Quick Reference Guide

Agilent Technologies 8510 Network Analyzer

Serial Numbers
This guide applies directly to 8510 Network Analyzers with serial number prefix 3031A or higher.

Firmware Revision
This guide applies directly to any 8510C Network Analyzer having operating firmware revision 7.xx.

Agilent Technologies

Manufacturing Part Number: 08510-90292
Printed in USA
Print Date: May 1994

Hewlett-Packard to Agilent Technologies Transition

This manual may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement, semiconductor products and chemical analysis businesses are now part of Agilent Technologies. To reduce potential confusion, the only change to product numbers and names has been in the company name prefix: where a product number/name was HP XXXX the current name/number is now Agilent XXXX. For example, model number HP 8510C is now model number Agilent 8510C.

For the latest information on Agilent's test and measurement products, go to:
www.agilent.com/find/products.

In the U.S., call Agilent Technologies at 1-800-452-4844.

Documentation Warranty

THE MATERIAL CONTAINED IN THIS DOCUMENT IS PROVIDED "AS IS," AND IS SUBJECT TO BEING CHANGED, WITHOUT NOTICE, IN FUTURE EDITIONS. FURTHER, TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, AGILENT DISCLAIMS ALL WARRANTIES, EITHER EXPRESS OR IMPLIED WITH REGARD TO THIS MANUAL AND ANY INFORMATION CONTAINED HEREIN, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. AGILENT SHALL NOT BE LIABLE FOR ERRORS OR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE FURNISHING, USE, OR PERFORMANCE OF THIS DOCUMENT OR ANY INFORMATION CONTAINED HEREIN. SHOULD AGILENT AND THE USER HAVE A SEPARATE WRITTEN AGREEMENT WITH WARRANTY TERMS COVERING THE MATERIAL IN THIS DOCUMENT THAT CONFLICT WITH THESE TERMS, THE WARRANTY TERMS IN THE SEPARATE AGREEMENT WILL CONTROL.

DFARS/Restricted Rights Notice

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as "Commercial computer software" as defined in DFAR 252.227-7014 (June 1995), or as a "commercial item" as defined in FAR 2.101(a) or as "Restricted computer software" as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Agilent Technologies' standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

HP 8510 NETWORK ANALYZER
Quick Reference Guide

Serial Numbers

This guide applies directly to HP 8510 Network Analyzers with serial number prefix 3031A or higher.

Firmware Revision

This guide applies directly to any HP 8510C Network Analyzer having operating firmware revision **7.XX.**

1400 Fountaingrove Parkway,
Santa Rosa, CA 95403, U.S.A.

Manual Part Number: 08510–90292
Printed: May 1994

Edition 2

Introduction

Use this quick reference guide with the HP 8510C to identify the different mnemonics available for the system. This guide provides syntax requirements and briefly defines the function of individual HP-IB commands. The alphabetical list of programming mnemonics in this guide are more thoroughly explained in the system's *HP 8510C Keyword Dictionary (08510-90280).*

Table of Contents

Notation Conventions

BOLD Uppercase **bold** characters represent program keywords that 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 of units terminator for frequency, power, time, and voltage as listed below:

Frequency Units	**Power Units**	**Time Units**	**Voltage Units**
GHz	mdB	fs	mV
MHz	dB	ps	V
kHz		ns	
Hz		µs (us)	
		ms	
		s	

; A semicolon is the required terminator character for each program instruction.

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

(range of values) The lower case text enclosed in parenthesis describes the range of values that can be applied to the selected function.

value A constant or pre–assigned simple or complex numeric, or string, variable sent over the interface bus to the network analyzer.

variable A simple or complex numeric, or string, variable that receives the value returned from the network analyzer.

(Preset) The value or the state of the functions after selecting a network analyzer *[FACTORY PRESET]*.

Example Entry

GATECENT [value [time suffix]];

The mnemonic may be written as any of the following examples:

GATECENT; Makes gate center the active function.

GATECENT 1; Makes gate center the active function, sets gate center to 1 second. (If no units, default is 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. If any value is entered, it changes the active function value. For example, send the following string:

STAR 10 GHz;

Makes START the active function and while it remains active, sending the following string sets the start function to 2 GHz:

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).

ADDRSOUR [value];
ADDRSOU2 [value];
Source 1 (RF)/2 (LO) System Bus address. (0–31)

ADDRSYSB [value];
HP–IB address of analyzer System Bus. (0–30)

ADDRTESS [value];
Test set System Bus address. (0–31)

ANAOOFF;
ANAOON;
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)

B

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

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

C

C0 [value]; x10^{-15}F
C1 [value]; x10^{-27}F/Hz
C2 [value]; x10^{-36}F/Hz^2
C3 [value]; x10^{-45}F/Hz^3
Open circuit capacitance model values.

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

CALF;
Perform a power flatness correction calibration routine.

CALIFUL2;
Select full 2–port calibration.

CALIONE2;
Select one–path 2–port calibration.

CALIRAI;
Select response and isolation calibration.

CALIRESP;
Select response calibration.

CALIS111;
CALIS221;
Select S_{11}/S_{22} 1−port calibration.

CALITRL2;
Select TRL 2−port calibration.

CALK1;
CALK2;
Calibration kit 1/2 data type in **[TAPE]/[DISC]**.

CALRCVR;
Select receiver calibration.

CALS1;
CALS2;
CALS3;
CALS4;
CALS5;
CALS6;
CALS7;
CALS8;
Under **[DISC]**, calibration set data type. Under **[CAL]**, select or delete a calibration set. Under ***[ADAPTER REMOVAL]*** , specify port 1 or 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 Z_0 referenced to line Z_0.

CALZSYST;
TRL Z_0 referenced to system Z_0 `(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]** or **[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.

CLASS11A;
CLASS11B;
CLASS11C;
CLASS22A;
CLASS22B;
CLASS22C;
Select calibration standard class. Measure if single standard in class.

CLEL;
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.

Select Calibration Standard Class	
Mnemonic	**Standard 2.4 mm, 3.5 mm & 7 mm Labels**
CLASS11A	S_{11} OPEN (1st S_{11} std class)
CLASS11B	S_{11} SHORT (2nd S_{11} std class)
CLASS11C	S_{11} LOADS (3rd S_{11} std class)
CLASS22A	S_{22} OPEN (1st S_{22} std class)
CLASS22B	S_{22} SHORT (2nd S_{22} std class)
CLASS 22C	S_{22} LOADS (3rd S_{22} std class)
FWDT	FWD. TRANS. THRU
FWDM	FWD. MATCH THRU
REVT	REV. TRANS. THRU
REVM	REV. MATCH THRU
FWDI	FWD. ISOL'N ISOL'N STD.
REVI	REV. ISOL'N ISOL'N STD
RAIRESP	RESPONSE STD. in RESP & ISOL'N Cal
RAIISOL	ISOL'N STD. in RESP & ISOL'N Cal
TRLT	THRU
TRLR1	S_{11} RELECT SHORT
TRLR2	S_{22} REFLECT SHORT
TRLL	2 to 18 GHz LINE

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

Select display element to modify.

COLOR [value];

Adjust the degree of whiteness in specified color. (0 – 100)

COMPSYNC;

Set external video synchronization to composite video.

COMS;

Apply connector compensation, then save. Follow with `CALSn;`.

CONC;

Select connector compensation modify calibration set.

CONF [value];

Constant frequency value, multiple source. (0 to end of source frequency range)

CONK1;
Select calibration kit 1 in connector compensation for the connector pair mismatch.

CONK2;
Select calibration kit 2 in connector compensation for the connector pair mismatch.

CONP1;
Select port 1 connectors in connector compensation.

CONP2;
Select port 2 connectors in connector compensation.

CONT;
Continual sweep. (Preset)

CONV1S;
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;`.

CRTO;
Turn analyzer CRT off. (Preset turns on)

CWFREQ [value [freq suffix]];
Frequency list CW frequency.

D

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)

DATETIMEOFF;
DATETIMEON;
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.

