>,<bandwidth>,<bandwidth amplitude>

Note When using the DFB_ command, the first underscore (_) must be inserted as an underscore. The first underscore does not represent a space when using this command. The underscore is followed by either a space and your choice from the list of elements or by just a semicolon (;) if you do not make a choice from the list of elements.

DISPOSE_(<user-defined function>|<user-defined trace>|<user-defined variable>|ONEOS|AMP_COR|<number>|<delimiter><character string> <delimiter>|<character string>|ALL);
Clears all or part of internal memory, which is reserved for operator use.

DISPU_<number>;
Disposes of user menus.

DIV_<destination>,<source 1>,<source 2>;
Divides source 1 by source 2, then sends the result to the destination.

DL(_(<number>[DBM|DB|W|MW|US|NW|PW]|DN|UP|OFF|ON|EP))|?;
Controls the display and level of the display line. Default units are dBm.
Query response: <number>

DONE?;
Returns a 1 to the controller when all commands encountered before the DONE command have executed.
Query response: <number>

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DSPLY_<display variable>,<field width>,<decimal places>;
Displays the current value of a variable on the CRT at the current position of the graphics pen.
<display variable> ::= <field width> ::= <decimal places> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>

DSPMODE(_(CAT|CONFIG|EXTEND|NORMAL|PAGE|STATE))|?;
Displays catalog of user-memory contents by listing descriptions of system or module configurations on the display.
Query response: CAT|CONFIG|EXTEND|NORMAL|STATE

DSPTEXT_(CAT|CONFIG|EXTEND|STATE)?;
Returns system-level or module-level information according to the display mode specified.
Query response: <character string>

DWINDOW_(ON|OFF)|(<x length>,<y length>,(<x min>,<x max>,
<y min>,<y max>)|<reference trace>);
Defines an alternate scale for graphics that repositions, magnifies, or reduces graphics on the analyzer display.
<x length> ::= <y length> ::= <x min> ::= <x max> ::= <y min> ::= <y max> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>
<reference trace> ::= TRA|TRB|TRC|<user-defined trace>

ENTER_<HP-IB address>,(K|B|W),<destination>;
Establishes the analyzer as a controller on HP-IB.
<HP-IB address> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>
<destination> ::= <trace element>|<predefined variable>|<user-defined variable>

ERASE;
Erases all memory including any items protected by the PSTATE or PROTECT command.

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ERR?;
Returns numeric codes that describe the nature of any reported errors.
Query response: <number>{,<number>}

EXP_<destination>,<source>,<scaling factor>;
Divides source by scaling factor, raises this quotient by a power of 10, then sends the result to the destination.
<scaling factor> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>

FETCH?;
Returns the contents of trace data to the controller.
Query response: <data byte>

FFT_<destination>,<source>,<window>;
Performs a discrete fast fourier transform on the source trace and stores the log of the magnitude of the result in the destination trace. Before executing FFT, a trace window must be defined with the TWNDOW command.
<destination> ::= <source> ::= <window> ::= TRA|TRB|TRC|<user-defined trace>

FFTKNL_<real trace>,<imaginary trace>;
Performs a 16-bit discrete fourier transform on two traces of equal length, overlaying them with the results. The resulting traces represent the real and imaginary components of one complex trace. Scaling, clipping, and so on, must be done by user.
<real trace> ::= <imaginary trace> ::= TRA|TRB|TRC|<user-defined trace>

FORMAT;
Formats and erases the currently selected memory device.

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FP_[_(?|B|C|G|K|L|O|Q)];
Starts the FP_ (Fabry-Perot) laser characterization measurement downloadable program.
Query response: <peak wavelength>,<mean wavelength>,<mode spacing (M)>,<mode spacing (Hz)>,<full-width, half-maximum (FWHM)>,<peak amplitude>,<total power>,<sigma>

Note When using the FP_ command, the first underscore (_) must be inserted as an underscore. The first underscore does not represent a space when using this command. The underscore is followed by either a space and your choice from the list of elements or by just a semicolon (;) if you do not make a choice from the list of elements.

FP_MKBW(_(<number>[DB|X]|DN|UP|EP))|?;
Sets the Fabry-Perot laser envelope bandwidth amplitude.
Query response: <number>

FP_TH(_(<number>[DB|X]|DN|UP|EP))|?;
Sets or queries the Fabry-Perot laser threshold amplitude. All signals above the threshold are used in the calculations.
May only be used with the FP_ downloadable command.
Query response: <number>

Note When using the FP_TH command, the underscore (_) between FP and TH must be inserted as an underscore. The underscore does not represent a space when using this command. The FP_TH commnad is followed by either a space and your choice from the list of elements, a question mark (?), or by just a semicolon (;) if you do not make a choice from the list of elements.

FS;
Activates the widest measurement range allowed by hardware, setting start and stop wavelengths to their minimum and maximum values.

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FUNCDEF_<user-defined function name>,((<string data field>|<A-block data field>);|<I-block data field>)
Defines a list of analyzer commands that are executed whenever a user-defined function is encountered.
Query: <user-defined function name>?;
Query response: #A<msb length><lsb length><data byte[s]>

GATESWP(_(OFF|ON|0|1))|?;
Enables time-gated measurements.
Query response: 0|1

GRAPH_(TRA|TRB|TRC|<user-defined trace>);
Displays stored trace data, resized to a different scale.

GRAT(_(OFF|ON|0|1))|?;
Turns the graticule on or off. IP turns on the graticule.
Query response: 0|1

GRATORDER(_(AUTO|MAN))|?;
Selects reflection order of optical spectrum analyzer's internal diffraction grating.
MAN mode locks the optical spectrum analyzer into first-order defraction grating.
AUTO mode allows either first-order or second-order defraction grating.
Query returns a response indication of whether the optical spectrum analyzer is using first-order or second-order defraction grating.
Query response: 1|2

GRATSCRL(_(OFF|ON|0|1))|?;
Controls the positioning of the displayed horizontal graticule lines.

GRID_<x dimension>,<y dimension>,<#x boxes>,<#y boxes>;
Draws a grid with the dimensions and # of boxes as indicated and has its origin placed as specified by the OR command.
<x dimension> ::= <y dimension> ::= <#x boxes> ::= <#y boxes> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>

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HD;
Blanks the active function readout and disables data entry. Selected with IP.

ID?;
Returns the model number of the system master (control module).
Query response: HP70950B|HP70951B|HP70952B

IF_<operand 1>,(LT|GT|LE|GE|EQ|NE),<operand 2>;
THEN;[<command list>
[(**ELSE**;[<command list>]|**ELSIF**<IF/THEN syntax>)]]**ENDIF**;
Compares operand 1 to operand 2. If the condition is true, the command list is executed. Otherwise, commands following the next ELSE or ENDIF statements are executed.
<operand 1> ::= <operand 2> ::= <number>|<predefined variable>| <user-defined variable>|<predefined function>|<trace element>
<IF/THEN syntax> ::= (_<operand 1>,(LT|GT|LE|GE|EQ|NE),
<operand 2>;THEN;[<command list>)

IGEN(_(<number>[A|MA|UA]|OFF|ON|DN|UP))|?;
Turns on and sets the current source. This command is valid only if the current-generator, option 001 is installed.
The current source range is limited to the ±200 mA or the value set by the command IGENLIMIT, which ever absolute value is less.
Query response: <number>

IGENDTYCY(_(DN|UP|<percentage>))|?;
Sets the duty cycle of the current generator's pulse mode. This command is valid only if the current-generator, option 001 is installed.
Query response: <number>

IGENLIMIT(_(<number>[A|MA|UA]|DN|UP))|?;
Sets safety limit on current source's output. This command is valid only if the current-generator, option 001 is installed.
Query response: <number>

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IGENPW(_(<number>[S|MS|US]|DN|UP|EP))|?;
Sets the pulse width of the current generator's pulse mode. This command is valid only if the current-generator, option 001 is installed.
Query response: <number>

INSTMODE(_(OSA|PWRMTR|PRESEL|SR|PD|PULSE))|?;
Selects an optical spectrum analyzer measurement mode.
Query response: OSA|PWRMTR|PRESEL|SR|PD|PULSE

INT_<destination>,<source>;
Calculates the largest integer which is less than the source in the destination.

