

**HP 4396B Network/Spectrum/Impedance Analyzer**  
**HP-IB Command Reference**

**SERIAL NUMBERS**

This manual applies directly to instruments which have the serial number prefix JP1KE.  
For additional important information about serial numbers,  
read "Serial Number" in Appendix A of this Manual.



HP Part No. 04396-90034  
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## Manual Printing History

The manual printing date and part number indicate its current edition. The printing date changes when a new edition is printed. (Minor corrections and updates that are incorporated at reprint do not cause the date to change.) The manual part number changes when extensive technical changes are incorporated.

March 1997 ..... First Edition  
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## Typeface Conventions

**Bold** Boldface type is used when a term is defined. For example: **icons** are symbols.

*Italics* Italic type is used for emphasis and for titles of manuals and other publications.

Italic type is also used for keyboard entries when a name or a variable must be typed in place of the words in italics. For example: copy *filename* means to type the word copy, to type a space, and then to type the name of a file such as file1.

**Computer** Computer font is used for on-screen prompts and messages.

**HARDKEYS** Labeled keys on the instrument front panel are enclosed in **□**.

**SOFTKEYS** Softkeys located to the right of the CRT are enclosed in **■**.

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## Documentation Map

The following manuals are available for the analyzer.

### **User's Guide (HP Part Number 04396-90031)**

The User's Guide walks you through system setup and initial power-on, shows how to make basic measurements, explains commonly used features, and typical application measurement examples. After you receive your analyzer, begin with this manual.

### **Task Reference (HP Part Number 04396-90030)**

Task Reference helps you to learn how to use the analyzer. This manual provides simple step-by-step instructions without concepts.

### **Function Reference (HP Part Number 04396-90032)**

The Function Reference describes all function accessed from the front panel keys and softkeys. It also provides information on options and accessories available, specifications, system performance, and some topics about the analyzer's features.

### **Programming Guide (HP Part Number 04396-90033)**

The Programming Guide shows how to write and use BASIC program to control the analyzer and describes how HP Instrument BASIC works with the analyzer.

### **HP-IB Command Reference (HP Part Number 04396-90034)**

The HP-IB Command Reference provides a summary of all available HP-IB commands. It also provides information on the status reporting structure and the trigger system (these features conform to the SCPI standard).

### **Option 010 Operating Handbook (Option 010 only) (HP Part Number 04396-90036)**

The option 010 Operation Handbook describes the unique impedance measurement functions of the HP 4396B with option 010.

### **HP Instrument BASIC Manual Set (HP Part Number E2083-90000)**

The HP Instrument BASIC User's Handbook introduces you to the HP Instrument BASIC programming language, provide some helpful hints on getting the most use from it, and provide a general programming reference. It is divided into three books, *HP Instrument BASIC Programming Techniques*, *HP Instrument BASIC Interface Techniques*, and *HP Instrument BASIC Language Reference*.

### **Performance Test Manual (HP Part Number 04396-90120)**

The Performance Test Manual explains how to verify conformance to published specifications.

### **Service Manual (Option 0BW only) (HP Part Number 04396-90121)**

The Service Manual explains how to adjust, troubleshoot, and repair the instrument. This manual is option 0BW only.



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# Introduction

---

This manual provides a reference for the Hewlett-Packard Interface Bus (HP-IB) commands used to control the HP 4396B Network/Spectrum/Impedance Analyzer (analyzer). These commands are implemented using an external controller or the HP Instrument BASIC.

The following is a brief description of each chapter and appendix.

Chapter 2 explains all the HP-IB commands.

Appendix A contains the information required to adapt this manual to earlier versions or configurations of the analyzer than the current printing date of this manual.

Appendix B lists all the HP-IB commands sorted by the function (key label).

Appendix C lists all the HP-IB commands in alphabetical order for the Standard Commands for Programmable Instruments (SCPI) commands.

Appendix D provides information about the status reporting structure for service request functions.

Appendix E provides information about the trigger system, which corresponds to the SCPI standard.

Appendix F describes the calibration types and the standard classes, and the calibration coefficients.

Appendix G provides the front-panel key codes for the KEY HP-IB commands.

Appendix H provides information about data formats and data levels.

Appendix I provides detail information about the waveform analysis commands.

Error Messages lists all error messages with an explanation for each error.

See the *HP-IB Programming Guide* for introduction to using the analyzer's HP-IB commands and for a description of how the HP Instrument BASIC works with the analyzer.

---

## Note



You should become familiar with the operation of the analyzer before you attempt to control it using HP-IB commands. See the following documents which are better suited to this task.

For more information concerning the operation of the analyzer, see the following:

*User's Guide*

*Task Reference*

*Function Reference*

*Option 010 Operating Handbook* for impedance measurement mode.

---

---

**Note**

This manual is not intended to teach the BASIC programming language or the Standard Commands for Programmable Instruments (SCPI) commands. It also does not discuss HP-IB theory. See the following documents that are better suited to these tasks.

For more information concerning BASIC, see the manual set for the BASIC version being used:

*BASIC Programming Techniques*  
*BASIC Language Reference*

For more information concerning SCPI, see the following:

*Beginner's Guide to SCPI*

For more information concerning HP-IB operation, see the following:

*BASIC Interfacing Techniques*  
*Tutorial Description of the Hewlett-Packard Interface Bus*  
*Condensed Description of the Hewlett-Packard Interface Bus*

---

---

## HP-IB Commands

Most of the analyzer's functions have two corresponding HP-IB commands. One is unique to the analyzer (called a **Simple command**) and another corresponds to the Standard Commands for Programmable Instruments (called a **SCPI command**). You can use both commands in one program.

- For example, the command to select the analyzer type is as follows:

```
Simple command:  NA
SCPI command:   :INSTRument:TYPE NA
```

The analyzer also has other commands (called **Common command**) that are not measurement related. These include commands for functions such as status register control or synchronization.

- For example, the command to clear status registers is as follows:

```
*CLS
```

## Simple Commands

All the analyzer's front-panel keys have corresponding HP-IB commands. The names of the simple commands are derived from their front panel key titles (where possible). Commands that have no equivalent front-panel key use a similar convention based on the common name of the function.

## SCPI Commands

SCPI is the instrument command language for controlling instrument that goes beyond IEEE 488.2 standard to address a wide variety of instrument functions in a standard manner.

## Common Commands

All common commands begin with an asterisk (\*). Common commands are defined by IEEE 488.2.

---

## SCPI Subsystem Commands

Subsystem commands include all measurement functions and some general purpose functions. Each subsystem is a set of commands that roughly corresponds to a functional block inside the instrument.

Subsystem commands have a hierarchical structure, called a **command tree**, that consists of several key words separated by a colon between each word.

## Subsystem Command Tree

The top of the subsystem command tree is called the **root command**, or simply the **root**. To reach the low-level commands, you must specify a particular **path** (like a DOS file directory path). After Power ON or after presetting, the current path is set to the root. The path settings are changed as follows:

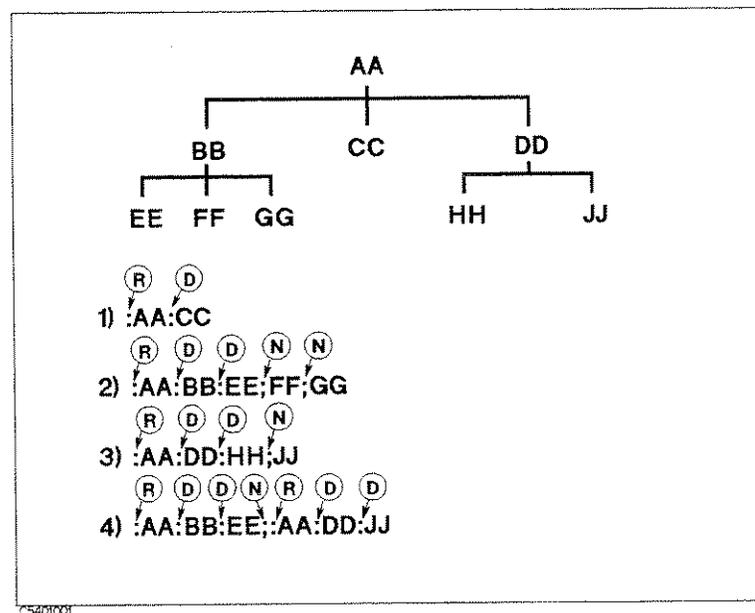
**Program Message Terminator** A program message terminator, such as <new line> character, sets the current path to the root.

**Colon (:)** When a colon is placed between two command mnemonics, the colon moves the current path down one level on the command tree. When the colon is the first character of a command, it specifies that the following command mnemonic is a root-level command.

**Semicolon (;)** A semicolon separates two commands in the same message without changing the current path.

Figure 1-1 shows examples of how to use the colon and semicolon to navigate efficiently through the command tree.

Common commands, such as \*RST, are not part of any subsystem. The analyzer interprets them in the same way, regardless of the current path setting.



CS401001

Figure 1-1. Proper Use of the Colon and Semicolon

- Ⓡ sets the current path to the root.
- ⓓ moves the current path down one level.
- Ⓝ does not change the current path.

## Command Abbreviations

Many commands have a long and a short form. In this manual, all commands are spelled out in the long form. The short form is obtained by deleting the lower case letters.

For example, the short form of :INITiate is :INIT and the long form of it is :INITIATE. (SCPI does *not* accept anything in between, such as :INITIA.)

---

## Program Message Syntax

This section provides the construction of program messages. A program message is the message that you send from a computer to an instrument. Program messages consist of commands combined with appropriate punctuation and program message terminators.

### Case

Letter cases (upper and lower) are ignored.

### Program Message Terminator

A program message must end with one of the three **program message terminators**, <new line>, <^END>, or <new line><^END>. <^END> means that End Of Identify (EOI) is asserted on the HP-IB interface at the same time the preceding data byte is sent. For example, the HP BASIC OUTPUT statement is automatically sent after last data byte. If you are using a PC, you can usually configure your system to send whatever terminator you specify.

### Multiple Messages

To send more than one command in the same message, you must separate them with a semicolon:

```
NA;CHAN1
```

### Query and Response Message Syntax

All commands can be queried except the commands described as "no query" in the command reference. To send a query message, add ? after the last command mnemonic.

```
NA?
```

A response message may contain both commas and semicolons as separators. When a single query command returns multiple values, a comma is used to separate each data item. When multiple queries are sent in the same message, the group of data items corresponding to each query are separated by a semicolon. For example, the fictitious query :QUERY1?;QUERY2? might return a response message of:

```
<data1>,<data1>;<data2>,<data2>
```

After the message, <new line><^END> is always sent as a response message terminator.

## Parameters

There must be a <space> between the last command mnemonic and the first parameter in a subsystem command.

CENT  $\square$  *parameter*

$\square$  means a space (ASCII character (decimal 32)).

If you send more than one parameter with a single command, each parameter must be separated by a comma.

## Parameter Types

The analyzer accepts commands and parameters in various formats and responds to a particular query in a predefined and fixed format. Each command reference contains information about the parameter types available for the individual commands.

- <numeric> represents numeric parameters as follows:

100	no decimal point required
100.	fractional digits optional
-1.23, +235	leading signs allowed
4.56e $\square$ 3	space allowed after e in exponentials
-7.89E-01	use either E or e in exponentials
.5	digits left of decimal point optional

The analyzer setting programmed with a numeric parameter can assume a finite number of values, so the analyzer automatically rounds off the parameter. For example, the analyzer has a programmable input attenuator value. If you specified 50.1, it would be rounded off to 50.

Query response of <numeric\_value> is always a numeric value in <NR1> (integer) or <NR3> (floating point) format.

- Suffix

When a command has a specified suffix, the suffix multiplier and suffix units can be used with parameters as follows. (The suffix multiplier must be used with the suffix unit.):

Frequency:	HZ (Hz; default), KHZ (kHz), MAHZ or MHZ (MHz), GHZ (GHz)
Power:	DBM (dBm; default)
Attenuator:	DB (dB; default)
Time:	S (second; default), MS (ms), US ( $\mu$ s), NS (ns), PS (ps), FS (fs)
Scale:	DB (dB), DEG ( $^{\circ}$ ), S (second), DBM (dBm), DBV (dBV), DBUV (dB $\mu$ V), W (watt), V (Volt), OHM ( $\Omega$ ), SIE (siemens)
Phase:	DEG ( $^{\circ}$ ; default)
Capacitance:	F (farad; default)
Percent:	PCT (%; default)
Impedance:	OHM ( $\Omega$ ; default), KOHM (k $\Omega$ )
Loss:	DB (dB; default)

The suffix is optional and can be omitted.

- <string> is a string parameter that contains ASCII characters. A string must begin with a single quote (ASCII 39 decimal) or a double quote (ASCII 34 decimal) and end with the same corresponding character, a single or double quote. The quote to mark the beginning and end of the string is called the delimiter. You can include the delimiter as part of the string by typing it twice without any characters in between.

Example of *<string>* TXT,

```
OUTPUT @Meter;"ASCE 'TXT'"      using single quote  
OUTPUT @Meter;"ASCE ""TXT"""    using double quote
```

The query response is the string between double quote delimiters.

- *<block>* is typically used to transfer large quantities of related data. *<block>* can be sent as the definite length blocks.

General form of block parameters:

```
#<num_digits><num_bytes><data bytes>
```

The single decimal digit *<num\_digits>* specifies how many digits are contained in *<num\_bytes>*. The decimal number *<num\_bytes>* specifies how many data bytes will follow in *<data bytes>*.

Example of *<block>* ABC+XYZ,

```
OUTPUT @Meter;"#17ABC+XYZ"
```

(1 means one digit follows, 7 means seven bytes follow.)



## Commands Reference

---

This chapter provides a reference for the HP-IB commands of the analyzer. Use this information as a reference to the syntax requirements and general function of the individual commands.

This chapter is organized as follows:

- Simple Commands
- Common Commands
- SCPI Commands With No Equivalent Simple Command
- Service Related Commands

Within each group the commands are listed in alphabetical order. See Appendix B for a functional list of the commands. See Appendix C for a list of the SCPI commands in alphabetical order.

See the *Function Reference* for the details of each function. See *HP-IB Programming Guide* for an introduction to using the analyzer's HP-IB Commands.

The following conventions and definitions are used to describe the commands.

- ① → **AVER**␣{OFF|ON|0|1}  
 ② → Turns the averaging function ON or OFF for the active channel. (**AVERAGING on off** under **(Bw/Avg)**)

③ →

Parameter	Description
OFF or 0	Averaging function OFF
ON or 1	Averaging function ON

- ④ → ■ Query Response  
 {0|1} <new line> <END>  
 ⑤ → ■ Equivalent SCPI Command  
 :SENSe:AVERAge[:STATe] {OFF|ON|0|1}  
 ⑥ → ■ Example

```
OUTPUT 717;"AVER ON"
OUTPUT 717;"AVER?"
ENTER 717;A

OUTPUT 717;":SENS:AVER ON"
OUTPUT 717;":SENS:AVER?"
ENTER 717;A
```

①	<p>Command name and required parameter.</p> <p>Upper case bold characters represent the command that must appear exactly as shown with no embedded spaces. Upper and lower case characters are equivalent.</p> <p>A constant or a pre-assigned simple or complex numeric or string variable transferred to the analyzer. There must be a space between it and the code. (␣ indicates a space.)</p> <p>Characters enclosed in the { } brackets are qualifiers attached to the root mnemonic. There can be no spaces or symbols between the root mnemonic and its appendage. For example, {OFF ON 0 1} means OFF, ON, 0, or 1, and {1-4} means 1, 2, 3, or 4.</p>
②	<p>Description.</p> <p>Key or softkey that has the same function is shown in the brackets. The brackets may include more additional information.</p>
③	<p>Parameter description of the Simple command and SCPI command.</p>
④	<p>Query response of the Simple command and SCPI command.</p> <p>If the query response of the SCPI command differs from the response of the Simple command, the query response of the SCPI command is described in "Equivalent SCPI Command."</p>
⑤	<p>Equivalent SCPI command to the Simple command.</p> <p>See "SCPI Commands" in Chapter 1 for more information about the SCPI command. Square brackets indicate that the enclosed information is optional.</p>
⑥	<p>Example of the usage of the Simple command and SCPI command (including their query forms).</p>

## Simple Commands

### ADDRCONT $\square$ <numeric>

Sets the HP-IB address the analyzer will use to communicate with the external controller.

(ADDRESS: CONTROLLER under (Local))

Parameter	Range	Unit
<numeric>	0 to 30	

#### ■ Query Response

{numeric} <new line><END>

#### ■ Equivalent SCPI Command

:SYSTEM:COMMunicate:GPIB2:ADDRess  $\square$  <numeric>

### ANA0CH1

Selects channel 1 for waveform analysis. For details, see "ANA0CH1" in Appendix I.  
(Instrument BASIC EXECUTE executable; No equivalent SCPI command)

#### ■ Query Response

Parameter	Description
OFF or 0	Analysis for channel 1 is off.
ON or 1	Analysis for channel 1 is on.

### ANA0CH2

Selects channel 2 for waveform analysis. For details, see "ANA0CH2" in Appendix I.  
(Instrument BASIC EXECUTE executable; No equivalent SCPI command)

#### ■ Query Response

Parameter	Description
OFF or 0	Analysis for channel 1 is off.
ON or 1	Analysis for channel 1 is on.

### ANAODATA

Selects a data trace for waveform analysis. For details, refer to "ANAODATA" in Appendix I.  
(Instrument BASIC EXECUTE executable; No equivalent SCPI command)

#### ■ Query Response

Parameter	Description
OFF or 0	Analysis for data trace is off.
ON or 1	Analysis for data trace is on.

## ANAOMEMO

Selects a memory trace for waveform analysis. For details, refer to “ANAOMEMO” in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command)

### ■ Query Response

Parameter	Description
OFF or 0	Analysis for memory trace is off.
ON or 1	Analysis for memory trace is on.

## ANARANG□<numeric1>,<numeric2>

Sets the waveform analysis stimulus range by entering the START and STOP values. For details, see “ANARANG” in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command)

Parameter	Range	Description (Unit)
<numeric1 >	100000 (= 100 k) to 1.82×10 <sup>9</sup> (= 1.82 G) (Network and Impedance analyzer) 0 to 1.82×10 <sup>9</sup> (= 1.82 G) (Spectrum analyzer)	Start Frequency (Hz) Hz (frequency)
<numeric2 >	-70 to 20 100000 (= 100 k) to 1.82×10 <sup>9</sup> (= 1.82 G) (Network and Impedance analyzer) 0 to 1.82×10 <sup>9</sup> (= 1.82 G) (Spectrum analyzer) -70 to 20	Start Power (dBm) Stop Frequency (Hz) Hz (frequency) Stop Power (dBm)

### ■ Query Response

{numeric1},{numeric2}<new line><END>

## ANARFULL

Sets the analysis range equal to the full stimulus range. For details, see “ANARFULL” in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command)

## ATT□<numeric>[DB]

Changes the input attenuation when the S input is selected. Because the attenuators at the R, A, and B inputs are fixed, if either R, A, or B is selected, you can enter the value but not change. (Spectrum analyzer only) (**ATTEN** under **Scale Ref**)

Parameter	Range	Unit
<numeric>	0, 10, 20, 30, 40, 50, 60	dB

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

```
:SENSe:POWer:AC:ATTenuation:AUTO□{OFF|0}
:SENSe:POWer:AC:ATTenuation□<numeric>
```

■ Example

```
OUTPUT 717;"ATT 10DB"
OUTPUT 717;":SENS:POW:AC:ATT:AUTO OFF"
OUTPUT 717;":SENS:POW:AC:ATT 10"
```

**ATTAUTO□{OFF|ON|0|1}**

Sets the automatic and manual spectrum analyzer input attenuator of the S input. (Spectrum analyzer only) (ATTEN AUTO man under [Scale Ref](#))

Parameter	Description
OFF or 0	Manual attenuator
ON or 1	Automatic attenuator

■ Query Response

```
{0|1} <new line><END>
```

■ Equivalent SCPI Command

```
:SENSe:POWer:AC:ATTenuation:AUTO□{OFF|ON|0|1}
```

**ATTP1□<numeric>[DB]**

Controls the attenuation at port 1 of an S-parameter Test Set connected to the analyzer. (Network analyzer only) (ATTENUATOR PORT 1 under [Source](#))

Parameter	Range	Unit
<numeric>	0, 10, 20, 30, 40, 50, 60, 70	dB

■ Query Response

```
{numeric} <new line><END>
```

■ Equivalent SCPI Command

```
:OUTPut:ATTenuation1□<numeric>
```

**ATTP2□<numeric>[DB]**

Controls the attenuation at port 2 of an S-parameter Test Set connected to the analyzer. (Network analyzer only) (ATTENUATOR PORT 2 under [Source](#))

Parameter	Range	Unit
<numeric>	0, 10, 20, 30, 40, 50, 60, 70	dB

■ Query Response

```
{numeric} <new line><END>
```

■ Equivalent SCPI Command

```
:OUTPut:ATTenuation2□<numeric>
```

## AUTO

Brings the trace data, defined by the SCAF command, in view on the display. (Network and impedance analyzer only) (**AUTO SCALE** under **Scale Ref**; No query)

### ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1]|2}:Y[:SCALe]:AUTO|ONCE  
(TRACe[1] for the data trace; TRACe2 for the memory trace.)

## AVER{OFF|ON|0|1}

Turns the averaging function ON or OFF for the active channel. (**AVERAGING ON off** under **Bw/Avg**)

Parameter	Description
OFF or 0	Averaging function OFF
ON or 1	Averaging function ON

### ■ Query Response

{0|1} <new line><END>

### ■ Equivalent SCPI Command

:SENSe:AVERAge[:STATe]{OFF|ON|0|1}

## AVERFACT{<numeric>}

Makes the averaging factor for the active function. (**AVERAGING FACTOR** under **Bw/Avg**)

Parameter	Range	Unit
<numeric>	1 to 999	

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

:SENSe:AVERAge:COUNT{<numeric>}

## AVERREST

Resets the sweep-to-sweep averaging and restarts the sweep count at 1 at the beginning of the next sweep. (**AVERAGING RESTART** under **Bw/Avg**; No query)

### ■ Equivalent SCPI Command

:SENSe:AVERAge:CLEAr

**BACI** <numeric> [PCT]

Sets the background intensity of the display as a percent of the white level.

(BACKGROUND INTENSITY under **Display**)

Parameter	Range	Unit
<numeric>	0 to 100 (simple command)	%
<numeric>	0 to 1 (SCPI command)	

- Query Response

{numeric} <new line><END>

- Equivalent SCPI Command

:DISPlay:CONTRast <numeric>

**BEEPDONE** {OFF|ON|0|1}

Sets an annunciator that sounds to indicate completion of certain operations such as calibration or instrument state save. (BEEP DONE ON off under **System**)

Parameter	Description
OFF or 0	Operation completion beeper OFF
ON or 1	Operation completion beeper ON

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:SYSTem:BEEPer1:STATe {OFF|ON|0|1}

**BEEPFAIL** {OFF|ON|0|1}

Turns the limit fail beeper ON or OFF. When the limit testing is ON and the fail beeper is ON, a beep is emitted each time a limit test is performed and a failure is detected.

(BEEP FAIL ON off under **System**)

Parameter	Description
OFF or 0	Limit fail beeper OFF
ON or 1	Limit fail beeper ON

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:CALCulate:LIMit:BEEPer[:STATe] {OFF|ON|0|1}

### BEEPWARN $\square$ {OFF|ON|0|1}

Sets the warning annunciator. When the annunciator is ON, it sounds a warning when a cautionary message is displayed. (BEEP WARN ON off under **System**)

Parameter	Description
OFF or 0	Warning beeper OFF
ON or 1	Warning beeper ON

#### ■ Query Response

{0|1} <new line><END>

#### ■ Equivalent SCPI Command

:SYSTEM:BEEPPer2:STATe  $\square$  {OFF|ON|0|1}

### BLIGHT $\square$ {OFF|ON|0|1}

Sets backlighting the LCD screen ON or OFF.

Parameter	Description
OFF or 0	Backlighting OFF
ON or 1	Backlighting ON

#### ■ Query Response

{0|1} <new line><END>

#### ■ Equivalent SCPI Command

:DISPlay:BACKlight  $\square$  {OFF|ON|0|1}

### BOTV $\square$ <numeric>

Defines the bottom border of the display and adjusts the scale value. (BOTTOM VALUE under **Scale Ref**); Impedance analyzer only)

Parameter	Range	Unit
<numeric>	-1×10 <sup>9</sup> to 1×10 <sup>9</sup> -200×10 <sup>6</sup> to 200×10 <sup>6</sup>	y-axis unit y-axis unit (Log)

#### ■ Query Response

{numeric} <new line><END>

#### ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{1|2}:Y[:SCALE]:BOTTom  $\square$  <numeric>

**BW** <numeric> [HZ|KHZ|MAHZ]

Sets the bandwidth value for IF bandwidth reduction, or sets the IF bandwidth of the list sweep table. (Network analyzer and Impedance analyzer) (IF BW under Bw/Avg, or IF BW under Sweep)

Sets the bandwidth value for the resolution bandwidth reduction, or sets the resolution bandwidth of the list sweep table. (Spectrum analyzer) (RES BW under Bw/Avg, or RES BW under Sweep)

Parameter	Range	Unit
<numeric>	10, 30, 100, 300, 1000 (=1 k), 3000 (=3 k), 10000 (=10 k), 40000 (=40 k) (network analyzer and impedance analyzer)  1, 3, 10, 30, 100, 300, 1000 (=1 k), 3000 (=3 k), 10000 (=10 k), 30000 (=30 k), 100000 (=100 k), 300000 (=300 k), 1000000 (=1 M), 3000000 (=3 M) (spectrum analyzer)	Hz

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

Network and impedance analyzer :SENSe:BANDwidth[:RESolution] <numeric>

Spectrum analyzer :SENSe:BANDwidth[:RESolution]:AUTO {OFF|0}  
:SENSe:BANDwidth[:RESolution] <numeric>

IF BW, RES BW under Sweep :SENSe:LIST:SEGment:BANDwidth <numeric>

**BWAUTO** {OFF|ON|0|1}

Sets either the automatic or manual resolution bandwidth ON. (Spectrum analyzer only) (RES BW AUTO man under Bw/Avg)

Parameter	Description
OFF or 0	Manual resolution bandwidth.
ON or 1	Automatic resolution bandwidth.

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

:SENSe:BANDwidth[:RESolution]:AUTO {OFF|ON|0|1}

**BWAUTO**  $\square$  {OFF|ON|0|1}

**BWSRAT**  $\square$  <numeric>

Sets the RBW/SPAN ratio that specifies the resolution bandwidth in the AUTO mode. (Spectrum analyzer only) (**RBW/SPAN RATIO** under **Bw/Avg**)

Parameter	Range	Unit
<numeric>	0.01 to 10 (of SPAN) (simple command)	%
<numeric>	0.0001 to 0.1 (SCPI command)	

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:SENSe:BANDwidth[:RESolution]:RATio  $\square$  <numeric>

**CO**  $\square$  <numeric>

Enters the  $C_0$  term, which is the constant term of the capacitance model equation. (Network and impedance analyzer only) (**CO** under **Cal**; No query)

Parameter	Range	Unit
<numeric>	-10000 to 10000 ( $\times 10^{-15}$ )	F

■ Equivalent SCPI Command (Query)

:SENSe:CORRection:CKIT:STANdard:CO  $\square$  <numeric>

■ Query Response

{numeric} <new line><END>

**C1**  $\square$  <numeric>

Enters the  $C_1$  term, which is the constant term of the capacitance model equation. (Network and impedance analyzer only) (**C1** under **Cal**; No query)

Parameter	Range	Unit
<numeric>	-10000 to 10000 ( $\times 10^{-27}$ )	F/Hz

■ Equivalent SCPI Command (Query)

:SENSe:CORRection:CKIT:STANdard:C1  $\square$  <numeric>

■ Query Response

{numeric} <new line><END>

**C2**{<numeric>

Enters the  $C_2$  term, which is the constant term of the capacitance model equation. (Network and impedance analyzer only) (**C2** under **Cal**); No query)

Parameter	Range	Unit
<numeric>	-10000 to 10000 ( $\times 10^{-36}$ )	F/Hz <sup>2</sup>

- Equivalent SCPI Command (Query)

```
:SENSe:CORRection:CKIT:STANdard:C2{<numeric>
```

- Query Response

```
{numeric} <new line><END>
```

**CALCASSI**

Shows the tabular listing of the calibration kit class assignment. (Network and impedance analyzer only) (**CLASS ASSIGNMENT** under **Copy**); No query)

- Equivalent SCPI Command

```
:DISPlay[:WINDow]:TEXT3:PAGE{1}
:DISPlay[:WINDow]:TEXT3:STATe{ON|1}
```

**CALECPARA**

Calculates and displays the equivalent circuit parameters. (**CALCULATE EQV PARAMS** under **Display**); No query; Impedance analyzer only)

- Equivalent SCPI Command

```
:CALCulate:EVALuate:EPARameters
:DISPlay[:WINDow]:TEXT18:STATe{ON|1}
```

**CALI**{NONE|RESP|RAI|S111|S221|FUL2|ONE2|IMP}

Selects the measurement calibration type. (Network analyzer and impedance analyzer only) (**CALIBRATE: NONE**, **RESPONSE**, **RESPONSE & ISOL'N**, **S11 1-PORT**, **S22 1-PORT**, **FULL 2-PORT**, **ONE PATH 2-PORT** under **Cal**) of network analyzer mode or **CALIBRATE MENU** under **Cal** of impedance analyzer mode.)

Parameter	Description
NONE	No calibration (Network and impedance analyzer only)
RESP	Response measurement calibration (Network analyzer only)
RAI	Response and isolation measurement calibration (Network analyzer only)
S111	1-Port measurement calibration at port 1 (Network analyzer only)
S221	1-Port measurement calibration at port 2 (Network analyzer only)
FUL2	Full 2-Port measurement calibration (Network analyzer only)
ONE2	One-path 2-Port measurement calibration (Network analyzer only)
IMP	Calibration of the impedance analyzer mode. (Impedance analyzer only)

- Query Response

## CAL<sub>U</sub>{NONE|RESP|RAI|S111|S221|FUL2|ONE2|IMP}

{NONE|RESP|RAI|S111|S221|FUL2|ONE2|IMP} <new line><END>

### ■ Equivalent SCPI Command

```
CALUNONE      :SENSe:CORRection1:COLLect:METhodUNONE
CALURESP     :SENSe:CORRection1:COLLect:METhodURESPonse
CALURAI      :SENSe:CORRection1:COLLect:METhodURAIisol
CALUS111     :SENSe:CORRection1:COLLect:METhodUS111
CALUS221     :SENSe:CORRection1:COLLect:METhodUS221
CALUFUL2     :SENSe:CORRection1:COLLect:METhodUTPORT
CALUONE2     :SENSe:CORRection1:COLLect:METhodUOPTPort
CALUIMP      :SENSe:CORRection1:COLLect:METhodUIMPedance
```

### ■ Example

```
OUTPUT 717;"CALI NONE"
OUTPUT 717;"CALI?"
ENTER 717;A$
OUTPUT 717;":SENS:CORR:COLL:METH NONE"
OUTPUT 717;":SENS:CORR:COLL:METH?"
ENTER 717;A$
```

## CAL<sub>K</sub>{APC7|APC35|N50|N75|USED}

Selects one of the default calibration kits available for different connector types. (Network and impedance analyzer only) (CAL KIT: 7mm, 3.5mm, N 50 ohm, N 75 ohm, or USER KIT under Cal)

Parameter	Description
APC7	7 mm
APC35	3.5 mm
N50	Type-N 50 Ω
N75	Type-N 75 Ω
USED	User-defined

### ■ Query Response

{APC7|APC35|N50|N75|USED} <new line><END>

### ■ Equivalent SCPI Command

```
CALKAPC7     :SENSe:CORRection:CKITUAPC7
CALKAPC35    :SENSe:CORRection:CKITUAPC35
CALKN50      :SENSe:CORRection:CKITUN50
CALKN75      :SENSe:CORRection:CKITUN75
CALKUSED     :SENSe:CORRection:CKITUUDEFined
```

### ■ Example

```
OUTPUT 717;"CALK APC7"
OUTPUT 717;"CALK?"
ENTER 717;A$
OUTPUT 717;":SENS:CORR:CKIT APC7"
```

CENT<numeric>[HZ|KHZ|MAHZ|GHZ|DBM]

### CALS<numeric>

Provides the tabular listing of the standard definitions. (Network and impedance analyzer only)  
(STD NO.1 to STD NO.8 under (Copy); No query)

Parameter	Range	Unit
<numeric>	1 to 8	

#### ■ Equivalent SCPI Command

```
CALS1 :DISPlay[:WINDow]:TEXT4:PAGEL1  
      :DISPlay[:WINDow]:TEXT4:STATel{ON|1}  
CALS2 :DISPlay[:WINDow]:TEXT5:PAGEL1  
      :DISPlay[:WINDow]:TEXT5:STATel{ON|1}  
CALS3 :DISPlay[:WINDow]:TEXT6:PAGEL1  
      :DISPlay[:WINDow]:TEXT6:STATel{ON|1}  
CALS4 :DISPlay[:WINDow]:TEXT7:PAGEL1  
      :DISPlay[:WINDow]:TEXT7:STATel{ON|1}  
CALS5 :DISPlay[:WINDow]:TEXT8:PAGEL1  
      :DISPlay[:WINDow]:TEXT8:STATel{ON|1}  
CALS6 :DISPlay[:WINDow]:TEXT9:PAGEL1  
      :DISPlay[:WINDow]:TEXT9:STATel{ON|1}  
CALS7 :DISPlay[:WINDow]:TEXT10:PAGEL1  
      :DISPlay[:WINDow]:TEXT10:STATel{ON|1}  
CALS8 :DISPlay[:WINDow]:TEXT11:PAGEL1  
      :DISPlay[:WINDow]:TEXT11:STATel{ON|1}
```

### CBRI<numeric>[PCT]

Adjusts the brightness of the color being modified. (BRIGHTNESS under (Display); No equivalent SCPI command)

Parameter	Range	Unit
<numeric>	0 to 100	%

#### ■ Query Response

{numeric} <new line><END>

### CENT<numeric>[HZ|KHZ|MAHZ|GHZ|DBM]

Defines the center value of the sweep range, or the center value of the segment to be edited in the list sweep table. ((Center), or CENTER under (Sweep))

## CENT<numeric>[HZ|KHZ|MAHZ|GHZ|DBM]

Parameter	Range	Unit
<numeric>	100k to 1.82G (network analyzer and impedance analyzer) 0 to 1.8199999995 G (spectrum analyzer) 0 to 1.8199999990234 G (spectrum analyzer with span = 195mHz) 0 to 1.82 G (spectrum analyzer with span = 0Hz) -60 to +20 (network analyzer and impedance analyzer)	Hz (frequency)    dBm (power)

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

**Center** :SENSe:FREQuency:CENTer<numeric> (frequency) or  
:SOURce:POWer:CENTer<numeric> (power)

**CENTER** under **Sweep** :SENSe:LIST:SEGment:FREQuency:CENTer<numeric>  
(List sweep table)

### ■ Example

```
OUTPUT 717;"CENT 899.95MAHZ"
```

## CHAD<string>

Specifies changing the current directory of a DOS format disk. (**CHANGE DIRECTORY** under **Save**); No query)

Parameter	Description
<string>	Directory path

### ■ Equivalent SCPI Command

:MMEMory:CDIRectory<string>

### ■ Example

```
OUTPUT 717;"CHAD "" . """
```

## CHAN1

Selects channel 1 as the active channel. (**Chan 1**)

### ■ Query Response

{0|1} <new line><END>

### ■ Equivalent SCPI Command

:INSTrument[:SElect]<CH2 or :INSTrument:NSElect>2  
:INSTrument:STATe<OFF  
:INSTrument[:SElect]<CH1 or :INSTrument:NSElect>1  
:INSTrument:STATe<ON

### ■ Example

```
OUTPUT 717;"CHAN1"
OUTPUT 717;":INST CH2"
OUTPUT 717;":INST:STAT OFF"
OUTPUT 717;":INST CH1"
OUTPUT 717;":INST:STAT ON"
```

## CHAN2

Selects channel 2 as the active channel. (**Chan 2**)

### ■ Query Response

{0|1} <new line><END>

### ■ Equivalent SCPI Command

```
:INSTrument[:SElect] CH1 or :INSTrument:NSElect L1
:INSTrument:STATe LOFF
:INSTrument[:SElect] CH2 or :INSTrument:NSElect L2
:INSTrument:STATe LON
```

## CIRF{RI|LIN|LOG|RX|GB|SWR}

Selects format to readout the value of a Smith, polar, or admittance chart using markers. (Network and impedance analyzer only) (**REAL IMAG**, **LIN MAG PHASE**, **LOG MAG PHASE**, **R+jX**, **G+jB**, **SWR PHASE** under **Utility**)

Parameter	Description
RI	Real and imaginary form
LIN	Linear magnitude and phase form
LOG	Log magnitude and phase form
RX	Complex impedance form (R+jX)
GB	Complex admittance form (G+jB)
SWR	SWR and phase form

### ■ Query Response

{RI|LIN|LOG|RX|GB|SWR} <new line><END>

### ■ Equivalent SCPI Commands

```
CIRF LRI :CALCulate:EVALuate:R:FORMat LRIImaginary
CIRF LIN :CALCulate:EVALuate:R:FORMat LMLIPhase
CIRF LOG :CALCulate:EVALuate:R:FORMat LMLOPhase
CIRF LRX :CALCulate:EVALuate:R:FORMat LRX
CIRF LGB :CALCulate:EVALuate:R:FORMat LGB
CIRF LSWR :CALCulate:EVALuate:R:FORMat LSWRPhase
```

### ■ Example

```
OUTPUT 717;"CIRF GB"
```

## CLAD

Completes the class assignment and stores it. (Network and impedance analyzer only)  
(**CLASS DONE (SPE'D)** under **Cal**); No query)

- Equivalent SCPI Command

:SENSe:CORRection:CKIT:SAVE:CLASs

- Example

OUTPUT 717;"CLAD"

OUTPUT 717;":SENS:CORR:CKIT:SAVE CLAS"

## CLASIMP{A|B|C}

Selects and acquires the impedance calibration classes. (**CALIBRATION OPEN**, **SHORT**, or **LOAD** under **Cal**), respectively; No query; Impedance analyzer only)

The order in which you acquire the OPEN, SHORT, and LOAD is changeable. You can suspend a calibration sequence and do a different operation, and then resume the calibration sequence.

- Equivalent SCPI Command

:SENSe:CORRection1:COLLect[:ACQuire] IMP{A|B|C}

## CLASS11{A|B|C}

Selects port 1 (S11) calibration standard class: S11A (open), S11B (short), or S11C (load).  
(Network analyzer only) (**[S11] : OPEN**, **SHORT**, **LOAD** under **Cal**); No query)

- Equivalent SCPI Command

:SENSe:CORRection:COLLect[:ACQuire] :STANDARD{1|2|3}

## CLASS22{A|B|C}

Selects port 2 (S22) calibration standard class: S22A (open), S22B (short), or S22C (load).  
(Network analyzer only) (**[S22] : OPEN**, **SHORT**, **LOAD** under **Cal**); No query)

- Equivalent SCPI Command

:SENSe:CORRection:COLLect[:ACQuire] :CS22{A|B|C}

## CLEL

Clears the entire list. (**CLEAR LIST** under **Sweep**); No query)

- Equivalent SCPI Command

:SENSe:LIST:CLEAr

### CLES

Clears the Status Byte register, the Standard Event Status register, the Event Status register B (Instrument Event Status register), and the Operational Status register. (No query)

- Equivalent Common Command
  - \*CLS

### CNTS□<numeric>[HZ|KHZ|MAHZ|GHZ]

Changes the step size for the center frequency function. (CENTER STEP SIZE under Center)

Parameter	Range	Unit
<numeric>	0 to 1.8199×10 <sup>9</sup>	Hz

- Query Response
  - {numeric} <new line><END>

- Equivalent SCPI Command
  - :SENSe:FREQUency:CENTer:STEP[:INCRement]□<numeric>

- Example
  - OUTPUT 717;"CNTS 1MAHZ"

### CNTSAUTO□{OFF|ON|0|1}

Sets CENTER step policy. (STEP SIZE AUTO man under Center)

Parameter	Description
OFF or 0	Linear step
ON or 1	1-2-5 step

- Query Response
  - {0|1} <new line><END>

- Equivalent SCPI Commands
  - :SENSe:FREQUency:CENTer:STEP[:INCRement]:AUTO□{OFF|ON|0|1}

### COLO□<parameter>

Specifies the display element to change color. (CH1 DATA, CH1 MEM LIMIT LN, CH2 DATA, CH2 MEM LIMIT LN, GRATICULE, IBASIC, PEN 1, PEN 2, PEN 3, PEN 4, PEN 5, PEN 6, TEXT, WARNING under Display)

COLOU<parameter>

Parameter	Description
CH1D	Channel 1 data
CH1M	Channel 1 memory and limit lines
CH2D	Channel 2 data
CH2M	Channel 2 memory and limit lines
GRAT	Graticule and a portion of softkey text
WARN	Warning annotation
TEXT	All the non-data text
IBT	Text on the BASIC screen
PEN1	Pen 1
PEN2	Pen 2
PEN3	Pen 3
PEN4	Pen 4
PEN5	Pen 5
PEN6	Pen 6

■ Query response

```
{CH1D|CH1M|CH2D|CH2M|WARN|TEXT|GRAT|IBT|PEN1|PEN2|PEN3|PEN4|PEN5|PEN6}  
<new line><END>
```

■ Equivalent SCPI Command

- COLO□CH1D :DISPlay:CMAP:COLor1:HSL□<numeric (hue)> , <numeric (sat)> , <numeric (lum)>
- COLO□CH1M :DISPlay:CMAP:COLor2:HSL□<numeric (hue)> , <numeric (sat)> , <numeric (lum)>
- COLO□CH2D :DISPlay:CMAP:COLor3:HSL□<numeric (hue)> , <numeric (sat)> , <numeric (lum)>
- COLO□CH2M :DISPlay:CMAP:COLor4:HSL□<numeric (hue)> , <numeric (sat)> , <numeric (lum)>
- COLO□GRAT :DISPlay:CMAP:COLor5:HSL□<numeric (hue)> , <numeric (sat)> , <numeric (lum)>
- COLO□WARN :DISPlay:CMAP:COLor6:HSL□<numeric (hue)> , <numeric (sat)> , <numeric (lum)>
- COLO□TEXT :DISPlay:CMAP:COLor7:HSL□<numeric (hue)> , <numeric (sat)> , <numeric (lum)>
- COLO□IBT :DISPlay:CMAP:COLor8:HSL□<numeric (hue)> , <numeric (sat)> , <numeric (lum)>
- COLO□PEN1 :DISPlay:CMAP:COLor9:HSL□<numeric (hue)> , <numeric (sat)> , <numeric (lum)>
- COLO□PEN2 :DISPlay:CMAP:COLor10:HSL□<numeric (hue)> , <numeric (sat)> , <numeric (lum)>
- COLO□PEN3 :DISPlay:CMAP:COLor11:HSL□<numeric (hue)> , <numeric (sat)> , <numeric (lum)>
- COLO□PEN4 :DISPlay:CMAP:COLor12:HSL□<numeric (hue)> , <numeric (sat)> , <numeric (lum)>
- COLO□PEN5 :DISPlay:CMAP:COLor13:HSL□<numeric (hue)> , <numeric (sat)> , <numeric (lum)>
- COLO□PEN6 :DISPlay:CMAP:COLor14:HSL□<numeric (hue)> , <numeric (sat)> , <numeric (lum)>

Parameter	Range	Unit
<numeric (hue)>	(Hue) 0 to 100, circular, with a value of 0 resulting in the same hue as a value of 100. The approximate color is (starting at 0): red, orange, yellow, green, cyan, blue, magenta, and back to red.	%
<numeric (sat)>	(Saturation) 0 to 100, with 0 specifying no color (only white or gray, depending on intensity) and 1 specifying no white.	%
<numeric (lum)>	(Luminance) 0 to 100, with 0 resulting in black and 1 resulting in the brightest color available.	%

□ Query Response

{numeric (hue)}, {numeric (sat)}, {numeric (lum)} <new line><END>

■ Example

OUTPUT 717;"COLO CH1D"

OUTPUT 717;":DISP:CMAP:COL1:HSL 17,100,100"

COLO $\square$ <parameter>

COLOR $\square$ <numeric>[PCT]

Adjusts the degree of whiteness of the color being modified. (COLOR under Display); No equivalent SCPI Command)

Parameter	Range	Unit
<numeric>	0 to 100	%

■ Query response

{numeric} <new line><END>

COMC{A|B|C}

Measures the standards for the fixture compensation. (COMPEN OPEN, SHORT, or LOAD under Cal); No query; Impedance analyzer only)

Parameter	Description
A	Measures OPEN.
B	Measures SHORT.
C	Measures LOAD.

■ Equivalent SCPI Commands

COMCA :SENSe:CORRection2:COLLect[:ACQuire] $\square$ STANdard1  
COMCB :SENSe:CORRection2:COLLect[:ACQuire] $\square$ STANdard2  
COMCC :SENSe:CORRection2:COLLect[:ACQuire] $\square$ STANdard3

COMCDAT{A|B|C} $\square$ {OFF|ON|0|1}

Sets the OPEN, SHORT, and LOAD fixture compensation ON or OFF. (OPEN ON off, SHORT ON off, or LOAD ON off under Cal); Impedance analyzer only)

Parameter	Description
A	Uses OPEN compensation data.
B	Uses SHORT compensation data
C	Uses LOAD compensation data
ON or 1	Turns on the selected data.
OFF or 0	Turns off the selected data.

■ Query response

{1|0} <new line><END>

■ Equivalent SCPI Commands

COMCDATA {ON|OFF} :SENSe:CORRection2:OPEN $\square$ {ON|OFF|1|0}  
COMCDATB {ON|OFF} :SENSe:CORRection2:SHORT $\square$ {ON|OFF|1|0}  
COMCDATC {ON|OFF} :SENSe:CORRection2:LOAD $\square$ {ON|OFF|1|0}

## COMKDONE

Complete modifying the fixture compensation kit. (KIT DONE (MODIFIED) under **Cal**)  
**COMPEN KIT [USER] MODIFY [USER]**; Impedance analyzer only)

- Equivalent SCPI Command

```
:SENSE:CORRection2:CKIT:SAVE
```

## COMP

Call the fixture compensation menu. You need send this command before sending COMC.  
**(COMPEN MENU** under **Cal**) **FIXTURE COMPEN**; No query; Impedance analyzer only)

- Equivalent SCPI Command

```
:SENSE:CORRection2:COLLect:METhodIMPedance
```

## COMS

Displays the fixture compensation definition on the display. (**COMPEN KIT DEFINITION** under **Copy**); No query; Impedance analyzer only)

- Equivalent SCPI Commands

```
DISPlay[:WINDow]:TEXT20:PAGE 1  

DISPlay[:WINDow]:TEXT20:STATe ON
```

## COMSDONE

Complete defining the standard for the fixture compensation kit. (**STD DONE (DEFINED)** under **Cal**) **COMPEN KIT [USER] MODIFY [USER]**; Impedance analyzer only)

- Equivalent SCPI Command

```
:SENSE:CORRection2:CKIT:STANdard:SAVE
```

## CONT

Triggers sweep automatically and continuously and the trace is updated with each sweep.  
**(CONTINUOUS** under **Trig**)

- Query Response

```
{0|1} <new line><END>
```

- Equivalent SCPI Command

```
:INITiate:CONTInuous{1|ON}
```

## CONT

### CONV $\square$ <parameter>

Selects the measurement data conversion setting (impedance, admittance, or multiple phase). (Network analyzer only) (OFF, Z:Ref1, Z:Trans, Y:Ref1, Y:Trans, 1/S, 4xPHASE, 8xPHASE, 16xPHASE under (Meas))

Parameter	Description
OFF	Conversion OFF
ZREF	Z: reflection
ZTRA	Z: transmission
YREF	Y: reflection
YTRA	Y: transmission
ONEDS	Reciprocal (1/S)
MP4	Multiply phase by 4
MP8	Multiply phase by 8
MP16	Multiply phase by 16

#### ■ Query Response

{OFF|ZREF|ZTRA|YREF|YTRA|ONEDS|MP4|MP8|MP16} <new line><END>

#### ■ Equivalent SCPI Command

```
CONV $\square$ OFF      :CALCulate:MATH1[:EXPRession]:NAME $\square$ OFF
CONV $\square$ ZREF     :CALCulate:MATH1[:EXPRession]:NAME $\square$ ZREF
CONV $\square$ ZTRA     :CALCulate:MATH1[:EXPRession]:NAME $\square$ ZTRA
CONV $\square$ YREF     :CALCulate:MATH1[:EXPRession]:NAME $\square$ YREF
CONV $\square$ YTRA     :CALCulate:MATH1[:EXPRession]:NAME $\square$ YTRA
CONV $\square$ ONEDS    :CALCulate:MATH1[:EXPRession]:NAME $\square$ INVS
CONV $\square$ MP4      :CALCulate:MATH1[:EXPRession]:NAME $\square$ MP4
CONV $\square$ MP8      :CALCulate:MATH1[:EXPRession]:NAME $\square$ MP8
CONV $\square$ MP16     :CALCulate:MATH1[:EXPRession]:NAME $\square$ MP16
```

#### □ Query Response

{OFF|ZREF|ZTRA|YREF|YTRA|ONEDS|MP4|MP8|MP16} <new line><END>

#### ■ Example

```
OUTPUT 717;"CONV ZREF"
OUTPUT 717;":CALC:MATH1:NAME ZREF"
```

## COPA

Aborts a print in progress. (COPY ABORT under (Copy); No query)

#### ■ Equivalent SCPI Command

:HCOPY:ABORt

**COPT{OFF|ON|0|1}**

Turns printing time and date (the time stamp function) ON or OFF. (COPY TIME ON off under **Copy**)

Parameter	Description
OFF or 0	Time stamp function OFF
ON or 1	Time stamp function ON

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:HCOPY:ITEM:TDSamp:STATe{OFF|ON|0|1}

**CORR{OFF|ON|0|1}**

Turns error correction ON or OFF. (Network and impedance analyzer only)  
(CORRECTION ON off under **Cal**, This softkey is Network analyzer only)

Parameter	Description
OFF or 0	Error correction OFF
ON or 1	Error correction ON

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:SENSe:CORRection[:STATe]{OFF|ON|0|1}

- Example

```
OUTPUT 717;"CORR OFF"
```

```
OUTPUT 717;"CORR?"
ENTER 717;A
```

```
OUTPUT 717;":SENS:CORR OFF"
```

```
OUTPUT 717;":SENS:CORR?"
ENTER 717;A
```

**CORR**  $\square$  {OFF|ON|0|1}

**COUC**  $\square$  {OFF|ON|0|1}

Sets the channel coupling of sweep parameter values. (Between network or between impedance analyzers only) (**COUPLED CH ON off** under **Sweep**)

Parameter	Description
OFF or 0	Channel coupling OFF
ON or 1	Channel coupling ON

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

:INSTRument:COUPlE  $\square$  {OFF|ON|0|1}

**CRED**  $\square$  <string>

Create a new directory in a DOS format disk. (**CREATE DIRECTORY** under **Save**); No query)

Parameter	Description
<string>	Up to 8 characters for directory name (and up to 3 characters for extension)

■ Equivalent SCPI Command

:MMEMory:CREate:DIRectory  $\square$  <string>

■ Example

```
OUTPUT 717;"CRED ""DATA""
```

```
OUTPUT 717;":MMEM:CRE:DIR ""DATA""
```

CWFREQ  $\square$  <numeric> [HZ|KHZ|MAHZ|GHZ]

CRSC  $\square$  {OFF|ON|0|1}

Selects the destination channel of the marker→ functions. When a marker→ function is performed, the sweep parameter or amplitude value of the destination channel is changed.

(CROSS CHAN ON off under Marker→)

Parameter	Description
OFF or 0	Current active channel as the destination channel
ON or 1	Current inactive channel as the destination channel <sup>1</sup>

<sup>1</sup> Can be selected only when the dual channel function is ON.

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

:CALCulate:EVALuate:EFFect:ON  $\square$  {1|2}

When channel 1 is active,

Parameter	Description
1	The channel currently active is selected.
2	The channel currently not active is selected.

When channel 2 is active,

Parameter	Description
1	The channel currently not active is selected.
2	The channel currently active is selected.

CWFREQ  $\square$  <numeric> [HZ|KHZ|MAHZ|GHZ]

Sets the frequency for power sweep. (Network and impedance analyzer only) (CWFREQ under Source)

Parameter	Range	Unit
<numeric>	100000 (= 100 k) to $1.82 \times 10^9$ (= 1.82 G)	Hz

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:SOURce:FREQuency[:CW]  $\square$  <numeric>

■ Example

OUTPUT 717;"CWFREQ 500MAHZ"

**CWFREQ**  $\square$  *<numeric>* [**HZ**|**KHZ**|**MAHZ**|**GHZ**]

**DATAOVAL**  $\square$  *<numeric>*

Defines the imaginary part of the offset value when using the Smith, Polar, and admittance chart format. (**AUX OFFSET** under **Display**)

Parameter	Range	Unit
<i>&lt;numeric&gt;</i>	-500000 to 500000	

■ Query Response

{*numeric*} <new line><END>

■ Equivalent SCPI Command

:DATA[:DATA] $\square$ AOFF,*<numeric>*

**DATGAIN**  $\square$  *<numeric>*

Defines the gain value of the data math function. (**GAIN** under **Display**)

Parameter	Range	Unit
<i>&lt;numeric&gt;</i>	-100 to -0.001, or 0.001 to 100	

■ Query Response

{*numeric*} <new line><END>

■ Equivalent SCPI Command

:DATA[:DATA] $\square$ GAIN,*<numeric>*

**DATMEM**

Stores the current active measurement data in the memory of the active channel. (**DATA→MEMORY** under **Display**); No query)

■ Equivalent SCPI Command

:TRACe{1|2}:COPY $\square$ MTRace,DTRace

■ Example

OUTPUT 717;":TRAC:COPY MTR,DTR"

**DATOVALL** <*numeric*>

Defines the offset value. When using Smith, Polar, and admittance chart format, this command defines the real part of the offset value. (**OFFSET** under **Display**)

Parameter	Range	Unit
< <i>numeric</i> >	-500000 to 500000	

## ■ Query Response

{*numeric*} <new line><END>

## ■ Equivalent SCPI Command

:DATA[:DATA]L<sub>OFFS</sub>, <*numeric*>

**DAYMYEAR**

Changes the displayed date to the “day:month:year” format. (**DayMonYear** under **System**)

## ■ Query Response

{0|1} <new line><END>

(0 for the “month:day:year” format; 1 for the “day:month:year” format.)

## ■ Equivalent SCPI Command

:SYSTem:DATE:MODELDMY

**DEFC**

Returns all the color settings back to the factory-set default values. (**DEFAULT COLORS** under **Display**); No query)

## ■ Equivalent SCPI Command

:DISPlay:CMAP:DEFault

## DEFEC

**DEFEC**{R1|C1|L1|C0}␣<numeric>

Defines the specified equivalent circuit parameter for simulation. (PARAMETER R1, C1, L1, C0 under (Display); Impedance analyzer only)

Parameter	Description
R1	Parameter R <sub>1</sub>
C1	Parameter C <sub>1</sub>
L1	Parameter L <sub>1</sub>
C0	Parameter C <sub>0</sub>

Parameter	Range	Unit
<numeric>	-1×10 <sup>18</sup> to 1×10 <sup>18</sup>	F(C0, C1) H(L1) OHM(R1)

### ■ Query Response

<numeric> <new line><END>

### ■ Equivalent SCPI Command

:DATA[:DATA]␣EQ{R1|C1|L1|C0}, <numeric>

### ■ Example

```
OUTPUT @Hp4396;"DEFECR1 350HM"
```

```
OUTPUT @Hp4396;"DEFEC C1?"
```

```
ENTER @Hp4396;C1
```

## DEFGO

Returns the gain and offset values back to the default values (gain = 1, offset = 0).

(DEFAULT GAIN & OFFS under (Display); No query)

### ■ Equivalent SCPI Command

:DATA[:DATA]␣GAIN,1

:DATA[:DATA]␣OFFS,0

### ■ Example

```
OUTPUT 717;"DEFGO"
```

```
OUTPUT 717;":DATA GAIN,1"
```

```
OUTPUT 717;":DATA OFFS,0"
```

**DEFS □ {1-8}**

Defines the number of the calibration standards to be modified. (Network and impedance analyzer only) (DEFINE STANDARD under Cal); No query

Parameter	Description
1	Standard no. 1 (SHORT)
2	Standard no. 2 (OPEN)
3	Standard no. 3 (LOAD)
4	Standard no. 4 (DEL/THRU)
5	Standard no. 5 (LOAD)
6	Standard no. 6 (LOAD)
7	Standard no. 7 (SHORT)
8	Standard no. 8 (OPEN)

■ Equivalent SCPI Command (Query)

:SENSe:CORRection:CKIT:SELEct □ STANdard{1-8}

□ Query response

{ STAN{1-8} } <new line><END>

■ Example

```
OUTPUT 717;"DEFS 1"
OUTPUT 717;":SENS:CORR:CKIT:SEL STAN1"
OUTPUT 717;":SENS:CORR:CKIT:SEL?"
ENTER 717;A$
```

**DEFSLOAD{R|L} □ <numeric>**

Defines the LOAD standard by entering resistance and reactance value. (LOAD: RESIST. (R), INDUCT. (L) under Cal) CAL KIT □. Impedance analyzer only

Parameter	Description
R	Resistance value of the LOAD fixture compensation standard.
L	Inductance value of the LOAD fixture compensation standard.

Parameter	Range	Unit
<numeric>	-1×10 <sup>6</sup> to 1×10 <sup>6</sup>	Ω (R)
<numeric>	-1×10 <sup>6</sup> to 1×10 <sup>6</sup>	H (L)

■ Query Response

{ numeric } <new line><END>

■ Equivalent SCPI Command

```
DEFSLOADR :SENSe:CORRection2:CKIT:STANdard3:R □ <numeric>
DEFSLOADL :SENSe:CORRection2:CKIT:STANdard3:L □ <numeric>
```

## DEFSOPEN{G|C}□□<numeric>

Defines the OPEN standard by entering conductance and capacitance value.

(OPEN: CONDUCT. (G), CAP. (C) under **Cal** CAL KIT □. Impedance analyzer only)

Parameter	Description
G	Conductance value of the OPEN fixture compensation standard.
C	Capacitance value of the OPEN fixture compensation standard.

Parameter	Range	Unit
<numeric>	$-1 \times 10^6$ to $1 \times 10^6$	S (G)
<numeric>	$-1 \times 10^{-6}$ to $1 \times 10^6$ (simple command)	f (C)
<numeric>	$-1 \times 10^{-9}$ to $1 \times 10^9$ (SCPI command)	F (C)

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

DEFSOPENG SENSE:CORRection2:CKIT:STANdard1:G□<numeric>

DEFSOPENC SENSE:CORRection2:CKIT:STANdard1:C□<numeric>

### ■ Example

OUTPUT @Hp4396;"DEFSOPENG OS"

OUTPUT @Hp4396;"DEFSOPENC 53E-6F"

OUTPUT @Hp4396;"DEFSOPENG?"

ENTER @Hp4396;G

OUTPUT @Hp4396;"SENS:CORR2:CKIT:STAN1:G OS;C 53E-6F"

## DEFSSHOR{R|L}□□<numeric>

Defines the SHORT calibration standard by entering resistance and inductance value.

(SHORT: RESIST. (R), INDUCT. (L) under **Cal** CAL KIT □. Impedance analyzer only)

Parameter	Description
R	Resistance value of the SHORT fixture compensation standard.
L	Inductance value of the SHORT fixture compensation standard.

Parameter	Range	Unit
<numeric>	$-1 \times 10^6$ to $1 \times 10^6$	Ω (R)
<numeric>	$-1 \times 10^6$ to $1 \times 10^6$	H (L)

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

DEFSSHORR SENSE:CORRection2:CKIT:STANdard2:R□<numeric>

DEFSSHORL SENSE:CORRection2:CKIT:STANdard2:L□<numeric>

■ Example

```
OUTPUT @Hp4396;"DEFSSHORTTR 0OHM"
OUTPUT @Hp4396;"DEFSSHORTL OH"

OUTPUT @Hp4396;"DEFSSHORTTR?"
ENTER @Hp4396;R

OUTPUT @Hp4396;"SENS:CORR2:CKIT:STAN2:R 0OHM;L OH"
```

**DET**  $\square$  {POS|NEG|SAM}

Selects the detection mode for the active channel. (Spectrum analyzer only) (POS PEAK, NEG PEAK, SAMPLE under (Meas))

Parameter	Description
POS	Positive Detection
NEG	Negative Detection
SAM	Sample Detection

■ Query Response

{POS|NEG|SAM} <new line><END>

■ Equivalent SCPI Command

:SENSe:DETEctor[:FUNction] $\square$ {POSitive|NEGative|SAMple}

■ Example

```
OUTPUT 717;"DET POS"
```

**DFLT**

Returns the printing parameters to their default values. (DEFAULT SETUP under (Copy); No query)

The table below lists the default values.

Command	Default value	Unit
DPI	75	dpi
FORMFEED	ON	
LANDSCAPE	OFF	
LMARG	1.0	inch
TMARG	1.0	inch
SKEY	OFF	

■ Equivalent SCPI Command

:HCOPy:DEFault

## DFLT

### DHOLD□{OFF|MAX|MIN}

Selects the data hold operation. When the format is changed, the value held is initiated.

(HOLD: OFF, MAX, MIN under **Display**)

Parameter	Description
OFF	Data hold operation is turned off
MAX	Maximum data hold
MIN	Minimum data hold

#### ■ Query Response

{OFF|MAX|MIN} <new line><END>

#### ■ Equivalent SCPI Command

```
DHOLD□OFF      :CALCulate:AVERage:STATe□OFF
DHOLD□MAX      :CALCulate:AVERage:TYPE□MAXimum
                :CALCulate1:AVERage:STATe□ON
DHOLD□MIN      :CALCulate:AVERage:TYPE□MINimum
                :CALCulate1:AVERage:STATe□ON
```

#### ■ Example

```
OUTPUT 717;"DHOLD MAX"
OUTPUT 717;"DHOLD?"
ENTER 717;A$
OUTPUT 717;":CALC:AVER:TYPE MAX"
OUTPUT 717;":CALC:AVER:STAT ON"
OUTPUT 717;":CALC:AVER:TYPE?"
ENTER 717;A$
OUTPUT 717;":CALC:AVER:STAT?"
ENTER 717;A
```

### DISA□{ALLI|HIHB|ALLB|BASS}

Selects the display allocation mode. (**DISPLAY ALLOCATION** under **Display**)

Parameter	Description
ALLI	All instrument
HIHB	Half instrument and half HP Instrument BASIC
ALLB	All HP Instrument BASIC
BASS	HP Instrument BASIC status

- Query Response

{ALLI|HIHB|ALLB|BASS} <new line><^END>

- Equivalent SCPI Command

```
DISA:ALLI      :DISPlay[:WINDow]:ALLocation:INSTRument
DISA:HIHB     :DISPlay[:WINDow]:ALLocation:HIHB
DISA:ALLB     :DISPlay[:WINDow]:ALLocation:BASic
DISA:BASS     :DISPlay[:WINDow]:ALLocation:BSTatus
```

- Example

```
OUTPUT 717;"DISA HIHB"
OUTPUT 717;"DISA?"
ENTER 717;A$
```

## DISECIRC

Displays the equivalent circuit models. (SELECT EQV CKT [A] under **Display**); Impedance analyzer only)

Parameter	Description
OFF or 0	Turns off the equivalent circuit parameter display.
ON or 1	Turns on the equivalent circuit parameter display.

- Query Response

{0|1} <new line><^END>

- Equivalent SCPI Command

```
:DISPlay[:WINDow]:TEXT19:STATe{OFF|ON|0|1}
```

## DISECPARA {OFF|ON|0|1}

Displays the equivalent circuit parameters. (DISP EQV PARM [ON] or [OFF] under **Display**); Impedance analyzer only)

Parameter	Description
OFF or 0	Turns off the equivalent circuit parameter display.
ON or 1	Turns on the equivalent circuit parameter display.

- Query Response

{0|1} <new line><^END>

- Equivalent SCPI Command

```
:DISPlay[:WINDow]:TEXT18:STATe{OFF|ON|0|1}
```

**DISECPARA {OFF|ON|0|1}**

**DISF□{DOS|LIF}**

Selects the disk format (LIF or DOS) to be used when initializing a new disk. (**FORMAT [ ]** under **Save**); No equivalent SCPI command)

Parameter	Description
DOS	Disk Operating System format
LIF	Logical Interchange format

■ Query Response

{DOS|LIF} <new line><END>

■ Example

OUTPUT 717;"DISF DOS"

**DISL**

Displays the list sweep table on the display. (**DISPLAY LIST** under **Copy**); No query)

■ Equivalent SCPI Command

:DISPlay[:WINDow]:TEXT{12|13}:PAGE□1  
:DISPlay[:WINDow]:TEXT{12|13}:STATe□{ON|1}

(TEXT12 for the "start & stop" format; TEXT13 for the "center & span" format)

**DISLLIST**

Displays the limit testing table on the display. (**DISPLAY LIST** under **Copy**); No query)

■ Equivalent SCPI Command

:DISPlay[:WINDow]:TEXT{14|15}:PAGE□1  
:DISPlay[:WINDow]:TEXT{14|15}:STATe□{ON|1}

(TEXT14 for the "upper & lower" format; TEXT15 for the "middle & delta" format)

**DISMAMP□{UL|MD}**

Selects the amplitude format to display the limit testing table to list on the screen. (**DISP MODE: UPR & LWR, MID & DLT** under **Copy**); No equivalent SCPI command)

Parameter	Description
UL	Upper and lower format
MD	Middle and delta format

■ Query Response

{UL|MD} <new line><END>

- Example

```
OUTPUT 717;"DISMAMP UL"
OUTPUT 717;"DISMAMP?"
ENTER 717;A$
```

## DISMPRM{STSP|CTSP}

Selects the sweep parameter range format to display the list sweep table on the screen.  
(DISP MODE: ST & SP, CTR & SPAN under **Copy**; No equivalent SCPI command)

Parameter	Description
STSP	Start and stop format
CTSP	Center and span format

- Query Response

```
{STSP|CTSP} <new line><END>
```

- Example

```
OUTPUT 717;"DISMPRM STSP"
```

## DISP{DATA|MEMO|DATM}

Selects the display trace type. (DISPLAY: DATA, MEMORY, DATA and MEMORY under **Display**)

Parameter	Description
DATA	Current data trace
MEMO	Memory trace
DATM	Current data and memory traces

- Query Response

```
{DATA|MEMO|DATM} <new line><END>
```

- Equivalent SCPI Command

```
DISPDATA :DISPlay[:WINDow]:TRACe1:STATe{ON|1}
           :DISPlay[:WINDow]:TRACe2:STATe{OFF|0}

DISPMEMO :DISPlay[:WINDow]:TRACe1:STATe{OFF|0}
           :DISPlay[:WINDow]:TRACe2:STATe{ON|1}

DISPDATM :DISPlay[:WINDow]:TRACe1:STATe{ON|1}
           :DISPlay[:WINDow]:TRACe2:STATe{ON|1}
```

- Example

```
OUTPUT 717;"DISP DATA"
OUTPUT 717;":DISP:TRAC1:STAT ON"
OUTPUT 717;":DISP:TRAC2:STAT OFF"
```

**DISP** {DATA|MEMO|DATM}

**DMKR** {ON|FIX|TRAC|OFF}

Displays the  $\Delta$ marker (ON, FIX, TRAC) at the point of the marker and the marker mode changes to the  $\Delta$ mode. Erases (OFF) the  $\Delta$ marker and the  $\Delta$ mode is turned off. ( **$\Delta$ MKR**, **FIXED  $\Delta$ MKR**, **TRACKING  $\Delta$ MKR**,  **$\Delta$ MODE OFF** under **Marker**)

Parameter	Description
ON	Puts the $\Delta$ marker on a current position of the marker.
FIX	Sets a user-specified fixed reference marker.
TRAC	Puts a $\Delta$ marker at the present active marker position and turns on the tracking $\Delta$ marker.
OFF	Turns off the $\Delta$ mode.

