

HP 8510C
Network Analyzer

Quick
Reference
Guide

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Table of Contents

Programming Codes	4
Query Commands	60
User Display	70
Circuit Modeling Program	
Statements and Commands	71
HP-IB Universal Commands	73
HP-IB Addressed Commands	73
Index	75

Introduction

Use this alphabetical list of the analyzer programming mnemonics as a quick reference to the syntax requirements and general function of the individual commands. Refer to the *HP 8510C Keyword Dictionary* for more information on the individual entries.

Notation

Symbols used in this document are:

BOLD Upper case bold characters represent the program keywords which must appear exactly as shown with no embedded spaces.

[] Square brackets indicate that whatever is enclosed in the bracket is optional

[suffix] Optional programmer entry units terminator for frequency and time units:

Frequency	Time	Voltage
Suffix	Suffix	
GHZ	ts	mV
MHz	ps	V
KHz	ns	
Hz us (µs)	ms	
	s	

semicolon is the required terminator character for each program instruction.

the comma is used in program instructions to separate a series of values.

(range lower case text enclosed in parenthesis describes the range of values which may be input for the selected function.

value a constant or pre-assigned simple or complex numeric or string variable transferred to the analyzer.

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variable a simple or complex numeric or string variable which receives the value returned by the analyzer.

(Preset) Value or state after a network analyzer

[FACTORY PRESET]

Example

GATECENT [value [time suffix]];
 Mnemonic may be written as

GATECENT;
 Makes gate center the active function.

GATECENT i;
 Makes gate center the active function, sets gate center to 1 second. (If no units, default to basic units.)

GATECENT 1 ns;
 Makes gate center the active function, sets gate center to 1 nanosecond.

Once a function is active, it remains active until **[ENTRY OFF]** or another active function is selected, and any value input will change its value. For example, sending the string

STAR 10 GHz;

makes **start** the active function. As long as the function is active, sending the string

2 GHz;

will set the **start** function to 2 GHz.

Alphabetical List of Programming Codes

- ABORPRIP:** Abort a print or plot output to RS-232 port 1 or 2.
- ADAP1:**
- ADAP2:** Specify calibration kit containing adapter in adapter removal modify calibration set.
- ADAR:** Select adapter removal modify calibration set.
- ADDR8510 [value]:** HP-IB address of analyzer. (0-30)
- ADDRDISC [value]:** External disc unit System Bus address. (0-7)
- ADDRPASS [value]:** System Bus address of device to send/receive data via analyzer System Bus HP-IB address. (0-31)
- ADDRPLOT [value]:** Digital plotter System Bus address. (0-30)
- ADDRPRIN [value]:** Printer System Bus address. (0-30)
- ADDRPOWE [value]:** System Bus address of power meter. (0 - 30)
- ADDRRFs [value]:** System Bus address of RF switch for dual test set switching (0-31).
- ADDRSOUR2 [value]:** Source 1 (RF)/2 (LO) System Bus address. (0-31)

ADDRESSB [value]:
HP-IB address of analyzer System Bus. (0-30)

ADDRESS [value]:
Test set System Bus address. (0-31)

ANAOFF;
ANAON;

Analog output off/on.

ASEG;
Measure all frequency list segments.

ATTP1 [value]:
Port 1 attenuator. (0-90 dB, 10 dB steps)

ATTP2 [value]:
Port 2 attenuator. HP 8514, 8515 only. If attenuators installed, (0-90 dB, 10 dB steps)

AUTD;
Automatic setting of electrical delay to balance phase.

AUTO;
Automatic selection of [REF VALUE] and [SCALE] for current channel to position trace for viewing.

AUXV;
Source set to start frequency; measurement synchronized to aux out; stimulus controls set characteristics of digital ramp at AUX OUT connector.

AVEROFF;
Turn off averaging for selected channel. (Preset)

AVERON [value]:
Turn on averaging for selected channel. (1-4096; 1, 2, 4, 8, ... 4096 sequence)

BACI [value];
Set the background intensity of the CRT. (0 - 100)

BEEPON;
BEEPOFF;
Turn caution/warning beep off/on. (on = Preset)

C0 [value]; x10⁻¹⁵F
C1 [value]; x10⁻²⁷F/Hz
C2 [value]; x10⁻³⁶F/Hz²
C3 [value]; x10⁻⁴⁵F/Hz³
Open circuit capacitance model values.

CAL1;
CAL2;
Begin measurement calibration using calibration kit
1/2.

CALF;
Perform a flatness correction calibration routine.

CALFUL2;
Select full 2-port calibration.

CALONE2;
Select one-path 2-port calibration.

CALIRAI;
Select response and isolation calibration.

CALIRESP;
Select response calibration.

CALIS111;
CALIS221;
Select S₁₁/S₂₂ 1-port calibration.

CALITRL2;
Select TRL 2-port calibration.

CALK1:
CALK2:

Calibration kit 1/2 data type under [TAPF]/[DISC].

CAL1:
CAL2:
CAL3:
CAL4:
CAL5:
CAL6:
CAL7:
CAL8:

Under [DISC], calibration set data type. Under [CAL], select or delete a calibration set. Under [ADAPTER REMOVAL], specify port 1 and port 2 calibration set and storage for modified calibration set.

Limited Calibration Set Instrument State

Parameter(s) Corrected (1,2)

Frequency Range (1)

Number of Points (1)

Source Power (3)

Sweep Time (3)

Power Slope (3)

Ramp/Step/Single sweep mode(3)

Trim Sweep (3)

1. Correction turned off if changed and new

parameter not included.

2. Does not turn Correction On if current parameter

not included.

3. CAUTION: CORRECTION MAY BE INVALID

is displayed if changed.

CALSALL:
Calibration sets 1-8 data type under
[TAPE]/[DISC]. (Usable only to disc.)

CALSPORT1:
CALSPORT2:

Select port 1 or port 2 calibration set in adapter
removal modify calibration set, followed by CALSN.;

CALZLINE:

TRL Z₀ referenced to line Z₀.

CALZSYST:

TRL Z₀ referenced to system Z₀ (SETZ.;

CBRI [value]:

Set the brightness of active color. (0 - 100)

CENT [value [suffix]]:

Set center frequency stimulus value.

CHAC:

Change calibration type.

CHAN1:
CHAN2:

Select [CHANNEL 1]/[CHANNEL 2].

CHAS:

Change and save a 1-port calibration from a current
2-port calibration set, followed by CALSN.;

CLAD:

Current standard class is specified.

Select Calibration Standard Class	
Mnemonic	Standard 2.4mm, 3.5mm & 7mm Labels
CLASS1A:	S ₁₁ OPEN (1st S ₁₁ std class)
CLASS1B:	S ₁₁ SHORT (2nd S ₁₁ std class)
CLASS1C:	S ₁₁ LOADS (3rd S ₁₁ std class)
CLASS2A:	S ₂₂ OPEN (1st S ₂₂ std class)
CLASS2B:	S ₂₂ SHORT (2nd S ₂₂ std class)
CLASS2C:	S ₂₂ LOADS (3rd S ₂₂ std class)
FWD1:	FWD, TRANS, THRU
FWDM:	FWD, MATCH THRU
REVT:	REV, TRANS, THRU
REVM:	REV, MATCH THRU

CLASS1A:
 CLASS1B:
 CLASS1C:
 CLASS2A:
 CLASS2B:
 CLASS2C:
 Select calibration standard class. Measure if single standard in class.

CLEF:
 Clear frequency list.

CLES:
 Clear analyzer status bytes to 0.0.

COAD:
 Select coaxial (linear phase) electrical delay and port extensions. (Preset)

COAX:
 Coaxial (linear phase) calibration standard.

CONF [value]:
 Constant frequency value, multiple source. (0 to end of source frequency range)

COMPYNC:
 Set external video synchronization to composite video.

COLOR [value]:
 Adjust the degree of whiteness in specified color. (0 - 100)

Select display element to modify.

- COLRSOFT;
- COLRWARN;
- COLRS11D;
- COLRS22D;
- COLRS21D;
- COLRS12D;
- COLRGRAT;
- COLRMARK;
- COLRNU09;
- COLRS11M;
- COLRS22M;
- COLRS21M;
- COLRS12M;
- COLRNU14;
- COLRSTIM;

FWDI	FWD. ISOL.N ISOL.N STD.
REVI	REV. ISOL.N ISOL.N STD.
RAARESP	RESPONSE STD. IN RESP & ISOL.N CAL
RAISOL	ISOL.N STD. IN RESP & ISOL.N CAL
TRLT	THRU
TRLR1	S ₁₁ REFLECT SHORT
TRLR2	S ₂₂ REFLECT SHORT
TRLR	2 to 18 GHz LINE

CONT: Continual sweep. (Preset)
CONVS: Convert to 1/S.
CONVS: Convert to S-parameter. (Preset)
CONVY: Convert to Y.
CONVZ: Convert to Z.
CORROFF:
CORRON: Correction off/on for current parameter set. (Follow CORRON; with CALSN;.)
COUC: Couple channel 1 and channel 2 stimulus and calibration sets. (Preset)
CRES: Create and save a frequency subset calibration set. Followed by CALN;.
CRTQ: Turn analyzer CRT off. (Preset turns on)
CWFREQ [value [req suffix]]:
Frequency list CW frequency.
DATACHAN1:
DATACHAN2: Trace math uses data from channel 1/2. (dual channel mode)
DATADATA: Corrected Data type under [TAPE]/[DISC].