IP;
Perform an instrument preset which sets all functions to their preset state.

IT(_(<item number>))|?;
Assigns a number to a series of graphics commands for future recall or modification.
<item number> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>
Query response: <number>

IWINDOW_<x length>,<y length>;
Varies the size of the graticule and measurement results on the display. Size is specified in the current scale units (SCALE).
<x length> ::= <y length> ::= <number>|<predefined variable>| <user-defined variable>|<predefined function>|<trace element>

KEYCLR;
Blanks the user-defined ((USER)) keys.

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KEYDEF_<key number>,<key function>(,<delimiter><character string> <delimiter>|?);
Assigns a label and user-defined function to a (USER) key.
<key number> ::= <number>|<trace element>|<operand>|<predefined variable>|<user-defined variable>
<key function> ::= <user-defined function>|<analyzer command>
Query response: <user-defined function>

KEYPST;
Presets the user-defined keys to their initial command set.

LED_[_(?|B|C|K|L|O|Q)];
Start the LED_ (light-emitting diode) laser characterization measurement downloadable program.
Query response: <mean wavelength>,<peak wavelength from −3 dB points>,<peak wavelength>,<sigma>,<full-width, half-maximum (FWHM)>,<width at −3 dB points>,<total power>,<peak spectral purity>

Note When using the LED_ command, the first underscore (_) must be inserted as an underscore. The first underscore does not represent a space when using this command. The underscore is followed by either a space and your choice from the list of elements or by just a semicolon (;) if you do not make a choice from the list of elements.

LG[_(<number>[DB]|EP|DN|UP)|?];
Specifies the vertical graticule divisions as logarithmic units without changing the reference level. Default units are dB. 10 dB per division is selected with IP.
Query response: <number>

LIGHT_WHITE(_(OFF|ON|0|1))|?;
Turns on or off the internal white light source.
Query response: 0|1

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LIMIAMP(_(<number>[DBM|<power unit>]|EP|DN|UP))|?;
Sets the limit-line segment amplitude.
Query response: <number>

LIMIBEEP(_(OFF|ON|0|1))|?;
Sounds a beep when trace data exceeds limit-line test limits.
Query response: 0|1

LIMIBOT[?];
Activates the last segment of the limit-line table.
Query response: <number>

LIMIDEL;
Erases the entire contents of the limit-line table.

LIMIDONE;
Turns off the limit-line editor which removes the limit-line table and editing softkeys from the display.

LIMIEDIT;
Turns on the limit-line editor.

LIMIFAIL?;
Returns the limit-line test results as numbers.
Query response: 0|1|2|3
0 ::= Does not exceed test limits.
1 ::= Exceeds the lower test limit.
2 ::= Exceeds the upper test limit.
3 ::= Exceeds both upper and lower test limits.

LIMIHALF(_(UPPER|LOWER))|?;
Selects either the upper or lower limit line for modification or creation.
Query response: UPPER|LOWER

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LIMILINE(_<number>)|?;
Returns the current limit-line parameters for future recall or build a new limit line.
Query response: <character string> consisting of LIMILINE, LIMIREL, LIMIHALF, and LIMISEG commands, which restore the limit-line table.

LIMINEXT;
Activates the next limit-line segment.

LIMIRCL_(<number>|<predefined variable>|<user-defined variable>| <predefined function>|<trace element>);
Recalls limit lines that have been previously stored by LIMISAV.

LIMIREL(_(OFF|ON|0|1))|?;
Determines whether limit line values are absolute or relative referenced to the reference-level and center-wavelength settings.
Query response: 0|1

LIMISAV_(<number>|<predefined variable>|<user-defined variable>| <predefined function>|<trace element>);
Saves the contents of a limit-line table in user memory.

LIMISCRL(_<number>)|?;
Scrolls the active limit-line segment from the current active segment.
Query response: <number>

LIMISDEL;
Deletes the currently active limit-line segment.

LIMISEG_<wavelength>,<amplitude>,(SLOPE|FLAT|POINT);
Specifies the characteristics of a limit line that is stored in the limit-line table.
<wavelength> ::= <amplitude> ::= <number>|<predefined variable>| <user-defined variable>|predefined function>|<trace element>

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LIMITEST(_(OFF|ON|0|1))|?;
Compares active trace data to limit-line parameters.
Query response: 0|1

LIMITYPE(_(SLOPE|FLAT|POINT))|?;
Specifies the limit-line segment type.
Query response: SLOPE|FLAT|POINT|NA

LIMIWL(_(<number><wavelength unit>|DN|UP))|?;
Sets the wavelength of the currently active limit-line segment.
Query response: <number>

LIMTOCOR_(UPPER|LOWER);
Transfers limit-line data to amplitude-correction data.

LINES(_(ON|OFF|0|1))|?;
Connects lines between displayed trace points.
Query response: 0|1

LINET[_(<number>|<predefined variable>|<user-defined variable>| <predefined function>|<trace element>];
Sets the line type used for plots, traces, and graticules. If the parameter is omitted, the line type is set to continuous.

LN[_(V|W)|?];
Activates the linear display mode.
Query response: V|W

LOAD_<delimiter><character string><delimiter>[,(TRA|TRB|TRC| <user-defined trace>)];
Loads into internal memory any ASCII file that consists of optical spectrum analyzer commands.

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LOG_<destination>,<source>,<scaling factor>;
Computes the logarithm of the source, multiplies it by the scaling factor, then stores the result in the destination.
<scaling factor> ::= <number>|<predefined variable>|user-defined variable>|predefined function>|<trace element>

MDS(_(B_<scaling factor>)|W))|?;
Sets the measurement data size for binary output trace data (TDF B, I, or A) to either BYTE (B) or WORD (W).
<scaling factor> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>
Query response: <number>

MEAN(TRA|TRB|TRC|<user-defined trace>|<trace range>)?;
Calculates the mean value of the source.
Query response: <number>

MEASU_<source trace>[,<reference trace>]?;
Converts parameter-unit values to measurement-unit values based on the trace conditions of the reference trace.
<source trace> ::= <number>[DBM|DB|<power unit>]|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>
<reference trace> ::= TRA|TRB|TRC|<user-defined trace>
Query response: <number>

MEASURE(_(SA|SR|SRMILCPL))|?;
Selects the measurement mode of either spectrum analysis or stimulus response.
Query response: SA|SR|SRMILCPL

MEM?;
Returns the amount of allocatable memory available in bytes.
Query response: <number>

MIN_<destination>,<source 1>,<source 2>;
Compares source 1 and source 2, point by point, and sends the lesser value of each comparison to the destination.

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MINH_(TRA|TRB|TRC);
Updates each trace element with the minimum level detected.

MK_<x coordinate>,<y coordinate>;
Places a marker at the specified coordinates which are either in the current scaling units or in display window units.
<x coordinate> ::= <y coordinate> ::= <number>|<predefined variable>|<user-defined variable>|predefined function>|<trace element>

MKA(_<number[DB|DBM|<power unit>])|?;
Specifies the amplitude of the active marker.
Query response: <number>

MKACT(_(<number>|EP|DN|UP))|?;
Selects one of five markers as the active marker.
Query response: <number>

MKAL(_(<number>[X|DB]|EP|DN|UP))|?;
Activates marker #2 and positions it on a trace relative to the amplitude of marker #1.
Query response: <number>

MKAR(_(<number>[X|DB]|EP|DN|UP))|?;
Activates marker #3 and positions it on a trace relative to the amplitude of marker #1.
Query response: <number>

MKBW(_(ON|OFF))|?;
Displays the wavelength difference between markers #2 and #3, even if the markers are not displayed.
Query response: <number>

MKBWA(_(<number>DB|<number>|OFF|ON|DN|UP))|?;
Displays a signal's bandwidth at a user-specified amplitude below the signal's peak.
Query response: <number>

MKCONT;
Enables the sweep to continue past the marker.