■ Query Response

{ON|FIX|TRAC|OFF} <new line><END>

■ Equivalent SCPI Command

```
DMKR|ON      :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:RELative|{ON|1}
              :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:RELative:REFerence|MARKer

DMKR|FIX     :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:RELative|{ON|1}
              :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:RELative:REFerence|FIXed

DMKR|TRAC   :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:RELative|{ON|1}
              :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:RELative:REFerence|TRACked

DMKR|OFF    :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:RELative|{OFF|0}
```

(TRACe[1] for the data trace; TRACe2 for the memory trace)

■ Example

```
OUTPUT 717;"DMKR ON"
OUTPUT 717;":DISP:TRAC:MARK:REL ON"
OUTPUT 717;":DISP:TRAC:MARK:REL:REF MARK"
```

**DMKRAUV** <numeric>

Sets the auxiliary amplitude value of the fixed  $\Delta$ marker. This command is used with a polar, Smith, or admittance chart. (Network and impedance analyzer only) ( **$\Delta$ MKR AUX VALUE** under **Marker**)

Parameter	Range	Unit
<numeric>	-500000 to 500000	

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

```
:CALCulate:EVALuate:REFerence:Y2|<numeric>
```

■ Example

```
OUTPUT 717;"DMKRAUV 0"
```

**DMKRPRM**  $\square$  *<numeric>* [**HZ**|**KHZ**|**MAHZ**|**GHZ**|**DBM**]

Sets the sweep parameter value of the  $\Delta$ marker. (**DMKR SWP PRM** under **Marker**)

Parameter	Range	Unit
<i>&lt;numeric&gt;</i>	Start value to stop value	Hz (frequency) dBm (power)

- Query Response

{*numeric*} <new line><END>

- Equivalent SCPI Command

:CALCulate:EVALuate:REFerence:X  $\square$  *<numeric>*

**DMKRVAL**  $\square$  *<numeric>*

Sets the amplitude value of the fixed  $\Delta$ marker. (**DMKR VALUE** under **Marker**)

Parameter	Range	Format
<i>&lt;numeric&gt;</i>	-500 to 500 (spectrum analyzer)	(dBm, dB $\mu$ V, dBV formats)
<i>&lt;numeric&gt;</i>	-500 to 500 (network analyzer)	(Log magnitude format)
<i>&lt;numeric&gt;</i>	-500k to 500k	

- Query Response

{*numeric*} <new line><END>

- Equivalent SCPI Command

:CALCulate:EVALuate:REFerence:Y1  $\square$  *<numeric>*

**DONE**

Completes the measurement of the selected standard calibration. (Network and impedance analyzer only) (**DONE: RESPONSE** under **Cal**). When Type-N calkits or user calkit, **DONE: OPEN** **DONE: SHORT** under **Cal**. No query)

- Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE1

## DONE

**DPI** `<numeric>`

Specifies the printing resolution value for the printer. (**DPI** under **Copy**)

Parameter	Range	Unit
<code>&lt;numeric&gt;</code>	75 to 600	dpi

### ■ Query Response

`{numeric} <new line><END>`

### ■ Equivalent SCPI Command

`:HCOpy:DRIVer:DPI<numeric>`

## DSKEY

Disables the front panel keys and the rotary knob. To enable the keys and knob again, send the ENKEY command. (No query for the Simple command)

### ■ Equivalent SCPI Command

`:SYSTem:KLOCk{1|ON}`

### ■ Example

OUTPUT 717;"DSKEY"

OUTPUT 717;":SYST:KLOC ON"

**DUAC** {OFF|ON|0|1}

Selects the display of both measurement channels or the active channel only.

(DUAL CHAN ON off under **Display**)

Parameter	Description
OFF or 0	Active channel only
ON or 1	Both channels

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

When channel 1 is active,

```
DUACLON      :INSTRument[:SElect]LCH2
              :INSTRument:STATeLON
              :INSTRument[:SElect]LCH1
              :INSTRument:STATeLON
```

When channel 2 is active,

```
DUACLON      :INSTRument[:SElect]LCH1
              :INSTRument:STATeLON
              :INSTRument[:SElect]LCH2
              :INSTRument:STATeLON
```

```
DUACLOFF     :INSTRument[:SElect]L{CH1|CH2}
              :INSTRument:STATeLOFF
              :INSTRument[:SElect]L{CH1|CH2}
```

- Example

```
OUTPUT 717;"DUAC ON"
OUTPUT 717;":INST CH1"
OUTPUT 717;":INST:STAT ON"
OUTPUT 717;":INST CH2"
OUTPUT 717;":INST:STAT ON"
```

**EDITDONE**

Completes editing the frequency sweep list. (**LIST DONE** under **Sweep**); No query)

- Equivalent SCPI Command

```
:SENSe:LIST:SAVE
```

**EDITLIML**

Begins editing the limit line table. (**EDIT LIMIT LINE** under **System**); No query; No equivalent SCPI command)

## EDITLIML

## EDITLIST

Begins editing the frequency sweep list. (**EDIT LIST** under **Sweep**); No query; No equivalent SCPI command)

## ELED<numeric>[S|MS|US|NS|PS|FS]

Adjusts the electrical delay to balance the phase of the DUT. (Network analyzer only)  
(**ELECTRICAL DELAY** under **Scale Ref**)

Parameter	Range	Unit
<numeric>	-10 to 10	s

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

:SENSe:CORRection:EDELay2<numeric>

## ENKEY

Reenables the front panel keys and the rotary knob that have been disabled by the DSKEY command. (No query for the Simple command)

### ■ Equivalent SCPI Command

SYSTem:KLOCKL{OFF|0}

### ■ Example

```
OUTPUT 717;"ENKEY"
```

```
OUTPUT 717;":SYST:KLOC OFF"
```

## EQUCLCIR{A|B|C|D|E}

Selects the equivalent circuit. (**SELECT EQV CKT**  under **Display**). Impedance analyzer only)

Parameter	Description
CIRA	For coils with high core loss.
CIRB	For coils and resistance.
CIRC	For high-value resistors.
CIRD	For capacitors.
CIRE	For resonators.

### ■ Query Response

CIR{A|B|C|D|E}<new line><END>

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:EPARameters:CIRCuit<A|B|C|D|E>

### ■ Example

```
OUTPUT @Hp4396;"EQUC CIRA"
```

**EQUC0?□<numeric>**

Returns a  $C_0$  at the specified frequency. For more information, see “EQUC0? *value*” in Appendix I. (No equivalent SCPI command; Network analyzer only)

Parameter	Range	Unit
<numeric>	0 to $1.82 \times 10^9$ (= 1.82 G)	Hz

- Query Response

<numeric><new line><END>

**EQUCPARA?**

Executes six elements equivalent circuit analysis of a crystal resonator, and outputs parameters. For more information, see “EQUCPARA?” in Appendix I. (No equivalent SCPI command; Network analyzer only)

- Query Response

See “EQUCPARA?” in Appendix I.

**EQUCPARS?**

Executes six elements equivalent circuit analysis of a crystal resonator, and outputs parameters. For more information, see “EQUCPARS?” in Appendix I. (No equivalent SCPI command; Network analyzer only)

- Query Response

See “EQUCPARS?” in Appendix I.

**EQUCPARS4?**

Executes four elements equivalent circuit analysis of a crystal resonator, and outputs parameters. For more information, see “EQUCPARS4?” in Appendix I. (No equivalent SCPI command; Network analyzer only)

- Query Response

See “EQUCPARS4?” in Appendix I.

**EQUM?□<numeric>**

Specifies how many points are used for an approximation of a admittance circle for EQUCPARA? and EQUCPARS? equivalent circuit analysis commands for the crystal resonator. EQUCPARA? (or EQUCPARS?) thins the measured points out for the specified points, then make circle approximation. When the EQUM parameter is set greater than the number of points, EQUCPARA? (or EQUCPARS?) uses all points for the circle approximation. Default value is 8. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Network analyzer only)

Parameter	Range	Unit
<numeric>	2 to 801	N/A

- Query Response

<numeric><new line><END>

**EQU?**  $\square$   $\langle$ numeric $\rangle$

### ESB?

Outputs the Event Status register B (Instrument Event Status register) value. (Query Only)

■ Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

■ Equivalent SCPI Command

:STATus:INSTRument[:EVENT]?

**ESNB**  $\square$   $\langle$ numeric $\rangle$

Enables the bits of Event Status register B (Instrument Event Status register).

Parameter	Range	Unit
$\langle$ numeric $\rangle$	Decimal expression of the contents of the register, 0 to 65535 ( $-2^{16} - 1$ )	

■ Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

■ Equivalent SCPI Command

:STATus:INSTRument:ENABLe  $\square$   $\langle$ numeric $\rangle$

**EXPP**  $\square$  {OFF|ON|0|1}

Turns on and off the expanded phase display. (EXP PHASE on OFF under **Format**); Impedance analyzer only)

Parameter	Description
OFF or 0	Turns off the expanded phase display.
ON or 1	Turns on the expanded phase display.

■ Query Response

{0|1}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

■ Equivalent SCPI Command

EXPP  $\square$  OFF :CALCulate:MATH1:STATe  $\square$  OFF  
:CALCulate:FORMat  $\square$  PHASe

EXPP  $\square$  ON :CALCulate:MATH1:STATe  $\square$  OFF  
:CALCulate:FORMat  $\square$  PHASe

**FIXT** {NONE|HP16191|HP16192|HP16193|HP16194|USED}

**FILC** <string1>, <string2>, <string3>, <string4>

Copies files. (**COPY FILE** under **Save**); No query)

Parameter	Description
<string1>	Source file name
<string2>	Source device name ("DISK" or "MEMORY") <sup>1</sup>
<string3>	Destination file name
<string4>	Destination device name ("DISK" or "MEMORY")

<sup>1</sup> "DISK" for the built-in flexible disk drive; "MEMORY" for the RAM disk memory.

■ Equivalent SCPI Command

:MMEMory:COPIE<string1>, <string2>, <string3>, <string4>

■ Example

```
OUTPUT @Hp4396;"FILC ""DAT1.TXT"",""MEMORY"",""DAT1.TXT"",""DISK""
```

```
OUTPUT @Hp4396;":MMEM:COPIE ""DAT1.TXT"",""MEMORY"",""DAT1.TXT"",""DISK""
```

**FIXE** <numeric>

Sets the electrical length of the fixture. (**DEFINE EXTENSION** under **Meas**); Impedance analyzer only.)

Parameter	Range	Unit
<numeric>	-10 to 10	m

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:SYSTem:FIXTure:DISTance<numeric>

**FIXKDONE**

Terminates the user fixture setting. (**DONE** under **Meas**); No query; Impedance analyzer only.)

■ Equivalent SCPI Command

:SYSTem:FIXTure:SAVE

**FIXT** {NONE|HP16191|HP16192|HP16193|HP16194|USED}

Specifies the fixture in use in order to select which electrical length (recorded in the analyzer) is to be used. (**FIXTURE:NONE**, **HP16191**, **HP16192**, **HP16193**, **HP16194**, **USED** under **Meas** **SELECT FIXTURE**; Impedance analyzer only.)

■ Query Response

{NONE|HP16191|HP16192|HP16193|HP16194|USED}<new line><END>

■ Equivalent SCPI Command

**FIXT** {NONE|HP16191|HP16192|HP16193|HP16194|USED}

:SYSTem:FIXTure {NONE|HP16191|HP16192|HP16193|HP16194|USED}

**FMT** <parameter>

Selects the display format. (FORMAT: LOG MAG, PHASE, DELAY, SMITH [Re Im], POLAR [Re Im], LIN MAG, SWR, FORMAT: REAL, IMAGINARY, EXPANDED PHASE, ADMITTANCE [Re Im], FORMAT: SPECTRUM, NOISE, LIN Y-AXIS, LOG Y-AXIS, COPLEX PLANE under (Format))

Parameter	Description
LOGM	Log magnitude format (Network analyzer only)
PHAS	Phase format (Network analyzer only)
DELA	Delay format (Network analyzer only)
SMITH	Smith chart format (Network and impedance analyzer only)
POLA	Polar chart format (Network and impedance analyzer only)
LINM	Linear magnitude format (Network analyzer only)
SWR	SWR format (Network analyzer only)
REAL	Real format (Network analyzer only)
IMAG	Imaginary format (Network analyzer only)
EXPP	Expanded phase format (Network analyzer only)
ADMIT	Admittance Smith chart (Network and impedance analyzer only)
SPECT	Spectrum measurement (Spectrum analyzer only)
NOISE	Noise level measurement (Spectrum analyzer only)
LINY	Linear Y-axis measurement (Impedance analyzer only)
LOGY	Log Y-axis measurement (Impedance analyzer only)
COMP	Complex plane measurement (Impedance analyzer only)

■ Query Response

{LOGM|PHAS|DELA|SMITH|POLA|LINM|SWR|REAL|IMAG|EXPP|ADMIT|SPECT|NOISE|LINY|LOGY|COMP} <new line><END>

■ Equivalent SCPI Command

FMT:LOGM :DISPlay[:WINDow]:TRACe{[1]|2}:GRATICule:FORMat:RECTangle  
:CALCulate:FORMat:MLGARithmetic

FMT:PHAS :DISPlay[:WINDow]:TRACe{[1]|2}:GRATICule:FORMat:RECTangle  
:CALCulate:FORMat:PHASE

FMT:DELA :DISPlay[:WINDow]:TRACe{[1]|2}:GRATICule:FORMat:RECTangle  
:CALCulate:FORMat:GDelay

FMT:SMITH :DISPlay[:WINDow]:TRACe{[1]|2}:GRATICule:FORMat:SMITH  
:CALCulate:FORMat:COMPLEX

FMT:POLA :DISPlay[:WINDow]:TRACe{[1]|2}:GRATICule:FORMat:POLar  
:CALCulate:FORMat:COMPLEX

FMT:LINM :DISPlay[:WINDow]:TRACe{[1]|2}:GRATICule:FORMat:RECTangle  
:CALCulate:FORMat:MLNear

FMT:SWR :DISPlay[:WINDow]:TRACe{[1]|2}:GRATICule:FORMat:RECTangle  
:CALCulate:FORMat:SWR

```

FMT\LREAL      :DISPlay[:WINDow]:TRACe{[1]|2}:GRATicule:FORMat\LRECTangle
                :CALCulate:FORMat\LREAL

FMT\LIMAG      :DISPlay[:WINDow]:TRACe{[1]|2}:GRATicule:FORMat\LRECTangle
                :CALCulate:FORMat\LIMAGinary

FMT\LEXPP      :DISPlay[:WINDow]:TRACe{[1]|2}:GRATicule:FORMat\LRECTangle
                :CALCulate:FORMat\LUPHase

FMT\LADMIT     :DISPlay[:WINDow]:TRACe{[1]|2}:GRATicule:FORMat\LADMittance
                :CALCulate:FORMat\LCOMplex

FMT\LSPECT     :SENSe:FUNCTion\L"POWer\L{1|2|3|4}"

FMT\LNOISE     :SENSe:FUNCTion\L"POWer{1|2|3|4}:PSDdensity"

FMT\LINLY      DISPlay[:WINDow]:TRACe{[1]|2}:GRATicule:FORMat RECTangle
                DISPlay[:WINDow]:TRACe{[1]|2}:Y::SPACing LINear

FMT\LLOGY      DISPlay[:WINDow]:TRACe{[1]|2}:GRATicule:FORMat RECTangle
                DISPlay[:WINDow]:TRACe{[1]|2}:Y::SPACing LOGarithmic

FMT\LCOMP      DISPlay[:WINDow]:TRACe{[1]|2}:GRATicule:FORMat CPLane
                CALCulate:FORMat:COMplex

                (TRACe[1] for the data trace; TRACe2 for the memory trace.)

```

#### ■ Example

```

OUTPUT @Hp4396;"FMT LOGM"

OUTPUT @Hp4396;"FMT?"
ENTER @Hp4396;A$

OUTPUT @Hp4396;":DISP:TRAC:GRAT:FORM RECT"
OUTPUT @Hp4396;":CALC:FORM MLOG"

OUTPUT @Hp4396;":DISP:TRAC:GRAT:FORM?"
ENTER @Hp4396;A$
OUTPUT @Hp4396;":CALC:FORM?"
ENTER @Hp4396;B$

```

## FORM2

Sets the IEEE 32-bit floating point format to transfer trace data via HP-IB. See Appendix H for more information. (No query for the Simple command)

#### ■ Equivalent SCPI Command

```
:FORMat[:DATA]\LREAL,32
```

## FORM3

Sets the IEEE 64-bit floating point format to transfer the trace data via HP-IB. See Appendix H for more information. (No query for the Simple command)

#### ■ Equivalent SCPI Command

```
:FORMat[:DATA]\LREAL,64
```

### FORM3

### FORM4

Sets the ASCII transfer format to transfer the trace data via HP-IB. See Appendix H for more information. (No query for the Simple command)

- Equivalent SCPI Command

:FORMat[:DATA]␣ASCII

### FORM5

Sets MS-DOS format to transfer the trace data via HP-IB. See Appendix H for more information. (No query for the Simple command)

- Equivalent SCPI Command

:FORMat[:DATA]␣PACKed,32

### FORMFEED␣{OFF|ON|0|1}

Sets the printer ON or OFF for delivering printed paper each time printing an entire screen is finished. When the paper orientation is set to Landscape, the setting by this FORMFEED command will not take effect and the printer delivers printed paper screen by screen.

Parameter	Description
OFF or 0	Does not deliver printed paper
ON or 1	Delivers printed paper

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:HCOpy:DRIVer:FORMFeed␣{OFF|ON|0|1}

### FREQ

Blanks the displayed frequency notation for security purposes. Frequency notation cannot be restored except by sending the :SYSTEM:PRESet or \*RST command, or by turning the power OFF and ON. (FREQUENCY BLANK under Display)

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:DISPlay:ANNotation:FREQuency␣{OFF|0}  
:SYSTem:SECurity[:STATe]␣{ON|1}

### FULL

Sets the SPAN to the maximum range. (FULL SPAN under Span); No query)

- Equivalent SCPI Command

:SENSe:FREQuency:SPAN:FULL (frequency) or  
:SOURce:POWer:SPAN:FULL (power)

**FWDI**

Measures  $S_{21}$  isolation. (Network analyzer only) (FWD ISOL'N ISOL'N STD under **Cal**); No query)

- Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire] FWDI
```

**FWDM**

Measures  $S_{11}$  load match. (Network analyzer only) (FWD. MATCH THRU under **Cal**); No query)

- Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire] FWDM
```

**FWDT**

Measures  $S_{21}$  frequency response. (Network analyzer only) (FWD. TRANS. THRU under **Cal**); No query)

- Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire] FWDT
```

**GATCTL {LEV|EDG}**

Specifies the gate trigger mode. (Spectrum analyzer only) (Option 1D6 only)

(GATE CTL: LEVEL, EDGE under **Trigger**)

Parameter	Description
LEV	Level gate trigger mode
EDG	Edge gate trigger mode

- Query Response

```
{LEV|EDG} <new line><END>
```

- Equivalent SCPI Command

```
GATCTL LEV :SENSe:SWEep:GATed:TRIGger LEV
```

```
GATCTL EDG :SENSe:SWEep:GATed:TRIGger EDG
```

**GATCTL** {LEV|EDG}**GATDLY** <numeric> [US|MS|S]

Sets the gate delay. (Spectrum analyzer only) (Option 1D6 only) (**GATE DELAY** under **Trigger**)

Parameter	Range	Unit
<numeric>	0.000002 (= 2 $\mu$ ) to 3.2	s

- Query Response

{numeric} <new line><END>

- Equivalent SCPI Command

:SENSe:SWEep:GATed:DELay<numeric>

- Example

OUTPUT @Hp4396;"GATDLY 10US"

**GATLEN** <numeric> [US|MS|S]

Sets the gate length. (Spectrum analyzer only) (Option 1D6 only) (**GATE LENGTH** under **Trigger**)

Parameter	Range	Unit
<numeric>	0.000002 (= 2 $\mu$ ) to 3.2	s

- Query Response

{numeric} <new line><END>

- Equivalent SCPI Command

:SENSe:SWEep:GATed:LENGth<numeric>

- Example

OUTPUT @Hp4396;"GATLEN 100US"

OUTPUT @Hp4396;":SENS:SWE:GAT:LENG 100US"

**GRODAPER** <numeric> [PCT]

Sets the aperture for the group delay measurement as a percentage of the span. (Network analyzer only) (**GROUP DELY APERTURE** under **Bw/Avg**)

Parameter	Range	Unit
<numeric>	0.25 to 20 (of span) (simple command)	%
<numeric>	0.0025 to 0.2 (SCPI command)	

- Query Response

{numeric} <new line><END>

- Equivalent SCPI Command

:CALCulate:GDAPerture:APERTure<numeric>

**HOLD**

Freezes the data trace on the display. the analyzer stops sweeping and taking data.

(**SWEEP: HOLD** under **Trigger**)

- Query Response

{0|1} <new line><END>

Parameter	Description
0	Sweeping (not hold mode)
1	Hold mode

- Equivalent SCPI Command

```
:INITiate:CONTinuous{OFF|0}
:ABORt
```

**INID**

Initializes the disk in the flexible disk drive or the RAM disk memory. (**INITIALIZE** under **Save**); No query) Floppy disks can be initialized in the 2HD format only.

- Equivalent SCPI Command

```
:MMEMory:INITialize<string (msus)>,{LIF|DOS}
```

Parameter	Description
<string (msus)>	"DISK" for the internal flexible disk drive "MEMORY" for the internal RAM disk memory

- Example

```
OUTPUT @Hp4396;":MMEM:INIT ""DISK"",DOS"
```

**INP8IO?**

Inputs data from the 4-bit parallel input to the analyzer, and outputs the data to a controller. (Query only)

- Query Response

{numeric} <new line><END>

- Equivalent SCPI Command

```
:SYSTEM:COMMunicate:PARAllel[:RECEive]:DATA?
```

## INP8IO?

### INPUCALC{1-12} □ <numeric (1)>, <numeric (2)>, ... , <numeric (n)>

Stores the measurement calibration error coefficient set of real/imaginary pairs input via HP-IB into the analyzer's memory. The command definition changes to INPUCALC{1-3} when used in the impedance analyzer. See Appendix F for calibration array assignments. (Network and impedance analyzer only; No query)

Parameter	Description
<numeric>	Complex number (Data format: real, imaginary)

#### ■ Equivalent SCPI Command

:DATA[:DATA] □ UCCO{1-12}, {<numeric (1)>, <numeric (2)>, ... , <numeric(n)> | <block>}

#### ■ Example

```
DIM A(1:201,1:2)          NOP: 201
OUTPUT @Hp4396;"INPUCALC1 ";A(*)  Set the measurement calibration error coefficient.

DIM A(1:201,1:2)          NOP: 201
OUTPUT @Hp4396;":DATA CC01,";A(*)  Set the measurement calibration error coefficient.
```

### INPUCALK □ <block>

Stores the calibration kit data transmitted by the OUTPCALK? command. (Network and impedance analyzer only) (No query)

Parameter	Description
<block>	Block data (Data format: HP 4396B internal format (714 bytes of binary data))

#### ■ Equivalent SCPI Command

:DATA[:DATA] □ UCKIT, {<block> | <numeric (1)>, <numeric (2)>, ... , <numeric (n)>}

#### ■ Example

```
OUTPUT @Hp4396;"INPUCALK ";A$
OUTPUT @Hp4396;":DATA CKIT,";A$
```

### INPUCOMC{1|2|3} □ <numeric>

Inputs data into the fixture compensation coefficient arrays. (No query; Impedance analyzer only.)

The analyzer handles a reflection coefficient data for the intermediate processing. Thus, the fixture compensation is performed for the reflection coefficient as follows:

$$\Gamma = \frac{\Gamma_M - A}{B \times (\Gamma_M - A) + C}$$

Where,

$A$ ,  $B$ , and  $C$      Fixture compensation coefficients. (complex)  
 $\Gamma_M$              Measured reflection data. (converted from V and I.)  
 $\Gamma$                  Corrected reflection data.

**INPUDATA**  $\square$   $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$ 

By using this command, you can change the contents of the fixture compensation coefficient arrays.

Parameter	Description
1	coefficient A
2	coefficient B
3	coefficient C
$\langle$ numeric $\rangle$	Complex number (Data format: real, imaginary)

- Equivalent SCPI Command

```
:DATA[:DATA]  $\square$  CMP{1|2|3}, { $\langle$ numeric $\rangle$ 
```

- Example

```
OUTPUT @Hp4396;"INPUCOMC1 ";Dat(*)
```

```
OUTPUT @Hp4396;"DATA CMP1,";Dat(*)
```

**INPUD**

Executes a 3-term calibration by using real data which are set with INPULOAA, INPUOPEA, and INPUSHOA commands. (No equivalent SCPI command; No query; Network analyzer only)

**INPUDATA**  $\square$   $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$ 

Inputs the error corrected data. (No query)

Parameter	Description
$\langle$ numeric $\rangle$	Complex number (Data format: real, imaginary) for the Network analyzer Real number for the Spectrum analyzer

- Equivalent SCPI Command

```
DATA[:DATA]  $\square$  DATA, { $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$  |  $\langle$ block $\rangle$ }
```

- Example

```
DIM A(1:201,1:2) Network Analyzer, NOP: 201
```

```
! Set the error corrected data.
```

```
OUTPUT @Hp4396;"INPUDATA ";A(*)
```

```
DIM A(1:201,1:2)
```

```
! Set the error corrected data.
```

```
OUTPUT @Hp4396;" :DATA DATA,";A(*)
```

**INPUDATA**  $\square$   $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$

**INPUDTRC**  $\square$   $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$

Inputs data to DATA TRACE memory. (No query)

Parameter	Description
$\langle$ numeric $\rangle$	Complex number (Data format: real, imaginary) for the Network analyzer Real number for the Spectrum analyzer

■ Equivalent SCPI Command

:TRACe[:DATA]LDTR, { $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$  |  $\langle$ block $\rangle$ }

■ Example

```
DIM A(1:201,1:2)           Network analyzer, NOP: 201
! Set the trace data.
OUTPUT @Hp4396;"INPUDTRC ";A(*)

DIM A(1:201,1:2)
! Set the trace data.
OUTPUT @Hp4396;":TRAC DTR,";A(*)
```

**INPULOAA**  $\square$   $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$

Inputs the real LOAD data array for a 3-term calubtaion. (No equivalent SCPI command; No query; Network analyzer only)

Parameter	Description
$\langle$ numeric $\rangle$	Complex number (Data format: real, imaginary)

**INPUOPEA**  $\square$   $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$

Inputs the real OPEN data array for a 3-term calubtaion. (No equivalent SCPI command; No query; Network analyzer only)

Parameter	Description
$\langle$ numeric $\rangle$	Complex number (Data format: real, imaginary)

**INPURAW{1-4}** <numeric (1)>, <numeric (2)>, ... , <numeric (n)>

Inputs raw data. The command definition changes to INPURAW{1} when used in the impedance analyzer and spectrum analyzer. (No query)

Parameter	Description
<numeric>	Complex number (Data format: real, imaginary) for the Network analyzer Real number for the Spectrum analyzer

- Equivalent SCPI Command

```
:DATA[:DATA] RAW{1-4}, {<numeric (1)>, <numeric (2)>, ... , <numeric (n)> | <block>}
```

- Example

```
DIM A(1:201,1:2)           Network Analyzer, NOP: 201
! Set the raw data.
OUTPUT @Hp4396;"INPURAW1 ";A(*)

DIM A(1:201,1:2)
! Set the raw data.
OUTPUT @Hp4396;":DATA RAW1,";A(*)
```

**INPUSHOA** <numeric (1)>, <numeric (2)>, ... , <numeric (n)>

Inputs the real SHORT data array for a 3-term calibration. (No equivalent SCPI command; No query; Network analyzer only)

Parameter	Description
<numeric>	Complex number (Data format: real, imaginary)

**INPZ{50|75}[OHM]**

Sets the input impedance. (Spectrum analyzer only) (INPUT Z under Cal)

- Query Response

```
{numeric} <new line> <END>
```

- Equivalent SCPI Command

```
:INPut:IMPedance <numeric>
```

- Example

```
OUTPUT @Hp4396;"INPZ 50"
```

**INPZ**□{50|75}[OHM]

**INTE**□<numeric>[PCT]

Sets the display intensity as a percent of the brightest setting. (INTENSITY under **Display**)

Parameter	Range	Unit
<value>	0 to 100 (simple command)	%
<value>	0 to 1 (SCPI command)	

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:DISPlay:BRIGhtness□<numeric>

**ISOD**

Completes isolation calibration. The error coefficients are calculated and stored. (Network analyzer only) (ISOLATION DONE under **Cal**); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE7

**ISOL**

Starts the isolation calibration. (Network analyzer only) (ISOLATION under **Cal**); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:COLLect[:ACQuire]□ISOL2

**KEY**□<numeric>

Sends the key code for a key or a softkey on the front panel. This is equivalent to actually pressing a key. See Appendix G for key codes.

Parameter	Description
<numeric>	0 to 52

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:SYSTem:KEY□<numeric>

■ Example

OUTPUT @Hp4396;"KEY 8" *Equivalent to pressing* **Chan 1**

**KITD**

Completes the procedure to define user cal kit. (Network analyzer only)  
 (KIT DONE (MODIFIED) under Cal); No query

- Equivalent SCPI Command  
 :SENSe:CORRection:CKIT:SAVE□ALL

**LABECOMK□<string>**

Modifies the label of user defined fixture compensation kit. (Impedance analyzer only)  
 (LABEL KIT under Cal); No query

Parameter	Description
<string>	Up to 8 characters.

- Equivalent SCPI Command (Query)  
 :SENSe:CORRection2:CKIT:LABEl□<string>
- Query Response  
 {numeric} <new line><END>
- Example  
 OUTPUT @Hp4396;"LABECOMK ""NEW""

**LABEFIX□<string>**

Modifies the label of user defined test fixture. (LABEL FIXTURE under Meas FIXTURE □);  
 Impedance analyzer only.)

Parameter	Description
<string>	Up to ten characters.

- Query Response  
 <string><new line><END>
- Equivalent SCPI Command  
 :SYSTem:FIXTure:LABEl□<string>
- Example  
 OUTPUT @Hp4396;"LABEFIX ""NEW""

### **LABEFIX**□<string>

### **LABEFWD**{T|M}□<string>

Defines the label for the forward transmission (THRU) or the forward match (THRU) calibration. (Network analyzer only) (LABEL: FWD, TRANS., FWD, MATCH under **Cal**); No query)

Parameter	Description
<string>	Up to ten characters.

#### ■ Equivalent SCPI Command (Query)

LABEFWDT□<string> :SENSe:CORRection:CKIT:CLASs7:LABel□<string>

LABEFWDM□<string> :SENSe:CORRection:CKIT:CLASs9:LABel□<string>

#### ■ Query Response

{numeric} <new line><END>

### **LABEIMP**{A|B|C}□<string>

Defines the label for the first class, second class, or the third class required for an impedance measurement calibration. (Impedance analyzer only) (LABEL CLASS under **Cal**); No query)

Parameter	Description
<string>	Up to ten characters.

#### ■ Equivalent SCPI Command (Query)

LABEIMPAL□<string> :SENSe:CORRection:CKIT:CLASs13:LABel□<string>

LABEIMPB□<string> :SENSe:CORRection:CKIT:CLASs14:LABel□<string>

LABEIMPC□<string> :SENSe:CORRection:CKIT:CLASs15:LABel□<string>

#### ■ Query Response

{numeric} <new line><END>

### **LABERES**{P|I}□<string>

Defines the label for the response, or the response and isolation calibration. (Network analyzer only) (RESPONSE, RESPONSE & ISOL'N under **Cal**); No query)

Parameter	Description
<string>	Up to ten characters.

#### ■ Equivalent SCPI Command (Query)

LABERESP□<string> :SENSe:CORRection:CKIT:CLASs11:LABel□<string>

LABERESI□<string> :SENSe:CORRection:CKIT:CLASs12:LABel□<string>

#### ■ Query Response

{numeric} <new line><END>

■ Example

OUTPUT @Hp4396;"LABERESP ""RESPONSE""

OUTPUT @Hp4396;":SENS:CORR:CKIT:CLAS11:LAB ""RESPONSE""

**LABEREV{T|M}□<string>**

Defines the label for reverse transmission (THRU) or the reverse match (THRU) calibration. (Network analyzer only) (REV.TRANS., REV.MATCH under Cal); No query

Parameter	Description
<string>	Up to ten characters.

■ Equivalent SCPI Command (Query)

LABEREVT□<string> :SENSe:CORRection:CKIT:CLASs8:LABel□<string>

LABEREVM□<string> :SENSe:CORRection:CKIT:CLASs10:LABel□<string>

■ Query Response

{numeric} <new line><END>

**LABES11{A|B|C}□<string>**

Defines the label for the first class, the second class, or the third class required for an S<sub>11</sub> 1-port calibration. (Network analyzer only) (LABEL: S11A, S11B, S11C under Cal); No query

Parameter	Description
<string>	Up to ten characters.

■ Equivalent SCPI Command (Query)

LABES11A□<string> :SENSe:CORRection:CKIT:CLASs1:LABel□<string>

LABES11B□<string> :SENSe:CORRection:CKIT:CLASs2:LABel□<string>

LABES11C□<string> :SENSe:CORRection:CKIT:CLASs3:LABel□<string>

■ Query Response

{numeric} <new line><END>

**LABES11**{A|B|C}␣<string>

**LABES22**{A|B|C}␣<string>

Defines the label for the first class, the second class, or the third class required for an S<sub>22</sub> 1-port calibration. (Network analyzer only) (**LABEL: S22A**, **S22B**, **S22C** under **Cal**); No query)

Parameter	Description
<string>	Up to ten characters.

■ Equivalent SCPI Command (Query)

LABES22A␣<string> :SENSe:CORRection:CKIT:CLASs4:LABel␣<string>

LABES22B␣<string> :SENSe:CORRection:CKIT:CLASs5:LABel␣<string>

LABES22C␣<string> :SENSe:CORRection:CKIT:CLASs6:LABel␣<string>

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT @Hp4396;"LABES22A ""OPENS""
```

```
OUTPUT @Hp4396;":SENS:CORR:CKIT:CLAS4:LAB ""OPENS""
```

**LABK**␣<string>

Defines a label for a new calibration kit. (Network and impedance analyzer only) (**LABEL KIT** under **Cal**); No query)

Parameter	Description
<string>	Up to eight characters.

■ Equivalent SCPI Command (Query)

:SENSe:CORRection:CKIT:LABel␣<string>

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT @Hp4396;"LABK ""7mm""
```

```
OUTPUT @Hp4396;":SENS:CORR:CKIT:LAB ""7mm""
```

**LABS**□<string>

Defines a label for the standard. (Network and impedance analyzer only) (LABEL STD under **Cal**); No query)

Parameter	Description
<string>	Up to ten characters.

- Equivalent SCPI Command

```
:SENSe:CORRection:CKIT:STANdard:LABel□<string>
```

- Example

```
OUTPUT @Hp4396;"LABS ""SHORT"""
```

```
OUTPUT @Hp4396;":SENS:CORR:CKIT:STAN:LAB ""SHORT"""
```

**LANDSCAPE**□{OFF|ON|0|1}

Sets the orientation of paper landscape or not, using ON or OFF. This setting takes effect for printers which support printing paper placed in the landscape orientation. Setting the paper orientation mode will invalidate the setting by the FORMFEED command. (LANDSCAPE under **Copy**)

Parameter	Description
OFF or 0	The orientation of paper is not set to Landscape. (Thus, Portrait)
ON or 1	The orientation of paper is set to Landscape.

- Query Response

```
{0|1} <new line><END>
```

- Equivalent SCPI Command

```
:HCOPY:DRIVER:LANDScape□{OFF|ON|0|1}
```

**LIMCLEL**

Clears all segments in the limit line. (CLEAR LIST YES under **System**); No query)

- Equivalent SCPI Command

```
:CALCulate:LIMit:CLEar
```

**LIMD**□<numeric>

Sets the limits an equal amount above and below a specified middle value, instead of setting upper and lower limits separately. (DELTA LIMITS under **System**)

Parameter	Range	Unit
<numeric>	0 to 5000000	

**LIMD**  $\square$  *<numeric>*

- Query Response  
*{numeric}* <new line><^END>
- Equivalent SCPI Command  
:CALCulate:LIMit:SEGment:DELTA  $\square$  *<numeric>*

## LIMEDONE

Completes editing the limit table. (**DONE** under **System**); No query

- Equivalent SCPI Command  
:CALCulate:LIMit:SAVE

**LIMIAMPO**  $\square$  *<numeric>*

Adds or subtracts an offset in amplitude value. (**AMPLITUDE OFFSET** under **System**)

Parameter	Range	Unit
<i>&lt;numeric&gt;</i>	-5000000 to 5000000	

- Query Response  
*{numeric}* <new line><^END>
- Equivalent SCPI Command  
:CALCulate:LIMit:OFFSet  $\square$  *<numeric>*

**LIMILINE**  $\square$  {OFF|ON|0|1}

Sets limit lines ON or OFF. (**LIMIT LINE ON off** under **System**)

Parameter	Description
OFF or 0	Limit lines OFF
ON or 1	Limit lines ON

- Query Response  
{0|1} <new line><^END>
- Equivalent SCPI Command  
:CALCulate:LIMit:LINE  $\square$  {OFF|ON|0|1}
- Example  
OUTPUT @Hp4396;"LIMILINE ON"

**LIMIPRMO**<numeric>

Adds or subtracts an offset from the sweep parameter value. (**SWP PARAM OFFSET** under **System**)

Parameter	Range	Unit
<numeric>	-1.82×10 <sup>9</sup> (= -1.82 G) to 1.82×10 <sup>9</sup> (= 1.82 G) -60 to 60	Hz (frequency) dB (power)

## ■ Query Response

{numeric} <new line><END>

## ■ Equivalent SCPI Command

:CALCulate:LIMit:CONTRol:OFFSet<numeric>

**LIMITEST**{OFF|ON|0|1}

Sets the limit testing ON or OFF. (**LIMIT TEST ON off** under **System**)

Parameter	Description
OFF or 0	Limit testing OFF
ON or 1	Limit testing ON

## ■ Query Response

{numeric} <new line><END>

## ■ Equivalent SCPI Command

:CALCulate:LIMit:STATe{OFF|ON|0|1}

**LIML**<numeric>

Sets the lower limit value for the segment. (**LOWER LIMIT** under **System**)

Parameter	Range	Unit
<value>	-5000000 to 5000000	

## ■ Query Response

{numeric} <new line><END>

## ■ Equivalent SCPI Command

:CALCulate:LIMit:SEGment:LOWer<numeric>

**LIML**  $\lfloor$  *<numeric>*

**LIMM**  $\lfloor$  *<numeric>*

Sets the midpoint for delta limits. (**MIDDLE VALUE** under **System**)

Parameter	Range	Unit
<i>&lt;value&gt;</i>	-5000000 to 5000000	

■ Query Response

*{numeric}*  $\langle$  new line  $\rangle$   $\langle$  END  $\rangle$

■ Equivalent SCPI Command

:CALCulate:LIMit:SEGment:MIDDLE $\lfloor$  *<numeric>*

**LIMPRM**  $\lfloor$  *<numeric>* [**HZ**|**KHZ**|**MAHZ**|**GHZ**|**DBM**]

Sets the starting sweep parameter value of a segment, using entry block controls. (**SWP PARAM** under **System**)

Parameter	Range	Unit
<i>&lt;numeric&gt;</i>	100000 (= 100 k) to $1.82 \times 10^9$ (= 1.82 G) (Network and impedance analyzer)	Hz (frequency)
<i>&lt;numeric&gt;</i>	0 to $1.82 \times 10^9$ (= 1.82 G) (Spectrum analyzer) -60 to 20	Hz (frequency) dBm (power)

■ Query Response

*{numeric}*  $\langle$  new line  $\rangle$   $\langle$  END  $\rangle$

■ Equivalent SCPI Command

:CALCulate:LIMit:SEGment:CONTRol[:DATA]  $\lfloor$  *<numeric>*

**LIMSADD**

Adds a new segment to the end of the limit list. (**ADD** under **System**); No query)

■ Equivalent SCPI Command

:CALCulate:LIMit:SEGment:ADD

**LIMSDEL**

Deletes a limit testing segment. (**DELETE** under **System**); No query)

■ Equivalent SCPI Command

:CALCulate:LIMit:SEGment:DELete

**LIMSDON**

Terminates a limit segment definition. (**DONE** under **System**); No query)

- Equivalent SCPI Command

:CALCulate:LIMit:SEGment:SAVE

**LIMSEDI□[<numeric>]**

Specifies which limit segment in the table to edit. When you want to define or modify the values of the specified segment, you do not have to enter <numeric> (the segment number).

(**SEGMENT**, **EDIT** under **System**)

Parameter	Description
<numeric>	Segment number, 1 to 18.

- Query Response

{numeric} <new line><^END>

- Equivalent SCPI Command

LIMSEDI□<numeric> :CALCulate:LIMit:SEGment□<numeric>  
(**SEGMENT**)

LIMSEDI□[<numeric>] :CALCulate:LIMit:SEGment:EDIT□<numeric> (No query)  
(**EDIT**)

**LIMU□<numeric>**

Sets the upper limit value for a limit testing segment. (**UPPER LIMIT** under **System**)

Parameter	Range	Unit
<numeric>	-5000000 to 5000000	

- Query Response

{numeric} <new line><^END>

- Equivalent SCPI Command

:CALCulate:LIMit:SEGment:UPPer□<numeric>

**LMAX?□<numeric>**

Outputs the *n*th peak value from the left of the analysis range. See "LMAX?" in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command)

Parameter	Range	Unit
<numeric>	1 to 801	

- Query Response

### LMAX?□<numeric>

Parameter	Description
<numeric>	Complex number (Data format: real, imaginary)

### LMARG□<numeric>

Specify the value for the left margin of printed paper. (PRINT SETUP , LEFT MARGIN under Copy)

Parameter	Range	Unit
<numeric>	0 to 5	inch

#### ■ Query Response

{numeric} <new line><END>

#### ■ Equivalent SCPI Command

:HCOPY:DRIVER:LEFTMarg:□<numeric>

### LMIN?□<numeric>

Outputs the *n*th negative peak value from the left of the analysis range. See "LMIN?" in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command)

Parameter	Range	Unit
<numeric>	1 to 801	

#### ■ Query Response

Parameter	Description
<numeric>	Complex number (Data format: real, imaginary)

### LISV

Displays a tabular listing of all the measured data points and their current values. (LIST VALUES under Copy); No query)

#### ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TEXT1:PAGE□1  
:DISPlay[:WINDow]:TEXT1:STATe□{ON|1}

**MKRTIME** [ ] { OFF | ON | 0 | 1 }

Sets the x-axis units to time, (the start point is zero and the stop point is the value of the sweep time). (MKR TIME ON off under **Utility**)

Parameter	Description
OFF or 0	Sets the x-axis to the sweep parameter
ON or 1	Sets the x-axis to time

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:UNIT:TIME [ ] {OFF|ON|0|1}

- Example

```
OUTPUT @Hp4396;"MKRTIME ON"
```

**MKRVAL?**

Outputs the amplitude value of the measurement value at the marker position. See "Marker Readout" in Appendix H for the amplitude value of each display format. (Query only)

- Query Response

{*numeric*} <new line><END>

- Equivalent SCPI Command

:CALCulate:EVALuate:Y[1]:VALue1?

- Example

```
OUTPUT @Hp4396;"MKRVAL?"
ENTER @Hp4396;A
```

**MKRZM**

Sets the sweep parameter center value of the destination channel to the sweep parameter value of the marker, and changes the sweep parameter span value of the destination channel to "sweep parameter span × zooming aperture." (MKR ZOOM under **Marker** →; No query)

- Equivalent SCPI Command

:SENSe:FREQuency:SPAN [ ] MZAPerture (frequency) or  
:SOURce:POWer:SPAN [ ] MZAPerture (power)

**MODII**

Leads to the modify calibration kit menu, where a calibration kit can be user-modified. (Network and impedance analyzer only) (MODIFY [ ] under **Cal**); No query)

- Equivalent SCPI Command

:SENSe:CORRection:CKIT:MODify

## MODII

## MODICOMK

Leads to the modify fixture compensation kit menu. (MODIFY [ ] under (Cal) COMPEN KIT [ ] ; No query; Impedance analyzer only.)

- Equivalent SCPI Command

```
:SENSe:CORRection2:CKIT:MODify
```

## MODIFIX

Leads to the modify user fixture menu. (MODIFY [ ] under (Meas) FIXTURE [ ] ; No query; Impedance analyzer only.)

- Equivalent SCPI Command

```
:SYSTem:FIXTure:MODify
```

## MONDYEAR

Changes the displayed date to the "month:day:year" format. (DATE MODE: MonDayYear under (System))

- Query Response

```
{0|1} <new line> <^END>
```

Parameter	Description
0	"day:month:year" format
1	"month:day:year" format

- Equivalent SCPI Command

```
:SYSTem:DATE:MODELMDY
```

## NA

Selects the network analyzer as the analyzer type. (NETWORK ANALYZER under (Meas))

- Query Response

```
{0|1} <new line> <^END>
```

Parameter	Description
0	Network analyzer is not selected.
1	Network analyzer is selected.

- Equivalent SCPI Command

```
INSTRument:TYPELNA
```

- Example

```
OUTPUT @Hp4396;"NA?"  
ENTER @Hp4396;Na  
If 1 THEN PRINT "Network Analyzer Mode is selected."
```

**NEXP**

Displays the next page of information in a tabular listing. (**NEXT PAGE** under **Copy**); No query)

- Equivalent SCPI Command

```
:DISPlay[:WINDow]:TEXT{1-17}:PAGEUP
```

Parameter	Description
1	List Value
2	Operation Parameter
3	Cal Class
4 to 11	Cal Standard No. 1 to No. 8
12	Start and Stop
13	Center and Span (List)
14	Upper and Lower
15	Middle and Delta (Limit Test)
16	Marker List
17	Title

**NEXPK?**

Outputs the maximum peak value and its stimulus next to the peak last found by the PEAK?, or NEXPK? commands. For more information, see "NEXPK?" in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

**NUMG□<numeric>**

Triggers a user-specified number of sweeps and returns to the HOLD mode.

(**NUMBER OF GROUPS** under **Trigger**); No query)

Parameter	Description
<numeric>	1 to 999 (if <numeric> is 0 or less than 0, it is set to 1.)

- Equivalent SCPI Command (Query)

```
:INITiate:CONTinuous□{OFF|0}
:ABORt
:SENSe:SWEep:COUNt□<numeric>
:INITiate[:IMMediate]
```

- Query Response

```
{numeric} <new line><END>
```

- Example

```
OUTPUT @Hp4396;"NUMG 10"
OUTPUT @Hp4396;":INIT:CONT OFF"
OUTPUT @Hp4396;":SENS:SWE:COUN 10"
OUTPUT @Hp4396;":INIT"
```

## NUMLMAX?

Outputs the number of peaks within the analysis range. See “NUMLMAX?” in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command)

- Query Response

*<numeric>**<new line>**<END>*

## NUMLMIN?

Outputs the number of negative peaks within the analysis range. See “NUMLMIN?” in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command)

- Query Response

*<numeric>**<new line>**<END>*

## OFSD $\square$ *<numeric>* [S]

Specifies the one-way electrical delay from the measurement (reference) plane to the standard. (Network and impedance analyzer only) (OFFSET DELAY under **Cal**); No query)

Parameter	Range	Unit
<i>&lt;numeric&gt;</i>	-10 to 10	s

- Equivalent SCPI Command (Query)

:SENSe:CORRection:CKIT:STANdard:ODELay  $\square$  *<numeric>*

- Query Response

{*numeric*} *<new line>**<END>*

## OFSL $\square$ *<value>*

Specifies energy loss, due to skin effect, along a one-way length of coaxial cable offset. (Network and impedance analyzer only) (OFFSET LOSS under **Cal**); No query)

Parameter	Range	Unit
<i>&lt;value&gt;</i>	0 to $1 \times 10^{19}$	$\Omega$ /s

- Equivalent SCPI Command (Query)

:SENSe:CORRection:CKIT:STANdard:OLOSS  $\square$  *<numeric>*

- Query Response

{*numeric*} *<new line>**<END>*

**OFSZ**□<numeric>[OHM|KOHM]

Specifies the characteristic impedance of the coaxial cable offset. (Network and impedance analyzer only) (OFFSET Z0 under Cal); No query

Parameter	Range	Unit
<numeric>	0.001 to 5000000 (=5M)	Ω

- Equivalent SCPI Command (Query)
  - :SENSe:CORRection:CKIT:STANdard:OCIMpedance□<numeric>
- Query Response
  - {numeric} <new line><^END>

**OMII**

Omits correction for isolation of a 2-port calibration. (Network analyzer only) (OMIT ISOLATION under Cal); No query

- Equivalent SCPI Command
  - :SENSe:CORRection:COLLect[:ACQuire]□OMII

**OPEP**

Provides a tabular listing on the display of the key parameters for both channels. (OPERATING PARAMETERS under Copy); No query

- Equivalent SCPI Command
  - :DISPlay[:WINDow]:TEXT2:PAGEL1
  - :DISPlay[:WINDow]:TEXT2:STATe□{ON|1}

**OSE**□<numeric>

Enables the operational status register.

Parameter	Description
<numeric>	Decimal expression of the contents of the register, 0 to 65535 (=2 <sup>16</sup> -1)

- Query Response
  - {numeric} <new line><^END>
- Equivalent SCPI Command
  - :STATus:OPERation:ENABLe□<numeric>

**OSE**  $\square$  *<numeric>*

## OSER?

Outputs the current value in the event register of an operational status register. (Query only)

- Query Response

*{numeric}*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

- Equivalent SCPI Command

:STATus:OPERation[:EVENT]?

**OSNT**  $\square$  *<numeric>*

Sets the negative transition filter of an operational status register. For details, refer to Appendix D.

Parameter	Description
<i>&lt;numeric&gt;</i>	Decimal expression of the contents of the register, 0 to 65535 ( $=2^{16}-1$ )

- Query Response

*{numeric}*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

- Equivalent SCPI Command

:STATus:OPERation:NTRansition  $\square$  *<numeric>*

**OSPT**  $\square$  *<numeric>*

Sets the positive transition filter of an operational status register. For details, refer to Appendix D.

Parameter	Description
<i>&lt;numeric&gt;</i>	Decimal expression of the contents of the register, 0 to 65535 ( $=2^{16}-1$ )

- Query Response

*{numeric}*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

- Equivalent SCPI Command

:STATus:OPERation:PTRansition  $\square$  *<numeric>*

## OSR?

Outputs the operational status register value. (Query only)

- Query Response

*{numeric}*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

- Equivalent SCPI Command

:STATus:OPERation:CONDition?

**OUT8IO**  $\square$  *<numeric>*

Outputs the data to the 8-bit parallel output port. (No query)

Parameter	Description
<i>&lt;numeric&gt;</i>	0 to 255

- Equivalent SCPI Command

```
:SYSTem:COMMunicate:PARAllel:TRANsmit:DATA  $\square$  <numeric>
```

**OUTPCALC**{1-12}?

Outputs the active calibration set array of the active channel. Refer to Appendix F for the calibration set array. (Network and impedance analyzer only) (Query only)

- Query Response

*{numeric (1)} {numeric (2)} ... {numeric (n)} <new line><END>* (n is the number of points.)

*numeric* is a complex number (data format: real, imaginary).

- Equivalent SCPI Command

```
:DATA[:DATA]? $\square$ LCCO{1-12}
```

- Example

```
DIM A(1:201,1:2)      NOP: 201
OUTPUT 717;"OUTCALC1?"
ENTER 717;A(*)

DIM A(1:201,1:2)
OUTPUT 717;" :DATA? CC01"
ENTER 717;A(*)
```

**OUTPCALK?**

Outputs the active calibration kit. (Network and impedance analyzer only) (Query only)

- Query Response

*{block data (714 bytes of binary data)} <new line><END>*

- Equivalent SCPI Command

```
:DATA[:DATA]? $\square$ LCKIT
```

**OUTPCERR?**

Outputs ceramic resonator parameters. See "OUTPCERR?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only; Network analyzer only)

## OUTPCFIL?

Outputs ceramic filter parameters. See "OUTPCFIL?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only; Network analyzer only)

## OUTPCOMC{1|2|3}?

Outputs data of the fixture compensation arrays. See "INPUCCOMC{1|2|3}□<numeric>" for details about the fixture compensation arrays. (Impedance analyzer only)

### ■ Query Response

{*numeric (1)*} {*numeric (2)*} ... {*numeric (n)*} <new line><END>

(n is the number of points.)

*numeric* is a complex number. (data format: real, imaginary)

### ■ Equivalent SCPI Command

:DATA[:DATA]?□CMP{1|2|3}

## OUTPDATA?

Outputs the error corrected data. (Query only)

### ■ Query Response

{*numeric (1)*} {*numeric (2)*} ... {*numeric (n)*} <new line><END>

(n is the number of points.)

*numeric* is a complex number (data format: real, imaginary) for the Network analyzer, or a real number for the Spectrum analyzer.

### ■ Equivalent SCPI Command

:DATA[:DATA]?□LDATA

### ■ Example

```
DIM A(1:201,1:2)           Network Analyzer, NOP: 201
OUTPUT 717;"OUTPDATA?"
ENTER 717;A(*)

DIM A(1:201,1:2)
OUTPUT 717;":DATA? DATA"
ENTER 717;A(*)
```

**OUTPDATAP?**  $\square$  *<numeric>*

Outputs the error corrected data at the specified point. (Query only)

Parameter	Description
<i>&lt;numeric&gt;</i>	1 to "number of points" (If <i>&lt;numeric&gt;</i> is 0 or less than 0, it is set to 1. If <i>&lt;numeric&gt;</i> is greater than "number of points," it is set to "number of points.")

■ Query Response

*{numeric (real)}* *{numeric (imaginary)}*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$  (Network analyzer)

*{numeric (val)}*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$  (Spectrum analyzer)

■ Equivalent SCPI Command

:DATA[:DATA]:VALue?  $\square$  DATA, *<numeric>*

■ Example

```
OUTPUT 717;"OUTPDATAP? 1"
ENTER 717;A,B           Network Analyzer

OUTPUT 717;":DATA:VAL? DATA,1"
ENTER 717;A,B
```

**OUTPDMKR?**

Outputs sweep parameter and measurement value at the  $\Delta$ marker position. (Query only)

■ Query Response

*{numeric (val1)}* *{numeric (val2)}* *{numeric (stimulus)}*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

(Val1: Amplitude value, Val2: Auxiliary amplitude value. See "Marker Readout" in Appendix H.)

■ Equivalent SCPI Command

:CALCulate:EVALuate:REFerence:DATA?

■ Example

```
OUTPUT 717;"OUTPDMKR?"
ENTER 717;A,B,C

OUTPUT 717;":CALC:EVAL:REF:DATA?"
ENTER 717;A,B,C
```

## OUTPDMKR?

## OUTPDTRC?

Outputs DATA TRACE data. (Query only)

### ■ Query Response

{*numeric (1:val1)*} {*numeric (1:val2)*} {*numeric (2:val1)*} {*numeric (2:val2)*} ...  
{*numeric (n:val2)*} {*numeric (n:val2)*} <new line><END> (Network analyzer)

{*numeric (1)*} {*numeric (2)*} ... {*numeric (n)*} <new line><END> (Spectrum analyzer)

(n is the number of points.) (Val1: Amplitude value, Val2: Auxiliary amplitude value. See "Marker Readout" in Appendix H.)

### ■ Equivalent SCPI Command

:TRACe[:DATA]?LDTR

### ■ Example

```
DIM A(1:201,1:2)           Network Analyzer, NOP: 201
OUTPUT 717;"OUTPDTRC?"
ENTER 717;A(*)

DIM A(1:201,1:2)
OUTPUT 717;":TRAC? DTR"
ENTER 717;A(*)
```

## OUTPDTRCP?<numeric>

Outputs DATA TRACE data at the specified point. (Query only)

Parameter	Description
<numeric>	1 to "number of points" (If <numeric> is 0 or less than 0, it is set to 1. If <numeric> is greater than "number of points," it is set to "number of points.")

### ■ Query Response

{*numeric (val1)*} {*numeric (val2)*} <new line><END> (Network analyzer)

{*numeric (val)*} <new line><END> (Spectrum analyzer)

(Val1: Amplitude value, Val2: Auxiliary amplitude value. See "Marker Readout" in Appendix H.)

### ■ Equivalent SCPI Command

:TRACe[:DATA]:VALue?LDTR,<numeric>

### ■ Example

```
OUTPUT 717;"OUTPDTRCP? 1"
ENTER 717;A,B

OUTPUT 717;":TRAC:VAL? DTR,1"
ENTER 717;A,B
```

**OUTPERRO?**

Outputs the error message in the error queue.

- Query Response

*{numeric (Error number)}* *{string (Error message)}* <new line><END>

- Equivalent SCPI Command

:SYSTem:ERRor?

- Example

```
OUTPUT 717;"OUTPERRO?"
ENTER 717;A,A$

OUTPUT 717;":SYST:ERR?"
ENTER 717;A,A$
```

**OUTPFAIP?**

Outputs number of the failed point of the limit test. (Query only)

- Query Response

*{numeric}* <new line><END>

- Equivalent SCPI Command

:DATA:POINTs?LLFA

- Example

```
OUTPUT 717;"OUTPFAIP?"
ENTER 717;A

OUTPUT 717;":DATA:POIN? LFA"
ENTER 717;A
```

**OUTPFILT?**

Outputs filter parameters. See "OUTPFILT?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only; Network analyzer only)

**OUTPLIMF?**

Outputs the limit test results only for the failed points. (Query only)

- Query Response

*{numeric (stimulus 1)}* *{0}* *{numeric (upper\_limit 1)}* *{numeric (lower\_limit 1)}*  
*{numeric (stimulus 2)}* *{0}* *{numeric (upper\_limit 2)}* *{numeric (lower\_limit 2)}*  
 ⋮  
*{numeric (stimulus n)}* *{0}* *{numeric (upper\_limit n)}* *{numeric (lower\_limit n)}* <new  
 line><END> (Form 4)

(n is the number of failed points.)

*{0}* <new line><END> (for no failed points.)

## OUTPLIMF?

### ■ Equivalent SCPI Command

:DATA[:DATA]?LLFA

### ■ Example

```
DIM A(1:201,1:4)          NOP: 201
OUTPUT 717;"OUTPLIMF?"
ENTER 717 USING "%,K";A(*)

DIM A(1:201,1:4)
OUTPUT 717;" :DATA? LFA"
ENTER 717 USING "%,K";A(*)
```

## OUTPLIML?

Outputs the limit test results for each point. (Query only)

### ■ Query Response

*{numeric (stimulus 1)} {numeric (result 1)} {numeric (upper\_limit 1)}*  
*{numeric (lower\_limit 1)}*

*{numeric (stimulus 2)} {numeric (result 2)} {numeric (upper\_limit 2)}*  
*{numeric (lower\_limit 2)}*

⋮

*{numeric (stimulus n)} {numeric (result n)} {numeric (upper\_limit n)}*  
*{numeric (lower\_limit n)} <new line><END> (Form 4)*

(n is the number of points.) (result is 1 for pass, 0 for fail, or -1 for no test.)

### ■ Equivalent SCPI Command

:DATA[:DATA]?LLIS

### ■ Example

```
DIM A(1:201,1:4)          NOP: 201
OUTPUT 717;"OUTPLIML?"
ENTER 717;A(*)

DIM A(1:201,1:4)
OUTPUT 717;" :DATA? LLIS"
ENTER 717;A(*)
```

**LVCDT** {<numeric>} [DB]

Sets the level cal data (adds an offset value to the measured value). (Spectrum analyzer only)  
 (LVL CAL DATA under Cal)

Parameter	Range	Unit
<numeric>	-10 to 10	dB

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:SENSe:CORRection:OFFSet[:MAGNitude] {<numeric>}

**LVL CAL**

Measures the CAL OUT signal (20 MHz, -20 dBm) at the input selected by the MEAS command (automatically sets the level cal data). After executing this function, the instrument state is returned to the state that existed before executing this function. (Spectrum analyzer only)  
 (EXECUTE LVL CAL under Cal; No query)

■ Equivalent SCPI Command

:CALibration:AUTO|ONCE

**MATH** {DATA|DDVM|DMNM|DPLM}

Sets the trace math operation. (DATA MATH: DATA, DATA-MEM, DATA+MEM, DATA/MEM under DATA MATH [ ] under Display)

Parameter	Description
DATA	Turns OFF all data math functions.
DMNM	Subtracts the memory from the data.
DPLM	Adds the memory to the data.
DDVM	Divides the data by the memory.

■ Query Response

{DATA|DMNM|DPLM|DDVM} <new line><END>

■ Equivalent SCPI Command

MATH|DATA :CALCulate:MATH2[:EXPRession]:NAME|OFF  
 MATH|DMNM :CALCulate:MATH2[:EXPRession]:NAME|SUB  
 MATH|DPLM :CALCulate:MATH2[:EXPRession]:NAME|ADD  
 MATH|DDVM :CALCulate:MATH2[:EXPRession]:NAME|DIV

■ Example

OUTPUT @Hp4396;"MATH DATA"  
 OUTPUT @Hp4396;":CALC:MATH2:NAME OFF"

**MATH**  $\square$  {DATA|DDVM|DMNM|DPLM}

**MAXMLEV**  $\square$  *<numeric>* [DBM]

Sets the maximum mixer level. (Spectrum analyzer only) (MAX MIXER LEVEL under **Scale Ref**)

Parameter	Range	Unit
<i>&lt;numeric&gt;</i>	-100 to -10	dBm

■ Query Response

*{numeric}*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

■ Equivalent SCPI Command

:SENSE:POWER:AC:RANGE[:UPPER]  $\square$  *<numeric>*

**MEAS**  $\square$  *<parameter>*

Selects the parameters or inputs to be measured. (NETWORK: A/R, B/R, R, A, B, Refl: FWD S11 [A/R], Trans:FWD S21 [B/R], Trans:REV S12 [A/R], Refl: REV S22 [B/R], SPECTRUM: S, R, A, B, IMPEDANCE: MAG(|Z|), PHASE( $\theta_Z$ ), RESIST(R), REACT(X), ADMITTNCE:MAG(|Y|), PHASE( $\theta_Y$ ), CONDUCT(G), SUSCEPT(B), REFL.CDEF:MAX(| $\Gamma$ |), PHASE( $\theta_\Gamma$ )), REAL( $\Gamma_X$ ), IMAG( $\Gamma_Y$ ), CAPCITNCE:PRL(Cp), SER(Cs), INDUCTNCE:PRL(Lp) SER(Ls), RESISTNCE:PRL(Rp), SER(Rs), D FACTOR(D), Q FACTOR(Q) under **Meas**)

Parameter	Description
AR	A/R measurement (Network analyzer only)
BR	B/R measurement (Network analyzer only)
R	R measurement (Both Network and Spectrum analyzers)
A	A measurement (Both Network and Spectrum analyzers)
B	B measurement (Both Network and Spectrum analyzers)
S11	S11 measurement (Network analyzer only)
S12	S12 measurement (Network analyzer only)
S21	S21 measurement (Network analyzer only)
S22	S22 measurement (Network analyzer only)
S	S measurement (Spectrum analyzer only)
IMAG	Z  measurement (Impedance analyzer only)
IPH	$\theta_z$ (Impedance analyzer only)
IRE	R (Impedance analyzer only)
IIM	X (Impedance analyzer only)
AMAG	Y  (Impedance analyzer only)
APH	$\theta_y$ (Impedance analyzer only)
ARE	G (Impedance analyzer only)
AIM	B (Impedance analyzer only)
RCM	\Gamma  (Impedance analyzer only)
RCPH	$\theta_\Gamma$ (Impedance analyzer only)
RCR	$\Gamma_x$ (Impedance analyzer only)
RCIM	$\Gamma_y$ (Impedance analyzer only)
CP	Parallel Capacitance, $C_p$ (Impedance analyzer only)
CS	Series Capacitance, $C_s$ (Impedance analyzer only)
LP	Parallel Inductance, $L_p$ (Impedance analyzer only)
LS	Series Inductance, $L_s$ (Impedance analyzer only)
D	Disipation Factor, D (Impedance analyzer only)
Q	Quality Factor, Q (Impedance analyzer only)
RP	Parallel Resistance, $R_p$ (Impedance analyzer only)
RS	Series Resistance, $R_s$ (Impedance analyzer only)

#### ■ Query Response

```
{AR|RB|R|A|B|S11|S12|S21|S22|S|IMAG|IPH|IRE|IIM|AMAG|APH|ARE|AIM|RCM|RCPH|
RCM|RCPH|RCR|RCIM|CP|CS|LP|LS|D|Q|RP|RS} <new line><END>
```

#### ■ Equivalent SCPI Command

```
MEASU:AR :SENSe:FUNCTionU"POWer:RATioU3,2"
MEASU:BR :SENSe:FUNCTionU"POWer:RATioU4,2"
MEASU:R :SENSe:FUNCTionU"POWerU2"
MEASU:A :SENSe:FUNCTionU"POWerU3"
MEASU:B :SENSe:FUNCTionU"POWerU4"
MEASU:S11 :SENSe:FUNCTionU"POWer:S11"
MEASU:S21 :SENSe:FUNCTionU"POWer:S21"
MEASU:S12 :SENSe:FUNCTionU"POWer:S12"
MEASU:S22 :SENSe:FUNCTionU"POWer:S22"
MEASU:S :SENSe:FUNCTionU"POWerU1"
MEASU:IMAG CALCulate:MATH1[:EXPRession]:NAME IMPedance
CALCulate:FORMat MLINear
MEASU:IPH CALCulate:MATH1[:EXPRession]:NAME IMPedance
CALCulate:FORMat PHASe
```

## MEAS<parameter>

MEAS<IRE	CALCulate:MATH1[:EXPRession]:NAME IMPedance CALCulate:FORMat REAL
MEAS<IIM	CALCulate:MATH1[:EXPRession]:NAME IMPedance CALCulate:FORMat IMAGinary
MEAS<AMAG	CALCulate:MATH1[:EXPRession]:NAME ADMittance CALCulate:FORMat MLINear
MEAS<APHS	CALCulate:MATH1[:EXPRession]:NAME ADMittance CALCulate:FORMat PHASe
MEAS<ARE	CALCulate:MATH1[:EXPRession]:NAME ADMittance CALCulate:FORMat REAL
MEAS<AIM	CALCulate:MATH1[:EXPRession]:NAME ADMittance CALC:FORMat IMAGinary
MEAS<RCM	CALCulate:MATH1[:EXPRession]:NAME OFF CALCulate:FORMat MLINear
MEAS<RCPH	CALCulate:MATH1[:EXPRession]:NAME OFF CALCulate:FORMat PHASe
MEAS<RCR	CALCulate:MATH1[:EXPRession]:NAME OFF CALCulate:FORMat REAL
MEAS<RCIM	CALCulate:MATH1[:EXPRession]:NAME OFF CALCulate:FORMat IMAGinary
MEAS<CP	CALCulate:MATH1[:EXPRession]:NAME IMPedance CALCulate:FORMat CP
MEAS<CS	CALCulate:MATH1[:EXPRession]:NAME IMPedance CALCulate:FORMat CS
MEAS<LP	CALCulate:MATH1[:EXPRession]:NAME IMPedance CALCulate:FORMat LP
MEAS<LS	CALCulate:MATH1[:EXPRession]:NAME IMPedance CALCulate:FORMat LS
MEAS<D	CALCulate:MATH1[:EXPRession]:NAME IMPedance CALCulate:FORMat D
MEAS<Q	CALCulate:MATH1[:EXPRession]:NAME IMPedance CALCulate:FORMat Q
MEAS<RP	CALCulate:MATH1[:EXPRession]:NAME IMPedance CALCulate:FORMat RP
MEAS<RS	CALCulate:MATH1[:EXPRession]:NAME IMPedance CALCulate:FORMat RS

### ■ Example