DATAFORM:
Formatted Data type under [TAPE]/[DISC].

DATARAW:
Raw Data type under [TAPE]/[DISC]. (All

appropriate selected channel Raw Data arrays)

DATEIMEOFF;
DATEIMEON;

Turn off/on real-time clock annotation. (on=Preset)

DATI:

Transfer selected channel corrected data array to
default trace memory.

DEBUOFF;
DEBUON;

Turn off/on debug mode.

DEFA:

Multiple source default equation. (Preset)

DEFC:

Select default display colors.

DEFIRECV;

Multiple source define receiver equation.

DEFISOUR1;

Multiple source define RF source #1 (test signal)
equation.

DEFISOUR2;

Multiple source define LO source #2 (local oscillator)
equation.



DEFM1:
DEFM2:
DEFM3:
DEFM4:
DEFM5:
DEFM6:
DEFM7:
DEFM8:
 Define memory used for memory operations on selected channel. Memories 1, 2, 3, 4 are non-volatile. Memories 5, 6, 7, 8 are volatile.

DEFPENCLR:
 Set default pen colors for plots.

DEFS stdno:
 Define the number of the calibration standard to be modified. (stdno = 1-21)

DELA:
 Delay format

DELC:
 Delete calibration set, followed by CALSn.

DELE:
 Delete disc file, followed by data type and FILEn.

DELO:
 Δ mode off.

DELR1:
DELR2:
DELR3:
DELR4:
DELR5:
 Select Δ Ref = delta mode reference marker.

DELT:
 Delay table data type under [TAPE]/[DISC].

DISPMATH:
Display current data with math.

DISPDATM:
Display current data and memory.

DISPDATA:
Display current data only.

DISPDATA:
Select data type filename under disc store/load/delete operations. Maximum 7 characters, does not include filename data type prefix.

DISF "filename":
Delete disc filename. Load disc filename. Store/replace disc filename.

DISVOL [value]:
Disc volume number under disc setup.

DISCUNIT [value]:
Disc unit number under disc setup. Usually 0 (left drive), 1 (right drive).

DIRE:
Display directory for current tape cartridge or disc.

DETEWIDB:
Select the 3 MHz IF bandwidth path and detectors. Pulsed-RF applications.

DETEORRB:
Select the 10 KHz IF path and detectors.

Select denominator for current parameter.

DENOA1: a1
DENOA2: a2
DENOB1: b1
DENOB2: b2
DENOR: denominator = 1

DISPMEMO:
Display memory only.

DIVI:
Select complex divide trace math.

DONE:
Current standard class done during measurement calibration.

DOWN:
Decrease current active function one step.

DRIVNONE:
DRIVPORT1:
DRIVPORT2:
Select drive port for current parameter.

DUPD:
Frequency list delete duplicate points.

DUPM:
Frequency list measure duplicate points. (Preset)

DUTC [value]:
Set the duty cycle of the internally generated trigger. Wideband IF option 008 only. (0 - 100)

DWET [value [time suffix]]:
Set the dwell time in step or frequency list. (0 - 10)

EDITDONE:
Edit frequency list done.

EDITLIST:
Edit frequency list.

EDITMULS:
Edit multiple source equations.

ELED [value [time suffix]]:

ELED [value [time suffix]];
Set electrical delay for current parameter on selected channel. (See COAD; and WAVD.)

ENTO;
Entry off.

EXTOFF;
Select internal trigger.

EXTPOIN;
Select external measurement trigger.

EQUA;
Set current active function equal to current active marker value.

FACTPRES;
Execute a factory preset.

FASC;
Select fast CW data acquisition (externally triggered).

FILE1;
FILE2;
FILE3;
FILE4;
FILE5;
FILE6;
FILE7;
FILE8;

Select data type file number under [TAPE]/[DISC] store/load/delete operations.

FIRP;
First page of tape directory and operating parameters. (HP 8510B only)

FIXE;
Define load standard type as fixed.

FLATOFF: Turn off flatness correction calibration. (Preset)

FLATON: Enable flatness correction calibration

FORM1: HP 8510 internal binary (6 bytes/point).

FORM2: IEEE 32 bit fp (8 bytes/point).

FORM3: IEEE 64 bit fp (16 bytes/point).

FORMAT OFF
 DIM Data(Number of points,2)
 INTEGER Preamble, Size
 Output Nwa:"FORM3: OUTPUTDATA:"
 Enter Nwa_data:Preamble, Size, Data(*)

FORMAT OFF
 Output Nwa:"FORM3:INPUDATA:"
 Enter Nwa:Preamble, Size, Data(*)

Preamble = Standard Block Header, #A.
 Size = Number of Bytes in Block.
 Data(*) = x,y pairs.

FORM4: ASCII (strings separated by comma).

FORMAT ON

DIM Data(Number of points,2)

Output Nwa:"FORM4; OUTPUTA;"

Enter Nwa_data; Data(*)

Output Nwa:"FORM4; INPUTA;"

Enter Nwa; Data(*)

Data(*)=X,Y pairs

Suppress CR/LF after Output

FORM5:

MS-DOS 32 bit fp (8 bytes/point).

FOUPOVER:

Select four parameter overlay display format.

FOUPSPLI:

Select four parameter split display format.

FREQ:

Turn off display of frequency values. Turn on by **[FACTORY PRESET]** or recall Instrument State.

FREQ:

Select Frequency Domain.

FREQ:

Free-run selected sweep mode. (Preset)

FRES:

Begin creation of frequency subset, under modify calibration set.

FREU:

Update frequency annotation with no sweep.

FULP: Select full page plot.

FWDI: Measure forward isolation standard.

FWDM: Measure forward match standard.

FWDI: Measure forward transmission standard.

GAIN0:

GAIN1:

GAIN2:

GAIN3:

GAIN4:

GAINAUTO: (Auto=Preset)

Service only. Select ref or test IF gain.

GATECENT [value [time suffix]]: Set gate center.

GATEOFF:

Turn off time domain gating.

Turn on time domain gating. Display Time Domain

gate markers.

GATESPAN [value [time suffix]]:

GATESTAR [value [time suffix]]:

GATESTOP [value [time suffix]]:

Set gate span/start/stop.

GATSMAXI:

GATSMINI:

GATSNORM:

GATSWIDE: Select gate shape.

INIT;
Begin tape initialization. (HP 8510B only)

INIS;
Begin DOS disc initialization.

INID;
Begin LIF disc initialization.

IMAG;
Imaginary Cartesian format.

HVSYNC;
External video set to synchronize on horizontal and vertical.

HOLD;
Hold mode, sweep is stopped.

HARS;
Hardware State data type under [TARE]/[DISC].
Complete multiple source Hardware State and HP-IB addresses.

GREESYNC;
External video set to synchronize on green.

Gate Characteristics			
Gate Shape	Passband Ripple	Sidelobe Levels	Cutoff Time T2 = T3
MINIMUM	± 0.40 dB	-24 dB	0.6/f _{span}
NORMAL	± 0.40 dB	-45 dB	1.4/f _{span2}
WIDE	± 0.02 dB	-52 dB	4.0/f _{span}
MAXIMUM	± 0.01 dB	-80 dB	11.2/f _{span}
			22.4/f _{span}
			8.0/f _{span}
			2.8/f _{span2}
			1.2/f _{span}
			Minimum Gate Span T1

INPUCALC01;
 INPUCALC02;
 INPUCALC03;
 INPUCALC04;
 INPUCALC05;
 INPUCALC06;
 INPUCALC07;
 INPUCALC08;
 INPUCALC09;
 INPUCALC10;
 INPUCALC11;
 INPUCALC12;

Store measurement calibration error coefficient set
 real/maginary pairs input via HP-IB into analyzer
 memory. Select appropriate calibration type then
 input necessary coefficient sets (see OUTPCALcn);
 then issue SAVC; CALSn; to save in a calibration
 set. Issue CORRON; CALSn; to turn correction on.

INPUDATA;

Store selected channel corrected data trace memory
 real/maginary pairs input via HP-IB. To input to
 memory, "INPUDATA; DATA;"

INPUDELA;

Input delay table real/maginary pairs for selected
 channel via HP-IB.

INPUFORM;

Store selected channel formatted trace memory
 input via HP-IB. Cartesian: x = basic units, y = 0.
 Polar and Smith: real/maginary pairs.

INPULEAS;

Store FORM1 analyzer Learn String, previously
 output by OUTPLES. Input via HP-IB. Set analyzer
 to Learn String state.

INPURAW1:
 INPURAW2:
 INPURAW3:
 INPURAW4:
 Store selected channel Raw Data trace memory
 real/maginary pairs input via HP-IB. (See
 OUTPRAWn.)

INSS1:
 INSS2:
 INSS3:
 INSS4:
 INSS5:
 INSS6:
 INSS7:
 INSS8:

Single Instrument State data type under
 [TAPE]/[DISC].

INSSALL:
 All Instruments States 1-8 data type.

INTE [value]:
 Select the intensity level of the display. (0 - 100)

INVS:
 Inverted Smith chart format.

ISOD:
 2-port isolation done.

ISOL:
 Begin 2-port isolation calibration.

KEYC value:
 Press analyzer front panel key. See OUTPKEY :
 KITD:
 Kit done (modified). Store current calibration kit
 definition.

L0 [value]: X10⁻¹²H
 L1 [value]: X10²⁴H/Hz
 L2 [value]: X10⁻³³H/Hz²
 L3 [value]: X10⁻⁴²H/Hz³
 Short circuit inductance model values.