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MKCWL;
Sets center wavelength equal to wavelength at the marker.

MKD[_(<number>[<wavelength unit>|<time unit>]|EP|DN|UP)];
Positions a marker relative to the reference marker, according to wavelength.

MKDACT?;
Report which marker is the currently active delta marker.

MKDREFA(_(X|DB|DBM|W|MW|UW|DM))|?;
Specifies the general reference marker's amplitude.

MKDREFF(_<number>[(M|MM|UM|NM|PM|ANG|S|MS|US|SC)]|
|?);
Set the general reference marker to a specific wavelength (or time if in zero span).

MKMIN;
Moves the active marker to the minimum value detected.

MKN[(_(<number>[<wavelength unit>|<time
unit>]|EP|DN|UP))|?];
Places the active marker at the specified wavelength.
Query response: <number>

MKNOISE(_(OFF|ON|0|1))|?;
Displays or returns the noise level at the displayed, active marker.
Query response: 0|1

MKOFF[_ALL];
Turns off all markers, or the active marker.

MKP(_(<number>|<predefined variable>|<user-defined variable>|
<predefined function>|<trace element>))|?;
Specifies the horizontal position of the active marker, in position units.
Query response: <number>

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MKPABS_<number>;
Sets the current active delta marker to the bucket requested.

MKPAUSE(_(<number>[<time unit>]|EP|DN|UP|ON|OFF))|?;
Pauses the sweep at the active marker for the specified length of time.
Query response: <number>

MKPITX(_<number>[DB]|_(EP|OA|DN|UP))|?;
Control the excursion value for marker pit operations.

MKPK[_(CP|CPIT|HI|HIP|MI|MIPIT|NH|NHPIT|NL|NLPIT|NM|NMPIT|NR|NRPIT)];
Position active marker at a peak (or pit) on the trace.

MKPX(_(<number>[DB]|EP|DN|UP))|?;
Specifies the minimum signal excursion for signal identification and the marker-peak functions.
Query response: <number>

MKREAD(_(FRQ|WLN|PER|SWT|IST|AUTO))|?;
Selects the type of active trace information displayed by the marker readout and queried with the MKWL?, the MKT?, and the MKA? queries.
Query response: WLN|PER|SWT|IST

MKRL;
Sets the reference level equal to the absolute amplitude of the displayed active marker.

MKSP;
Sets the span equal to the wavelength difference of the markers.

MKSS;
Sets the center-wavelength step size equal to the wavelength difference between the delta markers.

MKSTOP;
Ends the sweep at the current active marker.

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MKT(_(<number>[<time unit>]|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>))|?;
Positions marker in units of time.
Query response: <number>

MKTRACE(_(TRA|TRB|TRC))|?;
Moves the displayed, active marker to a corresponding position on the specified trace.
Query response: TRA|TRB|TRC

MKTRACK(_(OFF|ON|0|1))|?;
Maintains the marked signal at center wavelength during changes in wavelength span.
Query response: 0|1

MKTUNE(_(<number><wavelength unit>|DN|UP))|?;
Fix tunes the optical spectrum analyzer to a specified wavelength. If INSTMODE is not set to PRESEL, MKTUNE generates an error message. This command is valid only for the HP 71451B (or the HP 70951B).
Query response: <number>

MKTV(_(<number>[DB]|EP|DN|UP))|?;
Specifies the amplitude variance monitored by the marker-tracking function.
Query response: <number>

MKTYPE?;
Returns the current type of active marker.
Query response: AMPR|AMPL|DELTA|PSN

MKWL(_(<number>[<wavelength unit>]|DN|UP))|?;
Position active marker to the specified wavelength, or return the marker wavelength.
Query response: <number>

MOD_<destination>,<source 1>,<source 2>;
Divides source 1 by source 2 and places the remainder in the destination.

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MODADD[_<module reference number>[,ROW|,COLUMN]]?;
Returns the HP-MSIB address of the specified module.
<module reference number> ::= <number>|<predefined variable>| <user-defined variable>|<predefined function>|<trace element>
Query response: <number> or <row>,<column>

MODID_<row>,<column>?;
Identifies the module or instrument located at the specified HP-MSIB address.
<row> ::= <column> ::= <number>|<predefined variable>| <user-defined variable>|<predefined function>|<trace element>
Query response: <number>

MOV_<destination>,<source>;
Moves the contents of the source to the destination.

MPY_<destination>,<source 1>,<source 2>;
Multiplies source 1 and source 2, point by point, then stores the result in the destination.

MSG?;
Returns the characters shown in the message area on the optical spectrum analyzer display, including the UNCAL and UNCOR messages if they are displayed.
Query response: (0|1),(0|1),#A<msb length><lsb length><data byte[s]>

MSI(_(INT|HPIB[,<HP-IB address>[.[<drive unit>[<volume>]]]]|
MSIB[,<number>]))|?;
Selects the user-memory location for storing files.
<HP-IB address> ::= <drive unit> ::= <volume> ::= <digit>
Query response: INT|MSIB,<number>|HPIB,<number>

MXM_<destination>,<source 1>,<source 2>;
Compares source 1 and source 2, point by point, and sends the greater value of each comparison to the destination.

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MXMH_(TRA|TRB|TRC);
Updates each trace element with the maximum level detected.

NORM(_(OFF|ON|0|1))|?;
Controls trace normalization for stimulus-response measurement.

NSTATE(_(<number>|EP|DN|UP))|?;
Sets the number of state register files available for information storage.
Query response: <number>

ONEOS(_(OFF|ON|0|1))|<string data field>|<A-block data field>|?;|
<I-block data field>
Executes the specified command(s) at the end of every sweep.
Query response: <A-block data format>

ONMENU(_(OFF|ON|0|1))|<string data field>|<A-block data field>|?;|
<I-block data field>
Defines the list of functions executed when the (MENU) key is pressed.
Query response: <A-block data format>

ONMKR(_(OFF|ON|0|1))|<string data field>|<A-block data field>|?;|
<I-block data field>
Defines the list of functions executed when the sweep reaches the pause marker.
Query response: <A-block data format>

ONUSER(_(OFF|ON|0|1))|<string data field>|<A-block data field>|?;|
<I-block data field>
Defines the list of functions executed when the (USER) key is pressed.
Query response: <A-block data format>

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ONWINDOW(_(OFF|ON|0|1))|<string data field>|<A-block data field>|?;|
<I-block data field>
Defines the list of functions executed when the display window is recreated.
Query response: <A-block data format>

OP?;
Returns the values of P_1 and P_2 for the current instrument window scale.
Query response: <p1x>,<p1y>,<p2x>,<p2y>

OPTSW(_(INT|EXT))|?;
Activates (EXT) or deactivates (INT) the HP 70951A's front panel MONOCHROMATOR OUTPUT and PHOTODETECTOR INPUT ports. This command is valid only for the HP 71451B (or the HP 70951B).
Query response: INT|EXT

OR_<x offset>,<y offset>;
Offsets the position of graphics on the display relative to P_1, in the current scale units set.
<x offset> ::= <y offset> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>

OUTPUT_<HP-IB address>,(K|KC|KL|F<number>),((<string data field>| <A-block data field>|<predefined variable>|<user-defined variable>| <predefined function>|<trace element>);|<I-block data field>)
Establishes the optical spectrum analyzer as a controller on HP-IB. RELHPIB releases this capability. The data is output according to the specified format options (K, KC, KL, F).

