Agilent E5070A/E5071A ENA Series RF Network Analyzers

Programmer's Guide

Second Edition

FIRMWARE REVISIONS

This manual applies directly to instruments that have the firmware revision 2.00.
For additional information about firmware revisions, see Appendix A.

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Notices

The information contained in this document is subject to change without notice.

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December 2001	First Edition (part number: E5070-90002)
April 2002	Second Edition (part number: E5070-90012)

Typeface Conventions

Bold	Boldface type is used when a term is defined. For example: **icons** are symbols.
Italic	Italic type is used for emphasis and for titles of manuals and other publications.
[Key]	Indicates the hardkey whose key label is Key.
[Key] - **Item**	Indicates a series of key operations in which you press the **[Key]** key, select (highlight) the item called **Item** on the displayed menu using the **[↓]** key and so on, and then press the **[Enter]** key.

Sample Program Disk

A sample program disk (Agilent part number: E5070-18010) is furnished with this manual. The disk contains the sample programs used in this manual.

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E5070A/E5071A Documentation Map

The following manuals are available for the E5070A/E5071A.

- ***User's Guide*** **(Part Number: E5070-900x0, attached to optional ABA)**

  This manual describes most of the basic information necessary to use the E5070A/E5071A. It provides a function overview, detailed operation procedure for each function (from preparation for measurement to analysis of measurement results), measurement examples, specifications, and supplemental information. For programming guidance on performing automatic measurement with the E5070A/E5071A, please see the *Programming Manual*.

- ***Installation and Quick Start Guide*** **(Part Number: E5070-900x1, attached to optional ABA)**

  This manual describes installation after it is delivered and the basic operation procedures for applications and analysis. Refer to this manual when you use the E5070A/E5071A for the first time.

- ***Programmer's Guide*** **(Part Number: E5070-900x2, attached to optional ABA)**

  This manual provides programming information for performing automatic measurement with the E5070A/E5071A. It includes an outline of remote control, procedures for detecting measurement start (trigger) and end (sweep end), application programming examples, command reference, and related information.

- ***VBA Programmer's Guide*** **(Part Number: E5070-900x3, attached to optional ABA)**

  This manual describes programming information for performing automatic measurement with internal controller. It includes an outline of VBA programming, some sample programming examples, a COM object reference, and related information.

NOTE The number position shown by "x" in the part numbers above indicates the edition number. This convention is applied to each manual, CD-ROM (for manuals), and sample programs disk issued. Here, "0" indicates the initial edition, and each time a revision is made this number is incremented by 1. The latest edition allows the customer to specify Option ABJ (Japanese) or Option ABA (English) of the product.

1 Making Effective Use of This Manual

This chapter describes the contents of this guide.Using this chapter with the table of contents helps you to retrieve description of a subject you wish to understand as well as to obtain an overview of this guide.Also see the latter part of this chapter for brief description of usage of this guide, focusing on searching commands.

Contents of This Manual

This is a programming guide with Agilent E5070A/E5071A.

This guide describes programming method mainly aiming at learning how to write a program that remotely controls the E5070A/E5071A using SCPI commands, focusing on sample usage with the HTBasic.

Controlling the E5070A/E5071A using the built-in VBA is not covered by this guide; it is described in *VBA Programmer's Guide*. For using the E5070A/E5071A VBA, see *VBA Programmer's Guide*.

Description in this guide assumes that the reader has learned manual operation of the E5070A/E5071A.Thus, this guide does not describe each feature of the E5070A/E5071A in detail. For detailed information on each feature, see *User's Guide*.

The chapter-by-chapter contents of this manual are as follows.

Chapter 1, “Making Effective Use of This Manual.”

> This chapter describes the contents of this guide.Using this chapter with the table of contents helps you to retrieve description of a subject you wish to understand as well as to obtain an overview of this guide.Also see the latter part of this chapter for brief description of usage of this guide, focusing on searching commands.

Chapter 3, “Setting Up the Analyzer.”

> This chapter describes how to configure measurement conditions and how to configure the way the instrument displays measurement results on the LCD.

Chapter 4, “Performing a Calibration.”

> This chapter describes how to obtain the calibration coefficients and perform error correction. It also describes how to define the calibration kit required to obtain the calibration coefficients.

Chapter 5, “Making a Measurement.”

> This chapter describes how to trigger the instrument to start a new measurement cycle and how to detect the end of a measurement cycle.

Chapter 6, “Analyzing Data.”

> This chapter describes how to use markers, analysis command, and fixture simulator features.

Chapter 7, “Reading/Writing Measurement Data.”

> This chapter provides an overview of the Agilent E5070A/E5071A's internal data processing flow and describes how to read and write measurement results (internal data array).

Chapter 8, “Limit Test.”

> This chapter describes how to use the Limit Test feature to perform a limit test and determine the pass/fail status of the measured data.

Chapter 9, “Saving and Recalling (File Management).”

This chapter describes how to save and recall instrument status and measurement results onto/from the files. Here also covered is managing files.

Chapter 10, “Communication with External Instruments Using Handler I/O Port.”

This chapter provides necessary information for communicating with external instruments (for example, a handler in a production line) using the handler I/O port equipped with the Agilent E5070A/E5071A.

Chapter 11, “Working with Automatic Test Systems.”

This chapter describes useful features when the Agilent E5070A/E5071A is integrated with the automatic test system.

Chapter 13, “Sample Application Programs.”

This chapter introduces several sample programs for basic measurement, measurement with a system using the handler I/O, and controlling the instrument over LAN.

Chapter 14, “SCPI Command Reference.”

This chapter describes the SCPI command reference for the Agilent E5070A/E5071A. It describes the commands using their abbreviated format in alphabetical order. If you want to look up commands using their fully qualified format, refer to the index for the desired SCPI command. If you want to look up commands by their function, refer to SCPI command list by function.

Appendix A, “Manual Changes.”

This appendix contains the information required to adapt this manual to earlier versions or configurations of the Agilent E5070A/E5071A than that indicated by the current printing date of this manual. The information in this manual applies directly to the E5070A/E5071A model that has the serial number prefix listed on the title page of this manual.

Appendix B, “Status Reporting System.”

This appendix describes the status reporting system of the Agilent E5070A/E5071A.

Appendix C, “Comparing Commands on the 8753ES and E5070A/E5071A.”

The following table presents a comparison of commands on the Agilent 8753ES and Agilent E5070A/E5071A, listed alphabetically by function.

Appendix D, “Error Messages.”

The Agilent E5070A/E5071A provides error messages to indicate its operating status. This appendix describes the error messages of the E5070A/E5071A in order of error number. To search for error messages alphabetically, refer to the Operation Manual.

How To Use This Manual

Chapters 3 to 9 provide task-based descriptions of SCPI commands that are useful for programming and explain how you can use them. These chapters contain explanations and sample program listings that you can use to develop your custom programs. For more information on individual commands, see Chapter 14, "SCPI Command Reference."

Looking up SCPI commands

Chapter 14 "SCPI Command Reference" contains a complete reference of SCPI commands. You can look up a particular SCPI command in any of the following ways:

Lookup by Abbreviated Command Name

The command reference is organized alphabetically according to the abbreviated name used as the title for each command's description.

Lookup by Full Command Name

You can use the index at the end of the manual to find full command names along with the page numbers where they appear.

Lookup by Command Function

Table 14-1 on page 467 provides a complete list of commands by function and indicates the page numbers where the commands appear in the command reference.

Lookup by Front panel key

Table 14-2 on page 477 provides a complete list of commands that correspond to the front panel key tree and indicates the page numbers where the commands appear in the command reference.

NOTE Some SCPI commands supported by the E5070A/E5071A have optional syntax elements. In the command reference conventions, these elements are enclosed between square brackets ([]) or printed in lowercase letters. See "Syntax" on page 208 for more information.

Using sample programs

This manual comes with a sample program disk, which contains the source files of the sample programs used in the manual. The disk is DOS-formatted and the files are saved in ASCII format.

Loading a sample program

To load a sample program into the HTBasic interpreter, use the GET command. For example, you can load setup.bas, one of the sample programs, by the following procedure:

In the HTBasic screen, type the following command and press the Return key.

```
GET "setup.bas"
```

Looking up a sample program

To look up the description of a sample program, see the listings under “Sample program” in the index.

2 Overview of Remote Control

This chapter provides an overview of the remote control system and the SCPI commands.

Types of remote control system

Depending on the system controller and the interface, you can configure 4 types of remote control system as shown in the table below.

System controller	Interface	Overview
External controller (external computer such as PC and workstation)	GPIB (talker/listener mode)	System to control the E5070A/E5071A and other devices connected via GPIB from the external controller. For more information, refer to “GPIB remote control system” on page 25.
	LAN	System to control the E5070A/E5071A and other devices connected via LAN from the external controller. For more information, refer to “LAN remote control system” on page 27.
E5070A/E5071A	——	System to control the E5070A/E5071A itself using built-in E5070A/E5071A VBA. For more information, refer to *VBA Programmers Guide*.
	GPIB (system controller mode)	System to control the E5070A/E5071A itself and external devices connected via GPIB using built-in E5070A/E5071A VBA. For more information, refer to *VBA Programmers Guide*.

GPIB remote control system

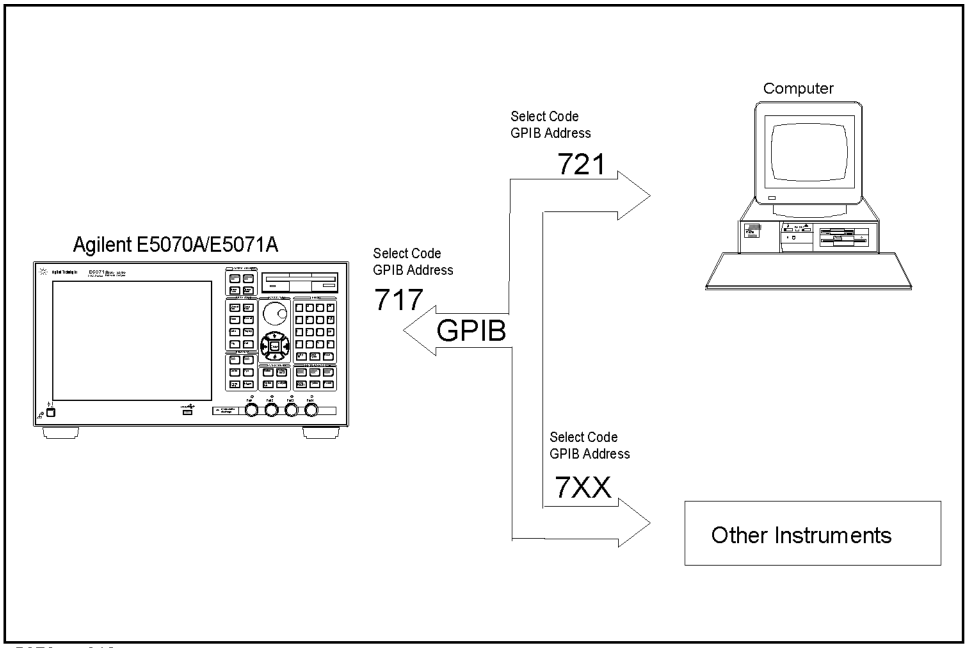
What is GPIB?

GPIB (General Purpose Interface Bus) is an interface standard for connecting computers and peripherals, which supports the following international standards: IEEE 488.1, IEC-625, IEEE 488.2, and JIS-C1901. The GPIB interface allows you to control the Agilent E5070A/E5071A from an external computer. The computer sends commands and instructions to the E5070A/E5071A and receives data sent from the E5070A/E5071A via GPIB.

System configuration

Use GPIB cables to connect between the E5070A/E5071A, the external controller (computer), and peripherals. Figure 2-1 shows the overview of the system configuration of the GPIB remote control system.

Figure 2-1 Configuration of the GPIB remote control system



e5070ape013

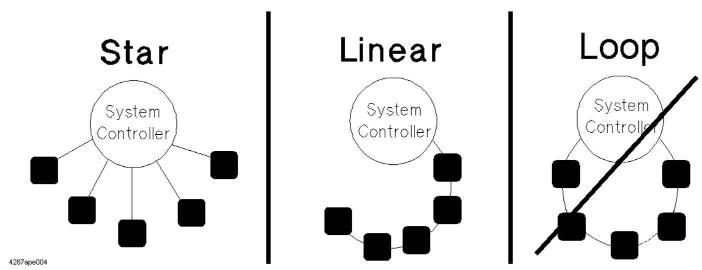
Required Equipment

1. E5070A/E5071A
2. External controller (computer)

   Use a personal computer or workstation equipped with the GPIB interface. You need to install software to control this instrument via GPIB into the external controller (for example, HTBasic and Agilent VEE) and set the GPIB mode to talker/listener mode (**[System]** - **GPIB Setup** - **GPIB Configuration Talker/Listener**).
3. Other devices (other instruments and/or peripherals that serve your purpose)
4. GPIB cables for connecting the E5070A/E5071A, the external controller, and other devices

Scale of system you can construct

- You can connect up to 15 devices in a single GPIB system.
- The length of cables to connect between devices must be 4 m or less. The total length of connecting cables in a single GPIB system must be 2 m × the number of connected devices (including the controller) or less. You cannot construct the system in which the total cable length exceeds 20 m.
- The number of connectors connected to an individual device must be 4 or less. If you connect 5 or more connectors, excessive force is applied to the connector part, which may result in failure.
- You can choose the device connection topology from start, linear, and combined. Loop connection is not supported.



Device selector

The device selector is a unique value assigned to each device that is used by the controller to select the control target (to send/receive messages) among devices connected on the GPIB remote control system.

The device selector consists of a select code (usually, 7) and a GPIB address. For example, when the select code is 7 and the GPIB address is 17, the device selector is 717. The select code must be set for each system. The GPIB address must be set to a unique value for each device, which is used to identify devices on the same system. In the description and sample programs in this manual, it is assumed that the device selector is set to 717.

Setting the GPIB address of the E5070A/E5071A

[System] - **GPIB Setup** - **Talker/Listener Address**

LAN remote control system

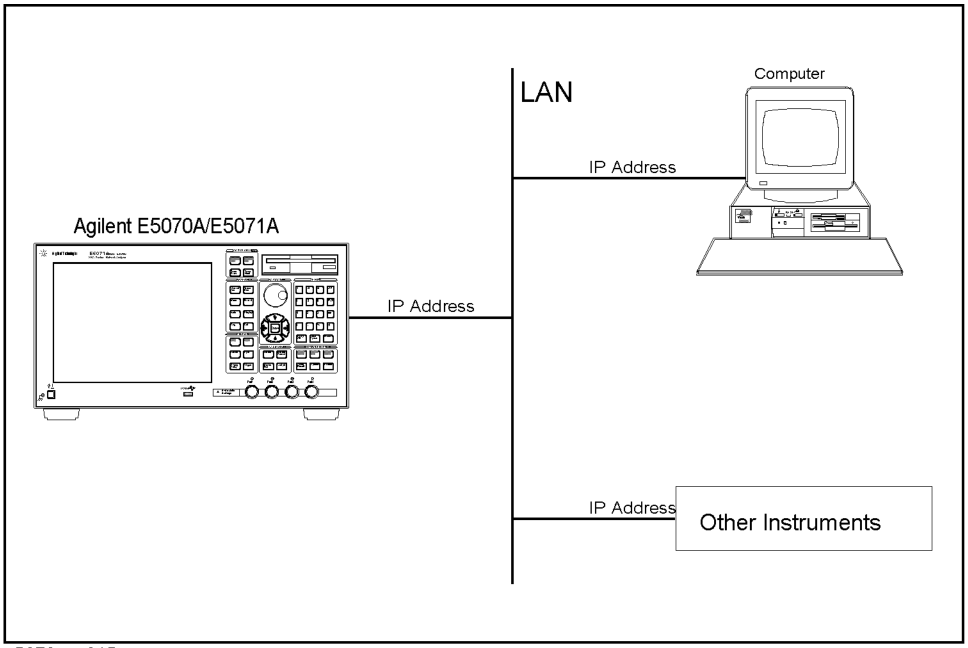
In the LAN (Local Area Network) remote control system, communications are performed through connection between the sockets provided by the processes of the external controller and the E5070A/E5071A to establish a network path between them.

A socket is an endpoint for network connection; port 23 and port 5025 are provided for the sockets for the E5070A/E5071A. Port 23 is provided for conversational control using telnet (user interface program for the TELNET protocol) and port 5025 for control from a program.

System configuration

Use a LAN cable to connect between the E5070A/E5071A and the external controller (computer). Figure 2-2 shows the overview of the system configuration of the LAN remote control system.

Figure 2-2 **Configuration of the LAN remote control system**



e5070ape015

Required Equipment

1. E5070A/E5071A
2. External controller (personal computer or workstation that can be connected to LAN)
3. Other devices (other instruments and/or peripherals that serve your purpose)
4. LAN cable for connecting the E5070A/E5071A with the external controller

Preparing the E5070A/E5071A

Before controlling the E5070A/E5071A via LAN, you need to turn on the telnet server, enable the network function, and set a proper IP address. The procedure of these settings is outlined below. For detailed information on the setting procedure, refer to *User's Guide*.

Turning on/off the telnet server

[System] - **Network Setup** - **Telnet server**

Setting the IP address

[System] - **Network Setup** - **Network Configuration**

Enabling/disabling the network function

[System] - **Network Setup** - **Network Device**

Conversational control using telnet (using port 23)

You can use telnet to perform conversational control by sending SCPI commands to the E5070A/E5071A on a message-by-message basis. For telnet, the socket of port 23 is used for communications.

In this example, in order to show you the control procedure using telnet, you control the E5070A/E5071A (IP address: 1.10.100.50 and host name: e5070a) from the external controller in the Windows environment.

Step 1. Open the MS-DOS command prompt screen.

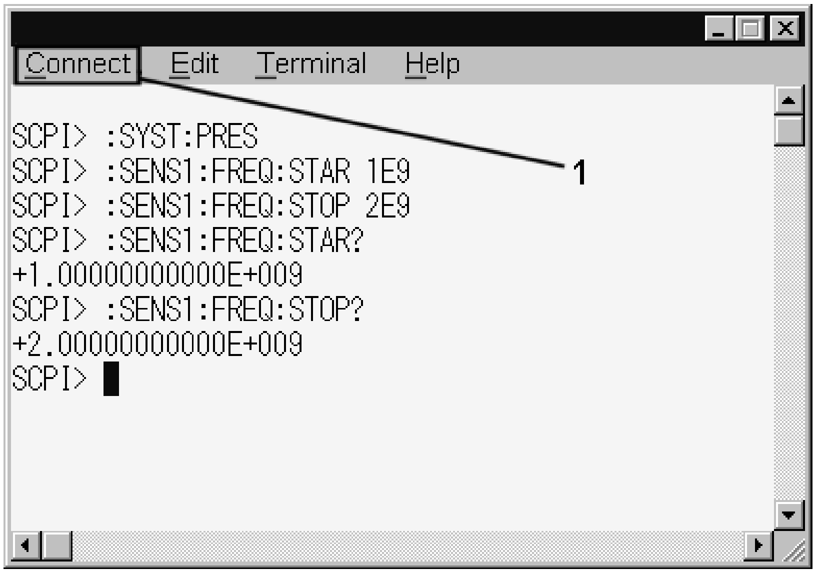
Step 2. At the MS-DOS prompt, type telnet 1.10.100.50 or telnet e5070a and press the return key.

Step 3. The telnet screen opens.

Step 4. Type a command and press the return key; it is sent to the E5070A/E5071A and executed. If you enter a command that queries some data, the query response is displayed below the line you have entered the command.

Figure 2-3 shows the screen after using the **:SYST:PRES** command on page 462 to reset, the **:SENS{1-9}:FREQ:STAR** command on page 423 and **:SENS{1-9}:FREQ:STOP** command on page 424 commands to set the sweep start value and stop value to 1 GHz and 2 GHz respectively, and checking the settings.

Figure 2-3 **Example of control using telnet**



e5070apj025

Step 5. Select Disconnect from the Connect menu in the telnet screen (1 in Figure 2-3) to break the connection to the E5070A/E5071A and select Exit from the Edit menu to exit the telnet. (In other environment such as the UNIX environment, press] while holding down the control key. The telnet prompt appears. At the telnet prompt, type quit and press the return key. The connection to the E5070A/E5071A breaks and telnet finishes.)

Control from a program (using port 5025)

When controlling the E5070A/E5071A from a program on the external controller, use the socket of port 5025 for connection.

NOTE Some functions such as service requests that are available in the GPIB remote control system are not available in the LAN remote control system.

Control using C or Visual Basic

You can control the E5070A/E5071A by socket programming using the C language in the UNIX environment, or Visual C++ or Visual Basic in the Windows environment.

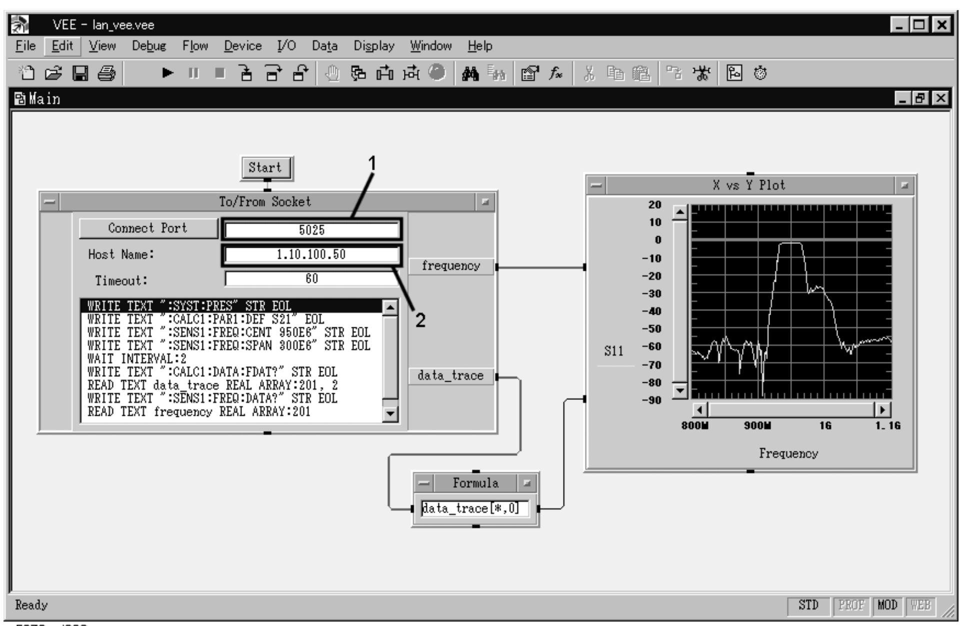
For socket programming, the library for network connection on the TCP/IP protocol is required. For the UNIX environment, BSD (Berkeley Software Distribution) Sockets API is available; for the Windows environment, WinSock (WinSock1.1 and WinSock2.0) created by porting BSD Sockets to Windows and expanding it is available.

For more information on the control method, see a sample program for control using WinSock described in "Controlling over LAN" on page 197.

Agilent Control using VEE

Agilent VEE allows you to control the E5070A/E5071A through the connection to the socket of port 5025 using To/From Socket. Figure 2-4 shows an example (when the IP address of the E5070A/E5071A is 1.10.100.50). Enter 5025 in the field to specify the port for connection (1 in Figure 2-4) and enter the IP address or host name of the E5070A/E5071A in the filed to specify the host name (2 in Figure 2-4).

Figure 2-4 **Example of control using Agilent VEE**



e5070apj026

Sending SCPI command messages

Types and structure of commands

The SCPI commands available for the E5070A/E5071A are classified into 2 groups as follows.

E5070A/E5071A commands

Commands specific to the E5070A/E5071A. They cover all measurement functions that the E5070A/E5071A has and some general-purpose functions. The commands in this group are arranged in a hierarchical structure called the command tree (see “Command tree” on page 485). Each command consists of character strings (mnemonics) indicating each hierarchical level and colon (:) separators between hierarchical levels.

IEEE common commands

Commands to cover general-purpose functions defined in IEEE488.2 that are available commonly to instruments that supprot this standard. The commands in this group have an asterisk (*) at the beginning. For the commands in this group, there is no hierarchical structure.

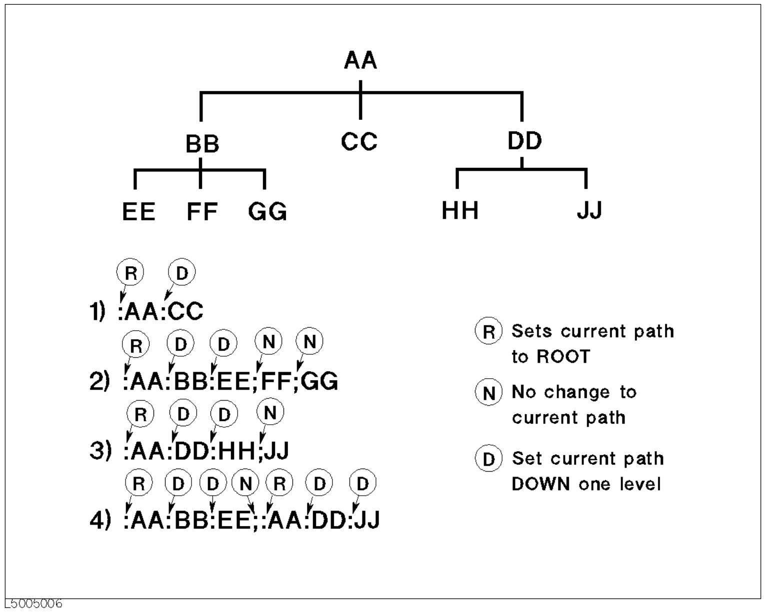
Concepts of the command tree

The commands at the top of the command tree are called "root command" or simply "root." To access lower level commands in the tree, you need to specify a specific path like a directory path in the DOS file system. After power-on or reset, the current path is set to the root. Special characters in messages change the path setting as described below.

Message terminator	A message terminator such as the <new line> character sets the current path to the root.
Colon (:)	A colon between 2 command mnemonics lowers the level of the current path in the command tree. A colon used as the first character of a command specifies the command mnemonic that follows as the root-level command.
Semicolon (;)	A semicolon does not change the current path and separates 2 commands in the same message.

Figure 2-5 shows an example of how to use colons and semicolons to efficiently access commands in the command tree.

Figure 2-5 **Using colons and semicolons**



Grammar of messages

This section describes the grammar to send program messages via GPIB. Program messages are messages that the user sends to the instrument from the external controller to control the instrument. A program message consists of 1 or more commands and their necessary parameters.

Upper/lower case sensitivity

Upper/lower case insensitive.

Program message terminator

A program message must be terminated with one of the 3 program message terminators: <new line>, <^END>, or <new line><^END>. <^END> indicates that EOI on the GPIB interface becomes active at the instant when the immediately previous data byte is sent. For example, the OUTPUT command of HTBasic automatically sends the message terminator after the last data byte.

Parameters

A space (ASCII code: 32) is required between a command and its first parameter. When sending several parameters in a single command, separate each parameter with a comma (,).

Message including several commands

When sending 2 or more commands in a single message, separate each command with a semicolon (;). The following example shows how to send the ***CLS** command and the **:STAT:PRES** command in a single message using HTBasic.

```
OUTPUT 717;"*CLS;:STAT:PRES"
```

Remote mode

The E5070A/E5071A does not provide remote mode. Therefore, even if you send a GPIB command, it never enters into remote mode automatically. There is no local key to release remote mode.

If you need to prevent misoperation during remote control due to entry from the front panel or mouse, lock the input devices using the following commands.

- **:SYST:KLOC:KBD** command on page 460
- **:SYST:KLOC:MOUS** command on page 461

3 Setting Up the Analyzer

This chapter describes how to configure measurement conditions and how to configure the way the instrument displays measurement results on the LCD.

Selecting the Active Channel/Trace

You can configure the E5070A/E5071A using various commands. Some commands require you to specify, and deal only with, a particular channel or trace while other commands do not require you to do so.

Those commands that do not require you to specify a particular channel or trace apply to currently active channels and traces. Before issuing such a command, therefore, you must make the appropriate channels and traces active.

To make a channel active, use the following command:

- **:DISP:WIND{1-9}:ACT** on page 337

NOTE Only the currently displayed channels can be an active channel. Therefore, you must display the desired channels using **:DISP:SPL** command on page 334 before you can make them active.

To make a trace active, use the following command:

- **:CALC{1-9}:PAR{1-9}:SEL** on page 302

NOTE Only the currently displayed traces can be an active trace. Therefore, you must display the desired traces using **:CALC{1-9}:PAR:COUN** command on page 300 before you can make them active.

Configuring Measurement Conditions

Setting the Number of Traces

When you set the number of traces, that setting determines the upper limit trace number; for example, if the setting is 3, traces 1 through 3 will be displayed. To set the number of traces, use the following command:

- **:CALC{1-9}:PAR:COUN** on page 300

NOTE Only the currently displayed traces can be an active trace. Therefore, you must set the number of traces appropriately before you can make them active.

Selecting Measurement Parameters

To select the measurement parameter (S parameter) for each trace, use the following command:

- **:CALC{1-9}:PAR{1-9}:DEF** on page 301

When you use the Balance-Unbalance Conversion feature, you can select the mixed mode S parameter as well. For more information, refer to “Analysis Using the Fixture Simulator” on page 94.

Setting the Sweep Condition (Stimulus)

How you can set the sweep condition depends on the sweep type. You can choose between the following two sweep types:

- Liner sweep
- Segment sweep

To select one of the above sweep types, use the following command:

- **:SENS{1-9}:SWE:TYPE** on page 437

To select the sweep mode (stepped mode/swept mode), use the following command:

- **:SENS{1-9}:SWE:GEN** on page 435

Configuring Linear Sweep Settings

To set the sweep range, use the following commands:

Start value	**:SENS{1-9}:FREQ:STAR** on page 423
Stop value	**:SENS{1-9}:FREQ:STOP** on page 424
Center value	**:SENS{1-9}:FREQ:CENT** on page 420
Span value	**:SENS{1-9}:FREQ:SPAN** on page 422

To set the number of measurement points, use the following command:

- **:SENS{1-9}:SWE:POIN** on page 435

To set the measurement time, use the following commands:

Measurement time	**:SENS{1-9}:SWE:TIME** on page 436
Turning on/off auto setting	**:SENS{1-9}:SWE:TIME:AUTO** on page 437

To set the sweep delay time, use the following command:

- **:SENS{1-9}:SWE:DEL** on page 434

To set the IF bandwidth, use the one of the following commands (both provide the same function):

- **:SENS{1-9}:BAND** on page 379
- **:SENS{1-9}:BWID** on page 380

To set the power, use the following command:

- **:SOUR{1-9}:POW** on page 438

When the instrument is equipped with the power range extension option, you can also set the power range using the following command:

- **:SOUR{1-9}:POW:ATT** on page 439

Configuring Segment Sweep Settings

When you opt to use segment sweep, you can set all items (in the segment sweep table) using a single command:

- **:SENS{1-9}:SEGM:DATA** on page 431

Alternatively, you can configure the segment sweep settings based on the data contained in a CSV file by issuing the following command:

- **:MMEM:LOAD:SEGM** on page 360

Also, you can save the contents of the current segment sweep table to a file by issuing the following command:

- **:MMEM:STOR:SEGM** on page 368

For more information on how to save and load the segment sweep table, refer to "Saving and recalling the segment sweep table."

Configuring Averaging Settings

To configure the smoothing settings, use the following commands:

On/off	**:SENS{1-9}:AVER** on page 377
Averaging factor	**:SENS{1-9}:AVER:COUN** on page 378
Clear (Restart)	**:SENS{1-9}:AVER:CLE** on page 377

Configuring Display Settings

Setting the Layout of Windows and Graphs

You can split the E5070A/E5071A's LCD screen into multiple windows that display channel-specific result information, and can select the window layout from a number of variations. In addition, you can place on screen a segment sweep table or echo window (which you can use to display messages from your custom program).

Selecting the Window Layout (Channel Display Mode)

One window displays the results for a single channel. You cannot have a single window display the results from more than one channel. This means that setting the window layout determines the number of channels displayed on screen.

To select one of the 19 different window layouts shown in Figure 3-1, use the following command:

- **:DISP:SPL** on page 334

Selecting the Graph Layout (Trace Display Mode)

You can place a number of trace graphs in each window, and can select one of the pre-defined graph layouts. The number of graphs differ depending on your selected graph layout. If the number of graphs is equal to or larger than the number of traces (set by the **:CALC{1-9}:PAR:COUN** command on page 300 command), each graph always displays one trace. On the other hand, if the number of graphs is smaller than the number of traces, some of the graphs display two or more traces. Graph 1 is populated with trace 1, graph 2 with trace 2, and so on. Traces whose numbers exceed the last graph's number will populate graph 1, graph 2, and so on.

To select one of the 19 different graph layouts shown in Figure 3-1, use the following command:

- **:DISP:WIND{1-9}:SPL** on page 339

Maximizing a Window and Graphs

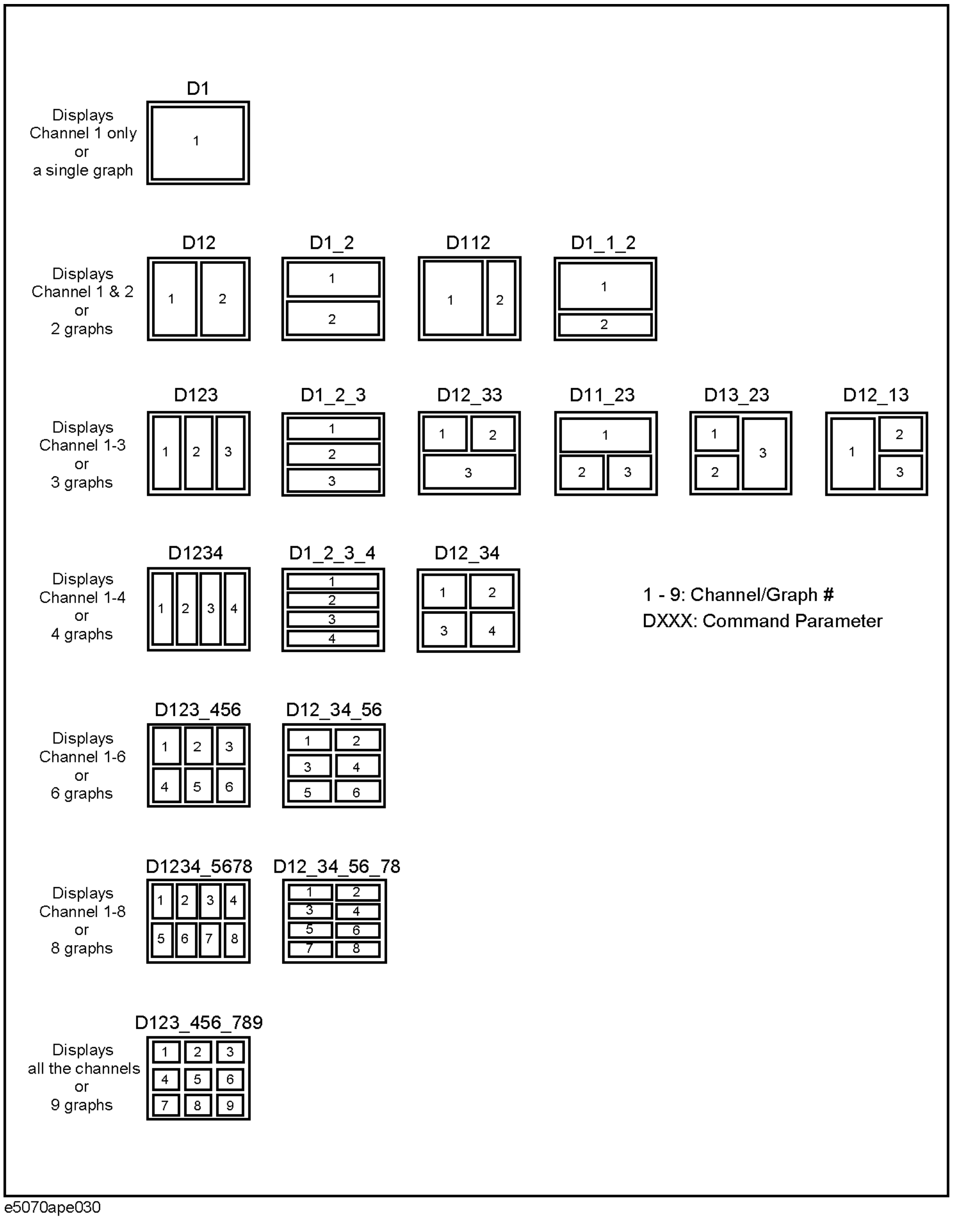
When you have multiple windows displayed, you can maximize the active channel window so that it covers the entire screen area. To maximize a window, use the following command:

- **:DISP:MAX** on page 333

Similarly, when you have multiple traces displayed, you can maximize the active trace so that it extends throughout the entire window. To maximize a trace, use the following command:

- **:DISP:WIND{1-9}:MAX** on page 338

Figure 3-1 **Window/graph layouts and command parameters**



Showing/Hiding a Table or Echo Window

You can have the following items displayed at the bottom of the LCD screen.

- Segment sweep table
- Limit table
- Marker list table
- Echo window (a window you can use to display messages from your custom program)

To show or hide each of the above items, use the following command:

- **:DISP:TABL** on page 335

You can have two or more of the above items displayed at a time. The screen displays only the item selected using the following command:

- **:DISP:TABL:TYPE** on page 336

Showing/Hiding Softkey Labels

You can show or hide the softkey labels placed alongside the right-hand edge of the LCD screen. To show or hide the softkey labels, use the following command:

- **:DISP:SKEY** on page 333

Configuring Trace Display Settings

Selecting Which Traces to Display

Each trace has two different representations: data and memory traces. You can show or hide the data and memory traces independently of each other. To show or hide the data or memory traces, use the following commands:

Data trace	**:DISP:WIND{1-9}:TRAC{1-9}:STAT** on page 342
Memory trace	**:DISP:WIND{1-9}:TRAC{1-9}:MEM** on page 341

To copy the data trace to the memory trace, use the following command:

- **:CALC{1-9}:MATH:MEM** on page 297

Configuring Cross-Trace Math Operations

You can perform math operations performed between the data and memory traces and have the results displayed as the data trace. To perform cross-trace math operations, use the following command:

- **:CALC{1-9}:MATH:FUNC** on page 297

Configuring Smoothing Settings

To turn on or off smoothing, use the following command:

- **:CALC{1-9}:SMO** on page 302

The smoothing aperture is expressed as a percentage with respect to the sweep range. To set the smoothing aperture, use the following command:

- **:CALC{1-9}:SMO:APER** on page 303

Selecting the Data Format

You can select the following data format:

❑ Rectangular display formats

  - Log magnitude format
  - Phase format
  - Group delay format
  - Linear magnitude format
  - SWR format
  - Real format
  - Imaginary format
  - Expanded phase format
  - Positive phase format

❑ Imaginary format
❑ Expanded phase format

To select the measurement parameter data format, use the following command:

- **:CALC{1-9}:FORM** on page 232

Configuring the Display Scale

Depending on the measurement parameter data format, you can configure the display scale in one of the following two ways:

Rectangular display formats:

When you are using one of rectangular display formats (Logarithmic magnitude/Phase/Group delay/Linear magnitude/SWR/Real/Imaginary/Expanded phase/Positive phase), you can configure the display scale by setting the following four items:

Divisions	**:DISP:WIND{1-9}:Y:DIV** on page 347
Scale per division	**:DISP:WIND{1-9}:TRAC{1-9}:Y:PDIV** on page 343
Reference graticule line	**:DISP:WIND{1-9}:TRAC{1-9}:Y:RPOS** on page 345
Reference graticule line value	**:DISP:WIND{1-9}:TRAC{1-9}:Y:RLEV** on page 344

NOTE The number of divisions is a channel-wide setting (shared among all traces) while the remaining three settings are trace-specific.

You can show or hide graticule label (the label on the left-hand side of the graticule lines) by issuing the following command:

- **:DISP:WIND{1-9}:LAB** on page 337

Smith Chart/Polar formats:

When you are using one of Smith chart/Polar formats, you can only set the full scale value (the outermost circle's value) using the following command:

- **:DISP:WIND{1-9}:TRAC{1-9}:Y:PDIV** on page 343

Auto Scale

You can use Auto Scale to automatically set the display scale. This feature works by automatically adjusting the reference division line value and the scale value per division when you are using one of rectangular display formats; or the full scale value when you are using one of Smith chart/Polar formats.