LABEADAP ["string"];
 LABEFWDI ["string"];
 LABEFWDM ["string"];
 LABEFWDT ["string"];
 LABERESP ["string"];
 LABEREVI ["string"];
 LABEREVM ["string"];
 LABEREVT ["string"];
 LABES11A ["string"];
 LABES11B ["string"];
 LABES11C ["string"];
 LABES22A ["string"];
 LABES22B ["string"];
 LABES22C ["string"];
 LABETRLR ["string"];
 LABETRLR ["string"];
 LABETRLT ["string"];
 Up to ten character standard class label. Standard class label is displayed only when more than one standard in class.

LABK ["string"];
 Label kit. Up to ten character label for current calibration kit.

LABS ["string"];
 Label standard. Up to ten character label for current calibration standard.

LASP;
 Last page of tape directory. (HP 8510B only)

LEFU;
 LEFL;

Left lower/upper plot.



LINM: Linear magnitude Cartesian format.

LINP: Linear marker on Polar format.

LISALL: List all S-parameters for the selected channel to a printer.

LISAUTFOFF: Turn off/on the automatic paper feed on a printer for listing S-parameters. (on = Preset)

LISFORF: Immediately eject a page from a printer.

LISFREQ: Select frequency list sweep mode.

LISSKIP [value]: Set the skip factor of a printed frequency list. (1 - 401, 4 = Preset)

LIST: List trace values to printer.

LISCOL1DECP [value]: Set the number of digits after the decimal point in column 1/2 data. (1 - 15, 2 = Preset)

LISCOL2WID [value]: Set the total number of characters printed in column 1/2. (1 - 15, 10 = Preset)

LISPARM: Print system parameters or operating parameters to a line printer.

LISSTIMDECP [value]: Set the number of digits after the decimal point printed for frequency data.(1 - 15, 2 = Preset)

LISSTIMWIDT [value]: Set the total number of characters printed for frequency data. (1 - 31, 12 = Preset)

LISSTIUGIGA: GHZ

LISSTIUKILO: KHZ

LISSTIUMEGA: MHZ

LISSTIUMICR: μ S

LISSTIUNANO: ms, mV

LISSTIUPICO: ns

LISSTIUUNIT: Hz, s, V

Specify the units for the stimulus values on a data list.

LOAD: Load tape/disc data file into analyzer memory.

LOAN: Measure load no offset.

LOAO: Measure load offset.

LOCKA1:
LOCKA2:
LOCKNONE:

Select phaseclock input for current parameter.

LOCSFAST: Select fast system phaseclock.

Approximate Formulas for Step Rise Time and Impulse Width (Response-Resolution)		
LOW PASS STEP RISE TIME = $(0.45/f_{\text{span}})$	X	{ 1.0 (WINDMIN) 2.2 (WINDNORM) 3.3 (WINDMAX)
LOW PASS IMPULSE WIDTH = $(0.60/f_{\text{span}})$	X	{ 1.0 (WINDMIN) 1.6 (WINDNORM) 2.4 (WINDMAX)
BANDPASS IMPULSE WIDTH = $(1.20/f_{\text{span}})$	X	{ 1.0 (WINDMIN) 1.6 (WINDNORM) 2.4 (WINDMAX)

- LOCSNORM:** Select normal system phaselock. (Preset)
- LOCTEXTE:**
- LOCTINTE:** Select system 1st IF phaselock to external/internal
- LO.** (internal = Preset)
- LOCTNONE:** Do not phaselock 1st IF
- LOGM:** Logarithmic magnitude Cartesian format.
- LOGP:** Logarithmic marker on Polar format.
- LOWF** [value [freq suffix]]: Specify TRF lowband frequency.
- LOWPIMPU:**
- LOWPSTEP:** Time Domain low pass, impulse/step.

Time Domain Low Pass Reflections
(REAL Format)

ELEMENT	STEP RESPONSE	IMPULSE RESPONSE
OPEN		
SHORT		
RESISTOR $R > Z_0$		
RESISTOR $R < Z_0$		
SERIES INDUCTOR		
SERIES CAPACITOR		

LOWR:

Begin TRL 2-port lowband reflection calibration.
(Full 2-port reflection)

MACD:

Machine dump data type under [TAPE/DISC].
Complete instrument state and all memories.
(Usable only to disc).

MAGO [value]:

Set magnitude offset, dB, for current parameter on selected channel.

MAGS [value]:
Set magnitude slope, dB/GHz, for current parameter on selected channel.

MARK1 [value] [suffix]:
MARK2 [value] [suffix]:
MARK3 [value] [suffix]:
MARK4 [value] [suffix]:
MARK5 [value] [suffix]:

Select active marker and move it to specified stimulus value.

MARKCONT:
Continuous markers (linear interpolation between measured points).

MARKDISC:
Discrete markers (only measured points). (Preset)

MARKMAXI:
MARKMINI:
Active marker to maximum/minimum trace value.

MARKOFF:
Turn all markers off.

MARKTARG:
Active marker to target trace value. (Search starts from lowest stimulus value.)

MAXF [value] [freq suffix]:
Maximum frequency of current calibration standard.

- MEMO1:
- MEMO2:
- MEMO3:
- MEMO4:
- MEMO5:
- MEMO6:
- MEMO7:
- MEMO8:
- MEMOALL:
- Trace memory data type under [TAPE]/[DISC].
- MENUCAL: Present [CAL] menu.
- MENUCOPY: Present [COPY] menu.
- MENUDISC: Present [DISC] menu.
- MENUDISP: Present [DISPLAY] menu.
- MENUDOMA: Present [DOMAIN] menu.
- MENUFORM: Present [FORMAT] menu.
- MENUMARK: Present [MARKER] menu.
- MENUOFF: Present [MARKER] menu.
- MENUNON: Turn off/on normal display of menus. (on = Preset)
- MENUPARA: Present [PARAMENTER] menu.
- MENUPRIO: Present [PRIOR] menu.

Turn the marker list off/on. (on = Preset)

MKRLISTOFF;
MKRLISTON;

Select marker list for four parameter display, the active marker per parameter.

MKRLFOUR;

Select 5 marker display list.

MKRLFIVE;

Minus. Complex subtraction trace math for selected channel.

MINU;

Minimum frequency of current calibration standard. (F_{co} for waveguide type)

MINF [value [freq suffix]]; [freq suffix]

Present test menu. (HP-IB activity suspended.)

MENUTEST;

Present [TAPE] menu.

MENUTAPE;

Present [SYSTEM] menu.

MENUSYST;

Present [STIMULUS] menu.

MENUSTIM;

Present [SAVE] menu.

MENUSAVE;

Present [RESPONSE] menu.

MENURESP;

Present [RECALL] menu

MENURECA;

MOD1: Modify calibration kit 1/2 label.
MOD2: Modify calibration kit 1/2 label.
MODS: Modify selected calibration sets and save, follow with CALSn: .
MONI: For Service Use Only. (TEST or cycle LINE power to exit)
MULD [value]: Multiple source multiplier/denominator/numerator.
MULN [value]: Multiple source multiplier/denominator/numerator.
MULSOFF: Turn off/on multiple source, and save into Hardware State.
MULSON: Turn off/on multiple source, and save into Hardware State.
MULT: Multiply. Complex multiplication trace math for selected channel.
NEGASYNC: Set external video synchronization to negative-logic TTL.
NEXP: Next page tape directory. (HP 8510B only)
NORMSTEP: Select normal data acquisition cycle. (Preset for HP 8350 and 8340 series sources)
NUMEA1: Select numerator for current parameter.
NUMEB1: Select numerator for current parameter.
NUMEB2: Select numerator for current parameter.

NUMG value;
 Number of groups. Execute the specified number of groups of sweeps.

OFFD [value [time suffix]];
 Offset delay of current calibration standard = physical length/C (C = 299.79 mm/s x Velocity Factor)

OFFF [value [freq suffix]];
 Multiple source offset frequency.

OFFL [value];
 Offset loss of current calibration standard. (GΩ/s at 1 GHz)
 Series resistance per unit length.

$$RF = R@1GHz \sqrt{F/1GHz}$$
 (Not used for waveguide type.)

OFFS;
 Define load or arbitrary impedance standard type as offset type.

OFFZ [value];
 Real Z of offset calibration standard (Ω). (Use Z₀ for waveguide type.)

OFLD;
 Offset load done.

OMII;
 2-port omit isolation calibration step.

OPRP;
 Display operating parameters.

OUTPACT1: Output current active function value. (One FORM4 ASCII number.)

OUTPCALC01:

OUTPCALC02:

OUTPCALC03:

OUTPCALC04:

OUTPCALC05:

OUTPCALC06:

OUTPCALC07:

OUTPCALC08:

OUTPCALC09:

OUTPCALC10:

OUTPCALC11:

OUTPCALC12:

Output measurement calibration error coefficient set real/imaginary pairs for current calibration set to external controller via HP-IB. (See "Internal Calibration Error Coefficient Storage" table for assignments.)

OUTPDATA: Output selected channel corrected data array real/imaginary pairs.

OUTPDELA: Output delay table real/imaginary pairs.

OUTPERRO: Output number and message of current caution/tell message to external controller, clear status bytes, clear caution/tell message, no change to Status Request Mask. (See SRQM.)