OVRW_(TRA|TRB|TRC);
Enable clear-write mode, but skip the initial clear.

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PA[_(PD|PU)]_<x coordinate>,<y coordinate>{,[PD|PU]_
<x coordinate>,<y coordinate>};
Moves the graphics pen from its current position to the position specified. If the pen is down, a line is drawn on the display.
<x coordinate> ::= <y coordinate> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>

PAUSE;
Stops all processing of remote commands and activates the debug mode. Program operation resumes when the CONT softkey is pressed, the INSTR PRESET key is pressed, or the input buffer is cleared.

PD;
Places the graphics pen down.

PDA_<destination>,<source>,<resolution>;
Finds the probability density in amplitude of the specified source and sends the result to the destination.
<destination> ::= <source> ::= TRA|TRB|TRC|<user-defined trace>
<resolution> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>

PDL_;
Starts the PDL downloadable program and loads the related commands.

PDLCALC;
Performs calculation and displays polarization dependent loss.

PDLDEV;
Toggles between an optical or electrical receive device.

PDL_DEV?;
Returns the current status value of the receive device to be either internal (0) or external (1).
Query response: 0|1

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PDLEXIT;
Terminates the polarization dependent loss (PDL) measurement program.

PDLINIT;
Initializes the polarization dependent loss (PDL) measurement procedure.

PDLREV;
Displays the polarization dependent loss (PDL) measurement program revision number.

PDL_REV?;
Returns the polarization dependent loss (PDL) measurement program revision number.
Query response: <number>

PDLSCALE;
Automatically scales the displayed signal during a polarization dependent loss (PDL) measurement.

PDLSRC;
Toggles the internal white light source on and off.

PDL_SRC?;
Returns the light source status; 0 indicates off and 1 indicates on.
Query response: 0|1

PDMEAS(_(OFF|ON)[_(PD|PU)];
Measures the flatness of a photo diode under test. This command is only valid for the HP 71451A (or the HP 70951A).

PDWL(_(<destination trace>),(<source trace>));
Analyzes the distribution of detected signals according to wavelength.

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PEAKS_<destination>,<source>,(AMP|WLN)?;
Sorts signal peaks by wavelength or amplitude, stores the horizontal position of each peak in the destination, then computes the number of peaks found.
<destination> ::= <source> ::= TRA|TRB|TRC|<user-defined trace>| <trace range>
Query response: <number>

PEN_(<number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>);
Specifies the pen number that corresponds to a color.

PERASE;
Partially erases internal memory and optical spectrum analyzer settings. Does not erase settings or functions that have been protected using PROTECT.

PERSIST(_(<number>|EP|DN|UP|OFF|ON))|?;
Sets the number of previous traces to be simultaneously displayed onscreen.
Query response: <number>

PLOT[_<P_1X>,<P_1Y>,<P_2X>,<P_2Y>];
Plots the optical spectrum analyzer display on a plotter or printer.
<P_1X> ::= <P_1Y> ::= <P_2X> ::= <P_2Y> :: = <number>|<predefined variable>|<user-defined variable>|<predefined function>| <trace element>

POSU_<source>[,<reference trace>]?;
Converts wavelength or time values to position units based on the trace conditions of the reference trace.
<source> ::= <number>[DB|DBM|<power unit>]|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>
<reference trace> ::= TRA|TRB|TRC|<user-defined trace>
Query response: <number>

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POWERON(_(IP|LAST|RECALL))|?;
Determines the instrument state of the optical spectrum analyzer when power is applied.
Query response: IP|LAST

PR_[PD|PU]_<x coordinate>,<y coordinate>{,[PD|PU]_<x coordinate>,<y coordinate>};
Moves pen to coordinate relative to the current pen position.
<x coordinate> ::= <y coordinate> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>

PREFX<delimiter><character string><delimiter>;
Changes the file prefix that identifies user-memory entries.

PROTECT_(<user-defined function>|<user-defined trace>|<user-defined variable>|ONEOS|AMP_COR|<number>|<delimiter><character string> <delimiter>|<character string>|ALL),(OFF|ON|0|1|?);
Protects entire contents, selected values, or user-defined functions of internal memory against erasure, overwriting, or redefinition. This command is defeated by ERASE.
Query response: 0|1

PSTATE(_(OFF|ON|0|1))|?;
Protects state-register files from accidental erasure or overwriting by the STOR, NSTATE, or SAVES command.
Query response: 0|1

PU;
Lifts up the graphics pen.

PURGE(<delimiter><character string><delimiter>|<A-block data field>);| <I-block data field>
Erases files from internal or external memory, regardless of protection by the PSTATE and PROTECT commands.

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PWRBW_<source>,<percentage>?;
Computes the bandwidth that contains a percentage of the total measured power.
<source> ::= TRA|TRB|TRC|<user-defined trace>|<trace range>
<percentage> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>
Query response: <number>

RB(_(<number>[<wavelength unit>]|EP|DN|UP|MAN|AUTO))|?;
Sets the resolution bandwidth.
Query response: <number>

RBR(_(<number>|EP|DN|UP))|?;
Sets the ratio between the resolution bandwidth and span settings.
Query response: <number>

RCLD_(<number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>);
Recalls the contents of a program file from the currently selected mass storage device.

RCLS_(<number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>);
Recalls the contents of a state-register file from the selected mass storage device.

RCLT_(<number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>);
Recalls the contents of a trace file from the selected mass storage device.

RCLU_(<number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>);
Recalls the contents of a (USER) key file from the selected mass storage device, erasing the previous menu.

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READMENU_<user-defined variable>,<key number>,<key label>
{<key number>,<key label>};
Assigns a series of key labels to form a menu of keys that can be accessed with the (USER) key.
<key number> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>
<key label> ::= <delimiter><character string><delimiter>

RELHPIB;
Releases HP-IB control by the optical spectrum analyzer.

REPEAT;<command list>{<command list>}
UNTIL_(<number>[<units>]| <predefined variable>|<user-defined
variable>|<trace element>),
(LT|GT|LE|GE|EQ|NE),(<number>[<units>]|
<predefined variable>|<user-defined variable>|<trace element>);
Repeats a list of commands until the condition specified after the UNTIL command is satisfied.

RETURN;
Interrupts operation of the currently operating user-defined function, then returns to the point where the function was originally encountered.

REV?;
Returns the revision number of the local-oscillator firmware.
Query response: <number> in YYMMDD format

RL(_(<number>[DB|DBM|<power unit>]|EP|DN|UP))|?;
Sets the absolute amplitude value of the reference level.
Query response: <number>

RLPOS(_(<number>|EP|DN|UP))|?;
Sets the reference level position in terms of graticule units from top of screen (10 = top; 0 = bottom).
Query response: <number>

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RMS_(TRA|TRB|TRC|<user-defined trace>|<trace range>)?;
Computes the root-mean-square value of a trace, in measurement units.
Query response: <number>

ROFFSET(_(<number>[DB]|EP|DN|UP))|?;
Offsets all amplitude readouts on the display without affecting the trace data.
Query response: <number>

RQS(_(<number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>))|?;
Defines conditions that interrupt computer operation.
Query response: <number>

SAVED_(<number>|<predefined variable>|<user-defined variable>| <predefined function>|<trace element>);
Stores limit lines and user-defined functions, variables, keys, and traces in a file on the selected mass storage device.

SAVES_(<number>|<predefined variable>|<user-defined variable>| <predefined function>|<trace element>);
Saves the current optical spectrum analyzer state in the specified state-register file on the selected mass storage device.

SAVET_(<number>|<predefined variable>|<user-defined variable>| <predefined function>|<trace element>);
Stores the contents of trace A in a user-memory file on the selected mass storage device.