DEFPENCOLR;
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]**.

DENOA1; a_1
DENOA2; a_2
DENOB1; b_1
DENONOR; **denominator=1**
Select denominator for current parameter.

DETENORB;
Select the 10 kHz IF path and detectors.

DETEWIDB;
Select the 3 MHz IF bandwidth path and detectors. Pulsed–RF applications.

DIRE;
Display directory for current tape cartridge or disc.

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

DISCVOL [value];
Disc volume number under disc setup.

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

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

DISPDATA;
Display current data only.

DISPDATM;
Display current data and memory.

DISPMATH;
Display current data with math.

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)

E

EDITDONE;
Edit frequency list done.

EDITLIST;
Edit frequency list.

EDITMULS;
Edit multiple source equations.

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

ENTO;
Entry off.

EXTTOFF;
Select internal trigger.

EXTTPOIN;
Select external measurement trigger.

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

F

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; OUTPDATA;"
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; OUTPDATA;"
Enter Nwa_data; Data(*)
  Output Nwa;"FORM4; INPUDATA;";
  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.

FREM [value [frequency suffix]];
Select frequency of measurement in power domain.

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

FREQ;
Select Frequency Domain.

FRER;
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 isolation standard.

FWDM;
Measure forward match standard.

FWDT;
Measure forward transmission standard.

G

GAIN0;
GAIN1;
GAIN2;
GAIN3;
GAIN4;
GAINAUTO;
Service only. Select ref or test IF gain.
(Auto=Preset)

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

GATEOFF;
GATEON;
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.

Gate Characteristics

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

f_{span} = Hz

GREESYNC;
External video set to synchronize on green.

H

HARS;
Hardware State data type under **[TAPE]/[DISC]**. Complete multiple source Hardware State and HP−IB addresses.

HOLD;
Hold mode, sweep is stopped.

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

IMAG;
Imaginary Cartesian format.

INID;
Begin LIF disc initialization.

INIS;
Begin DOS disc initialization.

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

INPUCALC01;
INPUCALC02;
INPUCALC03;
INPUCALC04;
INPUCALC05;
INPUCALC06;
INPUCALC07;
INPUCALC08;
INPUCALC09;
INPUCALC10;
INPUCALC11;
INPUCALC12;
Store measurement calibration error coefficient set real/imaginary 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/imaginary pairs input via HP-IB. To input to memory, "`INPUDATA; DATI;`"

INPUDELA;
Input delay table real,imaginary 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/imaginary 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/imaginary 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.

K

KEYC value
Press analyzer front panel key. See `OUTPKEY;`.

KITD;
Kit done (modified). Store current calibration kit definition.

L

L0 [value]; x10^{-12}H
L1 [value]; x10^{24}H/Hz
L2 [value]; x10^{-33}H/Hz^2
L3 [value]; x10^{-42}H/Hz^3
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"];
LABETRLL ["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)

LEFL;
LEFU;
Left lower/upper plot.

LIMIADDLMAX;
Add a limit line to define maximum valid data.

LIMIADDLMIN;
Add a limit line to define minimum valid data.

LIMIADDPMAX;
Add a limit point to define maximum valid data.

LIMIADDPMIN;
Add a limit point to define minimum valid data.

LIMIBEGLIM [measurement value [domain suffix]];
Set the measurement value of the beginning limit segment.

LIMIBEGSTIM [stimulus value [domain suffix]];
Set the stimulus value (horizontal position) of the beginning of a limit segment.

LIMIDELALL;
Remove all entries from a limit line table.

LIMIDELSEG;
Remove an entry from a limit line table.

LIMIEDITSEG [segment number];
Edit limit point or limit line segment.

LIMIENDLIM [measurement value [domain suffix]];
Set the measurement value of the end of a limit segment.

LIMIENDSTIM [stimulus value [domain suffix]];
Set the stimulus value (horizontal axis) of the end of the limit segment.

LIMILINEOFF;
Turn the display of all limit lines or points OFF for the current channel and parameter.

LIMILINEON;
Turn the display of the limit lines or points ON for the current channel and parameter.

LIMITESTOFF;
Turn OFF testing for data that violates limits for the current channel and parameter.

LIMITESTON;
Turn ON testing for data that violates limits for the current channel and parameter.

LINM;
Linear magnitude Cartesian format.

LINP;
Linear marker on Polar format.

LISALL;
List all S−parameters for the selected channel to a printer.

LISAUTFOFF;
LISAUTFON;
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];
LISCOL2DECP [value];
Set the number of digits after the decimal point in column 1/2 data.(1 – 15, 2 = Preset)

LISCOL1WID [value];
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;	**μs**
LISSTIUMILI;	**ms, mV**
LISSTIUNANO;	**ns**
LISSTIUPICO;	**ps**
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 phaselock input for current parameter.

LOCSFAST;
Select fast system phaselock.

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 TRL lowband frequency.

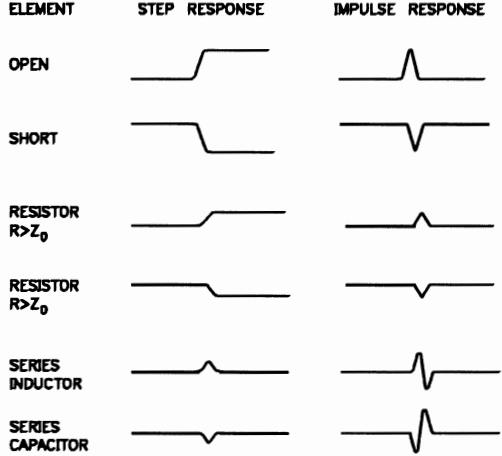
LOWPIMPU;
LOWPSTEP;
Time Domain low pass, impulse/step.

Approximate Formulas for Step Rise Time and Impulse Width (Response–Resolution)

LOW PASS STEP RISE TIME = $(0.45/f_{span})$ (10% – 90%)	X	{	1.0 (WINDMINI) 2.2 (WINDNORM) 3.3 (WINDMAXI)
LOW PASS IMPULSE WIDTH = $(0.60/f_{span})$ (50%)	X	{	1.0 (WINDMINI) 1.6 (WINDNORM) 2.4 (WINDMAXI)
BANDPASS IMPULSE WIDTH = $(1.20/f_{span})$ (50%)	x	{	1.0 (WINDMINI) 1.6 (WINDNORM) 2.4 (WINDMAXI)

Time Domain Low Pass Reflections

LOW PASS REFLECTIONS
(REAL Format)



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;
MENUON;
Turn off/on normal display of menus. (on=Preset)

MENUPARA;
Present **[PARAMETER]** menu.

MENUPRIO;
Present **[PRIOR]** menu.

MENURECA;
Present **[RECALL]** menu

MENURESP;
Present **[RESPONSE]** menu.

MENUSAVE;
Present **[SAVE]** menu.

MENUSTIM;
Present **[STIMULUS]** menu.

MENUSYST;
Present **[SYSTEM]** menu.

MENUTAPE;
Present **[TAPE]** menu.

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

MINF [value [freq suffix]];
Minimum frequency of current calibration standard. (F_{co} for waveguide type)

MINU;
Minus. Complex subtraction trace math for selected channel.

MKRLFIVM;
Select 5 marker display list.

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

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

MODI1;
MODI2;
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];
MULN [value];
Multiple source multiplier denominator/numerator.

MULSOFF;
MULSON;
Turn off/on multiple source, and save into Hardware State.

MULT;
Multiply. Complex multiplication trace math for selected channel.

N

NEGASYNC;
Set external video synchronization to negative–logic TTL.

NEXP;
Next page tape directory. (HP 8510B only)

NEXTHIGH;
In power domain, select the next calibrated power point above the current power point to measure.

NEXTLOWE;
In power domain, select the next calibrated power point below the current power point to measure.

NORMSTEP;
Select normal data acquisition cycle. (Preset for HP 8350 and 8340 series sources)

NUMEA1;
NUMEA2;
NUMEB1;
NUMEB2;
Select numerator for current parameter.