OUTFORM:
 Output selected channel formatted data array pairs.
 Cartesian: X = basic units of selected format, Y = 0.
 Polar and Smith: real/imaginary pairs.

OUTFREQ:
 Output frequency list.

OUTIDEN:
 Output analyzer identification ASCII string. (Same string as displayed for SORF.)

OUTPKY:
 Output integer number for last key pressed. (See *Keyword Dictionary*)

Input		Response		Response and Isolation		Calibration Type	
Memorize	Output	Response	Isolation	1-port	2-port		
CALC01	Ea or Et	Ea or Et	Ed	Ed	Ed		
CALC02	Ea or Et	Ea or Et	Es	Es	Es		
CALC03	Ea or Et	Ea or Et	Es	Es	Es		
CALC04	Ea or Et	Ea or Et	Es	Es	Es		
CALC05	Ea or Et	Ea or Et	Es	Es	Es		
CALC06	Ea or Et	Ea or Et	Es	Es	Es		
CALC07	Ea or Et	Ea or Et	Es	Es	Es		
CALC08	Ea or Et	Ea or Et	Es	Es	Es		
CALC09	Ea or Et	Ea or Et	Es	Es	Es		
CALC10	Ea or Et	Ea or Et	Es	Es	Es		
CALC11	Ea or Et	Ea or Et	Es	Es	Es		
CALC12	Ea or Et	Ea or Et	Es	Es	Es		

OUTPMEMO:
Output currently selected trace memory
real/imaginary pairs.

<i>Marker Units for all Display Formats</i>		
Marker	Format	Basic Units
LOG MAG	LOG MAG	dB
PHASE	PHASE	degrees (°)
DELAY	DELAY	seconds (s)
SMITH CHART	SMITH CHART	ohms, ohms
SWR	SWR	SWR, 0
LINEAR MAGNITUDE	LINEAR MAGNITUDE	in mag, 0
LN MKR on POLAR	LN MKR on POLAR	in mag, degrees
LOG MKR on POLAR	LOG MKR on POLAR	log mag degrees
Re/im MKR on POLAR	Re/im MKR on POLAR	real, imag
INVERTED SMITH	INVERTED SMITH	Siemens, Siemens
REAL	REAL	real, 0
IMAGINARY	IMAGINARY	real, 0

OUTPLEAS:
Output 4390-byte FORM1 analyzer Learn String.
(Same contents as Instrument State)

OUTPMARK:
Output active marker trace value. (Two FORM4 ASCII numbers.)

OUTPLOT:
Output complete screen including menu as variable-length HPGL strings to analyzer HP-IB.

OUTPRAW1:

OUTPRAW2:

OUTPRAW3:

OUTPRAW4:

Output trace data from currently selected channel
Raw Data array real/imaginary pairs.

OUTPSTAT:

Output analyzer Status Bytes (2 ASCII integers), and
clear Status Bytes. (See SQRM)

OUTPTITL:

Output current active title, calibration kit label,
standard label, standard class label, or standards in
class. ASCII string.

OVER:

Dual channel overlay display.

PAGP:

Page parameters. Display next page of operating
parameters list.

PARL ["string"]:

Parameter label. Label current user parameter using
up to eight characters. (User parameters only)

PEEK:

Examine contents of memory specified by
peek/poke location. Active functions contents of
specified memory location. Service Use Only.

PEEL memory address:

Peek/poke location. Specify peek and poke memory
address. Service Use Only.

PEN1:
PEN2:
PEN3:
PEN4:
PEN5:
PEN6:
PEN7:
PEN8:

Select pen for current plot type for selected channel.

PENMONO;

Monochromatic pen selection.

PENNSOFT;

PENNWARN;

PENNS1D;

PENNS22D;

PENNS21D;

PENNS12D;

PENNGRAT;

PENMMARK;

PENNNU09;

PENNS1M;

PENNS22M;

PENNS21M;

PENNS12M;

PENNNU14;

PENNST1M;

Select pen colors for the various display elements to plot to a color plotter.

PHAO [value];

Phase offset for current parameter on selected channel.

PHAS;

Phase Cartesian format.

PLOP;

Plot current page of operating parameters listing using digital plotter.

PLOT4S: Plot all four S-parameters using a digital plotter.

PLOTALL: Plot complete measurement display including user display using digital plotter.

PLOTAUTFOFF:

Turn off/on the automatic paper feed on a plotter.

PLOTDATA:

Plot trace data only using a digital plotter.

PLOTFORF:

Immediately eject a page from a plotter.

PLOTGRAT:

Plot graticule only using digital plotter.

PLOTHPIB [value];

Set address of plotter on System Bus. (1 - 30)

PLOTMARK:

Plot marker(s) only using digital plotter.

PLOTMEMO:

Plot the memory trace only using a digital plotter.

PLOTMENUOFF:

Turn off the ability to plot the softkey menus.

PLOTMENUON:

Plot the softkey menus only using a digital plotter.

PLOTRSPT:

Set the digital plotter interface connection to RS-232 port 1.

PLOTRSP2; Set the digital plotter interface connection to RS-232 port 2.

PLOTTXT; Plot text only using a digital plotter.

PLOTTITL; Plot the title only using a digital plotter.

PLOTTTRAC; Plot trace only using a digital plotter.

PLOTTYPPECOLR; Identify the plot type as a color plot. (Preset)

PLOTTYPPEMONO; Identify the plot type as monochromatic.

PLUS; Plus. Complex addition trace math for selected channel.

POIN; Make total number of measured points active function.

POIN [value]; Current frequency list segment edit.

POIN51;
POIN101;
POIN201;
POIN401;
POIN801; Select number of points for both channels. (Preset)

POKE value; Change contents of memory location specified by peek/poke location. Service Use Only.

PORT1 [value [time suffix]];
PORT2 [value [time suffix]];
Reference plane extensions. Additive with ELPD.
(See COAD; and WAVD.) PORT1 extends S11, S21,
S12. PORT2 extends S22, S12, S21.

POSSYNC:
Set external video synchronization to positive-logic
TTL.

POWER [value];
POWER2 [value];
Set source 1/2 power dbm.

PREC:
[Press to Continue] softkey during one-path 2-port
measurement

PREP:
Previous page. Display previous page of tape
directory. (HP 8510B only).

PRES:
Recalls Instrument State 8.

PRINALL:
Print the complete plot to a graphics printer.

PRINAUTOFF:
Turn automatic form feed off/on in a graphics
printer. (on = Preset)

PRINFORF:
Immediately eject a page from a graphics printer.

PRINHPIB [value];
Set address of printer on System Bus. (1 - 31)

PRINMENUOFF;
Turn off the ability to print the softkey menus using a graphics printer.

PRINMENUON;
Print the softkey menus using a graphics printer.

PRINORIEFLAN;
Set the graphics printer page orientation to landscape/portrait. (portrait=Preset)

PRINRESO [value];
Set the printer resolution in dots per inch. (0 - 400, 96 = Preset)

PRINRSP1;
PRINRSP2;
Set the graphics printer interface connection to RS-232 port 1/2.

PRINSDIMAR [value];
Set either left or right margin distance of printer plots. Left margin set in portrait orientation, right margin set in landscape orientation. (0 - 1.0 m)

PRINTOPMAR [value];
Set top margin distance for printer plots. (0 - 1.0 m)

PRINTYPECOLR;
Define the print type as a plot dump to a color printer.

PRINTYPEMONO;
Define the print type as a plot dump to a single-color printer.

PRINWID [value];
Set the total width of a printed plot. (0 - 1.0 m)

PRIP:
Print parameters. Print current page of operating or system parameters using printer.

PULOHIGH:
Set pulse output active high/low.

PULP:
Select Pulse Profile Domain.

PULW [value [time suffix]]:
Set width of internally-generated pulse. Wideband option 008 only. (0 - 40.88 ms)

QUICSTEP:
Select the quick-step phaselock mode.

RAID:
Response and isolation calibration done, followed by CALSN:

RAIRESP:
RAISOL:
Measure response/isolation standard in response and isolation calibration.

RAMP:
Ramp sweep mode.

REAL:
Real Cartesian format.

RECA1:
RECA2:
RECA3:
RECA4:
RECA5:
RECA6:
RECA7:
RECA8:
 Recall previously stored Instrument State from specified internal memory. (Restores standard Basic parameter definitions, selects DISPDATA.)

RECO:
 Recall previously saved CRT colors.

REDD:
 Redefine done. Store current parameter definition.

REFA:
 Reference amplifier gain. See GAINn.

REFD:
 Reflection done. All 2-port reflection standard classes are measured.

REFL:
 Begin 2-port reflection measurement calibration steps.

REFP [value]:
 Reference position. (0 - - 10)

REFV [value]:
 Reference value.

REIP:
 Real/imaginary on Polar format.

RESC:
 Resume calibration at point calibration menu structure was exited.

RESD: Restore display after DIRB, OPFP, or SYSP;
RESI: Reset IF correction. Initiate automatic IF gain calibration. Reset timer.
REST: Measurement restart at beginning of group.
REVI: Measure reverse isolation standard.
REVM:
REVT: Begin reverse match/transmission measurement calibration step. Measure if single standard in class.
RIGL:
RIGU: Right lower/upper plot quadrant.
RSCO: Set the selected color to the default values.
S11:
S12:
S21:
S22: Select S-parameter on current channel.
SADD: Add a frequency list segment.
SAV1:
SAV2: Save 1-port/2-port measurement calibration, followed by CALSN.