SAVEU_(<number>|<predefined variable>|<user-defined variable>| <predefined function>|<trace element>);
Stores the user-defined keys in a file on the selected mass storage device.

SCALE_<x min>,<x max>,<y min>,<y max>;
Scales the optical spectrum analyzer display for drawing graphics.
<x min> ::= <x max> ::= <y min> ::= <y max>
::= <number>| <predefined variable>|<user-defined variable>|<predefined function>| <trace element>

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SENS(_(<number>[<power unit>]|DN|UP|EP|AUTO|MAN))|?;
Selects the input sensitivity level.
Query response: <number>

SER(<delimiter><character string><delimiter>|<A-block data field>|?);| <I-block data field>
Returns or stores the serial number of the HP 70950A or the HP 70951A.
Query response: <A-block data format>

SMOOTH_<source>,<number of points>;
Smooths the amplitude level of a trace.
<source> ::= TRA|TRB|TRC|<user-defined trace>|<trace range>
<number of points> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>

SNGLS;
Selects single sweep mode.

SP(_(<number>[<wavelength unit>]|EP|DN|UP))|?;
Specifies the wavelength span. Default units are meters.
Query response: <number>

SQR_<destination>,<source>;
Computes the square root of the source and stores the result in the destination.

SRINPUT (_(DIODE|NORMAL))|?;
Select input for stimulus-response measurements.
Query response: DIODE|NORMAL

SRQ_(<number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>);
Sets bit(s) in the status-byte register to simulate a service request.

SS(_(<number>[<wavelength unit>]|EP|DN|UP|MAN|AUTO))|?;
Sets the center wavelength step size. Default units are meters.
Query response: <number>

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ST(_(<number>[<time unit>]|EP|DN|UP|MAN|AUTO))|?;
Specifies the rate that the optical spectrum analyzer sweeps the current measurement range. Default units are seconds.
Query response: <number>

STARTUP (_(AUTO|MAN))|?;
Controls the start up configuration operation of the optical spectrum analyzer.
Query response: AUTO|MAN|ONCE

STARTWL(_(<number>[<wavelength unit>]|DN|UP|EP))|?;
Sets the start wavelength of the measurement range.
Query response: <number>

STATE(#A<msb length><lsb length><data byte[s]>|?);
Transmit all instrument-state information to or from a computer.
Query response: #A<msb length><lsb length>STATE_#A <msb length><lsb length><data byte[s]>

STB?;
Returns the value of the status-byte register.
Query response: <number>

STDEV_(TRA|TRB|TRC|<user-defined trace>|<trace range>)?;
Returns the standard deviation of the specified trace amplitude in measurement units.
Query response: <number>

STOPWL(_(<number>[<wavelength unit>]|DN|UP|EP))|?;
Sets the stop wavelength of the measurement range.
Query response: <number>

STOR_((S|U|L),<file name>|D,<file name>[,(ONEOS|<user-defined function>|<user-defined variable>|<user-defined trace>|<character string>)]|T,<file name>,(TRA|TRB|TRC|<user-defined trace>));
<file name> ::= (<delimiter><character string><delimiter>|<character string>)

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STORREF_THRU;
Store through references for stimulus-response measurements. This command is valid only for the HP 71451B (or the HP 70951B).

SUB_<destination>,<source 1>,<source 2>;
Subtracts source 2 from source 1, point by point, then stores the result in the destination.

SUM_(TRA|TRB|TRC|<user-defined trace>|<trace range>)?;
Returns the sum of the trace amplitudes in measurement units.
Query response: <number>

SUMSQR_(TRA|TRB|TRC|<user-defined trace>|<trace range>)?;
Returns the sum of the square of the trace-point amplitudes in measurement units.
Query response: <number>

SWEEP(_(OFF|ON|0|1))|?;
Stops the optical spectrum analyzer from sweeping, immediately.
Query response: 0|1

SWPMODE?;
Return the current sweep mode.
Query response: CONTS|SNGLS)

TDF(_(A|B|I|M|P))|?;
Formats trace information for return to the controller.

A	represents an absolute block data field.
B	represents binary values in measurement units.
I	represents an indefinite block data field.
M	represents ASCII-decimal values in measurement units.
P	represents ASCII-decimal values in absolute units (for example, dBm, volts, and so on).

Query response: A|B|I|M|P

TEST;
Executes a self test of the instrument.

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TEXT(<delimiter><data byte[s]><delimiter>|<A-block data field>);| <I-block data field>
Writes text on the optical spectrum analyzer display.

TH(_(<number>[DB|DBM|<wavelength unit>]|EP|DN|UP|OFF|ON))|?;
Blanks signal responses below the specified threshold level. Default units are dBm.
Query response: <number>

THREED(_(<number>|OFF|ON|DN|UP|EP))|?;
Turns the three-dimensional trace display on or off.
Query response: <number>

THREEDH(_(<number>|DN|UP|EP))|?;
Select the horizontal offset of the three-dimensional trace display.
Query response: <number>

THREEDV(_(<number>|DN|UP|EP))|?;
Select the number of traces used in the three-dimensional trace display.
Query response: <number>

TIME(_(<number>[<time unit>]))|?;
Sets the clock that measures operating time.
Query response: <number>

TITLE(<delimiter><data byte[s]><delimiter>|<A-block data field>);| <I-block data field>
Displays text in the title line on the optical spectrum analyzer display.

TM(_(EXT|FREE|LINE|VID))|?;
Selects the trigger mode that determines how the sweep is triggered.
Query response: EXT|FREE|LINE|VID

TP_(<number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>);
Modifies the shape of stored, graphics items.

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(**TRA**|**TRB**|**TRC**)(<number>[<amplitude unit>]{,<number>
[<amplitude unit>]}|<A-block data field>|?;|<I-block data field>
Sends or receives trace-amplitude information for traces A, B, or C.
Query response: <trace>[_<element position>](<amplitude>|?)|
#A<msb length><lsb length><data byte>{<data byte>}|
#I<data byte>{<data byte>}|<data byte>{<data byte>}

TRCOND_<reference trace>(,<start>,<stop>,<sweep>,
<top of screen>,<bottom of screen>,<trace length>,
<reference level>, (LIN|LOG|RLOG)|?);
Scales trace data displayed in a graphics window.
<start> ::= <stop> ::= <sweep> ::=
<top of screen> ::= <bottom of screen> ::= <trace length> ::=
<reference level> ::= <number>
Query response: <start>,<stop>,<sweep>,<top of screen>,
<bottom of screen>,<trace length>,<reference
level>,(LIN|LOG|RLOG)

TRDEF_(TRA|TRB|TRC|<user-defined trace name>)(,<trace
length>|?);
Changes the trace length or creates new trace arrays.
<user-defined trace name> ::= <character string>
<trace length> ::= <number>|<predefined variable>|<user-
defined variable>|<predefined function>|<trace
element>
Query response: <number>

TRDSP_(TRA|TRB|TRC),(ON|OFF|0|1|?);
Blanks display of active trace(s) without clearing the trace data or interrupting measurements.
Query response: 0|1

TRNSZLOCK(_(ON|OFF)|_(0|1))|?;
Locks transimpedance amplifier for fast pulse measurements.
Query response: 0|1

TRPST;
Sets trace operations to their preset values.

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TRSTAT?;
Returns the current status of the active trace.
Query response:
(MAX|MIN|WRITE|OFF),(OFF|ON){L_F(MAX|MIN|
WRITE|OFF),(OFF|ON)}

TS;
Initiates and takes a sweep.