To perform Auto Scale, use the following command:

- **:DISP:WIND{1-9}:TRAC{1-9}:Y:AUTO** on page 342

Printing a Message in the Echo Window

You can print a message in the echo window by issuing the following command:

- **:DISP:ECHO** on page 330

You can clear any message displayed in the echo window by issuing the following command:

- **:DISP:ECHO:CLE** on page 330

Turning On or Off Display Update

To turn on or off the update of the LCD screen, use the following command:

- **:DISP:ENAB** on page 331

Showing/Hiding Frequencies

To show or hide frequencies on the LCD screen, use the following command:

- **:DISP:ANN:FREQ** on page 323

Showing or Hiding the Title

To show or hide the title, use the following command:

- **:DISP:WIND{1-9}:TITL** on page 340

To define the title string that appears in the title display area, use the following command:

- **:DISP:WIND{1-9}:TITL:DATA** on page 341

Configuring Date/Time Display

To show or hide the current date and time on the left-hand side of the instrument status bar, use the following command:

- **:DISP:CLOC** on page 324

To set the date and time, use the following command:

- **:SYST:DATE** on page 458
- **:SYST:TIME** on page 464

Turning On or Off the LCD Backlight

To turn on or off the LCD backlight, use the following command (note that turning off the backlight makes the screen unreadable):

- **:SYST:BACK** on page 455

Setting display colors

Selecting display mode

You can select the display mode of the LCD display from 2 modes: normal display (background: black) or inverted display (background: white).

To select the display mode, use the following command:

- **:DISP:IMAG** on page 332

Setting display color for each item

To set the display colors, use the following commands:

Data trace	**:DISP:COL{1-2}:TRAC{1-9}:DATA** on page 328
Memory trace	**:DISP:COL{1-2}:TRAC{1-9}:MEM** on page 329
Graph	**:DISP:COL{1-2}:GRAT{1-2}** on page 326
Limit test	**:DISP:COL{1-2}:LIM{1-2}** on page 327
Background	**:DISP:COL{1-2}:BACK** on page 325

Resetting display colors to factory state

You can reset the display colors in normal display and inverted display to the preset factory state.

To reset the display colors, use the following command:

- **:DISP:COL{1-2}:RES** on page 327

Saving and Loading the Settings

You can save the settings for measurement conditions and screen display to a file along with other instrument settings, and can later load them from the file.

Once you have saved the measurement condition and screen display settings to a file, you can later load them whenever necessary; you can quickly modify the settings loaded from a file to create new settings without having to issue many commands.

To save the current settings to a file, use the following command:

- **:MMEM:STOR** on page 362

To load the settings from a file, use the following command:

- **:MMEM:LOAD** on page 356

For more information on how to save and load the settings, refer to “Saving and recalling instrument status.”

Sample Program

Example 3-1 is a sample program that demonstrates how to configure measurement conditions. You can find the source file of this program, named setup.htb, on the sample program disk.

The sample program puts the instrument into the preset state, configures it as shown in Table 3-1, and saves the settings to a file named “Ex_3_1.sta”.

Table 3-1 **Target settings in Example 3-1**

<table>
<tr><th colspan="3">Item</th><th>Setting</th></tr>
<tr><td colspan="3">Window Layout</td><td>Channel 1 in the upper window (2/3 of the screen height) and channel 2 in the lower window (1/3 of the screen height)</td></tr>
<tr><td rowspan="23">Channel 1</td><td colspan="2">Sweep type</td><td>Segment</td></tr>
<tr><td colspan="2">Sweep range</td><td rowspan="4">See Table 3-2.</td></tr>
<tr><td colspan="2">Number of measurement points</td></tr>
<tr><td colspan="2">IF bandwidth</td></tr>
<tr><td colspan="2">Power</td></tr>
<tr><td colspan="2">Number of traces</td><td>4</td></tr>
<tr><td colspan="2">Graph Layout</td><td>Four graphs at upper left, upper right, lower left, and lower right.</td></tr>
<tr><td rowspan="3">Trace 1</td><td>Measurement parameter</td><td>S11</td></tr>
<tr><td>Data format</td><td>Smith chart (Lin)</td></tr>
<tr><td>Full-scale value</td><td>2</td></tr>
<tr><td rowspan="5">Trace 2</td><td>Measurement parameter</td><td>S21</td></tr>
<tr><td>Data format</td><td>Log magnitude</td></tr>
<tr><td>Reference division line number</td><td>9</td></tr>
<tr><td>Reference division line value</td><td>2</td></tr>
<tr><td>Scale per division</td><td>10 dBm</td></tr>
<tr><td rowspan="5">Trace 3</td><td>Measurement parameter</td><td>S12</td></tr>
<tr><td>Data format</td><td>Log magnitude</td></tr>
<tr><td>Reference division line number</td><td>9</td></tr>
<tr><td>Reference division line value</td><td>2</td></tr>
<tr><td>Scale per division</td><td>10 dBm</td></tr>
<tr><td rowspan="3">Trace 4</td><td>Measurement parameter</td><td>S22</td></tr>
<tr><td>Data format</td><td>Smith chart (Lin)</td></tr>
<tr><td>Full-scale value</td><td>2</td></tr>
</table>

Table 3-1 **Target settings in Example 3-1**

Item			Setting
Channel 2	Sweep type		Linear
	Sweep range	Center value	1.9 GHz
		Span value	500 MHz
	Number of measurement points		101
	IF bandwidth		70 kHz
	Power		0 dBm
	Number of traces		4
	Graph Layout		Two graphs at left and right
	Trace 1	Measurement parameter	S21
		Data format	Log magnitude
		Reference division line number	9
		Reference division line value	2
		Scale per division	10 dBm
	Trace 2	Measurement parameter	S22
		Data format	Smith chart (Lin)
		Full-scale value	2

Table 3-2 **Segment table for channel 1**

Segment Number	Start value	Stop value	Number of measurement points	IF bandwidth	Power
1	1.7 GHz	1.9 GHz	21	50 kHz	0 dBm
2	1.9 GHz	2 GHz	101	10 kHz	-10 dBm
3	2 GHz	2.2 GHz	21	50 kHz	0 dBm

The program is described in detail below:

Line 70	Assigns a GPIB address to the I/O pass.
Line 90	Stores the number of channel 1's sweep segments into the Segm variable.
Lines 100 to 150	These lines store the start and stop values for channel 1's segments 1 through 3 into the Star1(*) and Stop1(*) variables, respectively.
Lines 160 to 170	These lines store channel 2's center and span values into the Star2 and Stop2 variables, respectively.
Lines 180 to 210	These lines store the number of points for channel 1's segments 1 through 3 into the Nop1(*) variable, and the number of measurement points for channel 2 into the Nop2 variable.
Lines 220 to 250	These lines store the IF bandwidth for channel 1's segments 1 through 3 into the If_bw1(*) variable, and the IF bandwidth for channel 2 into the If_bw2 variable.
Lines 260 to 290	These lines store the power for channel 1's segments 1 through 3 into the Pow1(*) variable, and the power for channel 2 into the Pow2 variable.
Lines 300 to 310	These lines store the number of channel'1 traces into the Num_of_tr1 variable, and the number of channel 2's traces into the Num_of_tr2 variable.
Lines 320 to 330	These lines store channel 1's graph layout into the Allocate1$ variable, and channel 2's graph layout into the Allocate2$ variable.
Lines 340 to 390	These lines store the measurement parameters for channel 1's traces 1 through 4 into the Para1$(*) variable, and the measurement parameters for channel 2's traces 1 through 2 into the Para2$(*) variable.
Lines 400 to 450	These lines store the data formats for channel 1's traces 1 through 4 into the Fmt1$(*) variable, and the data formats for channel 2's traces 1 through 2 into the Fmt2$(*) variable.
Lines 460 to 480	These lines store the reference division line numbers for channel 1's traces 2 through 3 into the Ref_pos1(*) variable, and the reference division line numbers for channel 2's trace 1 into the Ref_pos2(*) variable.
Lines 490 to 510	These lines store the reference division line values for channel 1's traces 2 through 3 into the Ref_lev1(*) variable, and the reference division line values for channel 2's trace 1 into the Ref_lev2(*) variable.
Lines 520 to 570	These lines store the data formats for channel 1's traces 1 through 4 into the Fmt1$(*) variable, and the data formats for channel 2's traces 1 through 2 into the Fmt2$(*) variable.
Line 580	Stores the name of the file into the File$ variable.
Line 600	Puts the instrument into preset state.
Line 620	Places the window for channel 1 in the upper part of the LCD screen, and the window for channel 2 in the lower part.
Lines 630 to 640	These lines turn on Continuous Activation mode for channels 1 and 2.

Line 680	Sets channel 1's sweep type to "segment".
Lines 690 to 730	These lines set up the segment table for channel 1.

Line 600: Sends the command that sets up the segment table along with the parameter header ("5,0,1,1,0,0" causes the IF bandwidth and power to be set on a segment by segment basis; Segm represents the number of segments).

Lines 700 to 730: Send the data for the start and stop values, number of points, IF bandwidth, and power (Star1, Stop1, Nop1, If_bw1, Pow1) on a segment by segment basis.

Lines 750 to 760	For channel 1, these lines set the number of traces to Num_of_tr1 and the graph layout to Allocate1$.
Lines 770 to 890	For channel 1, the program iterates the following loop while incrementing i from 1 to Num_of_tr1 for each trace.

Line 780: Sets the measurement parameter to Para1$(i).

Line 790: Makes trace(i) active.

Line 800: Sets the data format to Fmt1$(i).

Line 830: If the data format is Smith chart or polar, this line sets the full-scale value to Scale1(i).

Lines 850 to 870: If the data format is neither Smith chart nor polar, these lines set the reference division line number to Ref_pos1(i), the reference division line value to Ref_lev1(i), and the scale per division to Scale1(i).

Line 930	Sets channel 2's sweep type to "linear".
Lines 940 to 980	For channel 2, these lines set the center value to Cent2, the span value to Span2, the number of measurement points to Nop2, the IF bandwidth to If_bw2, and the power to Pow2.
Lines 1000 to 1010	For channel 2, these lines set the number of traces to Num_of_tr2 and the graph layout to Allocate2$.
Lines 1020 to 1140	For channel 2, the program iterates the following loop while incrementing i from 1 to Num_of_tr2 for each trace.

Line 1030: Sets the measurement parameter to Para2$(i).

Line 1040: Makes trace(i) active.

Line 1050: Sets the data format to Fmt2$(i).

Line 1080: If the data format is Smith chart or polar, this line sets the full-scale value to Scale2(i).

Lines 1100 to 1120: If the data format is neither Smith chart nor polar, these lines set the reference division line number to Ref_pos2(i), the reference division line value to Ref_lev2(i), and the scale per division to Scale2(i).

Line 1160	Saves the settings of the E5070A/E5071A under the file name File$.

Example 3-1 **Configuring Measurement Conditions (setup.htb)**

```
10      DIM Allocate1$[9],Allocate2$[9],File$[20]
20      DIM Para1$(1:4)[9],Para2$(1:2)[9],Fmt1$(1:4)[9],Fmt2$(1:2)[9]
30      REAL Star1(1:3),Stop1(1:3),Pow1(1:3),Cent2,Span2,Pow2
40      REAL Ref_rev1(1:4),Ref_rev2(1:2),Scale1(1:4),Scale2(1:2)
50      INTEGER Segm,Nop1(1:3),Nop2,Num_of_tr1,Num_of_tr2
60      INTEGER Ref_pos1(1:4),Ref_pos2(1:2),I
70      ASSIGN @Agte507x TO 717
80      !
90      Segm=3                ! Number of Segment Ch.1      : 3
100     Star1(1)=1.7E+9       ! Start Frequency Ch.1 Segm.1: 1.7 GHz
110     Star1(2)=1.9E+9       !                      Segm.2: 1.9 GHz
120     Star1(3)=2.E+9        !                      Segm.3: 2 GHz
130     Stop1(1)=1.9E+9       ! Stop Frequency  Ch.1 Segm.1: 1.9 GHz
140     Stop1(2)=2.E+9        !                      Segm.2: 2 GHz
150     Stop1(3)=2.2E+9       !                      Segm.3: 2.2 GHz
160     Cent2=1.9E+9          ! Center Frequency Ch.2      : 1.9 GHz
170     Span2=5.00E+8         ! Span            Ch.2       : 500 MHz
180     Nop1(1)=21            ! Number          Ch.1 Segm.1: 21
190     Nop1(2)=101           !   of Points          Segm.2: 101
200     Nop1(3)=21            !                      Segm.3: 21
210     Nop2=101              !                 Ch.2       : 101
220     If_bw1(1)=5.0E+4      ! IF Bandwidth    Ch.1 Segm.1: 50 kHz
230     If_bw1(2)=1.0E+4      !                      Segm.2: 10 kHz
240     If_bw1(3)=5.0E+4      !                      Segm.3: 50 kHz
250     If_bw2=7.0E+4         !                 Ch.2       : 70 kHz
260     Pow1(1)=0             ! Power           Ch.1 Segm.1: 0 dBm
270     Pow1(2)=-10           !                      Segm.2: -10 dBm
280     Pow1(3)=0             !                      Segm.3: 0 dBm
290     Pow2=0                !                 Ch.2       : 0 dBm
300     Num_of_tr1=4          ! Number          Ch.1       : 4
310     Num_of_tr2=2          !   of Traces     Ch.2       : 2
320     Allocate1$="D12_34"   ! Allocate Traces Ch.1       : D12_34
330     Allocate2$="D12"      !                 Ch.2       : D12
340     Para1$(1)="S11"       ! Measurement     Ch.1 Trace1: S11
350     Para1$(2)="S21"       !   Parameter          Trace2: S21
360     Para1$(3)="S12"       !                      Trace3: S12
370     Para1$(4)="S22"       !                      Trace4: S22
380     Para2$(1)="S31"       !                 Ch.2 Trace1: S31
390     Para2$(2)="S33"       !                      Trace2: S33
400     Fmt1$(1)="SLIN"       ! Data Format     Ch.1 Trace1: Smith(Lin/Phase)
410     Fmt1$(2)="MLOG"       !                      Trace2: Log Mag
420     Fmt1$(3)="MLOG"       !                      Trace3: Log Mag
430     Fmt1$(4)="SLIN"       !                      Trace4: Smith(Lin/Phase)
440     Fmt2$(1)="MLOG"       !                 Ch.2 Trace1: Log Mag
450     Fmt2$(2)="SLIN"       !                      Trace2: Smith(Lin/Phase)
460     Ref_pos1(2)=9         ! Reference       Ch.1 Trace2: 9
470     Ref_pos1(3)=9         !   Position           Trace3: 9
480     Ref_pos2(1)=9         !                 Ch.2 Trace1: 9
490     Ref_lev1(2)=0         ! Reference Level Ch.1 Trace2: 0 dBm
500     Ref_lev1(3)=0         !                      Trace3: 0 dBm
510     Ref_lev2(1)=0         !                 Ch.2 Trace1: 0 dBm
520     Scale1(1)=2           ! Scale           Ch.1 Trace1: 2
530     Scale1(2)=10          !                      Trace2: 10 dBm
540     Scale1(3)=10          !                      Trace3: 10 dBm
550     Scale1(4)=2           !                      Trace4: 2
560     Scale2(1)=10          !                 Ch.2 Trace1: 10 dBm
570     Scale2(2)=2           !                      Trace2: 2
580     File$="Ex_3_1.sta"    ! Save File Name             : Ex_3_1.sta
590     !
600     OUTPUT @Agte507x;":SYST:PRES"
610     !
620     OUTPUT @Agte507x;":DISP:SPL D1_1_2"
630     OUTPUT @Agte507x;":INIT1:CONT ON"
640     OUTPUT @Agte507x;":INIT2:CONT ON"
```

```
650    !
660    ! Channel 1
670    !
680    OUTPUT @Agte507x;":SENS1:SWE:TYPE SEGM"
690    OUTPUT @Agte507x;":SENS1:SEGM:DATA 5,0,1,1,0,0,";Segm;",";
700    FOR I=1 TO Segm-1
710      OUTPUT @Agte507x;Star1(I);",";Stop1(I);",";Nop1(I);",";If_bw1
(I);",";Pow1(I);",";
720    NEXT I
730    OUTPUT @Agte507x;Star1(Segm);",";Stop1(Segm);",";Nop1(Segm);","
;If_bw1(Segm);",";Pow(Segm)
740    !
750    OUTPUT @Agte507x;":CALC1:PAR:COUN ";Num_of_tr1
760    OUTPUT @Agte507x;":DISP:WIND1:SPL "&Allocate1$
770    FOR I=1 TO Num_of_tr1
780      OUTPUT @Agte507x;":CALC1:PAR"&VAL$(I)&":DEF "&Para1$(I)
790      OUTPUT @Agte507x;":CALC1:PAR"&VAL$(I)&":SEL"
800      OUTPUT @Agte507x;":CALC1:FORM "&Fmt1$(I)
810      SELECT Fmt1$(I)
820        CASE "SLIN","SLOG","SCOM","SMIT","SADM","PLIN","PLOG","POL"
830          OUTPUT @Agte507x;":DISP:WIND1:TRAC"&VAL$(I)&":Y:PDIV ";
Scale1(I)
840        CASE ELSE
850          OUTPUT @Agte507x;":DISP:WIND1:TRAC"&VAL$(I)&":Y:RPOS ";
Ref_pos1(I)
860          OUTPUT @Agte507x;":DISP:WIND1:TRAC"&VAL$(I)&":Y:RLEV ";
Ref_rev1(I)
870          OUTPUT @Agte507x;":DISP:WIND1:TRAC"&VAL$(I)&":Y:PDIV ";
Scale1(I)
880      END SELECT
890    NEXT I
900    !
910    ! Channel 2
920    !
930    OUTPUT @Agte507x;":SENS2:SWE:TYPE LIN"
940    OUTPUT @Agte507x;":SENS2:FREQ:CENT ";Cent2
950    OUTPUT @Agte507x;":SENS2:FREQ:SPAN ";Span2
960    OUTPUT @Agte507x;":SENS2:SWE:POIN ";Nop2
970    OUTPUT @Agte507x;":SENS2:BAND ";If_bw2
980    OUTPUT @Agte507x;":SOUR2:POW ";Pow2
990    !
1000   OUTPUT @Agte507x;":CALC2:PAR:COUN ";Num_of_tr2
1010   OUTPUT @Agte507x;":DISP:WIND2:SPL "&Allocate2$
1020   FOR I=1 TO Num_of_tr2
1030     OUTPUT @Agte507x;":CALC2:PAR"&VAL$(I)&":DEF "&Para2$(I)
1040     OUTPUT @Agte507x;":CALC2:PAR"&VAL$(I)&":SEL"
1050     OUTPUT @Agte507x;":CALC2:FORM "&Fmt2$(I)
1060     SELECT Fmt2$(I)
1070       CASE "SLIN","SLOG","SCOM","SMIT","SADM","PLIN","PLOG","POL"
1080         OUTPUT @Agte507x;":DISP:WIND2:TRAC"&VAL$(I)&":Y:PDIV ";
Scale2(I)
1090       CASE ELSE
1100         OUTPUT @Agte507x;":DISP:WIND2:TRAC"&VAL$(I)&":Y:RPOS ";
Ref_pos2(I)
1110         OUTPUT @Agte507x;":DISP:WIND2:TRAC"&VAL$(I)&":Y:RLEV ";
Ref_rev2(I)
1120         OUTPUT @Agte507x;":DISP:WIND2:TRAC"&VAL$(I)&":Y:PDIV ";
Scale2(I)
1130     END SELECT
1140   NEXT I
1150   !
1160   OUTPUT @Agte507x;":MMEM:STOR """&File$&""""
1170   END
```

4 Performing a Calibration

This chapter describes how to obtain the calibration coefficients and perform error correction. It also describes how to define the calibration kit required to obtain the calibration coefficients.

Performing a Calibration (Obtaining the Calibration Coefficients)

Selecting a Calibration Kit

To select a calibration kit, use the following command:

- **:SENS{1-9}:CORR:COLL:CKIT** on page 381

Selecting a Calibration Type

The calibration coefficients are calculated based on the selected calibration type. Before you can calculate the calibration coefficients, therefore, you must select the appropriate calibration type using the following command.

Calibration type		Command
Response	OPEN	**:SENS{1-9}:CORR:COLL:METH:OPEN** on page 407
	SHORT	**:SENS{1-9}:CORR:COLL:METH:SHOR** on page 407
	THRU	**:SENS{1-9}:CORR:COLL:METH:THRU** on page 410
Full 1-Port		**:SENS{1-9}:CORR:COLL:METH:SOLT1** on page 408
Full 2-Port		**:SENS{1-9}:CORR:COLL:METH:SOLT2** on page 408
Full 3-Port		**:SENS{1-9}:CORR:COLL:METH:SOLT3** on page 409
Full 4-Port		**:SENS{1-9}:CORR:COLL:METH:SOLT4** on page 409

To check the currently selected calibration type, use the following command:

- **:SENS{1-9}:CORR:COLL:METH:TYPE?** on page 411

Measuring the Calibration Data

To measure the calibration data, use the following command:

Calibration data items	Command
OPEN	**:SENS{1-9}:CORR:COLL:OPEN** on page 412
SHORT	**:SENS{1-9}:CORR:COLL:SHOR** on page 413
LOAD	**:SENS{1-9}:CORR:COLL:LOAD** on page 406
THRU	**:SENS{1-9}:CORR:COLL:THRU** on page 414
Isolation	**:SENS{1-9}:CORR:COLL:ISOL** on page 405

NOTE

You cannot run more than one of the commands listed above at a time; if you issue another command before the currently running command completes successfully, the current command will be aborted. When you write a program that issues multiple calibration commands in series, therefore, you should use the ***OPC?** command on page 212 command or some other means to ensure that no command is executed before the preceding command completes.

As shown in Table 4-1, the data required to calculate the calibration coefficients differs depending on the selected calibration type.

Table 4-1 Calibration Types and Required Data

Calibration type Selected ports are enclosed in parentheses.		OPEN	SHORT	LOAD	THRU	Isolation
Response	OPEN (a)	a	Not required	[a]	Not required	Not required
	SHORT (a)	Not required	a	[a]	Not required	Not required
	THRU (a-b)	Not required	Not required	Not required	a-b	[a-b]
Full 1-Port (a)		a	a	a	Not required	Not required
Full 2-Port (a-b)		a,b	a,b	a,b	a-b,b-a	[a-b],[b-a]
Full 3-Port (a-b-c)		a,b,c	a,b,c	a,b,c	a-b,b-a a-c,c-a b-c,c-b	[a-b],[b-a] [a-c],[c-a] [b-c],[c-b]
Full 4-Port (a-b-c-d)		a,b,c,d	a,b,c,d	a,b,c,d	a-b,b-a a-c,c-a a-d,d-a b-c,c-b b-d,d-b c-d,d-c	[a-b],[b-a] [a-c],[c-a] [b-c],[c-b] [b-c],[c-b] [b-d],[d-b] [c-d],[d-c]

In the table above, the letters a through d represent the measurement data at ports a through d; m-n represents the measurement data between response port m and stimulus port n. You can omit data enclosed in brackets.

Calculating the Calibration Coefficients

To calculate the calibration coefficients, use the following command:

- **:SENS{1-9}:CORR:COLL:SAVE** on page 412

Before issuing the command above, you must measure all the required calibration data items that match your selected calibration types (see Table 4-1).

Calculating the calibration coefficients clears all calibration data whether or not used for the calculation and also clears the calibration type selections.

Turning On or Off Error Correction

To turn on or off Error Correction, use the following command:

- **:SENS{1-9}:CORR:STAT** on page 418

Also, once you have calculated the calibration coefficient using the **:SENS{1-9}:CORR:COLL:SAVE** command, Error Correction is automatically turned on.

Using ECal

An ECal (Electronic Calibration) module allows you to perform full 1/2/3/4-port calibration and response (THRU) calibration without having to replacing the standard device.

ECal works by using the calibration kit data contained in the ECal module, instead of the calibration kit data selected on the part of the E5070A/E5071A. This means that you do not have to define or select a calibration kit when using ECal.

NOTE When two or more ECal modules are connected through the USB port, the system uses the calibration kit data contained in the first ECal module.

To perform ECal, use the following command:

Calibration type	Command
Full 1-Port Calibration	**:SENS{1-9}:CORR:COLL:ECAL:SOLT1** on page 402
Full 2-Port Calibration	**:SENS{1-9}:CORR:COLL:ECAL:SOLT2** on page 402
Full 3-Port Calibration	**:SENS{1-9}:CORR:COLL:ECAL:SOLT3** on page 403
Full 4-Port Calibration	**:SENS{1-9}:CORR:COLL:ECAL:SOLT4** on page 403

Simply issuing one of the above commands completes all the tasks necessary for error correction, including measuring the calibration data, calculating the calibration coefficients, and running on the Error Correction feature.

NOTE Once you have initiated ECal, you cannot cancel the operation.

Any commands entered following the initiation of ECal will not be processed until ECal completes successfully. This means that, if you issue a command that queries some data, the system will not respond to the query until ECal is complete.

You can control whether to perform isolation measurement during ECal. To turn on or off isolation measurement, use the following command:

- **:SENS{1-9}:CORR:COLL:ECAL:ISOL** on page 401

NOTE If the ECal module does not support isolation measurement, the system never performs isolation measurement.

Checking the Applied Calibration Type

When you turn on Error Correction, you can check the calibration type actually applied to each trace. To check the calibration type, use the following command:

- **:SENS{1-9}:CORR:TYPE{1-9}?** on page 419

Defining Calibration Kits

Selecting a Calibration Kit

To select a calibration kit, use the following command:

- **:SENS{1-9}:CORR:COLL:CKIT** on page 381

Setting the Calibration Kit Name

To set the name of a calibration kit, use the following command:

- **:SENS{1-9}:CORR:COLL:CKIT:LAB** on page 382

Standard Definitions

Selecting a Standard Type

To select a standard type, use the following command:

- **:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:TYPE** on page 399

Setting the Standard Name

To set the standard name, use the following command:

- **:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:LAB** on page 397

Setting the Standard Value

To set the standard value, use the following command:

Item	Command
C0	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C0** on page 388
C1	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C1** on page 389
C2	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C2** on page 390
C3	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C3** on page 391
L0	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L0** on page 393
L1	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L1** on page 394
L2	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L2** on page 395
L3	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L3** on page 396
Offset Delay	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:DEL** on page 392
Offset Loss	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:LOSS** on page 398
Offset Z0	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:Z0** on page 400
Arbitrary Impedance	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:ARB** on page 387

As shown in Table 4-2, you need to set different items depending on the standard type.

Table 4-2 Settings Specific to Each Standard Type

Standard Types	C0 to C3	L0 to L3	Offset Delay	Offset Loss	Offset Z0	Arbitrary Impedance
OPEN	√		√	√	√	
SHORT		√	√	√	√	
LOAD			√	√	√	
THRU			√	√	√	
Arbitrary Impedance			√	√	√	√

You need to set the items identified by √ marks in the table above.

Defining a Standard Class Assignment

To select the standard to be applied to the OPEN measurement for each port, use the following command:

- **:SENS{1-9}:CORR:COLL:CKIT:ORD:OPEN** on page 384

To select the standard to be applied to the SHORT measurement for each port, use the following command:

- **:SENS{1-9}:CORR:COLL:CKIT:ORD:SHOR** on page 385

To select the standard to be applied to the LOAD measurement for each port, use the following command:

- **:SENS{1-9}:CORR:COLL:CKIT:ORD:LOAD** on page 383

To select the standard to be applied to the THRU measurement between each pair of ports, use the following command:

- **:SENS{1-9}:CORR:COLL:CKIT:ORD:THRU** on page 386

Saving and Loading Calibration Coefficients

You can save calibration coefficients to a file along with other instrument settings, and can later load them from the file.

NOTE You cannot save, load, read, or write calibration coefficients independently of the other instrument settings.

By default, the system does not save calibration coefficients when it saves instrument settings. To save calibration coefficients, therefore, you must explicitly configure the system to save calibration coefficients by issuing the following command:

- **:MMEM:STOR:STYP** on page 369

To save calibration coefficients to a file, use the following command:

- **:MMEM:STOR** on page 362

To load calibration coefficients from a file, use the following command:

- **:MMEM:LOAD** on page 356

For more information on how to save and load calibration coefficients, refer to “Saving and recalling instrument status.”

Sample Program

Calibration

Example 4-1 shows a sample program that demonstrates how to calibrate the instrument. You can find the source file of this program, named cal.htb, on the sample program disk.

The sample program performs calibration with the specified calibration type, and saves the results to a file named “Ex_4_1.sta.”

The program is described in detail below:

Line 40	Assigns a GPIB address to the I/O pass.
Line 50	Stores the name of the file (Ex_4_1.sta) into the File$ variable.
Line 60	Stores the channel number (1) into the Ch$ variable.
Line 80	Calls a subprogram named Select_cal_kit to select the calibration kit.
Line 110	Allows the user to return to the entry start line and re-enter the data if an error (such as an invalid entry) occurs while selecting the calibration type number.
Lines 130 to 230	These lines display the list of supported calibration types, and prompts the user to choose one of the items by typing in the appropriate number.
Line 240	Converts the entered value into an integer and stores it into the Cal_type variable.
Line 250	Returns to the entry start line if an invalid value is contained in Cal_type.
Lines 280 to 500	These lines call a subprogram named Select_port to select the appropriate port based on the value of Cal_type, and then perform calibration.

Lines 300 to 310: If Cal_type = 1, the program calls a subprogram named Cal_resp to perform response calibration (OPEN) after selecting the port.

Lines 330 to 340: If Cal_type = 2, the program calls the subprogram Cal_resp to perform response calibration (SHORT) after selecting the port.

Lines 360 to 370: If Cal_type = 3, the program calls a subprogram named Cal_resp_thru to perform response calibration (THRU) after selecting the port.

Lines 390 to 400: If Cal_type = 4, the program calls a subprogram named Cal_solt to perform full 1-port calibration after selecting the port.

Lines 420 to 430: If Cal_type = 5, the program calls the subprogram Cal_solt to perform full 2-port calibration after selecting the port.

Lines 450 to 460: If Cal_type = 6, the program calls the subprogram Cal_solt to perform full 3-port calibration after selecting the port.

Lines 480 to 490: If Cal_type = 7, the program calls the subprogram Cal_solt to perform full 4-port calibration after selecting the port.

Lines 520 to 530	These lines configure the system to save calibration coefficients along with instrument settings, and then save the instrument settings under the file name contained in the File$ variable.

The Select_cal_kit subprogram in lines 580 to 820, which selects the calibration kit, is described below.

Lines 630 to 670	These lines retrieve the names of all the calibration kits and stores them into the Cal_kit_lbl$(*) variable.
Line 680	Allows the user to return to the entry start line and re-enter the data if an error (such as an invalid entry) occurs while entering the number that identifies the calibration kit.
Lines 700 to 760	Displays the list of supported calibration kits, and prompts the user to choose one of the items by typing in the appropriate number.
Line 770	Converts the entered value into an integer and stores it into the Cal_kit variable.
Line 780	Returns to the entry start line if an invalid value is contained in Cal_kit.
Line 810	Selects the calibration kit that matches the number contained in the Cal_kit variable.

The Select_port subprogram in lines 860 to 1090, which allows the user to select a port, is described below.

Lines 910 to 940	If the value of Num_of_ports is 4 (4-port), the subprogram determines the port numbers (1, 2, 3, 4) without prompting the user to enter port numbers, and then store the port numbers into the Port(*) variable.
Lines 960 to 1090	If the value of Num_of_ports is not 4, the subprogram prompts the user to select as many ports as Num_of_ports.

Line 970: Allows the user to return to the entry start line and re-enter the data if an error (such as an invalid entry) occurs while entering the port number.

Lines 990 to 1010: These lines print the index of the current port and prompt the user to enter the port number.

Lines 1020: Converts the entered value into an integer and stores it into the Port(*) variable.

Lines 1040 to 1060: Return to the entry start line if the port number is beyond the range of 1 to 4 or conflicts with an already selected number.

The Cal_resp subprogram in lines 1150 to 1260, which performs response calibration (OPEN/SHORT), is described below.

Line 1180	Displays the calibration type.
Line 1190	Configures the instrument to perform response calibration (Type$) on the port identified by the Port variable.
Lines 1200 to 1210	These lines prompt the user to connect a Type$ to port Port, and wait for a press of the [Enter] key after the connection.
Lines 1220 to 1240	These lines execute the calibration data measurement command identified by Type$ on port Port, and wait until the measurement completes successfully.
Line 1250	Calculates the calibration coefficients and turns on error correction.
Line 1260	Displays a closing message.

The Cal_resp_thru subprogram in lines 1310 to 1430, which performs response calibration (THRU), is described below.

Line 1340	Displays the calibration type.
Line 1350	Configures the instrument to perform response calibration (THRU) on response port Port 1 and stimulus port Port 2.
Lines 1360 to 1370	These lines prompt the user to connect a THRU standard between the ports identified by Port1 and Port2, and wait for a press of the [Enter] key after the connection.
Lines 1380 to 1400	These lines execute the TURU calibration data measurement command on response port Port1 and stimulus port 2, and wait until the measurement completes successfully.
Line 1410	Calculates the calibration coefficients and turns on error correction.
Line 1420	Displays a closing message.

The Cal_solt subprogram in lines 1470 to 2000, which performs full n-port calibration, is described below.

Line 1510 Displays the calibration type.

Lines 1550 to 1590 These lines configure the instrument to perform full Num_of_ports port calibration on the ports identified by Port(1) trough Port(Num_of_ports).

Lines 1630 to 1790 These lines make up a loop that iterates while incrementing i from 1 to Num_of_ports.

Lines 1640 to 1650: Prompt the user to connect an OPEN standard to port Port(i), and wait for a press of the [Enter] key after the connection.

Lines 1660 to 1680: Execute the OPEN calibration data measurement command on port Port(i), and wait until the measurement completes successfully.

Lines 1690 to 1700: Prompt the user to connect a SHORT standard to port Port(i), and wait for a press of the [Enter] key after the connection.

Lines 1710 to 1730: Execute the SHORT calibration data measurement command on port Port(i), and wait until the measurement completes successfully.

Lines 1740 to 1750: Prompt the user to connect a LOAD standard to port Port(i), and wait for a press of the [Enter] key after the connection.

Lines 1760 to 1780: Execute the LOAD calibration data measurement command on port Port(i), and wait until the measurement completes successfully.

Lines 1830 to 1940 These lines make up a loop that iterates while incrementing i from 1 to Num_of_ports-1 and j from i+1 to Num_of_ports.

Lines 1850 to 1860: Prompt the user to connect a THRU standard between port Port(i) and port Port(j), and wait for a press of the [Enter] key after the connection.

Lines 1660 to 1680: Execute the THRU calibration data measurement command on response port Port(i) and stimulus port Port(j), and wait until the measurement completes successfully.

Lines 1690 to 1700: Execute the THRU calibration data measurement command on response port Port(j) and stimulus port Port(i), and wait until the measurement completes successfully.

Line 1980 Calculates the calibration coefficients and turns on error correction.

Line 1990 Displays a closing message.

Example 4-1 **Calibration (cal.htb)**

```
10     DIM File$[20],Ch$[9],Inp_char$[9]
20     INTEGER Cal_kit,Cal_type,Port(1:4)
30     !
40     ASSIGN @Agte507x TO 717
50     File$="Ex_4_1.sta"
60     Ch$="1"
70     !
80     Select_cal_kit(@Agte507x,Ch$)
90     !
100    CLEAR SCREEN
110    ON ERROR GOTO Type_select
120 Type_select: !
130    PRINT "## Calibration Type Selection ##"
140    PRINT " 1: Response (Open)"
150    PRINT " 2: Response (Short)"
160    PRINT " 3: Response (Thru)"
170    PRINT " 4: Full 1 Port"
180    PRINT " 5: Full 2 Port"
190    PRINT " 6: Full 3 Port"
200    PRINT " 7: Full 4 Port"
210    PRINT ""
220    PRINT "Input 1 to 7"
230    INPUT "Input number? (1 to 7)",Inp_char$
240    Cal_type=IVAL(Inp_char$,10)
250    IF Cal_type<1 OR Cal_type>7 THEN Type_select
260    OFF ERROR
270    !
280    SELECT Cal_type
290      CASE 1
300        Select_port(1,Port(*))
310        Cal_resp(@Agte507x,Ch$,"OPEN",Port(1))
320      CASE 2
330        Select_port(1,Port(*))
340        Cal_resp(@Agte507x,Ch$,"SHOR",Port(1))
350      CASE 3
360        Select_port(2,Port(*))
370        Cal_resp_thru(@Agte507x,Ch$,Port(1),Port(2))
380      CASE 4
390        Select_port(1,Port(*))
400        Cal_solt(@Agte507x,Ch$,1,Port(*))
410      CASE 5
420        Select_port(2,Port(*))
430        Cal_solt(@Agte507x,Ch$,2,Port(*))
440      CASE 6
450        Select_port(3,Port(*))
460        Cal_solt(@Agte507x,Ch$,3,Port(*))
470      CASE 7
480        Select_port(4,Port(*))
490        Cal_solt(@Agte507x,Ch$,4,Port(*))
500    END SELECT
510    !
520    OUTPUT @Agte507x;":MMEM:STOR:STYP CST"
530    OUTPUT @Agte507x;":MMEM:STOR """&File$&""""
540    END
550    !============================================
560    ! Calibration Kit Selection Function
570    !============================================
580  SUB Select_cal_kit(@Agte507x,Ch$)
590    DIM Cal_kit_lbl$(1:10)[20],Inp_char$[9]
600    INTEGER Cal_kit,I
610    CLEAR SCREEN
```

```
620    !
630    FOR I=1 TO 10
640      OUTPUT @Agte507x;":SENS1:CORR:COLL:CKIT ";I
650      OUTPUT @Agte507x;":SENS1:CORR:COLL:CKIT:LAB?"
660      ENTER @Agte507x;Cal_kit_lbl$(I)
670    NEXT I
680    ON ERROR GOTO Kit_select
690 Kit_select: !
700    PRINT "## Calibration Kit Selection ##"
710    FOR I=1 TO 10
720      PRINT USING "X,2D,A,X,20A";I,":",Cal_kit_lbl$(I)
730    NEXT I
740    PRINT ""
750    PRINT "Input 1 to 10"
760    INPUT "Input number? (1 to 10)",Inp_char$
770    Cal_kit=IVAL(Inp_char$,10)
780    IF Cal_kit<1 OR Cal_kit>10 THEN Kit_select
790    OFF ERROR
800    !
810    OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:CKIT ";Cal_kit
820  SUBEND
830    !============================================
840    ! Port Selection Function
850    !============================================
860  SUB Select_port(INTEGER Num_of_ports,INTEGER Port(*))
870    DIM Inp_char$[9]
880    !
890    CLEAR SCREEN
900    IF Num_of_ports=4 THEN
910      Port(1)=1
920      Port(2)=2
930      Port(3)=3
940      Port(4)=4
950    ELSE
960      PRINT "## Test Ports Selection ##"
970      ON ERROR GOTO Port_select
980      FOR I=1 TO Num_of_ports
990        PRINT "Port("&VAL$(I)&"):";
1000 Port_select:!
1010       INPUT "Number?",Inp_char$
1020       Port(I)=IVAL(Inp_char$,10)
1030       IF Port(I)<1 OR Port(I)>4 THEN Port_select
1040       FOR J=1 TO I-1
1050         IF Port(I)=Port(J) THEN Port_select
1060       NEXT J
1070       PRINT Port(I)
1080     NEXT I
1090     OFF ERROR
1100   END IF
1110 SUBEND
1120   !============================================
1130   ! Response (Open/Short) Calibration Function
1140   !============================================
1150 SUB Cal_resp(@Agte507x,Ch$,Type$,INTEGER Port)
1160   DIM Buff$[9]
1170   !
1180   PRINT "## Response ("&Type$&") Calibration ##"
1190   OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:METH:"&Type$&" ";Port
1200   PRINT "Set "&Type$&" to Port "&VAL$(Port)&". Then push [Enter]
key."
1210   INPUT "",Buff$
1220   OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:"&Type$&" ";Port
1230   OUTPUT @Agte507x;"*OPC?"
1240   ENTER @Agte507x;Buff$
```

```
1250   OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:SAVE"
1260   PRINT "Done"
1270 SUBEND
1280   !============================================
1290   ! Response (Thru) Calibration Function
1300   !============================================
1310 SUB Cal_resp_thru(@Agte507x,Ch$,INTEGER Port1,Port2)
1320   DIM Buff$[9]
1330   !
1340   PRINT "## Response (Thru) Calibration ##"
1350   OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:METH:THRU ";Port1;",";
Port2
1360  PRINT "Set THRU between Port "&VAL$(Port1)&" and Port "&VAL$(Port2
)&". Then push [Enter] key."
1370   INPUT "",Buff$
1380   OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:THRU ";Port1;",";Port2
1390   OUTPUT @Agte507x;"*OPC?"
1400   ENTER @Agte507x;Buff$
1410   OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:SAVE"
1420   PRINT "Done"
1430 SUBEND
1440   !============================================
1450   ! Full n Port Calibration Function
1460   !============================================
1470 SUB Cal_solt(@Agte507x,Ch$,INTEGER Num_of_ports,INTEGER Port(*))
1480   DIM Buff$[9]
1490   INTEGER I,J
1500   !
1510   PRINT "## Full "&VAL$(Num_of_ports)&" Port Calibration ##"
1520   !
1530   ! Calibration Type Selection
1540   !
1550   OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:METH:SOLT"&VAL$(Num_of_
ports)&" ";
1560   FOR I=1 TO Num_of_ports-1
1570     OUTPUT @Agte507x;Port(I);",";
1580   NEXT I
1590   OUTPUT @Agte507x;Port(Num_of_ports)
1600   !
1610   ! Reflection Measurement
1620   !
1630   FOR I=1 TO Num_of_ports
1640     PRINT "Set OPEN  to Port "&VAL$(Port(I))&". Then push [Enter]
key."
1650     INPUT "",Buff$
1660     OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:OPEN ";Port(I)
1670     OUTPUT @Agte507x;"*OPC?"
1680     ENTER @Agte507x;Buff$
1690     PRINT "Set SHORT to Port "&VAL$(Port(I))&". Then push [Enter]
key."
1700     INPUT "",Buff$
1710     OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:SHOR ";Port(I)
1720     OUTPUT @Agte507x;"*OPC?"
1730     ENTER @Agte507x;Buff$
1740     PRINT "Set LOAD  to Port "&VAL$(Port(I))&". Then push [Enter]
key."
1750     INPUT "",Buff$
1760     OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:LOAD ";Port(I)
1770     OUTPUT @Agte507x;"*OPC?"
1780     ENTER @Agte507x;Buff$
1790   NEXT I
1800   !
1810   ! Transmission Measurement
1820   !
```

```
1830   FOR I=1 TO Num_of_ports-1
1840     FOR J=I+1 TO Num_of_ports
1850       PRINT "Set THRU between Port "&VAL$(Port(I))&" and Port "&
VAL$(Port(J))&". Then push [Enter] key."
1860       INPUT "",Buff$
1870       OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:THRU ";Port(I);","
;Port(J)
1880       OUTPUT @Agte507x;"*OPC?"
1890       ENTER @Agte507x;Buff$
1900       OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:THRU ";Port(J);","
;Port(I)
1910       OUTPUT @Agte507x;"*OPC?"
1920       ENTER @Agte507x;Buff$
1930     NEXT J
1940   NEXT I
1950   !
1960   ! Done
1970   !
1980   OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:SAVE"
1990   PRINT "Done"
2000 SUBEND
```

ECal

Example 4-2 shows a sample program that demonstrates how to use ECal. You can find the source file of this program, named ecal.htb, on the sample program disk.