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

O

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 Z_0 for waveguide type.)

OFLD;
Offset load done.

OMII;
2-port omit isolation calibration step.

OPEP;
Display operating parameters.

OUTPACTI;

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.)

Internal Calibration Error Coefficient Storage				
	Calibration Type			
Input Output Mnemonic	**Response**	**Response and Isolation**	**1-port**	**2-port**
CALC01	E_R or E_T	E_R or E_T	E_D	E_{DF}
CALC02		E_D or E_X	E_S	E_{SF}
CALC03			E_R	E_{RF}
CALC04				E_{XF}
CALC05				E_{LF}
CALC06				E_{TF}
CALC07				E_{DR}
CALC08				E_{SR}
CALC09				E_{RR}
CALC10				E_{XR}
CALC11				E_{LR}
CALC12				E_{TR}

OUTPFORM;

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

OUTPFREL;

Output frequency list.

OUTPIDEN;

Output analyzer identification ASCII string. (Same string as displayed for `SOFR;`)

OUTPKEY;
Output integer number for last key pressed. (See *Keyword Dictionary*)

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

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

Marker Units for all Display Formats

Format	Marker Basic Units	Outpmark A, b Value
LOG MAG	dB	dB, 0
PHASE	degrees (°)	degrees, 0
DELAY	seconds (s)	seconds, 0
SMITH CHART	R ± jX (Ω)	ohms, ohms
SWR	(unitless)	SWR, 0
LINEAR MAGNITUDE	ϱ (unitless) (refl.) τ (unitless (trans.)	lin mag, 0 lin mag, 0
LIN MKR on POLAR	ϱ∠ϕ (refl.) τ∠Θ° (trans.)	lin mag, degrees lin mag, degrees
LOG MKR on POLAR	dB∠ϕ	log mag degrees
Re/Im MKR on POLAR	jy	real, imag
INVERTED SMITH	G ± jB	Siemens, Siemens
REAL	x (unitless)	real, 0
IMAGINARY	jy (unitless)	real, 0

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

OUTPPLOT;
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.

P

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.

PENNMONO;

Monochromatic pen selection.

PENNSOFT;
PENNWARN;
PENNS11D;
PENNS22D;
PENNS21D;
PENNS12D;
PENNGRAT;
PENNMARK;
PENNNU09;
PENNS11M;
PENNS22M;
PENNS21M;
PENNS12M;
PENNLIMI;
PENNSTIM;

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.

PLOTLIMI;
Plot limit lines or limit points, only, using a digital plotter.

PLOTAUTFOFF;
PLOTAUFON;
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.

PLOTRSP1;
Set the digital plotter interface connection to RS−232 port 1.

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

PLOTTEXT;
Plot text only using a digital plotter.

PLOTTITL;
Plot the title only using a digital plotter.

PLOTTRAC;
Plot trace only using a digital plotter.

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

PLOTTYPEMONO;
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 ELED;. (See COAD; and WAVD;) PORT1 extends S_{11}, S_{21}, S_{12}. PORT2 extends S_{22}, S_{12}, S_{21}.

POSISYNC;
Set external video synchronization to positive–logic TTL.

POWD;
Select power domain operating mode.

POWE [value];
POW2 [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 or the factory preset state. See the HP 8510C Keyword Dictionary for status.

PRINALL;
Print the complete plot to a graphics printer.

PRINAUTFOFF;
PRINAUTFON;
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.

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

PRINRESO [value];
Set the printer resolution in dots per inch.
(0 – 400, 300 = Preset)

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

PRINSIDMAR [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;
PULOLOW;
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)

Q

QUICSTEP;
Select the quick-step phaselock mode.

R

RAID;
Response and isolation calibration done, followed by `CALSn;`.

RAIRESP;
RAIISOL;
Measure response/isolation standard in response and isolation calibration.

RAMP;
Ramp sweep mode.

RCVI;
Measure input power for receiver calibration.

RCVK1;
Select calibration kit 1 for receiver calibration.

RCVK2;
Select calibration kit 2 for receiver calibration.

RCVO;
Measure output power for receiver calibration.

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 `DIRE;`, `OPEP;`, or `SYSP;`.

RESI;
Reset IF correction. Initiate automatic IF gain calibration. Reset timer.

REST;
Measurement restart at beginning of group.

REVI;
Measure reverse isolation 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.

S

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.

SAVR;
Save receiver calibration, followed by `CALSn;`.

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

SAVUASCI;
SAVUBINA;
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;
SERVDETG;
SERVREFC;
SERVTEMP1;
SERVTEMP2;
SERVTESC;
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;`.

Minimum Frequency Ranges for Time Low Pass			
Number of Points	**Minimum Frequency Range (GHz)**		
		Stop	
(n)	**Start**	**2–Point**	**DC**
51	0.045	1.170	2.295
101	0.045	2.295	4.545
201	0.045	4.545	9.045
401	0.045	9.045	18.045
801	0.045	18.045	36.045

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.

SETRTHRU;
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)

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.

SLIL;
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.

SMOOOFF;
Smoothing off for selected channel.

SMOOON [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.

SOFT1;
SOFT2;
SOFT3;
SOFT4;
SOFT5;
SOFT6;
SOFT7;
SOFT8;
Press softkey. 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.

SPECADAP stanAno [, stanBno ... [, stanGno]];
SPECFWDI stanAno [, stanBno ... [, stanGno]];
SPECFWDM stanAno [, stanBno ... [, stanGno]];
SPECFWDT stanAno [, stanBno ... [, stanGno]];
SPECRESP stanAno [, stanBno ... [, stanGno]];
SPECREVI stanAno [, stanBno ... [, stanGno]];
SPECREVM stanAno [, stanBno ... [, stanGno]];
SPECREVT stanAno [, stanBno ... [, stanGno]];
SPECS11A stanAno [, stanBno ... [, stanGno]];
SPECS11B stanAno [, stanBno ... [, stanGno]];
SPECS11C stanAno [, stanBno ... [, stanGno]];
SPECS22A stanAno [, stanBno ... [, stanGno]];
SPECS22B stanAno [, stanBno ... [, stanGno]];
SPECS22C stanAno [, stanBno ... [, stanGno]];
SPECTRLL stanAno [, stanBno ... [, stanGno]];
SPECTRLR stanAno [, stanBno ... [, stanGno]];
SPECTRLT stanAno [, stanBno ... [, stanGno]];

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

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.

HP 8510 Status Bytes				
PRIMARY STATUS BYTE (#1)				
Bit #	**7**	**6**	**5**	**4**
Decimal Value	**128**	**64**	**32**	**16**
Function	Reason in Extended Byte	RQS (SRQ issued)	Syntax Error	SING, NUMB, complete
Bit #	**3**	**2**	**1**	**0**
Decimal Value	**8**	**4**	**2**	**1**
Function	Waiting for GET after reverse device	TRIG waiting for GET FASC; issued, ready for external trigger	Data entry complete	CAUTION message displayed
PRIMARY STATUS BYTE (#2)				
Bit #	**7**	**6**	**5**	**4**
Decimal Value	**128**	**64**	**32**	**16**
Function	Not Used	Not Used	Not Used	Not Used
Bit #	**3**	**2**	**1**	**0**
Decimal Value	**8**	**4**	**2**	**1**
Function	Not used	Power ON sequence complete	Key pressed	Not used

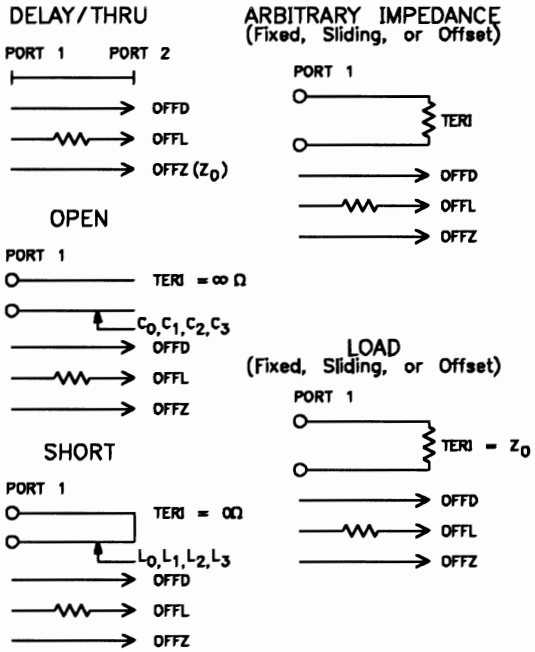
SSEG [value];
Measure single frequency list segment.
(value = segment number)

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.