```
OUTPUT @Hp4396;"MEAS AR"  
OUTPUT @Hp4396;"MEAS?"  
ENTER @Hp4396;A$  
OUTPUT @Hp4396;":SENS:FUNC ""POW:RAT 3,2""  
OUTPUT @Hp4396;":SENS:FUNC?"  
ENTER @Hp4396;A$
```

**MEASSTAT**  $\{OFF|ON|0|1\}$ 

Calculates the mean, standard deviation, and peak-to-peak values in the portion of the displayed trace that is in the search range. (STATISTICS ON off under **Utility**)

Parameter	Description
OFF or 0	Does not display the statistical values
ON or 1	Displays the statistical values

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:CALCulate:EVALuate:MStatistics[:STATe]  $\{OFF|ON|0|1\}$

**MKR**  $\{OFF|ON|0|1\}$ 

Sets the marker to active (ON) or inactive (OFF). When the MKR is turned off, the marker, sub-marker, and  $\Delta$ marker are tuned to be off. (**MKR**)

Parameter	Description
OFF or 0	Turns off the marker function.
ON or 1	Turns on the marker function.

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:ALL:STATe  $\{OFF|ON|0|1\}$

(TRACe[1] for the data trace; TRACe2 for the memory trace.)

**MKRAMPO**

Moves the limits so that they are centered an equal amount above and below the marker at the sweep parameter value. (MAKER  $\rightarrow$  AMP.OFS. under **System**; No query)

- Equivalent SCPI Command

:CALCulate:LIMit:OFFSetLMARKer

**MKRAUV?**

Outputs the auxiliary amplitude value (value 2) of the measurement value at the marker position. See "Marker Readout" in Appendix H for the auxiliary amplitude value of each display format. (Query only)

- Query Response

{*numeric*} <new line><END>

- Equivalent SCPI Command

:CALCulate:EVALuate:Y[1]:VALue2?

## MKRAUV?

## MKRCENT

Sets the sweep parameter center value of the destination channel to the sweep parameter value of the marker and centers the new span about that value. (MKR→CENTER under Marker→); No query)

### ■ Equivalent SCPI Command

:SENSe:FREquency:CENTer␣MARKer (frequency) or  
:SOURce:POWer:CENTer␣MARKer (power)

## MKRCONT␣{OFF|ON|0|1}

Sets the continuous or discontinuous marker mode. (Network and impedance analyzer only) (MKR [ ] under Marker)

Parameter	Description
OFF or 0	Discontinuous marker mode.
ON or 1	Continuous marker mode.

### ■ Query Response

{0|1} <new line><END>

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:INTerpolate␣{OFF|ON|0|1}

## MKRCOUP␣{OFF|ON|0|1}

Sets the coupled or uncoupled marker mode. (MKR [ ] under Marker)

Parameter	Description
OFF or 0	Uncoupled marker mode
ON or 1	Coupled marker mode

### ■ Query Response

{0|1} <new line><END>

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:COUPle␣{OFF|ON|0|1}

## MKRCSTE

Sets the CENTER step size to the marker's sweep parameter value. (MKR→CNTR STEP under Center); No query)

### ■ Equivalent SCPI Command

:SENSe:FREquency:CENTter:STEP[:INCRement]␣MARKer

**MKRDCEM**

Sets the sweep parameter center value of the destination channel to the difference value between the marker and the  $\Delta$ marker values. (MKRA→CENTER under Center and Marker→; No query)

## ■ Equivalent SCPI Command

:SENSe:FREQuency:CENTer $\Delta$ DMARker (frequency) or  
:SOURce:POWer:CENTer $\Delta$ DMARker (power)

**MKRDCEM**

Sets the CENTER step size to the difference between the marker and  $\Delta$ marker values. (MKRA→CNTR STEP under Center; No query)

## ■ Equivalent SCPI Command

:SENSe:FREQuency:CENTer:STEP[:INCRement] $\Delta$ DMARker

**MKRDELA**

Sets the group delay at the marker point of a fixed frequency aperture, 20% of the span, to the electrical delay to balance the phase of the DUT. (Network analyzer only) (MKR→DELAY under Scale Ref; No query)

## ■ Equivalent SCPI Command

:SENSe:CORRection:EDELay2 $\Delta$ MARKer

**MKRDSPAN**

Sets the SPAN of the destination channel to the difference between the marker and the  $\Delta$ marker values. (MKRA→CENTER under Span or Marker→; No query)

## ■ Equivalent SCPI Command

:SENSe:FREQuency:SPAN $\Delta$ DMARker (frequency) or  
:SOURce:POWer:SPAN $\Delta$ DMARker (power)

**MKRL {OFF|ON|0|1}**

Sets the maker list function ON or OFF. (MKR LIST ON off under Utility)

Parameter	Description
OFF or 0	Marker list function OFF
ON or 1	Marker list function ON

## ■ Query Response

{0|1} <new line><END>

## ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TEXT16:STATe {OFF|ON|0|1}

**MKRL** {OFF|ON|0|1}

## MKRMIDD

Sets the midpoint the LIMD command using the marker to set the middle amplitude value of a limit segment. (~~MKR→MIDDLE~~ under **System**); No query)

■ Equivalent SCPI Command

:CALCulate:LIMit:SEGment:MIDDLE↵MARKer

**MKRNOI** {OFF|ON|0|1}

Sets the noise format of the marker ON or OFF. This marker reads out the average noise level at the marker position (referenced to a 1 Hz noise power bandwidth). (Spectrum analyzer only) (~~NOISE FORM ON off~~ under **Utility**)

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

:CALCulate:EVALuate:NOISe[:STATe]↵{OFF|ON|0|1}

**MKRO** {DATA|MEMO}

Sets a trace from data or memory to be applied for the marker values. (~~MKR ON [ ]~~ under **Marker**)

Parameter	Description
DATA	DATA TRACE
MEMO	MEMORY TRACE

■ Query Response

{DATA|MEMO} <new line><END>

■ Equivalent SCPI Command

MKRO↵DATA :CALCulate:EVALuate:ON↵"DTR"

MKRO↵MEMO :CALCulate:EVALuate:ON↵"MTR"

■ Example

OUTPUT @Hp4396;"MKRO DATA"

## MKROFS

Sets the marker's amplitude value into the offset value. (~~MKR→OFFSET~~ under **Display**); No query)

■ Equivalent SCPI Command

:DATA[:DATA]↵OFFS,MARKer

**MKRP**  $\square$   $\langle$ numeric $\rangle$ 

Moves the marker to the specified data point number.

Parameter	Description
$\langle$ numeric $\rangle$	1 to Number of Points

- Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

- Equivalent SCPI Command

:CALCulate:EVALuate:Y[1]:XPOSITION:POINT  $\square$   $\langle$ numeric $\rangle$

**MKRPKD**

Sets the peak delta value to the smaller value of the difference of amplitude values between the present marker position and both side display points of the marker. (Network and impedance analyzer only) (**MKR**  $\rightarrow$  **PEAK DELTA** under **Search**); No query)

- Equivalent SCPI Command

:CALCulate:EVALuate:PEAK:EXCursion  $\square$  DMARKer

**MKRPRM**  $\square$   $\langle$ numeric $\rangle$  [HZ|KHZ|MAHZ|GHZ|DBM]

Sets the marker at the point of the specified sweep parameter, when the marker is ON.

Parameter	Range	Unit
$\langle$ numeric $\rangle$	start value to stop value	Hz (frequency) dBm (power)

- Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

- Equivalent SCPI Command

:CALCulate:EVALuate:Y[1]:XPOSITION  $\square$   $\langle$ numeric $\rangle$

**MKRREF**

Makes the reference value of the destination channel equal to the marker's absolute value (regardless of the  $\Delta$ marker value). (**MKR**  $\rightarrow$  **REFERENCE** under **Scale Ref** and **Marker**); No query)

- Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1]|2}:Y[:SCALE]:RLEVELMARKer  
(TRACe[1] for the data trace; TRACe2 for the memory trace.)

## MKRREF

## MKRSTAR

Sets the sweep parameter start value of the destination channel to the sweep parameter value of the marker. (`SEGMENT: MKR→START` under `Sweep`), or `MKR→START` under `Marker→`; No query)

### ■ Equivalent SCPI Command

`SEGMENT: MKR→START` under `Sweep` :SENSe:LIST:SEGment:FREQuency:START↓MARKer  
`MKR→START` under `Marker→` :SENSe:FREQuency:START↓MARKer (frequency) or  
:SOURce:POWer:START↓MARKer (power)

## MKRSTOP

Sets the sweep parameter stop value of the destination channel to the sweep parameter value of the marker. (`MKR→STOP` under `Sweep`), or `MKR→STOP` under `Marker→`; No query)

### ■ Equivalent SCPI Command

`MKR→STOP` under `Sweep` :SENSe:LIST:SEGment:FREQuency:STOP↓MARKer  
`MKR→STOP` under `Marker→` :SENSe:FREQuency:STOP↓MARKer (frequency) or  
:SOURce:POWer:STOP↓MARKer (power)

## MKRSWPRM

Sets the segment sweep parameter value to the present marker sweep parameter value. (`MKR→SWP PARAM` under `System`); No query)

### ■ Equivalent SCPI Command

:CALCulate:LIMit:SEGment:CONTRol[:DATA]↓MARKer

## MKRTHRE

Sets the threshold value to the amplitude value of the present marker position. (`MKR→THRESHOLD` under `Search`); No query)

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:PEAK:THReshold↓MARKer

**OUTPLIMM?**

Outputs the limit test result for the marker position. (Query only)

- Query Response

```
{numeric (stimulus)} {numeric (result)} {numeric (upper_limit)} {numeric (lower_limit)}
<new line><END>
```

(result is 1 for pass, 0 for fail, or -1 for no test)

- Equivalent SCPI Command

```
:DATA[:DATA]?LIMAR
```

- Example

```
OUTPUT 717;"OUTPLIMM?"
ENTER 717;A,B,C,D

OUTPUT 717;":DATA? LMAR"
ENTER 717;A,B,C,D
```

**OUTPMAX?**

Outputs maximum value within analysis range. See "OUTPMAX?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

**OUTPMEAN?**

Outputs mean value within analysis range. See "OUTPMEAN?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

**OUTPMEMO?**

Outputs the memory data from the active channel. (Query only)

- Query Response

```
{numeric (1)} {numeric (2)} ... {numeric (n)} <new line><END>
```

(n is the number of points.)

*numeric* is a complex number (data format: real, imaginary) for the Network analyzer, or a real number for the Spectrum analyzer.

- Equivalent SCPI Command

```
:DATA[:DATA]?LIMEM
```

- Example

```
DIM A(1:201,1:2)           Network Analyzer, NOP: 201
OUTPUT 717;"OUTPMEMO?"
ENTER 717;A(*)

DIM A(1:201,1:2)
OUTPUT 717;":DATA? MEM"
ENTER 717;A(*)
```

## OUTPMEMO?

### OUTPMEMOP?□<numeric>

Outputs the memory data from the active channel at a specified point. (Query only)

Parameter	Description
<value>	1 to "number of points" (If <numeric> is 0 or less than 0, it is set to 1. If <numeric> is greater than "number of points," it is set to "number of points.")

#### ■ Query Response

{real} {imaginary} <new line><END> (Network analyzer)

{numeric} <new line><END> (Spectrum analyzer)

#### ■ Equivalent SCPI Command

:DATA[:DATA]:VALue?□MEM, <numeric>

## OUTPMIN?

Outputs minimum value within analysis range. See "OUTPMIN?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## OUTPMINMAX?

Outputs maximum and minimum value within analysis range. See "OUTPMIN?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## OUTPMKR?

Outputs the sweep parameter and measurement values at the marker position. (Query only)

#### ■ Query Response

{numeric (val1)} {numeric (val2)} {numeric (stimulus)} <new line><END>

(Val1: Amplitude value, Val2: Auxiliary amplitude value. See "Marker Readout" in Appendix H.)

#### ■ Equivalent SCPI Command

:CALCulate:EVALuate:Y:DATA?

#### ■ Example

```
OUTPUT 717;"OUTPMKR?"
ENTER 717;A,B,C

OUTPUT 717;":CALC:EVAL:Y:DATA?"
ENTER 717;A,B,C
```

**OUTPMSTA?**

Outputs the marker statistics. (STATISTICS ON off under **Utility**); Query only)

## ■ Query Response

```
{numeric (mean)} {numeric (standard deviation)} {numeric (peak to peak)}
<new line><END>
```

## ■ Equivalent SCPI Command

```
:CALCulate:EVALuate:MStatistics:DATA?
```

## ■ Example

```
OUTPUT 717;"OUTPMSTA?"
ENTER 717;A,B,C

OUTPUT 717;":CALC:EVAL:MST:DATA?"
ENTER 717;A,B,C
```

**OUTPMTRC?**

Outputs the MEMORY TRACE data. (Query only)

## ■ Query Response

```
{numeric (1:val1)} {numeric (1:val2)} {numeric (2:val1)} {numeric (2:val)} ...
{numeric (n:val1)} {numeric (n:val2)} <new line><END> (Network analyzer)
```

```
{numeric (1)} {numeric (2)} ... {numeric (n)} <new line><END> (Spectrum analyzer)
```

(n is the number of points.) (Val1: Amplitude value, Val2: Auxiliary amplitude value. See "Marker Readout" in Appendix H.)

## ■ Equivalent SCPI Command

```
:TRACe[:DATA]?LMTR
```

## ■ Example

```
DIM A(1:201,1:2)           Network Analyzer, NOP: 201
OUTPUT 717;"OUTPMTRC?"
ENTER 717;A(*)

DIM A(1:201,1:2)
OUTPUT 717;":TRAC? MTR"
ENTER 717;A(*)
```

## OUTPMTRC?

### OUTPMTRCP? $\square$ *<numeric>*

Outputs the MEMORY TRACE data at the specified point. (Query only)

Parameter	Description
<i>&lt;numeric&gt;</i>	1 to "number of points" (If <i>&lt;numeric&gt;</i> is 0 or less than 0, it is set to 1. If <i>&lt;numeric&gt;</i> is greater than "number of points," it is set to "number of points.")

#### ■ Query Response

{*numeric (val1)*} {*numeric (val2)*}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$  (Network analyzer)

{*numeric (val)*}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$  (Spectrum analyzer)

(Val1: Amplitude value, Val2: Auxiliary amplitude value. See "Marker Readout" in Appendix H.)

#### ■ Equivalent SCPI Command

:TRACe[:DATA]:VALue?  $\square$  MTR, *<numeric>*

#### ■ Example

```
OUTPUT 717;"OUTPMTRCP? 1" Network Analyzer
ENTER 717;A,B
```

f

```
OUTPUT 717;":TRAC:VAL? MTR,1"
ENTER 717;A,B
```

## OUTPMWID?

Outputs the results of the bandwidth search. (Network and impedance analyzer only)  
(**WIDTHS ON** off under **Search**); Query only)

#### ■ Query Response

{*numeric (bandwidth)*} {*numeric (center)*} {*numeric (Q)*}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

#### ■ Equivalent SCPI Command

:CALCulate:EVALuate:WIDTh:DATA?

#### ■ Example

```
OUTPUT 717;"OUTPMWID?"
ENTER 717;A,B,C

OUTPUT 717;":CALC:EVAL:WIDT:DATA?"
ENTER 717;A,B,C
```

**OUTPRAW{1-4}?**

Outputs the uncorrected data arrays for the active channel. (Query only)

- Query Response

*{numeric (1)} {numeric (2)} ... {numeric (n)}* <new line><END>

(n is the number of points.)

*numeric* is a complex number (data format: real, imaginary) for the Network analyzer, or a real number for the Spectrum analyzer.

- Equivalent SCPI Command

:DATA[:DATA]?LRAW{1-4}

**OUTPRESF?**

Outputs resonator parameters. See “OUTPRESF?” in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only; Network analyzer only)

**OUTPRESO?**

Outputs resonator parameters. See “OUTPRESO?” in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only; Network analyzer only)

**OUTPRESR?**

Outputs resonator parameters. See “OUTPRESR?” in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only; Network analyzer only)

**OUTPSMKR{1-7}?**

Outputs the measurement values and sweep parameter at the sub-marker position. (Query only)

- Query Response

*{numeric (val1)} {numeric (val2)} {numeric (stimulus)}* <new line><END>

(Val1: Amplitude value, Val2: Auxiliary amplitude value. See “Marker Readout” in Appendix H.)

- Equivalent SCPI Command

```
OUTPSMKR1? :CALCulate:EVALuate:Y2:DATA?
OUTPSMKR2? :CALCulate:EVALuate:Y3:DATA?
OUTPSMKR3? :CALCulate:EVALuate:Y4:DATA?
OUTPSMKR4? :CALCulate:EVALuate:Y5:DATA?
OUTPSMKR5? :CALCulate:EVALuate:Y6:DATA?
OUTPSMKR6? :CALCulate:EVALuate:Y7:DATA?
OUTPSMKR7? :CALCulate:EVALuate:Y8:DATA?
```

## OUTPSMKR{1-7}?

## OUTPSWPRM?

Outputs the sweep parameter data. (Query only)

### ■ Query Response

{*numeric 1*} {*numeric 2*} ... {*numeric n*} <new line><END>

(n is the number of points.)

### ■ Equivalent SCPI Command

:DATA[:DATA]?LSPAR

## OUTPSWPRMP?□<numeric>

Outputs the sweep parameter data at a specified point. (Query only)

Parameter	Description
<numeric>	1 to "number of points" (If <numeric> is 0 or less than 0, it is set to 1. If <numeric> is greater than "number of points," it is set to "number of points.")

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

:DATA[:DATA]:VALue?LSPAR,<numeric>

## OUTPXFIL?

Outputs crystal filter parameters. See "OUTPXFIL?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only; Network analyzer only)

**PARS**{OFF|ON|0|1}

Sets the partial search of the marker search function ON or OFF. (**PART SRCH ON off** under **Search**)

Parameter	Description
OFF or 0	Partial search OFF
ON or 1	Partial search ON

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:CALCulate:EVALuate:BAND:FULL[:STATe]{OFF|ON|0|1}

Parameter	Description
OFF or 0	Partial search ON
ON or 1	Partial search OFF

- Example

```
OUTPUT 717;"PARS ON"
```

```
OUTPUT 717;"PARS?"
```

```
ENTER 717;A
```

```
OUTPUT 717;":CALC:EVAL:BAND:FULL OFF"
```

```
OUTPUT 717;":CALC:EVAL:BAND:FULL?"
```

```
ENTER 717;A
```

**PEAK?**

Outputs maximum peak within analysis range, and memorizes its position for the NEXPK? command. See "PEAK?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

**PEAKCENT**

Searches for a peak using the marker and then changes the CENTER of the destination channel to the sweep parameter value of that peak. (**PEAK—CENTER** under **Center** or **Marker→**; No query)

- Equivalent SCPI Command

:SENSe:FREQuency:CENTerLTPEak (frequency) or

:SOURce:POWer:CENTerLTPEak (power)

## PEAKCENT

### PHAO <numeric> [DEG]

Adds or subtracts a phase offset that is constant with frequency. (Network analyzer only)  
(PHASE OFFSET under [Scale Ref](#))

Parameter	Range	Unit
<numeric>	-360 to +360	°

#### ■ Query Response

{numeric} <new line><END>

#### ■ Equivalent SCPI Command

:SENSe:CORRection:OFFSet:PHASe  <numeric>

### PHAU {RAD|DEG}

Selects the unit of phase format. (PHASE UNIT  under [Format](#); Impedance analyzer only.)

Parameter	Description
DEG	Degree.
RAD	Radian.

#### ■ Query Response

{DEG|RAD}<new line><END>

#### ■ Equivalent SCPI Command

:CALCulate:FORMat:UNIT:ANGLE  {DEG|RAD}

### PKDLTX <numeric> [HZ|KHZ|MAHZ|GHZ|DBM]

Sets the peak  $\Delta X$  value that is used to define the peak. (Network and impedance analyzer only)  
(PEAK DEF:  $\Delta X$  under [Search](#))

Parameter	Range	Unit
<numeric>	0 to 8 G	Hz (frequency)
	0 to 500	dBm (power)

#### ■ Query Response

{numeric} <new line><END>

#### ■ Equivalent SCPI Command

:CALCulate:EVALuate:PEAK:EXCursion:X  <numeric>

■ Example

```
OUTPUT 717;"PKDLTX 1E6"
OUTPUT 717;"PKDLTX?"
ENTER 717;A
OUTPUT 717;":CALC:EVAL:PEAK:EXC:X 1E6"
OUTPUT 717;":CALC:EVAL:PEAK:EXC:X?"
ENTER 717;A
```

**PKDLTY**{<numeric>

Sets the peak ΔY value that is used to define the peak. (PEAK DEF: ΔY under [Search](#))

Parameter	Range	Format
<numeric>	0 to 500 (spectrum analyzer)	(dBm, dBμV, dBV formats)
	0 to 500k	(Watt format, Volt format)
	0 to 500 (network analyzer)	(Log magnitude format)
	0 to 500k (any format in network analyzer except log magnitude format, and impedance analyzer)	

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:CALCulate:EVALuate:PEAK:EXCursion:Y{numeric}

**PKPOL**{POS|NEG}

Sets the peak polarity for the marker search functions. (Network and impedance Analyzer only) (PEAK PLRTY pos neg under [Search](#))

Parameter	Description
POS	Positive peak
NEG	Negative peak

■ Query Response

{POS|NEG} <new line><END>

■ Equivalent SCPI Command

:CALCulate:EVALuate:PEAK:POLarity{POSitive|NEGative}

## PKPOL{POS|NEG}

## PKTHRE{OFF|ON|0|1}

Sets the threshold ON or OFF. ([THRESHOLD ON off](#) under [Search](#))

Parameter	Description
OFF or 0	Threshold OFF
ON or 1	Threshold ON

### ■ Query Response

{0|1} <new line><^END>

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:PEAK:THReshold:STATe{OFF|ON|0|1}

## PKTHVAL<value>

Sets the threshold values. ([THRESHOLD VALUE](#) under [Search](#))

Parameter	Range	Unit
<numeric>	-500 to 500	(Log mag format)
	$-5 \times 10^6$ to $5 \times 10^6$	(Phase, Expanded phase, Lin man, Real, Imaginary, SWR formats)
	-0.5 to 0.5	(Delay format)
	$1 \times 10^{-11}$ to 500	(Smith chart, Admittance chart, Polar formats)
	-100 to 30	(dBm format)
	-113 to 17 (50 $\Omega$ )	(dBV format)
	-111.2 to 18.8 (75 $\Omega$ )	
	7 to 137 (50 $\Omega$ )	(dB $\mu$ V format)
	8.8 to 138.8 (75 $\Omega$ )	
	$1 \times 10^{-13}$ to 1	(Watt format)
	$1 \times 10^{-6}$ to 7.071 (50 $\Omega$ )	(Volt format)
	$1 \times 10^{-6}$ to 8.66 (75 $\Omega$ )	

### ■ Query Response

{numeric} <new line><^END>

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:PEAK:THReshold<numeric>

**POIN**□<numeric>

Sets the number of points for the segment, or sets the number of points for the list sweep table. (NUMBER OF POINTS under **Sweep**)

Parameter	Description
<numeric>	2 to 801. <sup>1</sup>

<sup>1</sup> For the spectrum analyzer, <numeric> can be set when the SPAN is set to zero. When the SPAN is not zero, this command is query only.

- Query Response

{numeric} <new line><END>

- Equivalent SCPI Command

:SENSe:SWEEp:POINts□<numeric> or

:SENSe:LIST:SEGment:POINts□<numeric> (List sweep)

**POLE?**□<numeric>

Outputs the first found negative peaks for both side from the maximum peak. Negative peaks must be lower than the <numeric> down from the maximum peak. See "POLE?" in Appendix I for details, command paramter, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; No query)

**PORE**□{OFF|ON|0|1}

Sets the reference plane extension mode ON or OFF. (Network and impedance analyzer only) (EXTENSIONS ON off under **Cal**)

Parameter	Description
OFF or 0	Reference plane extension mode OFF
ON or 1	Reference plane extension mode ON

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:SENSe:CORRection:EDELay:STATe□{OFF|ON|0|1}

**PORE**  $\square$  {OFF|ON|0|1}

**PORT1**  $\square$   $\langle$ numeric $\rangle$  [S|MS|US|NS|PS]

Extends the reference plane for measurement of  $S_{11}$ ,  $S_{21}$ , and  $S_{12}$ . (Network analyzer only)  
(**EXTENSION PORT 1** under **Cal**)

Parameter	Range	Unit
$\langle$ numeric $\rangle$	-10 to 10	s

■ Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

■ Equivalent SCPI Command

:SENSe:CORRection:EDELay:PORT1:TIME  $\square$   $\langle$ numeric $\rangle$

**PORT2**  $\square$   $\langle$ numeric $\rangle$  [S|MS|US|NS|PS]

Extends the reference plane for measurement of  $S_{22}$ ,  $S_{12}$ , and  $S_{21}$ . (Network analyzer only)  
(**EXTENSION PORT 2** under **Cal**)

Parameter	Range	Unit
$\langle$ numeric $\rangle$	-10 to 10	s

■ Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

■ Equivalent SCPI Command

:SENSe:CORRection:EDELay:PORT2:TIME  $\square$   $\langle$ numeric $\rangle$

**PORTA**  $\square$   $\langle$ numeric $\rangle$  [S|MS|US|NS|PS]

Adds electrical delay to the input A reference plan for all A input measurements (including S-parameters). (Network analyzer only) (**EXTENSION INPUT A** under **Cal**)

Parameter	Range	Unit
$\langle$ value $\rangle$	-10 to 10	s

■ Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

■ Equivalent SCPI Command

:SENSe:CORRection:EDELay:PORT4:TIME  $\square$   $\langle$ numeric $\rangle$

**PORTB□<numeric>[S|MS|US|NS|PS]**

Adds electrical delay to the input B reference plane for all B input measurements (including S-parameters). (Network analyzer only) (**EXTENSION INPUT B** under **Cal**)

Parameter	Range	Unit
<numeric>	-10 to 10	s

## ■ Query Response

{numeric} <new line><END>

## ■ Equivalent SCPI Command

:SENSe:CORRection:EDELay:PORT5:TIME□<numeric>

**PORTR□<numeric>[S|MS|US|NS|PS]**

Adds electrical delay to extend the reference plane at input R to the end of cable. (Network analyzer only) (**EXTENSION INPUT R** under **Cal**)

Parameter	Range	Unit
<value>	-10 to 10	s

## ■ Query Response

{numeric} <new line><END>

## ■ Equivalent SCPI Command

:SENSe:CORRection:EDELay:PORT3:TIME□<numeric>

**PORTZ□<numeric>**

Sets the port extension value. (**EXTENSION VALUE** under **Cal**); Impedance analyzer only.)

## ■ Query response

<numeric><new line><END>

## ■ Equivalent SCPI command

:SENSe:CORRection1:EDELay:PORT6:[:TIME]□<numeric>

**PORTZ**  $\square$   $\langle$ numeric $\rangle$

**POWER**  $\square$   $\langle$ numeric $\rangle$  [DBM]

Sets the power level segment by segment, or sets the power level for the list sweep table.

(POWER under Sweep)

Parameter	Range	Unit
$\langle$ numeric $\rangle$	-60 to +20	dBm

■ Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

■ Equivalent SCPI Command

:SOURCE:POWER[:LEVEL][:IMMEDIATE][:AMPLITUDE]  $\square$   $\langle$ numeric $\rangle$  or

:SENSE:LIST:SEGMENT:POWER  $\langle$ numeric $\rangle$  (List sweep)

**PREP**

Displays the previous page of information in a tabular listing. (PREV PAGE under Copy); No query)

■ Equivalent SCPI Command

:DISPLAY[:WINDOW]:TEXT{1-17}:PAGE  $\square$  DOWN

Parameter	Description
1	List Value
2	Operation Parameter
3	Cal Class
4 to 11	Cal Standard No. 1 to No. 8
12	Start and Stop
13	Center and Span (List)
14	Upper and Lower
15	Middle and Delta (Limit Test)
16	Marker List
17	Title

**PRES**

Presets the ANALYZER to the preset default values. See Appendix D of the *Function Reference* for the default values. The PRES command does *not* preset the HP Instrument BASIC.

(PRESET); No query)

■ Equivalent SCPI Command

:SYSTEM:PRESet

**PRIC**

Sets the print command to the color printing. (**COLOR** under **Copy**)

## ■ Query Response

{0|1} <new line><END>

Parameter	Description
0	Single-color printing
1	Color printing

## ■ Equivalent SCPI Command

:HCOPY:DRIVER:COLOR{0N|1}

**PRICFIXE**

Sets the default colors for printing a hard copy. (**PRINT COLOR [FIXED]** under **Copy**)

## ■ Query Response

{0|1} <new line><END>

Parameter	Description
0	Variable colors (colors similar to the display)
1	Fixed colors (default colors)

## ■ Equivalent SCPI Command

:HCOPY:DRIVER:CMAP:COLOR{FIXED}

**PRICVARI**

Sets the colors used for printing a hard copy as close as possible to the display colors. Refer to "System Accessory Printer" in Chapter 9 of *FuncRef* for the printers which support the variable color printing. (**PRINT COLOR [VARIABLE]** under **Copy**)

## ■ Query Response

{0|1} <new line><END>

Parameter	Description
0	Fixed colors (default colors)
1	Variable colors (colors similar to the display)

## ■ Equivalent SCPI Command

:HCOPY:DRIVER:CMAP:COLOR{VARIABLE}

## PRICVARI

## PRINALL

Causes an extra copy of the display to be printed. (**PRINT [ ]** under **Copy**); No query)

- Equivalent SCPI Command  
:HCOPY[:IMMEDIATE]

## PRIS

Sets the print command to the single color printing. (**PRINT: STANDARD** under **Copy**)

- Query Response  
{0|1} <new line><END>

Parameter	Description
0	Color printing
1	Single color printing

- Equivalent SCPI Command  
:HCOPY:DRIVER:COLOR{OFF|0}
- Query Response

Parameter	Description
0	Default printing (black only)
1	Color printing

## PRSOFT{OFF|ON|0|1}

Sets printing the softkeys displayed in the screen ON or OFF. (**COPY SKEY** under **Copy**)

Parameter	Description
OFF or 0	Does not print the soft keys
ON or 1	Print the soft keys

- Query Response  
{0|1} <new line><END>
- Equivalent SCPI Command  
:HCOPY:DRIVER:SKEY{OFF|ON|0|1}

**PRSMKRS**

Turns off all markers and cancels all settings of the marker functions. (**PRESET MKRS** under **Marker**); No query)

- Equivalent SCPI Command

```
:DISPlay[:WINDow]:TRACe{[1] | 2}:MARKer[1]:ALLUDEFault
(TRACe[1] for the data trace; TRACe2 for the memory trace.)
```

**PURG**  $\square$  *<string>*

Removes the file. (**PURGE FILE** under **SAVE**); No query)

Parameter	Description
<i>&lt;string&gt;</i>	File name, up to 10 characters including the extension

- Equivalent SCPI Command

```
:MMEMory:DELEte  $\square$  <string (file_name)> [, <string (msus)>]
```

Parameter	Description
<i>&lt;string (msus)&gt;</i>	"DISK" for the flexible disk drive "MEMORY" for the RAM disk memory

- Example

```
OUTPUT 717;"PURG ""TEST_S""
OUTPUT 717;":MMEM:DEL ""TEST_S""
```

**RAID**

Completes the response and isolation calibration. Computes and stores the error coefficients. (Network analyzer only) (**DONE RESP ISOL'N CAL** under **Cal**); No query)

- Equivalent SCPI Command

```
:SENSe:CORRection:COLLect:SAVE3
```

**RAISOL**

Selects the isolation class for the response and isolation calibration. (Network analyzer only) (**ISOL'N STD** under **Cal**); No query)

- Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire]  $\square$  ISOL
```

## RAHSOL

## RAIRESP

Selects the response class for the response and isolation calibration. (Network analyzer only)  
(RESPONSE under Cal); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:COLLect[:ACQuire]LRESP

## RECC

Recalls the previously saved version of the color set from the non-volatile memory.  
(RECALL COLORS under Display); No query)

■ Equivalent SCPI Command

:DISPlay:CMAP:LOAD

## RECD<string>

Loads the instrument states or data. (file name under Recall); No query)

Parameter	Description
<string>	File name, Up to 10 characters including the extension

■ Equivalent SCPI Command

:MMEMory:LOAD:STATeL<string (file\_name)>[, <string (msus)>] (State)

:MMEMory:LOAD:TRACeLISEL, <string (file\_name)>[, <string (msus)>] (Data)

Parameter	Description
<string (file_name)>	File name, Up to 10 characters including the extension
<string (msus)>	"DISK" for the flexible disk drive "MEMORY" for the RAM disk memory

■ Example

```
OUTPUT 717;"RECD ""TEST_S""
```

```
OUTPUT 717;":MMEM:LOAD:STAT ""TEST_S""
```

## REFD

Completes with the reflection part of the full 2-port or one-path 2-port calibration. (Network analyzer only) (REFLECT'N DONE under Cal); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE5

**REFL**

Begins the reflection part of the full 2-port or one-path 2-port calibration. (Network analyzer only) (**REFLECT'N** under **Cal**); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:COLLect[:ACQuire]  $\square$  REFL2

**REFP**  $\square$  <numeric>

Sets the position of the reference line on the graticule of a Cartesian display. (Network and impedance analyzer only) (**REFERENCE POSITION** under **Scale Ref**)

Parameter	Range	Unit
<numeric>	0 to 10 (simple command) 0 to 100 (SCPI command)	Div

■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1] | 2}:Y[:SCALe]:RPOSition  $\square$  <numeric>

Where,

TRACe1            Data trace  
TRACe2            Memory trace

**REFV**  $\square$  <numeric>

Sets the value of the reference line, moving the measurement trace correspondingly.

(**REFERENCE VALUE** under **Scale Ref**)

Parameter	Range	Format
<numeric>	-500 to 500 (Network analyzer)	(Log mag format)
<numeric>	-500 M to 500 M (Impedance analyzer)	(Linear magnitude format)
	-500 M to 500 M (Network analyzer)	(Phase, Expanded phase, Lin man, Real, Imaginary, SWR formats)
	-0.5 to 0.5 (Network analyzer)	(Delay format)
	$1 \times 10^{-11}$ to 500 (Network analyzer)	(Smith chart, Admittance chart, Polar formats)
	10 f to 500 M (Impedance analyzer)	(Smith chart, Admittance chart, Polar formats)
	-100 to 30 (Spectrum analyzer)	(dBm format)
	-113 to 17 (50 $\Omega$ )	(dBV format)
	-111.2 to 18.8 (75 $\Omega$ ) (Spectrum analyzer)	
	7 to 137 (50 $\Omega$ )	(dB $\mu$ V format)
	8.8 to 138.8 (75 $\Omega$ ) (Spectrum analyzer)	
	$1 \times 10^{-13}$ to 1 (Spectrum analyzer)	(Watt format)
	2.236 $\mu$ to 7.071 (50 $\Omega$ )	(Volt format)
	2.739 $\mu$ to 8.66 (75 $\Omega$ ) (Spectrum analyzer)	

### REFV□<numeric>

#### ■ Query Response

{numeric} <new line><END>

#### ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1]|2}:Y[:SCALE]:RLEVell□<numeric>

Where,

TRACe1        Data trace  
TRACe2        Memory trace

### REFX□<numeric>

Sets the value of the x-axis reference line in complex plane format, moving the measurement trace correspondingly, when the measurement format is set to the complex plane.

(REFERENCE X VALUE under (Scale Ref); Impedance analyzer only.)

Parameter	Range	Unit
<numeric>	-5.0×10 <sup>8</sup> to 5.0×10 <sup>8</sup>	U

#### ■ Query Response

<numeric><new line><END>

#### ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{1|2}:X[:SCALE]:RLEVell□<numeric>

Where,

TRACe1        Data trace  
TRACe2        Memory trace

### REFY□<numeric>

Sets the value of the y-axis reference line in complex plane format, moving the measurement trace correspondingly, when the measurement format is set to the complex plane.

(REFERENCE Y VALUE under (Scale Ref))

Parameter	Range	Unit
<numeric>	-5.0×10 <sup>8</sup> to 5.0×10 <sup>8</sup>	U

#### ■ Query Response

<numeric><new line><END>

#### ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{1|2}:Y[:SCALE]:RLEVell□<numeric>

Where,

TRACe1        Data trace  
TRACe2        Memory trace

**REPTSMP** □ {OFF|ON|0|1}

Sets the normal or repetitive sampling mode for zero span. (Spectrum analyzer only)

(**SAMPLING NORMAL** repet under **Sweep**)

Parameter	Description
OFF or 0	Normal sampling
ON or 1	Repetitive sampling <sup>1</sup>

<sup>1</sup> Can be set only when the trigger source is the external or video trigger, the frequency span is 0 Hz, and the sweep type is linear frequency.

- Query response

{*numeric*} <new line><END>

- Equivalent SCPI Command

:SENSe:DETEctor:CONTinuous □ {OFF|ON|0|1}

**RESAVD** □ <string>

Updates a file that is already saved. (**RE-SAVE FILE** under **Save**); No query)

Parameter	Description
<string>	File name up to 10 characters including the extension

- Equivalent SCPI Command

STATE :MMEMory:DELEte □ <string (file\_name)> [, <string (msus)>]  
 :MMEMory:STORe:STATe □ <string (file\_name)> [, <string (msus)>]

TRACE :MMEMory:DELEte □ <string (file\_name)> [, <string (msus)>]  
 :MMEMory:STORe:TRACe □ SEL, <string (file\_name)> [, <string (msus)>]

Parameter	Description
<string (msus)>	"DISK" for the flexible disk drive "MEMORY" for the RAM disk memory

- Example

```
OUTPUT 717;"RESAVD ""TEST_S""
OUTPUT 717;":MMEM:DEL ""TEST_S""
OUTPUT 717;":MMEM:STOR:STAT ""TEST""
```

**RESC**

Eliminates the need to restart a calibration sequence that was interrupted to access some other menu. (Network and impedance analyzer only) (**RESUME CAL SEQUENCE** under **Cal**); No query)

- Equivalent SCPI Command

:SENSe:CORRection:COLLect:RESume

## RESCOM

Resume the last measured compensation sequence. (**RESUME COMP SEQ** under **Cal**); No query; Impedance analyzer only.)

■ Equivalent SCPI Command

:SENSe:CORRection2:COLLect:RESume

## RESD

Turns off the tabular listing and returns the measurement display to the screen. (**RESTORE DISPLAY** under **Copy**); No query)

■ Equivalent SCPI Command

:DISPlay[:WINDow]:TEXT{1-17}:STATeLlOFF

Parameter	Description
1	List Value
2	Operation Parameter
3	Cal Class
4 to 11	Cal Standard No. 1 to No. 8
12	Start and Stop
13	Center and Span (List)
14	Upper and Lower
15	Middle and Delta (Limit Test)
16	Marker List
17	Title

## RESPDONE

Completes the response calibration. Computes and stores the error coefficients. (Network analyzer only) (**DONE: RESPONSE** under **Cal**); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE2

## REST

Aborts the sweep in progress and then restarts the measurement. (**MEASURE RESTART** under **Trigger**); No query)

■ Equivalent SCPI Command

:INITiate[:IMMediate]:AGain:ALL

## REVI

Measures  $S_{12}$  isolation for the full 2-port calibration. (Network analyzer only) (**REV ISOL'N ISOL'N STD** under **Cal**); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:COLLect[:ACQuire]LREVI

**REVM**

Measures  $S_{22}$  load match for the full 2-port calibration. (Network analyzer only)  
 (REV. MATCH THRU under **Cal**); No query)

## ■ Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire]LREVM
```

**REVT**

Measures  $S_{12}$  frequency response for the full 2-port calibration. (Network analyzer only)  
 (REV. TRANS. THRU under **Cal**); No query)

## ■ Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire]LREVT
```

**RFO**{OFF|ON|0|1}

Sets the signal output on the RF OUT port ON or OFF. (RF OUT ON off under **Source**)

Parameter	Description
OFF or 0	RF OUT port OFF
ON or 1	RF OUT port ON

## ■ Query Response

```
{0|1} <new line><END>
```

## ■ Equivalent SCPI Command

```
:SOURce:POWer:STATeL{OFF|ON|0|1}
```

**RPLENV?**

Returns the maximum height between the negative peak and intersection of an imaginary slope line between the adjacent positive peaks. See "RPLENV?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

**RPLHEI?**

Returns the maximum difference between adjacent positive and negative peaks. See "RPLHEI?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## RPLLHEI?

Returns the maximum difference between the positive peak and right-hand adjacent negative peak. See "RPLLHEI?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## RPLMEA?

Returns the mean of the difference between adjacent positive and negative peaks within range. See "RPLPP?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## RPLPP?

Returns the maximum difference between the positive peak and the negative peak within range. See "RPLPP?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## RPLRHEI?

Returns the maximum difference between the positive peak and left-hand adjacent negative peak. See "RPLRHEI?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## RPLVAL?

Returns the maximum total of the differences between the negative peaks and the adjacent positive peaks on both sides and the stimulus of the corresponding negative peak. See "RPLPP?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## RSCO

Resets the color being modified to the default color. (RESET COLOR under Display); No query)

### ■ Equivalent SCPI Command

DISPlay:CMAP:COLor{1-14}:DEFault

Parameter	Description
1	Channel 1 data
2	Channel 1 memory and limit lines
3	Channel 2 data
4	Channel 2 memory and limit lines
5	Graticule and a portion of softkey text
6	Warning annotation
7	All the non-data text
8	Text on the BASIC screen
9-14	Pen 1-6

**SA**

Selects the spectrum analyzer as the analyzer type. (SPECTRUM ANALYZER under Meas)

- Query Response

{0|1} <new line><END>

Parameter	Description
0	Spectrum analyzer is not selected.
1	Spectrum analyzer is selected.

- Equivalent SCPI Command

:INSTrument:TYPE|SA

- Example

```
OUTPUT 717;"SA"
OUTPUT 717;"SA?"
ENTER 717;A

OUTPUT 717;":INST:TYPE SA"
OUTPUT 717;":INST:TYPE?"
ENTER 717;A$
```

**SADD**

Adds a new segment to a list sweep table. (ADD under Sweep); No query)

- Equivalent SCPI Command

:SENSe:LIST:SEGment:ADD

**SAUNIT{DBM|DBV|DBUV|W|V}**

Selects the measurement data unit of the spectrum analyzer on the active channel. (Spectrum analyzer only) (UNIT: dBm, dBV, dB $\mu$ V, WATT, VOLT under Format)

Parameter	Description
DBM	dBm
DBV	dBV
DBUV	dB $\mu$ V
W	Watt
V	Volt

## SAUNIT{DBM|DBV|DBUV|W|V}

### ■ Query Response

{DBM|DBV|DBUV|W|V} <new line><END>

### ■ Equivalent SCPI Command

SAUNIT:DBM :CALCulate:FORMat:MLOGarithmic  
:UNIT:POWer:DBM

SAUNIT:DBV :CALCulate:FORMat:MLOGarithmic  
:UNIT:POWer:DBV

SAUNIT:DBUV :CALCulate:FORMat:MLOGarithmic  
:UNIT:POWer:DBUV

SAUNIT:W :CALCulate:FORMat:MLINear  
:UNIT:POWer:W

SAUNIT:V :CALCulate:FORMat:MLINear  
:UNIT:POWer:V

### ■ Example

OUTPUT 717;"SAUNIT DBM"

OUTPUT 717;"SAUNIT?"

ENTER 717;A\$

OUTPUT 717;":CALC:FORM MLOG"

OUTPUT 717;":UNIT:POW DBM"

OUTPUT 717;":CALC:FORM?"

ENTER 717;A\$

OUTPUT 717;":UNIT:POW?"

ENTER 717;B\$

## SAV1

Completes the  $S_{11}$  or  $S_{22}$  1-port calibration. The error coefficients are computed and stored. (Network analyzer only) (DONE: 1-PORT CAL under **Cal**); No query)

### ■ Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE4

## SAV2

Completes the full or one-path 2-port calibration. The error coefficients are computed and stored. (Network analyzer only) (DONE: 2-PORT CAL under **Cal**); No query)

### ■ Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE8

## SAVC

Redraws a trace using the current error coefficient array data. (Network and impedance analyzer only) (No query)

### ■ Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE9

**SAVCAL□{OFF|ON|0|1}**

Selects whether or not to save the calibration coefficients arrays. (CAL ON off under **Save**); No query for the SCPI command)

Parameter	Description
OFF or 0	Does not save the calibration coefficients arrays.
ON or 1	Saves the calibration coefficients arrays.

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

SAVCAL□{OFF|0} :MMEMory:STORe:ITEM:TRACe{1|2}:DELete□CCO

SAVCAL□{ON|1} :MMEMory:STORe:ITEM:TRACe{1|2}:SELect□CCO

**SAVCOM**

Calculates the fixture compensation coefficients and store it. (DONE: COMPEN under **Cal**); No query; Impedance analyzer only)

- Equivalent SCPI Command

:SENSe:CORRection2:COLLect:SAVE

**SAVDASC□<string>**

Specifies saving the internal data arrays as an ASCII file. (SAVE ASCII under **Save**); No query)

Parameter	Description
<string>	File name, up to 8 characters

- Equivalent SCPI Command

:MMEMory:STORe:DINTerchange:TRACe□SEL, <string (file\_name)> [, <string (msus)>]

Parameter	Description
<string (msus)>	"DISK" for the flexible disk drive "MEMORY" for the RAM disk memory

- Example

OUTPUT 717;"SAVDASC ""DATA1""

OUTPUT 717;" :MMEM:STOR:DINT:TRAC SEL, ""DATA1""

## SAVDASC $\square$ $\langle$ string $\rangle$

## SAVDAT $\square$ {OFF|ON|0|1}

Selects whether or not to save the data arrays. (DATA ON off under **Save**); No query for the SCPI command)

Parameter	Description
OFF or 0	Does not save the data arrays.
ON or 1	Saves the data arrays.

### ■ Query Response

{0|1}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

### ■ Equivalent SCPI Command

SAVDAT  $\square$  {OFF|0} :MMEMory:STORe:ITEM:TRACe{1|2}:DELete  $\square$  DATA  
SAVDAT  $\square$  {ON|1} :MMEMory:STORe:ITEM:TRACe{1|2}:SELEct  $\square$  DATA

### ■ Example

OUTPUT 717;"SAVDAT ON"

## SAVDDAT $\square$ $\langle$ string $\rangle$

Specifies saving the internal data arrays which are defined by the SAVRAW, SAVCAL, SAVDAT, SAVMEM, SAVTDAT, and SAVTMEM commands. (SAVE BINARY under **Save**); No query)

Parameter	Description
$\langle$ string $\rangle$	File name up to 8 characters

### ■ Equivalent SCPI Command

:MMEMory:STORe:TRACe  $\square$  SEL,  $\langle$ string (file\_name) $\rangle$  [,  $\langle$ string (msus) $\rangle$ ]

Parameter	Description
$\langle$ string (msus) $\rangle$	"DISK" for the flexible disk drive "MEMORY" for the RAM disk memory

### ■ Example

OUTPUT 717;"SAVDDAT ""DATA1"""

OUTPUT 717;":MMEM:STOR:TRAC SEL, ""DATA1"""

## SAVDSTA $\square$ $\langle$ string $\rangle$

Specifies saving only the instrument states and the calibration coefficients. (STATE under **Save**); No query)

Parameter	Description
$\langle$ string $\rangle$	File name up to 8 characters

**SAVDTIF**  $\square$   $\langle string \rangle$ 

## ■ Equivalent SCPI Command

:MMEMory:STORe:STATe  $\square$   $\langle string (file\_name) \rangle$  [,  $\langle string (msus) \rangle$ ]

Parameter	Description
$\langle string (msus) \rangle$	"DISK" for the flexible disk drive "MEMORY" for the RAM disk memory

## ■ Example

OUTPUT 717;"SAVDSTA ""STA1""

OUTPUT 717;":MMEM:STOR:STAT ""STA1""

**SAVDSTAC**  $\square$   $\langle string \rangle$ Specifies saving the instrument states the calibration coefficients and measurement data which are compatible with HP 4196A. (**4396A STATE** under **Save**); No query)**Note**

The following settings are not saved:



- dpi
- Printer Orientation
- Form feed
- Top Margin
- Left Margin
- Print Softkey

Parameter	Description
$\langle string \rangle$	File name up to 8 characters

## ■ Equivalent SCPI Command

None

## ■ Example

OUTPUT 717;"SAVDSTA ""STA1""

**SAVDTIF**  $\square$   $\langle string \rangle$ Saves the displayed screen in the TIFF format. (**GRAPHICS** under **Save**); No Query)

Parameter	Description
$\langle string \rangle$	File name having maximum 8 characters

## ■ Equivalent SCPI Command

:MMEMory:STORe:DINTerchange:TIFF  $\square$   $\langle string (file\ name) \rangle$

**SAVDTIF**  $\square$  *<string>*

**SAVDTRC**  $\square$  {OFF|ON|0|1}

Sets whether or not to save the trace arrays. (**DATA TRACE ON off** under **Save**); No query for the SCPI command)

Parameter	Description
OFF or 0	Does not save the trace arrays.
ON or 1	Saves the trace arrays.

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

SAVDTRC  $\square$  {OFF|0} :MMEMory:STORe:ITEM:TRACe{1|2}:DELete  $\square$  DTR  
SAVDTRC  $\square$  {ON|1} :MMEMory:STORe:ITEM:TRACe{1|2}:SELect  $\square$  DTR

**SAVEUSEK**

Stores the user-modified or user-defined calibration kit into memory. (Network and impedance analyzer only) (**SAVE USER KIT** under **Cal**); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:CKIT:MODify:SAVE

**SAVIMP**

Calculates the error-correction coefficients from the calibration data and stores the coefficients. (**DONE:CAL** under **CAL**); No query; Impedance analyzer only)

■ Equivalent SCPI Command

:SENSe:CORRection1:COLLect:SAVE

**SAVMEM**  $\square$  {OFF|ON|0|1}

Specifies whether or not to save the memory arrays. (**MEM ON off** under **Save**); No query for the SCPI command)

Parameter	Description
OFF or 0	Does not save the memory arrays.
ON or 1	Saves the memory arrays.

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

SAVMEM  $\square$  {OFF|0} :MMEMory:STORe:ITEM:TRACe{1|2}:DELete  $\square$  MEM  
SAVMEM  $\square$  {ON|1} :MMEMory:STORe:ITEM:TRACe{1|2}:SELect  $\square$  MEM

**SAVMTRC**{OFF|ON|0|1}

Specifies whether or not to save the memory trace arrays. (MEM TRACE ON off under **Save**); No query for the SCPI command)

Parameter	Description
OFF or 0	Does not save the memory trace arrays.
ON or 1	Saves the memory trace arrays.

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

SAVMTRC{OFF|0} :MMEMory:STORe:ITEM:TRACe{1|2}:DELeteLMTR  
 SAVMTRC{ON|1} :MMEMory:STORe:ITEM:TRACe{1|2}:SELectLMTR

**SAVRAW**{OFF|ON|0|1}

Specifies whether or not to save the raw data arrays. (RAW ON off under **Save**); No query for the SCPI command)

Parameter	Description
OFF or 0	Does not save the raw data arrays.
ON or 1	Saves the raw data arrays.

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

SAVRAW{OFF|0} :MMEMory:STORe:ITEM:TRACe{1|2}:DELeteLRAW  
 SAVRAW{ON|1} :MMEMory:STORe:ITEM:TRACe{1|2}:SELectLRAW

**SAVUCOMK**

Stores the user-modified compensation kit into memory. (SAVE COMPEN KIT under **Cal**); No query; Impedance analyzer only)

■ Equivalent SCPI Command

:SENSe:CORRection2:CKIT:MODifySAVE

**SAVUFIXT**

Saves the settings of user difined fixture. (SAVE USER FXTR KIT under **Meas** FIXTURE ); No query; Impedance analyzer only)

■ Equivalent SCPI Command

:SYSTem:FIXTure:SAVE

## SAVUFIXT

### SCACL{OFF|ON|0|1}

Couples or uncouples the "DATA" and "MEMORY" traces to be scaled. (D&M SCALE [ ] under Scale Ref);)

Parameter	Description
OFF or 0	Uncouples the "DATA" and "MEMORY" traces.
ON or 1	Couples the "DATA" and "MEMORY" traces.

#### ■ Query Response

{0|1} <new line><END>

#### ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1]|2}:Y[:SCALE]:COUPlE{OFF|ON|0|1}

(TRACe[1] for the data trace; TRACe2 for the memory trace.)

### SCAF{DATA|MEMO}

Selects one of the "DATA" or "MEMORY" traces to be scaled. (SCALE FOR [ ] under Scale Ref);  
No equivalent SCPI command)

#### ■ Query Response

{DATA|MEMO} <new line><END>

### SCAL<numeric>

Sets the response value scale per graticule trace. (SCALE/DIV under Scale Ref)

Parameter	Range	Format
<numeric>	0.001 to 500 (Network analyzer)	(Log magnitude format)
	1p to 500 (Network analyzer)	(Phase format)
	$1 \times 10^{-14}$ to 10 (Network analyzer)	(Delay format)
	$1 \times 10^{-11}$ to 10000 (Network analyzer)	(Smith chart, Admittance chart, Polar, Lin mag, Real, Imaginary, SWR, and Expanded phase formats)
	1f to 100M (Network analyzer)	(Lin mag, Real, Imaginary, SWR, and Expanded phase formats)
	0.1 to 20 (Network analyzer)	(dBm, dB $\mu$ V, dBV formats)
	1f to 0.1 (Network analyzer)	(Watt format)
	1n to 1 (Network analyzer)	(Volt format)
	1f to 100M (Impedance analyzer)	(Log mag, Lin mag, and complex plane formats)
	10f to 500M (Impedance analyzer)	(Smith chart, Admittance chart, and Polar formats)

- Query Response

{*numeric*} <new line><^END>

- Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1]|2}:Y[:SCALe]:PDIVision␣<*numeric*>

(TRACe[1] for the data trace; TRACe2 for the memory trace.)

## SCRN␣{OFF|ON|0|1}

Controls whether the LCD display is visible or not. (No equivalent SCPI command)

Parameter	Description
OFF or 0	Invisible (only softkey labels are displayed.)
ON or 1	Visible

- Query Response

{0|1} <new line><^END>

## SDEL

Deletes a segment from a list sweep table. (DELETE under **Sweep**; No query)

- Equivalent SCPI Command

:SENSe:LIST:SEGMENT:DELEte

## SDON

Saves the modified segment of a list sweep table. (SEGMENT DONE under **Sweep**; No query)

- Equivalent SCPI Command

:SENSe:LIST:SEGMENT:SAVE

- Example

OUTPUT 717;"SDON"

OUTPUT 717;":SENS:LIST:SEG:SAVE"

## SEAL

Searches the trace for the next occurrence of the target value to the left of the marker. (Network and impedance analyzer only) (SEARCH LEFT under **Search**; No query)

- Equivalent SCPI Command

:CALCulate:EVALuate:Y:XPOSITION:LTARGET

## SEAL

**SEAM** {PEAK|MAX|MIN|TARG|PKSA|PKSR|PKSL|OFF}

Selects the marker search function. (SEARCH: PEAK, MAX, MIN, TARGET, SEARCH: PEAKS ALL, PEAKS RIGHT, PEAKS LEFT under Search); No query for the SCPI command)

Parameter	Description
PEAK	Peak search
MAX	Maximum search
MIN	Minimum search
TARG	Target search (Network and impedance analyzer only)
PKSA	Peak all
PKSR	Peak right all
PKSL	Peak left all
OFF	Marker search function OFF

### ■ Query Response

{PEAK|MAX|MIN|TARG|PKSA|PKSR|PKSL|OFF} <new line><END>

### ■ Equivalent SCPI Command

```
SEAM:PEAK      :CALCulate:EVALuate:Y:XPOSition:PEAK
SEAM:MAX       :CALCulate:EVALuate:Y:XPOSition:MAXimum
SEAM:MIN       :CALCulate:EVALuate:Y:XPOSition:MINimum
SEAM:TARG      :CALCulate:EVALuate:Y:XPOSition:TARGet<numeric>
SEAM:PKSA      :CALCulate:EVALuate:Y:XPOSition:PALL
SEAM:PKSR      :CALCulate:EVALuate:Y:XPOSition:PRIGHT
SEAM:PKSL      :CALCulate:EVALuate:Y:XPOSition:PLEft
SEAM:OFF       None
```

Parameter	Range	Unit
<numeric> for :CALC:EVAL:Y:XPOS:TARG	$-5 \times 10^5$ to $5 \times 10^5$	

### ■ Example

```
OUTPUT 717;"SEAM PEAK"
OUTPUT 717;"SEAM?"
ENTER 717;A$
OUTPUT 717;":CALC:EVAL:Y:XPOS:PEAK"
```

## SEANPK

Moves the marker to the next peak. (NEXT PEAK under Search); No query)

### ■ Equivalent SCPI Command

```
:CALCulate:EVALuate:Y:XPOSition:NPEak
```

**SEANPKL**

Moves the marker to the peak to the left of the present marker position. (**NEXT PEAK LEFT** under **Search**); No query)

- Equivalent SCPI Command

```
:CALCulate:EVALuate:Y:XPOSITION:LPEak
```

**SEANPKR**

Moves the marker to the peak to the right of the present marker position. (**NEXT PEAK RIGHT** under **Search**); No query)

- Equivalent SCPI Command

```
:CALCulate:EVALuate:Y:XPOSITION:RPEak
```

**SEAR**

Searches the trace for the next occurrence of the target value to the right of the marker. (Network and impedance analyzer only) (**SEARCH RIGHT** under **Search**); No Query)

- Equivalent SCPI Command

```
:CALCulate:EVALuate:Y:XPOSITION:RTARGET
```

**SEARSTR**

Sets the partial search range to the range between the marker and the  $\Delta$ marker. (**MKRA $\rightarrow$ SEARCH RNG** under **Search**); No query)

- Equivalent SCPI Command

```
:CALCulate:EVALuate:BAND:SPAN $\Delta$ MARKer
```

**SEARSTRL**

Sets the left (lower) border of the partial search range at the current position of the marker. (**MKR $\rightarrow$ LEFT RNG** under **Search**); No query)

- Equivalent SCPI Command

```
:CALCulate:EVALuate:BAND:STARtLMARKer
```

- Example

```
OUTPUT 717;"SEARSTRL"
```

```
OUTPUT 717;" :CALC:EVAL:BAND:STAR MARK"
```

## SEARSTRL

## SEARSTRR

Sets the right (higher) border of the partial search range at the current position of the marker. (MKR→RIGHT RNG under Search); No query

■ Equivalent SCPI Command

:CALCulate:EVALuate:BAND:STOPMARKer

■ Example

OUTPUT 717;"SEARSTRR"

OUTPUT 717;":CALC:EVAL:BAND:STOP MARK"

## SEATARG□<numeric>[DB|DEG|S|OHM]

Makes the target value to the active function to enter a value and moves the marker to a specified target point on the trace. (Network and impedance analyzer only) (TARGET under Search)

Parameter	Range	Unit
<numeric>	-5x10 <sup>5</sup> to 5x10 <sup>5</sup>	

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:CALCulate:EVALuate:Y:XPOSITION:TARGET□<numeric>

■ Example

OUTPUT 717;"SEATARG 0"

## SEDI□<numeric>

Determines the segment of the list sweep table to be modified. (EDIT under Sweep); No query for the SCPI command)

Parameter	Description
<numeric>	1 to 15

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:SENSe:LIST:SEGMENT:EDIT

**SETZ**  $\square$  *<numeric>* [OHM|KOHM|MAOHM]

**SETCDATE**  $\square$  *<numeric (year)>*, *<numeric (month)>*, *<numeric (day)>*

Sets the date of the internal clock. (**DATE** MM/DD/YY under **System**)

Parameter	Description
<i>&lt;numeric (year)&gt;</i>	1900 to 2099
<i>&lt;numeric (month)&gt;</i>	1 to 12
<i>&lt;numeric (day)&gt;</i>	1 to 31

■ Query Response

{*numeric (year)*} {*numeric (month)*} {*numeric (day)*} <new line><END>

■ Equivalent SCPI Command

:SYSTem:DATE  $\square$  *<numeric (year)>*, *<numeric (month)>*, *<numeric (day)>*

■ Example

OUTPUT 717; "SETCDATE 1993,1,1"

**SETCTIME**  $\square$  *<numeric (hour)>*, *<numeric (minute)>*, *<numeric (second)>*

Sets the time of the internal clock. (**SETCTIME** under **System**)

Parameter	Description
<i>&lt;numeric (hour)&gt;</i>	0 to 23
<i>&lt;numeric (minute)&gt;</i>	0 to 59
<i>&lt;numeric (second)&gt;</i>	0 to 59

■ Query Response

{*numeric (hour)*} {*numeric (minute)*} {*numeric (second)*} <new line><END>

■ Equivalent SCPI Command

:SYSTem:TIME  $\square$  *<numeric (hour)>*, *<numeric (minute)>*, *<numeric (second)>*

■ Example

OUTPUT 717; "SETCTIME 10,30,0"

**SETZ**  $\square$  *<numeric>* [OHM|KOHM|MAOHM]

Sets the characteristic impedance of the coaxial cable offset. (Network analyzer only) (**SET Z0** under **Cal**)

Parameter	Range	Unit
<i>&lt;numeric&gt;</i>	0.001 to 5 M	$\Omega$

**SETZ**  $\llcorner$  *numeric*  $\llcorner$  {OHM|KOHM|MAOHM}

■ Query Response

{*numeric*}  $\llcorner$  new line  $\llcorner$  END  $\llcorner$

■ Equivalent SCPI Command

:SENSe:CORRection:CIMPedance  $\llcorner$  *numeric*  $\llcorner$

**SGTRK**  $\llcorner$  {OFF|ON|0|1}

Sets the signal tracking function ON or OFF. (Spectrum analyzer only) (SGNL TRACK ON off under [Search](#))

Parameter	Description
OFF or 0	Signal tracking OFF
ON or 1	Signal tracking ON

■ Query Response

{0|1}  $\llcorner$  new line  $\llcorner$  END  $\llcorner$

■ Equivalent SCPI Command

:SENSe:TRACk:SIGNaL:MARKer  $\llcorner$  {OFF|ON|0|1}  $\llcorner$

**SIMFCHAR**

Simulates frequency response of the equivalent circuit. (SIMULTE F-CHAR under [Display](#)); No query; Impedance analyzer only)

■ Equivalent SCPI Command

CALCulate:EVALuate:EPARameters:SIMulation

**SING**

Makes one sweep of the data and returns to the hold mode. (Instrument BASIC EXECUTE executable; **SINGLE** under **Trigger**; No query;)

When you execute this command by EXECUTE command of the instrument BASIC, the analyzer sweeps once and then back the control to the analyzer. The program waits the completion of sweep. You can use this method instead of detecting the sweep end by monitoring the status register to synchronize the program with the analyzer.

- Equivalent SCPI Command

```
:INITiate:CONTinuous{OFF|0}
:ABORt
:SENSe:SWEep:COUNt1
:INITiate[:IMMediate]
```

- Example

```
OUTPUT 717;"SING"
OUTPUT 717;":INIT:CONT OFF"
OUTPUT 717;":SENS:SWE:COUN 1"
OUTPUT 717;":INIT"
EXECUTE "SING"
```

**SLOP{OFF|ON|0|1}**

Sets the power slope function ON or OFF. With the slope ON, the output power increases with frequency (starting at the selected power level). (Network analyzer only) (**SLOPE ON off** under **Source**)

Parameter	Description
OFF or 0	Power slope function OFF
ON or 1	Power slope function ON

- Query Response

```
{0|1} <new line><END>
```

- Equivalent SCPI Command

```
:SOURce:POWer[:LEVel] [:IMMediate] [:AMPLitude] :SLOPe:STATe{OFF|ON|0|1}
```

**SLOPE**  $\square$  {OFF|ON|0|1}

**SLOPE**  $\square$  <numeric>

Compensates for the power loss versus the frequency sweep, by sloping the output power upwards proportionally to the frequency. (Network analyzer only) (**SLOPE** under **Source**)

Parameter	Range	Unit
<numeric>	0 to 2	dB/GHz

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:SOURce:POWer[:LEVel][:IMMediate][:AMPLitude]:SLOPe  $\square$  <numeric>

**SMKR** {1-7}  $\square$  {OFF|ON|0|1}

Displays the specified sub-marker at the point of the marker (ON), or erases the sub-marker (OFF). (**SUB MKR** {1-7} under **Marker**)

Parameter	Description
OFF or 0	Sub-marker ON
ON or 1	Sub-marker OFF

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

SMKR1  $\square$  {OFF|ON|0|1} :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer2:STATe  $\square$  {OFF|ON|0|1}  
SMKR2  $\square$  {OFF|ON|0|1} :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer3:STATe  $\square$  {OFF|ON|0|1}  
SMKR3  $\square$  {OFF|ON|0|1} :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer4:STATe  $\square$  {OFF|ON|0|1}  
SMKR4  $\square$  {OFF|ON|0|1} :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer5:STATe  $\square$  {OFF|ON|0|1}  
SMKR5  $\square$  {OFF|ON|0|1} :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer6:STATe  $\square$  {OFF|ON|0|1}  
SMKR6  $\square$  {OFF|ON|0|1} :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer7:STATe  $\square$  {OFF|ON|0|1}  
SMKR7  $\square$  {OFF|ON|0|1} :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer8:STATe  $\square$  {OFF|ON|0|1}

(TRACe[1] for the data trace; TRACe2 for the memory trace.)

**SMKRAUV{1-7}?**

Outputs the auxiliary amplitude value of the measurement value at the sub-marker position. See "Marker Readout" in Appendix H for the auxiliary amplitude value of each display format.

(SUB MKR {1-7}) under **Marker**; Query only)

- Query Response

{*numeric*} <new line><END>

- Equivalent SCPI Command

```
SMKRAUV1? :CALCulate:EVALuate:Y2:VALue2?
SMKRAUV2? :CALCulate:EVALuate:Y3:VALue2?
SMKRAUV3? :CALCulate:EVALuate:Y4:VALue2?
SMKRAUV4? :CALCulate:EVALuate:Y5:VALue2?
SMKRAUV5? :CALCulate:EVALuate:Y6:VALue2?
SMKRAUV6? :CALCulate:EVALuate:Y7:VALue2?
SMKRAUV7? :CALCulate:EVALuate:Y8:VALue2?
```

- Example

```
OUTPUT 717;"SMKRAUV1?"
ENTER 717;A
```

**SMKRP{1-7}□<numeric>**

Moves the sub-marker to the specified data point number.