TWNDOW_<destination>,(FLATTOP|HANNING|UNIFORM|
HAMMING);
Formats a trace array with real values for use with the fast Fourier transform function (FFT).
<destination> ::= TRA|TRB|TRC|<user-defined trace>|<trace range>

USERERR_<error number>,(<delimiter><error text>
<delimiter>|
<A-block data field>);|<I-block data field>
Returns an error message of your design and assigns the error a number.
<error number> ::= <number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>
<error text> ::= <character string>

USERKEY(<A-block data field>|?);
Return or receive data that configures (USER) keys.
Query response: #A<msb length><lsb length>USTATE_#A
<msb length><lsb length><data byte[s]>

USERLOCK(_(OFF|ON|0|1))|?;
Restricts front-panel operation to the (USER) keys only. Must be reset remotely.
Query response: 0|1

USERMSG(<delimiter><data byte[s]><delimiter>|<A-block data field>);| <I-block data field>
Writes a message of 39 characters or less in the message area on the display.

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USERWARN_(<number>|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>),((<delimiter>{<character>}<delimiter>|#A<msb length><lsb length>{<character>})|#I{<character>};
Display a user defined warning message.

USTATE(<A-block data field>|?);
Transmits all information that is stored in internal memory by the user.
Query response: #A<msb length><lsb length>USTATE_#A<msb length><lsb length><data byte[s]>

VARDEF_[<delimiter>]<character string>[<delimiter>],(<number> [<units>]|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>);
Creates a user-defined variable and assigns it a value.

VARIANCE_(TRA|TRB|TRC|<user-defined trace>|<trace range>)?;
Computes the amplitude variance of the specified trace.
Query response: <number>

VAVG(_(<number>|EP|DN|UP|OFF|ON))|?;
Reduces amplitude variation of trace using digital averaging.
Query response: <number>

VB(_(<number>[<frequency unit>]|EP|DN|UP|MAN|AUTO))|?
Specifies the video bandwidth filter value to reduce the noise floor of trace data. Default units are Hz.
Query response: <number>

VIEW_(TRA|TRB|TRC);
Stops sweeping the specified trace and displays it.

VTDL(_(OFF|ON|0|1))|?;
Control the video trigger display lines.

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VTH(_(<number>[DB]|EP|DN|UP))|?;
Determines the direction and magnitude of change in the detected video-signal level that triggers a sweep.
Query response: <number>

VTL(_(<number>[DBM|DB|<power unit>]|EP|DN|UP))|?;
Specifies the video trigger amplitude level.
Query response: <number>

VW_(OFF|ON|0|1);
Blanks or displays graphic items that have been created with the IT command.

WAIT_(<number>[S|MS|US]|<predefined variable>|<user-defined variable>|<predefined function>|<trace element>);
Suspends program operation for the specified length of time.

WARN?;
Return a listing of all reported warning codes.

WARNCTRL(_(OFF|ON|0|1))|?;
Enable or disable warnings messages.

WLLIMIT(_(OFF|ON|0|1))|?;
Extends the wavelength measurement range.
Query response: 0|1

WLMKRL_<number>_<wavelength unit>;
Positions the left power integration point.
May only be used with the LED_ downloadable command.

WLMKRR_<number>_<wavelength unit>;
Positions the right power integration point.
May only be used with the LED_ downloadable command.

WLOFFSET(_(<number>[<wavelength unit>]|DN|UP|EP))|?;
Offsets the wavelength scale for all absolute wavelength readouts, inputs, and outputs.
Query response: <number>

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WLUNITS_<source trace>[,<reference trace>]?;
Converts trace position units to wavelength.
Query response: <number>

XAMPSW(_(OFF|ON))|?;
Activates the rear-panel TRANS-Z INPUT connector. This command is valid only in the HP 71451B (or the HP 70951B). The maximum current allowed at the rear-panel TRANS-Z INPUT connector is ±10 mA and the maximum input voltage is ±10 V.
Query response: OFF|ON

XCH_<source 1>,<source 2>;
Exchanges the contents of source 1 and source 2.
<source 1> ::= TRA|TRB|TRC|<user-defined trace>|<trace range>|
<predefined variable>|<user-defined variable>
<source 2> ::= TRA|TRB|TRC|<user-defined trace>|<trace range>|
<predefined variable>|<user-defined variable>|<predefined function>| <number>{<units>}

XERR?;
Returns error information when an instrument in a system encounters an error.
Query response: <error #>,<model #>,<row>,<column>,<error text>

XWARN?;
Return an extended listing of all reported warnings.
Query response:
{<number>,{<character>},<number>,<number>,{<character>}}

ZERO[(_(AUTO|MAN|ONCE))|?];
Zeroes the photodiode's dark current.
Query response: AUTO|MAN

ZOOMRB(_(<number>[<wavelength unit>]|UP|DN))|?;
Measures a signal in zero span with a desired resolution bandwidth.
Query response: <number>

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4

Error Messages

This chapter defines all possible error messages displayed on the optical spectrum analyzer's screen. These error messages can be the result of incorrect operating procedures, illegal programming commands, or hardware failures. Normally, the optical spectrum analyzer removes error messages from the screen as soon as the error conditions are corrected. If you have a computer, error messages can also be retrieved via HP-IB by executing the ERR? programming command. Refer to the *Programmer's Guide* for information on the ERR? command and programming.

In addition, this chapter lists the default warning messages that appear on the display.

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User Application Errors (0001 – 0999)

The optical spectrum analyzer reports these errors when it cannot decipher a command in a user-application program. User-application programs consists of remote programming messages that are loaded into RAM. Refer to the *Programmer's Guide* for information on programming.

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Operating Errors (2000 – 2999)

Operating errors occur when the spectrum analyzer is operated incorrectly.

2000 No errors
This message is returned from querying the system when no error is present in the system.

2001 Illegal command
The remote command sent over the bus or executed as part of a DLP was not a legal remote command. This error could also occur if a User Variable (VARDEF), which did not exist, was used as a parameter in a remote command.
To solve thisproblem, check for missing terminators, and the proper number of parameters. Also verify that delimited strings are properly ended. Use the `debug` softkey or the DEBUG command to locate the programming error. Refer to the `debug` softkey description in the *User's Guide* and the DEBUG command description in the *Programmer's Guide* .

2002 Illegal parameter
This is a user-generated system protocol error.

2003 Missing parameter
The command being executed requires more parameters than were provided, or a user variable VARDEF used as a parameter for a function was not found.
To solve thisproblem, use the `debug` softkey or the DEBUG command to locate the programming error. Refer to the `debug` softkey description in the *User's Guide* and the DEBUG command description in the *Programmer's Guide* .

2004 Illegal character
Refer to chapter 6 for a table of valid character codes.

2005 Illegal character set
Refer to chapter 6 for a table of valid character codes.

2006 Parm out of range

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Operating Errors (2000 – 2999)

A change was made to an instrument setting that was beyond the capabilities of the hardware. This could be remote, DLP, or front panel changes.
To solve thisproblem, use the `debug` softkey or the DEBUG command to locate the programming error. Refer to the `debug` softkey description in the *User's Guide* and the DEBUG command description in the *Programmer's Guide* .

2007 Missing terminator
Many programming commands and decision constructs require the use of termination characters. For example, the TITLE command uses termination characters to delimit the text string. Also, FUNCDEFs require termination characters. This error indicates a missing termination character. Refer to the *Programmer's Guide* for more information.

2009 Protocol error
Internal error due to illegal communication. Due to a hardware failure. To solve thisproblem, please document all details possible that lead up to the error and contact your HP representative.

2010 Cmd out of sequence
Internal error due to process synchronization. Possible hardware failure.
To solve thisproblem, please document all details possible that lead up to the error and contact your HP representative.

2011 Memory overflow
There is not enough available memory for the operation. Examples would be adding a VARDEF, FUNCDEF, or ACTDEF sending AMPCOR data adding new modules to a system that was almost out of memory because of FUNCDEF's, etc.
To solve thisproblem, some items must be removed from memory. Analyze DLP's to see if there are extra characters (spaces, etc.) that could be removed.