STDD;
Standard done, defined. All necessary characteristics of current standard are defined.

STDTARBI; arbitrary impedance
STDTDELA; delay/thru
STDTLOAD; load
STDTOPEN; open
STDTSHOR; short
Specify current standard type.



STEP;
Step sweep mode.

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

STOIEXT;
STOIINT;
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.

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

SVCO;
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.

SYSBLOCA;
Analyzer System Bus set to front panel (local) response.

SYSBREMO;
Analyzer System Bus set to remote response. (Automatic after HP 8510 addressed following Pass–Thru; includes Source Limited Instrument State Recall)

SYSP;
Display system parameters.

T

TABD;
Use delay table for electrical delay.

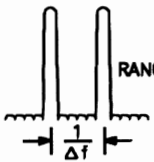
TARV [value];
Specify current format target value for marker to target.

TERI [value];
Terminal impedance of arbitrary impedance type calibration standard (Ohms).

TESA;
Test amplifier gain. See `GAINn;`.

TIMB;
Time band pass. Time Domain display with no frequency limitations.

TIML;
Time low pass. Time Domain display with harmonically related frequencies. (Includes execution of `SETF;`)



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

TITL ["string"];
Title.

TRAD;
Transmission done. All necessary 2–port transmission and match standard classes are measured.

TRAN;
Begin 2–port transmission measurement calibration steps.

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)

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

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.

TWOPS11;
TWOPS22;
Create an S_{11}/S_{22} 1–port calibration set from a currently active 2–port calibration set, part of modify calibration set.

U

UNCC;
Uncoupled channels.

UNDE;
Undelete last deleted disc file.

UP;
Increase current active function one step.

USED;
User display disc data type.

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

USERPRES;
Execute a user preset, recall instrument state 8.

V

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 10^6 m/s)

W

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.

Window Characteristics

Impulse Sidelobe Level

Step Sidelobe Level

WINDOW TYPE	IMPULSE SIDELOBE LEVEL	STEP SIDELOBE LEVEL
MINIMUM	−13 dB	−21 dB
NORMAL	−44 dB	−60 dB
MAXIMUM	<−90 dB	<−90 dB

Example Window Characteristics
18 GHz Frequency Span

Window Characteristics		Rise Time 10%–90% (18 GHz Span)	Impulse Width 50% (18 GHz Span)	Sidelobe Level
Low	Min	25 psec		−21 dBc
Pass	Norm	55 psec		−61 dBc
Step	Max	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

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
("RECEIVER", "RESPONSE",
"RESPONSE␣&␣ISOL'N", "S11␣1-PORT",
"S22␣1-PORT", "2-PORT",
"UNDEFINED")

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

CALSDIRE?;
Stored Cal Sets
("<list of cal sets saved>" example: "1,2,3")

CALZ?;
TRL Cal Z_0
("THRU" or "SYSTEM")

CHAN?;
Selected Channel (1 or 2)

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

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

COUP?;
Coupled Channels
(1=coupled , 0=uncoupled)

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

DATESTR?
Date/Time String
("DD␣MMM␣YY")

DATETIME?;
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
"DATA␣from␣CHANNEL␣1", or
"CHANNEL␣2")

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

DELR?;
Delta Ref Marker
(0=Δ␣Mode␣Off or 1, 2, 3, 4, 5)

DENO?;
Parameter Denominator
(a1, a2, b1, or "NO␣RATIO")

DETE?;
Detector Bandwidth
("NORMAL␣BW" or "WIDE␣BW")

DISCTYPE?;
Disc Format

DISP?;
Display Trace
("DATA", "MEMORY",
"DATA␣and␣MEMORY", "MATH␣(␣+␣)",
"MATH␣(␣&MINUS;␣)", "MATH␣(␣␣)",
or "MATH␣(␣/␣)")

DOMA?;
Domain
("FREQUENCY", "POWER",
"TIME␣LOW␣PASS",
"TIME␣BAND␣PASS",
"AUX␣VOLT␣OUTPUT", or
"PULSE␣PROFILE")

DRIV?;
Parameter Drive
("PORT␣1", "PORT␣2", or "NONE")

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

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

FLAT?;
Flatness On/Off
(1=on, 0=off)

FORM?;
Format
("LOG␣MAG", "PHASE",
"DELAY","SMITH␣CHART", "SWR",
"LINEAR␣MAGNITUDE",
"LIN␣mkr␣on␣POLAR",
"LOG␣mkr␣on␣POLAR",
"Re/Im␣mkr␣on␣POLAR",
"INVERTED␣SMITH",
"IMAGINARY", "REAL")

FREA?;
Frequency Annotation
1=frequency annotation on)
(0=frequency annotation off,

GATE?;
Gate On/Off
(1=Gate On, 0=Gate Off)

GATS?;
Gate Shape
("MAXIMUM", "WIDE", "NORMAL", or
"MINIMUM")

GROU?;
Sweep
("CONTINUAL", or "HOLD")

IFGREFA?;
Ref IF gain
(0, 1, 2, 3, 4, or "AUTO")

IFGTESA?;
Test IF gain
(0, 1, 2, 3, 4, or "AUTO")

LIMILINE?;
Limits On/Off
(1=on, 0=off)

LIMIPASSFAIL?;
Limit test pass/fail status
("PASS", "FAIL", "INVALID")

LIMISEGTYPE?;
Returns type of active limit
("DELETED", "PMIN", "PMAX", "LMIN",
"LMAX")

LIMITEST?;
Limit test on/off
(1=on, 0=off)

LISTAUTF?;
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
("CONTINIOUS" or "DISCRETE")

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

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

MEDT?;
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
("FOUR␣PARAM", or "FIVE␣MKR")

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

NUME?;
Parameter Numerator
(b1, b2, a1, a2, "TEST␣CAL", "REF␣CAL",
"DETECTOR␣GROUND",
"ADC␣GROUND", "VCAL", "VREF",
"TEMP␣1", or "TEMP␣2")

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)

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

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

PLOTTYPE?;
Plotter Type
("MONOCHROME" or "COLOR")

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

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

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

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

PULO?;
Pulse Output
("HIGH" or "LOW")

QUAD?;
Select Quadrant
("UPPER␣LEFT", "LOWER␣LEFT"
"UPPER␣RIGHT", "LOWER␣RIGHT", or
"FULL␣PAGE")

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

SEG?;
Segment Measured
("ALL␣SEGMENTS" or
"SINGLE␣␣SEGMENTS")

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

SLOP?;
Power 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 "EXT␣LEVEL")

SOU2LEV?;
Leveling Type of LO Source 2
("INTERNAL" or "EXT␣LEVEL")

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

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

STOI?;
Storage is
("TAPE" or "DISC". HP 8510C responds
"TAPE" only.)

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

SWEM?;
Sweep Mode
("RAMP", "STEP", "SINGLE␣POINT",
"FREQUENCY␣LIST" or "FAST␣CW")

SYNM;
System Sync Mode
("TRIGGERED␣STEP" or "FREE␣RUN")

SYSB?;
System Bus
("'LOCAL'" or "'REMOTE'")

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

TRAM?;
Single/Dual Channel
"SINGLE␣␣␣CHANNEL", "SPLIT",
"OVERLAY", ("FOUR␣PARAM␣OVERLAY",
or "FOUR␣PARAM␣SPLIT")

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.
$0 \leq x \leq 5377$,
$0 \leq y \leq 4095$.