The sample program performs full 1-port or 2-port calibration using ECal, and saves the results to a file named “Ex_4_2.sta.”

The program is described in detail below:

Line 40	Assigns a GPIB address to the I/O pass.
Line 50	Stores the name of the file (Ex_4_2.sta) into the File$ variable.
Line 60	Stores the channel number (1) into the Ch$ variable.
Line 90	Allows the user to return to the entry start line and re-enter the data if an error (such as an invalid entry) occurs while selecting the calibration type number.
Lines 110 to 160	These lines display the list of supported calibration types, and prompt the user to choose one of the items by typing in the appropriate number.
Line 170	Converts the entered value into an integer and stores it into the Cal_type variable.
Line 180	Returns to the entry start line if an invalid value is contained in Cal_type.
Lines 230 to 240	These lines call a subprogram named Select_port to select the appropriate port based on the value of Cal_type, and then perform ECal.
Lines 260 to 270	These lines configure the system to save calibration coefficients along with instrument settings, and then save the instrument settings under the file name contained in the File$ variable.

For more information on the Select_port subprogram (lines 320 to lines 570), refer to the description in Example 4-1.

The Ecal subprogram in lines 610 to 1030, which performs ECal, is described below.

Line 650	Displays the calibration type.
Line 670	Clears the error queue.
Lines 700 to 720	If Num_of_ports = 1, the subprogram prompts the user to connect the E5070A/E5071A's port Port(1) with the ECal module, and waits for a press of the [Enter] key after the connection.
Line 730	If Num_of_ports = 1, the subprogram executes the ECal command that performs full 1-port calibration on port Port(1).
Lines 750 to 780	If Num_of_ports = 2, the subprogram prompts the user to connect the E5070A/E5071A's ports Port(1) and Port(2) with the ECal module, and waits for a press of the [Enter] key after the connection.
Line 790	If Num_of_ports = 2, the subprogram executes the ECal command that performs full 2-port calibration on ports Port(1) and Port(2).
Lines 810 to 850	If Num_of_ports = 3, the subprogram prompts the user to connect the E5070A/E5071A's ports Port(1), Port(2) and Port(3) with the ECal module, and waits for a press of the [Enter] key after the connection.
Line 860	If Num_of_ports = 3, the subprogram executes the ECal command that performs full 3-port calibration on ports Port(1), Port(2) and Port(3).
Lines 880 to 900	If Num_of_ports = 4, the subprogram prompts the user to connect the E5070A/E5071A's ports 1, 2, 3 and 4 with the ECal module, and waits for a press of the [Enter] key after the connection.
Line 910	If Num_of_ports = 4, the subprogram executes the ECal command that performs full 4-port calibration.
Lines 940 to 950	These lines retrieve the error number and error message from the error queue, and then store them into the variables Err_no and Err_msg$, respectively.

NOTE Unlike calibration data measurement commands such as **:SENS{1-9}:CORR:COLL:OPEN**, the ECal command cannot be combined with the ***OPC?** command to make the program wait until the measurement completes successfully. However, because the system accepts no command during ECal, you can suspend the program until ECal is complete by following the ECal command with a command that queries some data. The sample program executes the **:SYST:ERR?** for the purposes of waiting for the completion of ECal and checking for any errors.

Lines 970 to 990	If Err_no returns a non-zero value (an error value), the program displays the corresponding error message.
Line 1010	If Err_no returns 0 (no error), the program displays a closing message.

Example 4-2 **ECal (ecal.htb)**

```
10     DIM File$[20],Ch$[9],Inp_char$[9]
20     INTEGER Cal_kit,Cal_type,Port(1:4)
30     !
40     ASSIGN @Agte507x TO 717
50     File$="Ex_4_2.sta"
60     Ch$="1"
70     !
80     CLEAR SCREEN
90     ON ERROR GOTO Type_select
100 Type_select: !
110    PRINT "## Calibration Type Selection ##"
120    PRINT " 1: Full 1 Port"
130    PRINT " 2: Full 2 Port"
140    PRINT " 3: Full 3 Port"
150    PRINT " 4: Full 4 Port"
160    PRINT ""
170    PRINT "Input 1 to 4"
180    INPUT "Input number? (1 to 4)",Inp_char$
190    Cal_type=IVAL(Inp_char$,10)
200    IF Cal_type<1 OR Cal_type>4 THEN Type_select
210    OFF ERROR
220    !
230    Select_port(Cal_type,Port(*))
240    Ecal(@Agte507x,Ch$,Cal_type,Port(*))
250    !
260    OUTPUT @Agte507x;":MMEM:STOR:STYP CST"
270    OUTPUT @Agte507x;":MMEM:STOR """&File$&""""
280    END
290    !============================================
300    ! Port Selection Function
310    !============================================
320  SUB Select_port(INTEGER Num_of_ports,INTEGER Port(*))
330    DIM Inp_char$[9]
340    !
350    CLEAR SCREEN
360    IF Num_of_ports=4 THEN
370      Port(1)=1
380      Port(2)=2
390      Port(3)=3
400      Port(4)=4
410    ELSE
420      PRINT "## Test Ports Selection ##"
430      ON ERROR GOTO Port_select
440      FOR I=1 TO Num_of_ports
450        PRINT "Port("&VAL$(I)&"):";
460 Port_select: !
470        INPUT "Number?",Inp_char$
480        Port(I)=IVAL(Inp_char$,10)
490        IF Port(I)<1 OR Port(I)>4 THEN Port_select
500        FOR J=1 TO I-1
510          IF Port(I)=Port(J) THEN Port_select
520        NEXT J
530        PRINT Port(I)
540      NEXT I
550      OFF ERROR
560    END IF
570  SUBEND
580    !============================================
590    ! Electronic Calibration Function
600    !============================================
610  SUB Ecal(@Agte507x,Ch$,INTEGER Num_of_ports,INTEGER Port(*))
```

```
620     DIM Buff$[9],Err_msg$[100]
630     INTEGER Err_no,Port1
640     !
650     PRINT "## Full "&VAL$(Num_of_ports)&" Port ECal ##"
660     !
670     OUTPUT @Agte507x;"*CLS"
680     SELECT Num_of_ports
690       CASE 1
700         PRINT "Connect Port "&VAL$(Port(1))&" to ECal Module."
710         PRINT "Then push [Enter] key."
720         INPUT "",Buff$
730         OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:ECAL:SOLT1 ";Port(1)
740       CASE 2
750         PRINT "Connect Port "&VAL$(Port(1));
760         PRINT " and Port "&VAL$(Port(2))&" to ECal Module."
770         PRINT "Then push [Enter] key."
780         INPUT "",Buff$
790        OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:ECAL:SOLT2 ";Port(1);
",";Port(2)
800       CASE 3
810         PRINT "Connect Port "&VAL$(Port(1));
820         PRINT ", Port "&VAL$(Port(2));
830         PRINT " and Port "&VAL$(Port(3))&" to ECal Module."
840         PRINT "Then push [Enter] key."
850         INPUT "",Buff$
860        OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:ECAL:SOLT3 ";Port(1);
",";Port(2);",";Port(3)
870       CASE 4
880        PRINT "Connect Port 1, Port 2, Port 3 and Port 4 to to ECal Mod
ule."
890         PRINT "Then push [Enter] key."
900         INPUT "",Buff$
910         OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:ECAL:SOLT4 1,2,3,4"
920     END SELECT
930     PRINT "Executing ..."
940     OUTPUT @Agte507x;":SYST:ERR?"
950     ENTER @Agte507x;Err_no,Err_msg$
960     IF Err_no<>0 THEN
970       PRINT "Error occurred!!"
980       PRINT "  No:";Err_no,"Description: "&Err_msg$
990       PRINT "ECAL INTERRUPT!!"
1000    ELSE
1010      PRINT "Done"
1020    END IF
1030 SUBEND
```

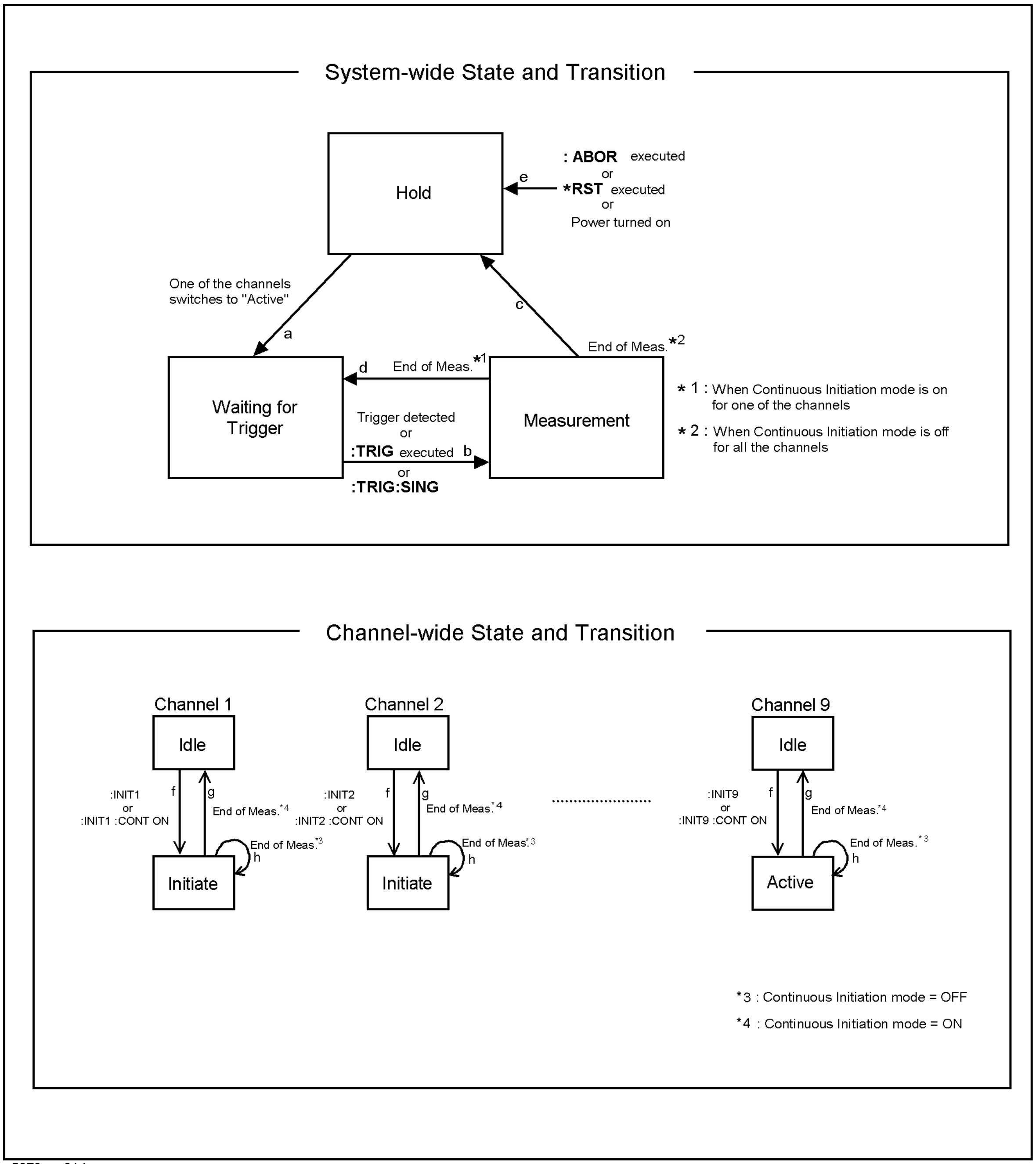
5 Making a Measurement

This chapter describes how to trigger the instrument to start a new measurement cycle and how to detect the end of a measurement cycle.

Trigger system

The trigger system is responsible for such tasks as detecting the start of a measurement cycle (triggering) and enabling/disabling measurement on each channel. As shown in Figure 5-1, the trigger system has two types of state: system-wide and channel-wide. The system-wide state can be “Hold”, “Waiting for Trigger”, or “Measurement” while the channel-wide state can be “Idle” or “Initiate”.

Figure 5-1 Trigger system



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The following subsections describe each state and how the trigger system switches among the states.

System-wide state and transition

"Hold" State

The trigger system switches to "Hold" state when one of the following commands has been executed (arrow "e" in Figure 5-1). Also, turning on the power to the instrument puts the trigger system into "Hold" state. When the power is turned on, however, continuous initiation mode is on for channel 1 and the trigger source is set to "Internal"; therefore, the trigger system immediately switches to "Waiting for Trigger" state and subsequently repeats transitions between "Measurement" and "Waiting for Trigger" states.

- **:ABOR** on page 216
- ***RST** on page 213

When the trigger system is in "Hold" state and one of the channels switches to "Initiate" state (arrow "f" in Figure 5-1), then the trigger system switches to "Waiting for Trigger" state (arrow "a" in Figure 5-1).

"Waiting for Trigger" State

When the trigger system is in "Waiting for Trigger" state and either the instrument is triggered (i.e., a trigger is detected) or one of the commands is executed, then the trigger system switches to "Measurement" state (arrow "B" in Figure 5-1).

- **:TRIG** on page 465
- **:TRIG:SING** on page 465

As shown in the table below, how the instrument is triggered differs depending on which trigger source is specified. To specify the trigger source, use the **:TRIG:SOUR** command on page 466 command.

Trigger Source	How the instrument is triggered
Internal trigger	The instrument is automatically triggered within itself.
External trigger	The instrument is triggered when a trigger signal is input through the Ext Trig terminal or handler interface.
Bus trigger	The instrument is triggered when the ***TRG** command on page 215 command is issued.
Manual trigger	The instrument is triggered when you press **[Trigger]** - **Trigger** on the front panel.

“Measurement” State

In “Measurement” state, the instrument waits for the elapse of the sweep delay time (set by the **:SENS{1-9}:SWE:DEL** command on page 434) and then starts a measurement cycle; this process is performed sequentially on each of those channels that were active immediately before the transition to this state, in the ascending order of the channel numbers.

When the instrument has finished measuring all the active channels, the trigger system behaves in one of the following ways depending on the setting of continuous initiation mode.

If continuous initiation mode is off for all the channels:

The trigger system switches to “Hold” state (arrow “c” in Figure 5-1).

If continuous initiation mode is on for one of the channels:

The trigger system switches to “Waiting for Trigger” state (arrow “d” in Figure 5-1).

Channel-wide state and transition

“Idle” State

A channel switches to “Initiate” state when one of the following commands has been executed (arrow “f” in Figure 5-1).

- **:INIT{1-9}** on page 351
- **:INIT{1-9}:CONT** on page 352 (“ON” specified)

“Initiate” State

A channel in this state is measured just before the entire system switches to “Measurement” state.

When the instrument has finished measuring a channel, the channel behaves in one of the following ways depending on the setting of continuous initiation mode (set by the **:INIT{1-9}:CONT** command on page 352 command).

If continuous initiation mode is off:	The channel switches to “Idle” state (arrow “g” in Figure 5-1).
If continuous initiation mode is on:	The channel remains in “Initiate” state (arrow “h” in Figure 5-1).

Staring a Measurement Cycle (Triggering the instrument)

Configuring the Instrument to Automatically Perform Continuous Measurement

Step 1. Use the **:INIT{1-9}:CONT** command on page 352 to turn on continuous initiation mode for the channels you want to measure and turn the mode off for any other channels.

Step 2. Issue the **:TRIG:SOUR** command on page 466 to set the trigger source to Internal trigger.

Starting Measurement on Demand

Step 1. Use the **:INIT{1-9}:CONT** command to turn on continuous initiation mode for the channels you want to measure and turn the mode off for any other channels.

Step 2. Issue the **:TRIG:SOUR** command to set the trigger source to “Bus Trigger”.

Step 3. Trigger the instrument at any time you want to perform measurement. An external controller can trigger the instrument using one of the following three commands:

<table>
<tr><th>Command</th><th>Can the *OPC? command on page 212 command be used to wait for the end of sweep?</th><th>Applicable trigger source</th></tr>
<tr><td>*TRG on page 215</td><td rowspan="2">No</td><td>Bus trigger only</td></tr>
<tr><td>:TRIG on page 465</td><td rowspan="2">External trigger
Bus trigger
Manual trigger</td></tr>
<tr><td>:TRIG:SING on page 465</td><td>Yes</td></tr>
</table>

Step 4. To start the next measurement cycle, repeat step 3.

Waiting for the End of Measurement

Using the Status Register

The status of the E5070A/E5071A can be detected through the status registers. This section describes how to detect the end of measurement using the status registers. For the complete description of the status report mechanism, including the specifications of each bit, see Appendix B, “Status Reporting System,”.

Measurement status is reported by the operation status condition register (see Table B-3 on page 510). An SRQ (service request) is useful when you create a program that uses the information reported by this register to detect the end of measurement.

To detect the end of measurement via an SRQ, use one of the following commands:

- ***SRE** on page 214
- **:STAT:OPER:ENAB** on page 441
- **:STAT:OPER:PTR** on page 443
- **:STAT:OPER:NTR** on page 442

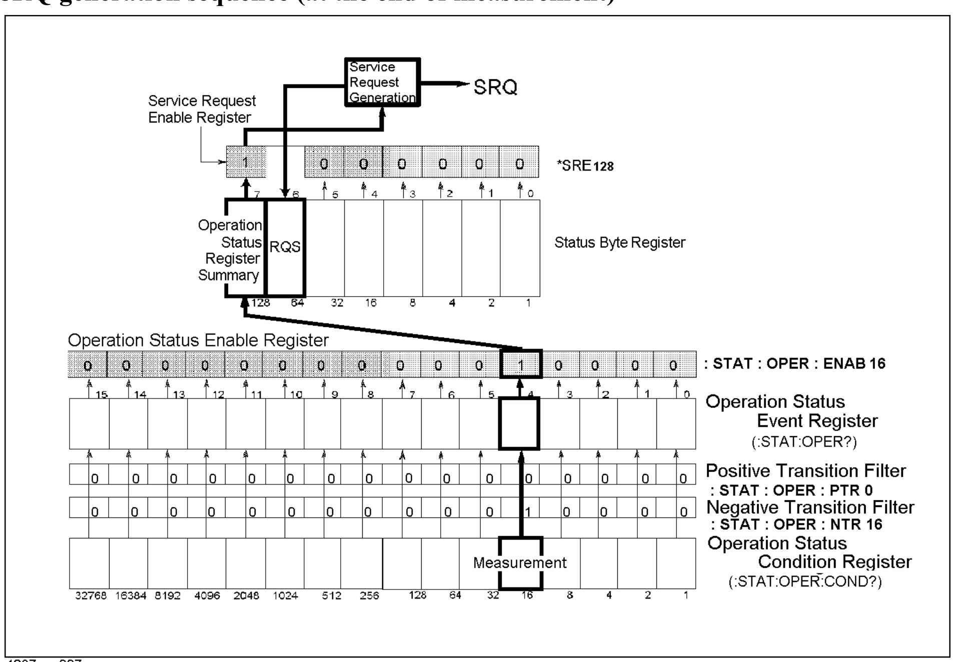
Follow these steps:

Step 1. Configure the E5070A/E5071A so that it generates an SRQ when the operation status condition register's bit 4 (a bit that is set to 1 during measurement) is changed from 1 to 0.

Step 2. Trigger the instrument to start a measurement cycle.

Step 3. When an SRQ is generated, the program interrupts the measurement cycle.

Figure 5-2 **SRQ generation sequence (at the end of measurement)**



Sample Program

Example 5-2 is a sample program that demonstrates how to use an SRQ to detect the end of measurement. You can find the source file of this program, named srq_meas.htb, on the sample program disk.

The sample program sets up the trigger system, configures the instrument to properly generate an SRQ, and then triggers the instrument. When the instrument has generated an SRQ that indicates the end of measurement, the program exits after printing a measurement completion message.

The program is described in detail below:

Line 40	Assigns a GPIB address to the I/O pass.
Lines 60 to 140	These lines store the settings of continuous initiation mode for each channel (on for channels 1 and 2; off for channels 3 through 9) into the array variable Cont_mode$(*).
Lines 160 to 180	These lines turn on or off continuous initiation mode for each channel depending on the value of Cont_mode$(*).
Line 190	Sets the trigger source to “Bus Trigger”.
Lines 210 to 220	These lines configure the instrument so that operation status event register's bit 4 is set to 1 only when operation status condition register's bit 4 is changed from 1 to 0 (negative transition).
Lines 230 to 240	These lines enable the operation status event register's bit 4 and status byte register's bit 7.
Lines 250 to 270	These lines clear the status byte register and operation status event register.
Lines 290 to 300	These lines set the branch target for an SRQ interrupt to enable SRQ interrupts.
Lines 310 to 320	These lines trigger the instrument, and waits until the measurement cycle finishes.
Line 350	Displays a measurement completion message.

Example 5-1 **Using an SRQ to Detect the End of Measurement (srq_meas.htb)**

```
10     DIM Cont_mode$(1:9)[9],Buff$[9]
20     INTEGER I
30     !
40     ASSIGN @Agte507x TO 717
50     !
60     Cont_mode$(1)="ON"
70     Cont_mode$(2)="ON"
80     Cont_mode$(3)="OFF"
90     Cont_mode$(4)="OFF"
100    Cont_mode$(5)="OFF"
110    Cont_mode$(6)="OFF"
120    Cont_mode$(7)="OFF"
130    Cont_mode$(8)="OFF"
140    Cont_mode$(9)="OFF"
150    !
160    FOR I=1 TO 9
170      OUTPUT @Agte507x;":INIT"&VAL$(I)&":CONT "&Cont_mode$(I)
180    NEXT I
190    OUTPUT @Agte507x;":TRIG:SOUR BUS"
200    !
210    OUTPUT @Agte507x;":STAT:OPER:PTR 0"
220    OUTPUT @Agte507x;":STAT:OPER:NTR 16"
230    OUTPUT @Agte507x;":STAT:OPER:ENAB 16"
240    OUTPUT @Agte507x;"*SRE 128"
250    OUTPUT @Agte507x;"*CLS"
260    OUTPUT @Agte507x;"*OPC?"
270    ENTER @Agte507x;Buff$
280    !
290    ON INTR 7 GOTO Meas_end
300    ENABLE INTR 7;2
310    OUTPUT @Agte507x;"*TRG"
320    PRINT "Waiting..."
330 Meas_wait:  GOTO Meas_wait
340 Meas_end:  OFF INTR 7
350    PRINT "Measurement Complete"
360    END
```

Using the :TRIG:SING Command

When you trigger the instrument by issuing the **:TRIG:SING** command on page 465 command, you can use the ***OPC?** command to wait until the measurement cycle completes.

Sample Program

Example 5-2 is a sample program that demonstrates how to use the **:TRIG:SING** command to wait until the measurement cycle completes. You can find the source file of this program, named trg_sing.htb, on the sample program disk.

The sample program uses the **:TRIG:SING** command to start a sweep (measurement) cycle, uses the ***OPC?** command to wait until the measurement cycle completes, then prints a message and exits.

The program is described in detail below:

Line 40	Assigns a GPIB address to the I/O pass.
Lines 60 to 140	These lines store the settings of continuous initiation mode for each channel (on for channels 1 and 2; off for channels 3 through 9) into the array variable Cont_mode$(*).
Lines 160 to 180	These lines turn on or off continuous initiation mode for each channel depending on the value of Cont_mode$(*).
Line 190	Sets the trigger source to “Bus Trigger”.
Line 210	Triggers the instrument to start a sweep cycle.
Lines 220 to 230	These lines execute the ***OPC?** command and wait until the command returns 1 (i.e., the measurement cycle completes).
Line 250	Displays a measurement completion message.

Example 5-2 **Using the :TRIG:SING Command to Wait until the End of Measurement (trg_sing.htb)**

```
10      DIM Cont_mode$(1:9)[9],Buff$[9]
20      INTEGER I
30      !
40      ASSIGN @Agte507x TO 717
50      !
60      Cont_mode$(1)="ON"
70      Cont_mode$(2)="ON"
80      Cont_mode$(3)="OFF"
90      Cont_mode$(4)="OFF"
100     Cont_mode$(5)="OFF"
110     Cont_mode$(6)="OFF"
120     Cont_mode$(7)="OFF"
130     Cont_mode$(8)="OFF"
140     Cont_mode$(9)="OFF"
150     !
160     FOR I=1 TO 9
170       OUTPUT @Agte507x;":INIT"&VAL$(I)&":CONT "&Cont_mode$(I)
180     NEXT I
190     OUTPUT @Agte507x;":TRIG:SOUR BUS"
200     !
210     OUTPUT @Agte507x;":TRIG:SING"
220     OUTPUT @Agte507x;"*OPC?"
230     ENTER @Agte507x;Buff$
240     !
250     PRINT "Measurement complete"
260     END
```

Using Wait Time

Before creating your program, actually measure the time between the start and end of the measurement cycle. Then code your program so that the controller waits for the actually measured time using the appropriate command (for example, the WAIT command for HTBasic). This is a straightforward method, but care must be taken: an incorrect wait time could result in an unexpected error.

6 Analyzing Data

This chapter describes how to use markers, analysis command, and fixture simulator features.

Retrieving Measurement Results at Specified Points

Markers allow you to retrieve measurement results at your specified points. You can use up to eight markers for each trace, and you can move them to any point on the trace. In addition to the regular markers, you can use a reference marker.

Showing/Hiding Markers

To show or hide markers including the reference marker, use the following command:

- **:CALC{1-9}:MARK{1-10}** on page 283

NOTE You can move markers or retrieve the data at a marker even when the markers are hidden.

NOTE The display of the reference marker is turned on or off when you turn on or off Reference Marker mode.

Turning On or Off Reference Marker Mode

Turning on Reference Marker mode provides relative marker values with respect to the reference marker (by deducting the value at the reference marker from the value at a particular marker).

To turn on or off Reference Marker mode, use the following command:

- **:CALC{1-9}:MARK:REF** on page 282

Setting (Changing) and Retrieving Stimulus Value at Marker Positions

To set (or change along the frequency axis) the stimulus value at a particular marker or the reference maker or retrieve the current stimulus value, use the following command:

- **:CALC{1-9}:MARK{1-10}:X** on page 295

When Reference Marker mode is on, the stimulus value at a regular marker is a relative stimulus value obtained by deducting the stimulus value at the reference marker from the actual stimulus value at that particular marker.

Retrieving Measurement Results at Marker Positions

To retrieve the measurement results (response values) at a particular marker or the reference marker, use the following command:

- **:CALC{1-9}:MARK{1-10}:Y?** on page 296

When Reference Marker mode is on, the response value at a regular marker is a relative value obtained by deducting the response value at the reference marker from the actual response value at that particular marker.

Searching for Positions That Match Specified Criteria

You can search for a position that matches your specified criteria using the Marker Search feature or analysis command.

Using Marker Search

NOTE Marker Search is available whether the markers are shown or hidden.

Setting the Search Range

Marker Search does not allow you to select a search range. This feature always searches the entire sweep range.

Selecting a Search Type

Marker Search allows you to choose from the following eight search types:

- Maximum value
- Minimum value
- Peak (3 types)
    - Maximum peak (for a positive peak), minimum peak (for a negative peak)
    - Peak nearest to the left-hand side of the marker position
    - Peak nearest to the right-hand side of the marker position
- Target (3 types)
    - Peak nearest to the marker position
    - Target nearest to the left-hand side of the marker position
    - Target nearest to the right-hand side of the marker position

To select a search type, use the following command:

- **:CALC{1-9}:MARK{1-10}:FUNC:TYPE** on page 293

Defining a Peak

You can define a peak by specifying the lower limit for the peak excursion value and polarity (positive or negative peak). The peak excursion value is the difference between the positive peak and the minimum value on either side (or between the negative peak and the maximum value on either side). For more information about the peak excursion value, see *User's Guide*.

To define a peak, use the following command:

lower limit for the peak excursion value	**:CALC{1-9}:MARK{1-10}:FUNC:PEXC** on page 288
polarity	**:CALC{1-9}:MARK{1-10}:FUNC:PPOL** on page 289

Defining a Target

You can define a target by specifying the target value (response value) and transitional direction (positive or negative value change).

To define a target, use the following command:

Target value	**:CALC{1-9}:MARK{1-10}:FUNC:TARG** on page 290
Transitional direction	**:CALC{1-9}:MARK{1-10}:FUNC:TTR** on page 292

Performing Marker Search

To perform Marker Search, use the following command:

- **:CALC{1-9}:MARK{1-10}:FUNC:EXEC** on page 287

To turn on or off the Search Tracking feature, which performs Marker Search every time the trace is updated, use the following command:

- **:CALC{1-9}:MARK{1-10}:FUNC:TRAC** on page 291

Retrieving Search Results

Performing Marker Search moves the marker to the points that matches the search criteria, so you can obtain the search results by retrieving the marker value. For information on how to retrieve marker values, refer to “Setting (Changing) and Retrieving Stimulus Value at Marker Positions” on page 84 and “Retrieving Measurement Results at Marker Positions” on page 84.

Using the Analysis Command

You can use the analysis command to perform search and analysis.

Setting the Search (Analysis) Range

You can use either the entire sweep range or a user-defined range as the search (analysis) range, using the following command:

- **:CALC{1-9}:FUNC:DOM** on page 266

When you opt to use a user-defined range, use the following command to set the range:

Start value (lower limit value)	**:CALC{1-9}:FUNC:DOM:STAR** on page 267
Stop value (upper limit value)	**:CALC{1-9}:FUNC:DOM:STOP** on page 268

Selecting the Search (Analysis) Type

The analysis command allows you to choose from the following five search types:

❑ Maximum value
❑ Minimum value
❑ Maximum peak (for a positive peak), minimum peak (for a negative peak)
❑ All peaks
❑ All targets

In addition, you can choose from the following three analysis types:

❑ Difference between the maximum and minimum values
❑ Standard deviation
❑ Average

To select the search (analysis) type, use the following command:

- **:CALC{1-9}:FUNC:TYPE** on page 274

Defining a Peak

You can define a peak by specifying the lower limit for the peak excursion value and polarity (positive or negative peak). The peak excursion value is the difference between the positive peak and the minimum value on either side (or between the negative peak and the maximum value on either side). For more information about the peak excursion value, see *User's Guide*.

To define a peak, use the following command:

lower limit for the peak excursion value	**:CALC{1-9}:FUNC:PEXC** on page 269
Polarity	**:CALC{1-9}:FUNC:PPOL** on page 271

Defining a Target

You can define a target by specifying the target value (response value) and transitional direction (positive or negative value change).

To define a target, use the following command:

Target value	**:CALC{1-9}:FUNC:TARG** on page 272
Transitional direction	**:CALC{1-9}:FUNC:TTR** on page 273

Performing Search (Analysis)

To perform search (analysis), use the following command:

- **:CALC{1-9}:FUNC:EXEC** on page 268

Retrieving Search (Analysis) Results

To retrieve search (analysis) results, use the following command:

- **:CALC{1-9}:FUNC:DATA?** on page 265

The number of the data items contained in search (analysis) results differ depending on the search (analysis) type and the number of points found by the search operation. To retrieve the number of data items, use the following command:

- **:CALC{1-9}:FUNC:POIN?** on page 270

Sample Program

Example 6-2 is a sample program that demonstrates how to search for peaks using the Marker Search feature and analysis command. You can find the source file of this program, named search.htb, on the sample program disk.

This program works in two steps: it uses Marker Search to search for the maximum positive peak and displays the results; it then uses analysis command to search for all positive peaks and displays the results.

The program is described in detail below:

Line 50	Assigns a GPIB address to the I/O pass.
Line 60	Stores a peak excursion value of 0.5 into the Excursion variable.
Lines 80 to 120	These lines configure the system to generate an SRQ when it cannot perform Bandwidth Search due to an error.
Lines 130 to 140	These lines set the branch target for an SRQ interrupt to enable SRQ interrupts.
Line 180	Sets the active trace to trace 1.
Line 190	Sets the search type for marker 1 to Peak.
Lines 200 to 210	These lines set the Excursion variable to the peak excursion value for the peak search of marker 1 and set the polarity to Positive Peak.
Line 220	Performs Peak Search, and moves marker 1 to the maximum positive peak.
Lines 230 to 240	These lines retrieve the frequency at marker 1.
Lines 250 to 260	These lines retrieve the response value at marker 1.
Lines 270 to 290	These lines display the results of searching for the maximum positive peak.
Line 330	Sets the analysis range to the entire sweep range.
Line 340	Sets the search type of the analysis command to All Peaks.
Lines 350 to 360	These lines set the Excursion variable to the peak excursion value for the peak search of the analysis command and set the polarity to Positive Peak.
Line 370	Searches for all peaks.
Lines 380 to 390	These lines retrieve the number of data pairs contained in the search results, and stores that number into the Point variable.
Line 400	Resizes the Result array based on the value of the Point variable.
Lines 380 to 390	These lines retrieve the response values and frequencies for all peaks.
Lines 430 to 470	These lines display the results of searching for all peaks.
Lines 490 to 530	These lines define an error handler that retrieves and displays the number and message of an error that has occurred.

Example 6-1 **Peak Search (search.htb)**

```
10      DIM Buff$[9],Img$[50],Err_msg$[100]
20      REAL Excursion,Freq,Resp,Result(1:100,1:2)
30      INTEGER Poin,Err_no
40      !
50      ASSIGN @Agte507x TO 717
60      Excursion=.5
70      !
80      OUTPUT @Agte507x;"*ESE 60"
90      OUTPUT @Agte507x;"*SRE 32"
100     OUTPUT @Agte507x;"*CLS"
110     OUTPUT @Agte507x;"*OPC?"
120     ENTER @Agte507x;Buff$
130     ON INTR 7 GOTO Err
140     ENABLE INTR 7;2
150     !
160     PRINT "Maximum Peak Search using Marker 1"
170     !
180     OUTPUT @Agte507x;":CALC1:PAR1:SEL"
190     OUTPUT @Agte507x;":CALC1:MARK1:FUNC:TYPE PEAK"
200     OUTPUT @Agte507x;":CALC1:MARK1:FUNC:PEXC ";Excursion
210     OUTPUT @Agte507x;":CALC1:MARK1:FUNC:PPOL POS"
220     OUTPUT @Agte507x;":CALC1:MARK1:FUNC:EXEC"
230     OUTPUT @Agte507x;":CALC1:MARK1:X?"
240     ENTER @Agte507x;Freq
250     OUTPUT @Agte507x;":CALC1:MARK1:Y?"
260     ENTER @Agte507x;Resp
270     Img$="8A,MD.4DE,2X,MD.6DE"
280     PRINT "         Frequency      Responce"
290     PRINT USING Img$;"Peak:   ",Freq,Resp
300     !
310     PRINT "All Peaks Search using Command"
320     !
330     OUTPUT @Agte507x;":CALC1:FUNC:DOM OFF"
340     OUTPUT @Agte507x;":CALC1:FUNC:TYPE APE"
350     OUTPUT @Agte507x;":CALC1:FUNC:PEXC ";Excursion
360     OUTPUT @Agte507x;":CALC1:FUNC:PPOL POS"
370     OUTPUT @Agte507x;":CALC1:FUNC:EXEC"
380     OUTPUT @Agte507x;":CALC1:FUNC:POIN?"
390     ENTER @Agte507x;Poin
400     REDIM Result(1:Poin,1:2)
410     OUTPUT @Agte507x;":CALC1:FUNC:DATA?"
420     ENTER @Agte507x;Result(*)
430     Img$="4A,2D,2A,MD.4DE,2X,MD.6DE"
440     PRINT "         Frequency      Responce"
450     FOR I=1 TO Poin
460       PRINT USING Img$;"Peak",I,": ",Result(I,2),Result(I,1)
470     NEXT I
480     GOTO No_err
490 Err: OFF INTR 7
500     OUTPUT @Agte507x;";:SYST:ERR?"
510     ENTER @Agte507x;Err_no,Err_msg$
520     PRINT "Error occurred!!"
530     PRINT "  No:";Err_no,"Description: "&Err_msg$
540 No_err: OFF INTR 7
550     END
```

Bandwidth Search

The E5070A/E5071A has a feature called Bandwidth Search. This feature searches for the cutoff points on both right- and left-hand sides of the marker position on the trace.

- ❏ Bandwidth ($BW = high - low$)
- ❏ Center frequency ($cent = \frac{high + low}{2}$)
- ❏ Q value ($Q = \frac{cent}{BW}$)
- ❏ Loss (response value at the marker position)

Where $high$ is the right-hand cutoff point frequency; low is the left-hand cutoff point frequency.

Setting the Bandwidth Definition Value

Bandwidth Search finds a point whose response value is different, by the amount defined as the bandwidth definition value, than the response value at the marker position, and identifies that point as the cutoff point.

To set the bandwidth definition value, use the following command:

- **:CALC{1-9}:MARK{1-10}:BWID:THR** on page 286

Retrieving Bandwidth Search Results

Once you have moved the marker to the appropriate position using Marker Search or some other feature, you can retrieve the results of Bandwidth Search using the following command:

- **:CALC{1-9}:MARK{1-10}:BWID:DATA?** on page 285

Also, you can use the following command to control whether to display the results of Bandwidth Search on the LCD:

- **:CALC{1-9}:MARK:BWID** on page 280

NOTE You can retrieve the results of Bandwidth Search even after you have turned off the display of markers or the results of Bandwidth Search.

Sample Program

Example 6-2 shows a sample program that demonstrates how to perform Bandwidth Search. You can find the source file of this program, named bandwid.htb, on the sample program disk.

The sample program moves the marker to the maximum value position, then retrieves and displays the results of Bandwidth Search.

The program is described in detail below:

Line 50	Assigns a GPIB address to the I/O pass.
Line 60	Stores a bandwidth definition value of 3 into the Threshold variable.

Lines 80 to 120	These lines configure the system to generate an SRQ when it cannot perform Bandwidth Search due to an error.
Lines 130 to 140	These lines set the branch target for an SRQ interrupt to enable SRQ interrupts.
Line 160	Sets the search type for marker 1 to Peak.
Lines 170 to 180	These lines use the Marker Search feature to move the marker to the maximum value position.
Line 190	Sets the bandwidth definition value to Threshold.
Lines 200	Sends the command to retrieve the results of Bandwidth Search.
Lines 210	Waits 0.5 seconds to prevent the retrieve before an SRQ is generated if an error occurs on Bandwidth Search.
Lines 220	Retrieves the results of Bandwidth Search.
Lines 240 to 280	These lines display the results of Bandwidth Search.
Lines 310 to 350	These lines define an error handler that retrieves and displays the number and message of an error that has occurred.