2013 Item not found or XXXXX not found
The XXXXX will be replaced by the name of the item that was not found. A request was made to operate on an item in memory that was not located.

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To solve thisproblem, use the debug softkey or the DEBUG command to locate the programming error. Refer to the debug softkey description in the *User's Guide* and the DEBUG command description in the *Programmer's Guide*.

2014 Duplicate identifier

A variable, trace, or DLP name matches a reserved spectrum analyzer command. To solve thisproblem, use the debug softkey or the DEBUG command to locate the programming error. Refer to the debug softkey description in the *User's Guide* and the DEBUG command description in the *Programmer's Guide* .

2015 Too many entries

Too many user definitions. More entries have been made in an internal table then was reserved. This often occurs when there are too many entries in a limit line table.
To solve thisproblem, use the LIMILINE command to allocate more space for limit line entries.

2016 Label too long

A user generated key label that has more than 14 characters, or a FUNCDEF, VARDEF, or ACTDEF with more than 12 characters will generate this error.
To solve thisproblem, the system will truncate the text to the correct number of characters and execute the requested function. Use the debug softkey or the DEBUG command to locate the programming error. Refer to the debug softkey description in the *User's Guide* and the DEBUG command description in the *Programmer's Guide* .

2018 State protected

This error occurs if a user stored instrument state that is protected was requested to be removed from memory. The state will not be removed. Also, if the number of user states is reduced using NSTATE, all states above the requested number will be deleted. If any of those states were protected, the NSTATE command will be ignored and this error will occur.
To solve thisproblem, unprotect any states no longer needed.

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Operating Errors (2000 – 2999)

2019 Illegal marker type
The command executed does not apply to the marker mode of the markers on the display. For example, if a normal marker is on screen, and the "Marker delta into span" function is activated, the function cannot be executed, and the error will occur.
To solve thisproblem, refer to the programming or operation manual for the function being executed to determine the proper marker type for the operation.

2020 No active marker
This error occurs when Marker Delta is moved to Center Frequency Step Size (MKSS) while no markers are active.

2021 Bad IF/ENDIF nesting
To solve thisproblem, use the `debug` softkey or the DEBUG command to locate the programming error. Refer to the `debug` softkey description in the *User's Guide* and the DEBUG command description in the *Programmer's Guide* .

2022 REPEAT/UNTIL error
To solve thisproblem, use the `debug` softkey or the DEBUG command to locate the programming error. Refer to the `debug` softkey description in the *User's Guide* and the DEBUG command description in the *Programmer's Guide* .

2023 Illegal Cal signal
Calibration signal did not match expected limits. Refer to chapter 1 of the *User's Guide*.

2024 Illegal HP-MSIB comm
Illegal HP-MSIB communication. An HP-MSIB protocol violation has occurred. To solve thisproblem, document all steps leading up to the error condition and contact your HP representative.

2025 System error (slave)
HP-MSIB communications with a slave module has created this error. To solve this problem,
Record the error number and the hexadecimal code.
Record all events that led up to the occurrence of the error message.

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Record the HP model numbers of the modules in the system.
Record the firmware version.
Contact the nearest HP Sales and Service Office for assistance.

2027 Service mode—do IP
This is a user-generated system protocol error. The bandwidth or reference select is not in their AUTO modes. (For service use only.)

2029 Command syntax error
This error is generated when MSIB packet syntax is incorrect, or when a BDLP call is does not have the proper syntax.
To solve thisproblem, please document all the steps that led up to this error and contact your HP representative.

2030 Scaling overflow
The user has requested a scale factor that is too large in the DWINDOW command. To solve this problem, refer to the DWINDOW command description in the *Programmer's Guide* .

2031 Too many errors
The error buffer has been filled.

2032 Hardware not present
A function was requested that required hardware not available in the system. To solve thisproblem, use the `debug` softkey or the DEBUG command to locate the programming error. Refer to the `debug` softkey description in the *User's Guide* and the DEBUG command description in the *Programmer's Guide* .

2034 Test switch on
The module test switch is in the "test" position. All RAM is erased at each power cycle. To solve thisproblem, set the module test switch to the "normal" position.

2035 Illegal operation
The command cannot be performed as written or does not affect the current measurement conditions.
To solve thisproblem, use the `debug` softkey or the DEBUG command to determine which command generated the error message. Refer to the `debug` softkey description in the

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User's Guide and the DEBUG command description in the *Programmer's Guide* .

2036 HP-IB multiple cntlr
A DLP used an OUTPUT command or the spectrum analyzer attempted to access the disk when another device had control of the HP-IB. To solve thisproblem, remove the other device from the HP-IB.

2037 No instr resp
No HP-IB instrument response from an OUTPUT command or mass storage (such as SAVE or RECALL) to an HP-IB disk. To solve thisproblem, verify that the HP-IB address is correct.

2039 User stack overflow
There is not enough RAM space remaining for the operation requested. Often nested DLPs are calling too deeply. For example, DLP "A" calls DLP "B" which calls DLP "C", and so forth. To solve thisproblem, DLP program should be redesigned using fewer nesting levels.

2040 Partial USTATE data
A recalled user state is not complete.

2042 Not stored, A−X->A
To solve thisproblem, use the `debug` softkey or the DEBUG command to locate the programming error. Refer to the `debug` softkey description in the *User's Guide* and the DEBUG command description in the *Programmer's Guide* .

2044 Not stored: open 1st
The data for the short is entered before the data for the open when normalizing for swept response. To solve thisproblem, store the data for the open first. Refer to the STORREF command.

2045 HP-IB bus error
HP-IB protocol violation. To solve thisproblem, verify cables and computer for proper operation.

2048 Userdef protected

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User-defined function or (USER) key is protected. To solve thisproblem, use the debug softkey or the DEBUG command to locate the programming error. Refer to the debug softkey description in the *User's Guide* and the DEBUG command description in the *Programmer's Guide* .

2049 Battery failed
The battery backed up RAM was not valid. To solve thisproblem, return to Hewlett-Packard for servicing.

2050 Ampcr/span too large
Amplitude-correction data too large

2051 File not found
A user state was not found in memory. To solve thisproblem, check the state number or name.

2052 File already exists

2053 storage device
The address of the selected storage device is incorrect. Refer to "Connecting an External HP-IB Drive" in chapter 10 of the *User's Guide* for information on addressing external disk drives. If an HP-MSIB card is the selected storage device, make sure the card is in the front-panel card slot and that the card's address is the same value as the display's HP-IB address.

2054 write protect
Mass storage device is write protected.

2055 bad file
File cannot be read.

2056 bad revision
A recalled state is from a different firmware revision and cannot be used.

2057 volume full
The mass storage device is full. To solve thisproblem, remove some files from the mass storage device.

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Operating Errors (2000 – 2999)

2058 bad volume or illegal volume

2059 directory full
The directory of the mass storage device is full. To solve thisproblem, remove some files from the mass storage device.

2063 Bad cal wavelength
The wavelength correction required for a wavelength calibration was too great. Only small wavelength errors may be corrected using the wavelength calibration feature. To solve thisproblem, specify a different wavelength for calibration or use a different light source.

2064 Signal not found
The automeasure or autoalignment routine did not find a valid signal. To solve thisproblem, connect a light source to the front-panel MONOCHROMATOR INPUT connector (OPTICAL INPUT on HP 71450A instruments.) Or, use a trace marker to specify a signal for the automeasure or autoalignment routine to use.

2066 Illegal mode for cal
The optical spectrum analyzer only allows power and wavelength calibrations in certain instrument modes. This error occurs when one of these calibrations is requested in the wrong instrument mode. To solve this problem, change the instrument mode to one of the selections shown on the screen.