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.

HP-IB UNIVERSAL COMMANDS

DCL	Device Clear.
LLO	Local Lockout, disables HP 8510 **[LOCAL]** key. Must be cancelled by GTL.
SPD	Disable Serial Poll.
SPE	Enable Serial Poll.
PPU	Not Used.

HP-IB ADDRESSED COMMANDS

GET Group Execute Trigger.

1. After `TRIG;`, make next measurement. Bit 2 of Primary Status Byte set upon completion.
2. During measurement using R/T test set with ONE-PATH 2-PORT error model. Continue measurement after reversing device. Bit 3 of Primary Status Byte set upon completion.
3. After `FASC;` data acquisition triggered by external input.

GTL Go to Local. No response to HP 8510 instructions.

PPC Not Used.

REN Remote Enable. Enable all HP-IB functions.

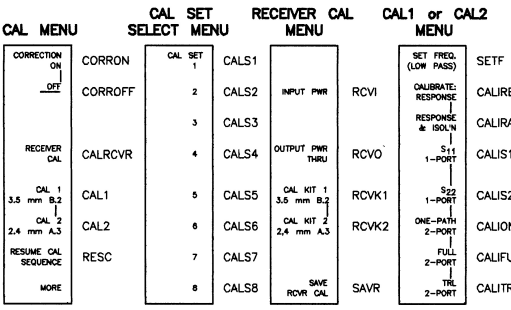
SDC Selected Device Clear.

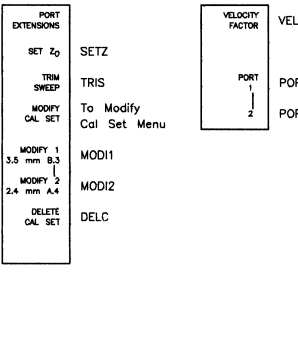
TCT Not Used.

Menu Maps for the HP 8510C Network Analyzer

HP 8510 Menu Maps
Table of Contents

CAL

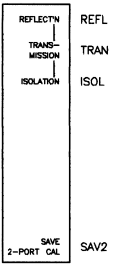

CAL MENU
CAL SET SELECT MENU
RECEIVER CAL MENU
CAL1 or CAL2 MENU
CORRECTION ON
OFF
CORRON
CORROFF
RECEIVER CAL
CALRCVR
CAL 1 3.5 mm B.2
CAL 2 2.4 mm A.3
CAL1
CAL2
RESUME CAL SEQUENCE
RESC
MORE
CAL SET 1
2
3
4
5
6
7
8
CALS1
CALS2
CALS3
CALS4
CALS5
CALS6
CALS7
CALS8
INPUT PWR
RCVI
OUTPUT PWR THRU
RCVO
CAL KIT 1 3.5 mm B.2
RCVK1
CAL KIT 2 2.4 mm A.3
RCVK2
SAVE RCVR CAL
SAVR
SET FREQ. (LOW PASS)
SETF
CALIBRATE: RESPONSE
CALIRESP
RESPONSE & ISOL'N
CALIRAI
S11 1-PORT
CALIS111
S22 1-PORT
CALIS221
ONE-PATH 2-PORT
CALIONE2
FULL 2-PORT
CALIFUL2
TRL 2-PORT
CALITRL2


CAL MORE MENU
PORT EXTENSIONS MENU
PORT EXTENSIONS
SET Z0
SETZ
TRIM SWEEP
TRIS
MODIFY CAL SET
To Modify Cal Set Menu
MODIFY 1 3.5 mm B.3
MODI1
MODIFY 2 2.4 mm A.4
MODI2
DELETE CAL SET
DELC
VELOCITY FACTOR
VELOFACT
PORT 1
PORT1
2
PORT2

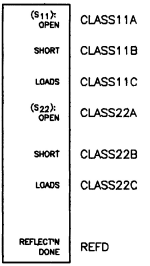
calqrg

CAL FULL 2-PORT CAL

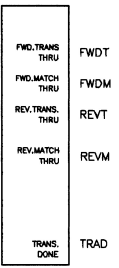
FULL 2-PORT CAL MENU



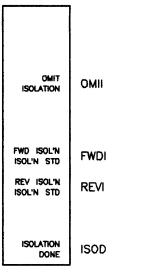
FULL 2-PORT REFLECTION CAL MENU



FULL 2-PORT TRANSMISSION CAL MENU

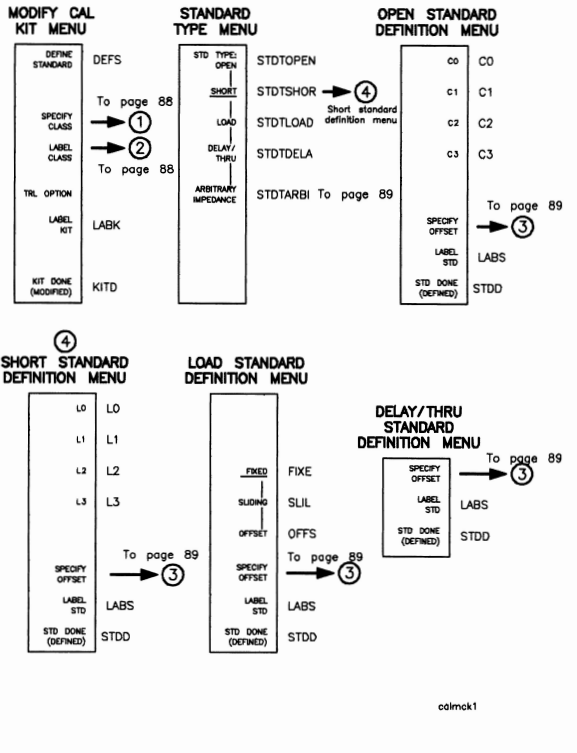


ONE-PATH ISOLATION CAL MENU



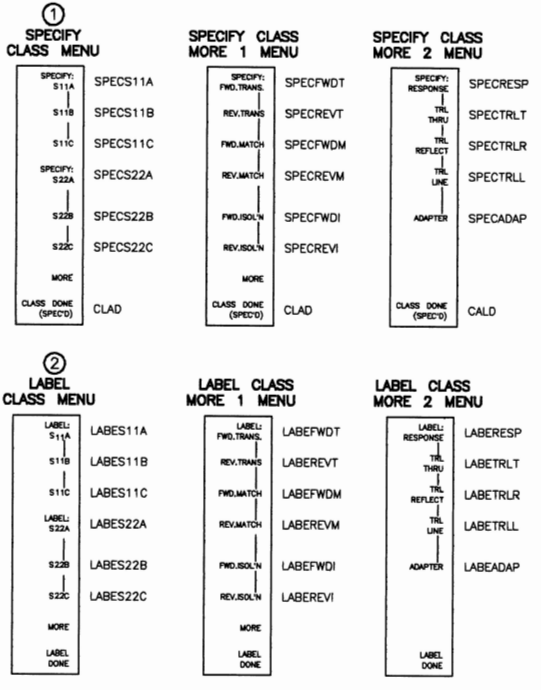
cal2portqrg

CAL, MODIFY CAL KIT MENU (1 OF 3)



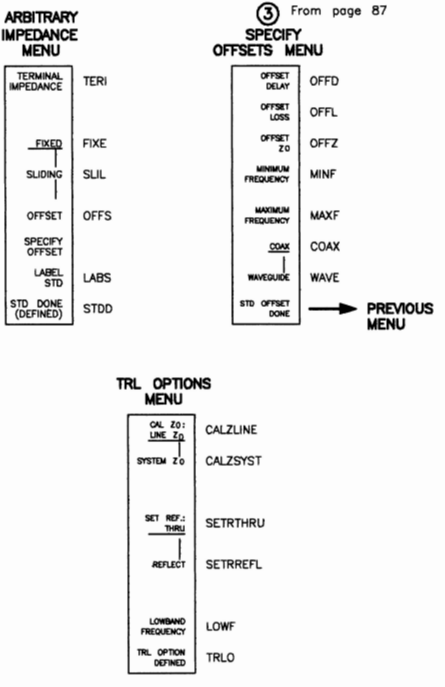
calmck1

CAL, MODIFY CAL KIT MENU (2 OF 3)