SAVC:
Store calibration coefficients loaded using
INPUCALcn;. Followed by CALSn.;

SAVE1:
SAVE2:
SAVE3:
SAVE4:
SAVE5:
SAVE6:
SAVE7:
SAVE8:

Save current instrument State in specified internal
memory.

SAVT:

Save TRL 2-port measurement calibration, followed
by CALSn.;

SAVUSCI:
SAVBINA:

Select ASCII/binary format for tape operation.
(ASCII = Preset) (HP 8510B only)

SCAL [value]:

Scale Y-axis and Polar scale/division.

SDEL [value]:

Delete current or specified frequency list segment.
(value = 1-31)

SDON:

Current frequency list segment edit done. If in
frequency list sweep mode, update trace.

SEAL:

Active marker search left from current position for
selected minimum, maximum, or target.

SEAR: Active marker search right from current position for selected minimum, maximum, or target.

SEDI [value]: Edit current or specified frequency list segment.

SEGM [value]: Choose frequency list segment to edit.

SERVADCG:

SERVDFTG:

SERVREFC:

SERVTEMP1:

SERVTEMP2:

SERVTEESC:

SERVVCAL:

SERVVREF:

Service Use Only.

SETDAY [value]: Set the day of the month for the real-time clock. (1 - 31)

SETF: Set frequency low pass. Start/stop frequencies may change. Issue once after CAL1 or CAL2. Included in TIML.

SETHOUR [value]: Set the hour part of the real-time clock. (0 - 24)

SETMIN [value]: Set the minutes part of the real-time clock. (0 - 60)

SETMTH [value]: Set the month part of the real-time clock. (1 - 12)

SETYEAR [value]: Set the year part of the real-time clock. (00 - 99)

SETRREFL: TRL reflection standard sets reference plane.

SETRHRU: TRL thru standard sets reference plane.

SETZ [value]: Set Z_0 of Smith Chart, inverted Smith, load calibration standards, convert to Z and convert to Y (Preset selects $Z_0 = 50\Omega$)

SIMS: In TRIG mode, with calibration standard selected, move Raw Data to calibration coefficient storage. (Simulate measurement of calibration standard)

Minimum Frequency Ranges for Time Low Pass

Number of Points	Minimum Frequency Range (GHz)	
	Start	2-Point Stop
(n)	Start	2-Point Stop
51	0.045	1.170
101	0.045	2.295
4.545	0.045	4.545
201	0.045	9.045
401	0.045	18.045
801	0.045	36.045

- SINC:** Single channel display.
- SING:** Single sweep. Execute one group of sweeps, then hold.
- SINP:** Single point mode. Use [CENT [value[suffix]]]; to set frequency.
- SLID:** Sliding load done.
- SLI:** Specify the current standard load calibration standard as sliding.
- SLIS:** Slide is set, measure one slide position. 5 slides minimum; 6-12 slides recommended.
- SLOPOFF:** Source 1 (RF) power slope off.
- SLOP2OFF:** Source 2 (LO) power slope off.
- SLOPON [value]:** Set source 1 (RF) power slope (dB/GHz).
- SLOP2ON [value]:** Set source 2 (LO) power slope (dB/GHz).
- SMIC:** Smith Chart format.
- SMOOFF:** Smoothing off for selected channel.

SMOON [value];
Smoothing on for selected channel. (Value =
percent of span: 0.1, 0.2, 0.5,... 20 sequence)
Cartesian displays only.

SOFR;
Display operating system software revision.

SOF1;
SOF2;
SOF3;
SOF4;
SOF5;
SOF6;
SOF7;
SOF8;

Press sortkey. Execute current labeled function.

SOU1EXTE;
SOU2EXTE;

Select source 1 (RF)/2 (LO) external leveling.

SOU1INTE;
SOU2INTE;

Select source 1 (RF)/2 (LO) internal leveling.

SOU1MM;
SOU2MM;

Select source 1 (RF)/2 (LO) mm-wave leveling.

SPAN [value [suffix]];

Set stimulus span.

SPLI;
 Dual channel split display format.
SRQM bytea,byteb;
 Set SRQ mask. Mask selected bits of the Status
 Bytes to enable analyzer SRQ. Mask does not affect
 OUTPSTAT.
 bytea = primary status byte, 0-255;
 byteb = secondary status byte, 0-255.

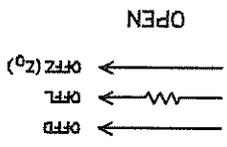
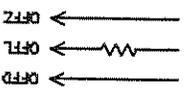
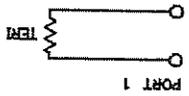
Specify one to seven standards in each class.
 stanAno = stdno of first standard in class.
 stanGno = stdno of seventh standard in class.

stanAno	stanBno	stanGno	SPECADAP
stanAno	stanBno	stanGno	SPECFWDI
stanAno	stanBno	stanGno	SPECFWDM
stanAno	stanBno	stanGno	SPECFWDT
stanAno	stanBno	stanGno	SPECRESPI
stanAno	stanBno	stanGno	SPECRESPI
stanAno	stanBno	stanGno	SPECRESVM
stanAno	stanBno	stanGno	SPECREVT
stanAno	stanBno	stanGno	SPECST1A
stanAno	stanBno	stanGno	SPECST1B
stanAno	stanBno	stanGno	SPECST1C
stanAno	stanBno	stanGno	SPECST2A
stanAno	stanBno	stanGno	SPECST2B
stanAno	stanBno	stanGno	SPECST2C
stanAno	stanBno	stanGno	SPECTRLL
stanAno	stanBno	stanGno	SPECTRLR
stanAno	stanBno	stanGno	SPECTRLT

STANA:
 STANB:
 STANC:
 STAND:
 STANE:
 STANF:
 STANG:
 Measure calibration standard in class. (See Cal Kit
 Standard Class Assignments)
 STAR [value [suffix]]:
 Set start stimulus value.
 STDP:
 Standard done, defined. All necessary
 characteristics of current standard are defined.
 STDARB: arbitrary impedance
 STDDELA: delay/thru
 STDLOAD: load
 STDOPEN: open
 STDISHOR: short
 Specify current standard type.

Standard Types

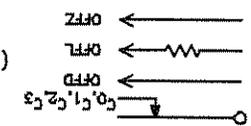
ARBITRARY IMPEDANCE
(Fixed, Sliding, or Offset)



PORT 1 PORT 2
TERM = $\infty \Omega$

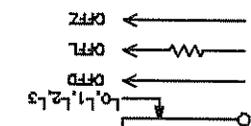
OPEN

PORT 1
TERM = $\infty \Omega$



SHORT

PORT 1
TERM = 0Ω

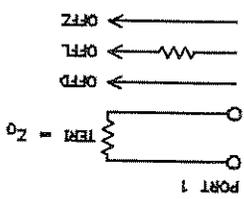


STEP:

Step sweep mode.

STOIDISC:

Select external disc on System Bus for store/load/delete operations. (HP 8510B only)



LOAD
(Fixed, Sliding, or Offset)

ARBITRARY IMPEDANCE
(Fixed, Sliding, or Offset)

STOINT;
STOEXT;
 Select external/internal disc drive for store/load/delete operations : (internal = Preset)

STOITAPE;
 Select internal tape for store/load/delete operations. (Applies to HP 8510B only)

STOP [value [suffix]];
 Set stop stimulus value.

STOR;
 Store tape/disc data file.

STPSIZE [value [freq suffix]];
 Specify current frequency list segment frequency step size.

SUBSCENT [value [suffix]];
SUBSSPAN [value [suffix]];
 Set frequency subset center frequency/span value. part of modify calibration set.

SUBBSTAR [value [suffix]];
SUBSSTOP [value [suffix]];
 Set frequency subset start/stop frequency, part of modify calibration set.

SVC0;
 Save the current CRT color selections in the "user's color" memory part of the Hardware State.

SWET [value [time suffix]];
 Set sweep time.

SWR;
 SWR Cartesian format.

TRIG: Select triggered data acquisition. Waits for HP-IB Group Execute Trigger command to make next measurement, or SIMS; Exit using FRR; or PRES;. See SRQM.

TRID [value [time suffix]]: Set measurement trigger delay for all domains except pulse profile. Wideband IF option 008 only. (-1 us minimum to +40.88 ms maximum)

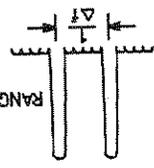
TRAN: Begin 2-port transmission measurement calibration steps.

TRAD: Transmission done. All necessary 2-port transmission and match standard classes are measured.

TINT [value]: Title.

TINT [value]: Set the tint for the color being modified. (0 - 100)

RANGE (m) = $(\frac{1}{\Delta f}) \times (2.997925 \times 10^8 \text{ m/s}) \times (vf)$
 Δf = Hz
 vf = Velocity Factor



$$\text{RANGE(sec)} = \frac{1}{\Delta f} \times \text{span (Hz)}$$

Response Repetition and Range Calculations

TRIS [value]:
Trim sweep. (Applies to HP 8350-series and 8340-series sources only).

TRLL:
Measure TRL line calibration standard.

TRLO:
Modify calibration kit, TRL options defined.

TRLR1:
TRLR2:
Measure TRL port 1/2 reflection standard.

TRLT:
Measure TRL thru standard.

TWOPSS11:
TWOPSS22:
Create an S_{11}/S_{22} 1-port calibration set from a currently active 2-port calibration set, part of modify calibration set.