2067 Invalid Traj Corrns
The slope of the trajectory corrections from one point to another is too steep. This error may indicate a problem with the optical spectrum analyzer's monochromator or fiber micro-positioner. To solve this problem, do an align preset to remove trajectory corrections. If this does not fix the problem, return the optical spectrum analyzer for servicing.

2069 Bad Wavelength Range
Some commands (for example `ALIGN AUTOPTS`) require start and stop wavelength settings for proper operation. This error occurs when the valid range is exceeded. To solve this problem,

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change the start and stop wavelengths to be within the valid range of the command.

2070 Sweep too fast

The selected sweep time is too fast to produce accurate data. The frequency of the trigger signal is too low. This error only occurs in non-zero spans.To solve this problem, increase the external trigger frequency or sweep time. Sweep time must be increased if trigger frequency is above 20 kHz to 50 kHz.

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Hardware-Warning Errors (6000 – 6999)

Hardware-warning errors occur when the hardware is faulty. The optical spectrum analyzer can still make measurements, but the accuracy of the measurement cannot be guaranteed.

6000 EAROM unprotected
The memory-enable write switch is set to the WRITE position. It is not set to the PROTECT position. To solve thisproblem, set the memory-enable write switch to the PROTECT position.

6001 Confidence test passed

6002 A6 RAM checksum (battery)

6007 MSIB NMAA received
HP-MSIB "no module at address" received. The module attempted to establish communication with a module at an incorrect address. The system responded with an NMAA (no module at address). To solve thisproblem, if using MSIB communication, verify the address if the module you are trying to communicate with is correct. Otherwise, document all steps that led to the error condition and contact your HP representative.

6008 Confidence test failed

6009 No module label

6010 Err in MDOC response
An error in module-output capabilities response has occurred. To solve thisproblem, return to Hewlett-Packard for servicing.

6014 DSP parm error
An internal firmware error occurred in the data-acquisition firmware. The 2-digit hexadecimal code listed with the error may assist Hewlett-Packard in diagnosing the problem. To solve thisproblem, report the error (including the 2-digit hexadecimal code) to your field service representative.

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Hardware-Broken Errors (7000 – 7999)

Hardware-broken errors occur with faulty hardware.

7000 ROM check error
The programmed checksum of the ROM does not agree with the computed checksum. To solve thisproblem, because this could only be caused by a hardware failure. Return to Hewlett-Packard for servicing.

7009 ROM 2 check error

7033 Power supply error
One or more of the +5 V, −12 V, or −5 V voltages are out of spec.

7036 HP-MSIB error

7047 RAM failure
The RAM self test detected a failure in the system RAM. To solve thisproblem, return to Hewlett-Packard for servicing.

7051 Slit failed
The slit wheel motor or associated hardware has failed. The 2-digit hexadecimal code indicates the nature of the failure and may assist Hewlett-Packard in diagnosing the problem. To solve thisproblem, return to Hewlett-Packard for servicing.

7052 Grating failed
The diffraction grating rotation motor or associated hardware has failed. The 2-digit hexadecimal code indicates the nature of the failure and may assist Hewlett-Packard in diagnosing the problem. To solve thisproblem, return to Hewlett-Packard for servicing.

7053 Bad spect ROM
The calibration-data ROM for the monochromator has failed. The 2-digit hexadecimal code indicates the nature of the failure

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and may assist Hewlett-Packard in diagnosing the problem. To solve thisproblem, return to Hewlett-Packard for servicing.

7054 Bad DSP ROM

The calibration-data ROM for the data acquisition hardware has failed. This is probably due to faulty hardware. The 2-digit hexadecimal code indicates the nature of the failure and may assist Hewlett-Packard in diagnosing the problem. To solve thisproblem, return to Hewlett-Packard for servicing.

7055 Cal failed

The optical spectrum analyzer could not calibrate the data acquisition hardware. This is probably due to faulty hardware. The 2-digit hexadecimal code indicates the nature of the failure and may assist Hewlett-Packard in diagnosing the problem. If the displayed 2-digit code is not shown in the following list, you will probably need to return the instrument to Hewlett-Packard for servicing. The following 2-digit hexadecimal codes originate from preforming an alignment to adjust the fiber-positionaer tracking table. (Refer to the ALIGN programming command.)

Code	Definition
0B	Trajectory Table Overflow: This error indicates an attempt to add a point to an already-full trajectory correction table. Neither the table or the current autoalign data are altered. Trajectory correction table data may be viewed via the extended state display (EXTEND STATE softkey).
2B	Invalid Trajectory Corrections: The data being added to the correction table would cause the correction curve to become too steep. Neither the table or the current AUTO ALIGN data are altered. This can happen when executing the function after a long period of time has elapsed since the last ALIGN, of after the instrument has received a substantial mechanical shock. It can usually be remedied by executing the ALIGN function.

7056 Bad flatness

The flatness correction data in one of the calibration ROMs is faulty. The 2-digit hexadecimal code indicates the nature of the failure and may assist Hewlett-Packard in diagnosing the

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problem. To solve thisproblem, return to Hewlett-Packard for servicing.

7057 DSP Error

An internal error occurred in the data acquisition hardware or firmware. The 4-digit hexadecimal code indicates the nature of the failure and may assist Hewlett-Packard in diagnosing the problem. To solve thisproblem, report this error (including the 4-digit hexadecimal code) to you field-service representative.

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Computation Errors (8000 – 8999)

Computation errors occurs during illegal math operations. For all of these computation errors, Use the `debug` menu or the DEBUG command to locate the programming error. Refer to the `debug` softkey description in Chapter 3. Or, refer to the DEBUG command description in the *Programmer's Guide* .

8000 Divide by zero

8001 Float pt overflow
Floating-point overflow. Absolute value of number exceeds $1.797{,}693{,}134{,}862{,}315 \times 10^{308}$.

8002 Log of zero

8003 Log of negative

8004 Integer overflow
Number is less than −32,768 or greater than 32,767.

8005 Square root error

8006 Modulus of zero

8999 Float pt underflow
Floating-point underflow. Number is between 0 and $\pm 2.225{,}073{,}858{,}507{,}202 \times 10^{-308}$

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Factory-Use Only Errors (9000 – 9999)

These errors are for factory use only. If any of the 9000 – 9999 error messages occur, perform the following:

- Record the error number and the hexadecimal code.
- Record all events that led up to the occurrence of the error message.
- Record the HP model number of the optical spectrum analyzer and the display.
- Record the firmware version.
- Contact the nearest HP Sales and Service Office for assistance.

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Warning Messages (16001 – 16012)

Warnings indicate that a user might not be performing a task properly.

16001 Simulated hardware
System hardware is missing. The instrument attempts to simulate the missing hardware in order to continue operation.

16002 Trace length changed (due to ADC switch)
The trace length has been changed to accommodate a change in the analog-to-digital converter (ADC).

16003 Usable RBW limited
The range of available resolution bandwidths has been reduced due to instrument settings or conditions.

16004 Usable VBW limited
The range of available video bandwidths has been reduced due to instrument settings or conditions.

16005 Sweep too fast
The selected sweep time is too fast to produce accurate data.

16006 No current state 0
The optical spectrum analyzer attempted to recall a state register that was empty. The POWERON RECALL command or POWERON RECALL softkey has been used and then the instrument's power recycled. This causes the optical spectrum analyzer to attempt to recall state register 0.

16007 Possible compression
Instrument settings have resulted in a condition that may result in signal compression.

16008 No autoalign data
The display of this warning message results from executing the ALIGN programming command. The MANUAL argument performs an automatic alignment and transfers the resulting X and Y digital-to-analog converter (DAC) offsets to the fiber

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positioner's trajectory correction table. In rare situations where these offsets are zero, this warning is displayed.

16011 Span too large

The wavelength span has set the start and stop wavelengths outside the tunning range of the optical spectrum analyzer.

16012 PSDAC adjust past RL

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