Example 6-2 **Bandwidth Search (bandwid.htb)**

```
10      DIM Buff$[9],Err_msg$[100]
20      REAL Threshold,Bwid,Cent,Q,Loss
30      INTEGER Err_no
40      !
50      ASSIGN @Agte507x TO 717
60      Threshold=-3
70      !
80      OUTPUT @Agte507x;"*ESE 60"
90      OUTPUT @Agte507x;"*SRE 32"
100     OUTPUT @Agte507x;"*CLS"
110     OUTPUT @Agte507x;"*OPC?"
120     ENTER @Agte507x;Buff$
130     ON INTR 7 GOTO Err
140     ENABLE INTR 7;2
150     !
160     OUTPUT @Agte507x;":CALC1:PAR1:SEL"
170     OUTPUT @Agte507x;":CALC1:MARK1:FUNC:TYPE MAX"
180     OUTPUT @Agte507x;":CALC1:MARK1:FUNC:EXEC"
190     OUTPUT @Agte507x;":CALC1:MARK1:BWID:THR ";Threshold
200     OUTPUT @Agte507x;":CALC1:MARK1:BWID:DATA?"
210     WAIT .5
220     ENTER @Agte507x;Bwid,Cent,Q,Loss
230     !
240     PRINT "## Bandwidth Search ##"
250     PRINT "Bandwidth       : ",Bwid
260     PRINT "Center Frequency: ",Cent
270     PRINT "Q               : ",Q
280     PRINT "Loss            : ",Loss
290     !
300     GOTO No_err
310 Err: OFF INTR 7
320     OUTPUT @Agte507x;":SYST:ERR?"
330     ENTER @Agte507x;Err_no,Err_msg$
340     PRINT "Error occurred!!"
350     PRINT "  No:";Err_no,"Description: "&Err_msg$
360 No_err: OFF INTR 7
370     END
```

Statistical Analysis

The E5070A/E5071A provides a mechanism that analyzes trace statistics. You can analyze the following statistics:

- ❑ Average
- ❑ Standard deviation
- ❑ Difference between the maximum and minimum values

To retrieve the results of statistical analysis, use the following command:

- **:CALC{1-9}:MST:DATA?** on page 299

Also, you can use the following command to control whether to display the results of statistical analysis on the LCD:

- **:CALC{1-9}:MST** on page 298

NOTE You can retrieve the results of statistical analysis even after you have turned off the display of the results of statistical analysis.

Alternatively, you can use the analysis command to analyze the trace statistics. When you use the analysis command, you can analyze the trace data in a specific range as well as the trace data throughout the entire sweep range. For information how to use the analysis command, refer to “Using the Analysis Command” on page 87.

Analysis Using the Fixture Simulator

The Fixture Simulator provides the following functions:

- ❑ Matching Circuit Embedding
- ❑ Port Impedance Conversion
- ❑ Network De-embedding
- ❑ Balance-Unbalance Conversion (only 3 ports/4 ports model)
- ❑ Differential Matching Circuit Embedding (only 3 ports/4 ports model)
- ❑ Differential Port Impedance Conversion (only 3 ports/4 ports model)

Before you can use any of the features listed above, you must turn on the desired feature individually and issue the following command to turn on the Fixture Simulator:

- **:CALC{1-9}:FSIM:STAT** on page 264

Matching Circuit Embedding

The Matching Circuit feature simulates the characteristics the DUT would exhibit when connected with a matching circuit.

On/off

To turn on or off Matching Circuit, use the following command:

- **:CALC{1-9}:FSIM:SEND:PMC:STAT** on page 261

You can only turn on or off Matching Circuit for all the ports, but not for each port individually. However, any port whose circuit type is set to “None” behaves as if this feature were permanently off.

Configuring the Matching Circuit Settings

To select a circuit type, use the following command:

- **:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}** on page 255

To set the circuit constant, use the following command:

Circuit constant	Command
C	**:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:C** on page 256
G	**:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:G** on page 257
L	**:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:L** on page 258
R	**:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:R** on page 259

When you want to use a user file to defined the circuit type, specify the file using the following command:

- **:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:USER:FIL** on page 260

Port Impedance Conversion

The Port Impedance Conversion feature converts the measurement results with a port impedance of 50 Ω to the characteristics with a different port impedance.

On/off

To turn on or off Port Impedance Conversion, use the following command:

- **:CALC{1-9}:FSIM:SEND:ZCON:STAT** on page 263

You can only turn on or off Port Impedance Conversion for all the ports, but not for each port individually. However, any port with ZO set to 50 Ω behaves as if this feature were permanently off.

Setting the Z0 Value

To set the target port impedance, use the following command:

- **:CALC{1-9}:FSIM:SEND:ZCON:PORT{1-4}:Z0** on page 262

Network De-embedding

The Network De-embedding feature eliminates any networks that can cause error between the calibration level and the DUT.

On/off

To turn on or off Network De-embedding, use the following command:

- **:CALC{1-9}:FSIM:SEND:DEEM:STAT** on page 254

You can only turn on or off Network De-embedding for all the ports, but not for each port individually. However, any port whose Network De-embedding type is set to “None” behaves as if this feature were permanently off.

Selecting a Type

To select a Network De-embedding type, use the following command:

- **:CALC{1-9}:FSIM:SEND:DEEM:PORT{1-4}** on page 252

Specifying the File

To specify the file that defines the criteria for Network De-embedding, use the following command:

- **:CALC{1-9}:FSIM:SEND:DEEM:PORT{1-4}:USER:FIL** on page 253

Balance-Unbalance Conversion

The Balance-Unbalance Conversion feature converts the measurement results obtained in an unbalanced state to the characteristics in a balanced state. You can select mixed mode S parameter, balanse and CMRR as the measuremsnt parameter when you turn on Balance-Unbalance Conversion.

On/off

You can turn on or off Balance-Unbalance Conversion for each trace individually. To turn on or off Balance-Unbalance Conversion, use the following command:

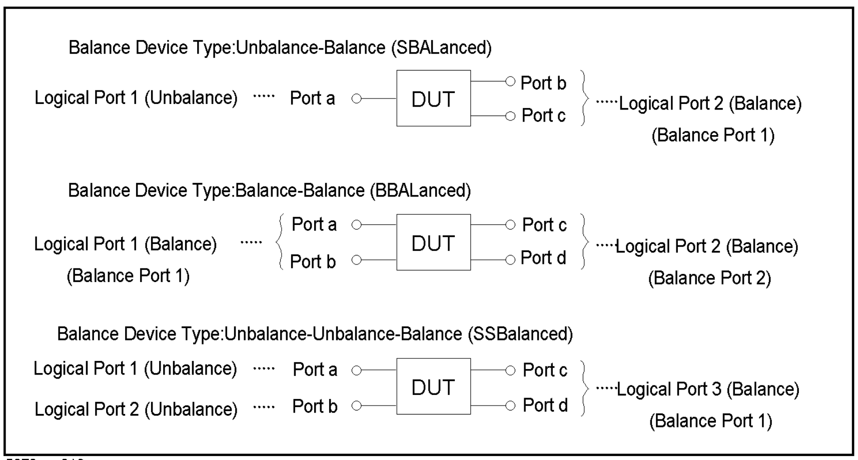
- **:CALC{1-9}:FSIM:BAL:PAR{1-9}:STAT** on page 248

Setting the Topology

To select a balance device type, use the following command:

- **:CALC{1-9}:FSIM:BAL:DEV** on page 235

Figure 6-1 **Balance device type**



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To assign the ports (ports a through d in Figure 6-1), use the command that matches your selected device type, as identified in the following table:

Device type	Command
Unbalance-balance (SBALanced)	**:CALC{1-9}:FSIM:BAL:TOP:SBAL** on page 250
Balance-balance (BBALanced)	**:CALC{1-9}:FSIM:BAL:TOP:BBAL** on page 249
Unbalance-unbalance-balance (SSBalanced)	**:CALC{1-9}:FSIM:BAL:TOP:SSB** on page 251

Selecting the Measurement Parameter

To select the measurement parameter, use the command that matches your selected device type, as identified in the following table:

Device type	Command
Unbalance-balance	**:CALC{1-9}:FSIM:BAL:PAR{1-9}:SBAL** on page 246
Balance-balance	**:CALC{1-9}:FSIM:BAL:PAR{1-9}:BBAL** on page 245
Unbalance-unbalance-balance	**:CALC{1-9}:FSIM:BAL:PAR{1-9}:SSB** on page 247

Differential Matching Circuit Embedding

The Differential Matching Circuit Embedding feature simulates the characteristic the DUT would exhibit if a balance-unbalance converted differential port were connected with a matching circuit after subjected to balance-unbalance conversion.

On/off

To turn on or off Differential Matching Circuit Embedding, use the following command:

- **:CALC{1-9}:FSIM:BAL:DMC:STAT** on page 242

You can only turn on or off Differential Matching Circuit Embedding for all the ports, but not for each balance port individually. However, any balance port whose circuit type is set to "None" behaves as if this feature were permanently off.

Configuring the Matching Circuit Settings

To select a circuit type, use the following command:

- **:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}** on page 236

To set the circuit constant, use the following command:

Circuit constant	Command
C	**:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:C** on page 237
G	**:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:G** on page 238
L	**:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:L** on page 239
R	**:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:R** on page 240

When you want to use a user file to defined the circuit type, specify the file using the following command:

- **:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:USER:FIL** on page 241

Differential Port Impedance Conversion

The Differential Port Impedance Conversion feature converts the measurement results for a balance-unbalance converted differential port to the characteristics with a different port impedance.

On/off

To turn on or off Differential Port Impedance Conversion, use the following command:

- **:CALC{1-9}:FSIM:BAL:DZC:STAT** on page 244

You can only turn on or off Differential Port Impedance Conversion for all the balance ports, but not for each port individually.

Setting the Z0 Value

To set the target differential port impedance, use the following command:

- **:CALC{1-9}:FSIM:BAL:DZC:BPOR{1-2}:Z0** on page 243

Sample Program

Example 6-2 shows a sample program that demonstrates how to use the Fixture Simulator. You can find the source file of this program, named fixture.htb, on the sample program disk.

The program configures the Balance-Unbalance Conversion, Differential Matching Circuit Embedding, Port Impedance Conversion, and Differential Port Impedance Conversion features so that the instrument can correctly deal with an unbalance-balance (3-port) DUT.

The program is described in detail below:

Line 50	Assigns a GPIB address to the I/O pass.
Lines 70 to 100	These lines store the balance device type (unbalance-balance), port assignments (logical port 1 = port 1, logical port 2 = port 2 and port 3), measurement parameter (Sds21) into the variables Dev_type$, Port(*), Para$, respectively.
Lines 120 to 150	These lines store the balance matching circuit constants (C:1 pF, G:2 mS, L:30 nH, R:4 mΩ) into the variables Dmc_c, Dmc_g, Dmc_l, and Dmc_r, respectively.
Lines 160 to 170	These lines store the port impedance (100 Ω), the differential port impedance (210 Ω) into the variables Z0_se, Z0_diff, respectively.
Lines 210 to 230	These lines set the balance device type to Dev_type$, the port assignment to Port(*), and the measurement parameter of port 1 (Sds21) to Para$.
Line 240	Turns on Balance-Unbalance Conversion.
Line 280	Specifies the type of the differential matching circuit to be a circuit composed of an L and a shunt C.
Lines 290 to 320	These lines set the differential matching circuit constants (C, G, L, R) to Dmc_c, Dmc_g, Dmc_l, and Dmc_r, respectively.
Line 330	Turns on Differential Matching Circuit Embedding.
Lines 370 to 380	Sets the port impedance of the port 2 and port 3 to Z0_se.
Line 390	Turns on Port Impedance Conversion.
Line 430	Sets the differential port impedance of the balance port 1 to Z0_diff.
Line 440	Turns on Differential Port Impedance Conversion.
Line 480	Turns on the Fixture Simulator.

Example 6-3 **Fixture Simulator (fixture.htb)**

```
10    DIM Dev_type$[9],Para$[9]
20    REAL Dmc_c,Dmc_g,Dmc_l,Dmc_r,Z0_se,Z0_diff
30    INTEGER Port(1:3)
40    !
50    ASSIGN @Agte507x TO 717
60    !
70    Dev_type$="SBAL"       ! Device Type     : SE-Bal
80    Port(1)=1              ! Port1(SE)       : 1
90    Port(2)=2              ! Port2(Bal)      : 2,3
100   Port(3)=3              !
110   Para$="SDS21"          ! Meas. Parameter : Sds21
120   Dmc_c=1.E-12           ! Diff.          C: 1 pF
130   Dmc_g=2.E-3            !   Matching     G: 2 mS
140   Dmc_l=3.E-8            !     Circuit    L: 30 nH
150   Dmc_r=4.E-3            !                R: 4 mohm
160   Z0_se=100              ! Z Conversion  Z0: 100 ohm
170   Z0_diff=210            ! Diff. Z Conv. Z0: 210 ohm
180   !
190   ! Balance-Unbalance Conversion Setting
200   !
210   OUTPUT @Agte507x;":CALC1:FSIM:BAL:DEV "&Dev_type$
220   OUTPUT @Agte507x;":CALC1:FSIM:BAL:TOP:"&Dev_type$&" ";Port(*)
230   OUTPUT @Agte507x;":CALC1:FSIM:BAL:PAR1:"&Dev_type$&" "&Para$
240   OUTPUT @Agte507x;":CALC1:FSIM:BAL:PAR1:STAT ON"
250   !
260   ! Diff. Matching Circuit Setting
270   !
280   OUTPUT @Agte507x;":CALC1:FSIM:BAL:DMC:BPOR1 PLPC"
290   OUTPUT @Agte507x;":CALC1:FSIM:BAL:DMC:BPOR1:PAR:C ";Dmc_c
300   OUTPUT @Agte507x;":CALC1:FSIM:BAL:DMC:BPOR1:PAR:G ";Dmc_g
310   OUTPUT @Agte507x;":CALC1:FSIM:BAL:DMC:BPOR1:PAR:L ";Dmc_l
320   OUTPUT @Agte507x;":CALC1:FSIM:BAL:DMC:BPOR1:PAR:R ";Dmc_r
330   OUTPUT @Agte507x;":CALC1:FSIM:BAL:DMC:STAT ON"
340   !
350   ! Z Conversion Setting
360   !
370   OUTPUT @Agte507x;":CALC1:FSIM:SEND:ZCON:PORT2:Z0 ";Z0_se
380   OUTPUT @Agte507x;":CALC1:FSIM:SEND:ZCON:PORT3:Z0 ";Z0_se
390   OUTPUT @Agte507x;":CALC1:FSIM:SEND:ZCON:STAT ON"
400   !
410   ! Diff. Z Conversion Setting
420   !
430   OUTPUT @Agte507x;":CALC1:FSIM:BAL:DZC:BPOR1:Z0 ";Z0_diff
440   OUTPUT @Agte507x;":CALC1:FSIM:BAL:DZC:STAT ON"
450   !
460   ! Fixture Simulator On/Off
470   !
480   OUTPUT @Agte507x;":CALC1:FSIM:STAT ON"
490   !
500   END
```

Analysis in time domain (time domain function)

The time domain function provides the following functions:

- ❏ Transforming measurement data to data in time domain (Transformation function)
- ❏ Deleting unnecessary measurement data in time domain (gating function)

Transforming measurement data to data in time domain

By using the transformation function, you can convert the result measured in frequency domain to data in time domain and analyze it.

ON/OFF

To turn ON/OFF the transformation function, use the following command:

- **:CALC{1-9}:TRAN:TIME:STAT** on page 310

Selecting transformation type

To select the transformation type (band pass/low pass), use the following commands:

- **:CALC{1-9}:TRAN:TIME** on page 304

To select the stimulus type (impulse/step) when the transformation type is low pass, use the following command:

- **:CALC{1-9}:TRAN:TIME:STIM** on page 312

When the transformation type is low pass, you need to execute the following command because each measurement point must be a multiple of the start frequency.

- **:CALC{1-9}:TRAN:TIME:LPFR** on page 308

Setting window shape

To set the window shape, use one of the following items.

Item	Command
β	**:CALC{1-9}:TRAN:TIME:KBES** on page 307
Impulse width	**:CALC{1-9}:TRAN:TIME:IMP:WIDT** on page 306
Rise time of step signal	**:CALC{1-9}:TRAN:TIME:STEP:RTIM** on page 311

The above 3 items are dependent each other. When the value of one of them is changed, the values of the other items are automatically changed to proper values.

Unlike manual operation, you cannot set the window shape by selecting the window type (maximum/normal/minimum). However, you can set the same shape as each window type by setting β as follows:

	Maximum	Normal	Minimum
The value of β.	13	6	0

Setting display range

To set the display range after time domain transformation, use the following commands:

Start value	**:CALC{1-9}:TRAN:TIME:STAR** on page 309
Stop value	**:CALC{1-9}:TRAN:TIME:STOP** on page 313
Center value	**:CALC{1-9}:TRAN:TIME:CENT** on page 305
Span value	**:CALC{1-9}:TRAN:TIME:SPAN** on page 308

Deleting unnecessary measurement data in time domain

You can use the gating function to delete unnecessary time domain data.

ON/OFF

To turn ON/OFF the gating function, use the following command:

- **:CALC{1-9}:FILT:TIME:STAT** on page 230

Selecting gate type

To select the gate type, use the following command:

- **:CALC{1-9}:FILT:TIME** on page 225

Setting gate shape

To select the gate shape, use the following command:

- **:CALC{1-9}:FILT:TIME:SHAP** on page 227

Setting gate range

To set the gate range, use the following commands:

Start value	**:CALC{1-9}:FILT:TIME:STAR** on page 229
Stop value	**:CALC{1-9}:FILT:TIME:STOP** on page 231
Center value	**:CALC{1-9}:FILT:TIME:CENT** on page 226
Span value	**:CALC{1-9}:FILT:TIME:SPAN** on page 228

Sample program

Example 6-2 shows a sample program that demonstrates how to use the transformation function of the time domain function. You can find the source file of this program, named time_dom.htb, on the sample program disk.

The sample program executes calibration (ECal), performs measurement once, converts the result to data in time domain, and display it.

The program is described in detail below:

Line 50	Assigns a GPIB address to the I/O path.
Lines 70 to 90	Sets the sweep stop frequency (3 GHz), the number of points (201), and the measurement parameter (S11) to the Stop_freq, Nop, and Para$ variables, respectively.
Lines 110 to 150	Sets the transformation type (low pass), the stimulus type (impulse), the β value of the window (13), the start value of the display range (0 s), and the stop value of the display range (10 ns) into the Tran_type$, Stim_type$, Win_beta, Star_time, and Stop_time variables, respectively.
Lines 170 to 190	After preset, sets the sweep stop frequency to Stop_freq and the number of points to Nop, respectively.
Line 210	Sets a measurement point that is appropriate when the transformation type is low pass.
Lines 230 to 240	Sets the measurement parameter to Para$ and the trigger source to BUS.
Lines 280 to 320	Uses the ECal module to execute full 1-port calibration on port 1.
Lines 360 to 410	Performs measurement once after the DUT is connected.
Lines 430 to 450	Executes auto scale and suspends progress to the next process (transformation to data in time domain) until any key is pressed.
Lines 490 to 530	Sets the transformation type to Tran_type$, the stimulus type to Stim_type$, the β value of the window to Win_beta, the start value of the display range to Star_time, and the stop value of the display range to Stop_time.
Line 540	Turns ON the transformation function of the time domain function.
Lines 560 to 580	Sets the data format to the real format and executes auto scale.

Example 6-4 **Time Domain Transformation (time_dom.htb)**

```
10     DIM Para$[9],Tran_type$[9],Stim_type$[9],Buff$[9],Inp_ch
ar$[9]
20     REAL Stop_freq,Win_beta,Star_time,Stop_time
30     INTEGER Nop
40     !
50     ASSIGN @Agte507x TO 717
60     !
70     Stop_freq=3.E+9        ! Stop Frequency  : 3 GHz
80     Nop=201                ! Nop             : 201
90     Para$="S11"            ! Meas. Parameter : S11
100    !
110    Tran_type$="LPAS"      ! Transform Type  : Lowpass
```

```
120    Stim_type$="IMP"       ! Stimulus Type    : Impulse
130    Win_beta=13            ! Window Beta      : 13 (Maximum Type)
140    Star_time=0            ! Start time       : 0 s
150    Stop_time=1.E-8        ! Stop time        : 10 ns
160    !
170    OUTPUT @Agte507x;":SYST:PRES"
180    OUTPUT @Agte507x;":SENS1:FREQ:STOP ";Stop_freq
190    OUTPUT @Agte507x;":SENS1:SWE:POIN ";Nop
200    !
210    OUTPUT @Agte507x;":CALC1:TRAN:TIME:LPFR"
220    !
230    OUTPUT @Agte507x;":CALC1:PAR1:DEF "&Para$
240    OUTPUT @Agte507x;":TRIG:SOUR BUS"
250    !
260    ! 1 Port Full Calibration (ECal)
270    !
280    PRINT "Connect Port 1 to ECal Module. Then push [Enter] key."
290    INPUT "",Buff$
300    OUTPUT @Agte507x;":SENS1:CORR:COLL:ECAL:SOLT1 1"
310    OUTPUT @Agte507x;":SYST:ERR?"
320    ENTER @Agte507x;Buff$
330    !
340    ! Measurement
350    !
360    PRINT "Set DUT. Then Push [Enter] key."
370    INPUT "",Inp_char$
380    !
390    OUTPUT @Agte507x;":TRIG:SING"
400    OUTPUT @Agte507x;"*OPC?"
410    ENTER @Agte507x;Buff$
420    !
430    OUTPUT @Agte507x;":DISP:WIND1:TRAC1:Y:AUTO"
440    PRINT "Push [Enter] key. -> [Time Domain Transform]"
450    INPUT "",Inp_char$
460    !
470    ! Time Domain Transform
480    !
490    OUTPUT @Agte507x;":CALC1:TRAN:TIME "&Tran_type$
500    OUTPUT @Agte507x;":CALC1:TRAN:TIME:STIM "&Stim_type$
510    OUTPUT @Agte507x;":CALC1:TRAN:TIME:KBES ";Win_beta
520    OUTPUT @Agte507x;":CALC1:TRAN:TIME:STAR ";Star_time
530    OUTPUT @Agte507x;":CALC1:TRAN:TIME:STOP ";Stop_time
540    OUTPUT @Agte507x;":CALC1:TRAN:TIME:STAT ON"
550    !
560    OUTPUT @Agte507x;":CALC1:PAR1:SEL"
570    OUTPUT @Agte507x;":CALC1:FORM REAL"
580    OUTPUT @Agte507x;":DISP:WIND1:TRAC1:Y:AUTO"
590    END
```

Analyzing impedance

By turning on the parameter conversion function, you can convert the measurement result of the S parameter to the following parameters.

- ❏ Equivalent impedance in reflection measurement
- ❏ Equivalent impedance in transmission measurement
- ❏ Equivalent admittance in reflection measurement
- ❏ Equivalent admittance in transmission measurement
- ❏ Inverse of S-parameter (1/S)

To turn ON/OFF the parameter conversion function, use the following command:

- **:CALC{1-9}:CONV** on page 217

To select the parameter to which you want to convert the measurement result, use the following command:

- **:CALC{1-9}:CONV:FUNC** on page 218

7 Reading/Writing Measurement Data

This chapter provides an overview of the Agilent E5070A/E5071A's internal data processing flow and describes how to read and write measurement results (internal data array).

Data Transfer Format

When you transfer data using the one of the following commands, you can choose between ASCII and binary transfer formats.

NOTE The instrument always uses the ASCII transfer format when you transfer data without using any of the following commands.

- **:CALC{1-9}:DATA:FDAT** on page 221
- **:CALC{1-9}:DATA:FMEM** on page 222
- **:CALC{1-9}:DATA:SDAT?** on page 223
- **:CALC{1-9}:DATA:SMEM?** on page 224
- **:CALC{1-9}:FUNC:DATA?** on page 265
- **:SENS{1-9}:FREQ:DATA?** on page 421

To set the data transfer format, use the following command:

- **:FORM:DATA** on page 349

NOTE Executing the **:SYST:PRES** on page 462 command does not affect the current setting of the data transfer format.

ASCII Transfer Format

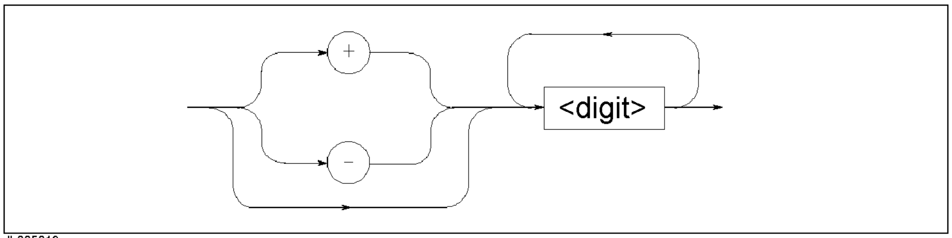
When you select the ASCII transfer format as the data transfer format, numbers are transferred as ASCII bytes, each of which corresponds to one of the formats shown below. Note that numbers are separated from one another with a comma (,) in accordance with the IEEE 488.2 specification.

NOTE Numeric data strings vary in length. Keep this in mind when you extract some data from retrieved numeric data strings in your program.

- Integer format

  Figure 7-1 shows this format. Numbers are expressed as integers. For example, 201 is expressed as “+201” or “201.”

Figure 7-1 Integer format

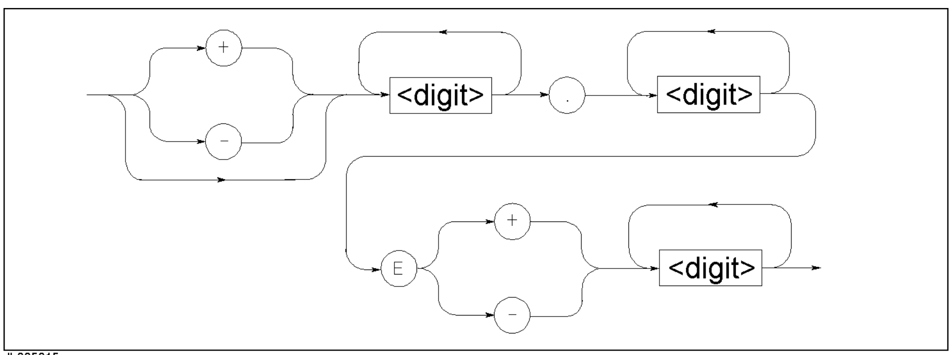


lb005013e

- Floating-point number format

  Figure 7-2 shows this format. Numbers are expressed with floating points. For example, 1000 is expressed as “+201” or “201.”

Figure 7-2 Floating-point number format



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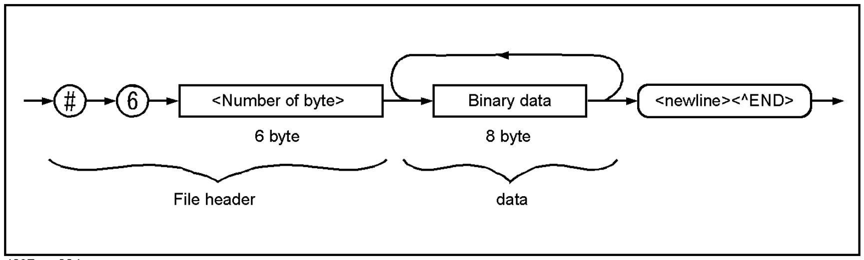
Binary Transfer Format

When you select the binary transfer format as the data transfer format, numbers are transferred in the format shown in Figure 7-3.

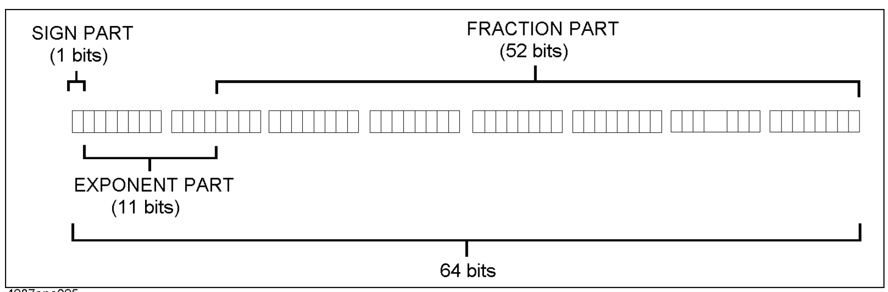
Figure 7-3 **Binary transfer format**



This data transfer format uses a header that consists of a sharp character (#), a number of 6 (which indicates the byte size of the <number of bytes transferred> part), and the <number of bytes transferred> part in this order. The header is followed by the binary data (of the byte size indicated by <number of bytes transferred>) and the message terminator <new line>^END.

The binary data is expressed in the IEEE 754 64-bit floating-point number format shown in Figure 7-4.

Figure 7-4 **64-bit floating point format**



Byte order

When you opt to perform binary transfer, you can configure the instrument to transfer the 8 bytes of the data in one of the following two byte orders:

NORMal — Transfer begins with the byte that contains the MSB (most significant bit); that is, the leftmost byte in Figure 7-4.

SWAPped — Transfer begins with the byte that contains the LSB (least significant bit); that is, the rightmost byte in Figure 7-4.

To set the byte order, use the following command:

- **:FORM:BORD** on page 348

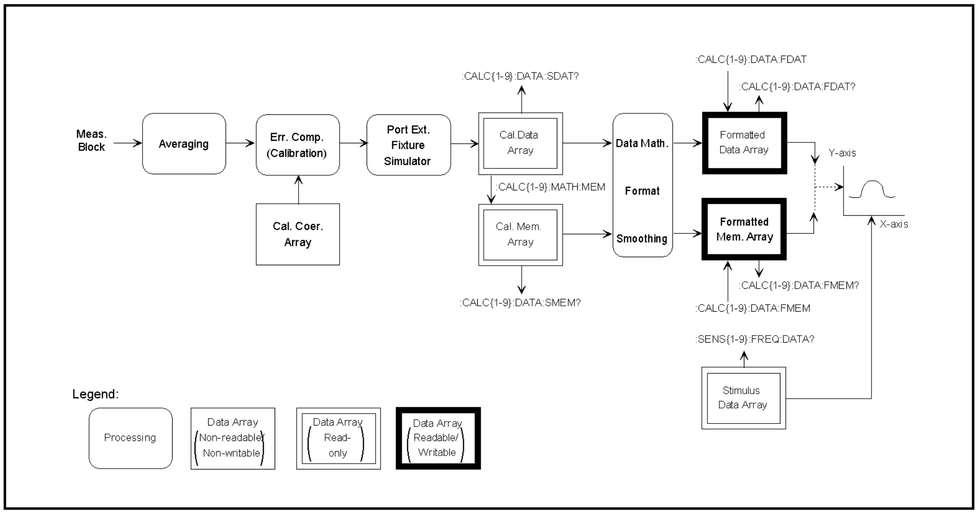
NOTE Executing the **:SYST:PRES** on page 462 command does not affect the current setting of the byte order.

Internal data processing

Data flow

Figure 7-5 provides an overview of the E5070A/E5071A's internal data processing flow. For more information on the data processing flow, refer to "*User's Guide*."

Figure 7-5 E5070A/E5071A's data processing flow



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Internal data arrays

Corrected data arrays

A corrected data array contains the corrected data obtained by performing error correction, port extension compensation (calibration), Fixture Simulator operations on the raw measured data for a particular channel. Each data element is stored as a complex number (Re/Im).

The instrument retains 9 corrected data arrays, each of which is associated with one of the 9 channels. Corrected data arrays are read-only. To retrieve one of the corrected data arrays, use the following command:

- **:CALC{1-9}:DATA:SDAT?** on page 223

Corrected memory arrays

When the **:CALC{1-9}:MATH:MEM** command on page 297 command is executed on a particular corrected data array, its copy is stored into the corrected memory array corresponding to that corrected data array.

The instrument retains 9 corrected memory arrays, each of which is associated with one of the 9 channels. Corrected memory arrays are read-only. To retrieve one of the corrected data arrays, use the following command:

- **:CALC{1-9}:DATA:SMEM?** on page 224

Formatted data array

A formatted data array contains the formatted data (values to be displayed) obtained by performing data math operations, measurement parameter conversion, and smoothing on a particular corrected data array. Regardless of the data format, it contains two data elements per measurement point as shown in the following table:

Table 7-1 Data elements and data formats

Data format*1	Data element (primary value)	Data element (secondary value)
log magnitude	log magnitude	Always 0
Phase	Phase	Always 0
Group delay	Group delay	Always 0
Smith chart (Lin)	Liner magnitude	Phase
Smith chart (Log)	log magnitude	Phase
Smith chart (Re/Im)	Real part of a complex number	Imaginary part of a complex number
Smith chart (R+jX)	Resistance	Reactance
Smith chart (G+jB)	Conductance	Susceptance
Polar (Lin)	Liner magnitude	Phase
Polar (Log)	log magnitude	Phase
Polar (Re/Im)	Real part of a complex number	Imaginary part of a complex number
Liner magnitude	Liner magnitude	Always 0
SWR	SWR	Always 0
Real number	Real part of a complex number	Always 0
Imaginary number	Imaginary part of a complex number	Always 0
Expanded phase	Expanded phase	Always 0

*1. To set this, use the **:CALC{1-9}:FORM** command on page 232 command.

The instrument retains 81 formatted data arrays, each of which is associated with one of the 9 traces contained in one of the 9 channels 9×9 = 81). To read/write one of the formatted data arrays, use the following command:

- **:CALC{1-9}:DATA:FDAT** on page 221

Formatted memory arrays

A formatted memory array contains the formatted data (values to be displayed) obtained by performing data math operations, measurement parameter conversion, and smoothing on a particular corrected memory array.

The instrument retains 81 formatted memory arrays, each of which is associated with one of the 9 traces contained in one of the 9 channels 9×9 = 81). To read/write one of the formatted memory arrays, use the following command:

- **:CALC{1-9}:DATA:FMEM** on page 222

Stimulus data arrays

A stimulus data array contains the stimulus values for all measurement points.

The instrument retains 9 stimulus data arrays, each of which is associated with one of the 9 channels. Stimulus data arrays are read-only. To retrieve one of the stimulus data arrays, use the following command:

- **:SENS{1-9}:FREQ:DATA?** on page 421

Calibration coefficient arrays

A calibration coefficient array contains the calibration coefficients calculated based on the results of measurement performed with standard devices.

The instrument retains 9 calibration coefficient arrays, each of which is associated with one of the 9 channels. No commands are available that read or write calibration coefficient arrays.

Retrieving Measurement Results

"Internal data arrays" on page 109 allow you to retrieve all measurement results throughout a particular trace. Alternatively, markers allow you to retrieve measurement results at your specified points. For information on how to retrieve marker values, refer to "Retrieving Measurement Results at Marker Positions" on page 84.

Retrieving Internal Data Arrays

You can chose between the ASCII and binary data transfer formats when you retrieve internal data arrays. For more information, refer to "Data Transfer Format" on page 106.

Example 7-1 and Example 7-2 show sample programs that demonstrate how to retrieve formatted data arrays. The sample program in Example 7-1 uses the ASCII transfer format while the sample in Example 7-2 uses the binary transfer format. You can find the source files of these programs, named read_asc.htb and read_bin.htb, on the sample program disk.

Each of the sample programs holds the sweep on channel 1, then retrieves and displays the stimulus array for channel 1 and the formatted data array for trace 1.

The program in Example 7-1 is described in detail below:

Line 50	Assigns a GPIB address to the I/O pass.
Lines 70 to 90	These lines set channel 1's active trace to trace 1 and hold the sweep.
Lines 100 to 110	These lines retrieve the number of points in channel 1 and stores that number into the Nop variable.
Line 120	Resizes the Fdata and Freq arrays based on the value of the Nop variable (the number of points).
Line 160	Sets the data transfer format to ASCII.
Lines 180 to 190	These lines retrieve the formatted data array for the active trace (trace 1) in channel 1, and store the data into the Fdata array.
Lines 200 to 210	These lines retrieve the stimulus array for channel 1 and stores the data into the Freq variable.
Lines 250 to 260	These lines retrieve the data format for the active trace (trace 1) in channel 1, and store it into the Fmt$ array.
Lines 270 to 400	The lines display each point along with one measured value and a frequency if the Fmt$ is "MLOG", "PHAS", "GDEL", "MLIN", "SWR", "REAL", "IMAG", or "UPH"; or along with two measured values and a frequency if Fmt$ returns any other string.

Example 7-1 **Using the ASCII Transfer Format to Retrieve Internal Data Arrays (read_asc.htb)**

```
10      REAL Fdata(1:1601,1:2),Freq(1:1601)
20      DIM Img$[30]
30      INTEGER Nop,I
40      !
50      ASSIGN @Agte507x TO 717
60      !
70      OUTPUT @Agte507x;":CALC1:PAR1:SEL"
80      OUTPUT @Agte507x;":INIT1:CONT OFF"
90      OUTPUT @Agte507x;":ABOR"
100     OUTPUT @Agte507x;":SENS1:SWE:POIN?"
110     ENTER @Agte507x;Nop
120     REDIM Fdata(1:Nop,1:2),Freq(1:Nop)
130     !
140     ! Reading out in ASCII transfer format
150     !
160     OUTPUT @Agte507x;":FORM:DATA ASC"
170     !
180     OUTPUT @Agte507x;":CALC1:DATA:FDAT?"
190     ENTER @Agte507x;Fdata(*)
200     OUTPUT @Agte507x;":SENS1:FREQ:DATA?"
210     ENTER @Agte507x;Freq(*)
220     !
230     ! Displaying
240     !
250     OUTPUT @Agte507x;":CALC1:FORM?"
260     ENTER @Agte507x;Fmt$
270     SELECT Fmt$
280       CASE "MLOG","PHAS","GDEL","MLIN","SWR","REAL","IMAG","UPH"
290         Img$="MD.4DE,2X,MD.6DE"
300         PRINT " Frequency      Data"
310         FOR I=1 TO Nop
320           PRINT USING Img$;Freq(I),Fdata(I,1)
330         NEXT I
340       CASE ELSE
350         Img$="MD.4DE,2X,MD.6DE,2X,MD.6DE"
360         PRINT " Frequency      Data1          Data2"
370         FOR I=1 TO Nop
380           PRINT USING Img$;Freq(I),Fdata(I,1),Fdata(I,2)
390         NEXT I
400     END SELECT
410     !
420     END
```

The program in Example 7-2 is described in detail below:

Lines 50 to 60	Assigns a GPIB address to the I/O pass.
Lines 80 to 100	These lines set channel 1's active trace to trace 1 and hold the sweep.
Lines 110 to 120	These lines retrieve the number of points in channel 1 and store that number into the Nop variable.
Line 130	Resizes the Fdata and Freq arrays based on the value of the Nop variable (the number of points).
Line 170	Sets the data transfer format to binary.
Lines 190 to 200	These lines retrieve the data header.
Line 210	Retrieves the formatted data array for the active trace (trace 1) in channel 1, and stores the data into the Fdata array.

NOTE Because binary data must be read without being formatted, the program uses an I/O path (@Binary) that is configured to support the retrieval of unformatted data. This applies to line 250 as well.

Line 220	Reads the message terminator at the end of the data.
Lines 230 to 240	These lines retrieve the data header.
Line 250	Retrieves the stimulus array for channel 1 and stores the data into the Freq variable.
Line 260	Reads the message terminator at the end of the data.
Lines 300 to 310	These lines retrieve the data format for the active trace (trace 1) in channel 1, and store it into the Fmt$ array.
Lines 320 to 450	The lines display each point along with one measured value and a frequency if the Fmt$ is “MLOG”, “PHAS”, “GDEL”, “MLIN”, “SWR”, “REAL”, “IMAG”, or “UPH”; or along with two measured values and a frequency if Fmt$ returns any other string.

Example 7-2 **Using the Binary Transfer Format to Retrieve Internal Data Arrays (read_bin.htb)**

```
10      REAL Fdata(1:1601,1:2),Freq(1:1601)
20      DIM Buff$[9],Img$[30]
30      INTEGER Nop,I
40      !
50      ASSIGN @Agte507x TO 717
60      ASSIGN @Binary TO 717;FORMAT OFF
70      !
80      OUTPUT @Agte507x;":CALC1:PAR1:SEL"
90      OUTPUT @Agte507x;":INIT1:CONT OFF"
100     OUTPUT @Agte507x;":ABOR"
110     OUTPUT @Agte507x;":SENS1:SWE:POIN?"
120     ENTER @Agte507x;Nop
130     REDIM Fdata(1:Nop,1:2),Freq(1:Nop)
140     !
150     ! Reading out in binary transfer format
160     !
170     OUTPUT @Agte507x;":FORM:DATA REAL"
180     !
190     OUTPUT @Agte507x;":CALC1:DATA:FDAT?"
200     ENTER @Agte507x USING "#,8A";Buff$
210     ENTER @Binary;Fdata(*)
220     ENTER @Agte507x USING "#,1A";Buff$
230     OUTPUT @Agte507x;":SENS1:FREQ:DATA?"
240     ENTER @Agte507x USING "#,8A";Buff$
250     ENTER @Binary;Freq(*)
260     ENTER @Agte507x USING "#,1A";Buff$
270     !
280     ! Displaying
290     !
300     OUTPUT @Agte507x;":CALC1:FORM?"
310     ENTER @Agte507x;Fmt$
320     SELECT Fmt$
330       CASE "MLOG","PHAS","GDEL","MLIN","SWR","REAL","IMAG","UPH"
340         Img$="MD.4DE,2X,MD.6DE"
350         PRINT " Frequency      Data"
360         FOR I=1 TO Nop
370           PRINT USING Img$;Freq(I),Fdata(I,1)
380         NEXT I
390       CASE ELSE
400         Img$="MD.4DE,2X,MD.6DE,2X,MD.6DE"
410         PRINT " Frequency      Data1          Data2"
420         FOR I=1 TO Nop
430           PRINT USING Img$;Freq(I),Fdata(I,1),Fdata(I,2)
440         NEXT I
450     END SELECT
460     !
470     END
```

Entering Data into a Trace

You can change the data/memory trace on the LCD by writing the new data into the "Formatted data array" on page 110/"Formatted memory arrays" on page 110.