UNCC:
Uncoupled channels.

UNDE:
Delete last deleted disk file.

UP:
Increase current active function one step.

USED:
User display disk data type.

USER1:
USER2:
USER3:
USER4:
Select user parameter.

USERPRES;
Execute a user preset.

VELOFACT [value];
Velocity factor used in supplementary distance

displays for Frequency Domain electrical delay, port
extensions, delay marker value, Time Domain
marker value, and gate marker value. (Range 0.01 -
500; 1 = Speed of Light = 299,7925 x 10⁶ m/s)

WAIT;
Hold off execution of next instruction until current
instruction is complete.

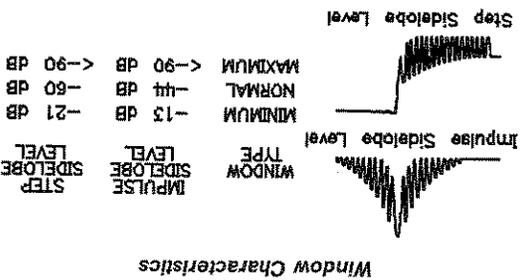
WAVD [cutoff freq [freq suffix]];
Select waveguide phase for electrical delay and port
extensions. Make cut off frequency active function.
(Standard rectangular waveguide phase)

WAVE;
Waveguide calibration standard. (Standard
rectangular waveguide.)

WINDMAXI; maximum.
WINDMINI; minimum.
WINDNORM; normal
Time Domain window type.

Example Window Characteristics
18 GHz Frequency Span

Window Characteristics	Rise Time		Impulse Width		Side-lobe Level	
	10%-90%	(18 GHz Span)	50%	(18 GHz Span)	Impulse	Step
Low	25 psec				-21 dB	
Pass	55 psec				-61 dB	
Step		81 psec				< -90 dBc
Low	Min		33 psec		-13 dBc	
Pass	Norm		54 psec		-44 dBc	
Impulse	Max		77 psec		< -90 dBc	
Band	Min		66 psec		-13 dBc	
Pass	Norm		108 psec		-44 dBc	
Impulse	Max		154 psec		< -90 dBc	



Window Characteristics

HP 8510 QUERY COMMANDS

NOTE: Response is given in parentheses.
[] represents a single space.

ANAO?: Analog On/Off
(1 = on, 0 = off)

AVER?: Averaging
(1 = on, 0 = off)

BEEP?: Beeper
(1 = on, 0 = off)

CALI?: Active Cal Type
("RESPONSE", "RESPONSEU&LISOLN",
"S11I1-PORT", "S22I1-PORT", "2-PORT", or
"UNDEFINED")

CALS?: Active Cal Set
(0 = no active cal set, or 1, 2, 3, 4, 5, 6, 7, 8)

CALSDIR?: Stored Cal Sets
("list of cal sets saved" example: "1,2,3")

CALZ?: TRL Cal Z₀
("THRU" or "SYSTEM")

CHAN?: Selected Channel
(1 or 2)

CONV?
Parameter Conversion
("S", "1/S", "Z", or "Y")

CORR?
Correction
(1 = on, 0 = off.)

COUR?
Coupled Channels
(1 = coupled, 0 = uncoupled)

CRT?
CRT On/Off
(1 = on, 0 = off)

DATESTR?
Date/Time String
("DDMMYY")

DATEIME?
Date/Time Clock On/Off
(1 = on, 0 = off)

DEBU?
Debug On/Off
(1 = on, 0 = off)

DEFM?
Default Memory
(1, 2, 3, 4, 5, 6, 7 or 8, or
"DATA1" from "CHANNEL1", or "CHANNEL2")

DELM?
Electrical Delay
("COAXIAL", "WAVEGUIDE", or "TABLE")

DELTR?
Delta Ref Marker
(0 = Δ ModelOff or 1, 2, 3, 4, 5)

DENOM?
Parameter Denominator
(a1, a2, b1, or "NORATIO")

DETE?
Detector Bandwidth
("NORMALBW" or "WIDEBW")

DISP?
Display Trace
("DATA", "MEMORY", "DATAandMEMORY",
"MATH(U+V)", "MATH(U&MINUS;V)",
"MATH(U|V)", or "MATH(U|V)")

DOMA?
Domain
("FREQUENCY", "TIMELOWPASS",
"TIMEBANDPASS", "AUX:VOLTOUTPUT",
or "PULSEPROFILE")

DRIV?
Parameter Drive
("PORT1", "PORT2", or "NONE")

DUPP?
Duplicate Points
("DELETED", or "MEASURED")

EXTT?
Measurement Trigger mode
("INTERNAL" or "EXTERNAL")

LISTAUTFF?:
List Autofeed On/Off
(1 = on, 0 = off)

LOAT?:
Load Type
("FIXED", "SLIDING", or "OFFSET")

LOCK?:
Parameter Lock To
(a1, a2, or "NONE")

LOCKS?:
Lock Speed
("NORMAL" or "FAST")

LOCT?:
System Phase Lock
("INTERNAL", "EXTERNAL", or "NONE")

LOWP?:
Time Stimulus
("STEP" or "IMPULSE")

LOWPSET?:
Set Freq (Low Pass)
(1 = yes, 0 = no)

MARK?:
Active Marker
(0 = All Off, 1, 2, 3, 4, 5)

MARKMODE?:
Marker Mode
("CONTINUOUS" or "DISCRETE")

MARKSEAR?:
Search Mode
("TARGET", "MINIMUM", or "MAXIMUM")

MATH?
Trace Math
("PLUS", "MINUS", "MULTIPLY", or "DIVIDE")

MED?
Cal Std Media Type
("COAX" or "WAVEGUIDE")

MENU?
Menu On/Off
(1 = on, 0 = off)

MKRLIST?
Marker List On/Off
(1 = on, 0 = off)

MKRLISTTYPE?
Marker List Type
("FOURPARAM", or "FIVEIMKR")

MULS?
Multiple Source
(1 = on, 0 = off)

NUMER?
Parameter Numerator
(b1, b2, a1, a2, "TESTJCAL", "REFJCAL",
"DETECTORBACKGROUND", "ADCLGROUND",
"VCAL", "VREF", "TEMPJ1", or "TEMPJ2")

NUMS?
Freq List Segments
(< number of segments in frequency list >)

PARA?
Parameter
("S11", "S21", "S12", "S22", "USER1", "USER2",
"USER3", or "USER4")

PEN?
Pen Select
(1, 2, 3, 4, 5, 6, 7, 8)

PLOTAUT?
Plotter Autofeed On/Off
(1 = on, 0 = off)

PLOTMENU?
Plot Menu On/Off
(1 = on, 0 = off)

PLOTTYPER?
Plotter Type
("MONOCHROME" or "COLOR")

PRINAUT?
Printer Autofeed On/Off
(1 = on, 0 = off)

PRINMENU?
Print Menu On/Off
(1 = on, 0 = off)

PRINORIE?
Print Orientation
("PORTRAIT" or "LANDSCAPE")

PRINTYPE?
Printer Type
("MONOCHROME" or "COLOR")

PULOR?
Pulse Output
("HIGH" or "LOW")

QUAD?: Select Quadrant
("UPPERLEFT", "LOWERLEFT",
"UPPERRIGHT", "LOWERRIGHT", or
"FULLPAGE")

SAVU?: Save Using
("ASCII" or "BINARY")

SEG?: Segment Measured
("ALLSEGMENTS" or "SINGLESEGMENTS")

SETR?: TRL Cal Ref. Plane
("THRU" or "REFLECT")

SLOP?: Slope of RF Source 1
(1 = on, 0 = off)

SLOP2?: Power Slope of LO Source 2
(1 = on, 0 = off)

SMOO?: Smoothing
(1 = on, 0 = off)

SOU1LEV?: Leveling Type of RF Source 1
("INTERNAL" or "EXTLEVEL")

SOU2LEV?: Leveling Type of LO Source 2
("INTERNAL" or "EXTLEVEL")

STDT?:
Standard Type
("OPEN", "SHORT", "LOAD", "DELAY/THRU", or
"ARBITRARY/IMPEDANCE")

STES?:
Step Type
("QUICK" or "NORMAL")

STOR?:
Storage is
("TAPE" or "DISC", HP 8510C responds "TAPE"
only)

STOIC?:
Storage is
HP 8510C responds "INTERNAL" or "EXTERNAL")

SWEM?:
Sweep Mode
("RAMP", "STEP", "SINGLEPOINT",
"FREQUENCYLIST" or "FASTJCV")

SYNM:
System Sync Mode
("TRIGGERED/JSTEP" or "FREEJRUN")

SYSB?:
System Bus
("LOCAL" or "REMOTE")

TIMESTR?:
Time String
(HH:MM:SS)

HP 8510C SERVICE MANUAL

TRAM?:
Single/Dual Channel
"SINGLECHANNEL", "SPLIT", "OVERLAY",
"FOURPARAMLOVERLAY", or
"FOURPARAMSPLIT")
WIND?:
Window
("MAXIMUM", "MINIMUM", or "NORMAL")

User Display

(ADDRPASS 31; send data to System Bus address)

CS:

Turn off measurement display.

DF:

Set to default state (PU, PA).

KP:

Turn off user display.

LB string CNTL C:

Label text. ASCII string terminated with

CONTROL C.

PA x1,y1[,x2,y2 ...[,xn,yn]]:

Plot absolute.