Parameter	Description
<numeric>	1 to "number of points" (If <numeric> is 0 or less than 0, it is set to 1. If <numeric> is greater than "number of points," it is set to "number of points.")

- Query Response

{*numeric*} <new line><END>

- Equivalent SCPI Command

```
SMKRP1□<numeric> :CALCulate:EVALuate:Y2:XPOSition:POINt□<numeric>
SMKRP2□<numeric> :CALCulate:EVALuate:Y3:XPOSition:POINt□<numeric>
SMKRP3□<numeric> :CALCulate:EVALuate:Y4:XPOSition:POINt□<numeric>
SMKRP4□<numeric> :CALCulate:EVALuate:Y5:XPOSition:POINt□<numeric>
SMKRP5□<numeric> :CALCulate:EVALuate:Y6:XPOSition:POINt□<numeric>
SMKRP6□<numeric> :CALCulate:EVALuate:Y7:XPOSition:POINt□<numeric>
SMKRP7□<numeric> :CALCulate:EVALuate:Y8:XPOSition:POINt□<numeric>
```

- Example

```
OUTPUT 717;"SMKRP1 1"
OUTPUT 717;"SMKRP1?"
ENTER 717;A
```

**SMKRP{1-7}** □ <numeric>

**SMKRPRM{1-7}** □ <numeric> [HZ|KHZ|MAHZ|GHZ|DBM]

Moves the sub-marker to the specified sweep parameter value. (SUB MKR {1-7}) under (Marker)

Parameter	Range	Unit
<numeric>	start value to stop value	Hz (frequency) dBm (power)

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

```
SMKRPRM1 □ <numeric> :CALCulate:EVALuate:Y2:XPOSITION □ <numeric>
SMKRPRM2 □ <numeric> :CALCulate:EVALuate:Y3:XPOSITION □ <numeric>
SMKRPRM3 □ <numeric> :CALCulate:EVALuate:Y4:XPOSITION □ <numeric>
SMKRPRM4 □ <numeric> :CALCulate:EVALuate:Y5:XPOSITION □ <numeric>
SMKRPRM5 □ <numeric> :CALCulate:EVALuate:Y6:XPOSITION □ <numeric>
SMKRPRM6 □ <numeric> :CALCulate:EVALuate:Y7:XPOSITION □ <numeric>
SMKRPRM7 □ <numeric> :CALCulate:EVALuate:Y8:XPOSITION □ <numeric>
```

**SMKRVAL{1-7}?**

Outputs the primary part of the measurement value at the sub-marker position.

(SUB MKR {1-7}) under (Marker); Query only)

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

```
SMKRVAL1? :CALCulate:EVALuate:Y2:VALue1?
SMKRVAL2? :CALCulate:EVALuate:Y3:VALue1?
SMKRVAL3? :CALCulate:EVALuate:Y4:VALue1?
SMKRVAL4? :CALCulate:EVALuate:Y5:VALue1?
SMKRVAL5? :CALCulate:EVALuate:Y6:VALue1?
SMKRVAL6? :CALCulate:EVALuate:Y7:VALue1?
SMKRVAL7? :CALCulate:EVALuate:Y8:VALue1?
```

**SPECIMP**{A|B|C}□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

**SPAN**□<numeric>[HZ|KHZ|MAHZ|GHZ|DBM]

Sets the frequency span of a segment about a specified center frequency, or sets the frequency span of the list sweep table. (**SPAN**) or **SPAN** under **Sweep**)

Parameter	Range	Unit
<numeric>	0 to 1.8199×10 <sup>9</sup> (=1.8199 G) 0 to 20 or 30 <sup>1</sup>	Hz (frequency) dBm (power)

<sup>1</sup> The maximum range depends on the center value.

#### ■ Query Response

{numeric} <new line><END>

#### ■ Equivalent SCPI Command

**Span** :SENSe:FREQuency:SPAN□<numeric> (frequency) or  
:SOURce:POWer:SPAN <numeric> (power)

**Span** under **Sweep** :SENSe:LIST:SEGment:FREQuency:SPAN□<numeric>  
(List sweep table)

**SPECFWD**{M|T}□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

Enters the standard numbers for the forward match (THRU) or forward transmission (THRU) calibration. (Network analyzer only) (**FWD.MATCH**, **FWD.TRANS.** under **Cal**); No query)

Parameter	Description
<numeric>	1 to 8

#### ■ Equivalent SCPI Command

SPECFWDM :SENSe:CORRection:CKIT:CLASs9:STANdard□<numeric 1>[,<numeric 2>  
[, ... [,<numeric 7>]

SPECFWDT :SENSe:CORRection:CKIT:CLASs7:STANdard□<numeric 1>[,<numeric 2>  
[, ... [,<numeric 7>]

#### ■ Example

OUTPUT 717;"SPECFWDM 1"

OUTPUT 717;":SENS:CORR:CKIT:CLAS9:STAN 1"

**SPECIMP**{A|B|C}□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

Enters the standard numbers for the first, second, or third standard class required for an impedance calibration. (**SPECIFY CLASS** under **Cal**); No query. Impedance analyzer only.)

Parameter	Description
<numeric>	1 to 8

#### ■ Equivalent SCPI Command

**SPECIMP{A|B|C}**□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

SPECIMPA :SENSe:CORRection:CKIT:CLASs13:STANdard□<numeric 1>[,<numeric 2>  
[, ... [,<numeric 7>]

SPECIMPB :SENSe:CORRection:CKIT:CLASs14:STANdard□<numeric 1>[,<numeric 2>  
[, ... [,<numeric 7>]

SPECIMPC :SENSe:CORRection:CKIT:CLASs15:STANdard□<numeric 1>[,<numeric 2>  
[, ... [,<numeric 7>]

**SPECRES{I|P}**□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

Enters the standard numbers for a response and isolation, or a response calibration. (Network analyzer only) (**RESPONSE & ISOL'N**, **RESPONSE** under **Cal**); No query)

Parameter	Description
<numeric>	1 to 8

■ Equivalent SCPI Command

SPECRESI :SENSe:CORRection:CKIT:CLASs12:STANdard□<numeric 1>[,<numeric 2>  
[, ... [,<numeric 7>]

SPECRESP :SENSe:CORRection:CKIT:CLASs11:STANdard□<numeric 1>[,<numeric 2>  
[, ... [,<numeric 7>]

**SPECREV{M|T}**□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

Enters the standard numbers for the reverse match (THRU) or reverse transmission (THRU) calibration. (Network analyzer only) (**REV.MATCH**, **REV.TRANS.** under **Cal**); No query)

Parameter	Description
<numeric>	1 to 8

■ Equivalent SCPI Command

SPECREVM :SENSe:CORRection:CKIT:CLASs10:STANdard□<numeric 1>[,<numeric 2>  
[, ... [,<numeric 7>]

SPECREVT :SENSe:CORRection:CKIT:CLASs8:STANdard□<numeric 1>[,<numeric 2>  
[, ... [,<numeric 7>] f

**SPECS22**{A|B|C}□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

**SPECS11**{A|B|C}□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

Enters the standard numbers for the first, second, or third standard class required for an S<sub>11</sub> 1-port calibration. (Network analyzer only) (SPECIFY: S11A, S11B, S11C under **Cal**); No query)

Parameter	Description
<numeric>	1 to 8

■ Equivalent SCPI Command

SPECS11A :SENSe:CORRection:CKIT:CLASs1:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

SPECS11B :SENSe:CORRection:CKIT:CLASs2:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

SPECS11C :SENSe:CORRection:CKIT:CLASs3:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

**SPECS22**{A|B|C}□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

Enters the standard numbers for the first, second, or third standard class required for an S<sub>22</sub> 1-port calibration. (Network analyzer only) (SPECIFY: S22A, S22B, S22C under **Cal**); No query)

Parameter	Description
<numeric>	1 to 8

■ Equivalent SCPI Command

SPECS22A :SENSe:CORRection:CKIT:CLASs4:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

SPECS22B :SENSe:CORRection:CKIT:CLASs5:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

SPECS22C :SENSe:CORRection:CKIT:CLASs6:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

**SPECS22**{A|B|C}□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

**SPLD**□{OFF|ON|0|1}

Sets the dual channel display mode. (SPLIT DISP ON off under **Display**)

Parameter	Description
OFF or 0	Full-screen single graticule display
ON or 1	Split display with two half-screen graticules

■ Query Response

{0|1} <new line><^END>

■ Equivalent SCPI Command

SPLD□{OFF|0} :DISPlay[:WINDow]:FORMatLFBACK  
 SPLD□{ON|1} :DISPlay[:WINDow]:FORMatLULOWer

**SQUI**

Terminates editing a segment of the list sweep table. (SEGMENT QUIT under **Sweep**; No query)

■ Equivalent SCPI Command

:SENSe:LIST:SEGment:QUIT

**STAN**{A-G}

Measures the calibration standard in the current standard class. (Network analyzer only)  
 (OPEN, SHORT, THRU, OPEN [ ], SHORT [ ], defined std {1-7} under **Cal**); No query)

■ Equivalent SCPI Command

STANA :SENSe:CORRection:COLLect[:ACQuire]LSTANdard1  
 STANB :SENSe:CORRection:COLLect[:ACQuire]LSTANdard2  
 STANC :SENSe:CORRection:COLLect[:ACQuire]LSTANdard3  
 STAND :SENSe:CORRection:COLLect[:ACQuire]LSTANdard4  
 STANE :SENSe:CORRection:COLLect[:ACQuire]LSTANdard5  
 STANF :SENSe:CORRection:COLLect[:ACQuire]LSTANdard6  
 STANG :SENSe:CORRection:COLLect[:ACQuire]LSTANdard7

**STAR**□<numeric>[HZ|KHZ|MAHZ|GHZ|DBM]

Sets the start value of a segment, or sets the start value of the list sweep table. (**Start** or **SEGMENT: START** under **Sweep**)

Parameter	Range	Unit
<numeric>	100000 (=100 k) to 1.82×10 <sup>9</sup> (=1.82 G) (Network analyzer) 0 to 1.82×10 <sup>9</sup> (=1.82 G) (Spectrum analyzer) -60 to 20	Hz (frequency)  dBm (power)

## ■ Query Response

*{numeric}* <new line><END>

## ■ Equivalent SCPI Command

**START**:SENSe:FREQuency:STARt<*numeric*> (frequency) or  
:SOURce:POWer:STARt<*numeric*> (power)**SEGMENT: START** under **Sweep**  
(List sweep table):SENSe:LIST:SEGment:FREQuency:STARt<*numeric*>**STDD**

Terminates the standard definition. (Network and impedance analyzer only)

**(STD DONE (DEFINED)** under **Cal**); No query)

## ■ Equivalent SCPI Command

:SENSe:CORRection:CKIT:STANdard:SAVE

**STDT**{**OPEN|SHOR|LOAD|DELA|ARBI**}Defines the standard type. (Network and impedance analyzer only) (**STD TYPE: OPEN**, **SHORT**, **LOAD**, **DELAY/THRU**, **ARBITRARY IMPEDANCE** under **Cal**)

Parameter	Description
OPEN	OPEN
SHOR	SHORT
LOAD	LOAD
DELA	Transmission line of specified length
ARBI	LOAD with an arbitrary impedance

## ■ Query Response

{OPEN|SHOR|LOAD|DELA|ARBI} &lt;new line&gt;&lt;END&gt;

## ■ Equivalent SCPI Command

:SENSe:CORRection:CKIT:STANdard:TYPE&lt;{OPEN|SHORT|LOAD|DELay|AIMpedance}&gt;

**STOD**{**DISK|MEMO**}Sets the storage device. (**STOR DEV**[ ] under **Save**); No query; No equivalent SCPI command)

Parameter	Description
STODDISK	Flexible disk drive
STODMEMO	RAM disk memory

## STOD{DISK|MEMO}

## STOP□<numeric>[HZ|KHZ|MAHZ|GHZ|DBM]

Sets the stop value frequency of a segment, or the stop value of the list table. (**STOP**) or **STOP** under **Sweep**)

Parameter	Range	Unit
<numeric>	100000 (=100 k) to $1.82 \times 10^9$ (=1.82 G) (Network analyzer)	Hz (frequency)
	0 to $1.82 \times 10^9$ (=1.82 G) (Spectrum analyzer)	
	-60 to 20	dBm (power)

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

**Stop** :SENSe:FREQuency:STOP□<numeric> (frequency) or  
:SOURce:POWer:STOP□<numeric> (power)

**Stop** under **Sweep** :SENSe:LIST:SEGment:FREQuency:STOP□<numeric>  
(List sweep table)

## SVCO

Saves the modified version of the color set to the non-volatile memory. (**SAVE COLORS** under **Display**); No query)

### ■ Equivalent SCPI Command

:DISPlay:CMAP:STORe

## SWET□<numeric>[S|MS]

Sets the sweep time. (**SWEEP TIME** under **Sweep**)

Parameter	Range	Unit
<numeric>	(depends on the analyzer's setting)	s

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

:SENSe:SWEEP:TIME□<numeric>

**SWETAUTO{OFF|ON|0|1}**

Sets the automatic or manual sweep time. The automatic mode gives the fastest sweep time at the analyzer's current settings of the channel. (SWEEP TIME AUTO man under Sweep)

Parameter	Description
OFF or 0	Manual sweep time
ON or 1	Automatic sweep time

## ■ Query Response

{0|1} <new line><END>

## ■ Equivalent SCPI Command

:SENSe:SWEep:TIME:AUTO{OFF|ON|0|1}

**SWPT{LINF|LOGF|LIST|POWE}**

Selects the sweep type. (SWEEP TYPE:LIN FREQ, LOG FREQ, LIST FREQ, POWER SWEEP under Sweep)

Parameter	Description
LINF	Linear frequency
LOGF	Log frequency (Network and impedance analyzer only)
LIST	Frequency list
POWE	Power (Network and impedance analyzer only)

## ■ Query Response

{LINF|LOGF|LIST|POWE} <new line><END>

## ■ Equivalent SCPI Command

SWPTLINF :SENSe:FREQuency:MODELSWEep  
:SOURce:POWer:MODELFIXed  
:SENSe:SWEep:SPACingLLINear

SWPTLOGF :SENSe:FREQuency:MODELSWEep  
:SOURce:POWer:MODELFIXed  
:SENSe:SWEep:SPACingLLOGarithmic

SWPTLIST :SENSe:FREQuency:MODELLIST  
:SOURce:POWer:MODELLIST  
:SENSe:SWEep:SPACingLLINear

SWPTPOWE :SENSe:FREQuency:MODELFIXed  
:SOURce:POWer:MODELSWEep  
:SENSe:SWEep:SPACingLLINear

## TARL?

Searches for the point having the parameter-specified value leftward from the right end of the range, and returns its stimulus. See "TARL?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## TARR?

Searches for the point having the parameter-specified value rightward from the left end of the range, and returns its stimulus. See "TARR?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## TERI<numeric>[OHM|KOHM]

Specifies the (arbitrary) impedance of the standard. (Network and impedance analyzer only)  
(**TERMINAL IMPEDANCE** under **Cal**); No query)

Parameter	Range	Unit
<numeric>	0 to 10000 (= 10 k)	$\Omega$

### ■ Equivalent SCPI Command

:SENSe:CORRection:CKIT:STANdard:TIMPedance<numeric>

## TESS?

Outputs the test set identifier. (Network analyzer only) (Query only)

### ■ Query Response

{0|1} <new line><^END>

Parameter	Description
0	None
1	S-parameter test set

### ■ Equivalent SCPI Command

:SYSTem:COMMunicate:TSET?

## THRR<numeric>

Sets threshold ripple height for waveform analysis commands. See "THRR" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

**TINT**□<numeric>

Adjusts the hue of the specified display element. (**TINT** under **Display**); No equivalent SCPI command)

Parameter	Range	Unit
<numeric>	0 to 100	%

## ■ Query Response

{numeric} <new line><END>

**TITL**□<string>

Sends the string to the title area on the display. (**TITLE** under **Display**)

Parameter	Description
<string>	up to 53 characters

## ■ Query Response

{string} <new line><END>

## ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TEXT17[:DATA]□<string>

## ■ Example

```
OUTPUT 717;"TITL ""COMMENT"""  
OUTPUT 717;"TITL?"  
ENTER 717;A$  
OUTPUT 717;":DISP:TEXT17 ""COMMENT"""  
OUTPUT 717;":DISP:TEXT17?"  
ENTER 717;A$
```

**TMARG**□<numeric>

Specify the value for the top margin of printed paper. (**TOP MARGIN** under **Copy**)

Parameter	Range	Unit
<numeric>	0 to 5	inch

## ■ Query Response

{numeric} <new line><END>

## ■ Equivalent SCPI Command

:HCOPy:DRIVER:TOPMarg□<numeric>

## TOPV<numeric>

Defines the top border of the display and adjusts the scale value. (TOP VALUE under Scale Ref; Impedance analyzer only.)

Parameter	Range	Unit
<numeric>	$-1 \times 10^9$ to $1 \times 10^9$	y-axis unit

### ■ Query Response

<numeric><new line><END>

### ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{1|2}:Y[:SCALE]:TOPV<numeric>

## TRACK{OFF|ON|0|1}

Sets the search tracking function ON or OFF. (SRCH TRACK ON off under Search)

### ■ Query Response

{0|1} <new line><END>

### ■ Equivalent SCPI Command

TRACK{OFF|0} :CALCulate:EVALuate:Y:XPOSITION:TRACkOFF  
TRACK{ON|1} :CALCulate:EVALuate:Y:XPOSITION:TRACk  
{MAXimum|MINimum|TARGet|PEAK|PALL|PLEFt|PRIGHt}

Parameter	Description
MAXimum	Maximum search
MINimum	Minimum search
TARGet	Target search
PEAK	Peak search
PALL	Peaks all
PLEFt	Peaks left
PRIGHt	Peaks right

## TRAD

Completes the transmission calibration of the full or one-path 2-port calibration. (Network analyzer only) (TRANS. DONE under Cal; No query)

### ■ Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE6

### ■ Example

OUTPUT 717;"TRAD"

OUTPUT 717;"SENS:CORR:COLL:SAVE6"

**TRAN**

Starts the transmission part of the full or one-path 2-port calibration. (Network analyzer only)  
(TRANSMISSION under Cal); No query)

- Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire]UTRAN2
```

**TRGEVE{SWE|POIN}**

Selects the trigger event mode. (Network and impedance analyzer only) (TRIG EVENT [ ]  
under Trigger)

Parameter	Description
SWE	Trigger event on sweep
POIN	Trigger event on point <sup>1</sup>

<sup>1</sup> Available only when the trigger source is the HP-IB, Manual, or External trigger.

- Query Response

```
{SWE|POIN} <new line><^END>
```

- Equivalent SCPI Command

```
:TRIGger:EVENT:TYPE{SWEep|POINT}
```

**TRGP{POS|NEG}**

Sets the trigger signal polarity of an external signal connected to the rear panel EXT TRIGGER input. (TRIG PLRTY pos neg under Trigger)

Parameter	Description
POS	Positive trigger (low-to-high transition)
NEG	Negative trigger (high-to-low transition)

- Query Response

```
{POS|NEG} <new line><^END>
```

- Equivalent SCPI Command

```
:TRIGger:SLOPe{POSitive|NEGative}
```

**TRGP** {POS|NEG}

**TRGS** {INT|EXT|BUS|VID|MAN|GAT}

Selects the trigger source, which is common to both channels. (TRIGGER: [ ] under **Trigger**)

Parameter	Description
INT	Internal trigger
EXT	External trigger input from BNC on the rear panel
BUS	HP-IB trigger
VID	Video trigger (Spectrum analyzer only)
MAN	Manual trigger
GAT	External gate trigger (Spectrum analyzer and option 1D6 only)

■ Query Response

{INT|EXT|BUS|VID|MAN|GAT} <new line><END>

■ Equivalent SCPI Command

```
TRGSINT      :TRIGger:SOURceINTernal1
              :SENSe:SWEEP:GATed{OFF|0}

TRGSEXT      :TRIGger:SOURceEXTernal
              :SENSe:SWEEP:GATed{OFF|0}

TRGSBUS      :TRIGger:SOURceBUS
              :SENSe:SWEEP:GATed{OFF|0}

TRGSVID      :TRIGger:SOURceINTernal2
              :SENSe:SWEEP:GATed{OFF|0}

TRGSMAN      :TRIGger:SOURceMANual
              :SENSe:SWEEP:GATed{OFF|0}

TRSGAT       :TRIGger:SOURceEXTernal
              :SENSe:SWEEP:GATed{ON|1}
```

**USKEY**

Displays the user menu of the soft keys. The user menu display returns to the ordinary measurement keys when the program ends. (No query; No equivalent SCPI command)

The USKEY command is equivalent to executing the program shown below;

```
OUTPUT @Hp4396;"KEY 47"
OUTPUT @Hp4396;"KEY 0"
OUTPUT @Hp4396;"KEY 6"
```

**VELOFACT**  $\square$  *<numeric>***VBW**  $\square$  *<numeric>* [**HZ**|**KHZ**|**MAHZ**]Sets the bandwidth of the video bandwidth filter. (Spectrum analyzer only) (**VIDEO BW** under **Bw/Avg**)

Parameter	Description
<i>&lt;numeric&gt;</i>	RBW, RBW/3, RBW/10, RBW/30, RBW/100, and RBW/300

- Query Response

```
{numeric} <new line><END>
```

- Equivalent SCPI Command

```
:SENSe:BANDwidth[:RESolution]:AUTO  $\square$  {OFF|0}
:SENSe:BANDwidth[:RESolution]  $\square$  <numeric>
```

**VBWT**  $\square$  {**LIN**|**LOG**}Selects either the linear or logarithmic video filter. (**VBW TYPE [LIN]** or **[LOG]** under **Bw/Avg**)

- Query Response

```
{LIN|LOG} <new line><END>
```

- Equivalent SCPI Command

```
SENSe:BANDwidth:VIDeo:TYPE  $\square$  {LIN|LOG}
```

- Examples

```
OUTPUT @Hp4396;"SENS:BAND:VID:TYPE LOG"
```

```
OUTPUT @Hp4396;"SENS:BAND:VID:TYPE?"
```

```
ENTER @Hp4396;Type$
```

```
PRINT "Current VBW setting is ";Type$
```

**VELOFACT**  $\square$  *<numeric>*Enters the velocity factor used by the analyzer to calculate the equivalent electrical length. (Network and impedance analyzer only) (**VELOCITY FACTOR** under **Cal**)

Parameter	Range	Unit
<i>&lt;numeric&gt;</i>	0 to 10	

- Query Response

```
{numeric} <new line><END>
```

- Equivalent SCPI Command

```
:SENSe:CORRection:RVELOCITY  $\square$  <numeric>
```

## VIDLVL <numeric>

Sets the video trigger level. (Spectrum analyzer only) (VIDEO under Trigger)

Parameter	Range	Unit
<numeric>	0 to 100	%

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

:TRIGger:LEVel<numeric>

## WIDSIN

Searches for the cutoff point on the trace within the current cutoff points. (Network and impedance analyzer only; SEARCH IN under Search); No query

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:WIDTh:XPOSition:IN

### ■ Example

OUTPUT 717;"WIDSIN"

OUTPUT 717;":CALC:EVAL:WIDT:XPOS:IN"

## WIDSOUT

Searches for the cutoff point on the trace outside of the current cutoff points. (Network and impedance analyzer only; SEARCH OUT under Search); No query

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:WIDTh:XPOSition:OUT

## WIDT {OFF|ON|0|1}

Sets the bandwidth search feature ON or OFF. (Network and impedance analyzer only)

(WIDTHS ON off under Search)

Parameter	Description
OFF or 0	Bandwidth search feature OFF
ON or 1	Bandwidth search feature ON (calculates the center stimulus value, bandwidth, Q, insertion loss, and cutoff point deviation from the center of a bandpass or band reject shape on the trace.)

### ■ Query Response

{0|1} <new line><END>

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:WIDTh:STATe {OFF|ON|0|1}

**WIDV**  $\square$  *<numeric>* [**DB**|**DEG**|**S**|**OHM**]

Sets an amplitude parameter that defines the start and stop points for a bandwidth search. (Network and impedance analyzer only) (**WIDTH VALUE** under **Search**)

Parameter	Range	Format
<i>&lt;numeric&gt;</i>	-5x10 <sup>5</sup> to 5x10 <sup>5</sup> -500 to 500 (Network analyzer)	Log magnitude format

■ Query Response

{*numeric*} <new line><END>

■ Equivalent SCPI Command

:CALCulate:EVALuate:WIDTH:Y  $\square$  *<numeric>*

**WIDVTYPE**  $\square$  {**DIVS2**|**MULS2**|**DIV2**|**FIXed**}

Select Maker Width Value Type. When you use **FIXed**, you must specify the bandwidth value by using **WIDV**. (**MKRVAL/(\sqrt{2})**, **MKRVAL\*(\sqrt{2})**, **MKRVAL/2**, or **FIXED VALUE** under **Search**)  
**WIDTH**  $\square$  **WIDHT VALUE**. Impedance analyzer only.)

■ Query Response

{**DIVS2**|**MULS2**|**DIV2**|**FIX**} <new line><END>

■ Equivalent SCPI Command

:CALCulate:EVALuate:WIDTH:Y:TYPE  $\square$  {**DIVS2**|**MULS2**|**DIV2**|**FIXed**, *<numeric>*}

■ Samples

```
OUTPUT @Hp4396;"WIDVTYPE DIV2"
OUTPUT @Hp4396;"WIDVTYPE FIXed"
OUTPUT @Hp4396;"WIDV ";3
```

**ZA**

Selects the impedance analyzer mode. (**IMPEDANCE ANALYZER** under **Meas**)

■ Query Response

{0|1} <new line><END>

Parameter	Description
0	Impedance analyzer mode is not selected.
1	Impedance analyzer mode is selected.

■ Equivalent SCPI Command

:INSTrument:TYPE  $\square$  ZA

## ZA

### ZMAPER $\lfloor$ *<numeric>*

Sets the zooming aperture value as a percentage of the span. (**ZOOMING APERTURE** under

Marker  $\rightarrow$ )

Parameter	Range	Unit
<i>&lt;numeric&gt;</i>	0.01 to 100 of SPAN	%

#### ■ Query Response

{*numeric*}  $\langle$  new line  $\rangle$   $\langle$  END  $\rangle$

#### ■ Equivalent SCPI Command

:DATA[:DATA]  $\lfloor$  MZAP, *<numeric>*

#### ■ Example

```
OUTPUT 717;"ZMAPER 50"
```

```
OUTPUT 717;"ZMAPER?"
```

```
ENTER 717;A
```

```
OUTPUT 717;":DATA MZAP,50"
```

```
OUTPUT 717;":DATA? MZAP"
```

```
ENTER 717;A
```

## Common Commands

### \*CLS

Clears the Status Byte Register, and the Event Register of the Operation Status Register, the Standard Event Status Register, and the Event Status Register B (Instrument Event Status Register). (No query)

- Example

```
OUTPUT 717;"*CLS"
```

### \*ESE<numeric>

Sets the enable bits of the Standard Event Status Register.

Parameter	Description
<numeric>	0 to 255 (decimal expression of enable bits of the operation status register)

- Query Response

```
{numeric} <new line><END>
```

- Example

```
OUTPUT 717;"*ESE 1"
```

```
OUTPUT 717;"*ESE?"
```

```
ENTER 717;A
```

### \*ESR?

Returns the contents of the Standard Event Status Register. (Query only)

- Query Response

```
{numeric} <new line><END>
```

- Example

```
OUTPUT 717;"*ESR?"
```

```
ENTER 717;A
```

### \*IDN?

Returns the analyzer's ID.

- Query Response

```
{manufacturer} {model} {serial no.} {firmware rev.} <new line><END>
```

- Example

```
OUTPUT 717;"*IDN?"
```

```
ENTER 717;A$
```

### \*IDN?

### \*OPC

Tells the analyzer to set bit 0 (Operation Complete bit) in the Standard Event Status Register when it completes all pending operations.

\*OPC? query places an ASCII character 1 into the analyzer's output queue when all pending operations have been completed.

#### ■ Query Response

{1} <new line><END>

#### ■ Example

```
OUTPUT 717;"*OPC"
```

```
OUTPUT 717;"*OPC?"
```

```
ENTER 717;A
```

### \*OPT?

Queries the options installed. (Query only)

#### ■ Query Response

{parameter} <new line><END>

Parameter	Description
(Null)	None
1C2	HP Instrument BASIC
1D6	Time-gated spectrum analysis

#### ■ Example

```
OUTPUT 717;"*OPT?"
```

```
ENTER 717;A$
```

### \*PCBL<numeric>

Specifies the address of a controller that is temporarily passing HP-IB control to the analyzer. (Option 1C2 only; No query)

Parameter	Description
<numeric>	0 to 30

#### ■ Example

```
OUTPUT 717;"*PCB 0"
```

**\*RST**

Resets the analyzer to its default values, (see Appendix D of the *Function Reference* for information on the default values), stops sweeping and taking data, and resets the HP Instrument BASIC (option 1C2 only). (No query)

## ■ Example

```
OUTPUT 717;"*RST"
```

**\*SRE**  $\square$  *<numeric>*

Sets the enable bits of the Status Byte Register.

Parameter	Description
<i>&lt;numeric&gt;</i>	0 to 255 (decimal expression of enable bits of the status byte register)

## ■ Query Response

```
{numeric} <new line><END>
```

## ■ Example

```
OUTPUT 717;"*SRE 1"
OUTPUT 717;"*SRE?"
ENTER 717;A
```

**\*STB?**

Reads the Status Byte Register by reading the master summary status bit. (Query only)

## ■ Query Response

```
{numeric} <new line><END>
```

## ■ Example

```
OUTPUT 717;"*STB?"
ENTER 717;A
```

**\*TRG**

Triggers the analyzer when the trigger mode is set to BUS trigger. (No query)

## ■ Example

```
OUTPUT 717;"*TRG"
```

**\*TRG**

**\*TST?**

Executes an internal self-test and returns the test result. (Query only)

■ Query Response

{*numeric*} <new line><^END>

Parameter	Description
0	Pass
1	Fail

■ Example

```
OUTPUT 717;"*TST?"  
ENTER 717;A
```

**\*WAI**

Makes the analyzer wait until all previously sent commands are completed. (No query)

■ Example

```
OUTPUT 717;"*WAI"
```

---

## SCPI Commands With No Equivalent Simple Command

### :CALCulate:MATH1[:EXPRession]:CATalog?

Returns the available parameters that can be used with the :CALCulate:MATH1[:EXPRession]:NAME command. (Query only)

■ Query Response

“OFF,YREF,YTRA,ZREF,ZTRA,INVS,MP4,MP8,MP16” <new line><END>

■ Example

```
OUTPUT 717;":CALC:MATH1:CAT?"
ENTER 717;A$
```

### :CALCulate:MATH2[:EXPRession]:CATalog?

Returns the available parameters that can be used with the :CALCulate:MATH2[:EXPRession]:NAME command. (Query only)

■ Query Response

“ADD,SUB,DIV,OFF” <new line><END>

■ Example

```
OUTPUT 717;":CALC:MATH2:CAT?"
ENTER 717;A$
```

### :CALCulate:PATH?

Returns the order in which CALCulate subsystems are to be performed.

■ Query Response

“MATH1,FORM,AVER,MATH2,LIM” <new line><END>

■ Example

```
OUTPUT 717;":CALC:PATH?"
ENTER 717;A$
```

## :PROG:CATalog?

Returns all the defined program names. The program name is always "PROG", because the analyzer's HP Instrument BASIC only executes a single program at a time. This command can be used from an external controller only. (Query only)

### ■ Query Response

```
{"PROG"} <new line><END>
```

### ■ Example

```
OUTPUT 717;":PROG:CAT?"  
ENTER 717;A$
```

## :PROGRAM[:SElected]:DEFine□<block>

Creates and downloads programs. The DEFine query uploads programs. This command can be used from an external controller only.

Parameter	Description
<block>	program

The <block> must be arbitrary block program data containing the lines of program code. The first line of <block> must be a header, which shows the program size. There are two formats for the header as follows:

- #0            Allows the OUTPUT statement to send program line until END is specified in the OUTPUT statement.
- #NMM... M    Specifies the program size.
  - N specifies the number of digits that define the program size
  - M... M is program size in byte (N digits)

Each line of the program must be separated by <CR> or <CR> <LF>. When the size of the <block> exceeds the amount of available memory in the instrument, the program lines are saved up to the point of memory overflow.

In the response to the DEFine query, the selected program and its size are returned. The selected program must be in either the paused or stopped state for the program to be uploaded. The <block> is uploaded as definite length arbitrary block response data. The program size is returned in the first line as the header, then program lines are returned.

**:PROG**[:SELEcted]:NAME□<string>

■ Example

```

OUTPUT 717;":PROG:DEF #0"
OUTPUT 717;":10 PRINT ""HELLO!""
OUTPUT 717;":20 END"
OUTPUT 717;":",END

DIM A$[100000]
OUTPUT 717;":PROG:DEF?"
ENTER 717 USING "%,2A";HEAD$ ! Gets the header.
B=VAL(HEAD$[2]) !
FOR I=1 TO B !
  ENTER 717 USING "%,A";HEAD$ !
NEXT I !
ENTER 717 USING "-K";A$ ! Gets the program.

```

**:PROG**[:SELEcted]:DELEte[:SELEcted]

Deletes the program in the BASIC editor of the analyzer. This command can be used from an external controller only. (No query)

■ Example

```
OUTPUT 717;":PROG:DEL"
```

**:PROG**[:SELEcted]:DELEte:ALL

Deletes the program in the BASIC editor of the analyzer. This command can be used from an external controller only. (No query)

■ Example

```
OUTPUT 717;":PROG:DEL:ALL"
```

**:PROG**[:SELEcted]:EXECute□<string>

Executes the program command. The program must be in either paused or stopped before the EXECute command is allowed. This command can be used from an external controller only. (No query)

Parameter	Description
<string>	Legal program command

■ Example

```
OUTPUT 717;":PROG:EXEC ""STEP"""
```

**:PROG**[:SELEcted]:MALLocate□{<numeric>|DEFault}

Performs no function in the analyzer's HP Instrument BASIC. This command can be used from an external controller only.

**:PROG**[:SELEcted]:NAME□<string>

Performs no function in the analyzer's HP Instrument BASIC. This command can be used from an external controller only.

**:PROG**[:SElected]:NAME␣<string>

**:PROG**[:SElected]:NUMBER␣<string>, <numeric 1>[, <numeric 2> [, ...  
[, <numeric n>]

Sets or queries the contents of numeric program variables and arrays in the program on the BASIC editor of the analyzer. This command can be used from an external controller only.

Parameter	Description
<string>	Name of an existing variable in the selected program (either character data or string data)
<numeric>	Variable value

■ Query Response

{<numeric 1>} [{<numeric 2>} [ ... [{<numeric n>}] ... ]] <new line><^END>

(n is the number of the array.)

■ Example

```
OUTPUT 717;":PROG:NUMB A,1"
```

```
OUTPUT 717;":PROG:NUMB? A"
```

```
ENTER 717;B
```

**:PROG**[:SElected]:STATe␣{RUN|PAUSE|STOP|CONTinue}

Sets or queries the state of the program in the BASIC editor of the analyzer. The table below defines the affect of setting the state to the specified state from each of the possible current states. This command can be used from an external controller only.

Desired State	Current State		
	RUN	PAUSE	STOP
RUN	error (-221)	RUN	RUN
CONT	error (-221)	RUN	error (-221)
PAUSE	PAUSE	PAUSE	STOP
STOP	STOP	STOP	STOP

■ Query Response

{"RUN"|"PAUS"|"STOP"|"CONT"} <new line><^END>

■ Example

```
OUTPUT 717;":PROG:STAT ""STOP""
```

```
OUTPUT 717;":PROG:STAT?"
```

```
ENTER 717;A$
```

**:PROGram[:SELEcted]:STRing**  $\square$  *<string (varname)>*, *<string (value 1)>* [, *<string (value 2)>* [, ... [, *<string (value n)>* ]]

Sets or queries the contents of string program variables and arrays in the program in the BASIC editor of the analyzer. If a string value is too long it is truncated when stored in the program's variable. This command can be used from an external controller only.

Parameter	Description
<i>&lt;string (varname)&gt;</i>	Name of an existing variable in the selected program (either character data or string data).
<i>&lt;string (value)&gt;</i>	Variable value

■ Query Response

*{string 1}* [*{string 2}* [ ... [*{string n}* ... ] ] *<new line><END>*

(n is the number of the array.)

■ Example

```
OUTPUT 717;":PROG:STR A, ""HELLO""
```

```
OUTPUT 717;":PROG:STR? A"
```

```
ENTER 717;B$
```

**:PROGram[:SELEcted]:WAIT**

Causes no further commands or queries to be executed until the defined program exits from the RUN state. That is, the program is either stopped or paused. This command can be used from an external controller only.

■ Query Response

*{1}* *<new line><END>*

1 is returned when the program is either stopped or paused.

■ Example

```
OUTPUT 717;":PROG:WAIT"
```

```
OUTPUT 717;":PROG:WAIT?"
```

```
ENTER 717;A
```

**Note**



The following commands under the EXPLicit node perform the specified functions in the same manner as the corresponding commands under the SELEcted node. The EXPLicit commands are included in the analyzer's HP-IB commands to maintain compatibility with other SCPI instruments. Therefore, you can use either the EXPLicit or the SELEcted commands for the analyzer. However, you should select one set and use it consistently to avoid confusion.

**:PROGRAM:EXPLICIT:DEFINE** **"PROG"**, <block>

See ":PROGRAM[:SELETED]:DEFINE **"PROG"**, <block>".

**:PROGRAM:EXPLICIT:DELETE** **"PROG"**

See ":PROGRAM[:SELETED]:DELETE[:SELETED]".

**:PROGRAM:EXPLICIT:EXECUTE** **"PROG"**, <string>

See ":PROGRAM[:SELETED]:EXECUTE **"PROG"**, <string>".

**:PROGRAM:EXPLICIT:MALLOCATE** **"PROG"**, {<numeric> | **DEFAULT**}

See ":PROGRAM[:SELETED]:MALLOCATE {<numeric> | **DEFAULT**}".

**:PROGRAM:EXPLICIT:NAME** **"PROG"**, <string>

See ":PROGRAM[:SELETED]:NAME **"PROG"**, <string>".

**:PROGRAM:EXPLICIT:NUMBER** **"PROG"**, <varname>, <numeric 1>  
[, <numeric 2> [, ... [, <numeric n>] ... ]]

See ":PROGRAM[:SELETED]:NUMBER **"PROG"**, <varname>, <numeric 1>[, <numeric 2> [, ... [, <numeric n>] ... ]".

**:PROGRAM:EXPLICIT:STATE** **"PROG"**, {**RUN** | **PAUSE** | **STOP** | **CONTINUE**}

See ":PROGRAM[:SELETED]:STATE {**RUN** | **PAUSE** | **STOP** | **CONTINUE**}".

**:PROGRAM:EXPLICIT:STRING** **"PROG"**, <varname>, <string 1>[, <string 2>  
[, ... [, <string n>] ... ]]

See ":PROGRAM[:SELETED]:STRING **"PROG"**, <varname>, <string (value 1)>[, <string (value 2)>  
[, ... [, <string (value n)>] ... ]".

**:PROGRAM:EXPLICIT:WAIT** **"PROG"**

See ":PROGRAM[:SELETED]:WAIT **"PROG"**".

**:SYSTem:VERSion?****:STATus:PRESet**

Clears the Operational and Questionable Status Register groups. Both event and enable registers are cleared. (No query)

## ■ Example

```
OUTPUT 717;":STAT:PRES"
```

**:STATus:QUEStionable:CONDition?**

Returns the contents of the condition register of the Questionable Register group. (Query only)  
The analyzer has no operation that reports an event to the questionable register.

**:STATus:QUEStionable:ENABle**  <numeric>

Sets or queries the enable register of the questionable register group.

The analyzer has no operation that reports an event to the questionable register.

**:STATus:QUEStionable[:EVENT]?**

Returns the contents of the event register of the Questionable register group. (Query only)  
The analyzer has no operation that reports an event to the questionable register.

**:SYSTem:VERSion?**

Returns the value corresponding to the SCPI version to which the instrument complies. (Query only)

## ■ Query Response

```
{YYYY.V} <new line><END>
```

Parameter	Description
YYYY	Year-version
V	Revision number for the year

## ■ Example

```
OUTPUT 717;":SYST:VERS?"
ENTER 717;A$
```

---

## Service Related Commands

---

**Note** See the *Service Manual* for more information about each function.



---

### **:DIAG:EReference:STATe?**

Tells whether an external frequency reference signal is connected to the rear-panel EXT REF INPUT connector. (Query only)

■ Query Response

{0|1} <new line><END>

Parameter	Description
0	The external reference is not connected.
1	The external reference is connected.

■ Example

```
OUTPUT 717;":DIAG:EREF:STAT?"  
ENTER 717;A
```

### **:DIAG:FREVision?**

Returns the current firmware revision information. (**FIRMWARE REVISION** under **System**); Query only)

■ Query Response

"HP 4396B REVN.NN MON DD YEAR HH:MM:SS" <new line><END>

Parameter	Description
N.NN	Revision number
MON	Implementation date (month)
DD	Implementation date (date)
YEAR	Implementation date (year)
HH	Implementation time (hour)
MM	Implementation time (minute)
SS	Implementation time (second)

■ Example

```
OUTPUT 717;":DIAG:FREV?"  
ENTER 717;A$
```

**:DIAG:SERVice:BUS:DC** $\square$ *<numeric>*

### **:DIAG:INIT:RESult?**

Returns the result of the power on test. (Query only)

- Query Response

{PASS|FAIL} <new line><END>

- Example

```
OUTPUT 717;":DIAG:INIT:RES?"
ENTER 717;A$
```

### **:DIAG:SERVice:BUS:AZERo** $\square$ {OFF|ON|0|1}

Sets the Auto Zero Switch of the Bus Measurement. (AZ SWITCH ON off under **System**)

- Query Response

{0|1} <new line><END>

- Example

```
OUTPUT 717;":DIAG:SERV:BUS:AZER ON"
OUTPUT 717;":DIAG:SERV:BUS:AZER?"
ENTER 717;A
```

### **:DIAG:SERVice:BUS:DC** $\square$ *<numeric>*

Selects the DC Bus Nodes of the Bus Measurement. (DC BUS [ ] under **System**)

Parameter	Description
<i>&lt;numeric&gt;</i>	0 to 26

- Query Response

{numeric} <new line><END>

- Example

```
OUTPUT 717;":DIAG:SERV:BUS:DC 0"
OUTPUT 717;":DIAG:SERV:BUS:DC?"
ENTER 717;A
```

**:DIAG:SERVice:BUS:DC**  <numeric>

**:DIAG:SERVice:BUS:FREQ**  <numeric>

Selects the Frequency Bus Nodes of the Bus Measurement. (**FREQ BUS** [ ] under **System**)

Parameter	Description
<numeric>	0 to 7

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:BUS:FREQ 0"
OUTPUT 717;":DIAG:SERV:BUS:FREQ?"
ENTER 717;A
```

**:DIAG:SERVice:BUS:STATe**  {OFF|ON|0|1}

Sets the Bus Measurement ON or OFF. (**BUS MEAS ON off** under **System**)

Parameter	Description
OFF or 0	Bus measurement OFF
ON or 1	Bus measurement ON

■ Query Response

{0|1} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:BUS:STAT ON"
OUTPUT 717;":DIAG:SERV:BUS:STAT?"
ENTER 717;A
```

**:DIAG:SERVice:BUS:WAIT**  <numeric>

Waits starting the Bus Measurement for the specified count. (**WAIT COUNT** under **System**)

Parameter	Description
<numeric>	2 to 32767

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:BUS:WAIT 2"
OUTPUT 717;":DIAG:SERV:BUS:WAIT?"
ENTER 717;A
```

**:DIAG:SERVice:CCONstant:SOURce**{OFF|ON|0|1}

**:DIAG:SERVice:CCONstant:FRESponse**{OFF|ON|0|1}

Sets the correction constants of the Frequency Response ON or OFF. (FRQ RSP CC ON off under **System**)

Parameter	Description
OFF or 0	Frequency response correction constant OFF
ON or 1	Frequency response correction constant ON

■ Query Response

{0|1} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:CCON:FRES ON"
OUTPUT 717;":DIAG:SERV:CCON:FRES?"
ENTER 717;A
```

**:DIAG:SERVice:CCONstant:IFGain**{OFF|ON|0|1}

Sets the correction constant of the IF Gain Error ON or OFF. (IF GAIN CC ON off under **System**)

Parameter	Description
OFF or 0	IF gain error correction constant OFF
ON or 1	IF gain error correction constant ON

■ Query Response

{0|1} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:CCON:IFG ON"
OUTPUT 717;":DIAG:SERV:CCON:IFG?"
ENTER 717;A
```

**:DIAG:SERVice:CCONstant:SOURce**{OFF|ON|0|1}

Sets the correction constant of the RF Output Level ON or OFF. (SOURCE CC ON off under **System**)

Parameter	Description
OFF or 0	RF output level correction constant OFF
ON or 1	RF output level correction constant ON

**:DIAG:SERVice:CCONstant:SOURce**{OFF|ON|0|1}

■ Query Response

{0|1} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:CCON:SOUR ON"
OUTPUT 717;":DIAG:SERV:CCON:SOUR?"
ENTER 717;A
```

**:DIAG:SERVice:CCONstant:XTAL**{OFF|ON|0|1}

Sets the correction constant of the Crystal Filter ON or OFF. (XTAL CC ON off under System)

Parameter	Description
OFF or 0	Crystal filter correction constant OFF
ON or 1	Crystal filter correction constant ON

■ Query Response

{0|1} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:CCON:XTAL ON"
OUTPUT 717;":DIAG:SERV:CCON:XTAL?"
ENTER 717;A
```

**:DIAG:SERVice:IF:ADMX:MODE**{AUTO|ALternate|DEG0|DEG90}

Sets the A/D Multiplexer of the A6 Receiver IF. (A/D MUX [ ] under System)

Parameter	Description
AUTO	Automatic
ALternate	Alternate
DEG0	0 °
DEG90	90 °

■ Query Response

{AUTO|ALT|DEG0|DEG90} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:ADMX:MODE AUTO"
OUTPUT 717;":DIAG:SERV:IF:ADMX:MODE?"
ENTER 717;A$
```

**:DIAG:SERVice:IF:GAIN:W**{AUTO|DB0|DB10}

**:DIAG:SERVice:IF:BPFilter:MODE**{AUTO|BW3M|BW1M|XTAL}

Sets the IF Band Pass Filter of the A6 Receiver IF. (IF BPF under **System**)

Parameter	Description
AUTO	Automatic
BW3M	3 MHz
BW1M	1 MHz
XTAL	Crystal

■ Query Response

{AUTO|BW3M|BW1M|XTAL} <new line><^END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:BPFilter:MODE AUTO"
OUTPUT 717;":DIAG:SERV:IF:BPFilter:MODE?"
ENTER 717;A$
```

**:DIAG:SERVice:IF:GAIN:MODE**{AUTO|MANual}

Sets the IF Gain mode of the A6 Receiver IF to Auto or Manual. Setting this mode to Manual enables setting the Gain W, Gain X, Gain Y, and Gain Z values. (IF GAIN AUTO man under **System**)

■ Query Response

{AUTO|MAN} <new line><^END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:GAIN:MODE AUTO"
OUTPUT 717;":DIAG:SERV:IF:GAIN:MODE?"
ENTER 717;A$
```

**:DIAG:SERVice:IF:GAIN:W**{AUTO|DB0|DB10}

Sets Gain W of the A6 Receiver IF. (GAIN W [ ] under **System**)

Parameter	Description
AUTO	Automatic
DB0	0 dB
DB10	10 dB

■ Query Response

{AUTO|DB0|DB10} <new line><^END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:GAIN:W AUTO"
OUTPUT 717;":DIAG:SERV:IF:GAIN:W?"
ENTER 717;A$
```

**:DIAG:SERVice:IF:GAIN:W**{AUTO|DB0|DB10}

**:DIAG:SERVice:IF:GAIN:X**{AUTO|DB0|DB18}

Sets Gain X of the A6 Receiver IF. (**GAIN X [ ]** under **System**)

Parameter	Description
AUTO	Automatic
DB0	0 dB
DB18	18 dB

■ Query Response

{AUTO|DB0|DB18} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:GAIN:X AUTO"  
OUTPUT 717;":DIAG:SERV:IF:GAIN:X?"  
ENTER 717;A$
```

**:DIAG:SERVice:IF:GAIN:Y**{AUTO|DB0|DB6|DB12|DB18}

Sets Gain Y of the A6 Receiver IF. (**GAIN Y [ ]** under **System**)

Parameter	Description
AUTO	Automatic
DB0	0 dB
DB6	6 dB
DB12	12 dB
DB18	18 dB

■ Query Response

{AUTO|DB0|DB6|DB12|DB18} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:GAIN:Y AUTO"  
OUTPUT 717;":DIAG:SERV:IF:GAIN:Y?"  
ENTER 717;A$
```

**:DIAG:SERVice:IF:LPFilter:MODE** { AUTO|BW5K|BW15K|BW50K| BW150K|THRough}

**:DIAG:SERVice:IF:GAIN:Z** { AUTO|DB0|DB2|DB4|DB18}

Sets Gain Z of the A6 Receiver IF. (**GAIN Z [ ]** under **System**)

Parameter	Description
AUTO	Automatic
DB0	0 dB
DB2	2 dB
DB4	4 dB
DB18	18 dB

■ Query Response

{AUTO|DB0|DB2|DB4|DB18} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:GAIN:Z AUTO"  
OUTPUT 717;":DIAG:SERV:IF:GAIN:Z?"  
ENTER 717;A$
```

**:DIAG:SERVice:IF:LPFilter:MODE** { AUTO|BW5K|BW15K|BW50K|  
**BW150K|THRough**}

Sets the IF Low Pass Filter of the A6 Receiver IF. (**IF LPF [ ]** under **System**)

Parameter	Description
AUTO	Automatic
BW5K	5 kHz
BW15K	15 kHz
BW50K	50 kHz
BW150K	150 kHz
THRough	Through

■ Query Response

{AUTO|BW5K|BW15K|BW50K|BW150K|THR} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:LPF:MODE AUTO"  
OUTPUT 717;":DIAG:SERV:IF:LPF:MODE?"  
ENTER 717;A$
```

**:DIAG:SERVice:IF:LPFILTER:MODE** {**AUTO|BW5K|BW15K|BW50K|BW150K|THROUGH**}

**:DIAG:SERVice:IF:RANGE:F** {**HIGH|LOW**}

Sets Range F of the A6 Receiver IF. (**RANGE F: HIGH, LOW** under **System**)

■ Query Response

{**HIGH|LOW**} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:RANG:F HIGH"
OUTPUT 717;":DIAG:SERV:IF:RANG:F?"
ENTER 717;A$
```

**:DIAG:SERVice:IF:RANGE:MODE** {**AUTO|MANual**}

Sets the Range mode of the A6 Receiver IF to Auto or Manual. Setting this mode to Manual enables setting Range F and Range R. (**IF RANGE AUTO man** under **System**)

■ Query Response

{**AUTO|MAN**} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:RANG:MODE AUTO"
OUTPUT 717;":DIAG:SERV:IF:RANG:MODE?"
ENTER 717;A$
```

**:DIAG:SERVice:IF:RANGE:R** {**HIGH|LOW**}

Sets Range R of the A6 Receiver IF. (**RANGE R: HIGH, LOW** under **System**)

■ Query Response

{**HIGH|LOW**} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:RANG:R HIGH"
OUTPUT 717;":DIAG:SERV:IF:RANG:R?"
ENTER 717;A
```

**:DIAG:SERVice:IF:SHBW:MODE** {**AUTO|NARRow|MIDDLE|WIDE**}

Sets the Sample and Hold of the A6 Receiver IF. (**S/H BW [ ]** under **System**)

■ Query Response

{**AUTO|NARR|MIDD|WIDE**} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:SHBW:MODE AUTO"
OUTPUT 717;":DIAG:SERV:IF:SHBW:MODE?"
ENTER 717;A$
```

**:DIAG:SERVice:SOURce:ALCLoop□{OPEN|CLOSe}**

**:DIAG:SERVice:IF:TLOCa1:MODE□{AUTO|AC|DC}**

Sets the 3rd Local Oscillator of the A6 Receiver IF. (S/H BW [ ] under **System**)

■ Query Response

{AUTO|AC|DC} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:TLOC:MODE AUTO"
OUTPUT 717;":DIAG:SERV:IF:TLOC:MODE?"
ENTER 717;A$
```

**:DIAG:SERVice:MODE□{ON|1}**

Activates the service mode. (**SERVICE MODE** under **System**)

■ Query Response

{0|1} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:MODE ON"
OUTPUT 717;":DIAG:SERV:MODE?"
ENTER 717;A
```

**:DIAG:SERVice:SOURce:ALCLoop□{OPEN|CLOSe}**

Sets the ALC Loop of the A3A2 ALC. (**ALC LOOP ON off** under **System**)

■ Query Response

{OPEN|CLOS}

■ Example

```
OUTPUT 717;":DIAG:SERV:SOUR:ALCL OPEN"
OUTPUT 717;":DIAG:SERV:SOUR:ALCL?"
ENTER 717;A
```

**:DIAG:SERVice:SOURce:ALCLoop** {OPEN|CLOSe}

**:DIAG:SERVice:SOURce:ATTenuator** {AUTO|DB0|DB10|DB20|DB30|DB40|DB50|DB60}

Sets the Output Attenuator of the A3A2 ALC. (OUTPUT ATT under **System**)

Parameter	Description
AUTO	Automatic
DB0	0 dB
DB10	10 dB
DB20	20 dB
DB30	30 dB
DB40	40 dB
DB50	50 dB
DB60	60 dB

■ Query Response

{AUTO|DB0|DB10|DB20|DB30|DB40|DB50|DB60} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SOUR:ATT AUTO"  
OUTPUT 717;":DIAG:SERV:SOUR:ATT?"  
ENTER 717;A$
```

**:DIAG:SERVice:SOURce:GAIN:DAC:MODE** {AUTO|MANual}

Sets the Gain DAC mode of the A3A2 ALC to Auto or Manual. Setting this mode to Manual enables setting Gain DAC value. (GAIN DAC AUTO man under **System**)

■ Query Response

{AUTO|MAN} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SOUR:GAIN:DAC:MODE AUTO"  
OUTPUT 717;":DIAG:SERV:SOUR:GAIN:DAC:MODE?"  
ENTER 717;A$
```

**:DIAG:SERVice:SOURce:LEVel:DAC:VALue**□<numeric>

**:DIAG:SERVice:SOURce:GAIN:DAC:VALue**□<numeric>

Sets the Gain DAC value of the A3A2 ALC. (**GAIN DAC VALUE** under **System**)

Parameter	Description
<numeric>	0 to 15

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SOUR:GAIN:DAC:VAL 0"
```

```
OUTPUT 717;":DIAG:SERV:SOUR:GAIN:DAC:VAL?"
```

```
ENTER 717;A
```

**:DIAG:SERVice:SOURce:LEVel:DAC:MODE**□{**AUTO**|**MANual**}

Sets the Level DAC mode of the A3A2 ALC to Auto or Manual. Setting this mode to Manual enables setting the Level DAC value. (**LVL DAC AUTO man** under **System**)

■ Query Response

{**AUTO**|**MAN**}

■ Example

```
OUTPUT 717;":DIAG:SERV:SOUR:LEV:DAC:MODE AUTO"
```

```
OUTPUT 717;":DIAG:SERV:SOUR:LEV:DAC:MODE?"
```

```
ENTER 717;A$
```

**:DIAG:SERVice:SOURce:LEVel:DAC:VALue**□<numeric>

Sets the Level DAC value of the A3A2 ALC. (**LVL DAC VALUE** under **System**)

Parameter	Description
<numeric>	0 to 4095

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SOUR:LEV:DAC:VAL 0"
```

```
OUTPUT 717;":DIAG:SERV:SOUR:LEV:DAC:VAL?"
```

```
ENTER 717;A
```

**:DIAG:SERVice:SOURce:LEVel:DAC:VALue**  <numeric>

**:DIAG:SERVice:SOURce:MODE**  {AUTO|MANual}

Sets the Source mode of the A3A2 ALC to Auto or Manual. Setting this mode to Manual enables setting the ALC Loop, Output attenuator, Level DAC, and Gain DAC.

(SOURCE AUTO man under  System)

■ Query Response

{AUTO|MANual} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SOUR:MODE AUTO"
```

```
OUTPUT 717;":DIAG:SERV:SOUR:MODE?"
```

```
ENTER 717;A$
```

**:DIAG:SERVice:SYNThesizer:FLOCAl:MODE**  {AUTO|SINGle|TRIPle}

Sets the 1st Local Oscillator of the A5 Synthesizer. (1st LO OSC [ ] under  System)

■ Query Response

{AUTO|SING|TRIP} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:FLOC:MODE AUTO"
```

```
OUTPUT 717;":DIAG:SERV:SYNT:FLOC:MODE?"
```

```
ENTER 717;A$
```

**:DIAG:SERVice:SYNThesizer:FN:MODE**  {AUTO|NARRow|WIDE}

Sets the Fractional N Oscillator of the A5 Synthesizer. (FN OSC [ ] under  System)

■ Query Response

{AUTO|NARR|WIDE} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:FN:MODE AUTO"
```

```
OUTPUT 717;":DIAG:SERV:SYNT:FN:MODE?"
```

```
ENTER 717;A$
```

**:DIAG:SERVice:SYNThesizer:STEP:DAC:VALue**□<numeric>

**:DIAG:SERVice:SYNThesizer:FREQUency:OFFSet**□<numeric>

Sets the Frequency Offset of the A5 Synthesizer. (Network analyzer only) (**FREQUENCY OFFSET** under **(System)**)

Parameter	Description
<numeric>	-8×10 <sup>9</sup> (= -8 G) to 8×10 <sup>9</sup> (= 8 G) Hz

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:FREQ:OFFS 0"
OUTPUT 717;":DIAG:SERV:SYNT:FREQ:OFFS?"
ENTER 717;A
```

**:DIAG:SERVice:SYNThesizer:STEP:DAC:MODE**□{AUTO|MANual}

Sets the Step DAC mode of the A5 Synthesizer to Auto or Manual. Setting this mode to Manual enables setting the Step DAC value. (**STEP DAC** under **(System)**)

■ Query Response

{AUTO|MANual} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:STEP:DAC:MODE AUTO"
OUTPUT 717;":DIAG:SERV:SYNT:STEP:DAC:MODE?"
ENTER 717;A$
```

**:DIAG:SERVice:SYNThesizer:STEP:DAC:VALue**□<numeric>

Sets the Step DAC value of the A5 Synthesizer. (**DAC VALUE** under **(System)**)

Parameter	Description
<numeric>	0 to 4095

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:STEP:DAC:VAL 0"
OUTPUT 717;":DIAG:SERV:SYNT:STEP:DAC:VAL?"
ENTER 717;A$
```

**:DIAG:SERVice:SYNThesizer:STEP:DAC:VALue**□<numeric>

**:DIAG:SERVice:SYNThesizer:STEP:LOOP**□{OPEN|CLOSE}

Sets the Step Oscillator Loop of the A5 Synthesizer. (LOOP open close under System)

■ Query Response

{OPEN|CLOS} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:STEP:LOOP OPEN"  
OUTPUT 717;":DIAG:SERV:SYNT:STEP:LOOP?"  
ENTER 717;A$
```

**:DIAG:SERVice:SYNThesizer:STEP:MODE**□{AUTO|MANual}

Sets the Step Oscillator mode of the A5 Synthesizer to Auto or Manual. Setting this mode to Manual enables setting the Oscillator Output, Loop, Polarity, and Step DAC.

(STEP OSC AUTO man under System)

■ Query Response

{AUTO|MAN} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:STEP:MODE AUTO"  
OUTPUT 717;":DIAG:SERV:SYNT:STEP:MODE?"  
ENTER 717;A$
```

**:DIAG:SERVice:SYNThesizer:STEP:OUTPut**□{OFF|ON|0|1}

Sets the Step Oscillator Output ON or OFF of the A5 Synthesizer. (OSC OUT ON off under System)

■ Query Response

{0|1} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:STEP:OUTP ON"  
OUTPUT 717;":DIAG:SERV:SYNT:STEP:OUTP?"  
ENTER 717;A
```

**:DIAG:SERVice:SYNThesizer:STEP:POLarity**□{AUTO|POSitive|NEGative}

Sets the Step Oscillator Polarity of the A5 Synthesizer. (POLARITY [ ] under System)

■ Query Response

{AUTO|POS|NEG} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:STEP:POL AUTO"  
OUTPUT 717;":DIAG:SERV:SYNT:STEP:POL?"  
ENTER 717;A$
```

**:DIAG:TEST** *<numeric>*

Selects the diagnostic tests. (TESTS, INTERNAL TESTS, EXTERNAL TESTS, ADJUSTMENT TESTS, DISPLAY TESTS, ALL EXT TESTS under System; No query)

Parameter	Description
0	First internal test (ALL INT).
17	First external test (FRONT PANEL DIAG).
41	First adjustment test (DC OFFST/HLD STEP).
48	First display test (TEST PATTERN 1).
53	First ALL EXT test (ALL EXT 1).
58	Miscellaneous test (IMPEDANCE TEST KIT).

■ Example

OUTPUT 717;":DIAG:TEST 0"

**:DIAG:TEST:CONTInue**

Continues the diagnostic test when the test is paused for user interaction. (CONTINUE under System; No query)

■ Example

OUTPUT 717;":DIAG:TEST:CONT"

**:DIAG:TEST:EXECute**

Runs the selected diagnostic tests. (EXECUTE TEST under System; No query)

■ Example

OUTPUT 717;":DIAG:TEST:EXEC"

**:DIAG:TEST:EXECute**

**:DIAG:TEST:RESult?** [ ] <numeric>

Returns the diagnostic test result. (Query only)

Parameter	Description
<numeric>	Test number; 0 to 67

■ Query Response

{ "PASS" | "FAIL" | "BUSY" | "NDON" | "DONE" } <new line> <END>

Parameter	Description
"PASS"	Pass
"FAIL"	Fail
"BUSY"	In progress
"NDON"	Not done
"DONE"	DONE

■ Example

```
OUTPUT 717;":DIAG:TEST:RES? 0"  
ENTER 717;A$
```

## Manual Changes

---

### Introduction

This appendix contains the information required to adapt this manual to earlier versions or configurations of the analyzer than the current printing date of this manual. The information in this manual applies directly to the HP 4396B Network/Spectrum/Impedance Analyzer serial number prefix listed on the title page of this manual.

### Manual Changes

To adapt this manual to your HP 4396B, see Table A-1 and Table A-2, and make all the manual changes listed opposite your instrument's serial number and firmware version.

Instruments manufactured after the printing of this manual may be different from those documented in this manual. Later instrument versions will be documented in a manual changes supplement that will accompany the manual shipped with that instrument. If your instrument's serial number is not listed on the title page of this manual or in Table A-1, it may be documented in a *yellow MANUAL CHANGES* supplement.

In additions to change information, the supplement may contain information for correcting errors (Errata) in the manual. To keep this manual as current and accurate as possible, Hewlett-Packard recommends that you periodically request the latest *MANUAL CHANGES* supplement.

For information concerning serial number prefixes not listed on the title page or in the *MANUAL CHANGE* supplement, contact the nearest Hewlett-Packard office.

Turn on the line switch or execute the \*IDN? command by HP-IB to confirm the firmware version. See the "\*IDN?" in Chapter 2 for information on the \*IDN? command.

**Table A-1. Manual Changes by Serial Number**

Serial Prefix or Number	Make Manual Changes
JPIKE	

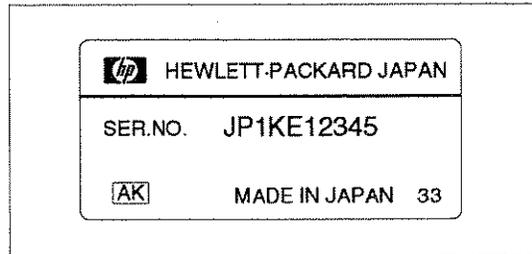
**Table A-2. Manual Changes by Firmware Version**

Version	Make Manual Changes
1.00	Change 1

---

## Serial Number

Hewlett-Packard uses a two-part, nine-character serial number that is stamped on the serial number plate (see Figure A-1) attached to the rear panel. The first four digits and the letter are the serial prefix and the last five digits are the suffix.



**Figure A-1. Serial Number Plate**

---

## Change 1

Delete the command of "SAVDSTAC".

## Command Summary

---

This appendix summarizes the HP-IB commands (and SCPI commands) according to the equivalent front panel keys as follows. It also summarizes the HP-IB only commands and the common commands.