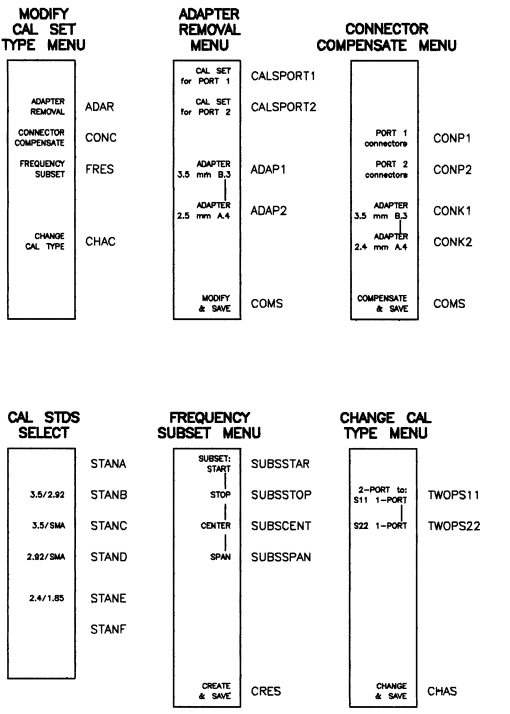
calmck2

CAL, MODIFY CAL KIT MENU (3 OF 3)



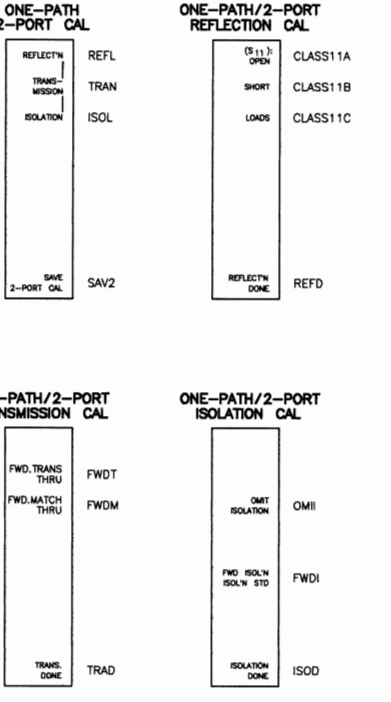
calmck3

CAL, MODIFY CAL SET



calmcsqrg

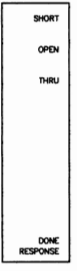
CAL, ONE-PATH 2-PORT



cal1p2pgrg

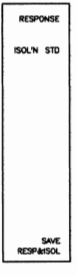
CAL RESPONSE CAL

FREQUENCY RESPONSE
CAL MENU (7mm)



CAL RESPONSE AND ISOLATION CAL

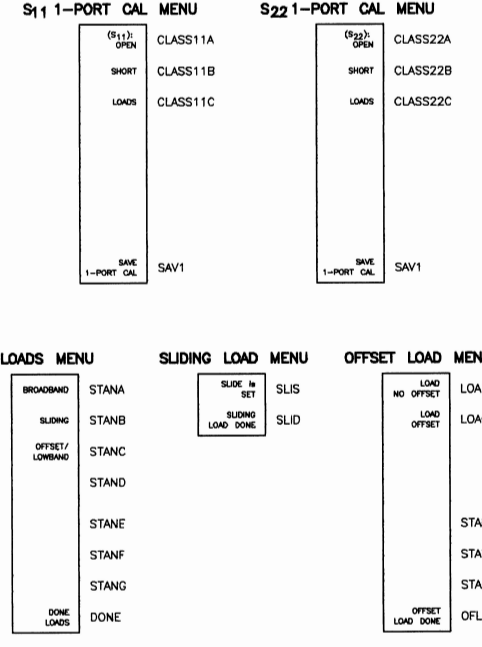
RESPONE & ISOLATION
CAL MENU (7mm)



RESPONSE STANDARD
SELECT MENU (7mm)

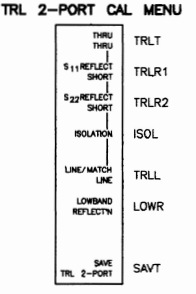
resparg

S_{11} 1-PORT CAL
S_{22} 1-PORT CAL



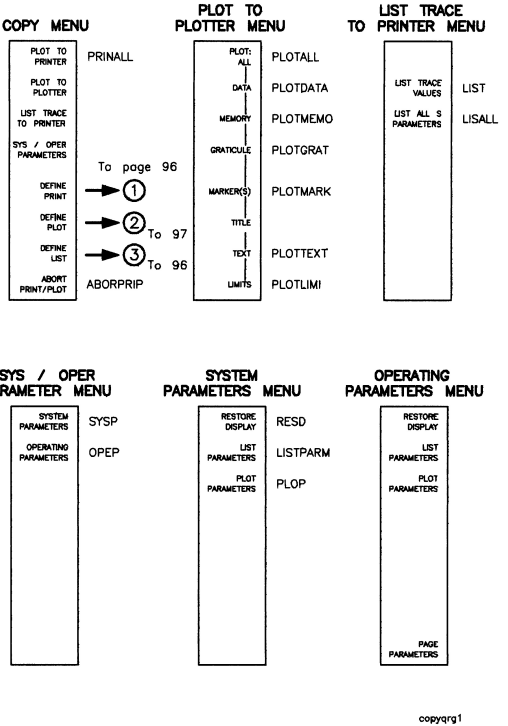
cal1pqrg

CAL TRL 2-PORT



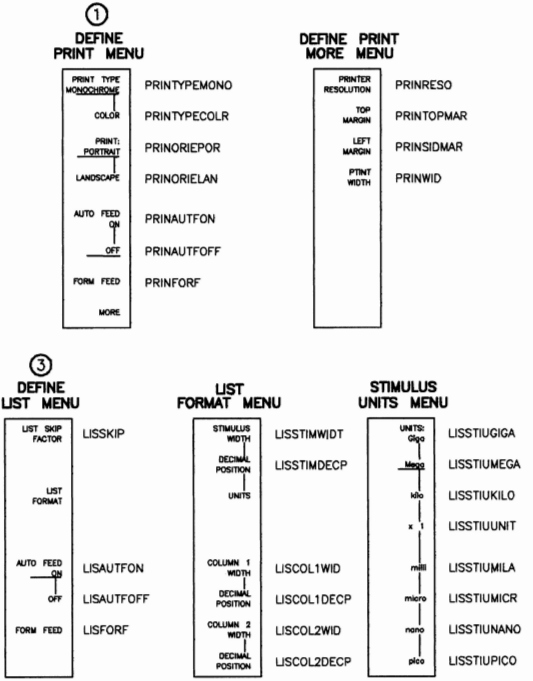
caltrlqrg

COPY (1 OF 3)



copyqrg1

COPY

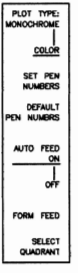


copyqrg2

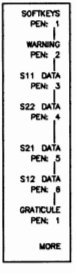
COPY (3 OF 3)