$0 < x \leq 5377,$

$0 \leq y \leq 4095.$

PD:

Pen down.

PG:

Clear (erase) user display.

PR x1,y1[,x2,y2 ...[,xn,yn]]:

Plot relative.

PU:

Pen up.

RP:

Turn on user display.

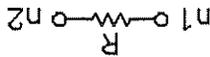
RS:

Turn on measurement display.

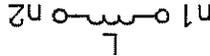
CIRCUIT MODELING PROGRAM

Statements

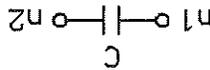
n n PORT node (50 ohm termination)
 n n R node1 node2 resistance



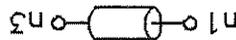
n n L node1 node2 inductance



n n C node1 node2 capacitance



n n TL node1 node2 Z len Er series corrqed shunt



n n n FREQ fstart fstop numsteps

n n n FREQ LOWPASS fstop numsteps

n n n OUTPUT S m Send S-parameter data to HP 8510.

n n n PLOT S m [S m] Plot data on Controller CRT.

NOTE: n n n represents a line number.

m n represents S-parameter notation.

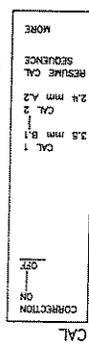
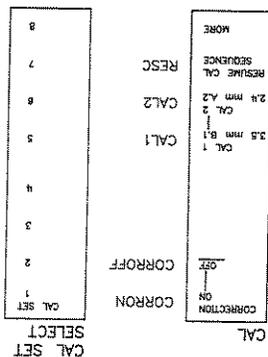
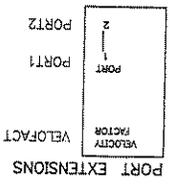
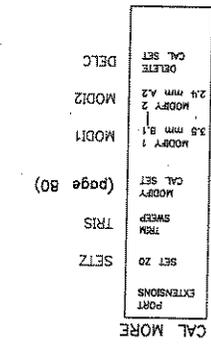
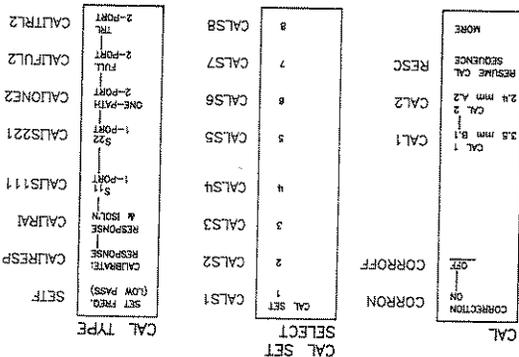
OUTPUT and PLOT can also be used as commands after the program has been RUN

once.

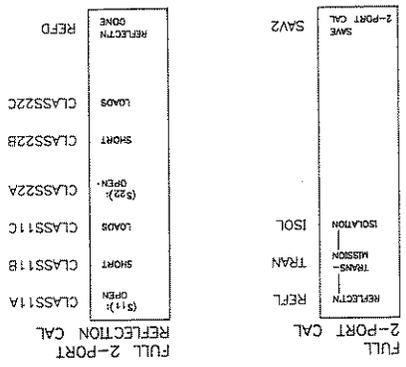
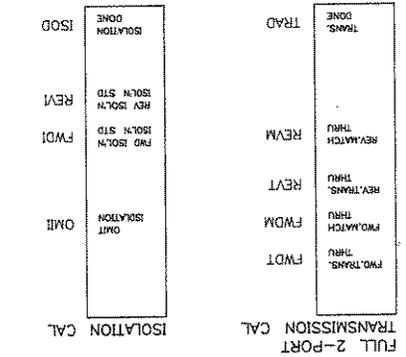
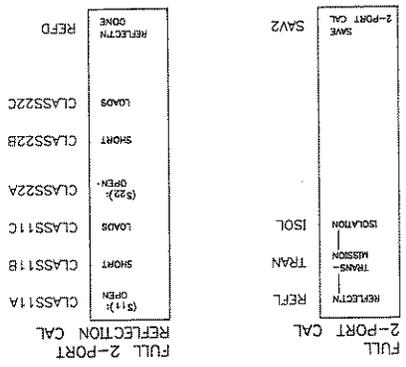
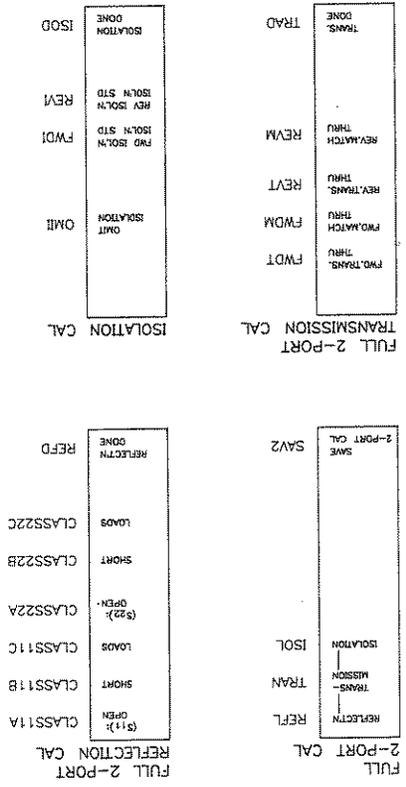
COMMANDS

The controller key CLR I/O interrupts an executing command and returns the program to user control.

- CAT [volume specifier]
- DEL
- GET filename
- HELP [statement or command]
- LIST
- RUN
- SAVE
- PURGE filename
- OUTPUT Snn
- PLOT Snn [, Snn] ...
- END
- BYE
- EXIT
- QUIT



CRL FULL 2-PORT CRL

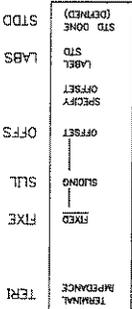


CAL MODIFY CAL KIT

ARBITRARY IMPEDANCE

STANDARD

DEFINITION



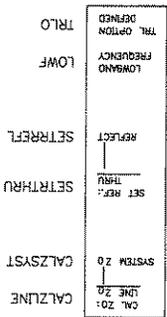
STANDARD

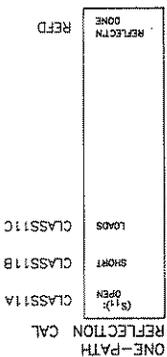
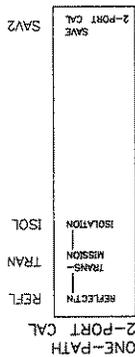
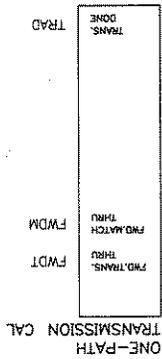
DEFINITION

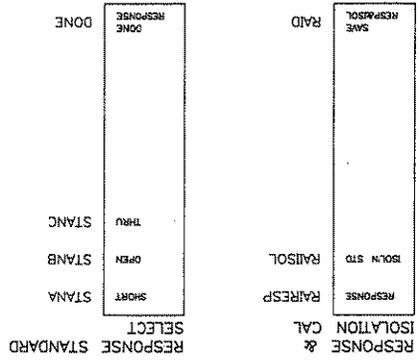


SPECIFY OFFSETS

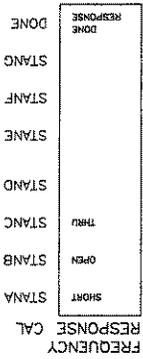
TRL OPTIONS





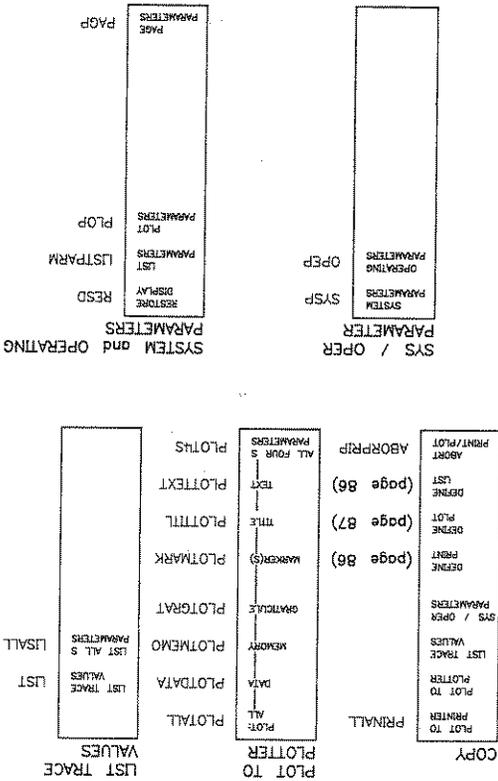


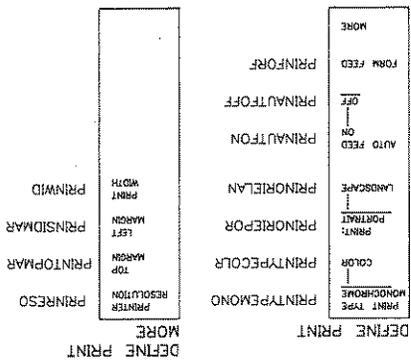
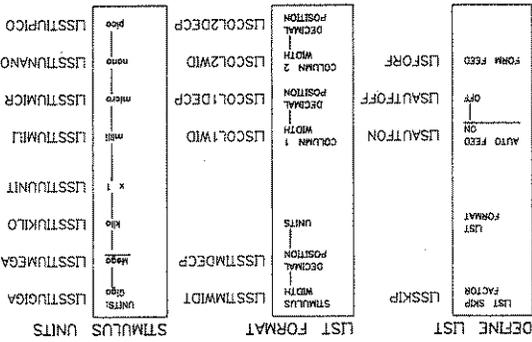
CAL RESPONSE AND ISOLATION CAL