When you write data into formatted data/memory array, you can choose either the ASCII or binary transfer format (see "Data Transfer Format" on page 106).

Example 7-3 and Example 7-4 show sample programs that demonstrate how to write data into formatted data arrays. The sample program in Example 7-3 uses the ASCII transfer format while the sample in Example 7-4 uses the binary transfer format. You can find the source files of these programs, named write_a.htb and write_b.htb, on the sample program disk.

Each of the sample programs holds the sweep on channel 1, retrieves the data from a specified file (a file saved measurement data using the **:MMEM:STOR:FDAT** command on page 364 command), and populates trace 1 for channel 1 with the retrieved data.

The program in Example 7-3 is described in detail below:

Line 50	Assigns a GPIB address to the I/O pass.
Line 70	Passes control to a subprogram named Inp_file_name, which lets the user input a file name, and then stores the returned file name into the File$ variable. For more information on the Inp_file_name subprogram, refer to the description in Example 7-4.
Lines 90 to 110	These lines set channel 1's active trace to trace 1 and hold the sweep.
Lines 130 to 140	These lines retrieve the number of points in channel 1 and stores that number into the Nop variable.
Line 150	Resizes the Fdata array based on the value of the Nop variable (the number of points).
Line 170	This line points to the statement block to be executed if an error occurs in retrieving data from the file (for example, if no file matches File$).
Lines 180 to 260	These lines retrieve the formatted data from the file identified by File$, and store the data into the Fdata array.
Line 280	Sets the data transfer format to ASCII.
Line 300	Writes Fdata into the formatted data array for the active trace (trace 1) in channel 1.
Lines 340 to 380	This statement block is executed if an error occurs in retrieving data from the file.

Example 7-3 Using the ASCII Transfer Format to Write Formatted Data Arrays (write_a.htb)

```
10     REAL Freq,Fdata(1:1601,1:2)
20     DIM File$[300]
30     INTEGER Nop
40     !
50     ASSIGN @Agte507x TO 717
60     !
70     CALL Inp_file_name(File$)
80     !
90     OUTPUT @Agte507x;":CALC1:PAR1:SEL"
100    OUTPUT @Agte507x;":INIT1:CONT OFF"
110    OUTPUT @Agte507x;":ABOR"
120    !
130    OUTPUT @Agte507x;":SENS1:SWE:POIN?"
140    ENTER @Agte507x;Nop
150    REDIM Fdata(1:Nop,1:2)
160    !
170    ON ERROR GOTO File_error
180    ASSIGN @File TO File$
190    ENTER @File USING "K";Buff$
200    ENTER @File USING "K";Buff$
210    ENTER @File USING "K";Buff$
220    FOR I=1 TO Nop
230     ENTER @File USING "19D,2X,19D,2X,19D";Freq,Fdata(I,1),Fdata
(I,2)
240    NEXT I
250    ASSIGN @File TO *
260    OFF ERROR
270    !
280    OUTPUT @Agte507x;":FORM:DATA ASC"
290    !
300    OUTPUT @Agte507x;":CALC1:DATA:FDAT ";Fdata(*)
310    !
320    GOTO Prog_end
330    !
340 File_error: OFF ERROR
350    PRINT "############ ERROR ############"
360    PRINT File$&" is NOT exist."
370    PRINT "             or"
380    PRINT File$&" has UNSUITABLE data."
390    !
400 Prog_end: END
410    !============================================
420    ! File Name Input Function
430    !============================================
440  SUB Inp_file_name(Inp_name$)
450    DIM Inp_char$[9]
460    ON ERROR GOTO Inp_start
470 Inp_start: !
480    PRINT "Input File Name!"
490    INPUT "Name?",Inp_name$
500    PRINT "Input Name: "&Inp_name$
510    INPUT "OK? [Y/N]",Inp_char$
520    IF UPC$(Inp_char$)<>"Y" THEN Inp_start
530    OFF ERROR
540  SUBEND
```

The program in Example 7-4 is described in detail below:

Lines 50 to 60	Assigns a GPIB address to the I/O pass.
Line 70	Passes control to a subprogram named Inp_file_name, which lets the user input a file name, and then stores the returned file name into the File$ variable.
Lines 90 to 110	These lines set channel 1's active trace to trace 1 and hold the sweep.
Lines 130 to 140	These lines retrieve the number of points in channel 1 and stores that number into the Nop variable.
Line 150	Resizes the Fdata array based on the value of the Nop variable (the number of points).
Line 170	This line points to the statement block to be executed if an error occurs in retrieving data from the file (for example, if no file matches File$).
Lines 180 to 260	These lines retrieve the formatted data from the file identified by File$, and store the data into the Fdata array.
Line 280	Sets the data transfer format to binary.
Line 290	Creates the data header and stores it into the Header$ variable.
Line 300	Sends the command that writes data into the formatted data array for the active trace (trace 1) in channel 1, following it with the data header (Header$).
Line 310	Sends the data itself (Fdata), following it with a message terminator.

NOTE Because binary data must be written without being formatted, the program uses an I/O path (@Binary) that is configured to support writing unformatted data.

Lines 340 to 380	This statement block is executed if an error occurs in retrieving data from the file.

The Inp_file_name subprogram in lines 440 to 540, which is used to enter a save filename, is described below.

Line 460	Allows the user to return to the entry start line and re-enter the data if an error (such as an invalid entry) occurs while entering the target file name.
Lines 480 to 490	These lines prompt the user to enter the target file name. The program does not continue till the user actually enters the file name.
Lines 500 to 510	These lines display the entered file name and waits for a confirmation entry (y/n key).
Line 520	Returns to the entry start line if the key the user pressed in line 870 is not the y key.

Example 7-4 Using the Binary Transfer Format to Write Formatted Data Arrays (write_b.htb)

```
10     REAL Freq,Fdata(1:1601,1:2)
20     DIM File$[300],Header$[10]
30     INTEGER Nop
40     !
50     ASSIGN @Agte507x TO 717
60     ASSIGN @Binary TO 717;FORMAT OFF
70     CALL Inp_file_name(File$)
80     !
90     OUTPUT @Agte507x;":CALC1:PAR1:SEL"
100    OUTPUT @Agte507x;":INIT1:CONT OFF"
110    OUTPUT @Agte507x;":ABOR"
120    !
130    OUTPUT @Agte507x;":SENS1:SWE:POIN?"
140    ENTER @Agte507x;Nop
150    REDIM Fdata(1:Nop,1:2)
160    !
170    ON ERROR GOTO File_error
180    ASSIGN @File TO File$
190    ENTER @File USING "K";Buff$
200    ENTER @File USING "K";Buff$
210    ENTER @File USING "K";Buff$
220    FOR I=1 TO Nop
230     ENTER @File USING "19D,2X,19D,2X,19D";Freq,Fdata(I,1),Fdata(I,2)
240    NEXT I
250    ASSIGN @File TO *
260    OFF ERROR
270    !
280    OUTPUT @Agte507x;":FORM:DATA REAL"
290    Header$="#6"&IVAL$(8*2*Nop,10)
300    OUTPUT @Agte507x;":CALC1:DATA:FDAT ";Header$;
310    OUTPUT @Binary;Fdata(*),END
320    GOTO Prog_end
330    !
340 File_error: OFF ERROR
350    PRINT "############ ERROR ############"
360    PRINT File$&" is NOT exist."
370    PRINT "             or"
380    PRINT File$&" has UNSUITABLE data."
390    !
400 Prog_end: END
410    !=============================================
420    ! File Name Input Function
430    !=============================================
440  SUB Inp_file_name(Inp_name$)
450    DIM Inp_char$[9]
460    ON ERROR GOTO Inp_start
470 Inp_start: !
480    PRINT "Input File Name!"
490    INPUT "Name?",Inp_name$
500    PRINT "Input Name: "&Inp_name$
510    INPUT "OK? [Y/N]",Inp_char$
520    IF UPC$(Inp_char$)<>"Y" THEN Inp_start
530    OFF ERROR
540  SUBEND
```

8 Limit Test

This chapter describes how to use the Limit Test feature to perform a limit test and determine the pass/fail status of the measured data.

Performing a Limit Test

Configuring Limit Lines

The Limit Test feature of the E5070A/E5071A allows you to create up to 100 upper/lower limit lines on each trace and then determine the pass/fail status of the measured data.

When you manually configure limit lines, you must add each segment (limit line) to the limit table, and define various conditions that apply to the specific segment. On the other hand, when you use an external controller to configure limit lines, you can use the following command to define all the segment conditions (all limit lines) in the active table trace at once.

- **:CALC{1-9}:LIM:DATA** on page 276

Alternatively, you can configure limit lines based on the data contained in a CSV file by issuing the following command:

- **:MMEM:LOAD:LIM** on page 358

Also, you can save the contents of the current limit table to a file by issuing the following command:

- **:MMEM:STOR:LIM** on page 366

Showing/Hiding Limit Lines

To turn on or off limit lines, use the following command:

- **:CALC{1-9}:LIM:DISP** on page 277

Even when limit lines are hidden, the system performs limit test if the Limit Test feature is on.

Turning On or Off the Limit Test Feature

To turn on or off the Limit Test feature, use the following command:

- **:CALC{1-9}:LIM** on page 275

Showing/Hiding “Fail”

To turn on or off the “Fail” which is displayed at the center of the window when the test result for the channel is “fail,” use the following command:

- **:DISP:FSIG** on page 332

Obtaining Test Results

You can obtain the test results by issuing a result retrieval command or through the status register. For detailed information on the status register, see Appendix B, “Status Reporting System.”

Test Results at Each Measurement Point

Using Commands That Retrieve Test Results

You can obtain the test results at each measurement point by retrieving the stimulus value at failed measurement points. To retrieve failed measurement points, use the following command:

Stimulus value	**:CALC{1-9}:LIM:REP?** on page 279
Number of measurement points	**:CALC{1-9}:LIM:REP:POIN?** on page 279

Using the Status Register

You cannot use the status register to obtain the test results at each measurement point.

Test Results for Each Trace

Using Commands That Retrieve Test Results

You can retrieve the test result for each trace (i.e., the trace-wide result that combines the results for all measurement points in a particular trace) by issuing the following command:

- **:CALC{1-9}:LIM:FAIL?** on page 278

Using the Status Register

The condition register and event register under the questionable limit channel {1-9} status register provide nine bits that correspond to traces 1 to 9 and contain the test results (0:Pass, 1:Fail) for the respective traces; for example, you can obtain the test result for trace 1 from bit 1, and that for trace 9 from bit 9.

Every bit of the condition register is set to 0 when a measurement cycle is started. Upon completion of measurement, those bits that correspond to failed traces are set to 1.

If the corresponding bit of the positive transition filter sets to 1 (preset value), each bit of the event register is set to 1 when the corresponding bit of the condition register changes from 0 to 1 (indicating that the corresponding trace failed the test).

To retrieve the condition register and event register under the questionable limit channel {1-9} status register, use the following command:

Condition register	**:STAT:QUES:LIM:CHAN{1-9}:COND?** on page 446
Event register	**:STAT:QUES:LIM:CHAN{1-9}?** on page 446

Test Results for Each Channel

Using Commands That Retrieve Test Results

No commands are available that allow you to directly retrieve the test result for each channel (i.e., the channel-wide result that combines the results for all traces in a particular channel).

Using the Status Register

The questionable limit status event register provides nine bits that correspond to channels 1 to 9 and contain the test results (0:Pass, 1:Fail) for the respective channels; for example, you can obtain the test result for channel 1 from bit 1, and that for channel 9 from bit 9.

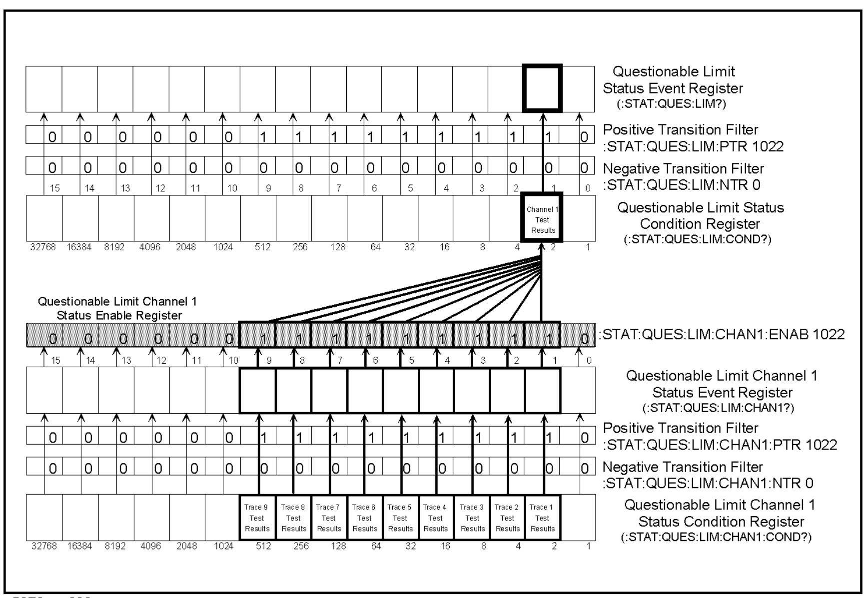
Every bit of the condition register is set to 0 after the event registers are cleared by ***CLS** command on page 210. Upon completion of measurement, if the channel-wide test result that combines the results for all traces[*1] in a channel is “fail”, the corresponding bit of the condition register is set to 1.

If the corresponding bit of the positive transition filter sets to 1 (preset value), every bit of the event register is set to 1 when the corresponding bit of the condition register changes from 0 to 1.

To retrieve the condition register and event register under the questionable limit status register, use the following command:

Condition register	**:STAT:QUES:LIM:COND?** on page 450
Event register	**:STAT:QUES:LIM?** on page 446

Figure 8-1 **Obtaining the test results for a channel (channel 1 in this example) using the status register**



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*1. This is when the registers are set as preset values. You can configure the enable register and transition filter under the questionable limit channel {1-9} status register so that the condition register's bits reflect the result that combines the results for a limited set of traces, rather than for all the traces.

Overall Test Result

Using Commands That Retrieve Test Results

No commands are available that allow you to directly retrieve the overall test result that combine the test results for all channels.

Using the Status Register

Each of the condition register and event register under the questionable status event register provides bit 10, from which you can obtain the overall test result (0:Pass, 1:Fail).

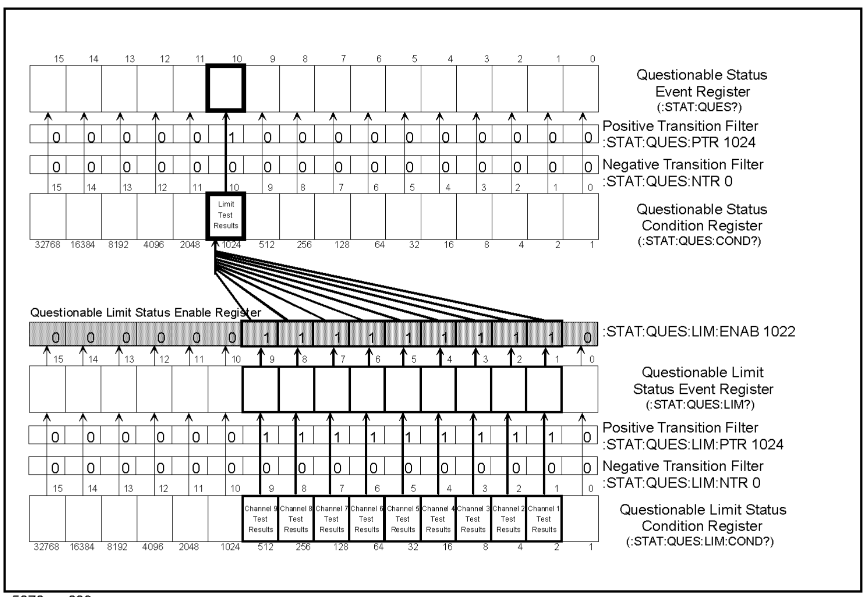
The condition register's bit 10 is set to 0 after the event registers are cleared by ***CLS** command on page 210. Upon completion of measurement, this bit is set to 1 if the overall test result that combines the results for all channels[*1] is "fail".

If the positive transition filter's bit 10 sets to 1 (preset value), the event register's bit 10 is set to 1 when the condition register's bit 10 changes from 0 to 1.

To retrieve the condition register and event register under the questionable status register, use the following command:

Condition register	**:STAT:QUES:COND?** on page 444
Event register	**:STAT:QUES?** on page 444

Figure 8-2 **Obtaining the overall test result using the status register**



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*1. This is when the registers are set as preset values. You can configure the enable register and transition filter under the questionable limit status register so that the condition register's bit 10 reflects the result that combines the results for a limited set of channels, rather than for all the channels.

Sample Program

Example 8-1 shows a sample program that demonstrates how to perform limit tests. You can find the source file of this program, named lim_test.htb, on the sample program disk.

The sample program creates a limit table as shown in Table 8-1 and Table 8-2; turns on the Limit Test feature; performs one cycle of measurement; then displays the test results.

Table 8-1 Limit table for trace 1

No.	Type	Begin Stimulus	End Stimulus	Begin Response	End Response
1	MAX	847.5 MHz	905.0 MHz	-55.0 dBm	-55.0 dBm
2	MIN	935.0 MHz	960.0 MHz	-3.5 dBm	-3.5 dBm
3	MAX	935.0 MHz	960.0 MHz	0 dBm	0 dBm
4	MAX	980.0 MHz	1047.5 MHz	-25.0 dBm	-25.0 dBm

Table 8-2 Limit table for trace 2

No.	Type	Begin Stimulus	End Stimulus	Begin Response	End Response
1	MAX	847.5 MHz	925.0 MHz	0 dBm	0 dBm
2	MIN	935.0 MHz	960.0 MHz	-9.5 dBm	-9.5 dBm
3	MAX	970.0 MHz	1047.5 MHz	0 dBm	0 dBm

The program is described in detail below:

Line 50 — Assigns a GPIB address to the I/O pass.

Lines 70 to 120 — These lines store the sweep center value, sweep span value, trace 1 measurement parameter, trace 2 measurement parameter, trace 1 data format, and trace 2 data format into the variables Cent, Span, Param1$, Param2$, Fmt1$, and Fmt2$, respectively.

Line 150 — Stores the number of segments in trace 1 limit table into the Num_of_seg1 variable.

Lines 160 to 390 — These lines store the settings in trace 1 limit table into the Lim1(*) variable.

Line 410 — Stores the number of segments in trace 2 limit table into the Num_of_seg2 variable.

Lines 420 to 590 — These lines store the settings in trace 2 limit table into the Lim2(*) variable.

Lines 610 to 620 — These lines configure the sweep range for channel 1's sweep range using the center and span values contained in the Cent and Span values.

Lines 630 to 660 — These lines configure channel 1 so that it contains 2 traces, displays graphs in two windows tiled horizontally (i.e., with the screen split into the upper and lower halves), uses a bus trigger source, and works in continuous activation mode.

Line 700	Sets channel 1's active trace to trace 1.
Lines 720 to 730	These lines store trace 1's measurement parameter and data format into the variables Param1$ and Fmt1$, respectively.
Lines 750 to 810	These lines set up the limit table for trace 1.

Line 750: Sends the command that sets up a limit table along with the Num_of_seg1 variable that contains the number of segments.

Lines 770 to 790: Sends five data items (type, start point stimulus value, end point stimulus value, start point response value, and end point response value) for each segment.

Lines 820 to 830	These lines turns on the display of limit lines and the Limit Test feature for trace 1.
Line 870	Sets channel 1's active trace to trace 2.
Lines 890 to 900	These lines set trace 2's measurement parameter and data format to Param2$ and Fmt2$, respectively.
Lines 920 to 980	These lines set up the limit table for trace 2.
Lines 990 to 1000	These lines turns on the display of limit lines and the Limit Test feature for trace 2.
Lines 1040 to 1060	These lines set, under the questionable limit channel 1 status register, the enable register and positive transition filter to 6 (0000000000000110 in binary notation) while setting the negative transition filter to 0 so that the questionable limit status condition register's bit 1 is set to 1 when the test result that combines the results for trace 1 and trace 2 is “fail”.

NOTE The sample program provides an example of explicitly configuring the register bits so that they reflect the test result that only covers trace 1 and trace 2. However, because the results for traces 3 to 9 will never be “fail” as long as the Limit Test feature is disabled for those traces, the register bits would reflect the test result that is limited to traces 1 and 2 even if you did not change the default setting.

Lines 1070 to 1080	These lines set transition filters so that the questionable limit status event register's bit 1 is set to 1 when the questionable limit status condition register's bit 1 changes from 0 to 1.
Line 1090	Clears the questionable limit status event register and questionable limit channel 1 status event register.
Lines 1110 to 1130	These lines trigger the instrument, and waits until the sweep cycle completes.
Lines 1170 to 1190	These lines retrieve the value of the questionable limit status event register, and store the setting of bit 1 of the value into Ch1_judge.
Lines 1200 to 1230	These lines retrieve the value of the questionable limit channel 1 status event register, and store the settings of bit 1 and bit 2 of the value into Tr1_judge and Tr2_judge, respectively.
Line 1280	Displays a message indicating that the DUT has passed the limit test if the test result for channel 1 is “Pass” (i.e., if Ch1_judge returns 0).
Lines 1300 to 1660	These lines are executed if the test result for channel 1 is “Fail” (i.e., if

Ch1_judge returns 1).

Line 1300: Notifies the user that the limit test result is “Fail”.

Line 1320: Displays a message indicating that trace 1 has passed the limit test if the test result for trace 1 is “Pass” (i.e., if Tr1_judge returns 0).

Lines 1340 to 1470: These lines are executed if the test result for trace 1 is “Fail” (i.e., if Tr1_judge returns 1). The lines notify the user that the test result for trace 1 is “Fail”, then retrieve and display the frequencies at the failed measurement points on trace 1.

Line 1340: Notifies the user that the limit test result for trace 1 is “Pass”.

Line 1380: Sets channel 1's active trace to trace 2.

Lines 1390 to 1410: These lines retrieve the number of failed measurement points on trace 1 and, based on that number, resize the array that will contain retrieved frequencies.

Lines 1420 to 1470: These lines retrieve and display the frequencies at the failed measurement points on trace 1.

Line 1500: Displays a message indicating that trace 2 has passed the limit test if the test result for trace 2 is “Pass” (i.e., if Tr2_judge returns 0).

Lines 1520 to 1650: If the test result for trace 2 is “Fail” (i.e., if Tr2_judge returns 1), these lines notify the user that trace 2 has failed to pass the limit test, and then retrieve and display the frequencies at the failed measurement points on trace 2.

Example 8-1 **Limit Test (lim_test.htb)**

```
10     DIM Param1$[9],Param2$[9],Fmt1$[9],Fmt2$[9],Buff$[9]
20     REAL Cent,Span,Lim1(1:4,1:5),Lim2(1:3,1:5),Fail_data(1:1601)
30     INTEGER Num_of_seg1,Num_of_seg2,Segment,Column,Fail_point
40     !
50     ASSIGN @Agte507x TO 717
60     !
70     Cent=9.475E+8
80     Span=2.00E+8
90     Param1$="S21"
100    Param2$="S11"
110    Fmt1$="MLOG"
120    Fmt2$="MLOG"
130    !
140    ! == Trace 1 Limit Line ==
150    Num_of_seg1=4           ! Number of segments: 4
160    ! -- Segment 1 --
170    Lim1(1,1)=1             ! Type            : Maximum
180    Lim1(1,2)=8.475E+8      ! Frequency Start: 847.5 MHz
190    Lim1(1,3)=9.050E+8      !           Stop : 905.0 MHz
200    Lim1(1,4)=-55           ! Response  Start: -55 dBm
210    Lim1(1,5)=-55           !           Stop : -55 dBm
220    ! -- Segment 2 --
230    Lim1(2,1)=2             ! Type            : Minimum
240    Lim1(2,2)=9.350E+8      ! Frequency Start: 935.0 MHz
250    Lim1(2,3)=9.600E+8      !           Stop : 960.0 MHz
260    Lim1(2,4)=-3.5          ! Response  Start: -3.5 dBm
270    Lim1(2,5)=-3.5          !           Stop : -3.5 dBm
280    ! -- Segment 3 --
290    Lim1(3,1)=1             ! Type            : Maximum
300    Lim1(3,2)=9.350E+8      ! Frequency Start: 935.0 MHz
310    Lim1(3,3)=9.600E+8      !           Stop : 960.0 MHz
320    Lim1(3,4)=0             ! Response  Start: 0 dBm
330    Lim1(3,5)=0             !           Stop : 0 dBm
340    ! -- Segment 4 --
350    Lim1(4,1)=1             ! Type            : Maximum
360    Lim1(4,2)=9.800E+8      ! Frequency Start: 980.0 MHz
370    Lim1(4,3)=1.0475E+9     !           Stop : 1047.5 MHz
380    Lim1(4,4)=-25           ! Response  Start: -25 dBm
390    Lim1(4,5)=-25           !           Stop : -25 dBm
400    ! == Trace 2 Limit Line ==
410    Num_of_seg2=3           ! Number of segments: 3
420    ! -- Segment 1 --
430    Lim2(1,1)=1             ! Type            : Maximum
440    Lim2(1,2)=8.475E+8      ! Frequency Start: 847.5 MHz
450    Lim2(1,3)=9.250E+8      !           Stop : 925.0 MHz
460    Lim2(1,4)=0             ! Response  Start: 0 dBm
470    Lim2(1,5)=0             !           Stop : 0 dBm
480    ! -- Segment 2 --
490    Lim2(2,1)=1             ! Type            : Maximum
500    Lim2(2,2)=9.350E+8      ! Frequency Start: 935.0 MHz
510    Lim2(2,3)=9.600E+8      !           Stop : 960.0 MHz
520    Lim2(2,4)=-9.5          ! Response  Start: -9.5 dBm
530    Lim2(2,5)=-9.5          !           Stop : -9.5 dBm
540    ! -- Segment 3 --
550    Lim2(3,1)=1             ! Type            : Maximum
```

```
560    Lim2(3,2)=9.700E+8      ! Frequency Start: 970.0 MHz
570    Lim2(3,3)=1.0475E+9     !           Stop : 1047.5 MHz
580    Lim2(3,4)=0             ! Response  Start: 0 dBm
590    Lim2(3,5)=0             !           Stop : 0 dBm
600    !
610    OUTPUT @Agte507x;":SENS1:FREQ:CENT ";Cent
620    OUTPUT @Agte507x;":SENS1:FREQ:SPAN ";Span
630    OUTPUT @Agte507x;":CALC1:PAR1:COUN 2"
640    OUTPUT @Agte507x;":DISP:WIND1:SPL D1_2"
650    OUTPUT @Agte507x;":TRIG:SOUR BUS"
660    OUTPUT @Agte507x;":INIT1:CONT ON"
670    !
680    ! Trace 1
690    !
700    OUTPUT @Agte507x;":CALC1:PAR1:SEL"
710    !
720    OUTPUT @Agte507x;":CALC1:PAR1:DEF "&Param1$
730    OUTPUT @Agte507x;":CALC1:FORM "&Fmt1$
740    !
750    OUTPUT @Agte507x;":CALC1:LIM:DATA ";Num_of_seg1;
760    FOR Segment=1 TO Num_of_seg1
770      FOR Column=1 TO 5
780        OUTPUT @Agte507x;",";Lim1(Segment,Column);
790      NEXT Column
800    NEXT Segment
810    OUTPUT @Agte507x;""
820    OUTPUT @Agte507x;":CALC1:LIM:DISP ON"
830    OUTPUT @Agte507x;":CALC1:LIM ON"
840    !
850    ! Trace 2
860    !
870    OUTPUT @Agte507x;":CALC1:PAR2:SEL"
880    !
890    OUTPUT @Agte507x;":CALC1:PAR2:DEF "&Param2$
900    OUTPUT @Agte507x;":CALC1:FORM "&Fmt2$
910    !
920    OUTPUT @Agte507x;":CALC1:LIM:DATA ";Num_of_seg2;
930    FOR Segment=1 TO Num_of_seg2
940      FOR Column=1 TO 5
950        OUTPUT @Agte507x;",";Lim2(Segment,Column);
960      NEXT Column
970    NEXT Segment
980    OUTPUT @Agte507x;""
990    OUTPUT @Agte507x;":CALC1:LIM:DISP ON"
1000   OUTPUT @Agte507x;":CALC1:LIM ON"
1010   !
1020   ! Setting status registers
1030   !
1040   OUTPUT @Agte507x;":STAT:QUES:LIM:CHAN1:ENAB 6"
1050   OUTPUT @Agte507x;":STAT:QUES:LIM:CHAN1:PTR 6"
1060   OUTPUT @Agte507x;":STAT:QUES:LIM:CHAN1:NTR 0"
1070   OUTPUT @Agte507x;":STAT:QUES:LIM:PTR 2"
1080   OUTPUT @Agte507x;":STAT:QUES:LIM:NTR 0"
1090   OUTPUT @Agte507x;"*CLS"
1100   !
1110   OUTPUT @Agte507x;":TRIG:SING"
1120   OUTPUT @Agte507x;"*OPC?"
1130   ENTER @Agte507x;Buff$
```

```
1140   !
1150   ! Checking test results
1160   !
1170   OUTPUT @Agte507x;":STAT:QUES:LIM?"
1180   ENTER @Agte507x;Reg_val
1190   Ch1_judge=BIT(Reg_val,1)
1200   OUTPUT @Agte507x;":STAT:QUES:LIM:CHAN1?"
1210   ENTER @Agte507x;Reg_val
1220   Tr1_judge=BIT(Reg_val,1)
1230   Tr2_judge=BIT(Reg_val,2)
1240   !
1250   ! Displaying test results
1260   !
1270   IF Ch1_judge=0 THEN
1280     PRINT "## PASS! ##"
1290   ELSE
1300     PRINT "## FAIL! ##"
1310     IF Tr1_judge=0 THEN
1320       PRINT " Trace1(S21): PASS"
1330     ELSE
1340       PRINT " Trace1(S21): FAIL"
1350       !
1360       ! Reading and displaying frequency at failed points
1370       !
1380       OUTPUT @Agte507x;":CALC1:PAR1:SEL"
1390       OUTPUT @Agte507x;":CALC1:LIM:REP:POIN?"
1400       ENTER @Agte507x;Fail_point
1410       REDIM Fail_data(1:Fail_point)
1420       OUTPUT @Agte507x;":CALC1:LIM:REP?"
1430       ENTER @Agte507x;Fail_data(*)
1440       PRINT "  Frequency:"
1450       FOR I=1 TO Fail_point
1460         PRINT USING "3X,MD.4DE";Fail_data(I)
1470       NEXT I
1480     END IF
1490     IF Tr2_judge=0 THEN
1500       PRINT " Trace2(S11): PASS"
1510     ELSE
1520       PRINT " Trace2(S11): FAIL"
1530       !
1540       ! Reading and displaying frequency at failed points
1550       !
1560       OUTPUT @Agte507x;":CALC1:PAR2:SEL"
1570       OUTPUT @Agte507x;":CALC1:LIM:REP:POIN?"
1580       ENTER @Agte507x;Fail_point
1590       REDIM Fail_data(1:Fail_point)
1600       OUTPUT @Agte507x;":CALC1:LIM:REP?"
1610       ENTER @Agte507x;Fail_data(*)
1620       PRINT "  Frequency:"
1630       FOR I=1 TO Fail_point
1640         PRINT USING "3X,MD.4DE";Fail_data(I)
1650       NEXT I
1660     END IF
1670   END IF
1680   END
```

9 Saving and Recalling (File Management)

This chapter describes how to save and recall instrument status and measurement results onto/from the files. Here also covered is managing files.

Saving and Recalling File

Specifying file

When running a command for saving, recalling, and managing files, use a filename with extension to specify a particular file. Specify “A:” in the beginning of the file name, when specifying a file on the flexible disk. Also, when specifying a file name with directory, use “/” (slash) or “\” (backslash) as a delimiter.

Saving and recalling instrument status

You can save the instrument state using one of the following 2 methods:

- ❏ Saving the entire instrument state into a file
- ❏ Saving the state for each channel into registers A to D (volatile memory)

Selecting content to be saved

When saving the instrument status into a file or register, the content to be saved can be selected among the following 4 options:

- ❏ Instrument status only (see *Users Guide* for setting items to be saved)
- ❏ Instrument status and calibration coefficient array.
- ❏ Instrument status, corrected data/memory array (measurement data)
- ❏ Instrument status, calibration coefficient array, and corrected data/memory array (measurement data)

To select a content to be saved, use the following command:

- **:MMEM:STOR:STYP** on page 369

Saving and recalling entire instrument status

To save the entire instrument status into a file, use the following command:

- **:MMEM:STOR** on page 362

Recalling a file saved with the above command can reproduce the status when it was saved. To recall the settings from a file, use the following command:

- **:MMEM:LOAD** on page 356

Auto recall

The file saved with the name autorec.sta or A:autorec.sta will be automatically recalled the E5070A/E5071A is powered ON.

Saving state for each channel into a register

For the active channel, when you want to save the instrument state specific to that channel only into one of registers A to D, use the following command:

- **:MMEM:STOR:CHAN** on page 363

Recalling an instrument state saved in a register can reproduce it as the state of the active channel. To recall a register, use the following command:

- **:MMEM:LOAD:CHAN** on page 357

NOTE It is possible to recall a file from a different channel where it was saved.

The contents in the registers are lost when you turn OFF the power. You can delete (clear) the contents of all the registers using the following command.

- **:MMEM:STOR:CHAN:CLE** on page 363

Saving measurement data

Measurement data (in a formatted data array) can be saved in the file with CSV (Comma Separated Value) format.

To save measurement data on a file, use the following command:

- **:MMEM:STOR:FDAT** on page 364

Executing the above command will save the measurement data of the active trace.Note that the data save using the above command cannot be recalled from the E5070A/E5071A.

Saving the images on the LCD screen

Images displayed on the LCD screen can be saved on a file in the bitmap (.bmp) or portable network graphics (.png) format.

To save screen image on a file, use the following command:

- **:MMEM:STOR:IMAG** on page 365

Executing the above command will save the screen image when the command is invoked.

NOTE Note that this gives different result than operation from the front panel where screen image is saved at the time **[Capture]** key is pressed.

Saving and recalling the segment sweep table

Segment sweep table can be saved in the file with CSV (Comma Separated Value) format.

To save segment sweep table on a file, use the following command:

- **:MMEM:STOR:SEGM** on page 368

Executing the above command will save the segment sweep table for the active channel.

Recalling the file saved using the above command can reproduce the segment sweep table on the active channel.

To recall the settings from a file, use the following command:

- **:MMEM:LOAD:SEGM** on page 360

NOTE It is possible to recall a file from a different channel where it was saved. Note that recalling operation is not guaranteed for the file that might have been modified with editor.

Saving and recalling the limit table

Limit table can be saved in the file with CSV (Comma Separated Value) format.

To save limit table on a file, use the following command:

- **:MMEM:STOR:LIM** on page 366

Executing the above command will save the limit table for the active trace of the active channel.

Recalling the file saved using the above command can reproduce the table on the active trace of the active channel.

To recall the settings from a file, use the following command:

- **:MMEM:LOAD:LIM** on page 358

NOTE It is possible to recall a file from a different channel or trace where it was saved. Note that recalling operation is not guaranteed for the file that might have been modified with editor.

Saving/loading (importing) the VBA program

Saving

Only the VBA project file can be saved using command.

To save the VBA project that is opened on the VBA editor on the file, use the following command.

- **:MMEM:STOR:PROG** on page 367

Loading (importing)

To load the VBA project to the VBA editor, or to import the module/form file, use the following command.

- **:MMEM:LOAD:PROG** on page 359

Executing above command will load/import the file according to its extension as follows:

Extension	File type
vba	VBA Project
bas	Standard module
frm	User Forms
cls	Class Modules

Sample program

Example 9-1 shows a sample program that demonstrates how to save a file.You can find the source file of this program, named file_sav.bas, on the sample program disk.

This program saves selected content on a file with a specified name.

The program is described in detail below:

Line 40	Assigns a GPIB address to the I/O pass.
Line 60	Allows the user to return to the entry start line and re-enter the data if an error (such as an invalid entry) occurs while entering the number that identifies the content to be saved.
Lines 80 to 180	These lines display the list of options for content to be saved, and prompt the user to choose one of the items by typing in the appropriate number.
Line 190	Converts the entered value into an integer and stores it into the Content variable.
Line 200	Returns to the entry start line if an invalid value is contained in Content.
Line 230	Passes control to a subprogram named Inp_file_name, which lets the user input a file name for saving, and then stores the returned file name into the File$ variable.
Lines 270 to 280	If Content is equal to 1, these lines set the content to be saved as the instrument status to “instrument status only”, and store the state with the file name which is combined the File$ variable with the extension “.sta”.
Lines 300 to 310	If Content is equal to 2, these lines set the content to be saved as the instrument status to “instrument status and calibration coefficient”, and store the state with the file name which is combined the File$ variable with the extension “.sta”.
Lines 330 to 340	If Content is equal to 3, these lines set the content to be saved as the instrument status to “instrument status and measurement data”, and store the state with the file name which is combined the File$ variable with the extension “.sta”.
Lines 360 to 370	If Content is equal to 4, these lines set the content to be saved as the instrument status to “instrument status, calibration coefficient, and measurement data”, and store the state with the file name which is combined the File$ variable with the extension “.sta”.
Line 390	If Content is equal to 5, and store the state with the file name which is combined the File$ variable with the extension “.csv”.
Line 410	If Content is equal to 6, and store the image data of the LCD screen with the file name which is combined the File$ variable with the extension “.bmp”.

The Inp_file_name subprogram in lines 480 to 590, which is used to enter a save filename, is described below.

Line 500	Allows the user to return to the entry start line and re-enter the data if an error (such as an invalid entry) occurs while entering the target file name.
Lines 520 to 540	These lines prompt the user to enter the target file name. The program does not continue till the user actually enters the file name.
Lines 550 to 560	These lines display the entered file name and waits for a confirmation entry (y/n key).
Line 570	Returns to the entry start line if the key the user pressed in line 560 is not the y key.

Example 9-1 **Saving file (file_sav.htb)**

```
10      DIM File$[300],Inp_char$[30]
20      INTEGER Content
30      CLEAR SCREEN
40      ASSIGN @Agte507x TO 717
50      !
60      ON ERROR GOTO Content_select
70 Content_select:  !
80      PRINT "## Save Content Selection ##"
90      PRINT "Select Content"
100     PRINT " 1: State (State only)"
110     PRINT " 2: State (State & Cal)"
120     PRINT " 3: State (State & Trace)"
130     PRINT " 4: State (State & Cal & Trace)"
140     PRINT " 5: Trace Data (CSV)"
150     PRINT " 6: Screen"
160     PRINT ""
170     PRINT "Input 1 to 6"
180     INPUT "Number?",Inp_char$
190     Content=IVAL(Inp_char$,10)
200     IF Content<1 OR Content>6 THEN Content_select
210     OFF ERROR
220     !
230     CALL Inp_file_name(File$)
240     !
250     SELECT Content
260       CASE 1
270         OUTPUT @Agte507x;":MMEM:STOR:STYP STAT"
280         OUTPUT @Agte507x;":MMEM:STOR """&File$&".sta"""
290       CASE 2
300         OUTPUT @Agte507x;":MMEM:STOR:STYP CST"
310         OUTPUT @Agte507x;":MMEM:STOR """&File$&".sta"""
320       CASE 3
330         OUTPUT @Agte507x;":MMEM:STOR:STYP DST"
340         OUTPUT @Agte507x;":MMEM:STOR """&File$&".sta"""
350       CASE 4
360         OUTPUT @Agte507x;":MMEM:STOR:STYP CDST"
370         OUTPUT @Agte507x;":MMEM:STOR """&File$&".sta"""
380       CASE 5
390         OUTPUT @Agte507x;":MMEM:STOR:FDAT """&File$&".csv"""
400       CASE 6
```

```
410        OUTPUT @Agte507x;":MMEM:STOR:IMAG """&File$&".bmp"""
420    END SELECT
430    !
440    END
450    !============================================
460    ! File Name Input Function
470    !============================================
480  SUB Inp_file_name(Inp_name$)
490    DIM Inp_char$[9]
500    ON ERROR GOTO Inp_start
510 Inp_start: !
520    PRINT "## File Name Input ##"
530    PRINT "Input Save File Name (without Extension)"
540    INPUT "Name?",Inp_name$
550    PRINT "Input Name: "&Inp_name$
560    INPUT "OK? [Y/N]",Inp_char$
570    IF UPC$(Inp_char$)<>"Y" THEN Inp_start
580    OFF ERROR
590  SUBEND
```

Managing Files

Creating directory (folder)

To create a directory (folder), use the following command:

- **:MMEM:MDIR** on page 361

Deleting file (directory)

To delete a file or a directory, use the following command:

- **:MMEM:DEL** on page 355

Copying file

To copy a file, use the following command:

- **:MMEM:COPY** on page 354

Transferring files

File transfer from the external controller to the E5070A/E5071A can be possible by reading data from a file on the controller and then writing them to the file on the E5070A/E5071A.