②

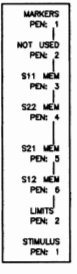
DEFINE PLOT MENU



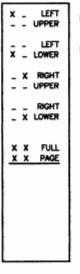
SET PEN NUMBERS MENU



SET PEN NUMBERS MORE MENU

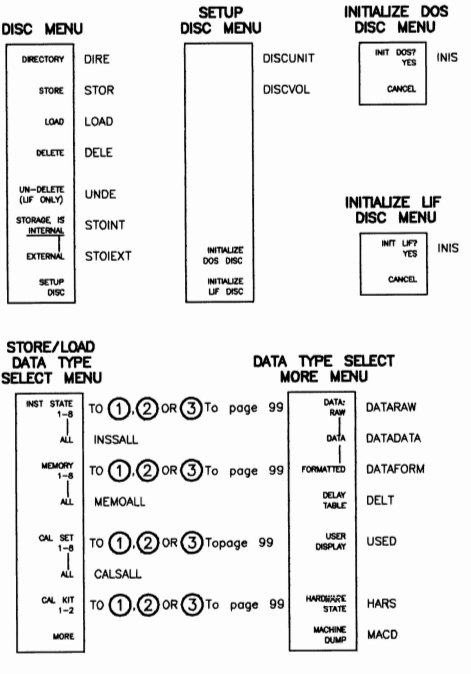


SELECT QUADRANT MENU



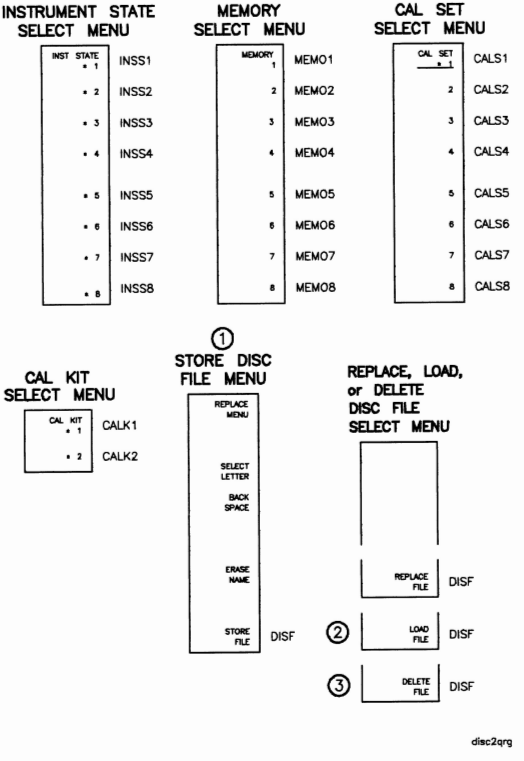
copyqrg3

DISC (1 OF 2)



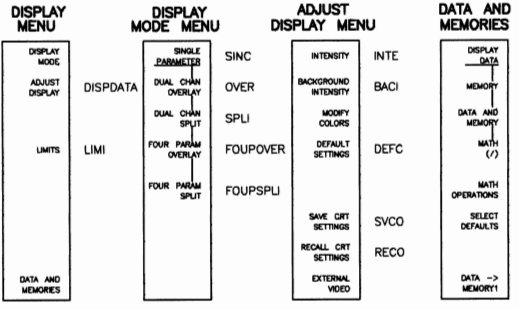
disc1qrg

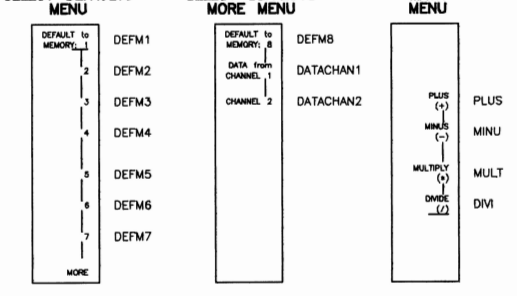
DISC (2 OF 2)



disc2qrg

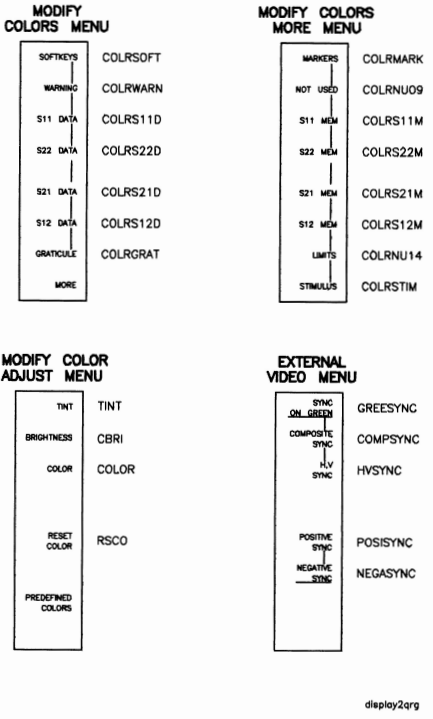
DISPLAY (1 OF 3)





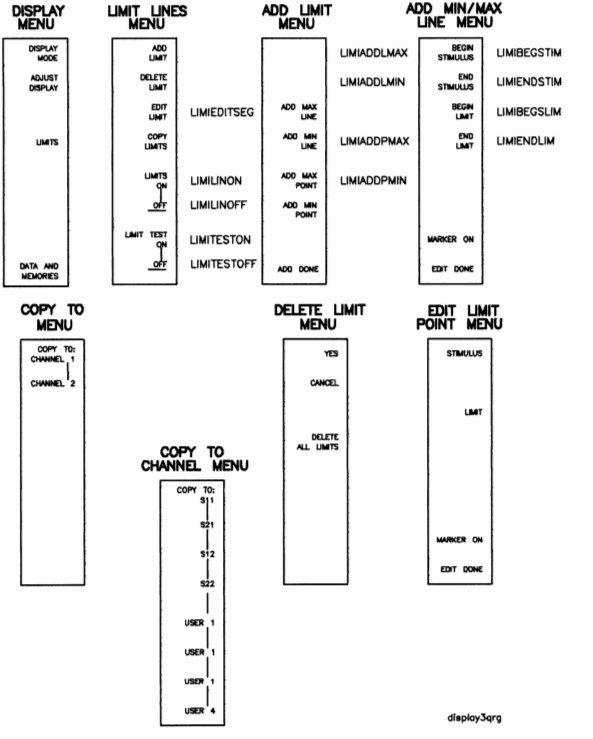
display1.qrg

DISPLAY (2 OF 3)



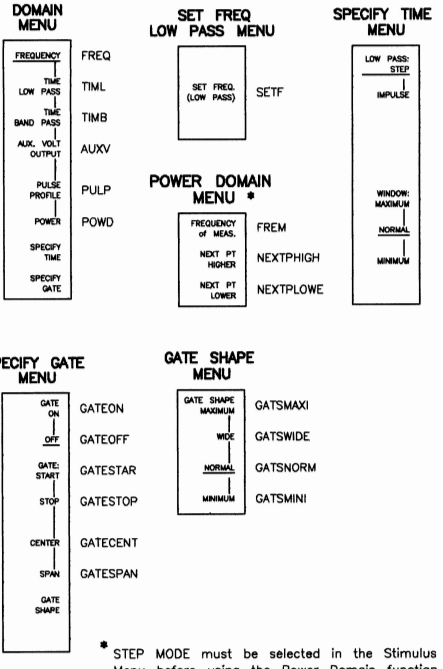
display2qrg

DISPLAY (3 OF 3)



display3qrg

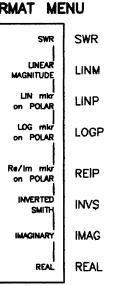
DOMAIN



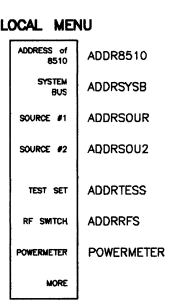
* STEP MODE must be selected in the Stimulus Menu before using the Power Domain function.