- Chan 1
- Chan 2
- Meas
- Format
- Display
- Scale Ref
- Cal
- Sweep
- Source
- Trigger
- Start
- Stop
- Center
- Span
- Marker
- Marker→
- Search
- Utility
- System
- Local
- Copy
- Save
- Recall
- Preset
- HP-IB Only Commands

Front Panel Key	Simple Command	Equivalent SCPI Command
Chan 1	CHAN1	INSTRUMENT[:SELECT] CH2 or INSTRUMENT:NSELECT 2 INSTRUMENT:STATE OFF INSTRUMENT[:SELECT] CH1 or INSTRUMENT:NSELECT 1 INSTRUMENT:STATE ON
Chan 2	CHAN2	INSTRUMENT[:SELECT] CH1 or INSTRUMENT:NSELECT 1 INSTRUMENT:STATE OFF INSTRUMENT[:SELECT] CH2 or INSTRUMENT:NSELECT 2 INSTRUMENT:STATE ON
Meas Network Analyzer NETWORK: A/R B/R R A B CONVERSION [OFF] → See Conversion menu S-PARAMETERS → See S-parameters menu ANALYZER TYPE → See Analyzer type menu	MEAS AR MEAS BR MEAS R MEAS A MEAS B	SENSE:FUNCTION "POWER:RATIo 3,2" SENSE:FUNCTION "POWER:RATIo 4,2" SENSE:FUNCTION "POWER 2" SENSE:FUNCTION "POWER 3" SENSE:FUNCTION "POWER 4"
S-parameters menu Ref: FWD S11 [A/R] Trans:FWD S21 [B/R] Trans:REV S12 [A/R] Ref: REV S22 [B/R] CONVERSION [OFF] → See Conversion menu INPUT PORTS → See Network input port menu ANALYZER TYPE → See Analyzer type menu	MEAS S11 MEAS S21 MEAS S12 MEAS S22	SENSE:FUNCTION "POWER:S11" SENSE:FUNCTION "POWER:S21" SENSE:FUNCTION "POWER:S12" SENSE:FUNCTION "POWER:S22"
Spectrum Analyzer SPECTRUM: S R A B DETECTION [POS] → See Detection menu ANALYZER TYPE → See Analyzer type menu	MEAS S MEAS R MEAS A MEAS B	SENSE:FUNCTION "POWER 1" SENSE:FUNCTION "POWER 2" SENSE:FUNCTION "POWER 3" SENSE:FUNCTION "POWER 4"
Impedance Analyzer IMPEDANCE:MAG(—Z—) PHASE( $\theta_z$ ) RESIST(R) REACT(X) ADMITTANCE:MAG(—Y—) PHASE( $\theta_y$ )	MEAS IMAG MEAS IPH MEAS IRE MEAS IIM MEAS AMAG MEAS APH	CALCulate:MATH1:NAME IMPedance CALCulate:FORMat MLINear CALCulate:MATH1:NAME IMPedance CALCulate:FORMat PHASe CALCulate:MATH1:NAME IMPedance CALCulate:FORMat REAL CALCulate:MATH1:NAME IMPedance CALCulate:FORMat IMAGinary CALCulate:MATH1:NAME ADMittance CALCulate:FORMat MLINear CALCulate:MATH1:NAME ADMittance CALCulate:FORMat PHASe

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>Impedance Analyzer (Continued)</b>		
<b>CONDUCT(G)</b>	MEAS ARE	CALCulate:MATH1:NAME ADMittance CALCulate:FORMat REAL
<b>SUSCEPT(B)</b>	MEAS AIM	CALCulate:MATH1:NAME ADMittance CALCulate:FORMat IMAGinary
<b>REFL_COEF:MAG(-Γ-)</b>	MEAS RCM	CALCulate:MATH1:NAME OFF CALCulate:FORMat MLINear
<b>PHASE(θ<sub>Γ</sub>)</b>	MEAS RCPH	CALCulate:MATH1:NAME OFF CALCulate:FORMat PHASE
<b>REAL(I<sub>x</sub>)</b>	MEAS RCR	CALCulate:MATH1:NAME OFF CALCulate:FORMat REAL
<b>IMAG(I<sub>y</sub>)</b>	MEAS RCIM	CALCulate:MATH1:NAME OFF CALCulate:FORMat IMAGinary
<b>CAPCITNCE:PRL(C<sub>p</sub>)</b>	MEAS CP	CALCulate:MATH1:NAME IMPedance CALCulate:FORMat CP
<b>SER(C<sub>s</sub>)</b>	MEAS CS	CALCulate:MATH1:NAME IMPedance CALCulate:FORMat CS
<b>INDUCTNCE:PRL(L<sub>p</sub>)</b>	MEAS LP	CALCulate:MATH1:NAME IMPedance CALCulate:FORMat LP
<b>SER(L<sub>s</sub>)</b>	MEAS LS	CALCulate:MATH1:NAME IMPedance CALCulate:FORMat LS
<b>RESISTNCE:PRL(R<sub>p</sub>)</b>	MEAS RP	CALCulate:MATH1:NAME IMPedance CALCulate:FORMat RP
<b>SER(R<sub>s</sub>)</b>	MEAS RS	CALCulate:MATH1:NAME IMPedance CALCulate:FORMat RS
<b>D FACTOR</b>	MEAS D	CALCulate:MATH1:NAME IMPedance CALCulate:FORMat D
<b>Q FACTOR</b>	MEAS Q	CALCulate:MATH1:NAME IMPedance CALCulate:FORMat Q
<b>FIXTURE</b>	MODIFX	SYSTem:FIXTure:MODify — See Fixture menu
<b>ANALYZER TYPE</b> — See Analyzer type menu		
<b>Analyzer type menu</b>		
<b>NETWORK ANALYZER</b>	NA	INSTrument:TYPE NA
<b>SPECTRUM ANALYZER</b>	SA	INSTrument:TYPE SA
<b>IMPEDANCE ANALYZER</b>	ZA	INSTrument:TYPE ZA
<b>Conversion menu</b>		
<b>CONVERSION OFF</b>	CONV OFF	CALCulate:MATH1[:EXPReSSion]:NAME OFF
<b>Z:Ref</b>	CONV ZREF	CALCulate:MATH1[:EXPReSSion]:NAME ZREF
<b>Z:Trans</b>	CONV ZTRA	CALCulate:MATH1[:EXPReSSion]:NAME ZTRA
<b>Y:Ref</b>	CONV YREF	CALCulate:MATH1[:EXPReSSion]:NAME YREF
<b>Y:Trans</b>	CONV YTRA	CALCulate:MATH1[:EXPReSSion]:NAME YTRA
<b>1/S</b>	CONV ONEDS	CALCulate:MATH1[:EXPReSSion]:NAME INVS
<b>MORE</b>		
<b>CONVERSION 4*PHASE</b>	CONV MP4	CALCulate:MATH1[:EXPReSSion]:NAME MP4
<b>8*PHASE</b>	CONV MP8	CALCulate:MATH1[:EXPReSSion]:NAME MP8
<b>16*PHASE</b>	CONV MP16	CALCulate:MATH1[:EXPReSSion]:NAME MP16
<b>RETURN</b>		
<b>RETURN</b>		

Front Panel Key	Simple Command	Equivalent SCPI Command
Detection menu DETECTION POS PEAK NEG PEAK SAMPLE RETURN	DET POS DET NEG DET SAM	SENSe:DETEctor[:FUNction] POSitive SENSe:DETEctor[:FUNction] NEGative SENSe:DETEctor[:FUNction] SAMPlE
Fixture Menu SELECT FIXTURE FIXTURE:NONE HP16191 HP16192 HP16193 HP16194 USER RETURN SAVE USER FXTR KIT MODIFY [NONE] DEFINE EXTENSION LABEL FIXTURE KIT DONE (MODIFIED)	FIXT NONE FIXT HP16191 FIXT HP16192 FIXT HP16193 FIXT HP16194 FIXT USED SAVUFXT MODIFX FIXE <numeric> LABEFIX <string> FIXKDONE	SYSTem:FIXTure NONE SYSTem:FIXTure HP16191 SYSTem:FIXTure HP16192 SYSTem:FIXTure HP16193 SYSTem:FIXTure HP16194 SYSTem:FIXTure UDEFined SYSTem:FIXTure:SAVE SYSTem:FIXTure:MODify SYSTem:FIXTure:DISTance <numeric> SYSTem:FIXTure:LABel <string> SYSTem:FIXTure:MODify:SAVE

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>Format</b> Network Analyzer <b>FORMAT:LOG MAG</b> <b>PHASE</b> <b>DELAY</b> <b>SMITH [Re Im]</b> <b>POLAR [Re Im]</b> <b>LIN MAG</b> <b>SWR</b> <b>MORE</b> <b>FORMAT:REAL</b> <b>IMAGINARY</b> <b>EXPANDED PHASE</b> <b>ADMITTANCE [Re Im]</b> <b>RETURN</b>	FMT LOGM FMT PHAS FMT DELA FMT SMITH FMT POLA FMT LINM FMT SWR FMT REAL FMT IMAG FMT EXPP FMT ADMIT	DISPlay[:WINDow]:TRACe:GRATICule:FORMat RECTangle CALCulate:FORMat MLOGarithmic DISPlay[:WINDow]:TRACe:GRATICule:FORMat RECTangle CALCulate:FORMat PHASe DISPlay[:WINDow]:TRACe:GRATICule:FORMat RECTangle CALCulate:FORMat GDELAy DISPlay[:WINDow]:TRACe:GRATICule:FORMat SMITH CALCulate:FORMat COMPLEX DISPlay[:WINDow]:TRACe:GRATICule:FORMat POLar CALCulate:FORMat COMPLEX DISPlay[:WINDow]:TRACe:GRATICule:FORMat RECTangle CALCulate:FORMat MLINear DISPlay[:WINDow]:TRACe:GRATICule:FORMat RECTangle CALCulate:FORMat SWR DISPlay[:WINDow]:TRACe:GRATICule:FORMat RECTangle CALCulate:FORMat REAL DISPlay[:WINDow]:TRACe:GRATICule:FORMat RECTangle CALCulate:FORMat IMAGinary DISPlay[:WINDow]:TRACe:GRATICule:FORMat RECTangle CALCulate:FORMat UPHase DISPlay[:WINDow]:TRACe:GRATICule:FORMat ADMittance CALCulate:FORMat COMPLEX
Spectrum Analyzer <b>FORMAT:SPECTRUM</b> <b>NOISE</b> <b>UNIT: dBm</b> <b>dBV</b> <b>dBuV</b> <b>WATT</b> <b>VOLT</b>	FMT SPECT FMT NOISE SAUNIT DBM SAUNIT DBV SAUNIT DBUV SAUNIT W SAUNIT V	SENSe:FUNCTION "POWer {1-4}" SENSe:FUNCTION "POWer{1-4}:PSDeNsity" CALCulate:FORMat MLOGarithmic UNIT:POWer DBM CALCulate:FORMat MLOGarithmic UNIT:POWer DBV CALCulate:FORMat MLOGarithmic UNIT:POWer DBUV CALCulate:FORMat MLINear UNIT:POWer W CALCulate:FORMat MLINear UNIT:POWer V
Impedance Analyzer <b>FORMAT: LIN Y-AXIS</b> <b>LOG Y-AXIS</b> <b>POLAR CHART</b> <b>SMITH CHART</b> <b>ADMITTANCE CHART</b> <b>COMPLEX PLANE</b> <b>PHASE UNIT [DEG]</b> <b>EXP PHASE ON off</b> <b>EXP PHASE on OFF</b>	FMT LINY FMT LOGY FMT POLA FMT SMITH FMT ADMIT FMT COMP PHAU {DEG RAD} EXPP ON EXPP OFF	DISPlay[:WINDow]:TRACe:GRATICule:FORMat RECTangle DISPlay[:WINDow]:TRACe:Y:SPACe LiNear DISPlay[:WINDow]:TRACe:GRATICule:FORMat RECTangle DISPlay[:WINDow]:TRACe:Y:SPACe LOGarithmic DISPlay[:WINDow]:TRACe:GRATICule:FORMat POLar CALCulate:FORMat COMPLEX DISPlay[:WINDow]:TRACe:GRATICule:FORMat SMITH CALCulate:FORMat COMPLEX DISPlay[:WINDow]:TRACe:GRATICule:FORMat ADMittance CALCulate:FORMat COMPLEX DISPlay[:WINDow]:TRACe:GRATICule:FORMat CPLane CALCulate:FORMat:COMPLEX CALCulate:FORMat:UNIT:ANGLE {DEG RAD} CALCulate:FORMat UPHase CALCulate:FORMat PHASe

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>Display</b>		
DUAL CHAN ON off	DUAC {ON 1}	When channel 1 is active, INSTrument[:SElect] CH2 INSTrument:STATe ON INSTrument[:SElect] CH1 INSTrument:STATe ON When channel 2 is active, INSTrument[:SElect] CH1 INSTrument:STATe ON INSTrument[:SElect] CH2 INSTrument:STATe ON
	DUAC {OFF 0}	INSTrument[:SElect] {CH1 CH2} INSTrument:STATe OFF INSTrument[:SElect] {CH1 CH2}
DISPLAY: DATA	DISP DATA	DISPlay[:WINDow]:TRACe1:STATe {ON 1} DISPlay[:WINDow]:TRACe2:STATe {OFF 0}
MEMORY	DISP MEMO	DISPlay[:WINDow]:TRACe2:STATe {ON 1} DISPlay[:WINDow]:TRACe1:STATe {OFF 0}
DATA & MEMORY	DISP DATM	DISPlay[:WINDow]:TRACe1:STATe {ON 1} DISPlay[:WINDow]:TRACe2:STATe {ON 1}
DATA→MEMORY	DATMEM	TRACe:COpy MTRace,DTRace
DATA HOLD (OFF)		
HOLD: OFF	DHOLD OFF	CALCulate:AVERAge:STATe {OFF 0}
MAX	DHOLD MAX	CALCulate:AVERAge:TYPE MAXimum CALCulate:AVERAge:STATe {ON 1}
MIN	DHOLD MIN	CALCulate:AVERAge:TYPE MINimum CALCulate:AVERAge:STATe {ON 1}
RETURN		
DATA MATH [DATA]		
DATA MATH: DATA	MATH DATA	CALCulate:MATH2[:EXPReSSion]:NAME OFF
DATA-MEM	MATH DMNM	CALCulate:MATH2[:EXPReSSion]:NAME SUB
DATA + MEM	MATH DPLM	CALCulate:MATH2[:EXPReSSion]:NAME ADD
DATA/MEM	MATH DDVM	CALCulate:MATH2[:EXPReSSion]:NAME DIV
DEFAULT GAIN & OFS	DEFGO	DATA[:DATA] GAIN,1 DATA[:DATA] OFFS,0
OFFSET		
MKR→OFFSET	MKROFS	DATA[:DATA] OFFS,MARKer
OFFSET VALUE	DATOVAL <numeric>	DATA[:DATA] OFFS,<numeric>
	DATOVAL?	DATA[:DATA]? OFFS
AUX OFFSET VALUE	DATAOVAL <numeric>	DATA[:DATA] AOFF,<numeric>
	DATAOVAL?	DATA[:DATA]? AOFF
RETURN		
GAIN	DATGAIN <numeric>	DATA[:DATA] GAIN,<numeric>
	DATGAIN?	DATA[:DATA]? GAIN
RETURN		

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>MORE</b>		
<b>SPLIT DISP ON off</b>	SPLD {ON 1} SPLD {OFF 0}	DISPlay[:WINDow]:FORMat ULowEr DISPlay[:WINDow]:FORMat FBACk
<b>DISPLAY ALLOCATION</b>		
<b>ALL INSTRUMENT</b>	DISA ALLI	DISPlay[:WINDow]:ALLocation INSTRument
<b>HALF INSTR HALF BASIC</b>	DISA HIHB	DISPlay[:WINDow]:ALLocation HIHB
<b>ALL BASIC</b>	DISA ALLB	DISPlay[:WINDow]:ALLocation BASic
<b>BASIC STATUS</b>	DISA BASS	DISPlay[:WINDow]:ALLocation BS'tatus
<b>RETURN</b>		
<b>EQUIV CKT MENU</b> → See Equivalent circuit menu		
<b>TITLE</b> → See Title menu	TTL <string>	DISPlay[:WINDow]:TEXT17[:DATA] <string>
<b>ADJUST DISPLAY</b> → See Adjust display menu		
<b>FREQUENCY BLANK</b>	FREQ	DISPlay:ANNotation:FREQuency {OFF 0} SYSTem:SECurity[:STATe] {ON 1}
<b>RETURN</b>		
<b>Equivalent Circuit Menu</b>		
<b>SELECT EQV CKT (A)</b>		
<b>CKT A</b>	EQUC CIRA	CALCulate:EVALuate:EPARameters:CIRCuit A
<b>B</b>	EQUC CIRB	CALCulate:EVALuate:EPARameters:CIRCuit B
<b>C</b>	EQUC CIRC	CALCulate:EVALuate:EPARameters:CIRCuit C
<b>D</b>	EQUC CIRD	CALCulate:EVALuate:EPARameters:CIRCuit D
<b>E</b>	EQUC CIRE	CALCulate:EVALuate:EPARameters:CIRCuit E
<b>CALCULATE EQV PARAMS</b>	CALECPARA	CALCulate:EVALuate:EPARameters DISPlay[:WINDow]:TEXT18:STATe {ON 1}
<b>SIMULATE F-CHAR</b>	SIMFCHAR	CALCulate:EVALuate:EPARameters:SIMulation
<b>RETURN</b>		
<b>DISP EQUIV PARM [OFF]</b>	DISECPARA OFF	DISPlay[:WINDow]:TEXT18:STAT {0 OFF}
<b>DISP EQUIV PARM [ON]</b>	DISECPARA ON	DISPlay[:WINDow]:TEXT18:STAT {1 ON}
<b>DEFINE EQV PARAMS</b>		
<b>PARAMETER R1</b>	DEFECR1 <numeric>	DATA[:DATA] EQR1,<numeric>
<b>C1</b>	DEFEC1 <numeric>	DATA[:DATA] EQC1,<numeric>
<b>L1</b>	DEFEL1 <numeric>	DATA[:DATA] EQL1,<numeric>
<b>CO</b>	DEFECO <numeric>	DATA[:DATA] EQC0,<numeric>
<b>SIMULATE F-CHAR</b>	SIMFCHAR	CALCulate:EVALuate:EPARameters:SIMulation
<b>RETURN</b>		
<b>CALCULATE EQV PARAMS</b>	CALECPARA	CALCulate:EVALuate:EPARameters
<b>SIMULATE F-CHAR</b>	SIMFCHAR	CALCulate:EVALuate:EPARameters:SIMulation
<b>RETURN</b>		

Front Panel Key	Simple Command	Equivalent SCPI Command
Adjust display menu		
<u>INTENSITY</u>	INTE <numeric>	DISPlay:BRIGhtness <numeric>
<u>BACKGROUND INTENSITY</u>	BACI <numeric>	DISPlay:CONTRast <numeric>
<u>MODIFY COLORS</u>		
<u>CH1 DATA</u>	COLO CH1D	DISPlay:CMAP:COLor1:HSL <hue>,<sat>,<lum>
<u>CH1 MEM/LIMIT LINE</u>	COLO CH1M	DISPlay:CMAP:COLor2:HSL <hue>,<sat>,<lum>
<u>CH2 DATA</u>	COLO CH2D	DISPlay:CMAP:COLor3:HSL <hue>,<sat>,<lum>
<u>CH2 MEM/LIMIT LINE</u>	COLO CH2M	DISPlay:CMAP:COLor4:HSL <hue>,<sat>,<lum>
<u>GRATICULE</u>	COLO GRAT	DISPlay:CMAP:COLor5:HSL <hue>,<sat>,<lum>
<u>WARNING</u>	COLO WARN	DISPlay:CMAP:COLor6:HSL <hue>,<sat>,<lum>
<u>MORE</u>		
<u>TEXT</u>	COLO TEXT	DISPlay:CMAP:COLor7:HSL <hue>,<sat>,<lum>
<u>IBASIC</u>	COLO IBT	DISPlay:CMAP:COLor8:HSL <hue>,<sat>,<lum>
<u>MORE</u>		
<u>PEN 1</u>	COLO PEN1	DISPlay:CMAP:COLor9:HSL <hue>,<sat>,<lum>
<u>PEN 2</u>	COLO PEN2	DISPlay:CMAP:COLor10:HSL <hue>,<sat>,<lum>
<u>PEN 3</u>	COLO PEN3	DISPlay:CMAP:COLor11:HSL <hue>,<sat>,<lum>
<u>PEN 4</u>	COLO PEN4	DISPlay:CMAP:COLor12:HSL <hue>,<sat>,<lum>
<u>PEN 5</u>	COLO PEN5	DISPlay:CMAP:COLor13:HSL <hue>,<sat>,<lum>
<u>PEN 6</u>	COLO PEN6	DISPlay:CMAP:COLor14:HSL <hue>,<sat>,<lum>
<u>RETURN</u>		
<u>RETURN</u>		
<u>RETURN</u>		
<u>DEFAULT COLORS</u>	DEFC	DISPlay:CMAP:DEFault
<u>SAVE COLOES</u>	SVCO	DISPlay:CMAP:STORe
<u>RECALL COLORS</u>	RECC	DISPlay:CMAP:LOAD
<u>RETURN</u>		
Color adjust menu		
<u>TINT</u>	TINT <numeric>	
<u>BRIGHTNESS</u>	CBRI <numeric>	
<u>COLOR</u>	COLOR <numeric>	
<u>RESET COLOR</u>	RSCO	DISPlay:CMAP:COLor{1-14}:DEFault
<u>RETURN</u>		

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>Scale Ref</b> Network Analyzer <b>AUTO SCALE</b> <b>SCALE/DIV</b> <b>REFERENCE POSITION</b> <b>REFERENCE VALUE</b> <b>MKR→REFERENCE</b> <b>SCALE FOR [DATA]</b>  <b>D&amp;M SCALE [COUPLE]</b> <b>ELECTRICAL DELAY MENU</b> <b>MKR→DELAY</b> <b>ELECTRICAL DELAY</b> <b>PHASE OFFSET</b> <b>RETURN</b>	AUTO SCAL <numeric> REFP <numeric> REFV <numeric> MKRREF SCAF DATA SCAF MEMO SCAC {OFF ON 0 1}  MKRDELA ELED <numeric> PHAO <numeric>	Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:AUTO ONCE Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:PDIVision <numeric> Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RPOStion <numeric> Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RLEVel <numeric> Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RLEVel MARKer  Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:COUPle {OFF ON 0 1}  SENSE:CORRection:EDElay2 MARKer SENSE:CORRection:EDElay2 <numeric> SENSE:CORRection:OFFSet:PHASe <numeric>
Spectrum Analyzer <b>ATTEN AUTO man</b> <b>ATTEN</b>  <b>SCALE/DIV</b> <b>REFERENCE VALUE</b> <b>MKR→REFERENCE</b> <b>SCALE FOR [DATA]</b>  <b>D&amp;M SCALE [COUPLE]</b> <b>MAX MIXER LEVEL</b>	ATTAUTO {OFF ON 0 1} ATT <numeric>  SCAL <numeric> REFV <numeric> MKRREF SCAF DATA SCAF MEMO SCAC {OFF ON 0 1} MAXMLEV <numeric>	SENSE:POWer:AC:ATTenuation:AUTO {OFF ON 0 1} SENSE:POWer:AC:ATTenuation:AUTO {OFF 0} SENSE:POWer:AC:ATTenuation <numeric> Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:PDIVision <numeric> Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RLEVel <numeric> Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RLEVel MARKer  Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:COUPle {OFF ON 0 1} SENSE:POWer:AC:RANGe[:UPPer] <numeric>
Impedance Analyzer <b>AUTO SCALE</b> <b>SCALE/DIV</b> <b>REFERENCE POSITION</b> <b>REFERENCE VALUE</b> <b>MKR→REFERENCE</b> <b>TOP VALUE</b> <b>BOTTOM VALUE</b> <b>MORE</b> <b>SCALE FOR [DATA]</b>  <b>D&amp;M SCALE [COUPLE]</b> <b>REFERENCE X VALUE</b> <b>REFERENCE Y VALUE</b> <b>RETURN</b>	AUTO SCAL <numeric> REFP <numeric> REFV <numeric> MKRREF TOPV <numeric> BOTV <numeric>  SCAF DATA SCAF MEMO SCAC {OFF ON 0 1} REFX <numeric> REFY <numeric>	Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:AUTO ONCE Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:PDIVision <numeric> Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RPOStion <numeric> Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RLEVel <numeric> Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RLEVel MARKer Display:TRACe{1 2}:Y[:SCALe]:TOP <numeric> Display:TRACe{1 2}:Y[:SCALe]:BOTTom <numeric>  Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:COUPle {OFF ON 0 1} Display:TRACe{1 2}:X[:SCALe]:RLEVel <numeric> Display:TRACe{1 2}:Y[:SCALe]:RLEVel <numeric>

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>Bw/Avg</b>		
Network Analyzer		
AVERAGING RESTART	AVERREST	SENSe:AVERAge:CLEAr
AVERAGING ON off	AVER {OFF ON 0 1}	SENSe:AVERAge[:STATe] {OFF ON 0 1}
AVERAGING FACTOR	AVERFACT <numeric>	SENSe:AVERAge:COUnT <numeric>
IF BW [40 kHz]	BW <numeric>	SENSe:BANDwidth[:RESolution]:AUTO {OFF 0} SENSe:BANDwidth[:RESolution] <numeric>
GROUP DELY APERTURE	GRODAPER <numeric>	CALCulate:GDAPerture:APERture <numeric>
Spectrum Analyzer		
	BW <numeric>	SENSe:BANDwidth[:RESolution]:AUTO {OFF 0} SENSe:BANDwidth[:RESolution] <numeric>
AVERAGING RESTART	AVERREST	SENSe:AVERAge:CLEAr
AVERAGING ON off	AVER {OFF ON 0 1}	SENSe:AVERAge[:STATe] {OFF ON 0 1}
AVERAGING FACTOR	AVERFACT <numeric>	SENSe:AVERAge:COUnT <numeric>
RES BW AUTO man	BWAUTO {OFF ON 0 1}	SENSe:BANDwidth[:RESolution]:AUTO {OFF ON 0 1}
RES BW [3 MHz]	BW <numeric>	SENSe:BANDwidth[:RESolution]:AUTO {OFF 0} SENSe:BANDwidth[:RESolution] <numeric>
RBW/SPAN RATIO	BWSRAT <numeric>	SENSe:BANDwidth[:RESolution]:RATio <numeric>
VIDEO BW	VBW <numeric>	SENSe:BANDwidth:VIDeo <numeric>
Impedance Analyzer		
AVERAGING RESTART	AVERREST	SENSe:AVERAge:CLEAr
AVERAGING ON off	AVER {OFF ON 0 1}	SENSe:AVERAge[:STATe] {OFF ON 0 1}
AVERAGING FACTOR	AVERFACT <numeric>	SENSe:AVERAge:COUnT <numeric>
IF BW [40 kHz]	BW <numeric>	SENSe:BANDwidth[:RESolution] <numeric>

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>Cal</b> Network Analyzer <b>CORRECTION ON off</b> <b>CALIBRATE MENU</b> <b>CALIBRATE:NONE</b> <b>RESPONSE</b> → See Response menu <b>RESPONSE &amp; ISOL:N</b> → See Response/isolation menu <b>S11 1-PORT</b> → See S11 1-port menu <b>S22 1-PORT</b> → See S22 1-port menu <b>FULL 2-PORT</b> → See Full 2-port menu <b>ONE PATH 2-PORT</b> → See One-path 2-port menu <b>RESUME CAL SEQUENCE</b> <b>CAL KIT [7mm]</b> <b>CAL KIT:7mm</b> <b>3.5mm</b> <b>N 50 ohm</b> <b>N 75 ohm</b> <b>USER KIT</b> <b>SAVE USER KIT</b> <b>MODIFY [7mm]</b> → See Modify calkit menu <b>RETURN</b> <b>MORE</b> <b>PORT EXTENSIONS</b> → See Reference plane menu <b>VELOCITY FACTOR</b> <b>SET Z0</b> <b>RETURN</b>	CORR {OFF ON 0 1}  CALI NONE CALI RESP CALI RAI CALI S111 CALI S221 CALI FUL2 CALI ONE2 RESC  CALK APC7 CALK APC35 CALK N50 CALK N75 CALK USED SAVEUSEK MODII  VELOFACT <numeric> SETZ <numeric>	SENSE:CORRection[:STATe] {OFF ON 0 1}  SENSE:CORRection:COLLect:METhod NONE SENSE:CORRection:COLLect:METhod RESPonse SENSE:CORRection:COLLect:METhod RAIsol SENSE:CORRection:COLLect:METhod S111 SENSE:CORRection:COLLect:METhod S221 SENSE:CORRection:COLLect:METhod TPORT SENSE:CORRection:COLLect:METhod OPTPort SENSE:CORRection:COLLect:RESume  SENSE:CORRection:CKIT APC7 SENSE:CORRection:CKIT APC35 SENSE:CORRection:CKIT N50 SENSE:CORRection:CKIT N75 SENSE:CORRection:CKIT UDEFined SENSE:CORRection:CKIT:MODify:SAVE SENSE:CORRection:CKIT:MODify  SENSE:CORRection:RVELocity <numeric> SENSE:CORRection:CIMPedance <numeric>
Response standard menu <b>defined std 1</b> <b>defined std 2</b> <b>defined std 3</b> <b>defined std 4</b> <b>defined std 5</b> <b>defined std 6</b> <b>defined std 7</b> <b>DONE: RESPONSE</b>	STANA STANB STANC STAND STANE STANF STANG RESPDONE	SENSE:CORRection:COLLect[:ACQuire] STANdard1 SENSE:CORRection:COLLect[:ACQuire] STANdard2 SENSE:CORRection:COLLect[:ACQuire] STANdard3 SENSE:CORRection:COLLect[:ACQuire] STANdard4 SENSE:CORRection:COLLect[:ACQuire] STANdard5 SENSE:CORRection:COLLect[:ACQuire] STANdard6 SENSE:CORRection:COLLect[:ACQuire] STANdard7 SENSE:CORRection:COLLect:SAVE2

Front Panel Key	Simple Command	Equivalent SCPI Command
Response/isolation menu RESPONSE → See OPEN/SHORT/Response standard menu ISOL'N STD DONE RESP ISOL'N CAL	RAIRESP  RAHSOL  RAID	SENSE:CORRection:COLLect[:ACQuire] RESP  SENSE:CORRection:COLLect[:ACQuire] ISOL  SENSE:CORRection:COLLect:SAVE3
S11 1-port menu [S11]: OPEN <sup>1</sup> SHORT <sup>1</sup> LOAD DONE: 1-PORT CAL	CLASS11A CLASS11B CLASS11C SAV1	SENSE:CORRection:COLLect[:ACQuire] CS11A SENSE:CORRection:COLLect[:ACQuire] CS11B SENSE:CORRection:COLLect[:ACQuire] CS11C SENSE:CORRection:COLLect:SAVE4
S22 1-port menu [S22]: OPEN <sup>1</sup> SHORT <sup>1</sup> LOAD DONE: 1-PORT CAL	CLASS22A CLASS22B CLASS22C SAV1	SENSE:CORRection:COLLect[:ACQuire] CS22A SENSE:CORRection:COLLect[:ACQuire] CS22B SENSE:CORRection:COLLect[:ACQuire] CS22C SENSE:CORRection:COLLect:SAVE4
Full 2-port menu REFLECT'N [S11]: OPEN <sup>1</sup> SHORT <sup>1</sup> LOAD [S22]: OPEN <sup>1</sup> SHORT <sup>1</sup> LOAD REFLECT'N DONE TRANSMISSION FWD TRANS THRU FWD MATCH THRU REV TRANS THRU REV MATCH THRU TRANS DONE ISOLATION OMIT ISOLATION FWD ISOL'N ISOL'N STD REV ISOL'N ISOL'N STD ISOLATION DONE DONE: 2-PORT CAL	REFL CLASS11A CLASS11B CLASS11C CLASS22A CLASS22B CLASS22C REFD TRAN FWDT FWDM REVT REVM TRAD ISOL OMII FWDI REVI ISOD SAV2	SENSE:CORRection:COLLect[:ACQuire] REFL2 SENSE:CORRection:COLLect[:ACQuire] CS11A SENSE:CORRection:COLLect[:ACQuire] CS11B SENSE:CORRection:COLLect[:ACQuire] CS11C SENSE:CORRection:COLLect[:ACQuire] CS22A SENSE:CORRection:COLLect[:ACQuire] CS22B SENSE:CORRection:COLLect[:ACQuire] CS22C SENSE:CORRection:COLLect:SAVE5 SENSE:CORRection:COLLect[:ACQuire] TRAN2 SENSE:CORRection:COLLect[:ACQuire] FWDT SENSE:CORRection:COLLect[:ACQuire] FWDM SENSE:CORRection:COLLect[:ACQuire] REVT SENSE:CORRection:COLLect[:ACQuire] REVM SENSE:CORRection:COLLect:SAVE6 SENSE:CORRection:COLLect[:ACQuire] ISOL2 SENSE:CORRection:COLLect[:ACQuire] OMII SENSE:CORRection:COLLect[:ACQuire] FWDI SENSE:CORRection:COLLect[:ACQuire] REVI SENSE:CORRection:COLLect:SAVE7 SENSE:CORRection:COLLect:SAVE8

<sup>1</sup> See OPEN/SHORT/Response standard menu when Type-N calkits or user calkit is selected.

Front Panel Key	Simple Command	Equivalent SCPI Command
One-path 2-port menu REFLECT'N [S11]: OPEN SHORT LOAD REFLECT'N DONE TRANSMISSION FWD. TRANS. THRU FWD. MATCH THRU TRANS. DONE ISOLATION OMIT ISOLATION FWD.ISOL'N ISOL'N STD REV.ISOL'N ISOL'N STD ISOLATION DONE DONE: 2-PORT CAL	REFL CLASS11A CLASS11B CLASS11C REFD TRAN FWDT FWDM TRAD ISOL OMI FWDI REVI ISOD SAV2	SENSE:CORRection:COLLect[:ACQuire] REFL2 SENSE:CORRection:COLLect[:ACQuire] CS11A SENSE:CORRection:COLLect[:ACQuire] CS11B SENSE:CORRection:COLLect[:ACQuire] CS11C SENSE:CORRection:COLLect:SAVE5 SENSE:CORRection:COLLect[:ACQuire] TRAN2 SENSE:CORRection:COLLect[:ACQuire] FWDT SENSE:CORRection:COLLect[:ACQuire] FWDM SENSE:CORRection:COLLect:SAVE6 SENSE:CORRection:COLLect[:ACQuire] ISOL2 SENSE:CORRection:COLLect[:ACQuire] OMI SENSE:CORRection:COLLect[:ACQuire] FWDI SENSE:CORRection:COLLect[:ACQuire] REVI SENSE:CORRection:COLLect:SAVE7 SENSE:CORRection:COLLect:SAVE8
OPEN/SHORT/Response standard menu defined std 1 defined std 2 defined std 3 defined std 4 defined std 5 defined std 6 defined std 7 DONE: OPENS/SHORTS /Response	STANA STANB STANC STAND STANE STANF STANG DONE	SENSE:CORRection:COLLect[:ACQuire] STANdard1 SENSE:CORRection:COLLect[:ACQuire] STANdard2 SENSE:CORRection:COLLect[:ACQuire] STANdard3 SENSE:CORRection:COLLect[:ACQuire] STANdard4 SENSE:CORRection:COLLect[:ACQuire] STANdard5 SENSE:CORRection:COLLect[:ACQuire] STANdard6 SENSE:CORRection:COLLect[:ACQuire] STANdard7 SENSE:CORRection:COLLect:SAVE1
Reference plane menu EXTENSIONS ON off EXTENSION INPUT R EXTENSION INPUT A EXTENSION INPUT B EXTENSION PORT 1 EXTENSION PORT 2 RETURN	PORE {OFF ON 0 1} PORTR <numeric> PORTA <numeric> PORTB <numeric> PORT1 <numeric> PORT2 <numeric>	SENSE:CORRection:EDELay:STATe {OFF ON 0 1} SENSE:CORRection:EDELay:PORT3:TIME <numeric> SENSE:CORRection:EDELay:PORT4:TIME <numeric> SENSE:CORRection:EDELay:PORT5:TIME <numeric> SENSE:CORRection:EDELay:PORT1:TIME <numeric> SENSE:CORRection:EDELay:PORT2:TIME <numeric>

Front Panel Key	Simple Command	Equivalent SCPI Command
Modify calkit menu		
<b>DEFINE STANDARD</b>		
STD NO.1 [SHORT]	DEFS 1	SENSe:CORRection:CKIT:SElect STANdard1
STD NO.2 [OPEN]	DEFS 2	SENSe:CORRection:CKIT:SElect STANdard2
STD NO.3 [LOAD]	DEFS 3	SENSe:CORRection:CKIT:SElect STANdard3
STD NO.4 [DEL/THRU]	DEFS 4	SENSe:CORRection:CKIT:SElect STANdard4
STD NO.5 [LOAD]	DEFS 5	SENSe:CORRection:CKIT:SElect STANdard5
STD NO.6 [LOAD]	DEFS 6	SENSe:CORRection:CKIT:SElect STANdard6
STD NO.7 [SHORT]	DEFS 7	SENSe:CORRection:CKIT:SElect STANdard7
STD NO.8 [OPEN]	DEFS 8	SENSe:CORRection:CKIT:SElect STANdard8
<b>SPECIFY CLASS</b>		
<b>SPECIFY: S11A</b>	SPECS11A <value, ... >	SENSe:CORRection:CKIT:CLASs1:STANdard <n,n, ... >
S11B	SPECS11B <value, ... >	SENSe:CORRection:CKIT:CLASs2:STANdard <n,n, ... >
S11C	SPECS11C <value, ... >	SENSe:CORRection:CKIT:CLASs3:STANdard <n,n, ... >
<b>SPECIFY: S22A</b>	SPECS22A <value, ... >	SENSe:CORRection:CKIT:CLASs4:STANdard <n,n, ... >
S22B	SPECS22B <value, ... >	SENSe:CORRection:CKIT:CLASs5:STANdard <n,n, ... >
S22C	SPECS22C <value, ... >	SENSe:CORRection:CKIT:CLASs6:STANdard <n,n, ... >
<b>MORE</b>		
<b>SPECIFY:FWD.TRANS.</b>	SPECFWDT <value, ... >	SENSe:CORRection:CKIT:CLASs7:STANdard <n,n, ... >
REV.TRANS.	SPECREVT <value, ... >	SENSe:CORRection:CKIT:CLASs8:STANdard <n,n, ... >
FWD.MATCH	SPECFWDM <value, ... >	SENSe:CORRection:CKIT:CLASs9:STANdard <n,n, ... >
REV.MATCH	SPECREVM <value, ... >	SENSe:CORRection:CKIT:CLASs10:STANdard <n,n, ... >
RESPONSE	SPECRESP <value, ... >	SENSe:CORRection:CKIT:CLASs11:STANdard <n,n, ... >
RESPONSE & ISO'N	SPECRESI <value, ... >	SENSe:CORRection:CKIT:CLASs12:STANdard <n,n, ... >
CLASS DONE (SPEC'D)	CLAD	SENSe:CORRection:CKIT:SAVE CLASs
CLASS DONE (SPEC'D)	CLAD	SENSe:CORRection:CKIT:SAVE CLASs
<b>LABEL CLASS</b>		
LABEL: S11A	LABES11A <string>	SENSe:CORRection:CKIT:CLASs1:LABel <string>
S11B	LABES11B <string>	SENSe:CORRection:CKIT:CLASs2:LABel <string>
S11C	LABES11C <string>	SENSe:CORRection:CKIT:CLASs3:LABel <string>
LABEL: S22A	LABES22A <string>	SENSe:CORRection:CKIT:CLASs4:LABel <string>
S22B	LABES22B <string>	SENSe:CORRection:CKIT:CLASs5:LABel <string>
S22C	LABES22C <string>	SENSe:CORRection:CKIT:CLASs6:LABel <string>
<b>MORE</b>		
<b>LABEL:FWD.TRANS.</b>	LABEFWDT <string>	SENSe:CORRection:CKIT:CLASs7:LABel <string>
REV.TRANS.	LABEREVT <string>	SENSe:CORRection:CKIT:CLASs8:LABel <string>
FWD.MATCH	LABEFWDM <string>	SENSe:CORRection:CKIT:CLASs9:LABel <string>
REV.MATCH	LABEREVM <string>	SENSe:CORRection:CKIT:CLASs10:LABel <string>
RESPONSE	LABERESP <string>	SENSe:CORRection:CKIT:CLASs11:LABel <string>
RESPONSE & ISO'N	LABERESI <string>	SENSe:CORRection:CKIT:CLASs12:LABel <string>
LABEL DONE		
LABEL DONE		
LABEL KIT	LABK <string>	SENSe:CORRection:CKIT:LABel <string>
KIT DONE (MODIFIED)	KITD	SENSe:CORRection:CKIT:SAVE ALL

Front Panel Key	Simple Command	Equivalent SCPI Command
Specify offset menu OFFSET DELAY OFFSET LOSS OFFSET Z0 STD OFFSET DONE	OFSD <numeric> OFSL <numeric> OFSZ <numeric>	SENSe:CORRection:CKIT:STANdard:ODELay <numeric> SENSe:CORRection:CKIT:STANdard:OLOs <numeric> SENSe:CORRection:CKIT:STANdard:OCIMpedance <numeric>
Standard type menu STD TYPE OPEN C0 C1 C2 SPECIFY OFFSET → See Specify offset menu LABEL STD STD DONE (DEFINED) SHORT SPECIFY OFFSET → See Specify offset menu LABEL STD STD DONE (DEFINED) LOAD SPECIFY OFFSET → See Specify offset menu LABEL STD STD DONE (DEFINED) DELAY/THRU SPECIFY OFFSET → See Specify offset menu LABEL STD STD DONE (DEFINED) ARBITRARY IMPEDANCE TERMINAL IMPEDANCE SPECIFY OFFSET → See Specify offset menu LABEL STD STD DONE (DEFINED) RETURN	STDT OPEN C0 <numeric> C1 <numeric> C2 <numeric> LABS <string> STDD STDT SHOR LABS <string> STDD STDT LOAD LABS <string> STDD STDT DELA LABS <string> STDD STDT ARBI TERI <numeric> LABS <string> STDD	SENSe:CORRection:CKIT:STANdard:TYPE OPEN SENSe:CORRection:CKIT:STANdard:C0 <numeric> SENSe:CORRection:CKIT:STANdard:C1 <numeric> SENSe:CORRection:CKIT:STANdard:C2 <numeric> SENSe:CORRection:CKIT:STANdard:LABel <string> SENSe:CORRection:CKIT:STANdard:SAVE SENSe:CORRection:CKIT:STANdard:TYPE SHORT SENSe:CORRection:CKIT:STANdard:LABel <string> SENSe:CORRection:CKIT:STANdard:SAVE SENSe:CORRection:CKIT:STANdard:TYPE LOAD SENSe:CORRection:CKIT:STANdard:LABel <string> SENSe:CORRection:CKIT:STANdard:SAVE SENSe:CORRection:CKIT:STANdard:TYPE DELay SENSe:CORRection:CKIT:STANdard:LABel <string> SENSe:CORRection:CKIT:STANdard:SAVE SENSe:CORRection:CKIT:STANdard:TYPE AIMPedance SENSe:CORRection:CKIT:STANdard:TIMPedance <numeric> SENSe:CORRection:CKIT:STANdard:LABel <string> SENSe:CORRection:CKIT:STANdard:SAVE
Spectrum Analyzer EXECUTE LVL CAL LVL CAL DATA INPUT Z	LVLCAL LVCDT <numeric> INPZ <numeric>	CaLibration:AUTO ONCE SENSe:CORRection:OFFSet[:MAGNitude] <numeric> INPut:IMPedance <numeric>

Front Panel Key	Simple Command	Equivalent SCPI Command
Impedance Analyzer		
CALIBRATE MENU	CALI IMP	SENSe:CORRection:COLLect:MEthod IMP
OPEN <sup>1</sup>	CLASIMPA	SENSe:CORRection:COLLect[:ACQuire] IMPA
SHORT <sup>1</sup>	CLASIMPB	SENSe:CORRection:COLLect[:ACQuire] IMPB
LOAD	CLASIMPC	SENSe:CORRection:COLLect[:ACQuire] IMPC
DONE:CAL	SAVIMP	SENSe:CORRection:COLLect:SAVE
RESUME CAL SEQUENCE	RESC	SENSe:CORRection:COLLect:RESume
FIXTURE COMPEN		
COMPEN MENU	COMP	SENSe:CORRection2:COLLect:MEthod IMPedance
OPEN	COMCA	SENSe:CORRection2:COLLect[:ACQuire] STANdard1
SHORT	COMCB	SENSe:CORRection2:COLLect[:ACQuire] STANdard2
LOAD	COMCC	SENSe:CORRection2:COLLect[:ACQuire] STANdard3
DONE:COMPEN	SAVCOM	SENSe:CORRection2:COLLect:SAVE
RESUME COMP SEQ	RESCOM	SENSe:CORRection2:COLLect:RESume
OPEN on OFF	COMCDATA {ON OFF}	SENSe:CORRection2:OPEN {ON OFF}1 0}
SHORT on OFF	COMCDATB {ON OFF}	SENSe:CORRection2:SHORT {ON OFF}1 0}
LOAD on OFF	COMCDATC {ON OFF}	SENSe:CORRection2:LOAD {ON OFF}1 0}
RETURN		
CAL KIT [IMP 7mm]		
CAL KIT : IMP 7mm	CALK APC7	SENSe:CORRection:CKIT APC7
3.5mm	CALK APC35	SENSe:CORRection:CKIT APC35
N 500	CALK N50	SENSe:CORRection:CKIT N50
N 750	CALK N75	SENSe:CORRection:CKIT N75
USER KIT	CALK USED	SENSe:CORRection:CKIT UDEFined
SAVE USER KIT	SAVEUSEK	SENSe:CORRection:CKIT:MODify:SAVE
MODIFY (IMP 7mm)	MODI1	SENSe:CORRection:CKIT:MODify
DEFINE STNADARD		
→ See Define standard menu		
SPECIFY CLASS		
SPECIFY: IMP A	SPECIMPA <numeric>	:SENSe:CORRection:CKIT:CLASs13:STANdard <num1>[,<num2>[, ... [,<num7>]]]
IMP B	SPECIMPB <numeric>	:SENSe:CORRection:CKIT:CLASs14:STANdard <num1>[,<num2>[, ... [,<num7>]]]
IMP C	SPECIMPC <numeric>	:SENSe:CORRection:CKIT:CLASs15:STANdard <num1>[,<num2>[, ... [,<num7>]]]
CLASS DONE	CLAD	SENSe:CORRection:CKIT:SAVE CLASs
LABEL CLASS		
LABEL: IMP A	LABEIMPA <string>	:SENSe:CORRection:CKIT:CLASs13:LABel <string>
IMP B	LABEIMPB <string>	:SENSe:CORRection:CKIT:CLASs14:LABel <string>
IMP C	LABEIMPC <string>	:SENSe:CORRection:CKIT:CLASs15:LABel <string>
LABEL KIT	LABK <string>	SENSe:CORRection:CKIT:LABel <string>
KIT DONE (MODIFIED)	KITD	SENSe:CORRection:CKIT:SAVE ALL
COMPEN KIT [USER]		
→ See Compensation kit menu		

1 See OPEN/SHORT/Response standard menu when Type-N calkits or user calkit is selected.

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>PORT EXTENSIONS</b>		
<b>EXTENSION ON off</b>	PORE {OFF ON 0 1}	SENSe:CORRection:EDELay:STATe {OFF ON 0 1}
<b>EXTENSION VALUE</b>	PORTZ <numeric>	SENSe:CORRection1:EDELay:PORT6[:TIME] <numeric>
<b>VELOCITY FACTOR</b>	VELOFACT <numeric>	SENSe:CORRection:RVELocity <numeric>
<b>RETURN</b>		

Front Panel Key	Simple Command	Equivalent SCPI Command
Compensation Kit Menu		
SAVE COMPEN KIT	SAVUCOMK	SENSe:CORRection2:CKIT:MODify:SAVE
MODIFY [USER]	MODICOMK	SENSe:CORRection2:CKIT:MODify
DEFINE STANDARD		
OPEN CONDUCT(G)	DEFSOPENG <numeric>	SENSe:CORRection2:CKIT:STNAdard1:G <numeric>
CAP(C)	DEFSOPENC <numeric>	SENSe:CORRection2:CKIT:STNAdard1:C <numeric>
SHORT RESIST(R)	DEFSSHORR <numeric>	SENSe:CORRection2:CKIT:STNAdard2:R <numeric>
INDUCT(L)	DEFSSHORL <numeric>	SENSe:CORRection2:CKIT:STNAdard2:L <numeric>
LOAD RESIST(R)	DEFSLOADR <numeric>	SENSe:CORRection2:CKIT:STNAdard3:R <numeric>
INDUCT(L)	DEFSLOADL <numeric>	SENSe:CORRection2:CKIT:STNAdard3:L <numeric>
STD DONE (DEFINED)	COMSDONE	SENSe:CORRection2:CKIT:STANdard:SAVE
LABEL KIT	LABECOMK <string>	SENSe:CORRection2:CKIT:LABel <string>
KIT DONE (MODIFIED)	COMKDONE	SENSe:CORRection2:CKIT:SAVE
RETURN		

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>Sweep</b> Network/Impedance Analyzer <b>SWEEP TIME AUTO</b> man <b>SWEEP TIME</b> h:ms <b>RETURN</b> <b>NUMBER OF POINTS</b> <b>COUPLED CH ON OFF</b> <b>SWEEP TYPE MENU</b> <b>SWEEP TYPE:LIN FREQ</b>  <b>LOG FREQ</b>  <b>LIST FREQ</b>  <b>POWER SWEEP</b>  <b>EDIT LIST</b> <b>SEGMENT</b> <b>EDIT</b> → See NA/ZA segment menu <b>DELETE</b> <b>ADD</b> → See NA/ZA segment menu <b>CLEAR LIST</b> <b>LIST DONE</b> <b>RETURN</b>	SWETAUTO {OFF ON 0 1} SWET <numeric>  POIN <numeric> COUC {OFF ON 0 1}  SWPT LINF  SWPT LOGF  SWPT LIST  SWPT POWE  EDITLIST SEDI <numeric> SEDI [<numeric>]  SDEL SADD  CLEL EDITDONE	SENSE:SWEep:TIME:AUTO {OFF ON 0 1} SENSE:SWEep:TIME <numeric>  SENSE:SWEep:POINTs <numeric> INSTRument:COUPlE {OFF ON 0 1}  SENSE:FREquency:MODE SWEep SOURce:POWer:MODE FIXed SENSE:SWEep:SPACing LINear  SENSE:FREquency:MODE SWEep SOURce:POWer:MODE FIXed SENSE:SWEep:SPACing LOGarithmic  SENSE:FREquency:MODE LIST SOURce:POWer:MODE LIST SENSE:SWEep:SPACing LINear  SENSE:FREquency:MODE FIXed SOURce:POWer:MODE SWEep SENSE:SWEep:SPACing LINear  SENSE:LIST:SEGment <numeric> SENSE:LIST:SEGment:EDIT  SENSE:LIST:SEGment:DELete SENSE:LIST:SEGment:ADD  SENSE:LIST:CLEar SENSE:LIST:SAVE
NA/ZA segment menu <b>SEGMENT: MKR→START</b> <b>MKR→STOP</b> <b>NUMBER of POINTS</b> <b>POWER</b> <b>IF BW</b> <b>MORE</b> <b>SEGMENT: START</b> <b>STOP</b> <b>CENTER</b> <b>SPAN</b> <b>RETURN</b> <b>SEGMENT QUIT</b> <b>SEGMENT DONE</b>	MKRSTAR MKRSTOP POIN <numeric> POWE <numeric> BW <numeric>  STAR <numeric> STOP <numeric> CENT <numeric> SPAN <numeric>  SQUI SDON	SENSE:LIST:SEGment:FREquency:STARt MARKer SENSE:LIST:SEGment:FREquency:STOP MARKer SENSE:LIST:SEGment:POINTs <numeric> SENSE:LIST:SEGment:POWer <numeric> SENSE:LIST:SEGment:BANDwidth <numeric>  SENSE:LIST:SEGment:FREquency:STARt <numeric> SENSE:LIST:SEGment:FREquency:STOP <numeric> SENSE:LIST:SEGment:FREquency:CENTer <numeric> SENSE:LIST:SEGment:FREquency:SPAN <numeric>  SENSE:LIST:SEGment:QUIT SENSE:LIST:SEGment:SAVE

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>Spectrum Analyzer</b> <b>SWEEP TIME AUTO</b> man <b>SWEEP TIME</b> h:m:s <b>RETURN</b> <b>SAMPLING NORMAL</b> repet. <b>NUMBER OF POINTS</b> <b>SWEEP TYPE MENU</b> <b>SWEEP TYPE:LIN FREQ</b>  <b>LIST FREQ</b>  <b>EDIT LIST</b> <b>SEGMENT</b> <b>EDIT</b> → See SA segment menu <b>DELETE</b> <b>ADD</b> → See SA segment menu <b>CLEAR LIST</b> <b>LIST DONE</b> <b>RETURN</b>	SWETAUTO {OFF ON 0 1} SWET <numeric>  REPTSMP {OFF ON 0 1} POIN <numeric>  SWPT LINF  SWPT LIST  EDITLIST  SEDI [<numeric>]  SDEL SADD  CLEL EDITDONE	SENSe:SWEep:TIME:AUTO {OFF ON 0 1} SENSe:SWEep:TIME <numeric>  SENSe:DETEctor:CONTinuous {OFF ON 0 1} SENSe:SWEep:POINts <numeric>  SENSe:FREQuency:MODE SWEep SOURce:POWer:MODE FIXed SENSe:SWEep:SPACing LINear  SENSe:FREQuency:MODE LIST SOURce:POWer:MODE LIST SENSe:SWEep:SPACing LINear  SENSe:LIST:SEGment <numeric> SENSe:LIST:SEGment:EDIT  SENSe:LIST:SEGment:DELeTE SENSe:LIST:SEGment:ADD  SENSe:LIST:CLEar SENSe:LIST:SAVE
<b>SA segment menu</b> <b>SEGMENT: MKR→START</b> <b>MKR→STOP</b> <b>NUMBER of POINTS</b> <b>POWER</b> <b>RESBW</b> <b>MORE</b> <b>SEGMENT: START</b> <b>STOP</b> <b>CENTER</b> <b>SPAN</b> <b>RETURN</b> <b>SEGMENT QUIT</b> <b>SEGMENT DONE</b>	MKRSTAR MKRSTOP POIN <numeric> POWE <numeric> BW <numeric>  STAR <numeric> STOP <numeric> CENT <numeric> SPAN <numeric>  SQUI SDON	SENSe:LIST:SEGment:FREQuency:STARt MARKer SENSe:LIST:SEGment:FREQuency:STOP MARKer SENSe:LIST:SEGment:POINts <numeric> SENSe:LIST:SEGment:POWer <numeric> SENSe:LIST:SEGment:BANDwidth <numeric>  SENSe:LIST:SEGment:FREQuency:STARt <numeric> SENSe:LIST:SEGment:FREQuency:STOP <numeric> SENSe:LIST:SEGment:FREQuency:CENter <numeric> SENSe:LIST:SEGment:FREQuency:SPAN <numeric>  SENSe:LIST:SEGment:QUIT SENSe:LIST:SEGment:SAVE

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>Source</b>		
Network Analyzer		
POWER	POWE <numeric>	SOURce:POWer[:LEVel][:IMMediate][:AMPLitude] <numeric>
SLOPE	SLOPE <numeric>	SOURce:POWer[:LEVel][:IMMediate][:AMPLitude]:SLOPe <numeric>
SLOPE ON off	SLOP {OFF ON 0 1}	SOURce:POWer[:LEVel][:IMMediate][:AMPLitude]:SLOPe:STATe {OFF ON 0 1}
CW FREQ	CWFREQ <numeric>	SOURce:FREQUency[:CW] <numeric>
ATTENUATOR PORT 1	ATTP1 <numeric>	OUTPut:ATTenuation1 <numeric>
ATTENUATOR PORT 2	ATTP2 <numeric>	OUTPut:ATTenuation2 <numeric>
RF OUT ON off	RFO {OFF ON 0 1}	SOURce:POWer:STATe {OFF ON 0 1}
Spectrum Analyzer		
POWER	POWE <numeric>	SOURce:POWer[:LEVel][:IMMediate][:AMPLitude] <numeric>
RF OUT ON off	RFO {OFF ON 0 1}	SOURce:POWer:STATe {OFF ON 0 1}
Impedance Analyzer		
POWER	POWE <numeric>	SOURce:POWer[:LEVel][:IMMediate][:AMPLitude] <numeric>
CW FREQ	CWFREQ <numeric>	SOURce:FREQUency[:CW] <numeric>
RF OUT ON off	RFO {OFF ON 0 1}	SOURce:POWer:STATe {OFF ON 0 1}
<b>Trigger</b>		
SWEEP:HOLD	HOLD	INITiate:CONTInuous {OFF 0} ABORt
SINGLE	SING	INITiate:CONTInuous {OFF 0} SENSe:SWEEp:COUNT 1 INITiate[:IMMediate]
NUMBER of GROUPS	NUMG <numeric>	INITiate:CONTInuous {OFF 0} SENSe:SWEEp:COUNT <numOfGroups> INITiate[:IMMediate]
CONTINUOUS	CONT	INITiate:CONTInuous {ON 1}
TRIGGER:[FREE RUN]		
FREE RUN	TRGS INT	TRIGger:SOURce INTernal1 SENSe:SWEEp:GATed {OFF 0}
EXTERNAL	TRGS EXT	TRIGger:SOURce EXTernal SENSe:SWEEp:GATed {OFF 0}
(HP-B)	TRGS BUS	TRIGger:SOURce BUS SENSe:SWEEp:GATed {OFF 0}
VIDEO <sup>1</sup>	TRGS VID	TRIGger:SOURce INTernal2 SENSe:SWEEp:GATed {OFF 0}
	VIDLVL <numeric>	TRIGger:LEVel <numeric>
MANUAL	TRGS MAN	TRIGger:SOURce MANual SENSe:SWEEp:GATed {OFF 0}
GATE [LEVEL] <sup>1</sup>	TRGS GAT	TRIGger:SOURce EXTernal SENSe:SWEEp:GATed {ON 1}
GATE CTL:LEVEL	GATCTL LEV	SENSe:SWEEp:GATed:TRIGger LEVel
EDGE	GATCTL EDG	SENSe:SWEEp:GATed:TRIGger EDGE
GATE DELAY	GATDLY <numeric>	SENSe:SWEEp:GATed:DELay <numeric>
GATE LENGTH	GATLEN <numeric>	SENSe:SWEEp:GATed:LENGth <numeric>
RETURN		
RETURN		
TRIG EVENT <sup>2</sup>	TRGEVE SWE	TRIGger:EVENT:TYPE SWEEp
	TRGEVE POIN	TRIGger:EVENT:TYPE POINt
TRIG PLRTY POS neg	TRGP {POS NEG}	TRIGger:SLOPe {POSitive NEGative}
MEASURE RESTART	REST	INITiate[:IMMediate]:AGAI:n:ALL

1 Spectrum analyzer only

2 Network and impedance analyzer only

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>Start</b>	STAR <numeric>	SENSe:FREQuency:STARt <numeric> (Frequency) or SOURce:POWer:STARt <numeric> (Power)
<b>Stop</b>	STOP <numeric>	SENSe:FREQuency:STOP <numeric> (Frequency) or SOURce:POWer:STOP <numeric> (Power)
<b>Center</b>  STEP SIZE AUTO man CENTER STEP SIZE MKR→CNTR STEP MKRA→CNTR STEP MKR→CENTER MKRA→CENTER PEAK→CENTER	CENT <numeric>  CNTSAUTO {OFF ON 0 1} CNTS <numeric> MKRCSTE MKRDCSTE MKRCENT MKRDCEnt PEAKCENT	SENSe:FREQuency:CENTer <numeric> (Frequency) or SOURce:POWer:CENTer <numeric> (Power)  SENSe:FREQuency:CENTer:STEP[:INCRement]:AUTO {OFF ON 0 1}  SENSe:FREQuency:CENTer:STEP[:INCRement] <numeric>  SENSe:FREQuency:CENTer:STEP[:INCRement] MARKer  SENSe:FREQuency:CENTer:STEP[:INCRement] DMARKer  SENSe:FREQuency:CENTer MARKer (Frequency) or SOURce:POWer:CENTer MARKer (Power)  SENSe:FREQuency:CENTer DMARKer (Frequency) or SOURce:POWer:CENTer DMARKer (Power)  SENSe:FREQuency:CENTer TPEak (Frequency) or SOURce:POWer:CENTer TPEak (Power)
<b>Span</b>  FULL SPAN  ZERO SPAN  MKRA→SPAN	SPAN <numeric>  FULS  SPAN 0  MKRDSPAN	SENSe:FREQuency:SPAN <numeric> (Frequency) or SOURce:POWer:SPAN <numeric> (Power)  SENSe:FREQuency:SPAN:FULL (Frequency) or SOURce:POWer:SPAN:FULL (Power)  SENSe:FREQuency:SPAN 0 (Frequency) or SOURce:POWer:SPAN 0 (Power)  SENSe:FREQuency:SPAN DMARKer (Frequency) or SOURce:POWer:SPAN DMARKer (Power)

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>Marker</b>	MKR {OFF ON 0 1}	DISPlay[:WINDow]:TRACe:MARKer:ALL:STATe {OFF ON 0 1}
Network/Impedance Analyzer <b>SUB MKR</b> → See Sub-marker menu <b>CLEAR SUB MKR</b> → See Sub-marker menu <b>PRESET MKRS</b> <b>MKR ON [DATA]</b>  <b>MKR [UNCOUPLE]</b> <b>MKR [CONT]</b> <b>ΔMODE MENU</b> → See NA/ZA Delta mode menu	PRSMKRS MKRO DATA MKRO MEMO MKRCOUP {OFF ON 0 1} MKRCONT {OFF ON 0 1}	DISPlay[:WINDow]:TRACe:MARKer:ALL DEFault CALCulate:EVALuate:ON "DTR" CALCulate:EVALuate:ON "MTR" CALCulate:EVALuate:COUPle {OFF ON 0 1} CALCulate:EVALuate:INTerpolate {OFF ON 0 1}
Spectrum Analyzer <b>SUB MKR</b> → See Sub marker menu <b>CLEAR SUB MKR</b> → See Sub marker menu <b>PRESET MKRS</b> <b>MKR ON [DATA]</b>  <b>MKR [UNCOUPLE]</b> <b>ΔMODE MENU</b> → See SA Delat mode menu	PRSMKRS MKRO DATA MKRO MEMO MKRCOUP {OFF ON 0 1}	DISPlay[:WINDow]:TRACe:MARKer:ALL DEFault CALCulate:EVALuate:ON "DTR" CALCulate:EVALuate:ON "MTR" CALCulate:EVALuate:COUPle {OFF ON 0 1}
NA/ZA Delta mode menu <b>ΔMKR</b>  <b>FIXED ΔMKR</b>  <b>TRACKING ΔMKR</b>  <b>ΔMODE OFF</b>  <b>ΔMKR SWP PRM</b> <b>ΔMKR VALUE</b> <b>ΔMKR AUX VALUE</b> <b>RETURN</b>	DMKR ON  DMKR FIX  DMKR TRAC  DMKR OFF  OUTPDMKR? DMKRPRM <numeric> DMKRVAL <numeric> DMKRAUV <numeric>	DISPlay[:WINDow]:TRACe:MARKer:RELAtive {ON 1} DISPlay[:WINDow]:TRACe:MARKer:RELAtive:REFerence MARKer DISPlay[:WINDow]:TRACe:MARKer:RELAtive {ON 1} DISPlay[:WINDow]:TRACe:MARKer:RELAtive:REFerence FIXed DISPlay[:WINDow]:TRACe:MARKer:RELAtive {ON 1} DISPlay[:WINDow]:TRACe:MARKer:RELAtive:REFerence TRACked DISPlay[:WINDow]:TRACe:MARKer:RELAtive {OFF 0} CALCulate:EVALuate:REFerence:DATA? CALCulate:EVALuate:REFerence:X <numeric> CALCulate:EVALuate:REFerence:Y1 <numeric> CALCulate:EVALuate:REFerence:Y2 <numeric>
SA Delta mode menu <b>ΔMKR</b>  <b>FIXED ΔMKR</b>  <b>TRACKING ΔMKR</b>  <b>ΔMODE OFF</b>  <b>ΔMKR SWP PRM</b> <b>ΔMKR VALUE</b> <b>RETURN</b>	DMKR ON  DMKR FIX  DMKR TRAC  DMKR OFF  DMKRPRM <numeric> DMKRVAL <numeric>	DISPlay[:WINDow]:TRACe:MARKer:RELAtive {ON 1} DISPlay[:WINDow]:TRACe:MARKer:RELAtive:REFerence MARKer DISPlay[:WINDow]:TRACe:MARKer:RELAtive {ON 1} DISPlay[:WINDow]:TRACe:MARKer:RELAtive:REFerence FIXed DISPlay[:WINDow]:TRACe:MARKer:RELAtive {ON 1} DISPlay[:WINDow]:TRACe:MARKer:RELAtive:REFerence TRACked DISPlay[:WINDow]:TRACe:MARKer:RELAtive {OFF 0} CALCulate:EVALuate:REFerence:X <numeric> CALCulate:EVALuate:REFerence:Y1 <numeric>

Front Panel Key	Simple Command	Equivalent SCPI Command
Sub-marker menu SUB MKR 1 2 3 4 5 6 7  RETURN	SMKR{1-7} {OFF ON 0 1} SMKRPRM{1-7} <numeric> OUTPSMKR{1-7}? SMKRPRM{1-7}? SMKRVAL{1-7}? SMKRAUV{1-7}?	DISPlay[:WINDow]:TRACe:MARKer{2-8}:STATe {OFF ON 0 1} CALCulate:EVALuate:Y{2-8}:XPOSITION <numeric> CALCulate:EVALuate:Y{2-8}:DATA? CALCulate:EVALuate:Y{2-8}:XPOSITION? CALCulate:EVALuate:Y{2-8}:VALue1? CALCulate:EVALuate:Y{2-8}:VALue2?
Marker→ MKR→CENTER MKR→START MKR→STOP MKR→REFERENCE PEAK→CENTER CROSS CHAN ON off MORE MKR ZOOM ZOOMING APERTURE MKRA→SPAN MKRA→CENTER CROSS CHAN ON off RETURN	MKRCENT MKRSTAR MKRSTOP MKRREF PEAKCENT CRSC {OFF ON 0 1} MKRZM ZMAPER <numeric> MKRDSPAN MKRDCENT CRSC {OFF ON 0 1}	SENSE:FREQuency:CENTer MARKer (Frequency) or SOURce:POWer:CENTer MARKer (Power) SENSE:FREQuency:STARt MARKer (Frequency) or SOURce:POWer:STARt MARKer (Power) SENSE:FREQuency:STOP MARKer (Frequency) or SOURce:POWer:STOP MARKer (Power) DISPlay[:WINDow]:TRACe{1 2}:Y[:SCALE]:RLEVel MARKer SENSE:FREQuency:CENTer TPEak (Frequency) or SOURce:POWer:CENTer TPEak (Power) CALCulate:EVALuate:EFFect:ON {1 2} SENSE:FREQuency:SPAN MZAPerture (Frequency) SOURce:POWer:SPAN MZAPerture (Power) DATA[:DATA] MZAP <numeric> SENSE:FREQuency:SPAN DMARker (Frequency) or SOURce:POWer:SPAN DMARker (Power) SENSE:FREQuency:CENTer DMARker (Frequency) or SOURce:POWer:CENTer DMARker (Power) CALCulate:EVALuate:EFFect:ON {1 2}



Front Panel Key	Simple Command	Equivalent SCPI Command
Peak menu PEAK NEXT PEAK NEXT PEAK LEFT NEXT PEAK RIGHT PEAK DEF MENU → See Peak definition menu SUB MKR → See Sub-marker menu RETURN	SEAM PEAK SEANPK SEANPKL SEANPKR	CALCulate:EVALuate:Y:XPOSITION:PEAK CALCulate:EVALuate:Y:XPOSITION:NPEak CALCulate:EVALuate:Y:XPOSITION:LPEak CALCulate:EVALuate:Y:XPOSITION:RPEak
Multiple peaks menu SEARCH: PEAKS ALL PEAKS RIGHT PEAKS LEFT PEAK DEF MENU → See Peak definition menu SBCH TRACK ON off RETURN	SEAM PKSA SEAM PKSR SEAM PKSL  TRACK {OFF ON 0 1}	CALCulate:EVALuate:Y:XPOSITION:PALL CALCulate:EVALuate:Y:XPOSITION:PRIGHT CALCulate:EVALuate:Y:XPOSITION:PLEFT  CALCulate:EVALuate:Y:XPOSITION:TRACK {MAXimum MINimum TARGET PEAK PALL PLEFT PRIGHT OFF}
Peak definition menu THRESHOLD ON off THRESHOLD VALUE MKR→THRESHOLD PEAK PLRTY POS neg <sup>1</sup> PEAK DEF: ΔX <sup>1</sup> PEAK DEF: ΔY MKR→PEAKDELTA <sup>1</sup> RETURN	PKTHRE {OFF ON 0 1} PKTHVAL <numeric> MKRTHRE PKPOL {POS NEG} PKDLTX <numeric> PKDLTY <numeric> MKRPKD	CALCulate:EVALuate:PEAK:THReshold:STATe {OFF ON 0 1} CALCulate:EVALuate:PEAK:THReshold <numeric> CALCulate:EVALuate:PEAK:THReshold MARKer CALCulate:EVALuate:PEAK:POLarity {POSitive NEGative} CALCulate:EVALuate:PEAK:EXCursion:X <numeric> CALCulate:EVALuate:PEAK:EXCursion[:Y] <numeric> CALCulate:EVALuate:PEAK:EXCursion DMARKer
Width value menu MKRVAL/(√2) MKRVAL*(√2) MKRVAL/2 FIXED VALUE RETURN	WIDVTYPE DIVS2 WIDVTYPE MULS2 WIDVTYPE DIV2 WIDVTYPE FIX WIDV <numeric>	CALCulate:EVALuate:WIDTh:Y:TYPE DIVS2 CALCulate:EVALuate:WIDTh:Y:TYPE MULS2 CALCulate:EVALuate:WIDTh:Y:TYPE DIV2 CALCulate:EVALuate:WIDTh:Y:TYPE FIXed,<numeric>
Search range menu PART SECH ON off MKR→SEARCH RNG MKR→LEFT RNG MKR→RIGHT RNG RETURN	PARS {OFF ON 0 1} SEARSTR SEARSTRL SEARSTRR	CALCulate:EVALuate:BAND:FULL[:STATe] {OFF ON 0 1} CALCulate:EVALuate:BAND:SPAN DMARKer CALCulate:EVALuate:BAND:STARt MARKer CALCulate:EVALuate:BAND:STOP MARKer