- **:MMEM:TRAN** on page 370

Also, file transfer from the E5070A/E5071A to the external controller can be possible by reading data from a file on the E5070A/E5071A using the commands as query and then writing them to the file on the controller.

Retrieving data from storage

To retrieve information for the storage that is built in the E5070A/E5071A (usage, property of file located in a specified directory), use the following command;

- **:MMEM:CAT?** on page 353

Sample program

Example 9-1 shows a sample program for transferring files between the external controller and the E5070A/E5071A. You can find the source file of this program, named file_xfr.bas, on the sample program disk.

This program reads out data from a specified file on the external controller (or the E5070A/E5071A), then write them to a specified file on the E5070A/E5071A(or the external controller).

The program is described in detail below:

Line 40	Assigns a GPIB address to the I/O pass.
Lines 60 to 130	These line allow the user to return to the entry start line and re-enter the data if an error (such as an invalid entry) occurs while entering the number that indicates the transfer direction. Then, these line display the list of transfer directions and prompt the user to input a selected number.
Lines 80 to 130	These lines display the list of transfer directions, and prompt the user to choose one of the items by typing in the appropriate number.
Lines 140 to 150	Converts the entered value into an integer and stores it into the Direction variable. Returns to the entry start line if an invalid value is contained in Direction.
Lines 180 to 210	These lines obtain the name of the source file for copying from the user input, store it into the Src_file$ variable, and display the value of Src_file$.
Lines 180 to 210	These lines obtain the name of the source file for copying from the user input, store it into the Src_file$ variable, and display the value of Src_file$.
Lines 230 to 270	If Direction is equal to 2 (from the external controller to the E5070A/E5071A), these lines obtain the size of the source file for copying, store it into the Src_size_char$, and display the value of Src_size_char$.
Lines 290 to 320	These lines obtain the name of the destination file for copying from the user input, store it into the Dst_file$ variable, and display the value of Dst_file$.
Line 350	If Direction is equal to 1 (from the E5070A/E5071A to the external controller), these lines use the subprogram Copy_to_contr to transfer (copy) a file with the name Src_file$ on the E5070A/E5071A to a file with the name Dst_file$ on the external controller.
Line 370	If Direction is equal to 2, these lines use the subprogram Copy_to_e507x to transfer (copy) a file with the name Src_file$ on the external controller to a file with the name Dst_file$ on the E5070A/E5071A.

Copy_to_contr, a subprogram for transferring files from the E5070A/E5071A to the external controller that appears in lines 440 to 1000, is described below.

Lines 490 to 520	If any file with the name File$ already exists, these lines delete the file and newly create a file with the name File$.
Line 530	Assigns a destination file for copying to the I/O pass.

Line 540	This line stores a maximum number of transferred data (in bytes) per one transfer, that is 24 KByte to meet the size limitation of string arrays in the HTBasic, into Max_bsize variable.
Lines 560 to 600	These lines configure the system to generate an SRQ when it cannot find a source file for copying due to an error.
Lines 620 to 630	These lines set the branch target for an SRQ interrupt to enable SRQ interrupts.
Lines 640 to 650	These lines display a message showing that the transfer has started, and execute commands for reading data from a file on the E5070A/E5071A.
Lines 670 to 680	These lines read the header symbol (#) in a block data, read number of digits (characters) indicating the size of data in bytes, then store it into Digit$ variable.
Line 690	This line creates a format for reading characters in Digit$.
Line 700	This line reads the data size in byte and stores it into Src_size_char$ variable.
Line 720	This line converts Src_size_char$ to a real number and stores it into Src_size variable.
Lines 730 to 870	These lines repeat the procedures below until Src_size reaches 0.

Lines 740 to 780: If Src_size is greater than Max_bsize, these lines assign the value of the Max_bsize to Block_size variable (transferred data in bytes). If Src_size is equal or less than Max_bsize, assign the value of Src_size to Block_size.

Line 800 This line defines Dat$ string variable with the size as large as Block_size and reserves memory area.

Line 810 This line creates a format for reading characters as many as Block_size characters.

Line 820 This line reads data from the file on the E5070A/E5071A, then stores them into Dat$.

Line 830 This line writes the contents of Dat$ to the file on the external controller.

Lines 840 to 860 These lines free the memory area for Dat$ and subtract Block_size from Src_size.

Lines 890 to 900	These lines display a message showing the completion of transfer, then read a message terminator at the end of the data.
Lines 940 to 980	These lines define an error handler that retrieves and displays the number and message of an error that has occurred.

Copy_to_e507x, a subprogram for transferring files from the external controller to the E5070A/E5071A that appears in lines 1040 to 1540, is described below.

Lines 1090 to 1110	Assigns a destination file for copying to the I/O pass.
Line 1120	This line stores a maximum number of transferred data (in bytes) per one transfer, that is 24 KByte, into Max_bsize variable.
Lines 1140 to 1160	Clears the error queue.

Line 1180 Displays a measurement start message.

Lines 1190 to 1200 These lines create the header part indicating that data will be sent as many as Src_size_char$ bytes, then send the header part of the command and its parameters for writing the data to the file on the E5070A/E5071A.

Line 1220 This line converts Src_size_char$ to a real number and stores it into Src_size variable.

Lines 1230 to 1370 These lines repeat the procedures below until Src_size reaches 0.

> Lines 1240 to 1280: If Src_size is greater than Max_bsize, these lines assign the value of the Max_bsiize to Block_size variable (transferred data in bytes). If Src_size is equal or less than Max_bsize, assign the value of Src_size to Block_size.
>
> Line 1300 This line defines Dat$ string variable with the size as large as Block_size and reserves memory area.
>
> Line 1310 This line creates a format for reading characters as many as Block_size characters.
>
> Line 1320 This line reads data from the file on the external controller, then stores them into Dat$.
>
> Line 1330 This line writes the contents of Dat$ to the file on the E5070A/E5071A.
>
> Lines 1340 to 1360 These lines free the memory area for Dat$ and subtract Block_size from Src_size.

Line 1390 This line sends a message terminator at the end of data.

Lines 1420 to 1430 These lines retrieve the error number and error message from the error queue, and then store them into the variables Err_no and Err_msg$, respectively.

Lines 1440 to 1490 If Err_no is equal to 0 (no error occurred), these lines display the message indicating completion of transfer, and if Err_no is not equal to 0 (an error occurred), display Err_no along with Err_msg$.

Lines 1510 to 1520 These lines handle the case with no source file for copying is found.

Example 9-2 **File transfer (file_xfr.htb)**

```
10     DIM Src_file$[50],Dst_file$[50],Src_size_char$[50],Inp_char$[30]
20     INTEGER Direction
30     ASSIGN @Agte507x TO 717
40     !
50     CLEAR SCREEN
60     ON ERROR GOTO Direct_select
70 Direct_select:  !
80     PRINT "####  File Transfer ####"
90     PRINT " 1: E507x -> Controller"
100    PRINT " 2: Controller -> E507x"
110    PRINT ""
120    PRINT "Input 1 or 2"
130    INPUT "Number?",Inp_char$
140    Direction=IVAL(Inp_char$,10)
150    IF Direction<1 OR Direction>2 THEN Direct_select
160    OFF ERROR
170    !
180    PRINT ""
190    PRINT " Input source file name.        ";
200    INPUT "Name?",Src_file$
210    PRINT ": "&Src_file$
220    !
230    IF Direction=2 THEN
240      PRINT " Input source file size.        ";
250      INPUT "Size[Byte]?",Src_size_char$
260      PRINT ": "&Src_size_char$&"[Byte]"
270    END IF
280    !
290    PRINT " Input destination file name.   ";
300    INPUT "Name?",Dst_file$
310    PRINT ": "&Dst_file$
320    PRINT ""
330    !
340    IF Direction=1 THEN
350      Copy_to_contr(@Agte507x,Src_file$,Dst_file$)
360    ELSE
370      Copy_to_e507x(@Agte507x,Src_file$,Src_size_char$,Dst_file$)
380    END IF
390    !
400    END
410    !=============================================
420    ! File Transfer Function (E507x -> Controller)
430    !=============================================
440  SUB Copy_to_contr(@Agte507x,Src_file$,Dst_file$)
450    DIM Img$[32],Src_size_char$[10],Buff$[9],Err_msg$[100]
460    INTEGER Max_bsize,Block_size,Err_no
470    REAL Src_size
480    !
490    ON ERROR GOTO Skip_purge
500    PURGE Dst_file$
510 Skip_purge: OFF ERROR
520    CREATE Dst_file$,1
530    ASSIGN @Dst_file TO Dst_file$
540    Max_bsize=24576   ! 24KByte
550    !
560    OUTPUT @Agte507x;"*ESE 60"
570    OUTPUT @Agte507x;"*SRE 32"
580    OUTPUT @Agte507x;"*CLS"
590    OUTPUT @Agte507x;"*OPC?"
600    ENTER @Agte507x;Buff$
610    !
```

```
620    ON INTR 7 GOTO Err
630    ENABLE INTR 7;2
640   PRINT "Now Copying: "&Src_file$&"(@E507x) -> "&Dst_file$&"(@Contro
ller)"
650    OUTPUT @Agte507x;":MMEM:TRAN? """&Src_file$&""""
660    WAIT .1
670    ENTER @Agte507x USING "#,A";Buff$
680    ENTER @Agte507x USING "#,A";Digit$
690    Img$="#,"&Digit$&"A"
700    ENTER @Agte507x USING Img$;Src_size_char$
710    !
720    Src_size=VAL(Src_size_char$)
730    WHILE Src_size>0
740      IF Src_size>Max_bsize THEN
750        Block_size=Max_bsize
760      ELSE
770        Block_size=Src_size
780      END IF
790      !
800      ALLOCATE Dat$[Block_size]
810      Img$="#,"&VAL$(Block_size)&"A"
820      ENTER @Agte507x USING Img$;Dat$
830      OUTPUT @Dst_file USING Img$;Dat$
840      DEALLOCATE Dat$
850      !
860      Src_size=Src_size-Block_size
870    END WHILE
880    !
890    PRINT "Done"
900    ENTER @Agte507x USING "#,A";Buff$
910    ASSIGN @Dst_file TO *
920    !
930    GOTO Skip_error
940 Err: OFF INTR 7
950    OUTPUT @Agte507x;";:SYST:ERR?"
960    ENTER @Agte507x;Err_no,Err_msg$
970    PRINT "Error occurred!!"
980    PRINT "  No:";Err_no,"Description: "&Err_msg$
990 Skip_error: OFF INTR 7
1000 SUBEND
1010   !============================================
1020   ! File Transfer Function (Controller -> E507x)
1030   !============================================
1040 SUB Copy_to_e507x(@Agte507x,Src_file$,Src_size_char$,Dst_file$)
1050   DIM Img$[32],Header$[10],Buff$[9],Err_msg$[100]
1060   INTEGER Max_bsize,Block_size,Err_no
1070   REAL Src_size
1080   !
1090   ON ERROR GOTO File_error
1100   ASSIGN @Src_file TO Src_file$
1110   OFF ERROR
1120   Max_bsize=24576   ! 24KByte
1130   !
1140   OUTPUT @Agte507x;"*CLS"
1150   OUTPUT @Agte507x;"*OPC?"
1160   ENTER @Agte507x;Buff$
1170   !
1180  PRINT "Now Copying: "&Src_file$&"(@Controller) -> "&Dst_file$&"(@
E507x)"
1190   Header$="#"&VAL$(LEN(Src_size_char$))&Src_size_char$
1200   OUTPUT @Agte507x;":MMEM:TRAN """&Dst_file$&""","&Header$;
1210   !
1220   Src_size=VAL(Src_size_char$)
1230   WHILE Src_size>0
```

```
1240     IF Src_size>Max_bsize THEN
1250       Block_size=Max_bsize
1260     ELSE
1270       Block_size=Src_size
1280     END IF
1290     !
1300     ALLOCATE Dat$[Block_size]
1310     Img$="#,"&VAL$(Block_size)&"A"
1320     ENTER @Src_file USING Img$;Dat$
1330     OUTPUT @Agte507x USING Img$;Dat$
1340     DEALLOCATE Dat$
1350     !
1360     Src_size=Src_size-Block_size
1370   END WHILE
1380   !
1390   OUTPUT @Agte507x;"",END
1400   ASSIGN @Src_file TO *
1410   !
1420   OUTPUT @Agte507x;";:SYST:ERR?"
1430   ENTER @Agte507x;Err_no,Err_msg$
1440   IF Err_no=0 THEN
1450     PRINT "Done"
1460   ELSE
1470     PRINT "Error occurred!!"
1480     PRINT "  No:";Err_no,"Description: "&Err_msg$
1490   END IF
1500   GOTO Skip_error
1510 File_error:OFF ERROR
1520   PRINT "File name NOT found!"
1530 Skip_error:!
1540 SUBEND
```

10 Communication with External Instruments Using Handler I/O Port

This chapter provides necessary information for communicating with external instruments (for example, a handler in a production line) using the handler I/O port equipped with the Agilent E5070A/E5071A.

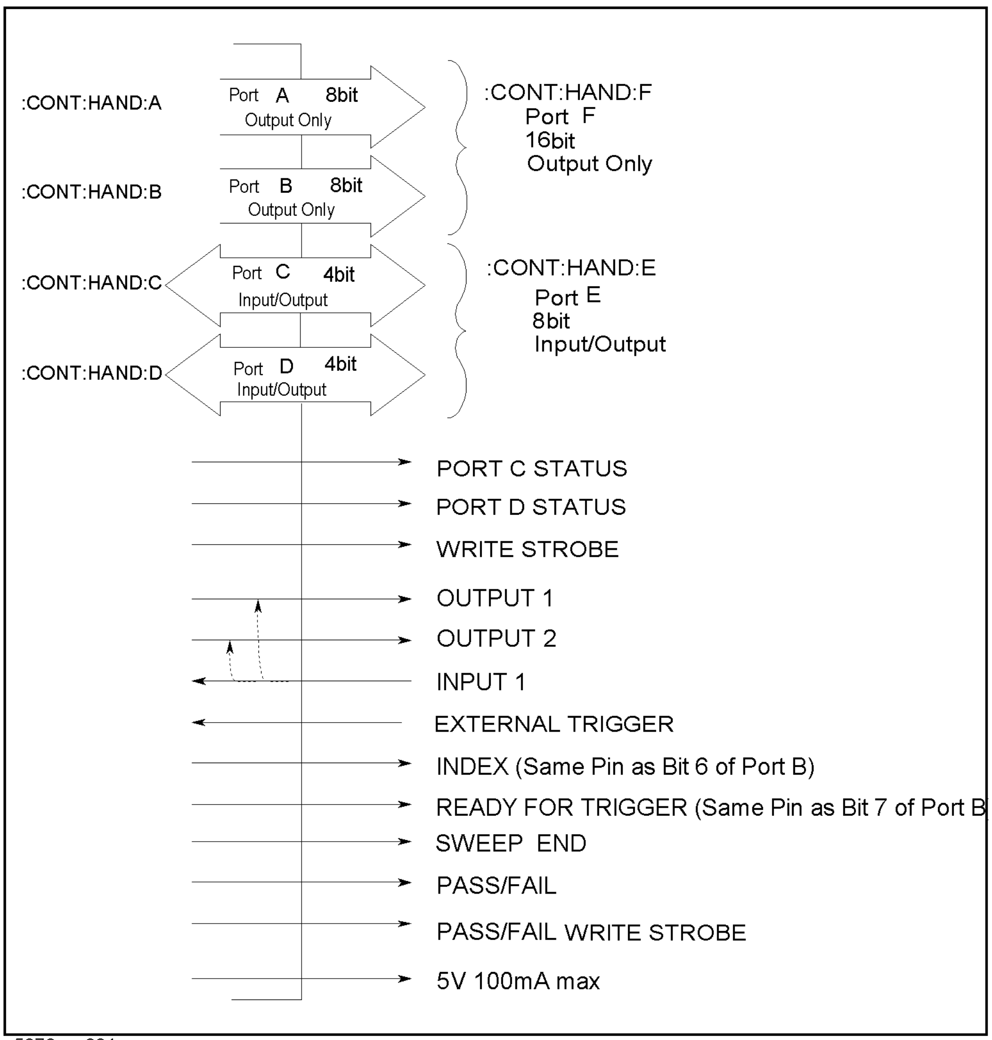
Handler I/O Port Overview

The E5070A/E5071A handler I/O port provides four independent parallel ports for data I/O associated with several control signal lines and the power line. All signals operate in TTL logic.

The data I/O ports are configured with 2 pairs of 8 bit output port and 2 pairs of 4 bit bi-directional port. Also those ports can cooperate to provide a maximum 16-bit-width output port or a maximum 8-bit-width input port.

The I/O signals operate on the negative logic basis, which can be altered. The control signal lines consist of various control output data, including completion of measurement or control signal for handshaking. Figure 10-1 outlines the I/O ports and control signal lines.

Figure 10-1 **Handler I/O port overview**



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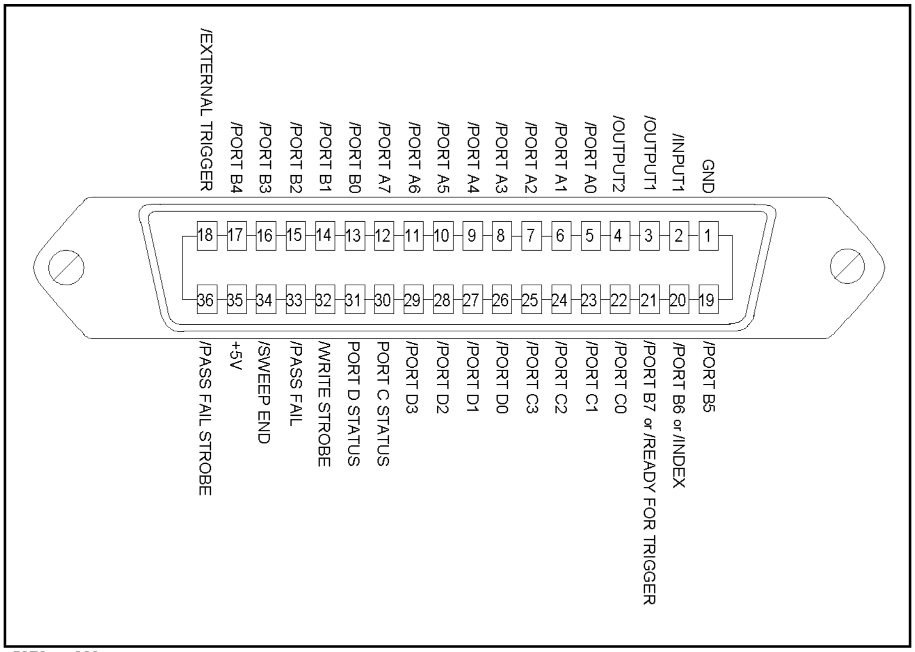
I/O Signal Pin Layout and Description

Figure 10-2 illustrates the layout of the I/O signal pins on the handler interface connector while Table 10-1 on page 150 briefly describes those signals.

Figure 10-2 **Handler interface connector pin layout**



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NOTE A slash (/) symbol preceding signal names means that they are negative logic (active low).

Table 10-1 Description of the handler interface I/O signals

Pin number	Signal name	Input/Output	Description
1	GND	——	Ground.
2	/INPUT1	Input	When this port receives a negative pulse, /OUTPUT1 and /OUTPUT2 are changed to the Low level.
3	/OUTPUT1	Output	Changes to the Low level when /INPUT1 receives a negative pulse.A command can be available for altering the Low/High level logic.
4	/OUTPUT2	Output	Changes to the Low level when /INPUT1 receives a negative pulse.A command can be available for altering the Low/High level logic.
5	/PORT A0	Output	Bit 0 of the port A (8 bit parallel output port)
6	/PORT A1	Output	Bit 1 of the port A.
7	/PORT A2	Output	Bit 2 of the port A.
8	/PORT A3	Output	Bit 3 of the port A.
9	/PORT A4	Output	Bit 4 of the port A.
10	/PORT A5	Output	Bit 5 of the port A.
11	/PORT A6	Output	Bit 6 of the port A.
12	/PORT A7	Output	Bit 7 of the port A.
13	/PORT B0	Output	Bit 0 of the port B (8 bit parallel output port)
14	/PORT B1	Output	Bit 1 of the port B.
15	/PORT B2	Output	Bit 2 of the port B.
16	/PORT B3	Output	Bit 3 of the port B.
17	/PORT B4	Output	Bit 4 of the port B.
18	/EXTERNAL TRIGGER	Input	An external trigger signal. When the trigger source is set to the “External,” this port generates a trigger in respond to the trailing edge of a negative pulse.
19	/PORT B5	Output	Bit 5 of the port B.
20*1	/PORT B6	Output	Bit 6 of the port B.
	/INDEX		Indicates that analog measurement is complete.The /INDEX signal changes to the Low level when analog measurement (all sweeps of all channels) is complete. When the handler receives the signal, it assumes that it is ready to connect the next DUT.However, no measurement data is available until data calculation completes.
21*2	/PORT B7	Output	Bit 7 of the port B.
	/READY FOR TRIGGER		Indicates that the instrument is ready for triggering.This signal is changed to the Low level when the instrument is ready for receiving a trigger signal.

Table 10-1 Description of the handler interface I/O signals

Pin number	Signal name	Input/Output	Description
22	/PORT C0	Input/Output	Bit 0 of the port C (4 bit parallel I/O port)
23	/PORT C1	Input/Output	Bit 1 of the port C.
24	/PORT C2	Input/Output	Bit 2 of the port C.
25	/PORT C3	Input/Output	Bit 3 of the port C.
26	/PORT D0	Input/Output	Bit 0 of the port D (4 bit parallel I/O port)
27	/PORT D1	Input/Output	Bit 1 of the port D.
28	/PORT D2	Input/Output	Bit 2 of the port D.
29	/PORT D3	Input/Output	Bit 3 of the port D.
30	PORT C STATUS	Output	Port C status signal.This signal is changed to the High level when the port C is configured to output port. It is changed to the Low level when the port is configured to input port.
31	PORT D STATUS	Output	Port D status signal.This signal is changed to the High level when the port D is configured to output port. It is changed to the Low level when the port is configured to input port.
32	/WRITE STROBE	Output	A output port write strobe signal.When data is present (that is, output level changes) on any of the output ports, this signal provides a negative pulse.
33	/PASS FAIL	Output	A limit test result[*3] signal.This signal is changed to the High level when limit test result is FAIL. It is changed to the Low level when limit test result is PASS.
34	/SWEEP END	Output	A sweep completion signal.When measurement (all sweeps of all channels) and data calculation are completed, this signal provides this signal provides a negative pulse.
35	+5V	Output	Provides +5V DC power supply for external instruments.
36	/PASS FAIL STROBE	Output	Limit test result write strobe signal.When limit test result is present on /PASS FAIL, this signal provides a negative pulse.

*1. This signal provides various functions depending upon the setting of **:CONT:HAND:IND:STAT** command on page 321.

*2. This signal provides various functions depending upon the setting of **:CONT:HAND:RTR:STAT** command on page 322.

*3. The overall test result that combine the test results for all traces in all channels.

Inputting/Outputting Data

The E5070A/E5071A handler I/O port provides the ports for data I/O shown in Table 10-2.

Table 10-2 I/O port

Port Name	Usage	Data Structure
Port A	Output	A7 A6 A5 A4 A3 A2 A1 A0 (8 bits)
Port B	Output	B7 B6 B5 B4 B3 B2 B1 B0 (8 bits)
Port C	Input/Output	C3 C2 C1 C0 (4 bits)
Port D	Input/Output	D3 D2 D1 D0 (4 bits)
Port E	Input/Output	D3 D2 D1 D0 C3 C2 C1 C0 (8 bits)
Port F	Output	B7 B6 B5 B4 B3 B2 B1 B0 A7 A6 A5 A4 A3 A2 A1 A0 (16 bits)

Specifying signal direction of port

Signal direction (input/output) can be changed for the ports C, D, and D as shown in Table 10-2. Thus, before the ports are used, the directions should be determined according to their usage.

To specify the signal direction for the ports C and D, use the following command.Direction for the port E depends on the setting for the ports C and D.

Port Name	Command
Port C	**:CONT:HAND:C:MODE** on page 316
Port D	**:CONT:HAND:D:MODE** on page 318

Reading data input to port

When the ports C, D, or E is configured to input ports, binary data represented with High(0)/Low(1) of each bit of the port will be read as decimal data.

To retrieve the data, use the following command as query:

Port Name	Command
Port C	**:CONT:HAND:C** on page 315
Port D	**:CONT:HAND:D** on page 317
Port E	**:CONT:HAND:E** on page 319

Data output to port

To the ports A through F (the ports C, D, and E should be configured to output ports), binary data (decimal data when output data is specified with a command) represented with High(0)/Low(1) of each bit of the port can be output.

To output data, use the following command.

Port Name	Command
Port A	**:CONT:HAND:A** on page 314
Port B	**:CONT:HAND:B** on page 314
Port C	**:CONT:HAND:C** on page 315
Port D	**:CONT:HAND:D** on page 317
Port E	**:CONT:HAND:E** on page 319
Port F	**:CONT:HAND:F** on page 320

NOTE

The bit 6 of the data outputed by **:CONT:HAND:B** command (the bit 14 of the data outputed by **:CONT:HAND:F** command) is ignored when outputting the /INDEX signal is turned on.

The bit 7 of the data outputed by **:CONT:HAND:B** command (the bit 15 of the data outputed by **:CONT:HAND:F** command) is ignored when outputting the /READY FOR TRIGGER signal is turned on.

Preset states at power-on

The handler I/O port is set at power-on as follows (not affected at reset).

Port A	High (All Bits)
Port B	High (All Bits)
Port C	Input
Port D	Input
PORT C STATUS	Low
PORT D STATUS	Low
/OUTPUT1	High
/OUTPUT2	High
/SWEEP END	High
/PASS FAIL	High

Timing Chart

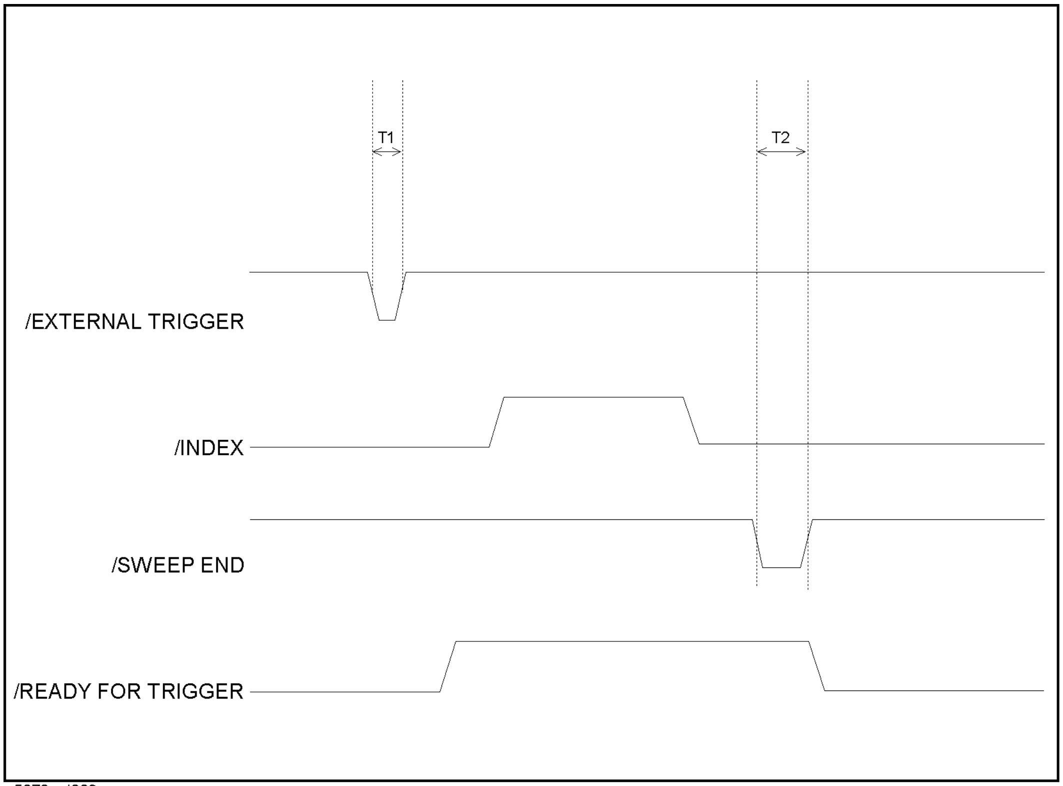
Figure 10-3 shows a timing chart for each timing signal output covering from the start of measurement (pulse input to /EXTERNAL TRIGGER) until the end of measurement.

Table 10-3 **Values of T1 through T2 in Figure 10-3 (typical)**

		Minimum value	Typical Value	Maximum value
T1	Pulse width of /EXTERNAL TRIGGER	1 μs*1	—	—
T2	Pulse width of /SWEEP END	10 μs	12 μs	—

*1. When a trigger signal is input from the handler I/O port.

Figure 10-3 **Timing chart of /EXTERNAL TRIGGER, /INDEX, /SWEEP END and /READY FOR TRIGGER**



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/INDEX and /READY FOR TRIGGER signals are outputed when outputting of these signals are turned on using the following commands.

/INDEX	**:CONT:HAND:C:MODE** on page 316
/READY FOR TRIGGER	**:CONT:HAND:D:MODE** on page 318

Figure 10-4 shows the timing chart for data output and write strobe signal output to the ports A through F.

Table 10-4 Values of T1 through T2 in Figure 10-4 (typical)

T1	Response time of write strobe signal	1 µs
T2	Pulse width of write strobe signal	1 µs

Figure 10-4 Timing chart of data output and write strobe signal

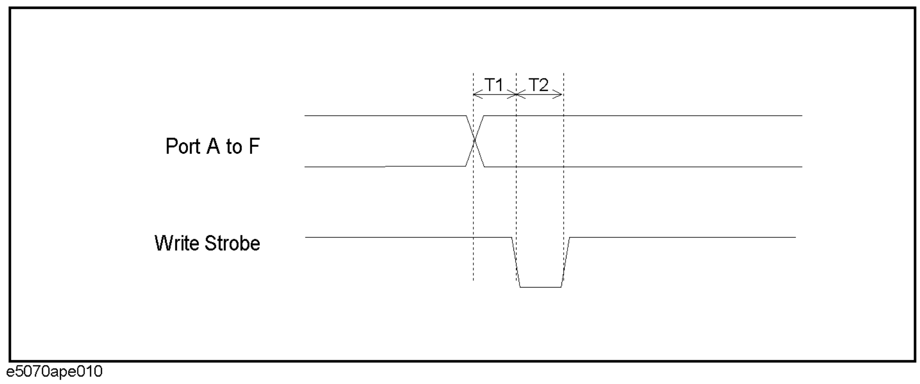


Figure 10-5 shows a timing chart of limit test result output (/PASS FAIL signal output) and /PASS FAIL write strobe signal output.

Table 10-5 Values of T1 through T2 in Figure 10-5 (typical)

T1	Response time of /PASS FAIL write strobe	1 µs
T2	Pulse width of /PASS FAIL write strobe	1 µs

Figure 10-5 Timing chart of limit test result output and write strobe signal

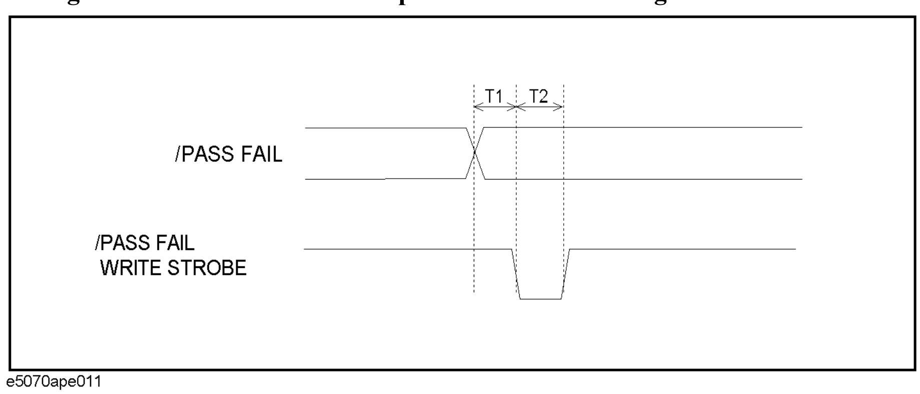
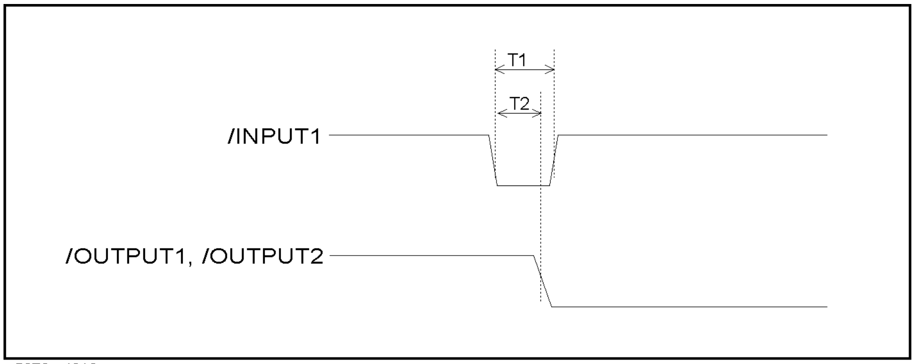


Figure 10-6 shows a timing chart of a pulse input to INPUT1, /OUTPUT1 signal output, and /OUTPUT2 signal output.

Table 10-6 Values of T1 through T2 in Figure 10-6 (typical)

		Minimum value	Maximum value
T1	Pulse width of /INPUT1	1 µs	—
T2	Response time of /OUTPUT1, /OUTPUT2	0.4 µs	0.6 µs

Figure 10-6 Timing chart of /INPUT1 and /OUTPUT1, /OUTPUT2



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Electrical Characteristics

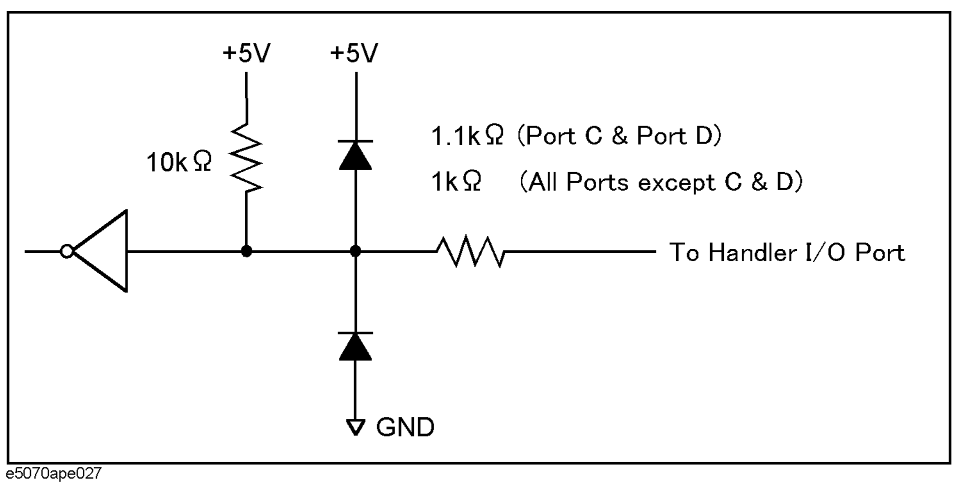
Input signal

All input signals are TTL compatible. Table 10-7 shows the electrical characteristics of input signals. Figure 10-7 shows the circuit diagram of input signals.

Table 10-7 Electrical characteristics of input signals (typical)

Maximum rate input voltage		-0.5 V to 7.0 V
Recommended input voltage	High level	2.0 V to 5.0 V
	Low level	0 V to 0.8 V
Maximum input current	High level	-0.3 mA (when input voltage is from 2.0 V to 5.0 V)
	Low level	-0.5 mA (when input voltage is from 0 V to 0.8 V)

Figure 10-7 Circuit diagram or input signals



Output signal

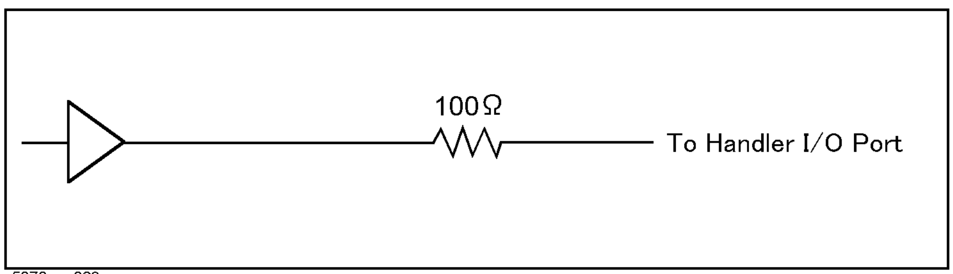
All output signals are TTL compatible. Table 10-8 shows the electrical characteristics of output signals. Figure 10-8 shows the circuit diagram of output signals.

Table 10-8 **Electrical characteristics of output signals (typical)**

Maximum rate output current		-10 mA to 10 mA
Maximum recommended output current	High level	-5 mA
	Low level	3 mA
Output voltage	High level	2.0 V to 3.3 V (when output current is from -5 mA to 0 mA) 3.20 V (when output current is -1 mA) 2.75 V (when output current is -5 mA)
	Low level	0 V to 0.8 V (when output current is from 0 mA to 3 mA) 0.25 V*1 (when output current is 1 mA) 0.55 V (when output current is 3 mA)

*1. Notice that, in case of C0 to C3 (port C) and D0 to D3 (port D), output voltage is 0.30 V.

Figure 10-8 **Circuit diagram of output signals**



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Power supply (+5 V)

Table 10-9 shows electrical characteristics of +5 V power supply for external instruments.

Table 10-9 **Electrical characteristics of +5 V power supply (typical)**

Output voltage	4.5 V to 5.5 V
Maximum output current	100 mA

Sample Program

Example 10-1 provides a sample program that communicates with an external instrument through the handler I/O port.You can find the source file of this program, named hander.htb, on the sample program disk.

This program outputs 5 (sets bit 2 and bit 0 to Low, and the other bits to High) to the port A of the handler I/O port, then waits until the bit 3 of the port C is set to Low.

The program is described in detail below:

Line 40	Assigns a GPIB address to the I/O pass.
Lines 60 to 70	These lines store the output data on the port A (binary) and bit location (bit 3) into Out_data_bin$ and Flag_bit variables, respectively.
Line 90	This line configures the port C to input port.
Lines 100 to 110	These lines enable /INDEX and /READY FOR TRIGGER signals.
Lines 130 to 140	These lines convert Out_data_bin$ to a decimal value and set it to the port A.
Lines 160 to 200	These lines repeat reading data from the port C until Flag_bit becomes TRUE.

Example 10-1 **Communicating with external instruments (handler.htb)**

```
10      INTEGER Out_data,In_data,Bit_stat
20      DIM Out_data_bin$[9]
30      !
40      ASSIGN @Agte507x TO 717
50      !
60      Out_data_bin$="00000101"
70      Flag_bit=3
80      !
90      OUTPUT @Agte507x;":CONT:HAND:C:MODE INP"
100     OUTPUT @Agte507x;":CONT:HAND:IND:STAT ON"
110     OUTPUT @Agte507x;":CONT:HAND:RTR:STAT ON"
120     !
130     Out_data=IVAL(Out_data_bin$,2)
140     OUTPUT @Agte507x;":CONT:HAND:A ";Out_data
150     !
160     REPEAT
170       OUTPUT @Agte507x;":CONT:HAND:C?"
180       ENTER @Agte507x;In_data
190       Bit_stat=BIT(In_data,Flag_bit)
200     UNTIL Bit_stat=1
210     END
```

11 Working with Automatic Test Systems

This chapter describes useful features when the Agilent E5070A/E5071A is integrated with the automatic test system.