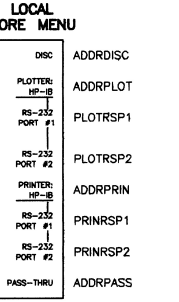
domainqrg

FORMAT



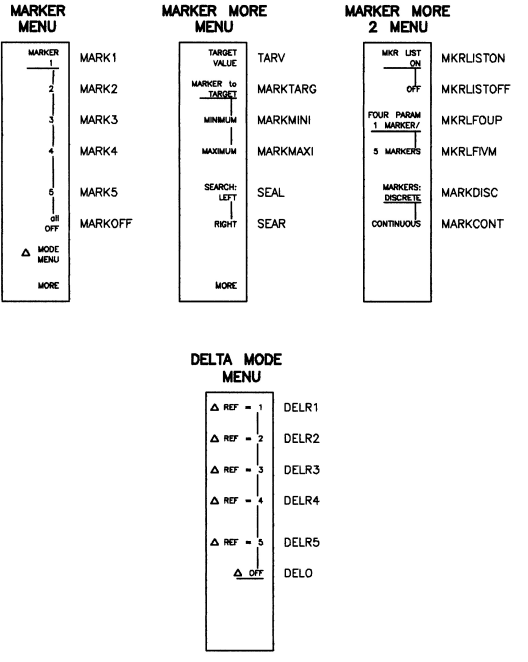
LOCAL





formatgrg

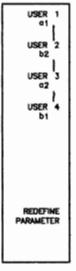
MARKER



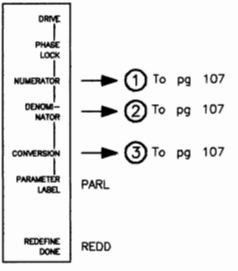
markerqrg

PARAMETER (1 OF 2)

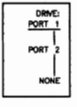
PARAMETER MENU



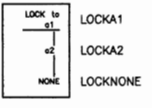
REDEFINE PARAMETER MENU



DRIVE MENU



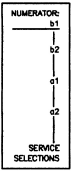
PHASE LOCK MENU



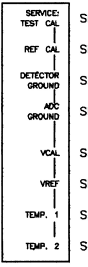
param1grg

PARAMETER (2 OF 2)

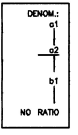
① NUMERATOR MENU



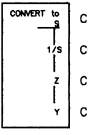
SERVICE SELECTIONS MENU



② DENOMINATOR MENU

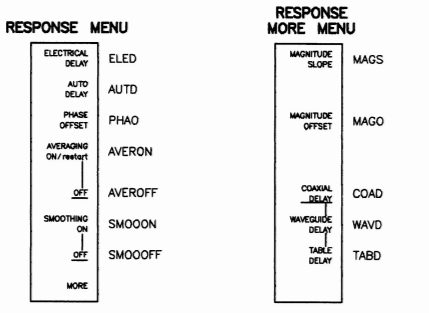


③ CONVERSION MENU

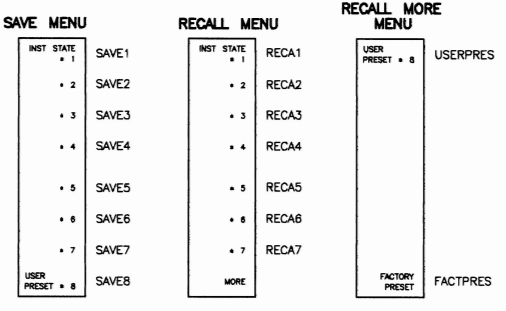


param2qrg

RESPONSE

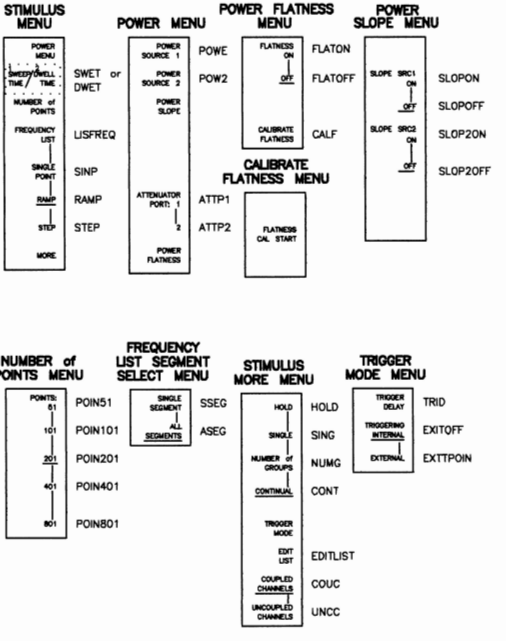


SAVE/RECALL



savrecqrg

STIMULUS (1 OF 2)

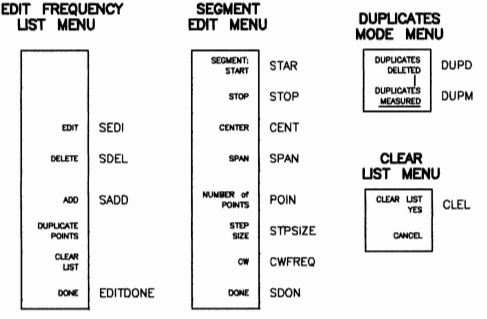


stimulus1qrg

NOTES:

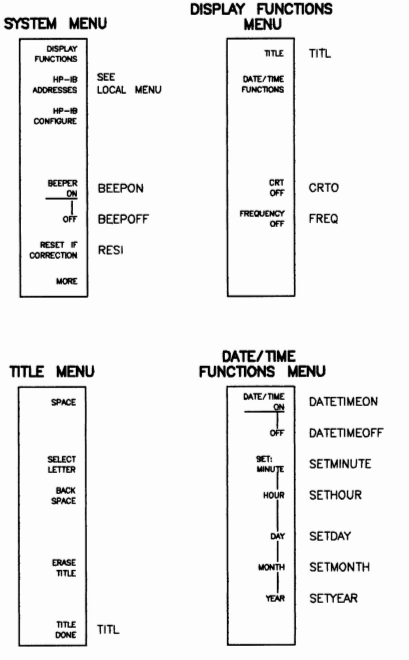
1. Key reads SWEEP TIME while system is in ramp mode.
2. Key reads DWELL TIME while system is in any mode other than ramp mode.

STIMULUS (2 OF 2)



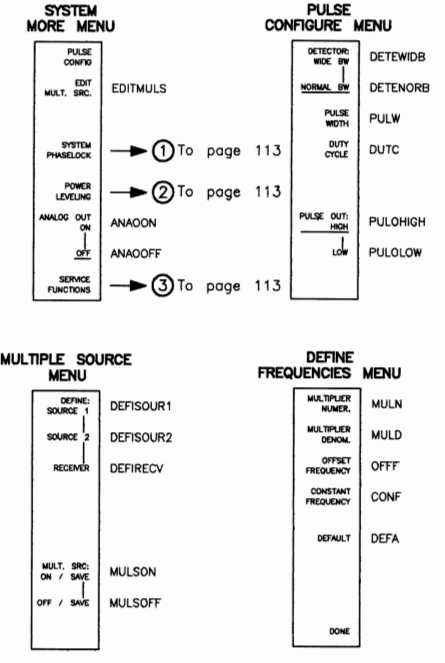
stimulus2qrg

SYSTEM (1 OF 3)



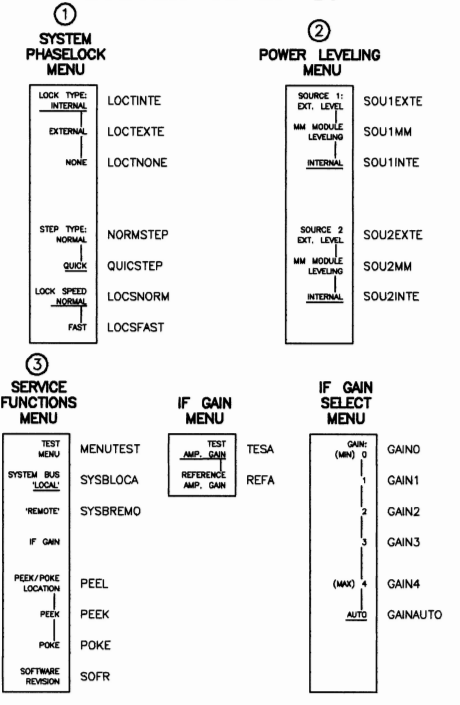
system1qrg

SYSTEM (2 OF 3)



system2qrg

SYSTEM (3 OF 3)



system3qrg