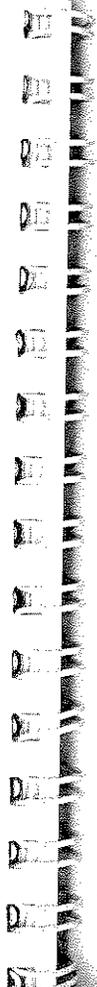
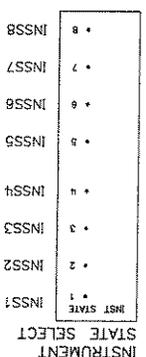
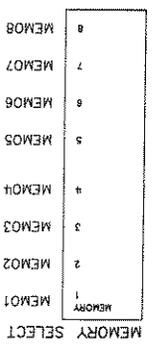
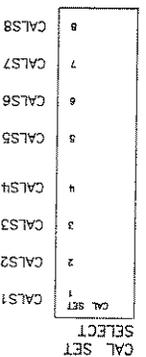
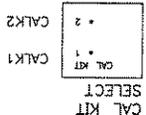
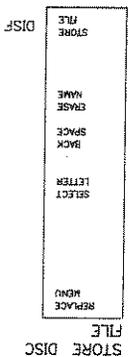
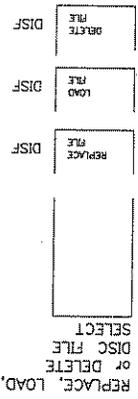


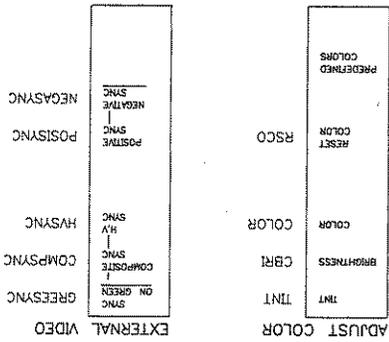
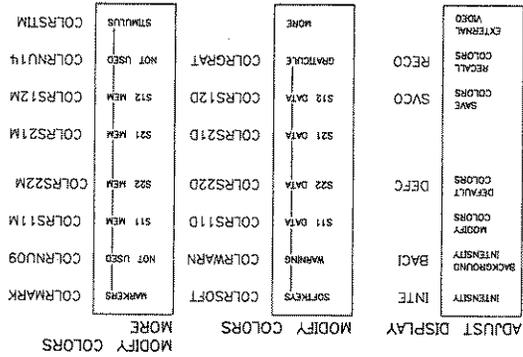
CAL RESPONSE CAL

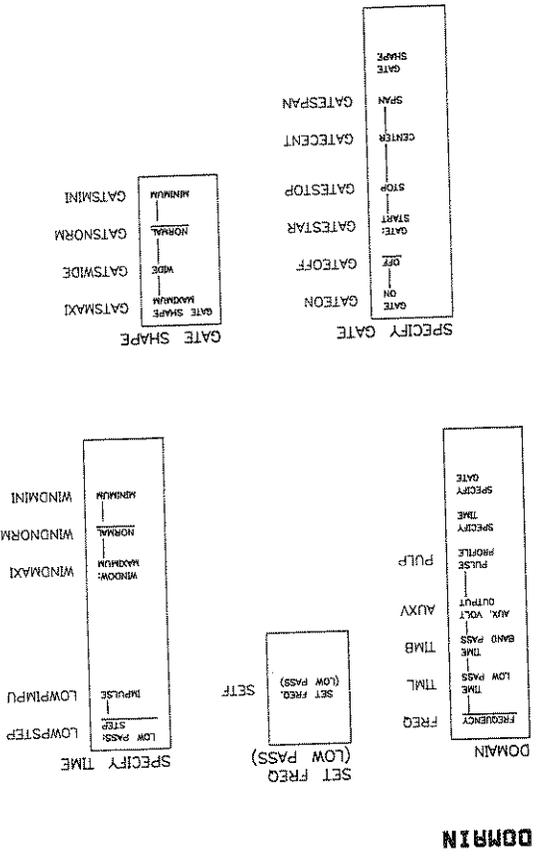
TRL 2-PORT CAL	THRU	undefined
TRL1	S ₁₁ REFLECT	undefined
TRLR1	S ₂₂ REFLECT	undefined
ISOL	ISOLATION	
TRL2	LINE/MATCH	undefined
TRLR2	LOWBAND REFLECT	undefined
SAVT	SWE	TRL 2-PORT

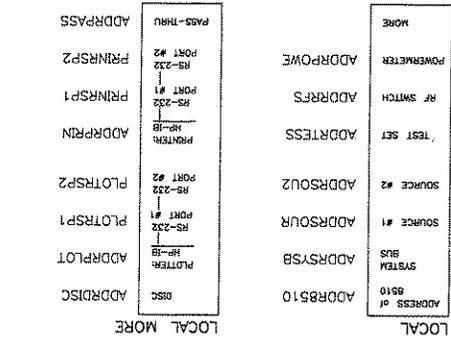






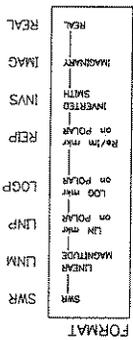


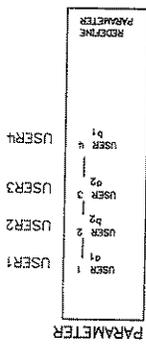
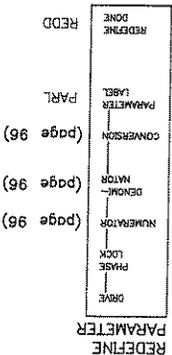
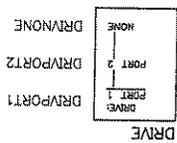
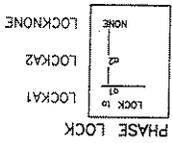


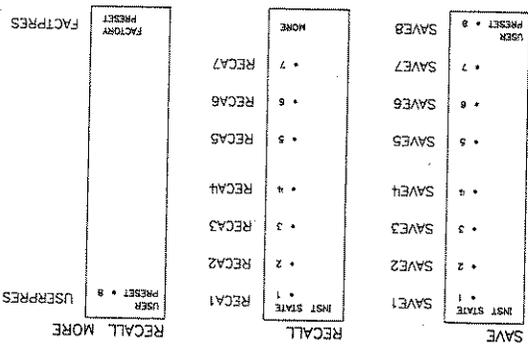


LOCAL

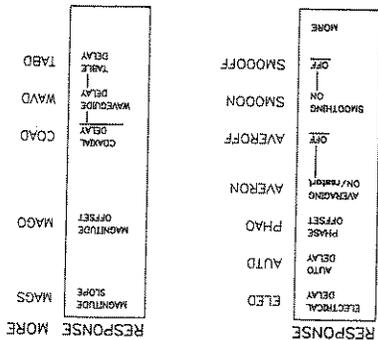
FORMAT





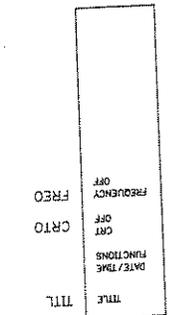


SAVE/RECALL

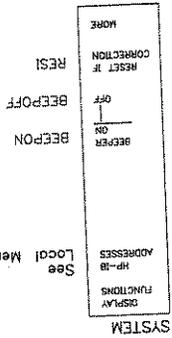


SYSTEM

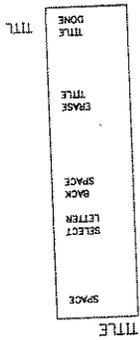
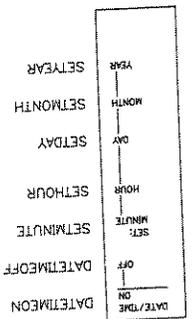
DISPLAY FUNCTIONS



See Local Menu



DATE/TIME FUNCTIONS



DEFINE FREQUENCIES

MULTIPLIER NUMBER

MULTIPLIER DIVISION

OFFSET FREQUENCY

CONSTANT FREQUENCY

DEFAULT

DONE

EDIT MULTIPLE SOURCE

DEFNSOUR1

DEFNSOUR2

DEFRECV

MULT SRC ON / SAVE

MULTSOFF OFF / SAVE

PULSE CONFIGURE

DETEMDB

DETEMRB

PULW

DUTC

PULSE OUT: HIGH

PULSE OUT: LOW

SYSTEM MORE

EDTMULS

SYSTEM PHYSBLOCK

POWER LEVELING

ANALO OUT ON

ANAOFF

SERVICES FUNCTIONS

(page 102)

(page 102)

(page 98)

101

102

103

104

105

106

107

108

109

110

111

112

113

114

115

116

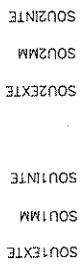
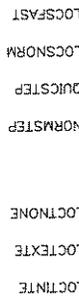
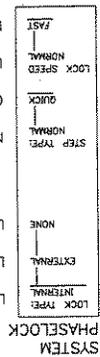
117

118

119

120

SYSTEM



SERVICE FUNCTIONS