Preventing Erroneous Key Operation on the Front Panel (Key Lock Feature)

When no operation is required from the front panel controls, the mouse, or the keyboard, disabling those input devices can prevent from any erroneous operation, which might be caused by accidentally touching such devices.

To turn on or off Key Locking, use the following command:

Locking the front panel controls and the keyboard.	**:SYST:KLOC:KBD** on page 460
Locking the mouse and the touch screen.	**:SYST:KLOC:MOUS** on page 461

Improving Command Processing Speed

SCPI commands should be processed in shorter time to improve throughput, when those commands are frequently executed (for example, reading out trace for each measurement).

With E5070A/E5071A, processing time for SCPI commands can be improved by decreasing refresh rate of the LCD display.

Measurement results (trace) need not to be updated

When the measurement trace needs not to be updated, turn off the update of the LCD display. This improves processing speed of SCPI commands and eliminates updating time of the screen.

To turn off the update of the LCD display, use the following command:

- **:DISP:ENAB** command on page 331

Measurement results (trace) need to be updated

When the measurement trace needs to be updated, processing speed of SCPI commands can be improved by controlling the update timing of the LCD display:

Step 1. Execute all SCPI commands that are required before measurement, including commands setting conditions.

Step 2. Turning Off the update of the LCD display.

Step 3. Perform the measurement.

Step 4. Execute the commands for reading out measurement result or analyzing the result.Not that reading out the result in binary format will accelerate data transfer.

Step 5. Execute the following command to update the LCD display once.

- **:DISP:UPD** command on page 336

Step 6. Return to the step 3.

Sample program

Example 11-2shows a sample program where the command processing time are improved by controlling the update timing of the LCD display.You can find the source file of this program, named cont_upd.htb, on the sample program disk.

This program sets necessary measurement conditions then turn off the update of the LCD display. Next, it performs measurement, reads out the result, and update the screen once.This program repeats this measurement procedure ten times.

The program is described in detail below:

Lines 50 to 60	Assigns a GPIB address to the I/O pass.
Lines 80 to 110	These lines set the sweep type to linear sweep, the sweep center value to 950 MHz, the sweep span value to 100 MHz, and the number of measurement points to 201, respectively.
Lines 120 to 160	These lines set the trigger source to bus trigger, turn on Continuous Activation mode for channel 1, turn the mode off for channels 2 through 9.
Lines 180 to 190	These lines display the window for channel 1 only, and arrange two graphs tiled horizontally.
Lines 210 to 270	These lines set the number of traces for channel 1 to 2, the measurement parameter and its data format for trace 1 to S21 and Log Mag, and those for trace 2 to S11 and Log Mag, respectively.
Line 290	This line turns Off the update of the LCD screen.
Line 300	This line sets the data transfer format to binary.
Lines 320 to 540	These lines repeat the following procedure ten times.

1. Lines 340 to 360 These lines trigger the instrument, and waits until the measurement cycle finishes.
2. Lines 400 to 440: Reads out the formatted data array of trace 1 in channel 1.
3. Lines 460 to 500: Reads out the formatted data array of trace 2 channel 1.
4. Line 540 This line updates the LCD screen once.

Example 11-1 **Controlling the update timing of LCD display(cont_upd.htb)**

```
10      REAL Trace1(1:201,1:2),Trace2(1:201,1:2)
20      DIM Buff$[9],Img$[30]
30      INTEGER Nop,I
40      !
50      ASSIGN @Agte507x TO 717
60      ASSIGN @Binary TO 717;FORMAT OFF
70      !
80      OUTPUT @Agte507x;":SENS1:SWE:TYPE LIN"
90      OUTPUT @Agte507x;":SENS1:FREQ:CENT 950E6"
100     OUTPUT @Agte507x;":SENS1:FREQ:SPAN 100E6"
110     OUTPUT @Agte507x;":SENS1:SWE:POIN 201"
120     OUTPUT @Agte507x;":TRIG:SOUR BUS"
130     OUTPUT @Agte507x;":INIT1:CONT ON"
140     FOR I=2 TO 9
150       OUTPUT @Agte507x;":INIT"&VAL$(I)&":CONT OFF"
160     NEXT I
170     !
180     OUTPUT @Agte507x;":DISP:SPL D1"
190     OUTPUT @Agte507x;":DISP:WIND1:SPL D1_2"
200     !
210     OUTPUT @Agte507x;":CALC1:PAR:COUN 2"
220     OUTPUT @Agte507x;":CALC1:PAR1:DEF S21"
230     OUTPUT @Agte507x;":CALC1:PAR1:SEL"
240     OUTPUT @Agte507x;":CALC1:FORM MLOG"
250     OUTPUT @Agte507x;":CALC1:PAR2:DEF S11"
260     OUTPUT @Agte507x;":CALC1:PAR2:SEL"
270     OUTPUT @Agte507x;":CALC1:FORM MLOG"
280     !
290     OUTPUT @Agte507x;":DISP:ENAB OFF"
300     OUTPUT @Agte507x;":FORM:DATA REAL"
310     !
320     FOR I=1 TO 10
330       OUTPUT @Agte507x;":TRIG:SING"
340       OUTPUT @Agte507x;"*OPC?"
350       ENTER @Agte507x;Buff$
360       !
370       ! Read Trace Data
380       !
390       OUTPUT @Agte507x;":CALC1:PAR1:SEL"
400       OUTPUT @Agte507x;":CALC1:DATA:FDAT?"
410       ENTER @Agte507x USING "#,8A";Buff$
420       ENTER @Binary;Trace1(*)
430       ENTER @Agte507x USING "#,1A";Buff$
440       !
450       OUTPUT @Agte507x;":CALC1:PAR2:SEL"
460       OUTPUT @Agte507x;":CALC1:DATA:FDAT?"
470       ENTER @Agte507x USING "#,8A";Buff$
480       ENTER @Binary;Trace2(*)
490       ENTER @Agte507x USING "#,1A";Buff$
500       !
510       ! Update Display
520       !
530       OUTPUT @Agte507x;":DISP:UPD"
540     NEXT I
550     END
```

Detecting Occurrence of an Error

Using the status reporting system

The status of the E5070A/E5071A can be detected through the status registers.This section describes how to detect the end of measurement using the status registers. For the complete description of the status report mechanism, including the specifications of each bit, see Appendix B, “Status Reporting System,”.

Occurrence of an error will be present in the standard event status register. An SRQ (service request) is useful when you create a program that uses the information reported by this register to detect occurrence of an error.

To detect the end of sweep via an SRQ, use one of the following commands:

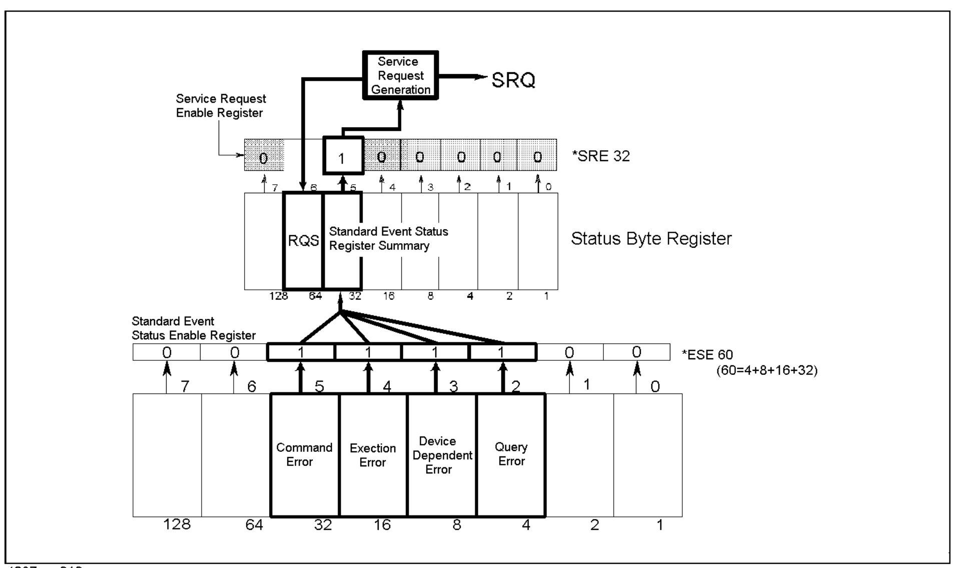
- ***SRE** on page 214
- ***ESE** on page 211

Follow these steps:

Step 1. Set the E5070A/E5071A so that it generates an SRQ when any of the error occurrence bit is set to 1 in the standard event status register.

Step 2. When an SRQ is generated, the program interrupts the measurement cycle.

Figure 11-1 **SRQ generation sequence (when an error occurs)**



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Using the error queue

An error queue holds the number for the error and the error message.Reading the error queue allows the user to verify the error that has been occurred.To retrieve the content of error queue, use the following command:

- **:SYST:ERR?** on page 459

The error queue can be used in the following ways:

1. It is used as a branch for error handling. When an error queue is retrieved, it returns 0 as the error number and “No error” as the error message if no errors detected. This can be used for detecting of an error and for branching flow of a program. Also this is useful when you wish to handle a specific error(s). Note that this method will not allow the user to perform any processing in synchronization with an occurrence of an error.
2. When an error is detected using SRQ, the error queue is used to examine the error. Refer to the example in Example 11-2.

Sample program

Example 11-2 is a sample program that demonstrates how to use an SRQ to detect occurrence of an error. You can find the source file of this program, named srq_err.htb, on the sample program disk.

This program sets SRQs then incidentally send an invalid parameter to generate an error, which is handled by this program.In the error handling part, this program examines the error, displays the error number and error message, and display the message indicating the suspend of the program.

Line 40	Assigns a GPIB address to the I/O pass.
Lines 60 to 70	These lines enables the bit 2, 3 4 and 5 in the standard event status register, and set the bit 5 to 1 in the service request enable register.
Lines 80 to 100	These lines clear the status byte register, the standard event status register, and the error queue.
Lines 120 to 130	These lines set the branch target for an SRQ interrupt to enable SRQ interrupts.
Lines 140 to 260	These lines set the measurement parameters and their data formats for trace 1 and 2. An invalid parameter is given to the data format setting for trace 2, causing an error.
Lines 280 to 330	These lines define an error handler that Lines 290 to 300: These lines retrieve the error number and error messages for the error from the error queue. Lines 310 to 330 These lines displays the message indicating occurrence of the error, the error number, the error message, and the message showing that the program is suspend.
Line 350	Displays a closing message.Note that this message will not display unless this program is re-executed after setting a corrected parameter to the data format setting for trace 2.

Example 11-2 **Error detection using an SRQ (srq_err.bas)**

```
10     DIM Buff$[9],Err_mes$[50]
20     INTEGER Err_no
30     !
40     ASSIGN @Agte507x TO 717
50     !
60     OUTPUT @Agte507x;"*ESE 60"
70     OUTPUT @Agte507x;"*SRE 32"
80     OUTPUT @Agte507x;"*CLS"
90     OUTPUT @Agte507x;"*OPC?"
100    ENTER @Agte507x;Buff$
110    !
120    ON INTR 7 GOTO Err_proc
130    ENABLE INTR 7;2
140    OUTPUT @Agte507x;":CALC1:PAR:COUN 2"
150    PRINT "Trace 1 Meas.Para: S21"
160    PRINT "Trace 1 Format   : Log Mag"
170    OUTPUT @Agte507x;":CALC1:PAR1:DEF S21"
180    OUTPUT @Agte507x;":CALC1:PAR1:SEL"
190    OUTPUT @Agte507x;":CALC1:FORM MLOG"
200    PRINT "Trace 2 Meas.Para: S11"
210    PRINT "Trace 2 Format   : Log Mag"
220    OUTPUT @Agte507x;":CALC1:PAR2:DEF S11"
230    OUTPUT @Agte507x;":CALC1:PAR2:SEL"
240    OUTPUT @Agte507x;":CALC1:FORM LOG"
250    OUTPUT @Agte507x;"*OPC?"
260    ENTER @Agte507x;Buff$
270    GOTO Skip_err_proc
280 Err_proc: OFF INTR 7
290    OUTPUT @Agte507x;";:SYST:ERR?"
300    ENTER @Agte507x;Err_no,Err_mes$
310    PRINT "Error occurred!!"
320    PRINT "  No:";Err_no,"Description: "&Err_mes$
330    PRINT "PROGRAM INTERRUPT!!"
340    GOTO Prog_end
350 Skip_err_proc: PRINT "PROGRAM DONE."
360 Prog_end: END
```

12 Controlling E5091A

This chapter describes how to control the E5091A.

Controlling E5091A

Turning ON/OFF of control

To turn ON/OFF control of the E5091A, use the following command:

- **:SENS:MULT{1-2}:STAT** on page 376

If you turn OFF the control of the E5091A, it does not affect the operation of the E5070A/E5071A even if it is connected.

Selecting ports assigned to Port 1 to Port 4

Selecting the connection ports

You can select the ports assigned to Port 1 to Port 4 for each channel. To select the ports, use the following command:

Port 1	**:SENS{1-9}:MULT{1-2}:TSET9:PORT1** on page 426
Port 2	**:SENS{1-9}:MULT{1-2}:TSET9:PORT2** on page 427
Port 3	**:SENS{1-9}:MULT{1-2}:TSET9:PORT3** on page 428
Port 4	**:SENS{1-9}:MULT{1-2}:TSET9:PORT4** on page 429

NOTE The connection between the assigned ports and Port 1 to Port 4 inside the E5091A is not changed when the above command is executed and it is changed immediately before a sweep for each channel.

Turning ON/OFF state display of connection ports (property display)

You can display the state of the ports assigned to Port 1 to Port 4 (E5091 property) in the lower right part in the window for each channel. To turn ON/OFF the property display, use the following command:

- **:SENS:MULT{1-2}:DISP** on page 375

Checking number of ports

To check the number of connected ports of the E5091A, use the following command:

- **:SENS:MULT{1-2}:COUN?** on page 375

Setting control line

You can set the HIGH/LOW of each line of the control line for each channel. To set the HIGH/LOW of each line, use the following command:

- **:SENS{1-9}:MULT{1-2}:TSET9:OUTP** on page 425

NOTE The HIGH/LOW state of each line of the E5091A is not changed when the above command is executed and it is changed immediately before a sweep for each channel.

Sample program

Example 12-1 shows a sample program that demonstrates how to control the E5091A. You can find the source file of this program, named e5091ctr.htb, on the sample program disk.

This program assigns Port 1 of the E5091A to A, Port 2 to T2, Port 3 to R2+, and Port 4 to R2- and sets Line 1 and Line 3 of the control line to HIGH.

The program is described in detail below:

Line 60	Assigns a GPIB address to the I/O path.
Lines 80 to 110	Sets the port assigned to Port 1 (A), the port assigned to Port 2 (T2), the port assigned to Port 3 (R2+), and the port assigned to Port 4 (R2-) to the Port1$, Port2$, Port3$, and Port4$ variables.
Lines 130 to 200	Sets the states of Line 1 to Line 8 of the control line (1 and 3: HIGH, 4 to 8: LOW) into Line1$ to Line8$ variables, respectively.
Lines 220 to 250	Sets the port assigned to Port 1 to Port1$, the port assigned to Port 2 to Port2$, the port assigned to Port 3 to Port3$, and the port assigned to Port 4 to Port4$, respectively.
Lines 270 to 290	Creates a decimal setting value from Line1$ to Line8$ and uses it to set the control line.
Line 310	Turns ON the E5091A property display.
Line 320	Turns ON the control of the E5091A.

Example 12-1 **Controlling E5091A (e5091ctr.htb)**

```
10      DIM Port1$[3],Port2$[3],Port3$[3],Port4$[3],Data_bin$[9]
20      DIM Line1$[3],Line2$[3],Line3$[3],Line4$[3]
30      DIM Line5$[3],Line6$[3],Line7$[3],Line8$[3]
40      INTEGER Data_dec
50      !
60      ASSIGN @Agte507x TO 717
70      !
80      Port1$="A"     ! Port1: A
90      Port2$="T2"    ! Port2: T2
100     Port3$="R2"    ! Port3: R2+
110     Port4$="R2"    ! Port4: R2-
120     !
130     Line1$="1"     ! Line1: HIGH
140     Line2$="0"     ! Line2: Low
150     Line3$="1"     ! Line3: HIGH
160     Line4$="0"     ! Line4: Low
170     Line5$="0"     ! Line5: Low
180     Line6$="0"     ! Line6: Low
190     Line7$="0"     ! Line7: Low
200     Line8$="0"     ! Line8: Low
210     !
220     OUTPUT @Agte507x;":SENS1:MULT1:TSET9:PORT1 "&Port1$
230     OUTPUT @Agte507x;":SENS1:MULT1:TSET9:PORT2 "&Port2$
240     OUTPUT @Agte507x;":SENS1:MULT1:TSET9:PORT3 "&Port3$
250     OUTPUT @Agte507x;":SENS1:MULT1:TSET9:PORT4 "&Port4$
260     !
270     Data_bin$=Line8$&Line7$&Line6$&Line5$&Line4$&Line3$&Line2$&
Line1$
280     Data_dec=IVAL(Data_bin$,2)
290     OUTPUT @Agte507x;":SENS1:MULT1:TSET9:OUTP ";Data_dec
300     !
310     OUTPUT @Agte507x;":SENS:MULT1:DISP ON"
320     OUTPUT @Agte507x;":SENS:MULT1:STAT ON"
330     !
340     END
```

13 Sample Application Programs

This chapter introduces several sample programs for basic measurement, measurement with a system using the handler I/O, and controlling the instrument over LAN.

Basic measurement (measuring a band pass filter)

Example 13-1 provides a sample program that measures a band pass filter.You can find the source file of this program, named meas_bpf.htb, on the sample program disk.

The sample program performs full 2-port calibration using the 85032F calibration kit, measure a band-pass filter (center frequency: 947.5 MHz), and calculates and displays its bandwidth, insertion loss, and so on. This measurement is the same as “Measuring a band pass filter” in *Installation and Quick Start Guide* of the E5070A/E5071A. Therefore, for information on the flow of the measurement, the connection of the standard, and so on, refer to the description of *Installation and Quick Start Guide*.

When started, the program displays the message “Set OPEN to Port 1. Then push [Enter] key.” Connect the OPEN standard to the port 1 and press **[Enter]** to measure the OPEN calibration data. Likewise, connect the SHORT and the LOAD standards and measure each calibration data.

Next, the program displays the message “Set OPEN to Port 2. Then push [Enter] key.” Connect the OPEN standard to the port 2 and press **[Enter]** to measure the OPEN calibration data. Likewise, connect the SHORT and the LOAD standards and measure each calibration data.

Further, the program displays the message “Set THRU between Port 1 and Port 2. Then push [Enter] key.” Connect the THRU standard between the ports 1 and 2 and press **[Enter]** to measure the THRU calibration data.

When the calibration is finished, the program displays the message “Set DUT. Then Push [Enter] key.” Connect the DUT and press **[Enter]**. This initiates the measurement and display the result as shown in Figure 13-1.

Figure 13-2 shows a sample display of the LCD screen after the program exits execution.

Figure 13-1 Sample execution result of the program of Example 13-1

```
## Measurement Result ##
   BW:     3.63757249908E+7
 cent:     9.4836227902E+8
  low:     9.30174417035E+8
 high:     9.66550142015E+8
    Q:     26.0712980976
 loss:    -2.2447956671
```

Figure 13-2 Sample display of the screen after the program Example 13-1 exits execution

The program is described in detail below:

Line 50	Assigns a GPIB address to the I/O pass.
Lines 70 to 110	Store the sweep center value (947.5 MHz), the sweep span value (200 MHz), the number of measurement points (401), the IF bandwidth (10 kHz), the power level (-10 dBm) into the variables Center, Span, Nop, If_Bw, and Pow, respectively.
Lines 120 to 160	Stores the number of traces (1), the measurement parameter (S21), the data format (log Mag), the calibration kit number (4: 85032F), and the save file name (State08.sta) into the variables, Num_of_tr, Para$, Fmt$, CalKit, and File$, respectively.
Line 200	Puts the instrument into preset state.
Lines 220 to 260	These lines assign the sweep center value for channel 1 to Center, sweep span value to Span, number of measurement points to Nop, IF bandwidth to If_bw, and power level to Pow, respectively.
Lines 280 to 310	These lines assign the number of trace for channel 1 to Num_of_tr, measurement parameters to Para$, and data format to Fmt$, respectively.
Line 350	Stores the calibration kit number for channel 1 to the CalKit variable.
Lines 360 to 380	These lines specifies ports 1 and 2 to be used and calls the sub program Cal_solt to perform full 2-port calibration for channel 1. For more information on the Cal_solt subprogram, refer to the description in Example 4-1 on page 64.
Lines 420 to 430	Saves the settings of the E5070A/E5071A and the calibration coefficients under the file name File$.
Lines 480 to 490	These lines set the trigger source to the bus trigger and turns on the continuous initiation mode for channel 1.

Lines 510 to 520	These lines prompt the user to connect the DUT and wait for **[Enter]** to be pressed after the DUT is connected.
Lines 540 to 560	These lines trigger the instrument, and waits until the measurement cycle finishes.
Line 580	This line executes auto scale for the trace 1 of channel 1.
Lines 620 to 650	These lines turn on the display of marker 1, move the marker to the position where the stimulus value is equal to Center, read out the response value at the marker and assign the value to the Resp variable.
Lines 670 to 710	These lines configure the system to generate an SRQ when it cannot perform Bandwidth Search due to an error.
Lines 730 to 740	These lines set the branch target for an SRQ interrupt to enable SRQ interrupts.
Lines 750 to 790	Sets the bandwidth definition value to -3 dB and the bandwidth search result display to on, reads out the bandwidth search results (bandwidth, center frequency, Q value, and insertion loss), and stores them into the variables Bwid, Cent, Q, and Loss, respectively.
Lines 830 to 900	These lines define an error handler that retrieves the error number and error messages for the error, then assign 0 to Bwid, Cent and Q, Resp (response value at marker 1) to Loss.
Lines 930 to 940	These lines calculate the 2 (higher and lower) cutoff frequencies from the values in the Bw and Cent variables and stores them into the Cut_l and Cut_h variables.
Lines 980 to 1040	These lines display the measurement results (values of Bwid, Cent, Q, Loss, Cut_l, and Cut_h).
Lines 1060 to 1070	These lines prompt the user to decide to perform another measurement. When **[y]** is pressed followed by **[Enter]** key, the program will return to the part where the DUT is connected and continue measurement.

Example 13-1 Measurement of band pass filter (meas_bpf.htb)

```
10     DIM Para$[9],Fmt$[9],File$[20],Buff$[9],Inp_char$[9],Err_msg$[20]
20     REAL Center,Span,If_bw,Pow,Resp,Bwid,Cent,Q,Loss,Cut_l,Cut_h
30     INTEGER Nop,Num_of_tr,Cal_kit,Port(1:4),Err_no
40     !
50     ASSIGN @Agte507x TO 717
60     !
70     Center=9.475E+8     ! Center Freq.     : 947.5 MHz
80     Span=2.00E+8        ! Span             : 200 MHz
90     Nop=401             ! Number of Points : 401
100    If_bw=1.0E+4        ! IF Bandwidth     : 10 kHz
110    Pow=-10             ! Power Level      : -10 dBm
120    Num_of_tr=1         ! Number of Traces : 1
130    Para$="S21"         ! Meas. Parameter  : S21
140    Fmt$="MLOG"         ! Data Format      : Log Mag
150    Cal_kit=4           ! Calibration Kit  : 85032F
160    File$="State08.sta" ! Save File Name   : State08.sta
170    !
180    ! Mesurement Condition
190    !
200    OUTPUT @Agte507x;":SYST:PRES"
210    !
220    OUTPUT @Agte507x;":SENS1:FREQ:CENT ";Center
230    OUTPUT @Agte507x;":SENS1:FREQ:SPAN ";Span
240    OUTPUT @Agte507x;":SENS1:SWE:POIN ";Nop
250    OUTPUT @Agte507x;":SENS1:BAND ";If_bw
260    OUTPUT @Agte507x;":SOUR1:POW ";Pow
270    !
280    OUTPUT @Agte507x;":CALC1:PAR:COUN ";Num_of_tr
290    OUTPUT @Agte507x;":CALC1:PAR1:DEF "&Para$
300    OUTPUT @Agte507x;":CALC1:PAR1:SEL"
310    OUTPUT @Agte507x;":CALC1:FORM "&Fmt$
320    !
330    ! Full 2 Port Calibration (@ Port 1 & Port 2)
340    !
350    OUTPUT @Agte507x;":SENS1:CORR:COLL:CKIT ";Cal_kit
360    Port(1)=1
370    Port(2)=2
380    Cal_solt(@Agte507x,"1",2,Port(*))
390    !
400    ! Save State & Cal
410    !
420    OUTPUT @Agte507x;":MMEM:STOR:STYP CST"
430    OUTPUT @Agte507x;":MMEM:STOR """&File$&""""
440    !
450    ! Measurement
460    !
470    CLEAR SCREEN
480    OUTPUT @Agte507x;":TRIG:SOUR BUS"
490    OUTPUT @Agte507x;":INIT1:CONT ON"
500 Meas_start:!
510    PRINT "Set DUT, then Push [Enter] key"
520    INPUT "",Inp_char$
530    !
540    OUTPUT @Agte507x;":TRIG:SING"
550    OUTPUT @Agte507x;"*OPC?"
560    ENTER @Agte507x;Buff$
570    !
580    OUTPUT @Agte507x;":DISP:WIND1:TRAC1:Y:AUTO"
590    !
600    ! Analysis
610    !
```

```
620    OUTPUT @Agte507x;":CALC1:MARK1 ON"
630    OUTPUT @Agte507x;":CALC1:MARK1:X ";Center
640    OUTPUT @Agte507x;":CALC1:MARK1:Y?"
650    ENTER @Agte507x;Resp
660    !
670    OUTPUT @Agte507x;"*ESE 60"
680    OUTPUT @Agte507x;"*SRE 32"
690    OUTPUT @Agte507x;"*CLS"
700    OUTPUT @Agte507x;"*OPC?"
710    ENTER @Agte507x;Buff$
720    !
730    ON INTR 7 GOTO Bw_err
740    ENABLE INTR 7;2
750    OUTPUT @Agte507x;":CALC1:MARK1:BWID:THR -3"
760    OUTPUT @Agte507x;":CALC1:MARK1:BWID ON"
770    OUTPUT @Agte507x;":CALC1:MARK1:BWID:DATA?"
780    WAIT .5
790    ENTER @Agte507x;Bwid,Cent,Q,Loss
800    GOTO Skip_bw_err
810    !
820 Bw_err: OFF INTR 7
830    OUTPUT @Agte507x;";:SYST:ERR?"
840    ENTER @Agte507x;Err_no,Err_msg$
850    PRINT "Error occurred!!"
860    PRINT "  No:";Err_no,"Description: "&Err_msg$
870    Bwid=0
880    Cent=0
890    Q=0
900    Loss=Resp
910    !
920 Skip_bw_err: OFF INTR 7
930    Cut_l=Cent-(Bwid/2)
940    Cut_h=Cent+(Bwid/2)
950    !
960    ! Display
970    !
980    PRINT "## Measurement Result ##"
990    PRINT "   BW:",Bwid
1000   PRINT " cent:",Cent
1010   PRINT "  low:",Cut_l
1020   PRINT " high:",Cut_h
1030   PRINT "    Q:",Q
1040   PRINT " loss:",Loss
1050   !
1060   INPUT "Once more? [Y]es/[N]o",Inp_char$
1070   IF UPC$(Inp_char$)="Y" OR UPC$(Inp_char$)="YES" THEN Meas_start
1080   !
1090   END
1100   !=============================================
1110   ! Full n Port Calibration Function
1120   !=============================================
1130 SUB Cal_solt(@Agte507x,Ch$,INTEGER Num_of_ports,INTEGER Port(*))
1140   DIM Buff$[9]
1150   INTEGER I,J
1160   !
1170   PRINT "## Full "&VAL$(Num_of_ports)&" Port Calibration ##"
1180   !
1190   ! Calibration Type Selection
1200   !
1210   OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:METH:SOLT"&VAL$(Num_of_
ports)&" ";
1220   FOR I=1 TO Num_of_ports-1
1230     OUTPUT @Agte507x;Port(I);",";
1240   NEXT I
```

```
1250   OUTPUT @Agte507x;Port(Num_of_ports)
1260   !
1270   ! Reflection Measurement
1280   !
1290   FOR I=1 TO Num_of_ports
1300     PRINT "Set OPEN  to Port "&VAL$(Port(I))&". Then push [Enter]
key."
1310     INPUT "",Buff$
1320     OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:OPEN ";Port(I)
1330     OUTPUT @Agte507x;"*OPC?"
1340     ENTER @Agte507x;Buff$
1350     PRINT "Set SHORT to Port "&VAL$(Port(I))&". Then push [Enter]
key."
1360     INPUT "",Buff$
1370     OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:SHOR ";Port(I)
1380     OUTPUT @Agte507x;"*OPC?"
1390     ENTER @Agte507x;Buff$
1400     PRINT "Set LOAD  to Port "&VAL$(Port(I))&". Then push [Enter]
key."
1410     INPUT "",Buff$
1420     OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:LOAD ";Port(I)
1430     OUTPUT @Agte507x;"*OPC?"
1440     ENTER @Agte507x;Buff$
1450   NEXT I
1460   !
1470   ! Transmission Measurement
1480   !
1490   FOR I=1 TO Num_of_ports-1
1500     FOR J=I+1 TO Num_of_ports
1510       PRINT "Set THRU between Port "&VAL$(Port(I))&" and Port "&
VAL$(Port(J))&". Then push [Enter] key."
1520       INPUT "",Buff$
1530       OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:THRU ";Port(I);","
;Port(J)
1540       OUTPUT @Agte507x;"*OPC?"
1550       ENTER @Agte507x;Buff$
1560       OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:THRU ";Port(J);","
;Port(I)
1570       OUTPUT @Agte507x;"*OPC?"
1580       ENTER @Agte507x;Buff$
1590     NEXT J
1600   NEXT I
1610   !
1620   ! Done
1630   !
1640   OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:SAVE"
1650   PRINT "Done"
1660 SUBEND
```

Measurement with Automatic Test Systems

Example 13-2 provides a sample program that performs duplexer measurement making use of the limit test function and the handler I/O port (trigger input and test result output), assuming the use with an automated test system using the handler. You can find the source file of this program, named meas_sys.htb, on the sample program disk.

When started, the program displays the screen where the user can select the calibration kit. Enter a number corresponding the desired kit and press **[Enter]**. Next, the program displays the message "Set OPEN to Port 1. Then push [Enter] key." Connect the OPEN standard to the port 1 and press **[Enter]** to measure the OPEN calibration data. Likewise, connect the SHORT and the LOAD standards and measure each calibration data.Follow instructions on the screen to measure OPEN/SHORT/LOAD calibration data for ports 2 and 3 as well as for port 1.

When the measurement of OPEN/SHORT/LOAD calibration data completes, the program displays the message "Set THRU between Port 1 and Port 2. Then push [Enter] key." Connect the THRU standard between the ports 1 and 2 and press **[Enter]** to measure the THRU calibration data. Likewise, measure THRU calibration data for ports 1 and 3, and 2 and 3.

When the calibration is done, the program displays the message "Set Dut. Then input external trigger." Connect the DUT and supply an external trigger signal through the handler I/O port. When the measurement is finished, the program displays the measurement result, the insertion loss for Tx and Rx and pass band ripple. After this operation is repeated ten times, the program terminates.

The program is described in detail below:

Line 70	Assigns a GPIB address to the I/O pass.
Lines 90 to 110	These lines assign the measurement times (10), the upper limit of ripple for Tx (2 dBm), and the one for Rx (2 dBm), to the variables Max_meas, Tx_rpl_lim, and Rx_rpl_lim, respectively.
Lines 130 to 190	These lines assign the IF bandwidth (70 kHz), the power level (0 dBm), the number of traces (2), the measurement parameters for trace 1 (S13), the ones for trace 2 (S21), the data format for trace 1 (Log Mag), and the one for trace 2 (Log Mag) to the variables If_bw, Pow, Num_of_tr, Param1$, Param2$, Fmt1$, and Fmt1$, respectively.
Lines 210 to 420	These lines assign necessary settings to corresponding variables for creating a segment sweep table shown in Table 13-1.

Table 13-1 **Segment sweep table**

No.	Start	Stop	Points
1	1730 MHz	1830 MHz	50
2	1830 MHz	2030 MHz	400
3	2030 MHz	2130 MHz	50
4	3650 MHz	4030 MHz	38
5	5500 MHz	6020 MHz	52

Lines 440 to 1010 These lines assign necessary setting to corresponding variables for creating a limit table shown in Table 13-2, Table 13-3.

Table 13-2 **Limit table for trace 1**

No.	Type	Begin Stimulus	End Stimulus	Begin Response	End Response
1	MAX	1730 MHz	1930 MHz	0 dBm	0 dBm
2	MIN	1850 MHz	1910 MHz	-4 dBm	-4 dBm
3	MAX	1930 MHz	1990 MHz	-35 dBm	-35 dBm
4	MAX	1990 MHz	2130 MHz	-40 dBm	-40 dBm
5	MAX	2130 MHz	6020 MHz	-25 dBm	-25 dBm

Table 13-3 **Limit table for trace 2**

No.	Type	Begin Stimulus	End Stimulus	Begin Response	End Response
1	MAX	1730 MHz	1850 MHz	-40 dBm	-40 dBm
2	MAX	1850 MHz	1910 MHz	-45 dBm	-45 dBm
3	MAX	1910 MHz	6020 MHz	0 dBm	0 dBm
4	MIN	1930 MHz	1990 MHz	-5 dBm	-5 dBm

Lines 1050 to 1070 These lines execute presetting, then assign the IF band width for channel 1 to If_bw and the power level to Pow, respectively.

Lines 1080 to 1140 These lines set the sweep type for channel 1 to segment sweep, and create a segment sweep table.

Lines 1150 to 1240 These lines assign the number of traces for channel 1 to Num_of_tr, the measurement parameters and data format for channel 1 to Para1$ and Fmt1$, the ones for channel 2 to Para2$ and Fmt2$, respectively, arrange two graphs tiled horizontally, and configure the display of horizontal axis to order basis.

Lines 1280 to 1320 These lines call the sub program Select_cal_kit to select a calibration kit for channel 1, set the ports to be used to 1, 2, and 3, then call another sub program Cal_solt to perform full 3-port calibration. For more information on the subprograms Select_cal_kit and Cal_solt, refer to the description in Example 4-1 on page 64.

Lines 1360 to 1370 These lines set the trigger source to the external trigger and turns on the continuous initiation mode for channel 1.

Lines 1410 to 1500 These lines create the limit table for trace 1 of channel 1, and then turn on the limit line display and limit test.

Lines 1540 to 1630 These lines create the limit table for trace 2 of channel 1, and then turn on the limit line display and limit test.

Lines 1670 to 1700 These lines set each bit in the operation status register and the service request enable register so that an SRQ is generated upon completion of the measurement.

Lines 1720 to 1740 These lines set each bit in the questionable limit channel 1 status register so that the combined test results of trace 1 and 2 is set to the bit 1 in the questionable limit status event register.

Lines 1780 to 1790 These lines lock any operation from the front panel, keyboard, or mouse.

Line 1830 This line turns Off the update of the LCD screen.

Lines 1870 to 2470 These lines repeat the following procedure Meas_max times.

1. Lines 1880 to 1910 Waits until the trigger system switches to "Waiting for Trigger" state.
2. Lines 1920 to 1940 Clears the status byte register, the operation status event register, the questionable limit status event register, and the questionable limit channel 1 status register.
3. Lines 1950 to 1960 These lines set the branch target for an SRQ interrupt to enable SRQ interrupts.
4. Lines 1970 to 1980: Displays a message prompting the user to connect the DUT and input an external trigger, and then waits until the program terminates upon the external trigger input.

NOTE This example employs the status reporting system to synchronize the trigger input and the termination of the program. It is also possible to use /READY FOR TRIG, /INDEX, or /SWEEP END output signals from the handler I/O port for synchronizing.

5. Lines 2030 to 2050: Retrieve the combined limit test results of trace 1 and 2.

NOTE It is also possible to obtain the limit test result using the /PASS_FAIL output signal from the handler I/O port.

6. Lines 2090 to 2100 Calls the sub program Select_cal_kit to obtain insertion loss for Tx and Rx and the value of pass band ripple.
7. Lines 2140 to 2230 Determines the ripple test result for Tx and Rx based on the ripple value for Tx and Rx.
8. Lines 2240 to 2300 Determines the overall result of the entire tests based on the limit test result and the ripple test result for Tx and Rx.
9. Line 2340: Output the overall result of entire test (Pass:0, Fail:1) to the bit 1 of the port A in the handler I/O port.
10. Line 2380: Updates the display on the LCD screen once.
11. Lines 2420 to 2460: Displays the measurement result.

Describe below is the sub program Analysis, which resides from line 3380 to 3560 and analyzes minimum value and difference between maximum and minimum values.

Line 3410 Set the trace with the trace number Tr$ in channel 1 active.

Lines 3430 to 3450 Set the analysis range for the analysis command to Star to Stop.

Lines 3470 to 3500 Use the analysis command to search the minimum value, retrieve the value and assign it to the Min variable.

Lines 3520 to 3550 Use the analysis command to search the difference between maximum and minimum values, retrieve the value and assign it to the Ptp variable.