<sup>1</sup> Network and impedance analyzer only

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>Utility</b> Network/Impedance Analyzer <b>MKR LIST ON off</b> <b>STATISTICS ON off</b> <b>MKR TIME ON off</b> <b>SMTH/POLAR MENU</b> → See Circle data menu	MKRL {OFF ON 0 1} MEASTAT {OFF ON 0 1} OUTPMSTA? MKRTIME {OFF ON 0 1}	DISPLAY[:WINDow]:TEXT16:STATe {OFF ON 0 1} CALCulate:EVALuate:MSStatistics[:STATe] {OFF ON 0 1} CALCulate:EVALuate:MSStatistics:DATA? DISPLAY[:WINDow]:TRACe:MARKer:UNIT:TIME {OFF ON 0 1}
Circle data menu <b>REAL IMAG</b> <b>LIN MAG PHASE</b> <b>LOG MAG PHASE</b> <b>R+jX</b> <b>G+jB</b> <b>SWR PHASE</b> <b>RETURN</b>	CIRF RI CIRF LIN CIRF LOG CIRF RX CIRF GB CIRF SWR	CALCulate:EVALuate:R:FORMat RIMaginary CALCulate:EVALuate:R:FORMat MLIPhase CALCulate:EVALuate:R:FORMat MLOPhase CALCulate:EVALuate:R:FORMat RX CALCulate:EVALuate:R:FORMat GB CALCulate:EVALuate:R:FORMat SWRPhase
Spectrum Analyzer <b>MKR LIST ON off</b> <b>STATISTICS ON off</b> <b>MKR TIME ON off</b> <b>NOISE FORM ON off</b>	MKRL {OFF ON 0 1} MEASTAT {OFF ON 0 1} OUTPMSTA? MKRTIME {OFF ON 0 1} MKRNOI {OFF ON 0 1}	DISPLAY[:WINDow]:TEXT16:STATe {OFF ON 0 1} CALCulate:EVALuate:MSStatistics[:STATe] {OFF ON 0 1} CALCulate:EVALuate:MSStatistics:DATA? DISPLAY[:WINDow]:TRACe:MARKer:UNIT:TIME {OFF ON 0 1} CALCulate:EVALuate:NOISe[:STATe] {OFF ON 0 1}

Front Panel Key	Simple Command	Equivalent SCPI Command
System		
IBASIC		
Step		PROGRAM[:SElected]:EXECute "STEP"
Continue		PROGRAM[:SElected]:STATe CONTINUE or PROGRAM[:SElected]:EXECute "CONT"
Run		PROGRAM[:SElected]:STATe RUN or PROGRAM[:SElected]:EXECute "RUN"
Pause		PROGRAM[:SElected]:STATe PAUSE or PROGRAM[:SElected]:EXECute "PAUSE"
Stop		PROGRAM[:SElected]:STATe STOP or PROGRAM[:SElected]:EXECute "STOP"
Edit		PROGRAM[:SElected]:EXECute "EDIT"
ASSIGN @Hp4396		
OUTPUT @Hp4396		
ENTER @Hp4396		
END		
GOTO LINE		
RECALL LINE		
END EDIT		
ON KEY LABELS		
[USER DEFINE]		
CAT		
SAVE		
RE-SAVE		
GET		
PURGE		
INITIALIZE		
MSI [INTERNAL/MEMORY]		
SCRATCH		
RENumber		
LIST		
COMMAND ENTRY		
SELECT LETTER		
SPACE		
BACK SPACE		
ERASE TITLE		
DONE		
CANCEL		

Front Panel Key	Simple Command	Equivalent SCPI Command
CLEAR I/O		
RESET		
MEMORY PARTITION		
mmK RAM nnK BASIC		
DONE		
CHANGE YES		
NO		
CANCEL		

Front Panel Key	Simple Command	Equivalent SCPI Command
SET CLOCK		
TIME HH:MM:SS		
HOUR		
MIN		
SEC		
ENTER	SETCTIME <h,m,s>	SYSTem:TIME <hour>,<minute>,<second>
CANCEL		
DATE DD/MM/YY		
MON		
DAY		
YEAR		
ENTER	SETCDATE <y,m,d>	SYSTem:DATE <year>,<month>,<day>
CANCEL		
DATE MODE:MonDayYear	MONDAYEAR	SYSTem:DATE:MODE MDY
DayMonYear	DAYMYEAR	SYSTem:DATE:MODE DMY
RETURN		
BEEPER MENU		
BEEP DONE ON off	BEEPDONE {OFF ON 0 1}	SYSTem:BEEPer1:STATe {OFF ON 0 1}
BEEP WARN ON off	BEEPWARN {OFF ON 0 1}	SYSTem:BEEPer2:STATe {OFF ON 0 1}
RETURN		
LIMIT MENU		
LIMIT LINE ON off	LIMILINE {OFF ON 0 1}	CALCulate:LIMit:LINE {OFF ON 0 1}
LIMIT TEST ON off	LIMITEST {OFF ON 0 1}	CALCulate:LIMit:STATe {OFF ON 0 1}
BEEP FAIL ON off	BEEPFAIL {OFF ON 0 1}	CALCulate:LIMit:BEEPer[:STATe] {OFF ON 0 1}
EDIT LIMIT LINE	EDITLIML	
SEGMENT	LIMSEDI <numeric>	CALCulate:LIMit:SEGment <numeric>
EDIT	LIMSEDI [<numeric>]	CALCulate:LIMit:SEGment:EDIT
DELETE	LIMSEDEL	CALCulate:LIMit:SEGment:DELe
ADD	LIMSEADD	CALCulate:LIMit:SEGment:ADD
CLEAR LIST	LIMCLEL	CALCulate:LIMit:CLEar
CLEAR LIST YES		
NO		
DONE	LIMEDONE	CALCulate:LIMit:SAVE
LIMIT LINE OFFSETS		
SWP PARAM OFFSET	LIMIPRMO <numeric>	CALCulate:LIMit:CONTRol:OFFSet <numeric>
AMPLITUDE OFFSET	LIMIAMPO <numeric>	CALCulate:LIMit:OFFSet <numeric>
MKR—AMPOFS.	MKRAMPO	CALCulate:LIMit:OFFSet MARKer
RETURN		
RETURN		
SERVICE MENU		

Front Panel Key	Simple Command	Equivalent SCPI Command
Limit line entry menu		
SWP PARAM	LIMPRM <numeric>	CALCulate:LIMit:SEGment:CONTRol[:DATA] <numeric>
MKR→SWP PARAM	MKRSWPRM	CALCulate:LIMit:SEGment:CONTRol[:DATA] MARKer
UPPER LIMIT	LIMU <numeric>	CALCulate:LIMit:SEGment:UPPer <numeric>
LOWER LIMIT	LIML <numeric>	CALCulate:LIMit:SEGment:LOWer <numeric>
DELTA LIMIT	LIMD <numeric>	CALCulate:LIMit:SEGment:DELTA <numeric>
MIDDLE VALUE	LIMM <numeric>	CALCulate:LIMit:SEGment:MIDDLE <numeric>
MKR→MIDDLE	MKRMIDD	CALCulate:LIMit:SEGment:MIDDLE MARKer
DCNE	LIMSDON	CALCulate:LIMit:SEGment:SAVE
<b>Local</b>		
SYSTEM CONTROLLER		
ADDRESSABLE ONLY		
SET ADDRESSES		
ADDRESS:4396		
ADDRESS:CONTROLLER	ADDRCONT <numeric>	SYSTem:COMMunicate:GPIB2:ADDRess <numeric>
RETURN		

Front Panel Key	Simple Command	Equivalent SCPI Command
<p><b>Copy</b></p> <p><b>PRINT [STANDARD]</b></p> <p><b>COPY ABORT</b></p> <p><b>COPY SKEY on OFF</b></p> <p><b>COPY TIME ON off</b></p> <p><b>PRINT SETUP</b> → See Print setup menu</p> <p><b>ORIENT [PORTRAIT]</b></p> <p><b>FORM FEED ON off</b></p> <p><b>MORE</b> → See Copy more menu</p>	<p>PRINALL</p> <p>COPIA</p> <p>PRSOFT {OFF ON 0 1}</p> <p>COPT {OFF ON 0 1}</p> <p>LANDSCAPE {OFF ON 0 1}</p> <p>FORMFEED {OFF ON 0 1}</p>	<p>HCOPY[:IMMEDIATE]</p> <p>HCOPY:ABORT</p> <p>HCOPY:DRIVER:SKEY {OFF ON 0 1}</p> <p>HCOPY:ITEM:TDSAMP:STATe {OFF ON 0 1}</p> <p>HCOPY:DRIVER:LANDSCAPE {OFF ON 0 1}</p> <p>HCOPY:DRIVER:FORMFEED {OFF ON 0 1}</p>
<p>Copy more menu</p> <p>Network Analyzer</p> <p><b>LIST VALUES</b></p> <p><b>OPERATING PARAMETERS</b></p> <p><b>CAL KIT DEFINITION</b> → See Copy cal kit menu</p> <p><b>LIST SWEEP TABLE</b> → See Copy list sweep menu</p> <p><b>LIMIT TEST TABLE</b> → See Copy limit test menu</p> <p><b>RETURN</b></p> <p>Spectrum Analyzer</p> <p><b>LIST VALUES</b></p> <p><b>OPERATING PARAMETERS</b></p> <p><b>LIST SWEEP TABLE</b> → See Copy list sweep menu</p> <p><b>LIMIT TEST TABLE</b> → See Copy limit test menu</p> <p><b>RETURN</b></p> <p>Impedance Analyzer</p> <p><b>LIST VALUES</b></p> <p><b>OPERATING PARAMETERS</b></p> <p><b>CAL KIT DEFINITION</b> → See Copy cal kit menu</p> <p><b>COMPEN KIT DEFINITION</b></p> <p><b>LIST SWEEP TABLE</b> → See Copy list sweep menu</p> <p><b>LIMIT TEST TABLE</b> → See Copy limit test menu</p> <p><b>RETURN</b></p>	<p>LISV</p> <p>OPEP</p> <p>LISV</p> <p>OPEP</p> <p>LISV</p> <p>OPEP</p> <p>COMS</p>	<p>DISPlay[:WINDow]:TEXT1:PAGE 1 DISPlay[:WINDow]:TEXT1:STATe {ON 1}</p> <p>DISPlay[:WINDow]:TEXT2:PAGE 1 DISPlay[:WINDow]:TEXT2:STATe {ON 1}</p> <p>DISPlay[:WINDow]:TEXT1:PAGE 1 DISPlay[:WINDow]:TEXT1:STATe {ON 1}</p> <p>DISPlay[:WINDow]:TEXT2:PAGE 1 DISPlay[:WINDow]:TEXT2:STATe {ON 1}</p> <p>DISPlay[:WINDow]:TEXT1:PAGE 1 DISPlay[:WINDow]:TEXT1:STATe {ON 1}</p> <p>DISPlay[:WINDow]:TEXT2:PAGE 1 DISPlay[:WINDow]:TEXT2:STATe {ON 1}</p> <p>DISPlay[:WINDow]:TEXT20:PAGE 1 DISPlay[:WINDow]:TEXT20:STATe ON</p>

Front Panel Key	Simple Command	Equivalent SCPI Command
Copy cal kit menu STANDARD DEFINITION → See Copy standard number menu CLASS ASSIGNMENT RETURN	CALCASSI	Display[:WINDow]:TEXT3:PAGE 1 Display[:WINDow]:TEXT3:STATe {ON 1}
Copy limit test menu DISPLAY LIST DISP MODE: UPR & LWR MID & DLT RETURN	DISLLIST DISMAMP UL DISMAMP MD DISMAMP?	Display[:WINDow]:TEXT{14 15}:PAGE 1 Display[:WINDow]:TEXT{14 15}:STATe {ON 1}
Copy list sweep menu DISPLAY LIST DISP MODE: ST & SP CTR & SPAN RETURN	DISL DISMPRM STSP DISMPRM CTSP DISMPRM?	Display[:WINDow]:TEXT{12 13}:PAGE 1 Display[:WINDow]:TEXT{12 13}:STATe {ON 1}
Copy standard number menu → See Screen menu STD NO.1 STD NO.2 STD NO.3 STD NO.4 STD NO.5 STD NO.6 STD NO.7 STD NO.8	CALS 1 CALS 2 CALS 3 CALS 4 CALS 5 CALS 6 CALS 7 CALS 8	Display[:WINDow]:TEXT4:PAGE 1 Display[:WINDow]:TEXT4:STATe {ON 1} Display[:WINDow]:TEXT5:PAGE 1 Display[:WINDow]:TEXT5:STATe {ON 1} Display[:WINDow]:TEXT6:PAGE 1 Display[:WINDow]:TEXT6:STATe {ON 1} Display[:WINDow]:TEXT7:PAGE 1 Display[:WINDow]:TEXT7:STATe {ON 1} Display[:WINDow]:TEXT8:PAGE 1 Display[:WINDow]:TEXT8:STATe {ON 1} Display[:WINDow]:TEXT9:PAGE 1 Display[:WINDow]:TEXT9:STATe {ON 1} Display[:WINDow]:TEXT10:PAGE 1 Display[:WINDow]:TEXT10:STATe {ON 1} Display[:WINDow]:TEXT11:PAGE 1 Display[:WINDow]:TEXT11:STATe {ON 1}

Front Panel Key	Simple Command	Equivalent SCPI Command
Print setup menu PRINT STANDARD COLOR PRINT COLOR (FIXED) DPI TOP MARGIN LFT MARGIN DEFAULT SETUP RETURN	PRIS PRIC PRICFIXE PRICVARI DPI <numeric> TMARG <numeric> LMARG <numeric> DFLT	HCOpy:DRIVER:COLor {OFF 0} HCOpy:DRIVER:COLor {ON 1} HCOpy:DRIVER:CMAP:COLor FIXed HCOpy:DRIVER:CMAP:COLor VARIable HCOpy:DRIVER:DPI <numeric> HCOpy:DRIVER:TOPMarg <numeric> HCOpy:DRIVER:LEFTMarg <numeric> HCOpy:DEFault
Screen menu PRINT [STANDARD] COPY ABORT COPY TIME ON off PRINT SETUP — See Print setup menu NEXT PAGE PREV PAGE RESTORE DISPLAY	PRINALL COPA COPT {OFF ON 0 1} NEXP PREP RESD	HCOpy:DRIVER:LANGUage PCL HCOpy{:IMMediate} HCOpy:ABORt HCOpy:ITEM:TDSlamp:STATe {OFF ON 0 1} DISPlay[:WINDow]:TEXT{1-17}:PAGE UP DISPlay[:WINDow]:TEXT{1-17}:PAGE DOWN DISPlay[:WINDow]:TEXT{1-17}:STATe {OFF 0}

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>Save</b>		
<b>STATE</b>	SAVDSTA <string>	MMEMory:STORe:STATe <string(file name)>[,<string(msus)>]
<b>DATA ONLY</b>		
<b>SAVE BINARY</b>	SAVDDAT <string>	MMEMory:STORe:TRACe SEL,<string(file name)>[,<string(msus)>]
<b>SAVE ASCII</b>	SAVDASC <string>	MMEMory:STORe:DINTerchange:TRACe SEL,<string(file name)>[,<string(msus)>]
<b>DEFINE SAVE DATA</b> — See Define save data menu		
<b>STOR DEV [DISK]</b>	STOD {DISK MEMO}	
<b>GRAPHICS</b>	SAVDTIF <string>	MMEMory:STORe:DINTerchange:TIFf <string(file name)>[,<string(msus)>]
<b>4396A STATE</b>	SAVDSTAC <string>	
<b>RE-SAVE FILE</b>	RESAVD <string>	MMEMory:DELete <file_name>[,<msus>] MMEMory:STORe:{STATe TRACe} [SEL,]<file_name>[,<msus>]
<b>file name</b>		
<b>PREV FILES</b>		
<b>NEXT FILES</b>		
<b>RETURN</b>		
<b>FILE UTILITIES</b>		
<b>PURGE FILE</b>	PURG <string>	MMEMory:DELete <file_name>[,<msus>]
<b>file name</b>		
<b>PREV FILES</b>		
<b>NEXT FILES</b>		
—See purge yes no menu		
<b>STOR DEV [DISK]</b>	STOD {DISK MEMO}	
<b>CREATE DIRECTORY</b>	CRED <string>	MMEMory:CREate:DIRectory <string>
<b>CHANGE DIRECTORY</b>	CHAD <string>	MMEMory:CDIRectory [<string>]
<b>COPY FILE</b>	FILC <string>,<string>,<string>,<string>	MMEMory:COpy <string(s)>,<msus>,<string(d)>,<msus>
<b>file name</b>		
<b>PREV FILES</b>		
<b>NEXT FILES</b>		
<b>STOR DEV [DISK]</b>	STOD {DISK MEMO}	

Front Panel Key	Simple Command	Equivalent SCPI Command
INITIALIZE DISK INITIALIZE: YES NO FORMAT [LIF] STOR DEV [ ] RETURN STOR DEV [ ]	INID  DISF LIF DISF DOS STOD{DISK MEMO}  STOD{DISK MEMO}	MMEMemory:INITIALize <msus>,{LIF DOS}
Define save data menu RAW ON off  CAL ON off  DATA ON off  MEM ON off  DATA TRACE ON off  MEM TRACE ON off  RETURN	SAVRAW {ON 1} SAVRAW {OFF 0} SAVCAL {ON 1} SAVCAL {OFF 0} SAVDAT {ON 1} SAVDAT {OFF 0} SAVMEM {ON 1} SAVMEM {OFF 0} SAVDTRC {ON 1} SAVDTRC {OFF 0} SAVMTRC {ON 1} SAVMTRC {OFF 0}	MMEMemory:STORe:ITEM:TRACe:SELEct RAW MMEMemory:STORe:ITEM:TRACe:DELEte RAW MMEMemory:STORe:ITEM:TRACe:SELEct CCO MMEMemory:STORe:ITEM:TRACe:DELEte CCO MMEMemory:STORe:ITEM:TRACe:SELEct DATA MMEMemory:STORe:ITEM:TRACe:DELEte DATA MMEMemory:STORe:ITEM:TRACe:SELEct MEM MMEMemory:STORe:ITEM:TRACe:DELEte MEM MMEMemory:STORe:ITEM:TRACe:SELEct DTR MMEMemory:STORe:ITEM:TRACe:DELEte DTR MMEMemory:STORe:ITEM:TRACe:SELEct MTR MMEMemory:STORe:ITEM:TRACe:DELEte MTR
Purge yes no menu PURGE: YES NO		
Recall file name file name file name file name PREV FILES NEXT FILES STOR DEV [ ]	RECD <string>      STOD{DISK MEMO}	MMEMemory:LOAD:STATe <file_name>[,<msus>] (State) MMEMemory:LOAD:TRACe SEL,<file_name>[,<msus>] (Data)
Preset	PRES	SYSTem:PRESet

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>HP-IB only commands</b> Marker related commands	MKR {ON 1} MKRPRM <numeric> OUTPMKR? MKRVAL? MKRAUV? MKRP <numeric> SMKRP{1-7} <numeric>	DISPlay[:WINDow]:TRACe:MARKer:STATe {ON 1} CALCulate:EVALuate:Y:XPOSITION <numeric> CALCulate:EVALuate:Y:DATA? CALCulate:EVALuate:Y:VALue1? CALCulate:EVALuate:Y:VALue2? CALCulate:EVALuate:Y:XPOSITION:POINt <numeric> CALCulate:EVALuate:Y{2-8}:XPOSITION:POINt <numeric>
8-bit IO related commands	INP8IO? OUT8IO <numeric>	SYSTem:COMMunicate:PARAllel[:RECeive]:DATA? SYSTem:COMMunicate:PARAllel:TRANsmit:DATA <numeric>
KEY related commands	KEY <NUMERIC> ENKEY DSKEY USKEY	SYSTem:KEY <numeric> SYSTem:KLOCK {OFF 0} SYSTem:KLOCK {ON 1}
Input/output data array related commands	INPURAW1 INPURAW2 INPURAW3 INPURAW4 INPUDATA INPUDTRC OUTPRAW1? OUTPRAW2? OUTPRAW3? OUTPRAW4? OUTPDATA? OUTPDATAP? <numeric> OUTPMEMO? OUTPMEMOP? <numeric> OUTPDTRC? OUTPDTRCP? <numeric> OUTPMTRC? OUTPMTRCP? <numeric> OUTPSWPRM? OUTPSWPRMP? <numeric>	DATA[:DATA] RAW1,{<block> <numeric>[,<numeric>]} DATA[:DATA] RAW2,{<block> <numeric>[,<numeric>]} DATA[:DATA] RAW3,{<block> <numeric>[,<numeric>]} DATA[:DATA] RAW4,{<block> <numeric>[,<numeric>]} DATA[:DATA] DATA,{<block> <numeric>[,<numeric>]} TRACe[:DATA] DTR,{<block> <numeric>[,<numeric>]} DATA[:DATA]? RAW1 DATA[:DATA]? RAW2 DATA[:DATA]? RAW3 DATA[:DATA]? RAW4 DATA[:DATA]? DATA DATA[:DATA]:VALue? DATA,<point> DATA[:DATA]? MEM DATA[:DATA]:VALue? MEM,<point> TRACe[:DATA]? DTR TRACe[:DATA]:VALue? DTR,<point> TRACe[:DATA]? MTR TRACe[:DATA]:VALue? MTR,<point> DATA[:DATA]? SPAR DATA[:DATA]:VALue? SPAR,<point>

Front Panel Key	Simple Command	Equivalent SCPI Command
Calibration and compensation related commands	INPUCALC{1-12} <numeric> OUTPCALC{1-12}? INPUCALK <numeric> OUTPCALK? SAVC INPUCOMC{1-3} OUTPCOMC{1-3}?	DATA[:DATA] CCO{1-12},{<block> <numeric>[,<numeric>]} DATA[:DATA]? CCO{1-12} DATA[:DATA] CKIT,{<block> <numeric>[,<numeric>]} DATA[:DATA]? CKIT SENSE:CORREction:COLLect:SAVE9 DATA[:DATA] CMP{1-3},{<block> <numeric>[,<numeric>]} DATA[:DATA]? CMP{1-3}
Transfer data format related commands	FORM2 FORM3 FORM4 FORM5	FORMat[:DATA] REAL,32 FORMat[:DATA] REAL,64 FORMat[:DATA] ASCii FORMat[:DATA] PACKed,32
Limit test related commands	OUTPLIMF? OUTPFAIP? OUTPLIMM?	DATA[:DATA]? LFA DATA:POINts? LFA DATA[:DATA]? LMAR
Error related command	OUTPERRO?	SYSTem:ERRor?
Status byte related commands	CLES ESB? ESNB <numeric> OSR? OSE <numeric> OSER? OSPT <numeric> OSNT <numeric>	*CLS (Common Command) STATus:INSTrument[:EVENT]? STATus:INSTrument:ENABle <numeric> STATus:OPEratiOn:CONDition? STATus:OPEratiOn:ENABle <numeric> STATus:OPEratiOn[:EVENT]? STATus:OPEratiOn:PTRansiOn <numeric> STATus:OPEratiOn:NTRansiOn <numeric>
Test set related command	TESS?	SYSTem:COMMunicate:TSET?
LCD display related command	SCRn {OFF ON 0 1} BLIGHT {OFF ON 0 1}	

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>Waveform analysis commands</b>		
Waveform analysis setup commands	ANAOCH1 ANAOCH2 ANARANG ANARFULL ANAODATA ANAOMEMO THRR	
Maximum/Minimum/Mean search commands	OUTPMAX? OUTPMIN? OUTPMINMAX? OUTPMEAN? PEAK? NEXPK? NUMLMAX? NUMLMIN? LMAX? LMIN? TARR? TARL?	
Ripple analysis commands	RPLPP? RPLHEI? RPLRHEI? RPLLHEI? RPLENV? RPLMEA? RPLVAL? POLE?	
Filter and Resonator analysis commands	OUTPFILT? OUTPXFIL? OUTPCFIL? OUTPRESO? OUTPRESR? OUTPRESF? OUTPCERR?	
Equivalent circuit analysis commands	EQUCPARA? EQU EQUCPARS? EQUCO? EQUCPARS4?	

Front Panel Key	Simple Command	Equivalent SCPI Command
<b>3-term calibration commands</b>	INPUOPEA INPUSHOA INPULOAA INPUD	
<b>Common commands</b>	*CLS *IDN? *OPT? *EST *TST? *OPC *WAI *CLS *ESE <numeric> *ESR? *SRE <numeric> *STB? *TRG *PCB <numeric>	

## **SCPI Commands Summary**

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This appendix summarizes the SCPI commands in alphabetical order. It also shows the equivalent simple command when applicable.

Command	Parameter	Note	Equivalent Simple Command
ABORT			HOLD
CALCulate			
:AVERage			
:STATe	{OFF ON 0 1}		DHOLD
:TYPE	{MAXimum MINimum}		DHOLD
:EVALuate			
:BAND			
:FULL			
[:STATe]	{OFF ON}		PARS
:SPAN	DMARKer	[no query]	SEARSTR
:STARt	MARKer	[no query]	SEARSTRL
:STOP	MARKer	[no query]	SEARSTRR
:COUple	{OFF ON 0 1}		MKRCOUP
:EFFect			
:ON	{1 2}		CRSC
:EPARameters		CALECPARA	
:CIRCUit {A B C D E}		EQUC	
:SIMulation		SIMFCHAR	
:INterpolate	{OFF ON 0 1}		MKRCONT
:MStatistics			
:DATA?		[query only]	OUTPMSTA?
[:STATe]	{OFF ON 0 1}		MEASTAT
:NOISe			
[:STATe]	{OFF ON 0 1}		MKRNOI
:ON	{"DTR" "MTR"}		MKRO
:PEAK			
:EXCursion			
:X	{<numeric> DMARKer}		MKRPKD, PKDLTX
[:Y]	{<numeric> DMARKer}		MKRPKD, PKDLTY
:POLarity	{POSitive NEGative}		PKPOL
:THReshold	{<numeric> MARKer}		MKRTHRE, PKTHVAL
:STATe	{OFF ON 0 1}		PKTHRE

Command	Parameter	Note	Equivalent Simple Command
CALCulate (continued)			
:EVALuate (continued)			
:REFErence			
:DATA?		[query only]	OUTPDMKR?
:X	<numeric>		DMKRPRM
:Y1	<numeric>		DMKRVAL
:Y2	<numeric>		DMKRAUV
:WIDTh			
:DATA?		[query only]	OUTPMWID?
:STATe	{OFF ON 0 1}		WIDT
:XPOSITion			
:IN		[no query]	WIDSIN
:OUT		[no query]	WIDSOUT
:Y	<numeric>		WIDV
:TYPE	{DIVS2 MULS2 DIV2 FIXed}		WIDVTYPE
:Y{1}			
:DATA?		[query only]	OUTPMKR?
:VALue1?		[query only]	MKRVAL?
:VALue2?		[query only]	MKRAUV?
:XPOSITion	<numeric>		MKRPRM
:LPEak		[no query]	SEANPKL
:LTARget		[no query]	SEAL
:MAXimum		[no query]	SEAM
:MINimum		[no query]	SEAM
:NPEak		[no query]	SEANPK
:PALL		[no query]	SEAM
:PEAK		[no query]	SEAM
:PLEFt		[no query]	SEAM
:POINT	<numeric>		MKRP
:PRIGHt		[no query]	SEAM
:RPEak		[no query]	SEANPKR
:RTARget		[no query]	SEAR
:TARGet	<numeric>		SEAM, SEATARG
:TRACk	{MAXimum MINimum TARGet PEAK PALL PLEFt PRIGHt OFF}		TRACK
:Y{2-8}			
:DATA?		[query only]	OUTPSMKR{1-7}?
:VALue1?		[query only]	SMKRVAL{1-7}?
:VALue2?		[query only]	SMKRAUV{1-7}?
:XPOSITion	<numeric>		SMKRPRM{1-7}
:POINT	<numeric>		SMKRP{1-7}

Command	Parameter	Note	Equivalent Simple Command
CALCulate (continued)			
:FORMat	{GDElay REAL IMAGinary MLINear MLOGarithmic PHASe UPHase SWR COMPLex}		FMT, SAUNIT
:FORMat	{RIMaginary MLIPhase MLOPhase RX GB SWRPhase   MLINear  PHASe UPHase  REAL  IMAGinary CP SC LP LS D Q RP RS COMPLex}		FMT, SAUNIT, CIRF, MEAS
:UNIT			
:ANGLE	{DEG RAD}		PHAU
:GDAPerture			
:APERture	<numeric>		GRODAPER
:LIMIT			
:BEEPper			
[:STATe]	{OFF ON 0 1}		BEEPFail
:CLEar		[no query]	LIMCLEL
:CONTRol			
:OFFSet	<numeric>		LIMIPRMO, MKRAMPO
:LINE	{OFF ON 0 1}		LIMILINE
:OFFSet	{<numeric> MARKer}		LIMIAMPO
:SAVE		[no query]	LIMEDONE
:SEGment	<numeric>		LIMSEDI
:ADD		[no query]	LIMSADD
:CONTRol			
[:DATA]	{<numeric> MARKer}		LIMPRM, MKRSWPRM
:DELete		[no query]	LIMSDEL
:DELta	<numeric>		LIMD
:EDIT		[no query]	LIMSEDI
:LOWer	<numeric>		LIML
:MIDDLE	{<numeric> MARKer}		LIMM, MKRMIDD
:SAVE		[no query]	LIMSDON
:UPPer	<numeric>		LIMU
:STATe	{OFF ON 0 1}		LIMITEST
:MATH1			
[:EXPReSSion]			
:CATalog?		[query only]	(None)
:NAME	{OFF YREF YTRA ZREF ZTRA INVS MP4 MP8 MP16}		CONV
:NAME	{OFF YREF YTRA ZREF ZTRA INVS MP4 MP8 MP16}	(NA)	CONV
	{OFF IMPedance ADMittance}	(ZA)	MEAS



Command	Parameter	Note	Equivalent Simple Command
DIAG (continued)			
:SERvice (continued)			
:IF			
:ADMx			
:MODE	{ AUTO ALternate DEGO DEG90}		(None)
:BPFilteR			
:MODE	{ AUTO BW3M BW1M XTAL}		(None)
:GAIN			
:MODE	{ AUTO MANual}		(None)
:W	{ AUTO DB0 DB10}		(None)
:X	{ AUTO DB0 DB18}		(None)
:Y	{ AUTO DB0 DB6 DB12 DB18}		(None)
:Z	{ AUTO DB0 DB2 DB4 DB18}		(None)
:LPFilteR			
:MODE	{ AUTO BW5K BW15K BW50K BW150K THRough}		(None)
:RANGe			
:F	{ HIGH LOW}		(None)
:MODE	{ AUTO MANual}	[no query]	(None)
:R	{ HIGH LOW}		(None)
:SHBW			
:MODE	{ AUTO NARRow MIDDLE WIDE}		(None)
:TLOCAl			
:MODE	{ AUTO AC DC}		(None)
:MODE	ON		(None)
:SOURce			
:ALCLoOp	{ OPEN CLoSe}		(None)
:ATTenuator	{ AUTO DB0 DB10 DB20 DB30 DB40 DB50 DB60}		(None)
:GAIN			
:DAC			
:MODE	{ AUTO MANual}		(None)
:VALue	< numeric >		(None)
:LEVel			
:DAC			
:MODE	{ AUTO MANual}		(None)
:VALue	< numeric >		(None)
:MODE	{ AUTO MANual}		(None)

Command	Parameter	Note	Equivalent Simple Command
DIAG (continued)			
:SERvice (continued)			
:SYNthesizer			
:FLOCal			
:MODE	{AUTO SINGLE TRIPle}		(None)
:FREQuency:OFFSet	<numeric>		
:FN			
:MODE	{AUTO NARRow WIDE}		(None)
:STEP			
:DAC			
:MODE	{AUTO MANual}		(None)
:VALue	<numeric>		(None)
:LOOP	{OPEN CLOSE}		(None)
:MODE	{AUTO MANual}		(None)
:OUTPut	{OFF ON 0 1}		(None)
:POLarity	{AUTO POSitive NEGative}		(None)
:TEST	<numeric>	[no query]	(None)
:EXECute		[no query]	(None)
:CONTInue		[no query]	(None)
:RESult?	<numeric>	[query only]	(None)
DISPlay			
:ANNotation			
:BACKlight	{OFF ON 0 1}		BLIGHT
:FREQuency	OFF		FREQ
:BRIGHtness	<numeric>		INTE
:CMAP			
:COLor{1-14}			
:DEFault		[no query]	RSCO
:HSL	<hue>,<sat>,<lum>		COLO
:DEFault			DEFC
:LOAD		[no query]	RECC
:STORe		[no query]	SVCO
:CONTRast	<numeric>		BACI

Command	Parameter	Note	Equivalent Simple Command
DISPlay (continued)			
[:WINDow]			
:ALLocation	{INSTRument HIHB BASic BSTatus}		DISA
:FORMat	{FBACk ULOWer}		SPLD
:TEXT{1-17}			
[:DATA]	<title_string> (only for TEXT17)		TITL
:PAGE	{UP DOWN <numeric>} (except TEXT16 and TEXT17)		CALCASSI, CALS, DISL, DISLLIST, LISV, NEXP, OPEP, PREP
:STATe	{OFF ON 0 1} (except TEXT17)		CALCASSI, CALS, DISL, DISLLIST, LISV, MKRL, OPEP, RESD
:TEXT18 (18: Equivalent circuit parameters)			
:STATe	{OFF ON 0 1}		DESECPARA
:TEXT19 (19: Equivalent circuit model)			
:STATe	{OFF ON 0 1}		DISECIRC
:TEXT20 (20: Fixture compensation kit definition table)			
:STATe	{OFF ON 0 1}		COMS
:TRACe{[1] 2} (1: Data Trace, 2: Memory Trace)			
:GRATticule			
:FORMat	{RECTangle POLar SMITH ADMittance}	(NA)	FMT
:FORMat	{RECTangle POLar SMITH ADMittance CPLane}	(ZA)	FMT
:MARKer{[1] 2-8} (1: Main Marker, 2-8: Sub Marker)			
:ALL	DEFault	[no query]	PRSMKRS
:STATe	{OFF ON 0 1} (MARKer{2-8} only)		MKR
:RELAtive	{OFF ON 0 1}		DMKR
:REFerence	{MARKer FIXed TRACked}		DMKR
:STATe	{OFF ON 0 1} (Only for MARKer{2-8})		SMKR{1-7}
:UNIT			
:TIME	{OFF ON 0 1}		
:X			
[:SCALE]			
:RLEVel	<numeric>		REFX

Command	Parameter	Note	Equivalent Simple Command
:Y [:SCALE]			
:AUTO	ONCE	[no query]	AUTO
:BOTTom	<numeric>		BOTV
:COUPle	{OFF ON 0 1}		SCAC
:PDIVision	<numeric>		SCAL
:RLEVel	{<numeric> MARKer}		REFV, REFY, MKRREF
:RPOStion	<numeric>		REFP
:TOP	<numeric>		TOPV
[:SCALE]			
:SPACing	{LINear LOGarithmic}		FMT
[:SCALE]			
:STATe	{OFF ON 0 1}		
FORMat [:DATA]	{ASCIi REAL,32 REAL,64 PACKed,32}		FORM2, FORM3, FORM4, FORM5

Command	Parameter	Note	Equivalent Simple Command
HCOpy :ABORt :DEfault :DRIVer :CMAP :COLor :COLor :DPI :FORMFeed :LANDScape :LEFTMarg :SKEY :TOPMarg :ITEM :TDSamp :STATe	    {FIXed VARIable} {OFF ON 0 1} <numeric> {OFF ON 0 1} {OFF ON 0 1} <numeric> {OFF ON 0 1} <numeric> {OFF ON 0 1}	 [No query] [No query]	 COPA DFLT  PRICFIXE, PRICVARI PRIC, PRIS DPI FORMFEED LANDSCAPE LMARG PRSOFT TMARG  COPT
INTIate [:IMMediate] :AGain :ALL :CONTinuous	   {OFF ON 0 1}	 [no query]  [no query]	 NUMG, SING  REST CONT, HOLD, NUMG, SING
INPut :IMPedance	 <numeric>		 INPZ
INSTRument :COUPle :NSElect [:SElect] :STATe :TYPE	 {OFF ON 0 1} {1 2} {CH1 CH2} {OFF ON 0 1} {NA SA ZA}		 COUC CHAN1, CHAN2 CHAN1, CHAN2, DUAC CHAN1, CHAN2, DUAC NA, SA, ZA

Command	Parameter	Note	Equivalent Simple Command
<b>MMEMemory</b>			
:CDIRectory	<string>	[no query]	CHAD
:COPY	<string(src)>,<msus>, <string(des)>,<msus>	[no query]	FILC
:CREate			
:DIRectory	<string>	[no query]	CRED
:DELete	<file_name>[,<msus>]	[no query]	PURG, RESAVD
:INITialize	<msus>,{LIF DOS}	[no query]	INID
:LOAD			
:STATe	<file_name>[,<msus>]		RECD
:TRACe	SEL,<file_name>[,<msus>]		RECD
:STORE			
:DINTerchange			
:TIFF	<file_name>[,<msus>]	[no query]	SAVDTF
:TRACe	SEL,<file_name>[,<msus>]		SAVDASC
:ITEM			
:TRACe			
:CATalog?		[query only]	SAVCAL?, SAVDAT?, SAVDTR?, SAVMEM?, SAVMTR?, SAVRAW?
:DELete	{CCO DATA DTR MEM MTR RAW}	[no query]	SAVCAL, SAVDAT, SAVDTR, SAVMEM, SAVMTR, SAVRAW
:SELect	{CCO DATA DTR MEM MTR RAW}	[no query]	SAVCAL, SAVDAT, SAVDTR, SAVMEM, SAVMTR, SAVRAW
:STATe	<file_name>[,<msus>]		SAVDSTA
:TRACe	SEL,<file_name>[,<msus>]		SAVDDAT
<b>OUTPut</b>			
:ATTenuation{1 2}	<numeric>		ATTP1, ATTP2

Command	Parameter	Note	Equivalent Simple Command
PROGRAM			
:CATalog?		[query only]	(None)
:EXPLicit			
:DEFine	<progrname> , <program>		(None)
:DEFine?	<progrname>	[query only]	(None)
:DELete	<progrname>	[no query]	(None)
:EXECute	<progrname> , <program command>	[no query]	(None)
:MALLocate	<progrname> , { <nbytes>   DEFAULT }		(None)
:NAME	<progrname> , <program name>		(None)
:NUMBer	<progrname> , <varname> { , <nvalues> }		(None)
:STATe	<progrname> , { RUN   PAUSE   STOP   CONTInue }		(None)
:STRing	<progrname> , <varname> { , <svalues> }		(None)
:WAIT	<progrname>		(None)
[:SELEcted]			
:DEFine	<program>		(None)
:DELete			
[:SELEcted]		[no query]	(None)
:ALL		[no query]	(None)
:EXECute	{ "RUN"   "PAUSE"   "STOP"   "STEP"   "CONT" }	[no query]	(None)
:MALLocate	{ <nbytes>   DEFAULT }		(None)
:NAME	<program name>		(None)
:NUMBer	<varname> { , <nvalues> }		(None)
:STATe	{ RUN   PAUSE   STOP   CONTInue }		(None)
:STRing	<varname> { , <svalues> }		(None)
:WAIT			(None)

Command	Parameter	Note	Equivalent Simple Command
SENSe			
:AVERage			
:CLEar		[no query]	AVERREST
:COUNT	<numeric>		AVERFACT
[:STATe]	{OFF ON 0 1}		AVER
:BANDwidth			
[:RESolution]	<numeric>		BW
:AUTO	{OFF ON 0 1}		BW, BWAUTO
:RATio	<numeric>		BWSRAT
:VIDeo	<numeric>		VBW
:TYPE	{LINear LOGarithmic}		VBWT
:CORRection			
:CIMPedance	<numeric>		SETZ
:CKIT	{APC35 APC7 N50 N75 UDEfined}		CALK
:CLASs{1-12}			
:STANdard	<n,r, ... > (max 7 items)	[no query]	SPECS11A, SPECS11B, SPECS11C, SPECS22A, SPECS22B, SPECS22C, SPECFWDM, SPECFWDT, SPECRESI, SPECRESF, SPECREVM, SPECREVT
:LABel	<string>		LABEFWD{T M}, LABERES{P I}, LABEREV{T M}, LABES11{A B C}, LABES22{A B C}
:LABel	<string>		LABK
:MODify		[no query]	MODII
:SAVE		[no query]	SAVEUSEK
:SAVE	{ALL CLASs}	[no query]	CLAD, KITD
:SELEct	STANdard{1-8}		DEFS

Command	Parameter	Note	Equivalent Simple Command
SENSe (continued)			
:CORRection (continued)			
:CKIT (continued)			
:CLASs{1-13} (continued)			
:STANdard			
:C0	<numeric>		C0
:C1	<numeric>		C1
:C2	<numeric>		C2
:LABel	<string>		LABS
:OCIMpedance	<numeric>		OFSZ
:ODELay	<numeric>		OFSD
:OLOSs	<numeric>		OFSL
:SAVE		[no query]	STDD
:TIMPedance	<numeric>		TERI
:TYPE	{AIMPedance DELay LOAD OPEN SHORT}		STDT
:COLLect			
[ACQuire]	{CS11A CS11B CS11C CS22A CS22B CS22C FWDI FWDM FWDT ISOL ISOL2 OMI REFL REFL2 RESP REVI REVM REVT TRAN TRAN2 STANdard{1-7}}	[no query]	CLASS11{A B C}, CLASS22{A B C}, FWDI, FWDM, FWDT, ISOL, OMI, RAISOL, RAIRESP, REFL, REVI, REVM, REVT, STAN{A-G}, TRAN
:METHod	{NONE RESPonse RAIsoI S11I S22I TPORt OPTPORt}		CALI
:RESume		[no query]	RESC
:SAVE{1-0}		[no query]	DONE, ISOD, RAID, REFD, RESPDONE, SAV1, SAV2, SAVC, TRAD
:EDELay[1]			
:PORt{1-5}			
[:TIME]	<numeric>		PORT1, PORT2, PORTA, PORTB, PORTR
:STATe	{OFF ON 0 1}		PORE
:EDELay2	{<numeric> MARKer}		ELED, MKRDELA
:OFFSet			
[:MAGNitude]	<numeric>		LVCDT
:PHASe	<numeric>		PHAO
:RVELocity	<numeric>		VELOFACT
[:STATe]	{OFF ON 0 1}		CORR

Command	Parameter	Note	Equivalent Simple Command
:CORRection1		(ZA)	
:CKIT (continued)			
:CLASs{13-15}			
:STANdard	<num1>[,<num2>[, ... [,<num7>]]]		SPECIMP{A B C}
:LABel	<string>		LABIMP{A B C}
:COLLect			
[:ACQuire]	STANdard{1 2}	[no query]	STAN{A B}
[:ACQuire]	IMP{A B C}	[no query]	CALSIMP{A B C}
:METHod	{NONE IMP}		CALI
:RESume			RESCOM
:SAVE			SAVIMP
:EDELay			
:PORT6			
[:TIME]	<numeric>		PORTZ
:CORRection2		(ZA)	
:CKIT			
:LABel	<string>		LABECOMK
:MODify			MODICOMK
:SAVE			SAVUCOMK
:SAVE			COMKDONE
:STANdard			
:SAVE			COMSDONE
:STANdard1			
:G	<numeric>		DEFSOPENG
:C	<numeric>		DEFSOPENC
:STANdard2			
:R	<numeric>		DEFSSHORR
:L	<numeric>		DEFSSHORL
:STANdard3			
:R	<numeric>		DEFSLOADR
:L	<numeric>		DEFSLOADL
:COLLect			
:METHod	IMPedance		COMP
[:ACQuire]	STANdard{1 2 3}	[no query]	COMC
:SAVE			SAVCOM
:RESUME			RESCOM

Command	Parameter	Note	Equivalent Simple Command
SENSE (continued)			
:OPEN	{OFF ON 0 1}		COMCDATA
:SHORT	{OFF ON 0 1}		COMCDATB
:LOAD	{OFF ON 0 1}		COMCDATC
:DETECTOR			
:CONTINUOUS	{OFF ON 0 1}		REPTSMP
{:FUNCTION}	{NEGATIVE POSITIVE SAMPLE}		DET
:FREQUENCY			
:CENTER	{<numeric> TPEAK DMARKER MARKER}		CENT, MKRCENT, MKRDCENT, PEAKCENT
:STEP			
{:INCREMENT}	{<numeric> DMARKER MARKER}		CNTS
:AUTO	{OFF ON 0 1}		CNTSAUTO
:MODE	{FIXED LIST SWEPT}		SWPT
:SPAN	{<numeric> DMARKER MZAPERTURE}		MKRSPAN, MKRZM, SPAN
:FULL		[no query]	FULS
:START	{<numeric> MARKER}		MKRSTAR, STAR
:STOP	{<numeric> MARKER}		MKRSTOP, STOP
:FUNCTION	{ "POWER 1" "POWER 2" "POWER 3" "POWER 4" "POWER:S11" "POWER:S12" "POWER:S21" "POWER:S22" "POWER{1-4}:PSDENSITY" "POWER:RATIO 3,2" "POWER:RATIO 4,2" }		FMT, MEAS
:LIST			
:CLEAR		[no query]	CLEL
:SAVE		[no query]	EDITDONE
:SEGMENT	<numeric>		(None)
:ADD		[no query]	SADD
:BANDWIDTH	<numeric>		BW
:DELETE		[no query]	SDEL
:EDIT		[no query]	SEDI
:FREQUENCY			
:CENTER	<numeric>		CENT
:SPAN	<numeric>		SPAN
:START	{<numeric> MARKER}		MKRSTAR, STAR
:STOP	{<numeric> MARKER}		MKRSTOP, STOP
:POINTS	<numeric>		POIN
:POWER	<numeric>		POWE
:QUIT		[no query]	SQUI
:SAVE		[no query]	SDON

Command	Parameter	Note	Equivalent Simple Command
SENSe (continued)			
:POWer			
:AC			
:ATTenuation	<numeric>		ATT
:AUTO	{OFF ON 0 1}		ATT, ATTAUTO
:RANGe			
[:UPPer]	<numeric>		MAXMLEV
:SWEEp			
:COUNT	<numeric>		NUMG, SING
:GATed	{OFF ON 0 1}		TRGS
:DELay	<numeric>		GATDLY
:LENGth	<numeric>		GATLEN
:TRIGger	{EDGE LEVel}		GATCTL
:POINTs	<numeric>		POIN
:SPACing	{LINear LOGarithmic}		SWPT
:TIME	<numeric>		SWET
:AUTO	{OFF ON 0 1}		SWETAUTO
:TRACk			
:SIGNal			
:MARKer	{OFF ON 0 1}		SGTRK
SOURce			
:FREQuency			
[:CW]	<numeric>		CWFREQ
:POWer			
:CENTer	{<numeric> TPEak DMARKer MARKer}		CENT, MKRCENT, MKRDCEnt, PEAKCENT
[:LEVel]			
[:IMMediate]			
[:AMPLitude]	<numeric>		POWE
:SLOPe	<numeric>		SLOPE
:STATe	{OFF ON 0 1}		SLOP
:MODE	{FIXed LIST SWEEp}		SWPT
:SPAN	{<numeric> DMARKer MZAPerture}		MKRDSpan, MKRZM, SPAN
:FULL		[no query]	FULS
:STARt	{<numeric> MARKer}		MKRSTAR, STAR
:STATe	{OFF ON 0 1}		RFO
:STOP	{<numeric> MARKer}		MKRSTOP, STOP

Command	Parameter	Note	Equivalent Simple Command
STATus			
:INSTRument			
:ENABle	<numeric>		ESNB
[:EVENT]?		[query only]	ESB?
:OPERation			
:CONDition?		[query only]	OSR?
:ENABle	<numeric>		OSE
[:EVENT]?		[query only]	OSER?
:NTRansition	<numeric>		OSNT
:PTRansition	<numeric>		OSPT
:PRESet			
:QUEStionable			
:CONDition?		[query only]	
:ENABle	<numeric>		
[:EVENT]?		[query only]	



Command	Parameter	Note	Equivalent Simple Command
TRIGger :EVENT :TYPE :LEVel :SLOPe :SOURce	{POINT SWEEp} <numeric> {POSitive NEGative} {BUS EXTernal INTernal1 INTernal2 MANual}		TRGEVE VIDLVL TRGP TRGS
UNIT :POWer	{DBM DBUV DBV V W}		SAUNIT

# D

## Status Reporting

The Status byte register (STB) summarizes four status registers that indicate the internal condition of the analyzer. Figure D-1 shows the status reporting structure of the analyzer.

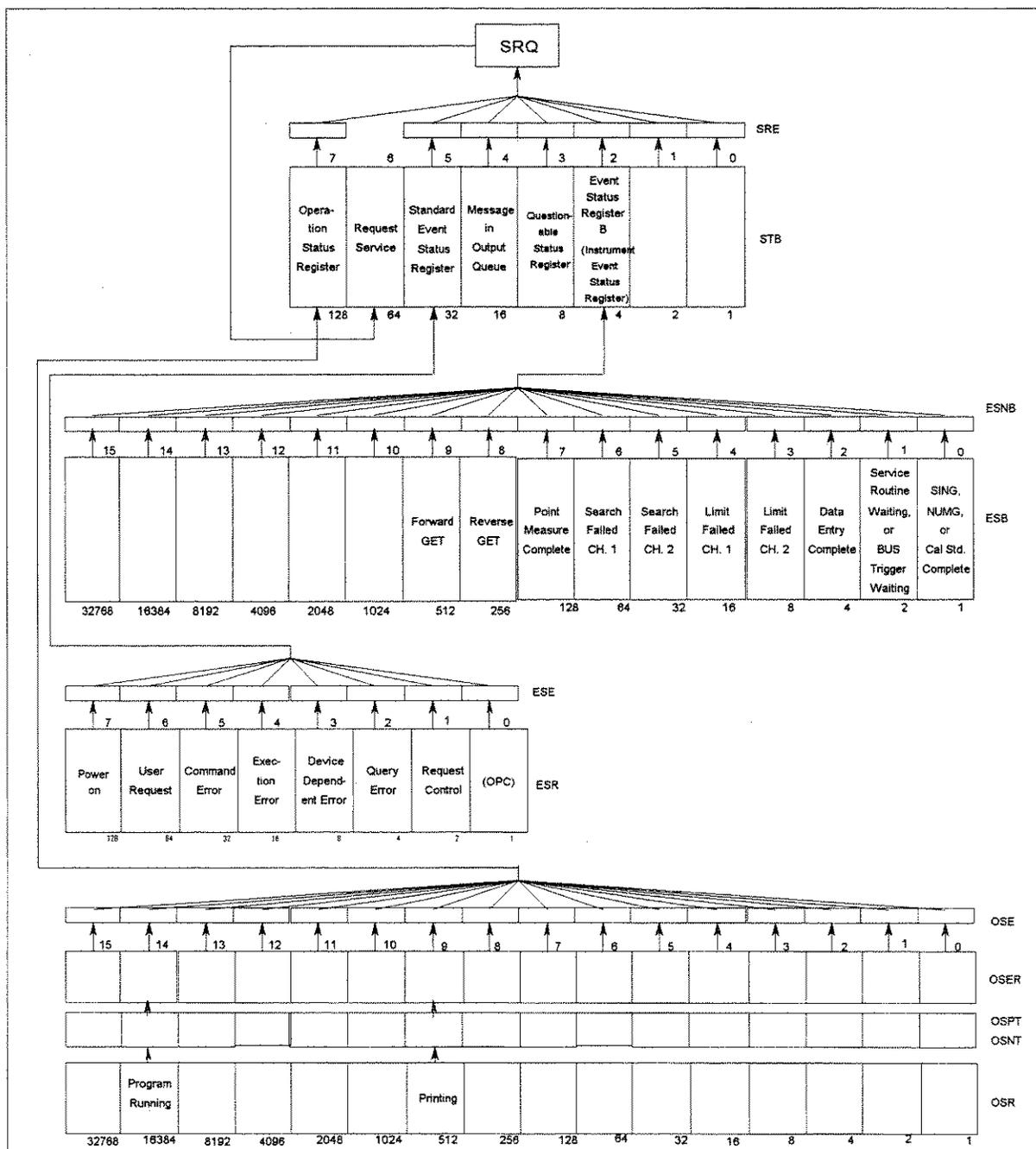


Figure D-1. Status Reporting Structure

The analyzer has a status reporting system to report the condition of the analyzer. The status bytes consist of 8-bit registers, with each bit representing a specific analyzer condition. The value of the Status Byte can be read by using SPOLL(717) statement from an external controller. This command reads a value directly from the analyzer without being set to remote. So, you can operate front panel keys while a controller is reading the Status Byte. Contents of the Status Byte can also be read by using the \*STB? command. Reading the Status Byte does not affect the contents of the Status Byte. Table D-1 shows contents of Status Byte.

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

Bit	Name	Description
2	Event Status Register B Summary Bit	One of the enabled bits in Event Status Register B (Instrument Event Status Register) has been set.
3	Questionable Status Register Summary Bit	The analyzer has no operation to report the event to the Questionable Status Register group. This register is available to keep the consistency with other SCPI compatible instruments.
4	Message in Output Queue	A command has prepared information to be output, but it has not been read yet.
5	Standard Event Status Register Summary Bit	One of the enabled bits in the Standard Event Status Register has been set.
6	Request Service	One of the enabled Status Byte bits is causing an SRQ.
7	Operation Status Register Summary Bit	One of the enabled bits in the Operation Status Register has been set.

For example, to read the contents of Message in the output queue,

```
10 Stat=SPOLL(717)
20 Stb4=BIT(Stat,4)
30 PRINT Stb4
40 END
```

**Figure D-2. Example of Reading Status Byte (1)**

or,

```
10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"*STB?"
30 ENTER @Hp4396;Stat
40 Stb4=BIT(Stat,4)
50 PRINT Stb4
60 END
```

**Figure D-3. Example of Reading Status Byte (2)**

The Standard Event Status Register (ESR), Event Status Register B (ESB; Instrument Event Status Register), and Operation Status Register (OSR) are subordinate to the Status Byte. Each

register can set a bit with a condition that is watched by status bit. A status bit is cleared when it is read by query or the CLES or \*CLS command is executed.

**Table D-2.**  
**Status Bit Definitions of the Standard Event Status Register (ESR)**

Bit	Name	Description
0	Operation Complete	A command for which OPC has been enabled, and completed an operation.
1	Request Control	The analyzer has been commanded to perform an operation that requires control of a peripheral, and needs control of HP-IB.
2	Query Error	<ol style="list-style-type: none"> <li>1. The analyzer has been addressed to talk, but there is nothing in the output queue to transmit.</li> <li>2. Data in the Output Queue has been lost.</li> </ol>
3	Device Dependent Error	An error, other than a command error, a query error, and an execution error has occurred.
4	Execution Error	<ol style="list-style-type: none"> <li>1. A program data element following a header exceeded its input range, or is inconsistent with the analyzer's capabilities.</li> <li>2. A valid program message could not be properly executed due to some analyzer condition.</li> </ol>
5	Command Error	<ol style="list-style-type: none"> <li>1. An IEEE 488.2 syntax error has occurred. Possible violations include, a data element violated the analyzer listening formats or a data element type is unacceptable to the analyzer.</li> <li>2. A semantic error that indicates an unrecognized header was received has occurred. Unrecognized headers include incorrect device-specific headers and incorrect or unimplemented IEEE 488.2 common commands.</li> <li>3. A Group Execute Trigger (GET) was entered into the Input Buffer of a program message.</li> </ol>
6	User Request	The operator pressed a front panel key or an optional keyboard key or turned the rotary knob.
7	Power ON	This bit is set when a power-on sequence occurs.

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

Bit	Name	Description
0	SING, NUMG, or Cal Std. Complete	A single, group sweep, calibration, or compensation has been completed since the last read of the register. Operates in conjunction with SING or NUMG.
1	Service Routine Waiting or Bus Trigger Waiting	1. An internal service routine has completed an operation, or is waiting for an operator response. 2. The analyzer has set the manual trigger to the point mode and is waiting for a manual trigger.
2	Data Entry Complete	A terminator key has been pressed.
3	Limit Failed, Ch 2	Limit test failed on channel 2.
4	Limit Failed, Ch 1	Limit test failed on channel 1.
5	Search Failed, Ch 2	A marker search was executed on channel 2, but the target value was not found.
6	Search Failed, Ch 1	A marker search was executed on channel 1, but the target value was not found.
7	Point Measurement Complete <sup>1</sup>	One measurement point of a sweep has been completed.
8	Reverse GET	A one-path 2-port calibration is active, and the analyzer has stopped, waiting for the operator to connect the device for a reverse measurement.
9	Forward GET	A one-path 2-port calibration is active, and the analyzer has stopped, waiting for the operator to connect the device for a forward measurement.

<sup>1</sup> This bit is set only when the related bits of both SRE and ESNB are enabled.

In the case of the manual trigger on point mode, the analyzer accepts the next trigger while the current measurement is in progress (up to the number of points). Use bit 1 and bit 7 correctly to synchronize the measurement and external triggering. For example, 1) wait until bit 1 is set, 2) trigger, and 3) wait until bit 7 is set.

**Table D-4. Status Bit Definitions of the Operation Status Register (OSR)**

Bit	Name	Description
14	Program running	An HP Instrument BASIC program is running.
9	Printing	Data is being transferred to the printer.

Each status register has a register that enables generating a Service Request (SRQ) with a condition of a status bit. For instance, to generate an SRQ when the analyzer completes the specified number of sweeps, enable ESNB bit 1. Bit 1 of ESNB is the mask register for ESB 0 ("SING, NUMG, or Cal Std. Complete") which shows sweep completion and SRE bit 2. This enables a path from ESB bit 0 to generate an SRQ. Figure D-4 shows a program listing that can be used to generate an SRQ.

```

10 ASSIGN @Hp4396 TO 717
20 !
30 OUTPUT @Hp4396;"CLES"      ! Clears status registers
40 OUTPUT @Hp4396;"ESNB 1"  ! Enables mask register of "SING. NUMG. or
50 !                          ! Cal Std. Complete" of ESB
60 OUTPUT @Hp4396;"*SRE 4"  ! Enables mask register of "Event Status
70 !                          ! Register B" of STB
80 !
90 ON INTR 7 GOTO End        ! Declare SRQ interrupt
100 ENABLE INTR 7;2
110 OUTPUT @Hp4396;"SING"   ! Execute single sweep
120 GOTO 120                 ! Endless loop
130 !
140 End:                     ! Exit from loop when sweep is completed
150 END

```

Figure D-4. Example of Generating a Service Request (SRQ)

## OSPT, OSNT

### OSPT (Operation Status Positive Transition Filter)

Sets the positive transition filter. Setting a bit in OSPT will cause a 0 to 1 transition in the corresponding bit of the associated Operation Status Register (OSR) to cause a 1 to be written in the associated bit of corresponding Operation Status Event Register (OSER).

Bit 14 of the analyzer's OSR is used to show program status. When bit 14 of OSPT is set to 1, starting a program causes a 1 to be written in bit 14 of OSER. (This sets bit 7 of STB to 1.)

### OSNT (Operation Status Negative Transition Filter)

Sets the negative transition filter. Setting a bit in the negative transition filter will cause a 1 to 0 transition in the corresponding bit of the associated Operation Status Register to cause a 1 to be written in the associated bit of corresponding Operation Status Event Register.

Bit 14 of the analyzer's OSR is used to show program status. When bit 14 of OSNT is set to 1, stopping a program causes a 1 to be written in bit 14 of OSER. (This sets bit 7 of STB to 1.)



## Trigger System

### Trigger System

This section provides information about the trigger system of the analyzer. SCPI defines a common trigger model for several types of instruments. A trigger system allows you to have control of your measurements.

Information on the trigger system requires more technical expertise than most other topics covered in this chapter. But you can avoid having to learn the information in this chapter by using the :INITiate commands to make your measurements.

### Analyzer Trigger System Configuration

The trigger system synchronizes the analyzer measurement with specified events. Events include an HP-IB trigger command or input pulse on the EXT TRIGGER input. The trigger system also allows you to specify the number of times to repeat a measurement and the delays between measurements.

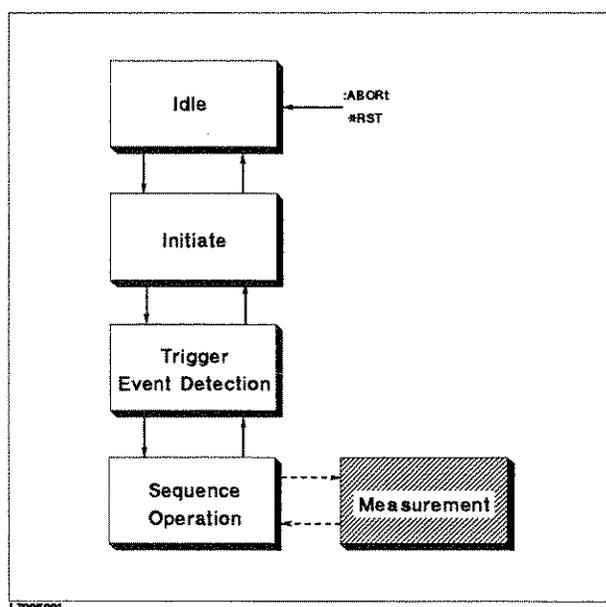


Figure E-1. Trigger System Configuration

Figure E-1 shows the configuration of the analyzer trigger system. Each unshaded block is called a **trigger state**. The analyzer moves between adjacent states depending on its conditions. The power ON state is called the **Idle** state. You can force the analyzer to the idle state using the :ABORT or \*RST command. The **Initiate** and **Trigger Event Detection** state branches to next state, whether the analyzer satisfies the specified conditions or not. The **Sequence Operation** state signals the instrument hardware to take a measurement and listens for a signal saying that the measurement has been taken.

## Idle State

The trigger system remains in the Idle state until it is initiated by `:INITiate:IMMediate` or `:INITiate:CONTinuous ON`. Once one of these conditions is satisfied, the trigger system exits downward to the Initiate state. Note that `*RST` sets `:INITiate:CONTinuous OFF`.

## Initiate State

If the trigger system is on a downward path, it travels directly through the Initiate state without restrictions. If the trigger system is on an upward path, and `:INITiate:CONTinuous` is ON, then it exits downward to an Trigger Event Detection state. If the trigger system is on an upward path and `:INITiate:CONTinuous` is OFF, then it exits upward to the Idle state.

## Trigger Event Detection State

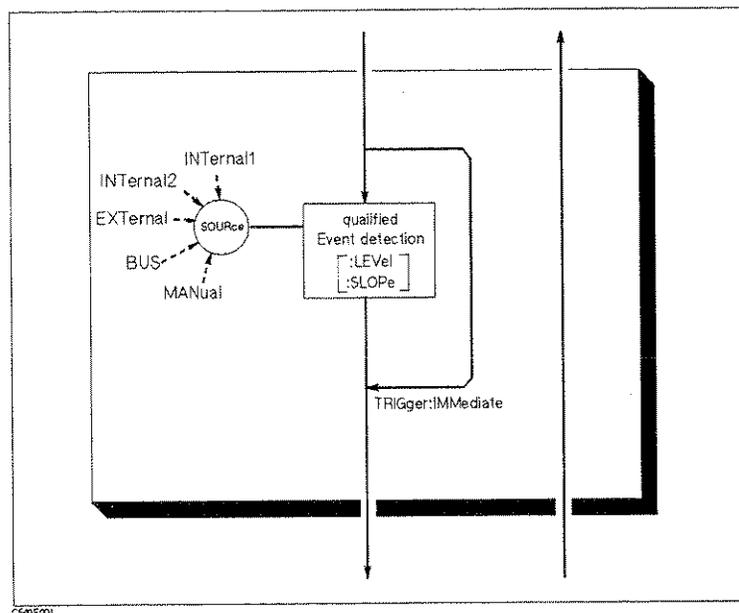


Figure E-2. Inside an Trigger Event Detection State

### SOURCE

The `:TRIGger:SOURce` command specifies which particular input can generate the event required to continue the downward path. If the source chosen is a nonanalog signal such as `IMMediate` or `BUS`, then no further qualifications are required to generate an event. However when an `INTernal1`, `INTernal2`, or `EXTernal` analog signal is chosen, you can specify additional qualifications by using the appropriate `LEVel` and `SLOPe` commands. Sending `*RST` sets the `SOURce` to `IMMediate`.

### IMMediate

The `:TRIGger:IMMediate` command bypasses the event detection and `DELay` qualifications one time. The upward path through the Trigger Event Detection state contains only one condition. If the condition is satisfied, the trigger system exits upward.

## Sequence Operation State

The downward entrance to the Sequence Operation state forces the analyzer to start a measurement. An upward exit is not allowed until the measurement is complete.

## Calibration Types and Standard Classes, and Calibration Arrays

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

**Table F-1. Calibration Types and Standard Classes**

Class	Response	Response and Isolation	S <sub>11</sub> 1-port	S <sub>22</sub> 1-port	One-path 2-port	Full 2-port	ZA calibration
Response:	•						
Response and isolation:							
Response		•					
Isolation		•					
Reflection: <sup>1</sup>							
S11A (opens)			•		•	•	
S11B (shorts)			•		•	•	
S11C (loads)			•		•	•	
S22A (opens)				•		•	
S22B (shorts)				•		•	
S22C (loads)				•		•	
Transmission: <sup>1</sup>							
Forward match					•	•	
Forward thru					•	•	
Reverse match						•	
Reverse thru						•	
Isolation: <sup>1</sup>							
Forward					•	•	
Reverse						•	
Impedance analyzer cal							
IMPA (OPEN)							•
IMPB (SHORT)							•
IMPC (LOAD)							•

<sup>1</sup> These subheadings must be called when doing 2-port calibrations.

**Table F-2. Calibration Array**

Array	Response <sup>1</sup>	Response and Isolation <sup>1</sup>	1-port <sup>1</sup> ZA cal	2-port <sup>1,2</sup>
1	$E_R$ or $E_T$	$E_X (E_D)^3$	$E_D$	$E_{DF}$
2		$E_T (E_R)$	$E_S$	$E_{SF}$
3			$E_R$	$E_{RF}$
4				$E_{XF}$
5				$E_{LF}$
6				$E_{TF}$
7				$E_{DR}$
8				$E_{SR}$
9				$E_{RR}$
10				$E_{XR}$
11				$E_{LR}$
12				$E_{TR}$

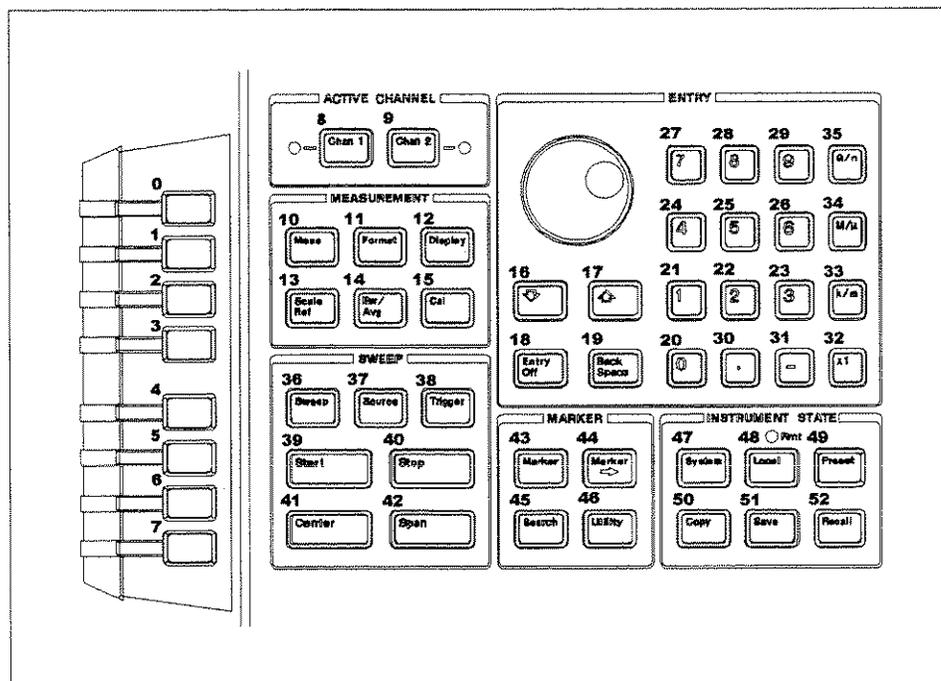
1 Meaning of first subscript: D=directivity; S=source match; X=crosstalk; L=load match; T=transmission tracking.  
 Meaning of second subscript: F=forward; R=reverse.

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

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

## Key Codes

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



CB40G001

Figure G-1. Key Codes



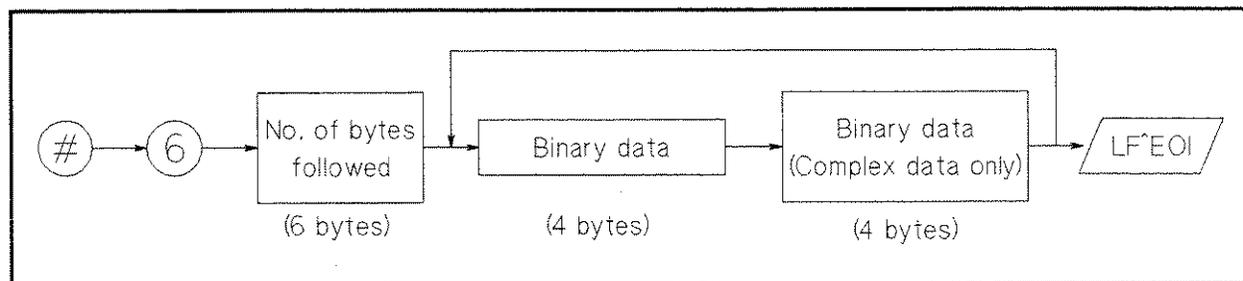
## Data Format and Data Levels

### Data Format

The analyzer can transmit data over HP-IB in four different formats. The type of format affects what kind of data array is declared (real or integer), because the format determines what type of data is transferred.

#### ■ Form 2

IEEE 32-bit floating point format. Figure H-1 shows the data transfer format of Form 2. In this mode, each number takes 4 bytes.

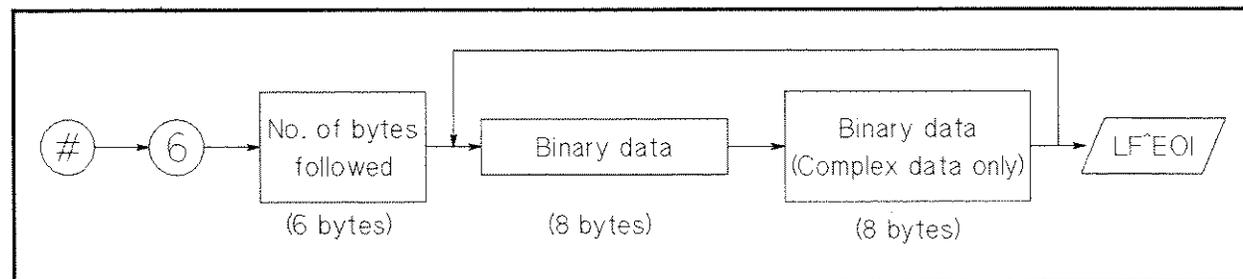


C450204

**Figure H-1. Form 2 Data Transfer Format**

#### ■ Form 3

IEEE 64-bit floating point format. Figure H-2 shows the data transfer format of Form 3. Data is stored internally in the 200/300 series computer with the IEEE 64-bit floating point format, eliminating the need for any reformatting by the computer. In this mode, each number takes 8 bytes.



C450203

**Figure H-2. Form 3 Data Transfer Format**

#### ■ Form 4

ASCII data transfer format. In this mode, each number is sent as a 24-character string, each character being a digit, sign, or decimal point.

- Form 5

MS-DOS<sup>®</sup> personal computer format. This mode is a modification of IEEE 32-bit floating point format with the byte order reversed. Form 5 also has a four-byte header that must be read in so that data order is maintained. In this mode, an MS-DOS<sup>®</sup> PC can store data internally without reformatting it.

---

## Data Levels

The analyzer has the following data arrays in internal memory:

- Raw data

These arrays store the results of all the preceding data processing operations. Note that the numbers here are still complex pairs.

When the Network analyzer mode and the full 2-port error correction are on, the raw data arrays contain all four S-parameter measurements required for accuracy enhancement.

- Error corrected data

The results of error correction are stored in the data arrays as complex number pairs.

- Formatted data

This is the array of data being displayed. It reflects all post-processing functions such as electrical delay, and the units of the array read out depends on the current display format.

- Calibration coefficients (Network and impedance analyzer only)

The results of a calibration are stored arrays of calibration coefficients that are used by the error correction routines. Each array corresponds to a specific error term in the error model. The calibration coefficients are read out with OUTPCALC{1-12}?.

- fixture compensation coefficients (Impedance analyzer only)

The results of a fixture compensation are stored arrays of fixture compensation coefficients that are used by the error correction routines. Each array corresponds to a specific error term in the error model. The fixture compensation coefficients are read out with OUTPCOMC{1-3}?.

Formatted data is generally the most useful, because it is the same information as that seen on the display. However, if post-processing is not necessary, as may be the case with smoothing, error corrected data is more desirable. Error corrected data also gives you the opportunity to load the data into the instrument and apply post-processing at a later time.

For more information of the data processing, refer to "Data Processing Flow" in chapter 12 of the *Reference Manual*.

## Marker Readout

The values specified by the marker, sub-marker, or delta-marker can be read using the following commands.

OUTPMKR?, Amplitude value (Value 1), Auxiliary amplitude value (Value 2), Sweep  
 OUTPSMKR?, Parameter  
 OUTPDMKR?

MKRVAL?, Amplitude value (Value 1)  
 SMKRVAL{1-7}?

MKRAUV?, Auxiliary amplitude value (Value 2)  
 SMKRAUV{1-7}?

The following table lists the amplitude value (value 1) and the auxiliary amplitude value (value 2) for each display format.

**Table H-1. Marker Readout**

Analyzer Type	Display Format	Parameter of CIRF Command	Amplitude Value (Value 1)	Auxiliary Amplitude Value (Value 2)
Network Analyzer	Log Magnitude	—	Log Magnitude (dB)	0
	Phase	—	Phase (degrees)	0
	Expanded Phase	—	Phase (degrees)	0
	Delay	—	Delay (seconds)	0
	Linear Magnitude	—	Linear Magnitude	0
	SWR	—	SWR	0
	Real	—	Real	0
	Imaginary	—	Imaginary	0
Network/impedance Analyzer <sup>1</sup>	Smith Chart	RI	Real	Imaginary
	Polar	LIN	Linear Magnitude	Phase (degrees)
	Addmittance	LOG	Log Magnitude (dB)	Phase (°)
		RX	Resistance (Ω)	Reactance (Ω)
		GB	Conductance (S)	Suseptance (S)
		SWR	SWR	Phase (°)
Spectrum Analyzer	Spectrum Measurement	—	Magnitude (dBm, dBV, dBμV, W, or V) <sup>2</sup>	0
	Noise Level Measurement	—	Magnitude (dBm, dBV, dBμV, W, or V) <sup>2</sup>	0

<sup>1</sup> For the other format than listed above in the impedance analyzer mode, the marker readout has the unit of the selected parameter by **Meas** key.

<sup>2</sup> Unit is specified by the SAUNIT command. (default: dBm)



## Waveform Analysis Commands

---

The HP 4396A has added a command set that can be used to analyze waveforms of specific devices. The waveform analysis commands analyze and output the results using only a single command. This appendix provides information about the added waveform analysis commands.

The commands are divided into five groups as follows:

- Waveform analysis setup commands
- Maximum/Minimum/Mean search commands
- Ripple analysis commands
- Filter and Resonator analysis commands
- Equivalent circuit analysis commands

All of the commands that are described in this appendix are executable using the Instrument BASIC EXECUTE command. By using the EXECUTE command, you can execute the waveform analysis commands much faster than by using the OUTPUT statement. If you use Instrument BASIC, it is recommended that you use EXECUTE with the waveform analysis commands.

For detail information about EXECUTE command, see the *Using HP Instrument BASIC with HP 4396A* manual.

## Conventions and Definitions

This section describes the conventions and definitions that are used to describe the waveform analysis commands.

- ① → **ANARANG**
- ② → Sets the stimulus range for the waveform. . . .
- ③ → **Syntax**      **ANARANG** *start,stop*
- ④ →                      Where,  
                               0      *start*      Start value of the analysis range  
                               1      *stop*       Stop value of the analysis range
- ⑤ → **Query**  
          **Response**
- ⑥ → **Semantics**
- ⑦ → **Note**
- ⑧ → **Examples**

①	Command name.
②	Command description.
③	Command syntax This part shows the syntax of the command. You must put a space between the command and the parameters.
④	Command parameter description The first column of the table lists the register number that is used by the EXECUTE command. You must put the parameter in the indicated register before using the EXECUTE command. For example (in the above case):  <pre>WRITEIO 15,0;Start    Put "Start" in register 0. WRITEIO 15,1;Stop    Put "Stop" in register 1. EXECUTE "ANARANG"    Execute "ANARANG".</pre> The second column lists the parameter name that is shown in the <b>Syntax</b> area. The third column describes the parameters.
⑤	Query response. This part shows what values will be returned as the query response. The description of the query response is similar to the description of the <b>Syntax</b> area shown above.
⑥	Semantics This part describes how the command obtains the values for the query response.
⑦	Note This part describes the required conditions or limitations when using the command.
⑧	Examples This part shows examples of how to use the command. Examples are provided for both HP BASIC on an external controller and Instrument BASIC on the analyzer.

## Waveform Analysis Setup Commands

The following commands are used for setting up the conditions for waveform analysis:

- ANAOCH1
- ANAOCH2
- ANARANG
- ANARFULL
- ANAODATA
- ANAOMEMO
- THRR

The settings are effective for all of the waveform analysis commands.

### ANAOCH1

Selects channel 1 for waveform analysis.

**Syntax** ANAOCH1

**Query** *boolean*

**Response** Where,

Register	Parameter	Description
0	<i>boolean</i>	1 or 0. Channel 1 is selected (1) or is not selected (0) for waveform analysis.

**Note** ■ The ANAOCH1 and ANAOCH2 channel setting is independent of the active channel setting.

### ANAOCH2

Selects channel 2 for waveform analysis.

**Syntax** ANAOCH2

**Query** *boolean*

**Response** Where,

Register	Parameter	Description
0	<i>boolean</i>	1 or 0. Channel 2 is selected (1) or is not selected (0) for waveform analysis.

**Note** ■ The ANAOCH1 and ANAOCH2 channel setting is independent of the active channel setting.

## ANARANG

Sets the stimulus range for waveform analysis commands by start and stop value.

**Syntax** ANARANG *start, stop*

Where,

Register	Parameter	Description
0	<i>start</i>	Start value of the analysis range.
1	<i>stop</i>	Stop value of the analysis range.

**Query** *start, stop*

**Response**

**Note**

- The waveform analysis range is independent of the marker search range.
- You can set the range for each channel independently. Therefore, you need to set the analysis channel using ANAOCH1 or ANAOCH2 before using ANARANG.
- The waveform analysis range will be truncated to fit the displayed stimulus range if the setting is exceeded.
- If the displayed stimulus range is changed, the waveform analysis range is set equal to the displayed range.
- Store the waveform analysis range setting using **SAVE ALL** or **STATE ONLY**.
- The waveform analysis range is set to equal to the displayed stimulus range when the power is turned on.

**Examples** For External Controller

```
INPUT "Enter Start for Analysis Range.",Start
INPUT "Enter Stop for Analysis Range.",Stop
OUTPUT @Hp4396;"ANARANG ";Start,Stop
```

For Instrument BASIC

```
INPUT "Enter Start for Analysis Range.",Start
INPUT "Enter Stop for Analysis Range.",Stop
WRITEIO 8,0;Start
WRITEIO 8,1;Stop
EXECUTE "ANARANG"
```

## ANARFULL

Sets the waveform analysis range equal to the displayed stimulus range. (No Query)

**Syntax** ANARFULL

**Note** ■ You can set the range for each channel independently. Therefore, you need to set the analysis channel using ANAOCH1 or ANAOCH2 before using ANARFULL.

## ANAODATA

Selects the data trace for waveform analysis.

**Syntax** ANAODATA

**Query** *boolean*

**Response** Where,

Register	Parameter	Description
0	<i>boolean</i>	1 or 0. Data trace is selected (1) or is not selected (0) for waveform analysis.

**Note** ■ You can select the trace for each channel independently. Therefore, you need to set the analysis channel using ANAOCH1 or ANAOCH2 before using ANAODATA.

## ANAOMEMO

Selects the data trace for waveform analysis.

**Syntax** ANAOMEMO

**Query** *boolean*

**Response** Where,

Register	Parameter	Description
0	<i>boolean</i>	1 or 0. Memory trace is selected (1) or is not selected (0) for waveform analysis.

**Note** ■ You can select the trace for each channel independently. Therefore, you need to set the analysis channel using ANAOCH1 or ANAOCH2 before using ANAOMEMO.

## THRR

Sets threshold ripple height for waveform analysis commands.

**Syntax** THRR *height*

Where,

Register	Parameter	Description
0	<i>height</i>	(Peak height) - (negative peak height)

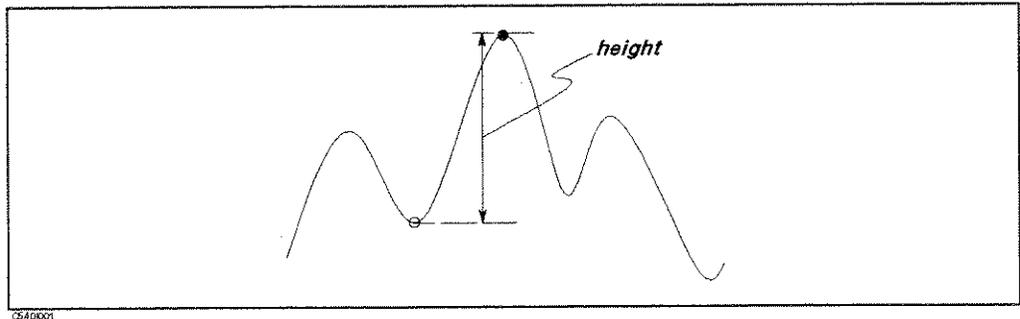


Figure I-1. THRR

**Query** *height*

**Response**

- Semantics**
- Ripple height is defined as the difference between the positive peak and the negative peak.
  - Waveform analysis commands search only for ripples greater than the threshold value, any others are ignored.

**Note** ■ Default threshold value is 0.

**Examples** **For External Controller**

```
INPUT "Enter Pos. Peak Gain [dB].",Local_max
INPUT "Enter Neg. Peak Gain [dB].",Local_min
Height=Local_max-Local_min
OUTPUT @Hp4396;"THRR ";Height
```

**For Instrument BASIC**

```
INPUT "Enter Pos. Peak Gain [dB].",Local_max
INPUT "Enter Neg. Peak Gain [dB].",Local_min
Height=Local_max-Local_min
WRITEIO 8,0;Height
EXECUTE "THRR"
```

## Maximum/Minimum/Mean Value Search Commands

The following commands return the maximum, minimum, and mean value of a trace within the range specified using the ANARANG command.

- OUTPMAX?
- OUTPMIN?
- OUTPMINMAX?
- OUTPMEAN?
- PEAK?
- NEXPK?
- NUMLMAX?
- NUMLMIN?
- LMAX?
- LMIN?
- TARR?
- TARL?

### OUTPMAX?

Returns the maximum point value and its stimulus within the specified range. (Query only)

**Syntax**       OUTPMAX?

**Query**         MAX,  $f_{max}$

**Response**     Where,

Register	Parameter	Description
0	MAX	Maximum value
1	$f_{max}$	Stimulus at maximum point (Frequency or Power)

#### Examples   For External Controller

```
OUTPUT @Hp4396;"OUTPMAX?"
ENTER @Hp4396;Max_value,F_max
PRINT Max_value,F_max
```

#### For Instrument BASIC

```
EXECUTE "OUTPMAX?"
PRINT READIO(8,0),READIO(8,1)
```

### OUTPMIN?

Returns the minimum point value and its stimulus within the specified range. (Query only)

**Syntax**       OUTPMIN?

**Query**         MIN,  $f_{min}$

**Response**     Where,

Register	Parameter	Description
0	MIN	Minimum value
1	$f_{min}$	Stimulus at minimum point (Frequency or Power)

## OUTPMINMAX?

Returns the maximum and minimum values and their stimulus values within the specified range. (Query only)

**Syntax**       OUTPMINMAX?

**Query**        *MIN, f<sub>min</sub>, MAX, f<sub>max</sub>*

**Response**     Where,

Register	Parameter	Description
0	<i>MIN</i>	Minimum value
1	<i>f<sub>min</sub></i>	Stimulus at minimum point (Frequency or Power)
2	<i>MAX</i>	Maximum value
3	<i>f<sub>max</sub></i>	Stimulus at maximum point (Frequency or Power)

### Examples   For External Controller

```
OUTPUT @Hp4396;"OUTPMINMAX?"
ENTER @Hp4396;Min_value,F_min,Max_value,F_max
PRINT "MIN:",Min_value,F_min
PRINT "MAX:",Max_value,F_max
```

### For Instrument BASIC

```
EXECUTE "OUTPMINMAX?"
PRINT "MIN:",READIO(8,0),READIO(8,1)
PRINT "MAX:",READIO(8,2),READIO(8,3)
```

## OUTPMEAN?

Returns the mean value within the specified range. (Query only)

**Syntax**       OUTPMEAN?

**Query**        *mean*

**Response**     Where,

Register	Parameter	Description
0	<i>mean</i>	Mean value.

### Examples   For External Controller

```
OUTPUT @Hp4396;"OUTPMEAN?"
ENTER @Hp4396;Mean
PRINT Mean
```

### For Instrument BASIC

```
EXECUTE "OUTPMEAN?"
PRINT READIO(8,0)
```

## PEAK?

Returns maximum peak and its stimulus within the specified range. (Query only)

**Syntax**      PEAK?

**Query**         $MAX_{peak}, f_{maxpeak}$

**Response**    Where,

Register	Parameter	Description
0	$MAX_{peak}$	Maximum peak value
1	$f_{maxpeak}$	Stimulus at maximum peak

**Semantics**   ■ The analyzer defines the searched value and point as a reference point for the next NEXPK? command. The reference point is stored using **SAVE ALL** or **STATE ONLY**.

**Note**        ■ If the search fails, the analyzer returns 0,0.

**Examples**    **For External Controller**

```
OUTPUT @Hp4396;"PEAK?"
ENTER @Hp4396;Peak,F_maxpeak
PRINT "Peak:",Peak,"[dB]","F_maxpeak,"[Hz]"
```

**For Instrument BASIC**

```
EXECUTE "PEAK?"
PRINT "Peak:",READIO(8,0),"[dB]","READIO(8,1),"[Hz]"
```

## NEXPK?

Returns the maximum peak having a value less than the value that was found using last PEAK? or NEXPK? command within the specified range. It also returns the corresponding stimulus value. (Query only)

**Syntax** NEXPK?

**Query** *Peak, f<sub>Peak</sub>*

**Response** Where,

Register	Parameter	Description
0	<i>Peak</i>	Searched peak value
1	<i>f<sub>Peak</sub></i>	Searched stimulus

### Note

- The analyzer defines the searched value and point as a reference point for the next NEXPK? command. The reference point is stored using **SAVE ALL** or **STATE ONLY**.
- If the multiple corresponded points are found, the analyzer returns right-hand nearest peak of the reference point.
- If the search fails, the analyzer returns 0,0.

### Examples For External Controller

```
OUTPUT @Hp4396;"NEXPK?"
ENTER @Hp4396;N_peak,F_npeak
PRINT N_peak,F_npeak
```

### For Instrument BASIC

```
EXECUTE "PEAK?"
I=1
REPEAT
  PRINT I,READIO(8,0),READIO(8,1)
  EXECUTE "NEXPK?"
  I=I+1
UNTIL READIO(8,0)=0
```

**NUMLMAX?**

Returns the number of positive peaks within the specified range. (Query only)

**Syntax** NUMLMAX?

**Query** *n*

**Response** Where,

Register	Parameter	Description
0	<i>n</i>	Number of peaks

**Note** ■ If the search fails, the analyzer returns 0.

**Examples** For External Controller

```
OUTPUT @Hp4396;"NUMLMAX?"
ENTER @Hp4396;N
PRINT N
```

For Instrument BASIC

```
EXECUTE "NUMLMAX?"
PRINT READIO(8,0)
```

**NUMLMIN?**

Returns the number of negative peaks within the specified range. (Query only)

**Syntax** NUMLMIN?

**Query** *n*

**Response** Where,

Register	Parameter	Description
0	<i>n</i>	Number of negative peaks

**Note** ■ If the search fails, the analyzer returns 0.

## LMAX?

Returns the  $n$ th positive peak counted from the left end of the range.

**Syntax** LMAX?  $n$

Where,

Register	Parameter	Description
0	$n$	Peak counted from the left end of the range.

**Query**  $LMAX_n$

**Response** Where,

Register	Parameter	Description
0	$LMAX_n$	Value of $n$ th peak

**Note** ■ If the search fails, the analyzer returns 3.40282346639E+38.

**Examples** **For External Controller**

```
OUTPUT @Hp4396;"LMAX? 5"  
ENTER @Hp4396;Lmax  
PRINT Lmax
```

**For Instrument BASIC**

```
INPUT "?",N  
WRITEIO 8,0;N  
EXECUTE "LMAX?"  
PRINT READIO(8,0)
```

## LMIN?

Returns the  $n$ th negative peak counted from the left end of the range.

**Syntax** LMIN?  $n$

Where,

Register	Parameter	Description
0	$n$	Negative peak counted from the left end of the range.

**Query**  $LMIN_n$

**Response** Where,

Register	Parameter	Description
0	$LMIN_n$	Value of $n$ th negative peak

**Note** ■ If the search fails, the analyzer returns 3.40282346639E+38.

## TARR?

Searches to the right for the point having the specified parameter-value from the left end of the range, and returns its stimulus.

**Syntax**      TARR? *target*

Where,

Register	Parameter	Description
0	<i>target</i>	Search value.

**Query**      *f<sub>target</sub>*

**Response**    Where,

Register	Parameter	Description
0	<i>f<sub>target</sub></i>	Stimulus of the first point found.

**Note**      ■ If the search fails, the analyzer returns 0.

### Examples    For External Controller

```
INPUT "Enter Target Value.",Target
OUTPUT @Hp4396;"TARR? ";Target
ENTER @Hp4396;F_target
PRINT F_target
```

### For Instrument BASIC

```
INPUT "Enter Target Value.",Target
WRITEIO 8,0;Target
EXECUTE "TARR?"
PRINT READIO(8,0)
```

## TARL?

Searches to the left for the point having the specified parameter-value from the right end of the range, and returns its stimulus.

**Syntax**      TARL? *target*

Where,

Register	Parameter	Description
0	<i>target</i>	Search value.

**Query**      *f<sub>target</sub>*

**Response**    Where,

Register	Parameter	Description
0	<i>f<sub>target</sub></i>	Stimulus of the first point found.

**Note**      ■ If the search fails, the analyzer returns 0.

## Ripple Analysis Commands

Ripple analysis commands analyze the ripples of the waveform and return the results.

- RPLPP?
- RPLHEI?
- RPLRHEI?
- RPLLHEI?
- RPLENV?
- RPLMEA?
- RPLVAL?
- POLE?

### RPLPP?

Returns the maximum difference between the positive peak and the negative peak within the specified range. (Query only)

**Syntax**      RPLPP?

**Query**        *MAX<sub>diff</sub>*

**Response**    Where,

Register	Parameter	Description
0	<i>MAX<sub>diff</sub></i>	Maximum difference between positive and negative peak.

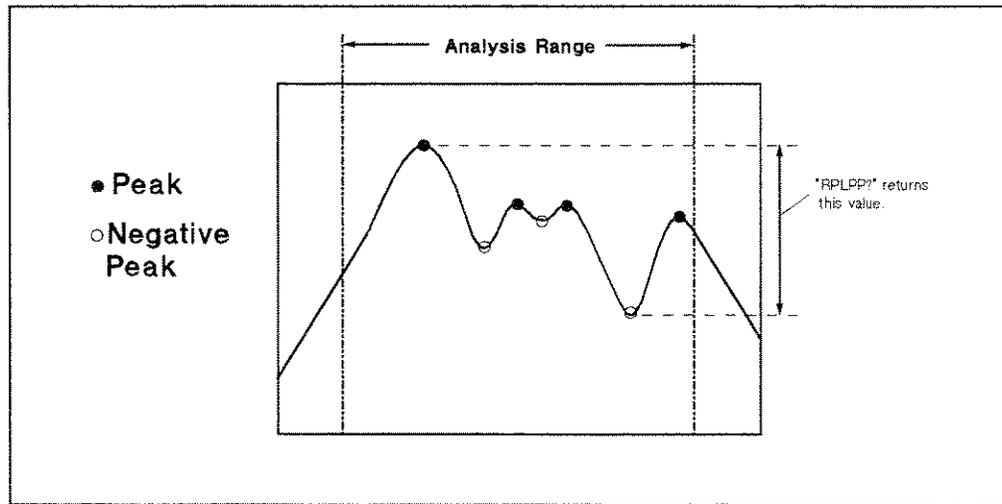


Figure I-2. RPLPP?

**Note**        ■ If the search fails, the analyzer returns 0.

**Examples**    **For External Controller**

```

ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
OUTPUT @Hp4396;"RPLPP?"
ENTER @Hp4396;Max_diff
PRINT Max_diff;"[dB]"
END
    
```

**For Instrument BASIC**

```
EXECUTE "ANAOCH1"  
EXECUTE "ANARFULL"  
EXECUTE "ANAODATA"  
EXECUTE "RPLPP?"  
PRINT READIO(8,0); "[dB]"  
END
```

## RPLHEI?

Returns the maximum difference between adjacent positive and negative peaks. (Query only)

**Syntax** RPLHEI?

**Query** *value*

**Response** Where,

Register	Parameter	Description
0	<i>value</i>	Maximum difference between adjacent positive and negative peaks.

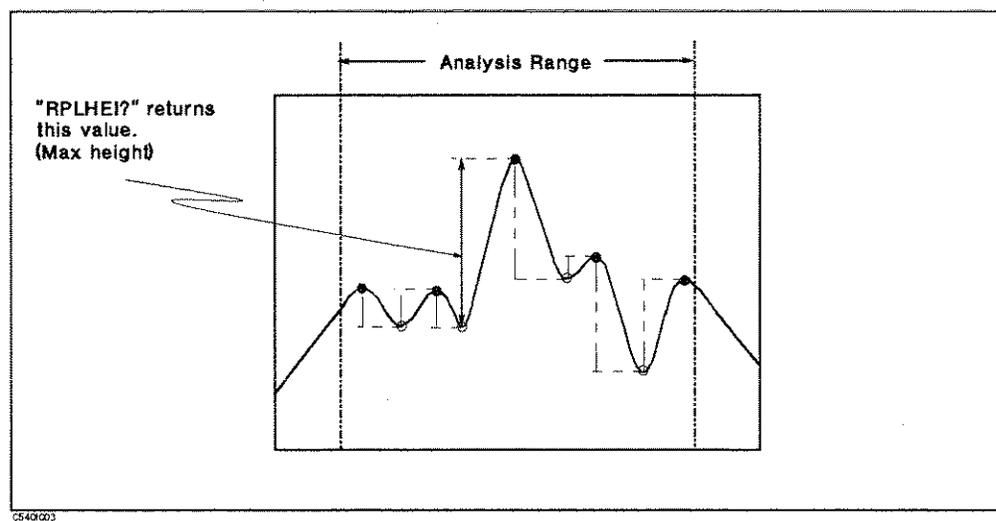


Figure I-3. RPLHEI?

**Note** ■ If the search fails, the analyzer returns 0.

### Examples For External Controller

```

ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
OUTPUT @Hp4396;"RPLHEI?"
ENTER @Hp4396;Adj_diff
PRINT Adj_diff;"[dB]"
END

```

### For Instrument BASIC

```

EXECUTE "ANAOCH1"
EXECUTE "ANARFULL"
EXECUTE "ANAODATA"
EXECUTE "RPLHEI?"
PRINT READIO(8,0);"[dB]"
END

```

## RPLRHEI?

Returns the maximum difference between the positive peak and the right-hand adjacent negative peak. (Query only)

**Syntax** RPLRHEI?

**Query** *value*

**Response** Where,

Register	Parameter	Description
0	<i>value</i>	Maximum difference between the positive peak and the right-hand adjacent negative peak.

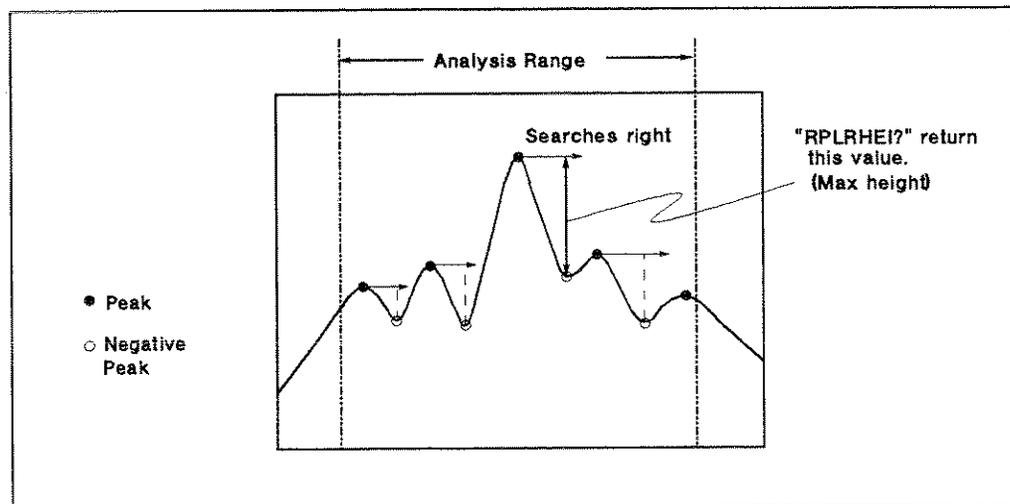


Figure I-4. RPLRHEI?

**Note** ■ If the search fails, the analyzer returns 0.

### Examples For External Controller

```
ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
OUTPUT @Hp4396;"RPLRHEI?"
ENTER @Hp4396;Adj_diff
PRINT Adj_diff;"[dB]"
END
```

### For Instrument BASIC

```
EXECUTE "ANAOCH1"
EXECUTE "ANARFULL"
EXECUTE "ANAODATA"
EXECUTE "RPLRHEI?"
PRINT READIO(8,0);"[dB]"
END
```

## RPLLHEI?

Returns the maximum difference between the positive peak and the left-hand adjacent negative peak. (Query only)

**Syntax** RPLLHEI?

**Query** *value*

**Response** Where,

Register	Parameter	Description
0	<i>value</i>	Maximum difference between the positive peak and the left-hand adjacent negative peak.

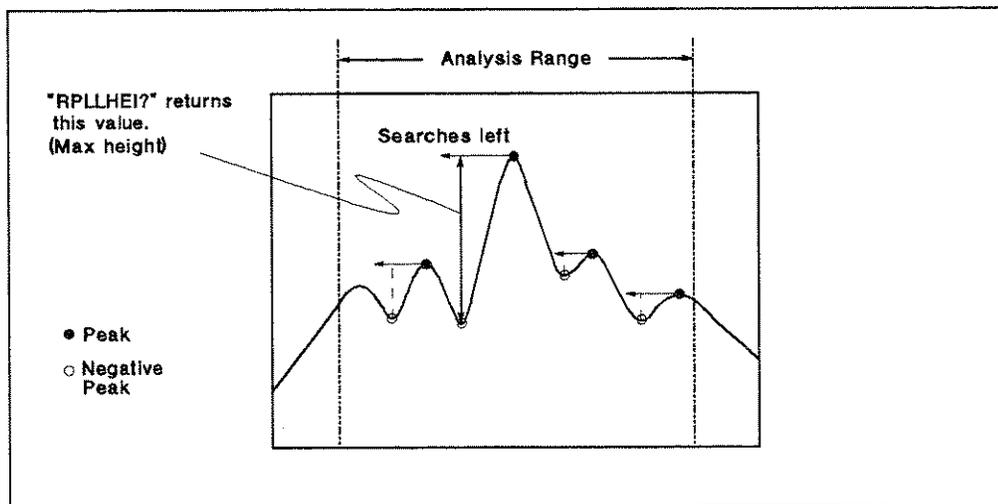


Figure I-5. RPLLHEI?

**Note** ■ If the search fails, the analyzer returns 0.

### Examples For External Controller

```

ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
OUTPUT @Hp4396;"RPLLHEI?"
ENTER @Hp4396;Adj_diff
PRINT Adj_diff;"[dB]"
END

```

### For Instrument BASIC

```

EXECUTE "ANAOCH1"
EXECUTE "ANARFULL"
EXECUTE "ANAODATA"
EXECUTE "RPLLHEI?"
PRINT READIO(8,0);"[dB]"
END

```

## RPLENV?

Returns the maximum height between the negative peak and the intersection of an imaginary slope line between the adjacent positive peaks. (Query only)

**Syntax** RPLENV?

**Query** *value*

**Response** Where,

Register	Parameter	Description
0	<i>value</i>	Maximum height between the negative peak and the intersection of an imaginary slope line between the adjacent positive peaks. (See Figure I-6.)

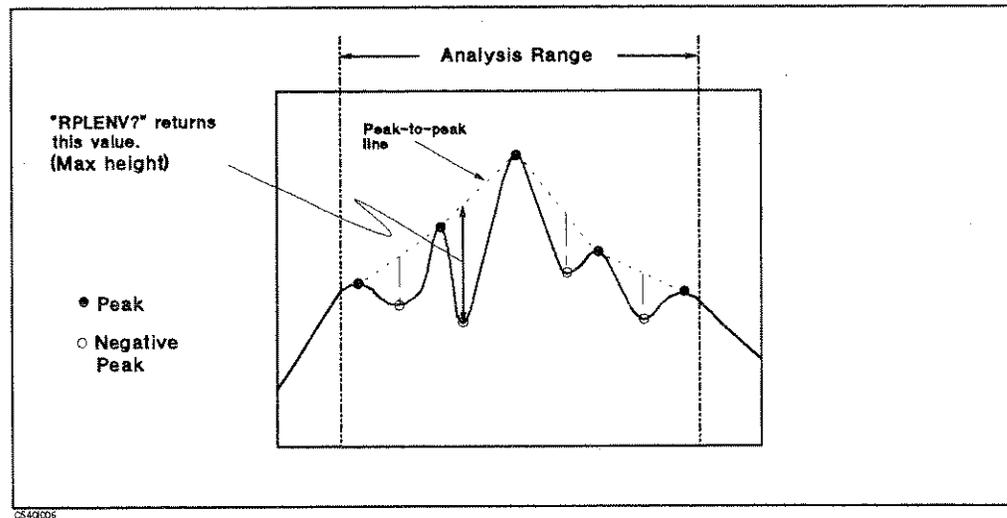


Figure I-6. RPLENV?

**Note** ■ If the search fails, the analyzer returns 0.

### Examples For External Controller

```
ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
OUTPUT @Hp4396;"RPLENV?"
ENTER @Hp4396;Env_diff
PRINT Env_diff;"[dB]"
END
```

### For Instrument BASIC

```
EXECUTE "ANAOCH1"
EXECUTE "ANARFULL"
EXECUTE "ANAODATA"
EXECUTE "RPLENV?"
PRINT READIO(8,0);"[dB]"
END
```

### RPLMEA?

Returns the mean of the difference between the adjacent positive and negative peaks within the specified range. (Query only)

**Syntax** RPLMEA?

**Query** *value*

**Response** Where,

Register	Parameter	Description
0	<i>value</i>	Mean of the difference between the adjacent positive and negative peaks. (See Figure I-7)

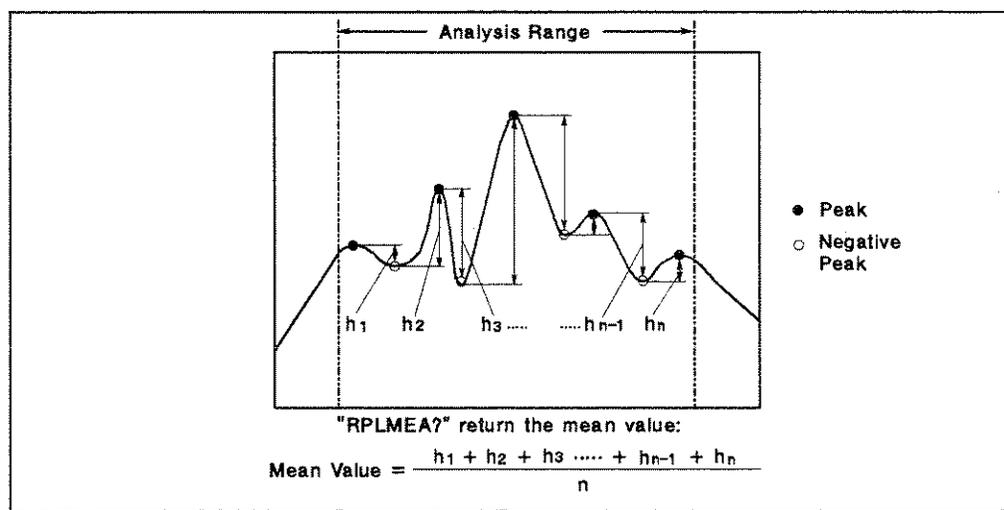


Figure I-7. RPLMEA?

**Note** ■ If the search fails, the analyzer returns 0.

**Examples For External Controller**

```

ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
OUTPUT @Hp4396;"RPLMEA?"
ENTER @Hp4396;Mean_diff
PRINT Mean_diff;"[dB]"
END
    
```

**For Instrument BASIC**

```

EXECUTE "ANAOCH1"
EXECUTE "ANARFULL"
EXECUTE "ANAODATA"
EXECUTE "RPLMEA?"
PRINT READIO(8,0);"[dB]"
END
    
```

## RPLVAL?

Returns the maximum total of the differences between the negative peaks and the adjacent positive peaks on both sides and the stimulus of the corresponding negative peak. (Query only)

**Syntax** RPLVAL?

**Query** *Rplval, stimulus*

**Response** Where,

Register	Parameter	Description
0	<i>Rplval</i>	Maximum total of the differences between the negative peaks and the adjacent positive peaks on both sides. (See Figure I-8)
1	<i>stimulus</i>	Stimulus of the corresponding negative peak

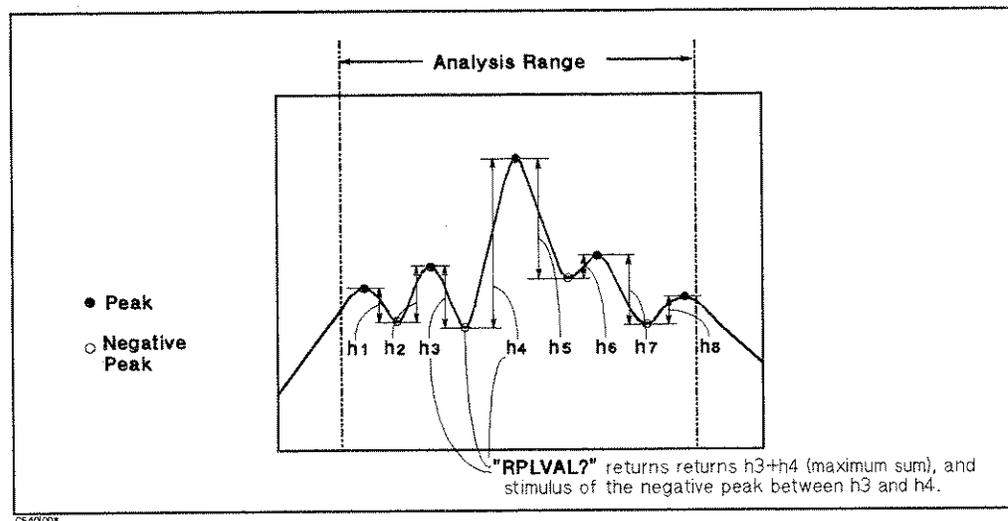


Figure I-8. RPLVAL?

**Note** ■ If the search fails, the analyzer returns 0.

### Examples For External Controller

```
ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
OUTPUT @Hp4396;"RPLVAL?"
ENTER @Hp4396;Val,Stim
PRINT Val;"[dB]";Stim;"[Hz]"
END
```

### For Instrument BASIC

```
EXECUTE "ANAOCH1"
EXECUTE "ANARFULL"
EXECUTE "ANAODATA"
EXECUTE "RPLVAL?"
PRINT READIO(8,0);"[dB]"
PRINT READIO(8,1);"[Hz]"
END
```

## POLE?

Returns the stimulus and value of the first negative peak found on each side of the maximum point that are below the specified value from the maximum peak. (Query only)

**Syntax** POLE? *D*

Where,

Register	Parameter	Description
0	<i>D</i>	Difference from the maximum peak.

**Query Response**  $x_1$ ,  $stim_1$ ,  $x_2$ ,  $stim_2$

Where,

Register	Parameter	Description
0	$x_1$	Left negative peak value.
1	$stim_1$	Stimulus of $x_1$ .
2	$x_2$	Right negative peak value.
3	$stim_2$	Stimulus of $x_2$ .

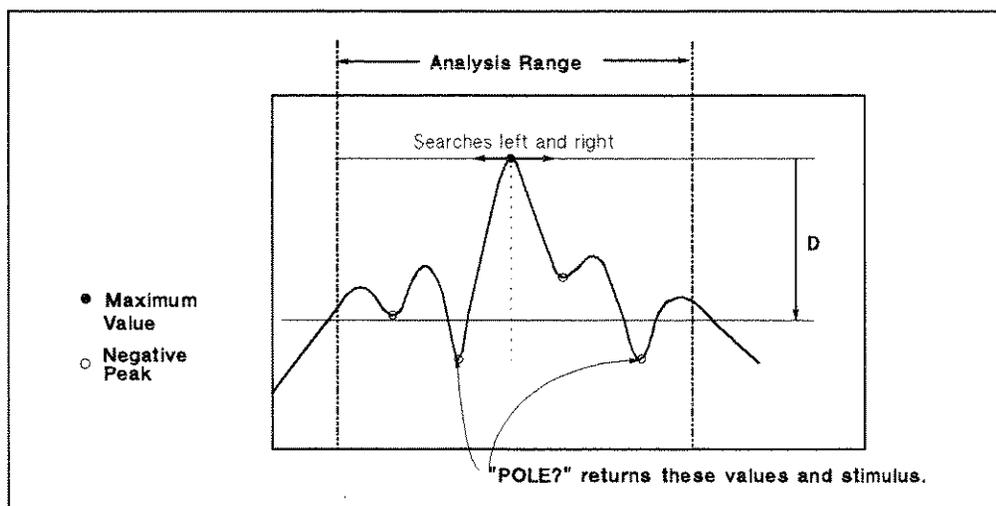


Figure I-9. POLE?

### Note

- If the search fails, the analyzer returns 0.
- Give the command parameter as a negative value. For instance, to specify 50 dB down from the maximum peak as a reference level, the parameter is -50.

### Examples For External Controller

```
ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAOATA"
OUTPUT @Hp4396;"POLE? -50"
ENTER @Hp4396;X1,S1,X2,S2
PRINT "LEFT :";X1;" [dB]";S1;" [Hz]"
PRINT "RIGHT :";X2;" [dB]";S2;" [Hz]"
```

END

**For Instrument BASIC**

```
EXECUTE "ANAOCH1"  
EXECUTE "ANARFULL"  
EXECUTE "ANAODATA"  
WRITEIO 8,0;-50  
EXECUTE "POLE?"  
PRINT "LEFT :";READIO(8,0);"[dB]";READIO(8,1);"[Hz]"  
PRINT "RIGHT:";READIO(8,2);"[dB]";READIO(8,3);"[Hz]"  
END
```

---

## Filter and Resonator Analysis Commands

The following commands are device related. They are easy to use for specific device analysis because they can output many parameters using only a single command.

- `OUTPFILT?`
- `OUTPXFIL?`
- `OUTPCFIL?`
- `OUTPRESO?`
- `OUTPRESR?`
- `OUTPRESF?`
- `OUTPCERR?`

## OUTPFILT?

Analyzes the filter and returns the parameters.

**Syntax**     OUTPFILT? *x*

Where,

Register	Parameter	Description
0	<i>x</i>	The dB value down the bandwidth filter.

**Query Response**     *Loss, BW, f<sub>cent</sub>, Q, Δf<sub>left</sub>, Δf<sub>right</sub>* (Total6)

Register	Parameter	Description
0	<i>Loss</i>	Insertion loss
1	<i>BW</i>	<i>x</i> dB down bandwidth
2	<i>f<sub>cent</sub></i>	Center frequency
3	<i>Q</i>	Q (Quality factor)
4	<i>Δf<sub>left</sub></i>	Frequency difference between the left cutoff point and the middle of the range.
5	<i>Δf<sub>right</sub></i>	Frequency difference between the right cutoff point and the middle of the range.

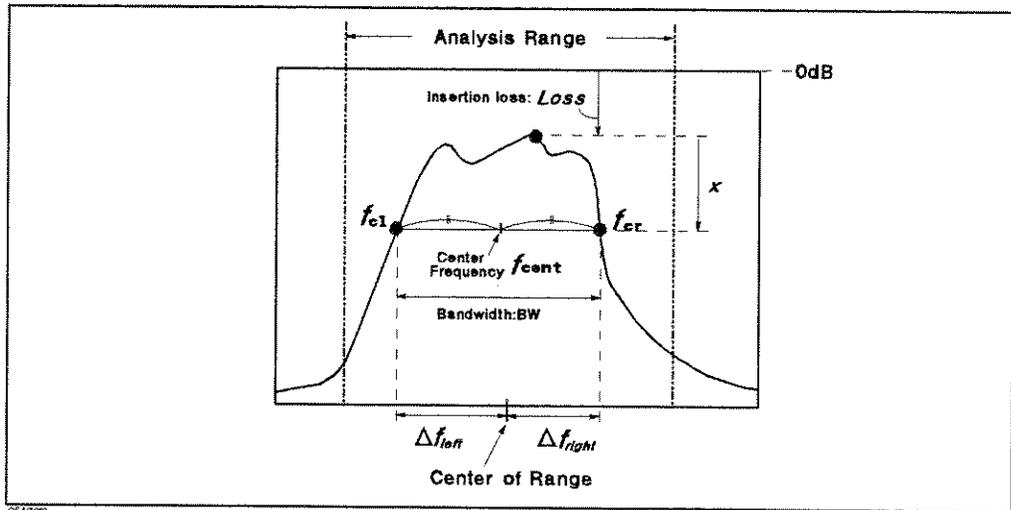


Figure I-10. OUTPFILT?

- Semantics**
- Insertion loss is the maximum value within the specified range.
  - *x* dB bandwidth is the frequency difference between both of the *x* dB down cutoff points.
  - Center frequency is the middle point of both cutoff points.
  - Q is calculated using the following equation:

$$Q = \frac{\sqrt{f_{cl} \times f_{cr}}}{BW}$$

**Note**

- If both of the two cutoff points are not found, the analyzer returns 0 for all values of the query response.

#### Examples For External Controller

```
10 ASSIGN @Hp4396 TO 717
20 CALL Sweep(1) ! Goes to the subroutine.
30 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
40 OUTPUT @Hp4396;"OUTPFILT? -3"
50 ENTER @Hp4396;Loss,Bw,Fc,Q,Dfl,Dfr
60 PRINT "Loss: ";Loss;" [dB] BW: ";Bw;" [Hz]"
70 PRINT "fc: ";Fc;" [Hz] Q: ";Q
80 PRINT "Dfl: ";Dfl;" [Hz] Dfr: ";Dfr;" [Hz]"
90 END
100 SUB Sweep(Ch)! Sweep End Detection Subroutine
101 ! (Parameter: No. of channel)
110 ASSIGN @Hp4396 TO 717
120 ON INTR 7 GOTO Sweep_end
130 OUTPUT @Hp4396;"TRGS BUS"
140 OUTPUT @Hp4396;"ESNB 2; *SRE 4"
150 FOR I=1 TO Ch
160 OUTPUT @Hp4396;"*CLS;*OPC?"
170 ENTER @Hp4396;0pc
180 ENABLE INTR 7;2
190 TRIGGER @Hp4396
200 Waiting:GOTO Waiting
210 Sweep_end:!
220 NEXT I
230 SUBEND
```

#### For Instrument BASIC

```
10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
30 EXECUTE "SING"
40 EXECUTE "ANAOCH1"
50 EXECUTE "ANARFULL"
60 EXECUTE "ANAODATA"
70 WRITEIO 8,0;-50
80 EXECUTE "POLE?"
90 PRINT "Loss: ";READIO(8,0);" [dB] BW: ";READIO(8,1);" [Hz]"
100 PRINT "fc: ";READIO(8,2);" [Hz] Q: ";READIO(8,3)
110 PRINT "Dfl: ";READIO(8,4);" [Hz] Dfr: ";READIO(8,5);" [Hz]"
120 END
```

## OUTPXFIL?

**Syntax**     OUTPXFIL?  $x_1, x_2, D, f_1, f_2$

Where,

Register	Parameter	Description
0	$x_1$	The dB value down the bandwidth filter. (1) $x_1$ [dB]
1	$x_2$	The dB value down the bandwidth filter. (2) $x_2$ [dB]
2	$D$	Difference from maximum value. (Same as POLE? parameter.)
3	$f_1$	Stop frequency of the range for the rejection level.
4	$f_2$	Start frequency of the range for the spurious level.

**Query**      $Loss, BW, f_{cent}, Q, \Delta f_{left1}, \Delta f_{right1}, \Delta f_{left2}, \Delta f_{right2}, Pass, Reject, Spurious, Pole_{x1},$   
**Response**  $Pole_{stim1}, Pole_{x2}, Pole_{stim2}$  (15)

Register	Parameter	Description
0	$Loss$	Insertion loss
1	$BW$	$x_1$ dB down bandwidth
2	$f_{cent}$	Center frequency
3	$Q$	Q
4	$\Delta f_{left}$	Frequency difference between the left cutoff point ( $f_{cl}$ ) and the middle of the range.
5	$\Delta f_{right}$	Frequency difference between the right cutoff point ( $f_{cr}$ ) and the middle of the range.
6	$\Delta f_{left2}$	Frequency difference between the left cutoff point ( $f_{cl2}$ ) and the middle of the range.
7	$\Delta f_{right2}$	Frequency difference between the left cutoff point ( $f_{cr2}$ ) and the middle of the range.
8	$Pass$	Passband ripple
9	$Reject$	Rejection level
10	$Spurious$	Spurious level
11	$Pole_{x1}$	First negative peak found to the left of the maximum point.
12	$Pole_{stim1}$	Stimulus of $Pole_{x1}$ .
13	$Pole_{x2}$	First negative peaks found to the right of the maximum point.
14	$Pole_{stim2}$	Stimulus of $Pole_{x2}$ .

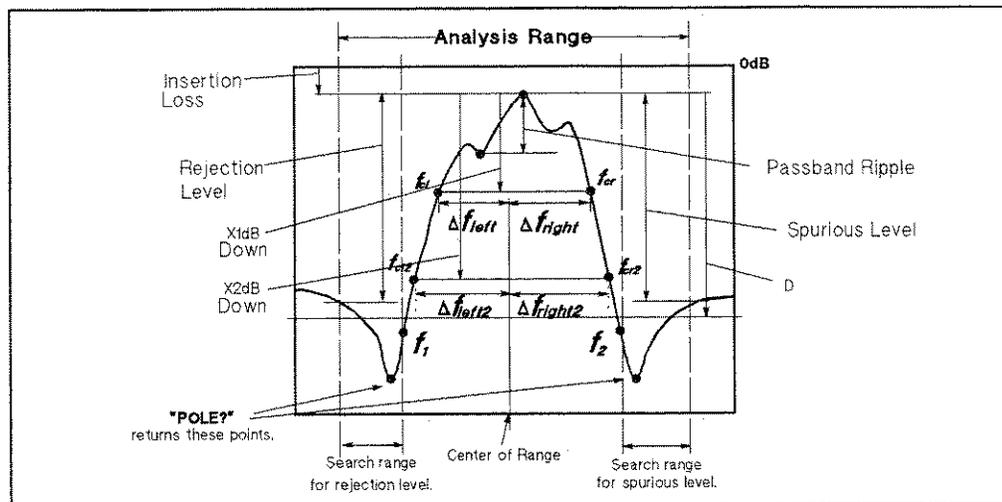


Figure I-11. OUTPXFIL?

- Semantics**
- Insertion loss,  $x_1$  dB bandwidth, center frequency,  $Q$ ,  $\Delta f_{left}$ , and  $\Delta f_{right}$  are the same as the responses of OUTPFILT?.
  - $\Delta f_{left2}$  and  $\Delta f_{right2}$  are the frequency differences between both sides at the  $x_2$  dB down cutoff points ( $f_{cl2}$  and  $f_{cr2}$ ) and the middle of the range.
  - Passband ripple is the frequency difference of the maximum positive peak and the minimum negative peak between the  $x_1$  dB down cutoff points ( $f_{cl}$ ,  $f_{cr}$ ).
  - Rejection level is the frequency difference from the insertion loss to the maximum level in the range from the left edge of analysis range to  $f_1$ .
  - Spurious level is the frequency difference from the insertion loss to the maximum level between  $f_2$  and the right edge of analysis range.
  - $Pole_{x1}$ ,  $Pole_{estim1}$ ,  $Pole_{x2}$ ,  $Pole_{estim2}$  are the same as the query response of POLE? with the parameter  $D$ .

- Note**
- If both of the two  $x_1$  dB down cutoff points are not found, the analyzer returns 0 for all values of the query response.
  - If both of the two  $x_2$  dB down cutoff points are not found, the analyzer returns 0 for  $\Delta f_{left2}$  and  $\Delta f_{right2}$ .
  - If the corresponding peak for POLE? is not found, the analyzer returns 0 for  $Pole_{x1}$ ,  $Pole_{estim1}$ ,  $Pole_{x2}$ , and  $Pole_{estim2}$ .

**Examples For External Controller**

```

10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
30 CALL Sweep(1) ! Goes to sub routine.
40 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAOADATA"
50 OUTPUT @Hp4396;"OUTPXFIL? -3,-10,-50,69.98MHz,70.02MHz"
60 ENTER @Hp4396;Loss,Bw,Fc,Q,Df1,Dfr,Df12,Dfr2,Pass,Reject,
Spurious,Pole1,Fp1,Pole2,Fp2
70 PRINT "Loss: ";Loss;" [dB] BW: ";Bw;" [Hz] fc: ";Fc;" [Hz]"
80 PRINT "Q: ";Q;" Df1: ";Df1;" [Hz] Dfr: ";Dfr;" [Hz]"
90 PRINT "Df12: ";Df12;" [Hz] Dfr2: ";Dfr2;" [Hz] Pass: ";Pass;" [dB]"

```

```
100 PRINT "Reject: ";Reject;"[dB] Spurious: ";Spurious;"[dB]"
110 PRINT "Pole (left): ";Pole1;"[dB] ";Fp1;"[Hz]"
120 PRINT "Pole (right): ";Pole2;"[dB] ";Fp2;"[Hz]"
130 END
```

#### For Instrument BASIC

```
10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
30 EXECUTE "SING"
40 EXECUTE "ANAOCH1"
50 EXECUTE "ANARFULL"
60 EXECUTE "ANAODATA"
70 WRITEIO 8,0;-3
80 WRITEIO 8,1;-10
90 WRITEIO 8,2;-50
100 WRITEIO 8,3;6.998E+7
110 WRITEIO 8,4;7.002E+7
120 EXECUTE "OUTPXFIL?"
130 PRINT "Passband Ripple: ";READIO(8,8);"[dB]"
140 PRINT "Rejection Level: ";READIO(8,9);"[dB]"
150 PRINT "Spurious Level: ";READIO(8,10);"[dB]"
160 END
```

## OUTPCFIL?

Analyzes the filter at the nominal frequency, and returns the parameters.

**Syntax**      OUTPCFIL?  $f_c, x_1, x_2, D, f_1, f_2$

Where,

Register	Parameter	Description
0	$f_c$	Nominal frequency
1	$x_1$	The dB value down the bandwidth filter. (1) $x_1$ [dB]
2	$x_2$	The dB value down the bandwidth filter. (2) $x_2$ [dB]
3	$D$	Difference from maximum value. (Same as POLE? parameter.)
4	$f_1$	Stop frequency of the range for the rejection level.
5	$f_2$	Start frequency of the range for the spurious level.

**Query Response**       $Loss, Loss_c, BW, f_{cent}, Q, \Delta f_{left1}, \Delta f_{right1}, \Delta f_{left2}, \Delta f_{right2}, Pass, Reject, Spurious, Pole_{x1}, Pole_{stim1}, Pole_{x2}, Pole_{stim2}$  (Total 16)

Register	Parameter	Description
0	$Loss$	Insertion loss
1	$Loss_c$	Const Loss
2	$BW$	$x_1$ dB down bandwidth
3	$f_{cent}$	Center frequency
4	$Q$	Q
5	$\Delta f_{left}$	Frequency difference between the left cutoff point ( $f_{cl}$ ) and the middle of the range.
6	$\Delta f_{right}$	Frequency difference between the right cutoff point ( $f_{cr}$ ) and the middle of the range.
7	$\Delta f_{left2}$	Frequency difference between the left cutoff point ( $f_{cl2}$ ) and the middle of the range.
8	$\Delta f_{right2}$	Frequency difference between the left cutoff point ( $f_{cr2}$ ) and the middle of the range.
9	$Pass$	Passband ripple
10	$Reject$	Rejection level
11	$Spurious$	Spurious level
12	$Pole_{x1}$	First negative peaks found to the left of the maximum point.
13	$Pole_{stim1}$	Stimulus of $Pole_{x1}$ .
14	$Pole_{x2}$	First negative peak found to the right of the maximum point.
15	$Pole_{stim2}$	Stimulus of $Pole_{x2}$ .

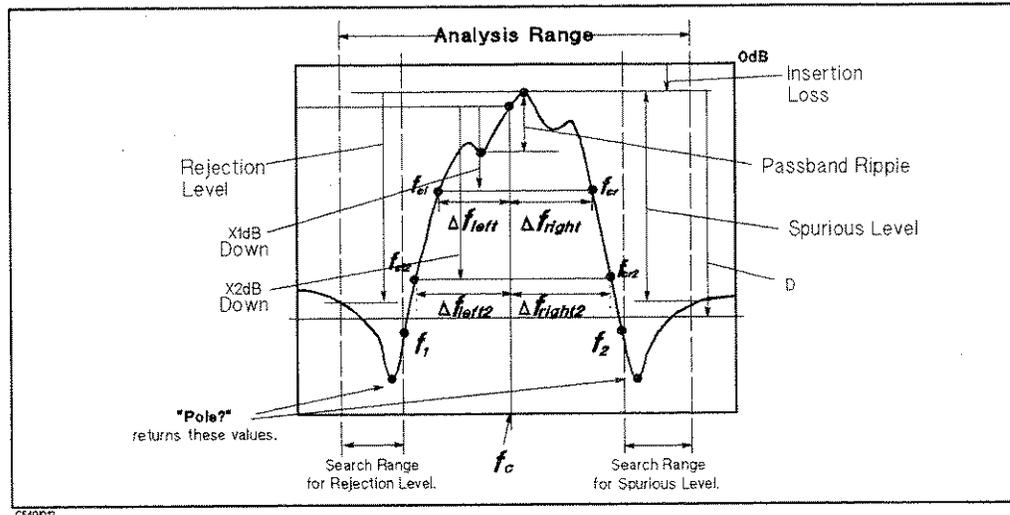


Figure I-12. OUTPCFIL?

- Semantics**
- Insertion loss, rejection level, spurious level,  $Pole_{x1}$ ,  $Pole_{stim1}$ ,  $Pole_{x2}$ , and  $Pole_{stim2}$  are the same as the responses of OUTPCFIL?
  - The const loss is the value of the point that is specified by command parameter,  $f_c$ .
  - $x_1$  dB bandwidth is the frequency difference between two  $x_1$  dB down cutoff points ( $f_{cl}$ ,  $f_{cr}$ ) from the const loss point.
  - Center frequency is the middle point of  $f_{cl}$  and  $f_{cr}$ .
  - $Q$  is calculated using the following equation:

$$Q = \frac{\sqrt{f_{cl} \times f_{cr}}}{BW}$$

- $\Delta f_{left}$  and  $\Delta f_{right}$  are the frequency differences between both sides at the  $x_1$  dB down cutoff points ( $f_{cl}$  and  $f_{cr}$ ) and  $f_c$ .
  - $\Delta f_{left2}$  and  $\Delta f_{right2}$  are the frequency differences between both sides at the  $x_2$  dB down cutoff points ( $f_{cl2}$  and  $f_{cr2}$ ) and  $f_c$ .
  - Passband ripple is the frequency difference of maximum positive peak and minimum negative peak between  $x_1$  dB down cutoff points ( $f_{cl1}$ ,  $f_{cr1}$ ).
- Note**
- If both of the two  $x_1$  dB down cutoff points are not found, the analyzer returns 0 for all values of the query response.
  - If both of the two  $x_2$  dB down cutoff points are not found, the analyzer returns 0 for  $\Delta f_{left2}$  and  $\Delta f_{right2}$ .
  - If the corresponding peak for POLE? is not found, the analyzer returns 0 for  $Pole_{x1}$ ,  $Pole_{stim1}$ ,  $Pole_{x2}$ , and  $Pole_{stim2}$ .

**Examples For External Controller**

```

10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
30 CALL Sweep(1) ! Goes to sub routine. (See OUTPCFIL?)
40 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAOADATA"

```

```
50 OUTPUT @Hp4396;"OUTPCFIL? 70MHZ,-3,-10,-50,69.98MHZ,70.02MHZ"  
60 ENTER @Hp4396;Loss,Lc,Bw,Fc,Q,Df1,Dfr,Df12,Dfr2,Pass,Reject,  
Spurious,Pole1,Fp1,Pole2,Fp2  
70 PRINT "Loss: ";Loss;"[dB] Const Loss: ";Lc;"[dB]"  
80 PRINT "BW: ";Bw;"[Hz] Fc: ";Fc;"[Hz]"  
90 PRINT "Q: ";Q;" DF1: ";Df1;"[Hz] DFR: ";Dfr;"[Hz]"  
100 PRINT "Df12: ";Df12;"[Hz] Dfr2: ";Dfr2;"[Hz] Pass: ";Pass;"[dB]"  
110 PRINT "Reject: ";Reject;"[dB] Spurious: ";Spurious;"[dB]"  
120 PRINT "Pole (left): ";Pole1;"[dB] ";Fp1;"[Hz]"  
130 PRINT "Pole (right): ";Pole2;"[dB] ";Fp2;"[Hz]"  
140 END
```

#### For Instrument BASIC

```
10 ASSIGN @Hp4396 TO 800  
20 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"  
30 EXECUTE "SING"  
40 EXECUTE "ANAOCH1"  
50 EXECUTE "ANARFULL"  
60 EXECUTE "ANAODATA"  
70 WRITEIO 8,0;7.E+7  
80 WRITEIO 8,1;-3  
90 WRITEIO 8,2;-10  
100 WRITEIO 8,3;-50  
110 WRITEIO 8,4;6.998E+7  
120 WRITEIO 8,5;7.002E+7  
130 EXECUTE "OUTPCFIL?"  
140 PRINT "Const Loss: ";READIO(8,1);"[dB]"  
150 END
```

## OUTPRESO?

Returns resonator specific parameters. (Query only)

**Syntax**      OUTPRESO?

**Query**         $Z_r, f_r, Z_a, f_a$  (Total 4)

**Response**    Where,

Register	Parameter	Description
0	$Z_r$	Resonant impedance
1	$f_r$	Resonant frequency
2	$Z_a$	Anti-resonant impedance
3	$f_a$	Anti-resonant frequency

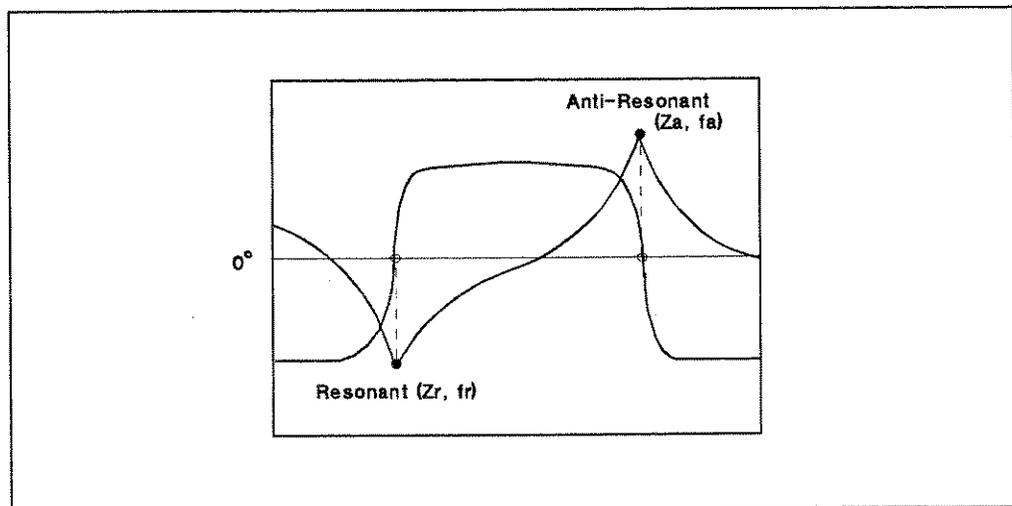


Figure I-13. OUTPRESO?

**Semantics**    ■ OUTPRESO? executes the following actions and returns their values:

1. Searches for the  $0^\circ$  phase point from the left edge of the analysis range.
2. Defines the first point found as the resonant point, and then returns its impedance and its frequency.
3. Defines the next point found as the anti-resonant point, and then returns its impedance and its frequency.

**Note**

■ You must select the following conditions to use this command:

- Dual Channel & Coupled Channel: ON
- Impedance Conversion: ON
- Analysis channel: LOG MAG format
- Non-analysis channel: Phase format

■ OUTPRESO? returns the first two found  $0^\circ$  phase point events if there are more than three corresponding points.

■ If there is only one  $0^\circ$  phase point in the range, OUTPRESO? defines that point as a resonant point and returns 0 for  $Z_a$  and  $f_a$ .

- If there is no 0° point, OUTPRES0? returns 0 for all parameters.
- If the impedance conversion is off, OUTPRES0? returns the magnitude (dB) at the 0° phase point.

**Examples For External Controller**

```
10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"DUAC ON; COUC ON"
30 OUTPUT @Hp4396;"CHAN2; FMT PHAS"
40 OUTPUT @Hp4396;"CHAN1; FMT LOGM; CONV ZTRA"
50 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
60 CALL Sweep(2) ! Goes to sub routine. (See OUTPFILT?)
61             ! Parameter is 2 because of Dual Channel ON.
70 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
80 OUTPUT @Hp4396;"OUTPRES0?"
90 ENTER @Hp4396;Zr,Fr,Za,Fa
100 PRINT "Resonant: ";Zr;" [ohm] ";Fr;" [Hz]"
110 PRINT "Anti-Resonant: ";Za;" [ohm] ";Fa;" [Hz]"
120 END
```

**For Instrument BASIC**

```
10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"DUAC ON; COUC ON"
30 OUTPUT @Hp4396;"CHAN2; FMT PHAS"
40 OUTPUT @Hp4396;"CHAN1; FMT LOGM; CONV ZTRA"
50 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
60 EXECUTE "SING" ! This line waits for the end of both channel sweep.
70 EXECUTE "ANAOCH1"
80 EXECUTE "ANARFULL"
90 EXECUTE "ANAODATA"
100 EXECUTE "OUTPRES0?"
110 PRINT "Resonant: ";READIO(8,0);" [ohm] ";READIO(8,1);" [Hz]"
120 PRINT "Anti-Resonant: ";READIO(8,2);" [ohm] ";READIO(8,3);" [Hz]"
130 END
```

## OUTPRESR?

Returns the resonator specific parameters. (Query only)

**Syntax**      OUTPRESR?

**Query**         $Z_r, f_r, Z_a, f_a, Rpl_1, Rpl_2, Rpl_3$  (Total 7)

**Response**    Where,

Register	Parameter	Description
0	$Z_r$	Resonant impedance
1	$f_r$	Resonant frequency
2	$Z_a$	Anti-resonant impedance
3	$f_a$	Anti-resonant frequency
4	$Rpl_1$	Maximum left height of the ripple where is on the left side of the resonant point.
5	$Rpl_2$	Maximum height right of the ripple that is between the resonant and anti-resonant points.
6	$Rpl_3$	Maximum height left of the ripple that is on the right side of the resonant point.

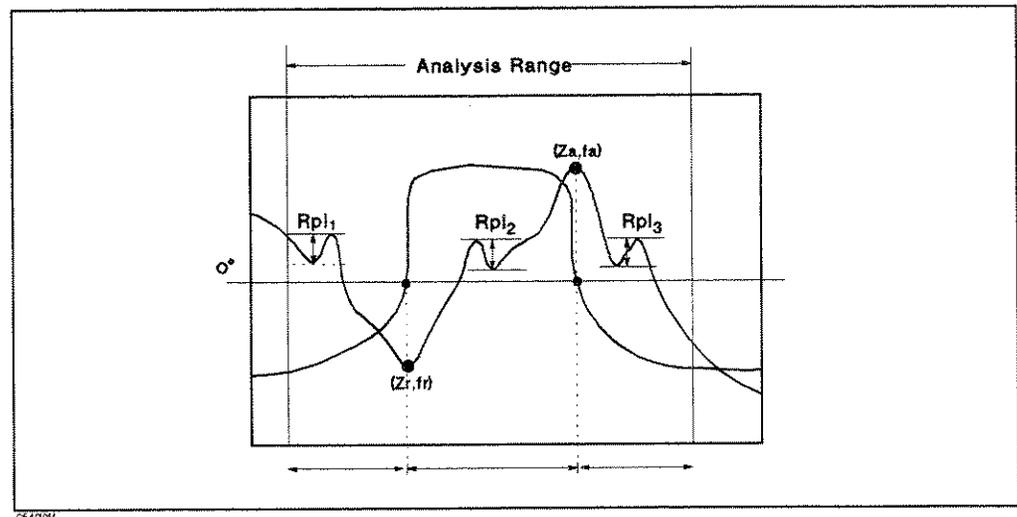


Figure I-14. OUTPRESR?

**Semantics**    ■ OUTPRESR? executes the following actions:

1. Searches for the  $0^\circ$  phase point from the left edge of the analysis range.
2. Defines the first point found as the resonant point, and then returns its impedance and its frequency.
3. Defines the next point found as the anti-resonant point, and then returns its impedance and its frequency.
4. Returns the maximum height of the ripple,  $Rpl_1$ , that is the difference between the peak and left adjacent negative peak.
5. Returns the maximum height of the ripple,  $Rpl_2$ , that is the difference between the peak and right adjacent negative peak.

6. Returns the maximum height of the ripple,  $Rpl_3$ , that is the difference between the peak and left adjacent negative peak.

**Note**

- You must select the following conditions to use this command:
  - Dual Channel & Coupled Channel: ON
  - Impedance Conversion: ON
  - Analysis channel: LOG MAG format
  - Non-analysis channel: Phase format
- OUTPRESR? returns the first two 0° phase point events found if there are more than three corresponding points points.
- If there is only one 0° phase point in the range, OUTPRESR? defines that point as a resonant point and returns 0 for  $Z_a$ ,  $f_a$ ,  $Rpl_1$ ,  $Rpl_2$ , and  $Rpl_3$ .
- If there is no 0° point, OUTPRESR? returns 0 for all parameters.

**Examples For External Controller**

```

10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"DUAC ON; COUC ON"
30 OUTPUT @Hp4396;"CHAN2; FMT PHAS"
40 OUTPUT @Hp4396;"CHAN1; FMT LOGM; CONV ZTRA"
50 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
60 CALL Sweep(2) ! Goes to sub routine. (See OUTPFILT?)
70 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
80 OUTPUT @Hp4396;"OUTPRESR?"
90 ENTER @Hp4396;Zr,Fr,Za,Fa,R1,R2,R3
100 PRINT "Resonant: ";Zr;"[ohm] ,";Fr;"[Hz] "
110 PRINT "Anti-Resonant: ";Za;"[ohm] ,";Fa;"[Hz] "
120 PRINT "Ripple L: ";R1;"[dB] "
130 PRINT "Ripple M: ";R2;"[dB] "
140 PRINT "Ripple R: ";R3;"[dB] "
150 END

```

**For Instrument BASIC**

```

10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"DUAC ON; COUC ON"
30 OUTPUT @Hp4396;"CHAN2; FMT PHAS"
40 OUTPUT @Hp4396;"CHAN1; FMT LOGM; CONV ZTRA"
50 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
60 EXECUTE "SING"
70 EXECUTE "ANAOCH1"
80 EXECUTE "ANARFULL"
90 EXECUTE "ANAODATA"
100 EXECUTE "OUTPRESR?"
110 PRINT "Resonant: ";READIO(8,0);"[ohm] ,";READIO(8,1);"[Hz] "
120 PRINT "Anti-Resonant: ";READIO(8,2);"[ohm] ,";READIO(8,3);"[Hz] "
130 PRINT "Ripple L: ";READIO(8,4);"[dB] "
140 PRINT "Ripple M: ";READIO(8,5);"[dB] "
150 PRINT "Ripple R: ";READIO(8,6);"[dB] "
160 END

```

## OUTPRESF?

Returns the resonator specific parameters. (Query only)

**Syntax**     OUTPRESF?  $x_1$ ,  $x_2$

Where,

Register	Parameter	Description
0	$x_1$	Value down from the maximum peak.
1	$x_2$	Value above the minimum peak.

**Query Response**      $f_s$ ,  $f_p$ ,  $f_{s1}$ ,  $f_{s2}$ ,  $f_{p1}$ ,  $f_{p2}$  (Total 6)

Where,

Register	Parameter	Description
0	$f_s$	Middle point frequency between $f_{s1}$ and $f_{s2}$ .
1	$f_p$	Middle point frequency between $f_{p1}$ and $f_{p2}$ .
2	$f_{s1}$	Left one of the two points $x_1$ dB down from the maximum peak.
3	$f_{s2}$	Right one of the two points $x_1$ dB down from the maximum peak.
4	$f_{p1}$	Left one of the two points $x_2$ dB above the minimum negative peak.
5	$f_{p2}$	Right one of the two points $x_2$ dB above the minimum negative peak.

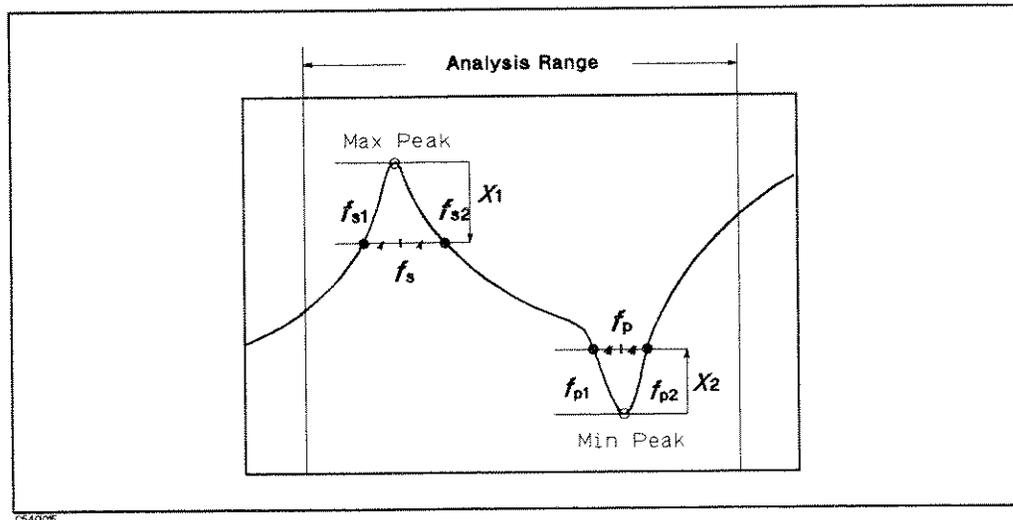


Figure I-15. OUTPRESF?

**Semantics**     ■ OUTPRESF? executes the following actions:

1. Searches for the maximum peak in the analysis range.
2. Searches for the  $x_1$  dB below points on both sides, and defines the first found left and right side points as  $f_{s1}$  and  $f_{s2}$ , respectively.

3. Defines the middle point between  $f_{s1}$  and  $f_{s2}$  to  $f_s$ .
4. Searches for the  $x_2$  dB above points on both sides, and defines the first found left and right side points as  $f_{p1}$  and  $f_{p2}$ , respectively.
5. Defines the middle point between  $f_{p1}$  and  $f_{p2}$  as  $f_p$ .

**Note**

- If there is no corresponding peak in the range, OUTPRESF? returns 0 for all parameters.
- If the maximum peak cannot be found, OUTPRESF? returns 0 for  $f_s$ ,  $f_{s1}$ , and  $f_{s2}$ .
- If the minimum negative peak cannot be found, OUTPRESF? returns 0 for  $f_p$ ,  $f_{p1}$ , and  $f_{p2}$ .
- Specify the negative value for  $x_1$  and positive value for  $x_2$ .

**Examples For External Controller**

```

10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"FMT LOGM; CENT 60.06MHz; SPAN 20kHz"
30 CALL Sweep(1) ! Goes to sub routine. (See OUTPFILT?)
40 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
50 OUTPUT @Hp4396;"OUTPRESF? -3dB,3dB"
60 ENTER @Hp4396;Fs,Fp,Fs1,Fs2,Fp1,Fp2
70 PRINT "Series-Resonant: ";Fs;" [Hz]"
80 PRINT "Parallel-Resonant: ";Fp;" [Hz]"
90 END

```

**For Instrument BASIC**

```

10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"FMT LOGM"
30 OUTPUT @Hp4396;"CENT 60.06MHz; SPAN 20kHz"
40 EXECUTE "SING"
50 EXECUTE "ANAOCH1"
60 EXECUTE "ANARFULL"
70 EXECUTE "ANAODATA"
80 WRITEIO 8,0;-3
90 WRITEIO 8,1;3
100 EXECUTE "OUTPRESF?"
110 PRINT "Series-Resonant: ";READIO(8,0);" [Hz]"
120 PRINT "Pararel-Resonant: ";READIO(8,1);" [Hz]"
130 END

```

## OUTPCERR?

Returns the ceramic resonator specific parameters. (Query only)

**Syntax**       OUTPCERR?

**Query**          $Z_r, f_r, Z_a, f_a, Rpl_1, Rpl_2, Rpl_3$  (Total7)

**Response**     Where,

Register	Parameter	Description
0	$Z_r$	Resonant impedance
1	$f_r$	Resonant frequency
2	$Z_a$	Anti-resonant impedance
3	$f_a$	Anti-resonant frequency
4	$Rpl_1$	Maximum height of the ripple that is on the left side of the resonant point.
5	$Rpl_2$	Maximum height of the ripple that is between the resonant and anti-resonant points.
6	$Rpl_3$	Maximum height of the ripple that is on the right side of the resonant point.

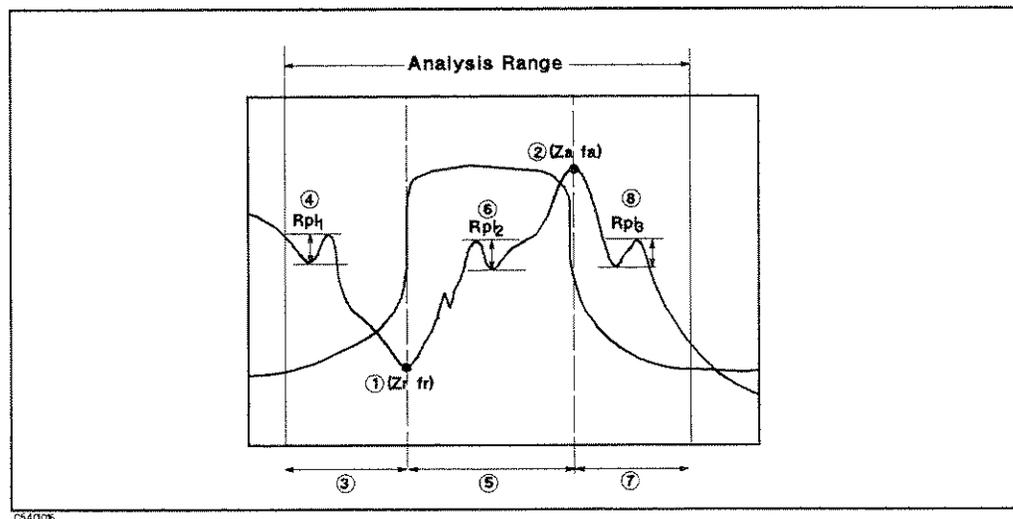


Figure I-16. OUTPCERR?

- Semantics**
- You need to select the LOG MAG format (FMT LOGM) and turn impedance conversion on (CONV ZTRA) to use this command.
  - OUTPCERR? executes the following actions:
    1. Searches for the minimum negative peak in the range and defines it as a resonant point. Then returns the resonant impedance,  $Z_r$ , and resonant frequency,  $f_r$ .
    2. Searches for the maximum peak in the range and defines it as a anti-resonant point. Then returns the anti-resonant impedance,  $Z_a$ , and anti-resonant frequency,  $f_p$ .

3. Returns the maximum height of the ripple,  $Rpl_1$ , that is the difference between the peak and left adjacent negative peak.
4. Returns the maximum height of the ripple,  $Rpl_2$ , that is the difference between the peak and right adjacent negative peak.
5. Returns the maximum height of the ripple,  $Rpl_3$ , that is the difference between the peak and left adjacent negative peak.

**Note**

- This command can be used when the LOG MAG format (FMT LOGM) is selected. If another format is selected, OUTPCERR? returns 0 for all parameters.
- If no corresponding ripple is found, OUTPCERR? returns 0.

**Examples**

```

10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"FMT LOGM; CONV ZTRA; CENT 60.02MHz; SPAN 20kHz"
30 CALL Sweep(1) ! Goes to sub routine. (See OUTPFILT?)
40 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
50 OUTPUT @Hp4396;"OUTPCERR?"
60 ENTER @Hp4396;Zr,Fr,Za,Fa,R1,R2,R3
70 PRINT "Resonant: ";Zr;"[ohm] ,";Fr;"[Hz]"
80 PRINT "Anti-Resonant: ";Za;"[ohm] ,";Fa;"[Hz]"
90 PRINT "Ripple L: ";R1;"[dB]"
100 PRINT "Ripple M: ";R2;"[dB]"
110 PRINT "Ripple R: ";R3;"[dB]"
120 END

```

**For Instrument BASIC**

```

10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"FMT LOGM"
30 OUTPUT @Hp4396;"CENT 60.02MHz; SPAN 20kHz"
40 EXECUTE "SING"
50 EXECUTE "ANAOCH1"
60 EXECUTE "ANARFULL"
70 EXECUTE "ANAODATA"
80 EXECUTE "OUTPCERR?"
90 PRINT "Resonant: ";READIO(8,0);"[ohm] ,";READIO(8,1);"[Hz]"
100 PRINT "Anti-Resonant: ";READIO(8,2);"[ohm] ,";READIO(8,3);"[Hz]"
110 PRINT "Ripple L: ";READIO(8,4);"[dB]"
120 PRINT "Ripple M: ";READIO(8,5);"[dB]"
130 PRINT "Ripple R: ";READIO(8,6);"[dB]"
140 END

```

---

## Equivalent circuit analysis commands

The following commands are for the equivalent circuit analysis. They are easy to use for specific device analysis because they can output many parameters using only a single command.

- EQUCPARA?
  - EQU
- EQUCPARS?
- EQUCO?
- EQUCPARS4?

## EQUCPARA?

Returns the six-device equivalent circuit parameters of the crystal resonator. (Query only)

**Syntax** EQUCPARA?

**Query**  $C_0, C_1, L_1, R_1, G_0, R_0$  (Total 6)

**Response** Where,

Register	Parameter	Description
0	$C_0$	Parallel capacitance
1	$C_1$	Motional capacitance
2	$L_1$	Motional inductance
3	$R_1$	Motional resistance
4	$G_0$	Electrode conductance
5	$R_0$	Electrode resistance

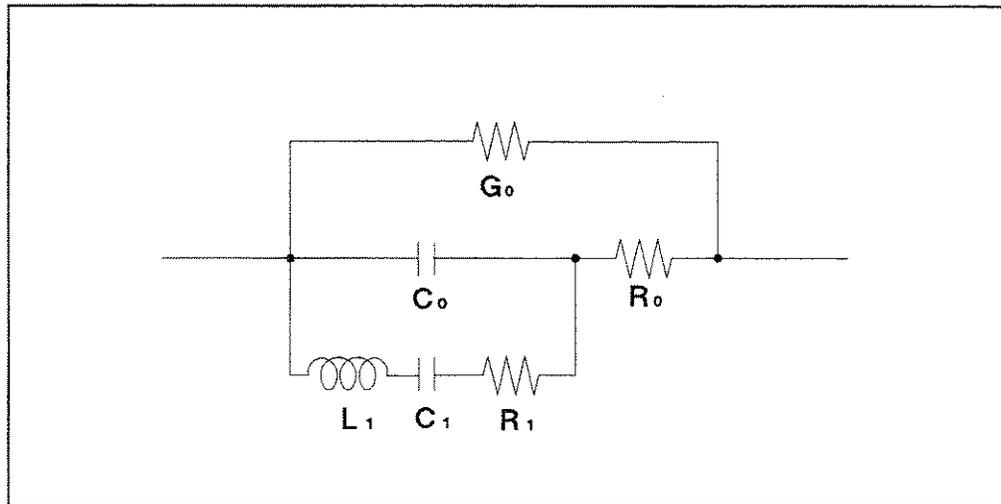


Figure I-17. Six-Device Equivalent Circuit of Crystal Resonator

**Semantics** ■ EQUCPARA? executes the following actions:

1. Obtains the admittance characteristic circle diagram.
2. Obtains the maximum conductance. ( $G_{max}$ )
3. Obtains frequencies  $f_1$  and  $f_2$  ( $f_1 < f_2$ ) of the two points where the conductance is half the maximum conductance ( $G_{max}$ ).
4. Calculates  $f_s$  by  $f_s = \sqrt{f_1 \times f_2}$ .
5. Obtains susceptance  $B_{fs}$  at  $f_s$ .
6. Calculates  $\omega_s$  by  $\omega_s = 2 \times \pi \times f_s$ .
7. Assumes that the frequency at which the phase becomes  $0^\circ$  near the parallel resonance frequency is  $f_a$ , and obtains its conductance  $G_a$ .
8. Calculates  $\omega_a$  by  $\omega_a = 2 \times \pi \times f_a$ .

9. Assumes that the frequency at which the phase becomes  $0^\circ$ \* near the series resonance frequency is  $f_r$ .
10. Calculates the constants using the above values and the following equations:

$$Q_s = \frac{f_s}{f_2 - f_1} \quad C_o' = \frac{B_1 + B_2}{2\omega_s}$$

$$L_1 = \frac{Q_s}{\omega_s G_{max}} \quad R_1 = \frac{C_o'}{C_o G_{max}}$$

$$C_1 = \frac{G_{max}}{\omega_s Q_s} \quad R_o = \frac{1}{G_{max}} - R_1$$

$$C_o = \frac{B_{fs}}{\omega_s} \quad G_o = G_a - \frac{R_1 \omega_a^2 C_o^2}{1 + R_o R_1 \omega_a^2 C_o^2}$$

\* "EQUCPARA?" interpolates the  $0^\circ$  phase points even if it does not exist in measured data.

- If the number of points between the maximum peak point ( $f_{Bmax}$ ) and the minimum peak point ( $f_{Bmin}$ ) of the conductance is less than 10 points, EQUCPARA? approximates an admittance circle. The circle approximation can be performed if there are 3 points for analysis. You can specify how many points are used for circle approximation using the EQU command to reduce the analysis time.
- If EQUCPARA? fails the circle approximation, 0 will be return for all parameters.
- If there are only 2 points for analysis, EQUCPARA? returns four-device equivalent circuit parameters. In this case, EQUCPARA? returns 0 for  $G_o$  and  $R_o$ .
- If there is only 1 point for analysis, EQUCPARA? returns 0 for all parameters.

**EQU**  
*value*

Specifies how many points are used for an approximation of a circle with the EQUCPARA? and EQUCPARS? commands. EQUCPARA? (or EQUCPARS?) thins the measured points out for the specified points, then makes a circle approximation. When the EQU parameter is set greater than the number of points, EQUCPARA? uses all the points for the circle approximation. Default value is 8.  
*value* 2 to 801

**Note**

- You must select the following conditions or Polar format to use this command:
  - Dual Channel & Coupled Channel: ON
  - Impedance Conversion: ON
  - Analysis channel: LOG MAG format
  - Non-analysis channel: Phase format

If another format is selected, 0 will be returned for query response.

**Examples For External Controller**

```
10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"FMT POLA; CONV YTRA; CENT 60.06MHz; SPAN 20kHz"
30 CALL Sweep(1) ! Goes to sub routine. (See OUTPFILT?)
40 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
50 OUTPUT @Hp4396;"EQUCPARA?"
60 ENTER @Hp4396;C0,C1,L1,R1,GO,RO
70 PRINT "C0:";C0;" C1:";C1
80 PRINT "L1:";L1;" R1:";R1
90 PRINT "GO:";GO;" RO:";RO
100 END
```

**For Instrument BASIC**

```
10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"FMT POLA; CONV YTRA"
30 OUTPUT @Hp4396;"CENT 60.06MHZ; SPAN 20kHz"
40 EXECUTE "SING"
50 EXECUTE "ANAOCH1"
60 EXECUTE "ANARFULL"
70 EXECUTE "ANAODATA"
80 WRITEIO 8,0;4
90 EXECUTE "EQUM"
100 EXECUTE "EQUCPARA?"
110 PRINT "CO:";READIO(8,0);" C1:";READIO(8,1)
120 PRINT "L1:";READIO(8,2);" R1:";READIO(8,3)
130 PRINT "GO:";READIO(8,4);" RO:";READIO(8,5)
140 END
```

## **EQUCPARS?**

Outputs the six-device equivalent circuit parameters of the crystal resonator. (Query only)

**Syntax** EQUCPARS?

**Query**  $C_0, C_1, L_1, R_1, f_s, f_a, f_r, f_1^*, f_2^*, G_0, R_0$  (Total 11)

**Response** \*  $f_1 < f_2$

For information about each parameter, see "EQUCPARA?".

**Note** ■ You must select the following conditions or Polar format to use this command:

- Dual Channel & Coupled Channel: ON
- Impedance Conversion: ON
- Analysis channel: LOG MAG format
- Non-analysis channel: Phase format

If another format is selected, 0 will be returned for query response.

**EQUCO? value**

Returns the parallel capacitance ( $C_0$ ) of the equivalent circuit of the resonator at the specified frequency. (Query only)

**Syntax** EQUCO? *value*

Where,

Register	Parameter	Description
0	<i>value</i>	Frequency for $C_0$

**Query**  $C_0$

**Response** Where,

Register	Parameter	Description
0	$C_0$	Parallel capacitance

**Semantics** ■  $C_0$  is calculated using the following equation:

$$C_0 = \frac{B_s}{\omega_s}$$

Where,

$B_s$  Imaginary part of the point on  $f_s$ .

$\omega_s = 2\pi f_s$

$f_s$  Frequency that is specified by the command parameter.

■ If the impedance conversion is selected,  $C_0$  is calculated using the following equation:

$$C_0 = \frac{-1}{B_s \times \omega_s}$$

**Note** ■ You must select the following conditions or Polar format to use this command:

- Dual Channel & Coupled Channel: ON
- Impedance Conversion: ON
- Analysis channel: LOG MAG format
- Non-analysis channel: Phase format

If another format is selected, 0 will be returned for query response.

- If the specified frequency is out of analysis range, 0 will be returned.
- If  $B_s$  is 0 when the impedance conversion is selected, EQUCO? returns 0.

**Examples For External Controller**

```

10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"DUAC ON; COUC ON"
30 OUTPUT @Hp4396;"CHAN2; FMT PHAS"
40 OUTPUT @Hp4396;"CHAN1; FMT LOGM; CONV ZTRA"
50 OUTPUT @Hp4396;"CENT 60.06MHz; SPAN 20kHz"
60 CALL Sweep(2) ! Goes to sob routine. (See OUTPFILT?)
70 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
80 OUTPUT @Hp4396;"EQUCO? 60.06MHz"
    
```

```
90 ENTER @Hp4396;CO
100 PRINT "CO:";CO
110 END
```

#### **For Instrument BASIC**

```
10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"FMT POLA"
30 OUTPUT @Hp4396;"CENT 60.06MHZ; SPAN 20kHz"
40 EXECUTE "SING"
50 EXECUTE "ANAOCH1"
60 EXECUTE "ANARFULL"
70 EXECUTE "ANAO DATA"
80 WRITEIO 8,0;6.006E+7
90 EXECUTE "EQUCO?"
100 PRINT "CO:";READIO(8,0)
110 END
```

## EQUCPARS4?

Returns the 4-device equivalent circuit parameters of the crystal resonator. (Query only)

**Syntax** EQUCPARS4?

**Query**  $C_0, C_1, L_1, R_1, f_s, f_a, f_r, f_1, f_2$  (Total9)

**Response** Where,

Register	Parameter	Description
0	$C_0$	Parallel capacitance
1	$C_1$	Motional capacitance
2	$L_1$	Motional inductance
3	$R_1$	Motional resistance
4	$f_s$	Motional (parallel) resonant frequency
5	$f_a$	Anti-resonant frequency
6	$f_r$	Resonant frequency
7	$f_1$	Frequency at the point where the half of maximum conductance.
8	$f_2$	Frequency at the point where the half of maximum conductance. ( $f_1 < f_2$ )

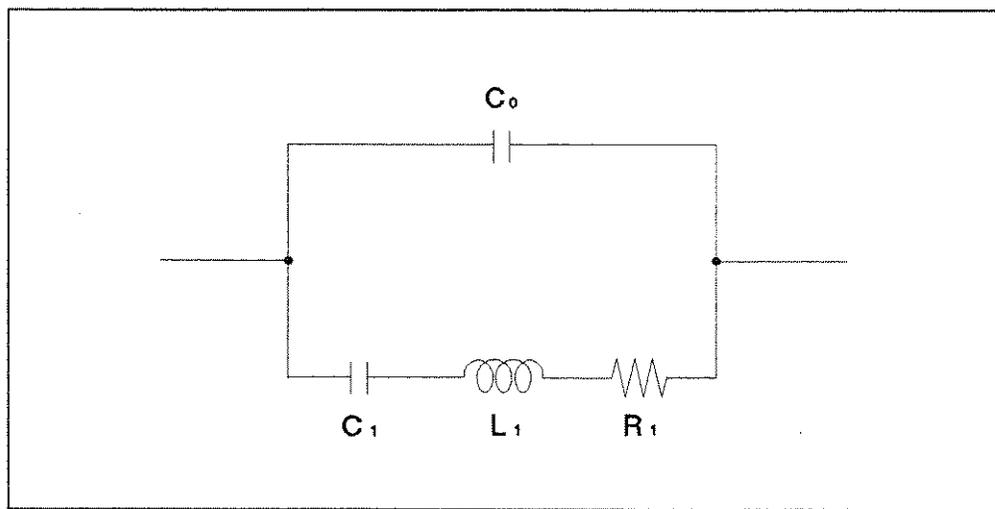


Figure I-18. Four-Device Equivalent Circuit of Crystal Resonator

- Semantics**
- You need to select the polar format (FMT POLA) and turn the admittance conversion on to use this command.
  - EQUCPARS4? executes the following actions:
    1. Obtains the admittance characteristic circle diagram. (See Figure I-19.)
    2. Obtains the susceptance ( $B_{fs}$ ) and its frequency ( $f_s$ ) at the maximum conductance ( $G_{max}$ ) point.
    3. Obtains frequencies  $f_1$  and  $f_2$  ( $f_1 < f_2$ ) of the two points where the conductance is half the maximum conductance ( $G_{max}$ ).

4. Assumes that the frequency at which the phase becomes  $0^\circ$  near the parallel resonance frequency is  $f_a$ .
5. Assumes that the frequency at which the phase becomes  $0^\circ$  near the series resonance frequency is  $f_r$ .
6. Calculates the constants using the above values and the following equations:

$$C_0 = \frac{f_r^2}{f_a^2 - f_r^2} \times C_1$$

$$C_1 = \frac{1}{QR_1 2\pi f_s}$$

$$L_1 = \frac{QR_1}{2\pi f_s}$$

$$Q = \left| \frac{f_s}{f_2 - f_1} \right|$$

$$R_1 = \frac{1}{G_{max}}$$

If there are no  $f_r$  and  $f_a$  points on the admittance chart,  $C_0$  is calculated using the following equation:

$$C_0 = \frac{B_{fs}}{2\pi f_s}$$

Where,  $B_{fs}$  is the susceptance at the  $G_{max}$  point.

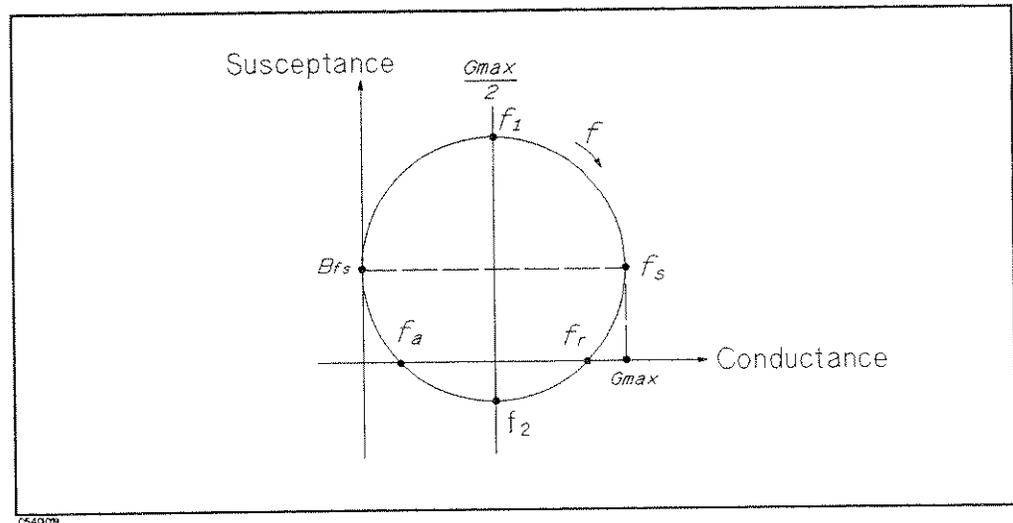


Figure I-19. Admittance Characteristic Circle Diagram

**Note** \* This command is only available when Polar format and the admittance conversion is on. If these are not selected, 0 will be returned.

**Examples For External Controller**

```

10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"FMT POLA; CONV YTRA; CENT 60.06MHz; SPAN 20kHz"
30 CALL Sweep(1) ! Goes to sub routine. (See OUTPFILT?)
40 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
50 OUTPUT @Hp4396;"EQUCPARS4?"
60 ENTER @Hp4396;C0,C1,L1,R1
70 PRINT "C0:";C0;" C1:";C1
80 PRINT "L1:";L1;" R1:";R1
90 END

```

**For Instrument BASIC**

```
10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"FMT POLA; CONV YTRA"
30 OUTPUT @Hp4396;"CENT 60.06MHZ; SPAN 20kHz"
40 EXECUTE "ANAOCH1"
50 EXECUTE "ANARFULL"
60 EXECUTE "ANAODATA"
70 EXECUTE "EQUCPARS4?"
80 PRINT "CO=";READIO(8,0);",C1=";READIO(8,1)
90 PRINT "L1=";READIO(8,2);",R1=";READIO(8,3)
100 END
```



## Error Messages

---

This section lists the error messages that are displayed on the analyzer display or transmitted by the instrument over HP-IB. Each error message is accompanied by an explanation, and suggestions are provided to help in solving the problem. Where applicable, references are provided to the related chapter of the appropriate manual. The messages are listed in numerical order.

In the explanation of many error commands, section numbers of the IEEE standard 488.2 are included. Refer to them for further information about an error with these IEEE section numbers.

### +0 No error

The error queue is empty. Every error in the queue has been read (OUTPERR0? query) or the queue was cleared by power-on or the \*CLS command.

### 1 CAN'T SET RBW AUTO IN ZERO SPAN

The RBW AUTO mode cannot be selected in the zero span. The RBW must be specified manually in the zero span. See Chapter 2 of the *Function Reference*. (spectrum analyzer mode only).

### 10 ADDITIONAL STANDARDS NEEDED

Error correction for the selected calibration class cannot be computed until all the necessary standards have been measured.

### 11 CALIBRATION REQUIRED

No valid calibration coefficients were found when you attempted to turn calibration ON. See *Task Reference* for information on how to perform calibration.

### 12 NO CALIBRATION CURRENTLY IN PROGRESS

The **RESUME CAL SEQUENCE** softkey is not valid unless a calibration is in progress. Start a new calibration. See “**Ca**” key” in the *Function Reference*.

### 13 CALIBRATION ABORTED

The calibration in progress was terminated due to a change of the active channel or stimulus parameters.

### 14 NOT VALID FOR PRESENT TEST SET

The calibration requested is inconsistent with the test set present. This message occurs in the following situations:

- A full 2-port calibration is requested with a test set other than an S-parameter test set.
- A one-path 2-port calibration is requested with an S-parameter test set (this procedure is typically used with a transmission/reflection test set).

**15 EXCEEDED 7 STANDARDS PER CLASS**

A maximum of seven standards can be defined for any class. See "Modifying Calibration Kits" in the *Function Reference*.

**16 CURRENT PARAMETER NOT IN CAL SET**

*HP-IB only.* Correction is not valid for the selected measurement parameter.

**17 BACKUP DATA LOST**

Data checksum error on the battery backup memory has occurred. The battery is recharged for approximately 10 minutes after power was turned on.

**18 NOT ALLOWED IN LIST SWEEP**

The level cal cannot be executed in the list sweep. The sweep type must be the linear frequency (spectrum analyzer mode only). See Chapter 5 of the *Function Reference*.

**19 UNEXPECTED DATA DETECTED: CAL ABORTED**

The signal measured for the level cal is not adequate for the calibration signal. (spectrum analyzer mode only.) See Chapter 5 of the *Function Reference*.

**26 PRINTER: not on, not connected, out of paper**

The printer does not respond to control. Verify power to the printer, and check the interface connection between the analyzer and the printer.

**34 NO VALID MEMORY TRACE**

If a memory trace is to be displayed or otherwise used, a data trace must first be stored to memory.

**44 OVERLOAD ON INPUT B**

**45 OVERLOAD ON INPUT A**

**46 OVERLOAD ON INPUT R**

**47 OVERLOAD ON INPUT S**

The power level at one of the four receiver inputs exceeds a certain level greater than the maximum input level.

**48 PHASE LOCK LOOP UNLOCKED**

Sever error. Contact your nearest Hewlett-Packard office.

**49 POWER FAILED ON *nnn***

Sever error. Contact your nearest Hewlett-Packard office. One or more power is failed. *nnn* is one of -5 V, -15 V, +5 V, +15 V, +65 V, and PostRegHot. It shows that which power line is failed. When this error occurs, the system halts so a controller cannot read this error by HP-IB.

**50 CONT SWITCHING MAY DAMAGE MECH SWITCH**

RF output power switch or input attenuator switch at input S is switching sweep by sweep, because RF power level or the input attenuator setting is different between two channels and the dual channel is turn on. To avoid premature wearing out of the output power switch and input attenuator switch, change trigger type to HOLD, SINGLE, or NUMBER of GROUP to hold sweep after measurement required. Or turn off the dual channel, or set the power level and the input attenuator of both channels to the same setting.

**51 MEASUREMENT INVALID AT  $f \leq 1\text{MHz}$ ,  $\text{IFBW} \geq 10\text{KHz}$** 

This message will displayed when whole frequency measured is less than or equal to 1 MHz and IFBW is set to 10 kHz or 40 kHz because the network measurement performance is not warranted at frequency  $\leq 1$  MHz with 10 kHz or 40 kHz IFBW.

**54 TOO MUCH DATA**

Either there is too much binary data to send to the analyzer when the data transfer format is FORM 2, FORM 3 or FORM 5, or the amount of data is greater than the number of points.

**55 NOT ENOUGH DATA**

The amount of data sent to the analyzer is less than that expected (*HP-IB only*).

**56 OPTION NOT INSTALLED**

This error occurs when an HP-IB command which is optional command is sent and the analyzer is not installed the option (*HP-IB only*). Please confirm options installed to the analyzer using \*OPT? command (see “\*OPT?” in Chapter 2.)

**64 TOO MANY SEGMENTS**

The maximum number of segments for the limit line table is 18. See Chapter 8 of the *Task Reference*.

**74 CURRENT EDITING SEGMENT SCRATCHED**

The current editing segment for the list table and the limit line is scratched when the following cases occur (*HP-IB only*):

- When EDITLIST (edit list table) command is received while editing a segment for the list table.
- When EDITLIML (edit limit line) command is received while editing a segment for the limit line.

Send LIMSDON (limit segment done) or SDON (segment done) to terminate editing segment.

**75 COMMAND IGNORED - SEGMENT NOT DONE YET**

The HP-IB command the analyzer received is ignored, because the segment is editing (*HP-IB only*). Send LIMSDON (limit segment done) or SDON (segment done) to terminate editing segment. (See “LIMSDON” in Chapter 2 and “SDON” in Chapter 2.)

**76 SEGMENT START/STOP OVERLAPPED**

Segments are not allowed to be overlapped. Reenter appropriate value for start or stop value of segments to avoid that segment is not overlapped.

**77 TOO MANY SEGMENTS OR POINTS**

Frequency list mode is limited to 31 segments or 801 points.

**78 TOO SMALL POINTS OR TOO LARGE STOP**

STOP + SPAN/(NOP-1) is out of sweep range. Increase NOP or change STOP value to lower frequency to avoid this error.

**82 CAN'T CHANGE- ANOTHER CONTROLLER ON BUS**

The analyzer cannot assume the mode of system controller until the active controller is removed from the bus or relinquishes the bus. See Chapter 7 of the *HP-IB Programming Guide*.

**83 FORMAT NOT VALID FOR MEASUREMENT**

The conversion function except the 1/S and the multiple phase modes is not valid for the Smith, admittance, and SWR formats.

**84 ANALYZER TYPE MISMATCH**

The analyzer receives a command that is not available for the current analyzer type. Please confirm HP-IB command or change analyzer type before sending the command.

**93 NO DATA TRACE**

The **MARKER ON [DATA]** is selected when the data trace is not displayed.

**94 NO MEMORY TRACE**

The **MARKER ON [MEMORY]** is selected when the memory trace is not displayed.

**95 NO MARKER DELTA - SPAN NOT SET**

The **MKRA→SPAN** softkey requires that delta marker mode be turned ON.

**96 NO MARKER DELTA - RANGE NOT SET**

The **MKRA→SEARCH RNG** softkey requires that delta marker is turned ON.

**98 NO ACTIVE MARKER**

The **marker→** command cannot be execute when no marker is displayed on the screen. Turn on the marker before executing the **marker→** commands.

**99 CAN'T CHANGE WHILE DUAL CHAN OFF**

The Cross channel cannot be turned on when dual channel is off. Turn on the dual channel before the cross channel is turned on.

**110 SAVE ERROR**

A serious error, for example physically damaged disk surface, is detected on saving a file.

**111 RECALL ERROR: INSTR STATE PRESET**

A serious error, for example corrupted data, is detected on recalling a file, and this forced the analyzer to be PRESET.

**112 INVALID FILE NAME**

*HP-IB only.* The file name for the RECALL, PURGE, or RE-SAVE function must have a "\_D" or "\_S" extension for LIF format.

**113 NO STATE/DATA FILES ON DISK**

There are no files on the flexible disk with extensions, "\_D" or "\_S" for LIF format, or "STA" or ".DTA" for DOS format.

**114 CAN'T SAVE GRAPHICS WHEN COPY IN PROGRESS**

If you attempt to save graphics when a print is in progress, this error message is displayed.

**115 LIF-DOS COPY NOT ALLOWED**

If you try to copy a file between the RAM disk and the flexible disk when the format of the RAM disk is different from the format of the flexible disk, this message is displayed.

**116 NO STATE/DATA FILES ON MEMORY**

There are no files on the RAM disk memory with extensions, "\_D" or "\_S" for LIF format, or "STA" or ".DTA" for DOS format.

**119 NO DATA TRACE DISPLAYED**

The **SCALE FOR [DATA]** is selected when the data trace is not displayed.

**120 NO MEMORY TRACE DISPLAYED**

The **SCALE FOR [MEMORY]** is selected when the memory trace is not displayed.

**124 LIST TABLE EMPTY OR INSUFFICIENT TABLE**

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

**125 CAN'T SET SLOPE ON IN POWER SWEEP**

The slope function can be turned on in frequency sweep.

**126 CAN'T CHANGE NUMBER OF POINTS**

The number of points of the spectrum analyzer mode cannot be to change manually, except in zero span.

**127 CAN'T SET SWEEP TIME AUTO IN ZERO SPAN**

The automatic sweep time cannot be in zero span of the spectrum analyzer mode. (The network analyzer mode allows that the automatic sweep time is turned on.)

**128 Repet Smpling : SPAN = 0 ONLY**

The repetitive sampling is turn on when span must be zero, the sweep type must be linear frequency, and the trigger source must be EXT or VIDEO only. Confirm the analyzer setting and set appropriate setting for the repetitive sampling mode.

**129 Repet Smpling : LIN FREQ ONLY**

The repetitive sampling is turn on when span must be zero, the sweep type must be linear frequency, and the trigger source must be EXT or VIDEO only. Confirm the analyzer setting and set appropriate setting for the repetitive sampling mode.

**130 Repet Smpling : TRIG = EXT OR VIDEO ONLY**

The repetitive sampling is turn on when span must be zero, the sweep type must be linear frequency, and the trigger source must be EXT or VIDEO only. Confirm the analyzer setting and set appropriate setting for the repetitive sampling mode.

**131 FREQUENCY SWEEP ONLY**

The sweep type must be frequency sweep when the center step size is set.

**133 CAN'T CHANGE ON LIST SWEEP**

When list sweep is selected, the following parameters are not allowed to be changed:

- CENTER, SPAN, START, STOP
- NOP
- IFBW or RBW
- POWER

Modify the list table to change these parameters in the list sweep.

**134 CAN'T COUPLE IN CURRENT INPUTS**

When one channel measures a ratio measurement, and the other one measures an absolute measurement (for example: A/R and B), **COUPLED CH** can not be turned on.

**135 COUPLED CHAN - BETWEEN NA & NA OR ZA & ZA**

The analyzer types of both channels must be the network analyzer mode when the coupled channel is turned on.

**141 INSUFFICIENT MEMORY**

If a lot of tasks is executed at same time, memory might be insufficient for a while. (For example, running HP Instrument BASIC program, printing a screen, and sending or receiving data array by HP-IB are required at same time.) Please wait until finishing some tasks then execute the next task.

**146 ON POINT NOT ALLOWD FOR THE CURRENT TRIG**

The trigger event mode cannot be changed to the ON POINT mode because the current trigger source setting does not allow the ON POINT mode. The trigger event ON POINT mode is available for only MANUAL, EXTERNAL, and BUS trigger sources of the network analyzer mode.

**154 INVALID DATE**

The date entered to set the real time clock is invalid. Reenter correct date.

**193 POWER ON TEST FAILED**

An internal test fails in the power on sequence (the power on self-test fails). Contact your nearest Hewlett-Packard office or see the *Service Manual* for troubleshooting.

**194 EEPROM WRITE ERROR**

Data cannot be stored properly into the EEPROM on the A1 CPU, when performing the display background adjustment or updating correction constants in the EEPROM using the adjustment program. See the *Service Manual* for troubleshooting.

**195 ALL INT TEST FAILED**

An "internal test 0: ALL INT" fails. See the *Service Manual* for troubleshooting.

**196 FLASH MEMORY CHECK SUM ERROR**

The data (firmware) stored in the A1 flash memory are invalid. This message is displayed in the bootloader menu. See the *Service Manual* for troubleshooting.

**197 BACKUP SRAM CHECK SUM ERROR**

An "internal test 1: A1 CPU" fails. The data (HP-IB Address and so on) stored in the A1 CPU's BACKUP SRAM are invalid. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**198 EEPROM CHECK SUM ERROR**

An "internal test 1: A1 CPU" fails. The data (Correction Constants and so on) stored in the A1 CPU's EEPROM are invalid. See the *Service Manual* for troubleshooting.

**199 DSP CHIP TEST FAILED**

An "internal test 1: A1 CPU" fails. The A1 CPU's DSP (Digital Signal Processor) does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**200 F-BUS TIMER CHIP TEST FAILED**

An "internal test 1: A1 CPU" fails. The A1 CPU's F-BUS (Frequency Bus) timer does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**201 RTC CHIP TEST FAILED**

An "internal test 1: A1 CPU" fails. The A1 CPU's RTC (Real Time Clock) does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**202 KEY CHIP TEST FAILED**

An "internal test 1: A1 CPU" fails. The A1 CPU's front keyboard control chip does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**203 FDC CHIP TEST FAILED**

An "internal test 1: A1 CPU" fails. The A1 CPU's FDC (Flexible Disk drive control) chip does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**204 HP-IB CHIP TEST FAILED**

An "internal test 1: A1 CPU" fails. The A1 CPU's HP-IB chip does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**205 HP-HIL CHIP TEST FAILED**

An "internal test 1: A1 CPU" fails. The A1 CPU's HP-HIL control chip does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**206 CPU INTERNAL SRAM R/W ERROR**

An "internal test 2: A1 VOLATILE MEMORY" fails. The A1 CPU's internal SRAM does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**207 CPU BACKUP SRAM R/W ERROR**

An "internal test 2: A1 VOLATILE MEMORY" fails. The A1 CPU's BACKUP SRAM does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**208 DSP SRAM R/W ERROR**

An "internal test 2: A1 VOLATILE MEMORY" fails. The DSP's SRAM on the A1 CPU does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**209 DUAL PORT SRAM R/W ERROR**

An "internal test 2: A1 VOLATILE MEMORY" fails. The DSP's dual port SRAM on the A1 CPU does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**210 POST REGULATOR OUTPUT VOLTAGE OUT OF SPEC**

An "internal test 4: A2 POST REGULATOR" fails. A power supply voltage of the A2 post-regulator is out of its limits. See the *Service Manual* for troubleshooting.

**211 GND LEVEL OUT OF SPEC**

An "internal test 4: A2 POST REGULATOR" fails. The voltage of the GND (Ground) at the DC bus node 26 is out of its limits. See the *Service Manual* for troubleshooting.

**212 FAN POWER OUT OF SPEC**

An "internal test 4: A2 POST REGULATOR" fails. The voltage of the fan power supply at the DC bus node 11 is out of its limits. See the *Service Manual* for troubleshooting.

**213 FAILURE FOUND FROM A/D MUX TO A/D CONVERTER**

An "internal test 5: A6 A/D CONVERTER" fails. A trouble is found on the signal path from the A/D multiplexer to A/D converter on the A6 receiver IF. See the *Service Manual* for troubleshooting.

**214 REF OSC TEST FAILED**

An "internal test 6: A5 REFERENCE OSC" fails. The reference oscillator on the A5 synthesizer does not work properly. See the *Service Manual* for troubleshooting.

**215 FRACTIONAL N OSC TEST FAILED**

An "internal test 7: A5 FRACTIONAL N OSC" fails. The fractional N oscillator on the A5 synthesizer does not work properly. See the *Service Manual* for troubleshooting.

**216 STEP OSC TEST FAILED**

An "internal test 8: A5 STEP OSC" fails. The step oscillator on the A5 synthesizer does not work properly. See the *Service Manual* for troubleshooting.

**217 1st LO OSC TEST FAILED**

An "internal test 9: A4A1 1ST LO OSC" fails. The 1st LO OSC (first local oscillator) on the A4A1 1st LO does not work properly. See the *Service Manual* for troubleshooting.

**218 2nd LO OSC TEST FAILED**

An "internal test 10: A3A2 2ND LO" fails. The 2nd LO OSC (second local oscillator) on the A3A2 2nd LO does not work properly. See the *Service Manual* for troubleshooting.

**219 3rd LO OSC TEST FAILED**

An "internal test 12: A6 3RD LO OSC" fails. The 3rd LO OSC (third local oscillator) on the A6 receiver IF does not work properly. See the *Service Manual* for troubleshooting.

**220 SOURCE OSC TEST FAILURE**

An "internal test 13: A3A1 SOURCE OSC" fails. The source oscillator on the A3A1 ALC does not work properly. See the *Service Manual* for troubleshooting.

**221 DC OFFSET TOO BIG ON 0 DEG PATH**

An "internal test 14: A6 3rd IF DC OFFSET" fails. The DC offset on 0° path of the A6 receiver IF is larger than its limit. See the *Service Manual* for troubleshooting.

**222 DC OFFSET TOO BIG ON 90 DEG PATH**

An "internal test 14: A6 3rd IF DC OFFSET" fails. The DC offset on 90° path of the A6 receiver IF is larger than its limit. See the *Service Manual* for troubleshooting.

**223 SAMPLE FREQUENCY OUT OF SPEC**

An "internal test 15: A6 SEQUENCER" fails. The sampling frequency of the sample/hold circuit on the A6 receiver IF is out of its limits. See the *Service Manual* for troubleshooting.

**224 ALC TEST FAILED**

An "internal test 16: A3A1 ALC" fails. The ALC (Auto Level Control) circuit on the A3A1 ALC does not work properly. See the *Service Manual* for troubleshooting.

**225 A3 DIVIDER OUTPUT FREQUENCY OUT OF SPEC**

An "internal test 11: A3A1 DIVIDER" fails. The output frequency of the divider circuit on the A3A1 ALC is out of its limits. See the *Service Manual* for troubleshooting.

**226 FLOPPY DISK DRIVE FAILURE FOUND**

An "external test 18: DSK DR FAULT ISOL'N" fails. The A53 built-in FDD (flexible disk drive) does not work properly. Replace the A53 FDD with a new one. See the *Service Manual* for troubleshooting.

**227 POWER SWEEP LINEARITY OUT OF SPEC**

An "external test 19: POWER SWEEP LINEARITY" fails. See the *Service Manual* for troubleshooting.

**228 OUTPUT ATTENUATOR ACCURACY OUT OF SPEC**

An "external test 20: OUTPUT ATTENUATOR" fails. See the *Service Manual* for troubleshooting.

**229 INPUT ATTENUATOR ACCURACY OUT OF SPEC**

An "external test 21: INPUT ATTENUATOR" fails. See the *Service Manual* for troubleshooting.

**230 RF OUT TO S-INPUT FLATNESS TEST FAILED**

An "external test 22: RF TO S LVL & FLTNESS" fails. See the *Service Manual* for troubleshooting.

**231 S-INPUT TO A-INPUT CROSSTALK TEST FAILED**

An "external test 23: S TO A CROSSTALK" fails. See the *Service Manual* for troubleshooting.

**232 S-INPUT LEVEL COMPRESSION TEST FAILED**

An "external test 24: S INPUT COMPRESSION" fails. See the *Service Manual* for troubleshooting.

**233 S-INPUT RESIDUAL RESPONSE OUT OF SPEC**

An "external test 25: S INPUT RESIDUALS" fails. See the *Service Manual* for troubleshooting.

**234 1st LO LEAKAGE TEST FAILED**

An "external test 25: S INPUT RESIDUALS" fails. See the *Service Manual* for troubleshooting.

**235 S-INPUT NOISE LEVEL OUT OF SPEC**

An "external test 26: S INPUT NOISE LEVEL" fails. See the *Service Manual* for troubleshooting.

**236 FRACTION SPURIOUS OUT OF SPEC**

An "external test 27: FRACTION SPURIOUS" fails. See the *Service Manual* for troubleshooting.

**237 RF OUT TO R-INPUT FLATNESS TEST FAILED**

An "external test 28: RF TO A LVL & FLTNESS" fails. See the *Service Manual* for troubleshooting.

**238 R-INPUT TO A-INPUT CROSSTALK OUT OF SPEC**

An "external test 29: NA CROSSTALK & NOISE" fails. See the *Service Manual* for troubleshooting.

**239 R-INPUT TO B-INPUT CROSSTALK OUT OF SPEC**

An "external test 29: NA CROSSTALK & NOISE" fails. See the *Service Manual* for troubleshooting.

**240 R-INPUT NOISE LEVEL OUT OF SPEC**

An "external test 29: NA CROSSTALK & NOISE" fails. See the *Service Manual* for troubleshooting.

**241 A-INPUT NOISE LEVEL OUT OF SPEC**

An "external test 29: NA CROSSTALK & NOISE" fails. See the *Service Manual* for troubleshooting.

**242 B-INPUT NOISE LEVEL OUT OF SPEC**

An "external test 29: NA CROSSTALK & NOISE" fails. See the *Service Manual* for troubleshooting.

**243 R-INPUT LEVEL COMPRESSION TEST FAILED**

An "external test 30: R INPUT COMPRESSION" fails. See the *Service Manual* for troubleshooting.

**244 RANGING ACCURACY TEST FAILED**

An "external test 31: RANGING" fails. See the *Service Manual* for troubleshooting.

**245 A/R RATIO ACCURACY OUT OF SPEC**

An "external test 32: A/R RATIO ACCURACY" fails. See the *Service Manual* for troubleshooting.

**246 A/R RATIO RAW RESPONSE TEST FAILED"**

An "external test 32: A/R RATIO ACCURACY" fails. See the *Service Manual* for troubleshooting.

**247 A-INPUT LEVEL COMPRESSION TEST FAILED**

An "external test 33: A INPUT COMPRESSION" fails. See the *Service Manual* for troubleshooting.

**248 B/R RATIO ACCURACY OUT OF SPEC**

An "external test 34: B/R RATIO ACCURACY" fails. See the *Service Manual* for troubleshooting.

**249 B/R RAW RESPONSE TEST FAILED**

An "external test 34: B/R RATIO ACCURACY" fails. See the *Service Manual* for troubleshooting.

**250 B-INPUT LEVEL COMPRESSION TEST FAILED**

An "external test 35: B INPUT COMPRESSION" fails. See the *Service Manual* for troubleshooting.

**251 SA RES FILTER 3 DB BW OUT OF SPEC**

An "external test 36: RESOLUTION BANDWIDTH" fails. See the *Service Manual* for troubleshooting.

**252 SA RES FILTER SHAPE FACTOR OUT OF SPEC**

An "external test 36: RESOLUTION BANDWIDTH" fails. See the *Service Manual* for troubleshooting.

**253 SA RES FILTER TRACK NOISE TEST FAILED**

An "external test 36: RESOLUTION BANDWIDTH" fails. See the *Service Manual* for troubleshooting.

**254 SA RES FILTER SWITCHING UNC. OUT OF SPEC**

An "external test 36: RESOLUTION BANDWIDTH" fails. See the *Service Manual* for troubleshooting.

**255 IF GAIN SWITCHING UNC. OUT OF SPEC**

An "external test 37: IF GAIN" fails. See the *Service Manual* for troubleshooting.

**256 SIDE BAND LEVEL OUT OF SPEC**

An "external test 38: PHASE NOISE" fails. See the *Service Manual* for troubleshooting.

**257 SA NON-HARMONIC SPURIOUS OUT OF SPEC**

An "external test 39: SPURIOUS" fails. See the *Service Manual* for troubleshooting.

**258 X-TAL FILTER RESPONSE OUT OF SPEC**

An "external test 40: X'TAL FILTER RESPONSE" fails. See the *Service Manual* for troubleshooting.

**259 X-TAL FILTER RAW RESPONSE TEST FAILED**

An "external test 40: X'TAL FILTER RESPONSE" fails. See the *Service Manual* for troubleshooting.

**260 ALL EXT TEST FAILED**

"External tests 63 to 67" fails. See the *Service Manual* for troubleshooting.

**261 IMPEDANCE ADAPTER TEST FAILED**

An error occurred while performing the impedance adapter test. Contact your nearest Hewlett-Packard office or follow the instructions in the *Service Manual* to repair the product.

**267 COMPENSATION REQUIRED**

**OPEN on OFF**, **SHORT on OFF** or **LOAD on OFF** key is pressed when the fixture compensation is not being performed. The fixture compensation is required before you attempt to press these keys.

**268 NO COMPENSATION CURRENTLY IN PROGRESS**

**RESUME COMP SEQ** is pressed when the fixture compensation is not suspended. Press **COMPEN MENU** to start the fixture compensation.

**270 COMPENSATION STD LIST UNDEFINED**

The value of the calibration kit used for the fixture compensation is not defined. Define the value using **MODIFY** .

**-100 Command error**

This is a generic syntax error that the analyzer cannot detect more specific errors. This code indicates only that a command error, as defined in IEEE 488.2, 11.5.1.1.4, has occurred.

**-101 Invalid character**

A syntax element contains a character that is invalid for that type. For example, a header containing an ampersand (**SENSE&**).

**-102 Syntax error**

An unrecognized command or data type was encountered. For example, a string was received when the analyzer was not expecting to receive a string.

**-103 Invalid separator**

The parser was expecting a separator and encountered an illegal character. For example, the semicolon was omitted after a program message unit, **\*RST:TRIG**.

**-104 Data type error**

The parser recognized an unallowed data element. For example, numeric or string data was expected but block data was encountered.

**-105 GET not allowed**

A Group Execute Trigger (GET) was received within a program message (see IEEE 488.2, 7.7).

**-108 Parameter not allowed**

More parameters were received than expected for the header. For example, the \*SRE command only accepts one parameter, so receiving \*SRE 4, 16 is not allowed.

**-109 Missing parameter**

Fewer parameters were received than required for the header. For example, the \*SRE command requires one parameter, so receiving only \*SRE is not allowed.

**-110 Command header error**

An error was detected in the header. This error message is used when the analyzer cannot detect the more specific errors described for errors -111 through -119.

**-111 Header separator error**

A character that is not a legal header separator was encountered while parsing the header. For example, no white space followed the header, thus \*SRE4 is an error.

**-112 Program mnemonic too long**

The header contains more than twelve characters (see IEEE 488.2, 7.6.1.4.1).

**-113 Undefined header**

The header is syntactically correct, but it is undefined for the analyzer. For example, \*XYZ is not defined for the analyzer.

**-114 Header Suffix out of range**

The value of a numeric suffix attached to a program mnemonic makes the header invalid.

**-120 Numeric data error**

This error, as well as errors -121 through -129, are generated when parsing a data element that appears to be numeric, including the nondecimal numeric types. This particular error message is used if the analyzer cannot detect a more specific error.

**-121 Invalid character in number**

An invalid character for the data type being parsed was encountered. For example, an alpha character in a decimal numeric or a "9" in octal data.

**-123 Exponent too large**

The magnitude of the exponent was larger than 32000 (see IEEE 488.2, 7.7.2.4.1).

**-124 Too many digits**

The mantissa of a decimal numeric data element contains more than 255 digits excluding leading zeros (see IEEE 488.2, 7.7.2.4.1).

**-128 Numeric data not allowed**

A legal numeric data element was received, but the analyzer does not accept it in this position for a header.

**-130 Suffix error**

This error, as well as errors –131 through –139, are generated when parsing a suffix. This particular error message is used if the analyzer cannot detect a more specific error.

**-131 Invalid suffix**

The suffix does not follow the syntax described in IEEE 488.2, 7.7.3.2, or the suffix is inappropriate for the analyzer.

**-134 Suffix too long**

The suffix contained more than 12 characters (see IEEE 488.2, 7.7.3.4).

**-138 Suffix not allowed**

A suffix was encountered after a numeric element that does not allow suffixes.

**-140 Character data error**

This error, as well as errors –141 through –148, are generated when analyzing the syntax of a character data element. This particular error message is used if the analyzer cannot detect a more specific error.

**-141 Invalid character data**

Either the character data element contains an invalid character or the particular element received is not valid for the header.

**-144 Character data too long**

The character data element contains more than twelve characters (see IEEE 488.2, 7.7.1.4).

**-148 Character data not allowed**

A legal character data element was encountered where prohibited by the analyzer.

**-150 String data error**

This error, as well as errors –151 and –158, are generated when analyzing the syntax of a string data element. This particular error message is used if the analyzer cannot detect a more specific error.

**-151 Invalid string data**

A string data element was expected, but was invalid for some reason (see IEEE 488.2, 7.7.5.2). For example, an END message was received before the terminal quote character.

**-158 String data not allowed**

A string data element was encountered but was not allowed by the analyzer at this point in parsing.

**-160 Block data error**

This error, as well as errors –161 and –168, are generated when analyzing the syntax of a block data element. This particular error message is used if the analyzer cannot detect a more specific error.

**-161 Invalid block data**

A block data element was expected, but was invalid for some reason (see IEEE 488.2, 7.7.6.2). For example, an END message was received before the length was satisfied.

**-168 Block data not allowed**

A legal block data element was encountered but was not allowed by the analyzer at this point in parsing.

**-200 Execution error**

This is the generic syntax error that the analyzer cannot detect more specific errors. This code indicates only that an execution error as defined in IEEE 488.2, 11.5.1.1.5 has occurred.

**-210 Trigger error**

A trigger related error occurred. This error message is used when the analyzer cannot detect the more specific errors described for errors -211 through -219.

**-211 Trigger ignored**

A GET, \*TRG, or triggering signal was received and recognized by the analyzer but was ignored because of analyzer timing considerations. For example, the analyzer was not ready to respond.

**-213 Init ignored**

A request for a measurement initiation was ignored as another measurement was already in progress.

**-220 Parameter error**

Indicates that a program data element related error occurred. This error message is used when the analyzer cannot detect the more specific errors described for errors -221 through -229.

**-221 Settings conflict**

A legal program data element was parsed but could not be executed due to the current device state (see IEEE 488.2, 6.4.5.3 and 11.5.1.1.5).

**-222 Data out of range**

A legal program data element was parsed but could not be executed because the interpreted value was outside the legal range as defined by the analyzer (see IEEE 488.2, 11.5.1.1.5).

**-223 Too much data**

A legal program data element of block, expression, or string type was received that contained more data than the analyzer could handle due to memory or related device-specific requirements.

**-224 Illegal parameter value**

Used where exact value, from a list of possibilities, was expected.

**-225 Data out of memory**

The analyzer has insufficient memory to perform the requested operation.

**-230 Data corrupt or stale**

Possibly invalid data. New reading started but not completed since last access.

**-231 Data questionable**

Measurement accuracy is suspect.

**-240 Hardware error**

A legal program command or query could not be executed because of a hardware problem in the analyzer. Definition of what constitutes a hardware problem is completely device-specific. This error message is used when the analyzer cannot detect the more specific errors described for errors -241 through -249.

**-241 Hardware missing**

A legal program command or query could not be executed because of missing analyzer hardware. For example, an option was not installed.

**-250 Mass storage error**

A mass storage error occurred. This error message is used when the analyzer cannot detect the more specific errors described for errors -251 through -259.

**-256 File name not found**

A legal program command could not be executed because the file name on the device media was not found: for example, an attempt was made to read or copy a nonexistent file.

**-257 File name error**

A legal program command or query could not be executed because the file name on the device media was in error. For example, an attempt was made to copy to a duplicate file name. The definition of what constitutes a file name error is device-specific.

**-280 Program error**

A downloaded program-related execution error occurred. This error message is used when the analyzer cannot detect the more specific errors described for errors -281 through -289.

**-281 Cannot create program**

An attempt to create a program was unsuccessful. A reason for the failure might include not enough memory.

**-282 Illegal program name**

The name used to reference a program was invalid. For example, redefining an existing program, deleting a nonexistent program, or in general, referencing a nonexistent program.

**-283 Illegal variable name**

An attempt was made to reference a nonexistent variable in a program.

**-284 Program currently running**

Certain operations dealing with programs may be illegal while the program is running. For example, deleting a running program might not be possible.

**-285 Program syntax error**

A syntax error appears in a downloaded program. The syntax used when parsing the downloaded program is device-specific.

**-286 Program runtime error**

A program runtime error of the HP Instrument BASIC has occurred. To get a more specific error information, use the ERRM\$ or ERRN command of the HP Instrument BASIC.

**-310 System error**

Some error, termed "system error" by the analyzer, has occurred.

**-311 Memory error**

An error was detected in the analyzer's memory.

**-330 Self-test failed**

A self-test failed. Contact your nearest Hewlett-Packard office or see the *Service Manual* for troubleshooting.

**-350 Queue overflow**

A specific code entered into the queue in lieu of the code that caused the error. This code indicates that there is no room in the queue and an error occurred but was not recorded.

**-400 Query errors**

This is the generic query error that the analyzer cannot detect more specific errors. This code indicates only that a query error as defined in IEEE 488.2, 11.5.1.1.7 and 6.3 has occurred.

**-410 Query INTERRUPTED**

A condition causing an interrupted query error occurred (see IEEE 488.2, 6.3.2.3). For example, a query followed by DAB or GET before a response was completely sent.

**-420 Query UNTERMINATED**

A condition causing an unterminated query error occurred (see IEEE 488.2, 6.3.2.2). For example, the analyzer was addressed to talk and an incomplete program message was received by the controller.

**-430 Query DEADLOCKED**

A condition causing a deadlocked query error occurred (see IEEE 488.2, 6.3.1.7). For example, both input buffer and output buffer are full and the analyzer cannot continue.

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