Example 13-2 **Measurement with Automatic Test Systems (meas_sys.htb)**

```
10      DIM Param1$[9],Param2$[9],Fmt1$[9],Fmt2$[9],Buff$[9],Judge$[9],
Handler$[9]
20      REAL If_bw,Pow,Swp(1:5,1:3),Lim1(1:5,1:5),Lim2(1:4,1:5)
30      REAL Tx_loss,Rx_loss,Tx_rpl,Rx_rpl,Tx_rpl_lim,Rx_rpl_lim
40      INTEGER Max_meas,Segm_swp,Segm_lim1,Segm_lim2,Segment,Column
50      INTEGER Port(1:4),Cond_reg,Lim_judge,Tx_rpl_judge,Rx_rpl_judge,I
60      !
70      ASSIGN @Agte507x TO 717
80      !
90      Max_meas=10       !
100     Tx_rpl_lim=2      ! Pass Band     Tx: 2 dBm
110     Rx_rpl_lim=2      !  Ripple Limit Rx: 2 dBm
120     !
130     If_bw=7.0E+4      ! IF Bandwidth    : 70 kHz
140     Pow=0             ! Power level     : 0 dBm
150     Num_of_tr=2       ! Number of Traces: 2
160     Param1$="S13"     ! Meas.     Trace1: S13
170     Param2$="S21"     !   Param.  Trace2: S21
180     Fmt1$="MLOG"      ! Data      Trace1:
190     Fmt2$="MLOG"      !   Format  Trace2:
200     !
210     ! == Segment Sweep Table ==
220     Segm_swp=5             ! Segments   : 5
230     ! -- Segment 1 --
240     Swp(1,1)=1.73E+9       ! Start      : 1730 MHz
250     Swp(1,2)=1.83E+9       ! Stop       : 1830 MHz
260     Swp(1,3)=50            ! Nop        : 50
270     ! -- Segment 2 --
280     Swp(2,1)=1.83E+9       ! Start      : 1830 MHz
290     Swp(2,2)=2.03E+9       ! Stop       : 2030 MHz
300     Swp(2,3)=400           ! Nop        : 400
310     ! -- Segment 3 --
320     Swp(3,1)=2.03E+9       ! Start      : 2030 MHz
330     Swp(3,2)=2.13E+9       ! Stop       : 2130 MHz
340     Swp(3,3)=50            ! Nop        : 50
350     ! -- Segment 4 --
360     Swp(4,1)=3.65E+9       ! Start      : 3650 MHz
370     Swp(4,2)=4.03E+9       ! Stop       : 4030 MHz
380     Swp(4,3)=38            ! Nop        : 38
390     ! -- Segment 5 --
400     Swp(5,1)=5.5E+9        ! Start      : 5500 MHz
410     Swp(5,2)=6.02E+9       ! Stop       : 6020 MHz
420     Swp(5,3)=52            ! Nop        : 52
430     !
440     ! == Trace 1 (S13) Limit Line ==
450     Segm_lim1=5            ! Segments   : 5
```

```
460    ! -- Segment 1 --
470    Lim1(1,1)=1              ! Type       : Maximum
480    Lim1(1,2)=1.73E+9        ! Freq. Start: 1730 MHz
490    Lim1(1,3)=1.93E+9        !       Stop : 1930 MHz
500    Lim1(1,4)=0              ! Resp. Start: 0 dBm
510    Lim1(1,5)=0              !       Stop : 0 dBm
520    ! -- Segment 2 --
530    Lim1(2,1)=2              ! Type       : Minimum
540    Lim1(2,2)=1.85E+9        ! Freq. Start: 1850 MHz
550    Lim1(2,3)=1.91E+9        !       Stop : 1910 MHz
560    Lim1(2,4)=-4             ! Resp. Start: -4 dBm
570    Lim1(2,5)=-4             !       Stop : -4 dBm
580    ! -- Segment 3 --
590    Lim1(3,1)=1              ! Type       : Maximum
600    Lim1(3,2)=1.93E+9        ! Freq. Start: 1930 MHz
610    Lim1(3,3)=1.99E+9        !       Stop : 1990 MHz
620    Lim1(3,4)=-35            ! Resp. Start: -35 dBm
630    Lim1(3,5)=-35            !       Stop : -35 dBm
640    ! -- Segment 4 --
650    Lim1(4,1)=1              ! Type       : Maximum
660    Lim1(4,2)=1.99E+9        ! Freq. Start: 1990 MHz
670    Lim1(4,3)=2.13E+9        !       Stop : 2130 MHz
680    Lim1(4,4)=-40            ! Resp. Start: -40 dBm
690    Lim1(4,5)=-40            !       Stop : -40 dBm
700    ! -- Segment 5 --
710    Lim1(5,1)=1              ! Type       : Maximum
720    Lim1(5,2)=2.13E+9        ! Freq. Start: 2130 MHz
730    Lim1(5,3)=6.02E+9        !       Stop : 6020 MHz
740    Lim1(5,4)=-25            ! Resp. Start: -25 dBm
750    Lim1(5,5)=-25            !       Stop : -25 dBm
760    ! == Trace 2 (S21) Limit Line ==
770    Segm_lim2=4              ! Segments   : 4
780    ! -- Segment 1 --
790    Lim2(1,1)=1              ! Type       : Maximum
800    Lim2(1,2)=1.73E+9        ! Freq. Start: 1730 MHz
810    Lim2(1,3)=1.85E+9        !       Stop : 1850 MHz
820    Lim2(1,4)=-40            ! Resp. Start: -40 dBm
830    Lim2(1,5)=-40            !       Stop : -40 dBm
840    ! -- Segment 2 --
850    Lim2(2,1)=1              ! Type       : Maximum
860    Lim2(2,2)=1.85E+9        ! Freq. Start: 1850 MHz
870    Lim2(2,3)=1.91E+9        !       Stop : 1910 MHz
880    Lim2(2,4)=-45            ! Resp. Start: -45 dBm
890    Lim2(2,5)=-45            !       Stop : -45 dBm
900    ! -- Segment 3 --
910    Lim2(3,1)=1              ! Type       : Maximum
920    Lim2(3,2)=1.91E+9        ! Freq. Start: 1910 MHz
930    Lim2(3,3)=6.20E+9        !       Stop : 6020 MHz
940    Lim2(3,4)=0              ! Resp. Start: 0 dBm
950    Lim2(3,5)=0              !       Stop : 0 dBm
960    ! -- Segment 4 --
970    Lim2(4,1)=2              ! Type       : Minimum
980    Lim2(4,2)=1.93E+9        ! Freq. Start: 1930 MHz
990    Lim2(4,3)=1.99E+9        !       Stop : 1990 MHz
1000   Lim2(4,4)=-5             ! Resp. Start: -5 dBm
1010   Lim2(4,5)=-5             !       Stop : -5 dBm
1020   !
1030   ! Measurement Conditions
1040   !
1050   OUTPUT @Agte507x;":SYST:PRES"
1060   OUTPUT @Agte507x;":SENS1:BWID ";If_bw
1070   OUTPUT @Agte507x;":SOUR1:POW ";Pow
```

```
1080   OUTPUT @Agte507x;":SENS1:SWE:TYPE SEGM"
1090   OUTPUT @Agte507x;":SENS1:SEGM:DATA 5,0,0,0,0,0,";Segm_swp;
1100   FOR Segment=1 TO Segm_swp
1110     FOR Column=1 TO 3
1120       OUTPUT @Agte507x;",";Swp(Segment,Column);
1130     NEXT Column
1140   NEXT Segment
1150   OUTPUT @Agte507x;""
1160   OUTPUT @Agte507x;":CALC1:PAR1:COUN ";Num_of_tr
1170   OUTPUT @Agte507x;":CALC1:PAR1:DEF "&Param1$
1180   OUTPUT @Agte507x;":CALC1:PAR1:SEL"
1190   OUTPUT @Agte507x;":CALC1:FORM "&Fmt1$
1200   OUTPUT @Agte507x;":CALC1:PAR2:DEF "&Param2$
1210   OUTPUT @Agte507x;":CALC1:PAR2:SEL"
1220   OUTPUT @Agte507x;":CALC1:FORM "&Fmt2$
1230   OUTPUT @Agte507x;":DISP:WIND1:SPL D1_2"
1240   OUTPUT @Agte507x;":DISP:WIND1:X:SPAC OBAS"
1250   !
1260   ! Full 3 Port Calibration
1270   !
1280   Select_cal_kit(@Agte507x,"1")
1290   Port(1)=1
1300   Port(2)=2
1310   Port(3)=3
1320   Cal_solt(@Agte507x,"1",3,Port(*))
1330   !
1340   ! Trigger System
1350   !
1360   OUTPUT @Agte507x;":TRIG:SOUR EXT"
1370   OUTPUT @Agte507x;":INIT1:CONT ON"
1380   !
1390   ! Trace 1 Limit Test
1400   !
1410   OUTPUT @Agte507x;":CALC1:PAR1:SEL"
1420   OUTPUT @Agte507x;":CALC1:LIM:DATA ";Segm_lim1;
1430   FOR Segment=1 TO Segm_lim1
1440     FOR Column=1 TO 5
1450       OUTPUT @Agte507x;",";Lim1(Segment,Column);
1460     NEXT Column
1470   NEXT Segment
1480   OUTPUT @Agte507x;""
1490   OUTPUT @Agte507x;":CALC1:LIM:DISP ON"
1500   OUTPUT @Agte507x;":CALC1:LIM ON"
1510   !
1520   ! Trace 2 Limit Test
1530   !
1540   OUTPUT @Agte507x;":CALC1:PAR2:SEL"
1550   OUTPUT @Agte507x;":CALC1:LIM:DATA ";Segm_lim2;
1560   FOR Segment=1 TO Segm_lim2
1570     FOR Column=1 TO 5
1580       OUTPUT @Agte507x;",";Lim2(Segment,Column);
1590     NEXT Column
1600   NEXT Segment
1610   OUTPUT @Agte507x;""
1620   OUTPUT @Agte507x;":CALC1:LIM:DISP ON"
1630   OUTPUT @Agte507x;":CALC1:LIM ON"
1640   !
1650   ! Status Registers
1660   !
1670   OUTPUT @Agte507x;":STAT:OPER:PTR 0"
1680   OUTPUT @Agte507x;":STAT:OPER:NTR 16"
1690   OUTPUT @Agte507x;":STAT:OPER:ENAB 16"
1700   OUTPUT @Agte507x;"*SRE 128"
```

```
1710   !
1720   OUTPUT @Agte507x;":STAT:QUES:LIM:CHAN1:ENAB 6"
1730   OUTPUT @Agte507x;":STAT:QUES:LIM:CHAN1:PTR 6"
1740   OUTPUT @Agte507x;":STAT:QUES:LIM:CHAN1:NTR 0"
1750   !
1760   ! Key Lock: ON
1770   !
1780   OUTPUT @Agte507x;":SYST:KLOC:KBD ON"
1790   OUTPUT @Agte507x;":SYST:KLOC:MOUS ON"
1800   !
1810   ! Display Update: OFF
1820   !
1830   OUTPUT @Agte507x;":DISP:ENAB OFF"
1840   !
1850   ! Measurement
1860   !
1870   FOR I=1 TO Max_meas
1880     REPEAT
1890       OUTPUT @Agte507x;":STAT:OPER:COND?"
1900       ENTER @Agte507x;Cond_reg
1910     UNTIL BIT(Cond_reg,5)
1920     OUTPUT @Agte507x;"*CLS"
1930     OUTPUT @Agte507x;"*OPC?"
1940     ENTER @Agte507x;Buff$
1950     ON INTR 7 GOTO Meas_end
1960     ENABLE INTR 7;2
1970     PRINT "Set DUT, then input external trigger!"
1980 Meas_wait: GOTO Meas_wait
1990 Meas_end: OFF INTR 7
2000     !
2010     ! Limit Test Result
2020     !
2030     OUTPUT @Agte507x;":STAT:QUES:LIM?"
2040     ENTER @Agte507x;Reg_val
2050     Lim_judge=BIT(Reg_val,1)    ! Fail:1, Pass:0
2060     !
2070     ! Insertion Loss & Ripple
2080     !
2090     Analysis(@Agte507x,"1",1.85E+9,1.91E+9,Tx_loss,Tx_rpl)
2100     Analysis(@Agte507x,"2",1.93E+9,1.99E+9,Rx_loss,Rx_rpl)
2110     !
2120     ! Pass/Fail Judgement
2130     !
2140     IF Tx_rpl>Tx_rpl_lim THEN
2150       Tx_rpl_judge=1
2160     ELSE
2170       Tx_rpl_judge=0
2180     END IF
2190     IF Rx_rpl>Rx_rpl_lim THEN
2200       Rx_rpl_judge=1
2210     ELSE
2220       Rx_rpl_judge=0
2230     END IF
2240     IF Lim_judge=0 AND Tx_rpl_judge=0 AND Rx_rpl_judge=0 THEN
2250       Judge$="PASS"
2260       Handler$="00000000"
2270     ELSE
2280       Judge$="FAIL"
2290       Handler$="00000001"
2300     END IF
```

```
2310     !
2320     ! Set Data to Handler I/O Port A
2330     !
2340     OUTPUT @Agte507x;":CONT:HAND:A ";IVAL(Handler$,2)
2350     !
2360     ! Update E507XA Display
2370     !
2380     OUTPUT @Agte507x;":DISP:UPD"
2390     !
2400     ! Display Results
2410     !
2420     PRINT "## "&Judge$&"! ##"
2430     PRINT USING "X,15A,X,SD.5DE";"[Tx] Ins. Loss:",Tx_loss
2440     PRINT USING "X,15A,X,SD.5DE";"     Ripple   :",Tx_rpl
2450     PRINT USING "X,15A,X,SD.5DE";"[Rx] Ins. Loss:",Rx_loss
2460     PRINT USING "X,15A,X,SD.5DE";"     Ripple   :",Rx_rpl
2470   NEXT I
2480   !
2490   END
2500   !=============================================
2510   ! Calibration Kit Selection Function
2520   !=============================================
2530 SUB Select_cal_kit(@Agte507x,Ch$)
2540   DIM Cal_kit_lbl$(1:10)[20],Inp_char$[9]
2550   INTEGER Cal_kit,I
2560   CLEAR SCREEN
2570   !
2580   FOR I=1 TO 10
2590     OUTPUT @Agte507x;":SENS1:CORR:COLL:CKIT ";I
2600     OUTPUT @Agte507x;":SENS1:CORR:COLL:CKIT:LAB?"
2610     ENTER @Agte507x;Cal_kit_lbl$(I)
2620   NEXT I
2630   ON ERROR GOTO Kit_select
2640 Kit_select: !
2650   PRINT "## Calibration Kit Selection ##"
2660   FOR I=1 TO 10
2670     PRINT USING "X,2D,A,X,20A";I,":",Cal_kit_lbl$(I)
2680   NEXT I
2690   PRINT ""
2700   PRINT "Input 1 to 10"
2710   INPUT "Input number? (1 to 10)",Inp_char$
2720   Cal_kit=IVAL(Inp_char$,10)
2730   IF Cal_kit<1 OR Cal_kit>10 THEN Kit_select
2740   OFF ERROR
2750   !
2760   OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:CKIT ";Cal_kit
2770 SUBEND
2780   !=============================================
2790   ! Full n Port Calibration Function
2800   !=============================================
2810 SUB Cal_solt(@Agte507x,Ch$,INTEGER Num_of_ports,INTEGER Port(*))
2820   DIM Buff$[9]
2830   INTEGER I,J
2840   !
2850   PRINT "## Full "&VAL$(Num_of_ports)&" Port Calibration ##"
2860   !
2870   ! Calibration Type Selection
2880   !
2890   OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:METH:SOLT"&VAL$(Num_of_
ports)&" ";
2900   FOR I=1 TO Num_of_ports-1
2910     OUTPUT @Agte507x;Port(I);",";
2920   NEXT I
```

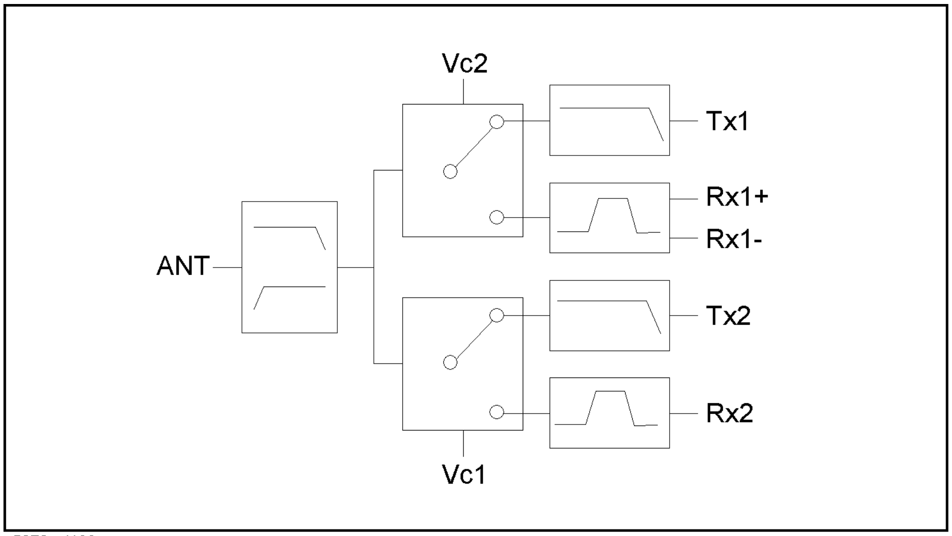
```
2930   OUTPUT @Agte507x;Port(Num_of_ports)
2940   !
2950   ! Reflection Measurement
2960   !
2970   FOR I=1 TO Num_of_ports
2980     PRINT "Set OPEN  to Port "&VAL$(Port(I))&". Then push [Enter]
key."
2990     INPUT "",Buff$
3000     OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:OPEN ";Port(I)
3010     OUTPUT @Agte507x;"*OPC?"
3020     ENTER @Agte507x;Buff$
3030     PRINT "Set SHORT to Port "&VAL$(Port(I))&". Then push [Enter]
key."
3040     INPUT "",Buff$
3050     OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:SHOR ";Port(I)
3060     OUTPUT @Agte507x;"*OPC?"
3070     ENTER @Agte507x;Buff$
3080     PRINT "Set LOAD  to Port "&VAL$(Port(I))&". Then push [Enter]
key."
3090     INPUT "",Buff$
3100     OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:LOAD ";Port(I)
3110     OUTPUT @Agte507x;"*OPC?"
3120     ENTER @Agte507x;Buff$
3130   NEXT I
3140   !
3150   ! Transmission Measurement
3160   !
3170   FOR I=1 TO Num_of_ports-1
3180     FOR J=I+1 TO Num_of_ports
3190       PRINT "Set THRU between Port "&VAL$(Port(I))&" and Port "&
VAL$(Port(J
))&". Then push [Enter] key."
3200       INPUT "",Buff$
3210       OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:THRU ";Port(I);","
;Port(J)
3220       OUTPUT @Agte507x;"*OPC?"
3230       ENTER @Agte507x;Buff$
3240       OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:THRU ";Port(J);","
;Port(I)
3250       OUTPUT @Agte507x;"*OPC?"
3260       ENTER @Agte507x;Buff$
3270     NEXT J
3280   NEXT I
3290   !
3300   ! Done
3310   !
3320   OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:SAVE"
3330   PRINT "Done"
3340 SUBEND
3350   !=============================================
3360   ! Min. Value & Peak to Peak Analysis Function
3370   !=============================================
3380 SUB Analysis(@Agte507x,Tr$,REAL Star,REAL Stop,REAL Min,REAL Ptp)
3390   REAL Dummy
3400   !
3410   OUTPUT @Agte507x;":CALC1:PAR"&Tr$&":SEL"
3420   !
3430   OUTPUT @Agte507x;":CALC1:FUNC:DOM ON"
3440   OUTPUT @Agte507x;":CALC1:FUNC:DOM:STAR ";Star
3450   OUTPUT @Agte507x;":CALC1:FUNC:DOM:STOP ";Stop
3460   !
```

```
3470   OUTPUT @Agte507x;":CALC1:FUNC:TYPE MIN"
3480   OUTPUT @Agte507x;":CALC1:FUNC:EXEC"
3490   OUTPUT @Agte507x;":CALC1:FUNC:DATA?"
3500   ENTER @Agte507x;Min,Dummy
3510   !
3520   OUTPUT @Agte507x;":CALC1:FUNC:TYPE PTP"
3530   OUTPUT @Agte507x;":CALC1:FUNC:EXEC"
3540   OUTPUT @Agte507x;":CALC1:FUNC:DATA?"
3550   ENTER @Agte507x;Ptp,Dummy
3560 SUBEND
```

Measurement using E5091A (measuring FEM)

Example 13-3 shows a sample program of front end module (FEM) measurement as a sample program of measurement using the E5091A. You can find the source file of this program, named meas_fem.htb, on the sample program disk.

This program calibrates each channel using the ECal module and then measures the transmission characteristics EGSM:Tx-Antenna (channel 1), EGSM:Antenna-Rx (channel 2), GSM1800:Tx-Antenna (channel 3), and GSM1800:Antenna-Rx (channel 4) of the 6-port dual-band FEM as shown in the below figure.



e5070auj199

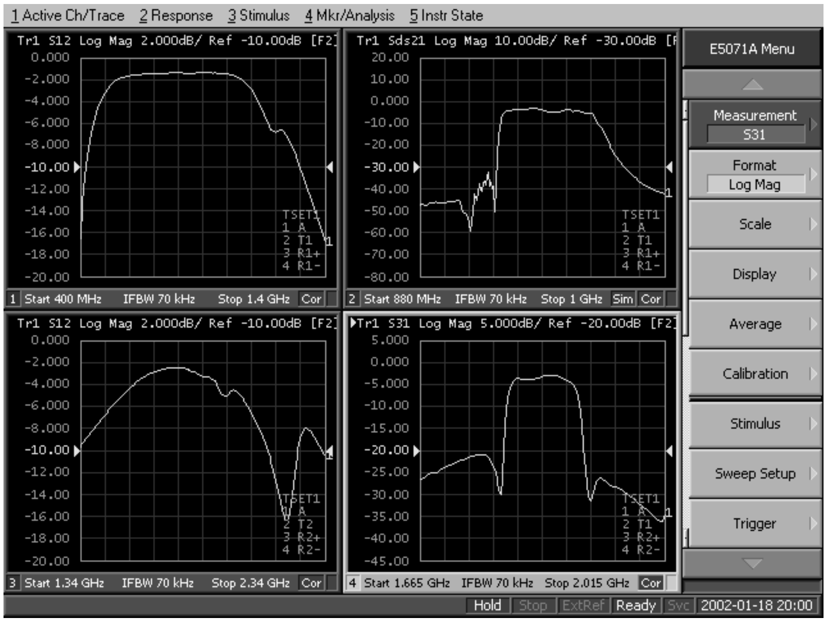
When you start the program, "Connect A and T1 to ECal Module." is displayed. Connect the cables connected to A and T1 of the E5091A to the ECal module and press the **[Enter]** key to calibrate channel 1. If an error occurs due to a problem in the connection to the ECal module, an error message appears and "Re-try? [Y]es/[N]o" appears. You can execute calibration again by pressing the **[y]** key and then the **[Enter]** key. If you want to abort the program, press the **[n]** key and then the **[Enter]** key. For channels 2 to 4, execute the calibration in the same way.

When the calibration is complete, "Set DUT. Then Push [Enter] key." is displayed. Connect the DUT (FEM) and the E5091A as shown below and press the **[Enter]** key to start the measurement.

FEM		E5091A
Antenna		A
EGSM	Tx	T1
	Rx+	R1+
	Rx-	R1-
GSM1800	Tx	T2
	Rx	R2+
Vc1		Control Line 1
Vc2		Control Line 2

Figure 13-3 shows a sample display of the LCD screen after the program exits execution.

Figure 13-3 Example of display after executing program in Example 13-3



The program is described in detail below:

Line 70 Assigns a GPIB address to the I/O path.

Lines 110 to 300 Sets the ports assigned to port 1 to port 4 of the E5091A and the control line setting (the below table) into the Port1$(*), Port2$(*), Port3$(*), Port4$(*), and C_lines(*) variables.

Channel number	Port 1	Port 2	Port 3	Port 4	Control Lines
1	A	T1	R1+	R1-	0 (00000000)
2	A	T1	R1+	R1-	2 (00000010)
3	A	T2	R2+	R2-	0 (00000000)
4	A	T2	R2+	R2-	1 (00000001)

Lines 340 to 660 Sets the settings required for the measurement conditions in the below table to the variables.

Channel number	Sweep range		Number of points	Number of traces	Measurement parameter
	Start	Stop			
1	400 MHz	1.4 GHz	51	1	S12
2	880 MHz	1 GHz	101	1	Sds21
3	1.34 GHz	2.34 GHz	201	1	S12
4	1.665 GHz	2.015 GHz	101	1	S31

Channel number	Fixture simulator		Title
	ON/OFF	Topology	
1	Off	——	[EGSM] Tx-Antenna
2	On	SE:1, Bal:3,4	[EGSM] Antenna-Rx

Channel number	Fixture simulator		Title
	ON/OFF	Topology	
3	Off	——	[GSM1800] Antenna-Rx
4	Off	——	[GSM1800] Tx-Antenna

Line 690 Puts the instrument into preset state.

Line 700 Allocate the windows to the upper left, upper right, lower left, and lower right.

Lines 720 to 1000 Repeat the following for channels 1 to 4. Where, i is the channel number.

Lines 760 to 810: For the E5091A whose ID is 1, sets the port assigned to port 1 to Port1$(i), the port assigned to port 2 to Port2$(i), the port assigned to port 3 to Port3$(i), and the port assigned to port 4 to Port4$(i), respectively.

Line 800: Sets the control line of the E5091A whose ID is 1 to C_lines(i).

Lines 840 to 870: Sets the sweep start value to Star(i), the sweep stop value to Stop(i), the number of points to Nop(i), and the number of traces to N_tr(i), respectively.

Lines 890 to 930: If the fixture simulator function is ON (Fsim$(i) is "ON"), sets the fixture simulator function to ON, the device type to Dev$(i), the port assignment to Top$(i), the balance-unbalance conversion to ON, and the measurement parameter (mix mode S-parameter) to Trc$(i), respectively.

Line 950: If the fixture simulator function is OFF (Fsim$(i) is "OFF"), sets the measurement parameter (S-parameter) to Trc$.

Lines 970 to 990: Sets the title label to Ttl$(i), the title display to ON, and the continuous startup mode to ON, respectively.

Line 1020 Sets the trigger source to "Bus."

Lines 1030 to 1040 For the E5091A whose ID is 1, sets the property display to ON and the control to ON, respectively.

Lines 1080 to 1090 Uses the subprogram FNCal_solt_tset to execute the calibration of channel 1 with the ECal module (full 2-port calibration of ports A and T1). If the calibration is not completed correctly, aborts the program.

Lines 1100 to 1150 Executes the calibration of channels 2 to 4 in the same way.

Lines 1200 to 1210 Prompts the user to connect the DUT and wait for **[Enter]** to be pressed after the DUT is connected.

Lines 1230 to 1250 Triggers the instrument, and waits until the measurement cycle finishes.

Lines 1270 to 1290 Executes auto scale for the trace 1 of channels 1 to 4.

Lines 1310 to 1320 Prompts the user to decide to perform another measurement. When **[y]** is pressed followed by **[Enter]** key, the program will return to the part where the DUT is connected and continue measurement.

The FNCal_solt_tset subprogram in lines 1380 to 1630, which performs ECal, is described below.

Line 1420	Displays the calibration type.
Line 1450	Clears the error queue.
Lines 1460 to 1480	Prompts the user to connect the Tset_Port$ of the E5091A to the ECal module and wait for a press of the [Enter] key after the connection.
Line 1490	Executes the ECal command for the full solt$-port calibration for the port Ana_port$ of the channel Ch$.
Lines 1510 to 1520	Retrieves the error number and error message from the error queue, and then stores them into the variables Err_no and Err_msg$, respectively.
Lines 1540 to 1550	If Err_no returns a non-zero value (an error value), the program displays the corresponding error message.
Lines 1560 to 1580	If Err_no is other than 0 (occurrence of an error), prompts the user to enter whether to execute ECal again. When **[y]** is pressed followed by **[Enter]** key, the program will return to the part of the connection and repeat ECal. When a key other than the **[y]** key is pressed followed by **[Enter]** key, the program will return Err_no as the return value of the subprogram.
Lines 1600 to 1610	If Err_no is 0 (no error occurrence), displays the ECal completion message and returns Err_no (0) as the return value of the subprogram.

Example 13-3 **Measurement of FEM (meas_fem.htb)**

```
10     DIM Port1$(1:4)[9],Port2$(1:4)[9],Port3$(1:4)[9],Port4$(1:4)[9]
20     DIM Fsim$(1:4)[9],Tpl$(1:4)[9],Trc$(1:4)[9],Ttl$(1:4)[30]
30     DIM Buff$[9],Inp_char$[9]
40     REAL Star(1:4),Stop(1:4)
50     INTEGER C_lines(1:4),Nop(1:4),N_tr(1:4),Ch,Res
60     !
70     ASSIGN @Agte507x TO 717
80     !
90     ! E5091A Setup
100    !
110    Port1$(1)="A"      ![Ch1]     Port1: A
120    Port2$(1)="T1"     !          Port2: T1
130    Port3$(1)="R1"     !          Port3: R1+
140    Port4$(1)="R1"     !          Port4: R1-
150    C_lines(1)=0       !     Ctrl Lines: 0
160    Port1$(2)="A"      ![Ch2]     Port1: A
170    Port2$(2)="T1"     !          Port2: T1
180    Port3$(2)="R1"     !          Port3: R1+
190    Port4$(2)="R1"     !          Port4: R1-
200    C_lines(2)=1       !     Ctrl Lines: 2 (Line2:HIGH)
210    Port1$(3)="A"      ![Ch3]     Port1: A
220    Port2$(3)="T2"     !          Port2: T2
230    Port3$(3)="R2"     !          Port3: R2+
240    Port4$(3)="R2"     !          Port4: R2- (Dummy)
250    C_lines(3)=0       !     Ctrl Lines: 0
260    Port1$(4)="A"      ![Ch4]     Port1: A
270    Port2$(4)="T2"     !          Port2: T2
280    Port3$(4)="R2"     !          Port3: R2+
290    Port4$(4)="R2"     !          Port4: R2- (Dummy)
300    C_lines(4)=1       !     Ctrl Lines: 1 (Line1:HIGH)
310    !
320    ! Measurement Condition
330    !                   [Ch1]
340    Star(1)=4.E+8      ! Start Frequency    : 400 MHz
350    Stop(1)=1.4E+9     ! Stop Frequency     : 1.4 GHz
360    Nop(1)=51          ! Number of Points   : 51
370    N_tr(1)=1          ! Number of Traces   : 1
380    Fsim$(1)="OFF"     ! Fixture Simulator  : OFF
390    Trc$(1)="S12"      ! Meas. Param.       : S12
400    Ttl$(1)="[EGSM] Tx-Antenna"
410    !                   [Ch2]
420    Star(2)=8.8E+8     ! Start Frequency    : 880 MHz
430    Stop(2)=1.E+9      ! Stop Frequency     : 1 GHz
440    Nop(2)=101         ! Number of Points   : 101
450    N_tr(2)=1          ! Number of Traces   : 1
460    Fsim$(2)="ON"      ! Fixture Simulator  : ON
470    Dev$(2)="SBAL"     ! Bal. Device Type   : SE-Bal
480    Tpl$(2)="1,3,4"    ! Topology           : SE:1,Bal:3-4
490    Trc$(2)="SDS21"    ! Meas. Param.       : Sds21
500    Ttl$(2)="[EGSM] Antenna-Rx"
510    !                   [Ch3]
520    Star(3)=1.34E+9    ! Start Frequency    : 1.34 GHz
530    Stop(3)=2.34E+9    ! Stop Frequency     : 2.34 GHz
540    Nop(3)=201         ! Number of Points   : 201
550    N_tr(3)=1          ! Number of Traces   : 1
560    Fsim$(3)="OFF"     ! Fixture Simulator  : OFF
570    Trc$(3)="S12"      ! Meas. Param.       : S12
580    Ttl$(3)="[GSM1800] Tx-Antenna"
590    !                   [Ch4]
600    Star(4)=1.665E+9   ! Start Frequency    : 1.665 GHz
610    Stop(4)=2.015E+9   ! Stop Frequency     : 2.015 GHz
```

```
620    Nop(4)=101          ! Number of Points    : 101
630    N_tr(4)=1           ! Number of Traces    : 1
640    Fsim$(4)="OFF"      ! Fixture Simulator   : OFF
650    Trc$(4)="S31"       ! Meas. Param.        : S31
660    Ttl$(4)="[GSM1800] Antenna-Rx"
670    !
680    CLEAR SCREEN
690    OUTPUT @Agte507x;":SYST:PRES"
700    OUTPUT @Agte507x;":DISP:SPL D12_34"
710    !
720    FOR Ch=1 TO 4
730      !
740      ! E5091A Setup
750      !
760     OUTPUT @Agte507x;":SENS"&VAL$(Ch)&":MULT1:TSET9:PORT1 "&Port1$(
Ch)
770     OUTPUT @Agte507x;":SENS"&VAL$(Ch)&":MULT1:TSET9:PORT2 "&Port2$(
Ch)
780     OUTPUT @Agte507x;":SENS"&VAL$(Ch)&":MULT1:TSET9:PORT3 "&Port3$(
Ch)
790     OUTPUT @Agte507x;":SENS"&VAL$(Ch)&":MULT1:TSET9:PORT4 "&Port4$(
Ch)
800     OUTPUT @Agte507x;":SENS"&VAL$(Ch)&":MULT1:TSET9:OUTP ";C_lines(
Ch)
810      !
820      ! Measurement Condition
830      !
840      OUTPUT @Agte507x;":SENS"&VAL$(Ch)&":FREQ:STAR ";Star(Ch)
850      OUTPUT @Agte507x;":SENS"&VAL$(Ch)&":FREQ:STOP ";Stop(Ch)
860      OUTPUT @Agte507x;":SENS"&VAL$(Ch)&":SWE:POIN ";Nop(Ch)
870      OUTPUT @Agte507x;":CALC"&VAL$(Ch)&":PAR:COUN ";N_tr(Ch)
880      IF Fsim$(Ch)="ON" THEN
890        OUTPUT @Agte507x;":CALC"&VAL$(Ch)&":FSIM:STAT ON"
900        OUTPUT @Agte507x;":CALC"&VAL$(Ch)&":FSIM:BAL:DEV "&Dev$(Ch)
910       OUTPUT @Agte507x;":CALC"&VAL$(Ch)&":FSIM:BAL:TOP:"&Dev$(Ch)&"
 "&Tpl$ (Ch)
920        OUTPUT @Agte507x;":CALC"&VAL$(Ch)&":FSIM:BAL:PAR1:STAT ON"
930       OUTPUT @Agte507x;":CALC"&VAL$(Ch)&":FSIM:BAL:PAR1:"&Dev$(Ch)&
" "&Trc $(Ch)
940      ELSE
950        OUTPUT @Agte507x;":CALC"&VAL$(Ch)&":PAR1:DEF "&Trc$(Ch)
960      END IF
970     OUTPUT @Agte507x;":DISP:WIND"&VAL$(Ch)&":TITL:DATA """&Ttl$(Ch)
&""""
980      OUTPUT @Agte507x;":DISP:WIND"&VAL$(Ch)&":TITL ON"
990      OUTPUT @Agte507x;":INIT"&VAL$(Ch)&":CONT ON"
1000   NEXT Ch
1010   !
1020   OUTPUT @Agte507x;":TRIG:SOUR BUS"
1030   OUTPUT @Agte507x;":SENS:MULT1:DISP ON"
1040   OUTPUT @Agte507x;":SENS:MULT1:STAT ON"
1050   !
1060   ! Calibration
1070   !
1080   Res=FNEcal_solt_tset(@Agte507x,"1","2","1,2","A and T1")
1090   IF Res<>0 THEN Prg_end
1100   Res=FNEcal_solt_tset(@Agte507x,"2","3","1,3,4","A, R1+ and R1-")
1110   IF Res<>0 THEN Prg_end
1120   Res=FNEcal_solt_tset(@Agte507x,"3","2","1,2","A and T2")
1130   IF Res<>0 THEN Prg_end
1140   Res=FNEcal_solt_tset(@Agte507x,"4","2","1,3","A and R2+")
1150   IF Res<>0 THEN Prg_end
1160   !
1170   ! Measurement
```

```
1180   !
1190 Meas_start:!
1200   PRINT "Set DUT. Then Push [Enter] key."
1210   INPUT "",Inp_char$
1220   !
1230   OUTPUT @Agte507x;":TRIG:SING"
1240   OUTPUT @Agte507x;"*OPC?"
1250   ENTER @Agte507x;Buff$
1260   !
1270   FOR Ch=1 TO 4
1280     OUTPUT @Agte507x;":DISP:WIND"&VAL$(Ch)&":TRAC1:Y:AUTO"
1290   NEXT Ch
1300   !
1310   INPUT "Once more? [Y]es/[N]o",Inp_char$
1320   IF UPC$(Inp_char$)="Y" OR UPC$(Inp_char$)="YES" THEN Meas_start
1330 Prg_end:!
1340   END
1350   !=========================================================
1360   ! Electronic Full n Port Calibration Function for E5091A
1370   !=========================================================
1380 DEF FNEcal_solt_tset(@Agte507x,Ch$,Solt$,Ana_port$,Tset_port$)
1390   DIM Buff$[9],Err_msg$[100]
1400   INTEGER Err_no
1410   !
1420   PRINT "## [Ch "&Ch$&"] Full "&Solt$&" Port Calibration (ECal) ##"
1430   !
1440 Ecal_start:!
1450   OUTPUT @Agte507x;"*CLS"
1460   PRINT "Connect "&Tset_port$&" to ECal Module."
1470   PRINT "Then push [Enter] key."
1480   INPUT "",Buff$
1490  OUTPUT @Agte507x;":SENS"&Ch$&":CORR:COLL:ECAL:SOLT"&Solt$&" "&Ana
_port$
1500   PRINT "Executing ..."
1510   OUTPUT @Agte507x;":SYST:ERR?"
1520   ENTER @Agte507x;Err_no,Err_msg$
1530   IF Err_no<>0 THEN
1540     PRINT "Error occurred!!"
1550     PRINT "  No:";Err_no,"Description: "&Err_msg$
1560     INPUT "Re-try? [Y]es/[N]o",Inp_char$
1570     IF UPC$(Inp_char$)="Y" OR UPC$(Inp_char$)="YES" THEN Ecal_start
1580     RETURN Err_no
1590   ELSE
1600     PRINT "Done"
1610     RETURN Err_no
1620   END IF
1630 FNEND
```

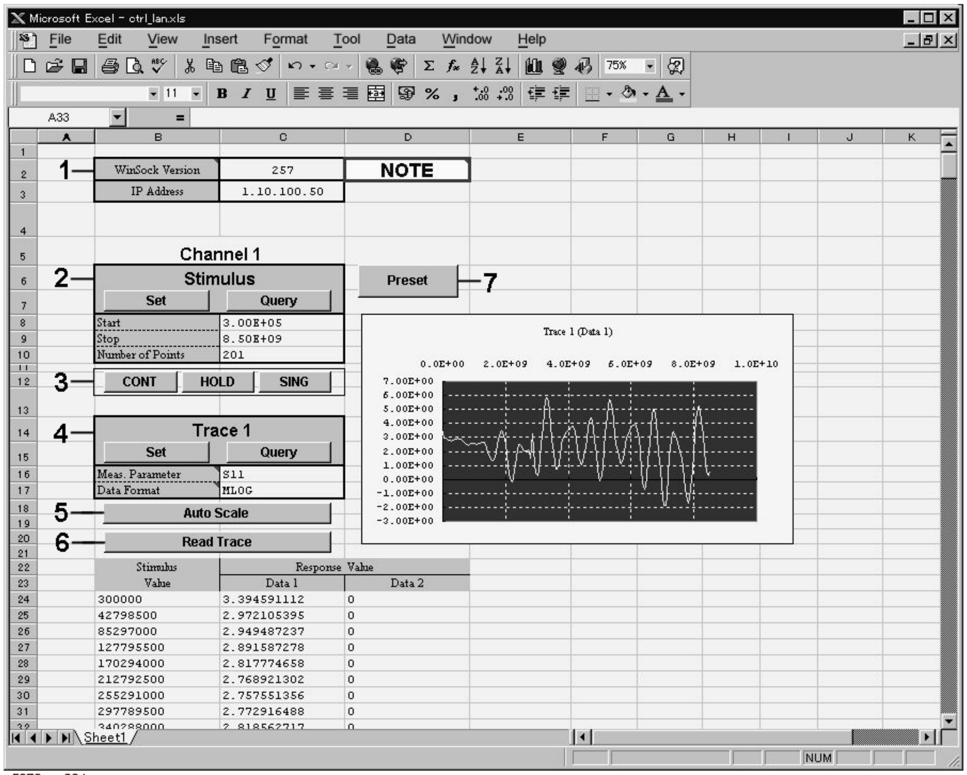
Controlling over LAN

This section describes how to control the E5070A/E5071A using WinSock API in the Windows environment, with a sample program written in Visual Basic (VBA macro). You can find the source file of this program, named ctrl_lan.xls (Microsoft Excel file), on the sample program disk.

Using VBA macro

Opening ctrl_lan.xls in Microsoft Excel display a screen as shown in Figure 13-4.

Figure 13-4 **ctrl_lan.xls**



e5070ape024

For how to use each element in Figure 13-4, refer to the following description.

We begin describing the part 1. Enter the version number of WinSock API in the cell right side of “Winsock Version.” The version number is obtained by multiplying 256 by the major version then adding the minor version. For example, when the version of your Winsock API is 1.1, the version number is obtained as follows: $256\times1+1=257$. Enter the IP address of the E5070A/E5071A in the cell right side of “IP Address.” This VBA macro will not work properly without appropriate values in the two cells.

In the part 2, sweep range (start and stop points) and number of measurement points are set. Clicking the button labeled as “Set” executes setting operation as specified with the setting table, while clicking the button labeled as “Query” retrieves the current settings of the E5070A/E5071A.

The part 3 is dedicated to setting the trigger mode.

The part 4 set the measurement parameters and data format for trace 1 in channel 1. Clicking the button labeled as ‘Set” executes setting operation as specified with the setting table, while clicking the button labeled as “Query” retrieves the current settings of the E5070A/E5071A.

In the part 5, clicking the button labeled as “Auto Scale” executes auto scaling for trace 1 in channel 1.

Clicking the button labeled as “Read Trace” in the part 6 retrieves the formatted data of trace 1 in channel 1 and displays it in tabular and graphical formats.

Clicking the button labeled as “Preset” executes the presetting operation.

Description of operation in VBA macro

Here described is operation of the VBA macro, focusing on the part related to controlling with WinSock API.

In order to use WinSock API, you must declare functions and define variables with a definition file of WinSock API, as shown in Example 13-4.

Example 13-4 **Definition file of WinSock API**

```
'This is the Winsock API definition file for Visual Basic

'Setup the variable type 'hostent' for the WSAStartup command
Type Hostent
  h_name As Long
  h_aliases As Long
  h_addrtype As String * 2
  h_length As String * 2
  h_addr_list As Long
End Type
Public Const SZHOSTENT = 16


'Set the Internet address type to a long integer (32-bit)
Type in_addr
   s_addr As Long
End Type


'A note to those familiar with the C header file for Winsock
'Visual Basic does not permit a user-defined variable type
'to be used as a return structure.  In the case of the
'variable definition below, sin_addr must
'be declared as a long integer rather than the user-defined
'variable type of in_addr.
Type sockaddr_in
   sin_family As Integer
   sin_port As Integer
   sin_addr As Long
   sin_zero As String * 8
End Type

Public Const WSADESCRIPTION_LEN = 256
Public Const WSASYS_STATUS_LEN = 128
Public Const WSA_DescriptionSize = WSADESCRIPTION_LEN + 1
Public Const WSA_SysStatusSize = WSASYS_STATUS_LEN + 1
```

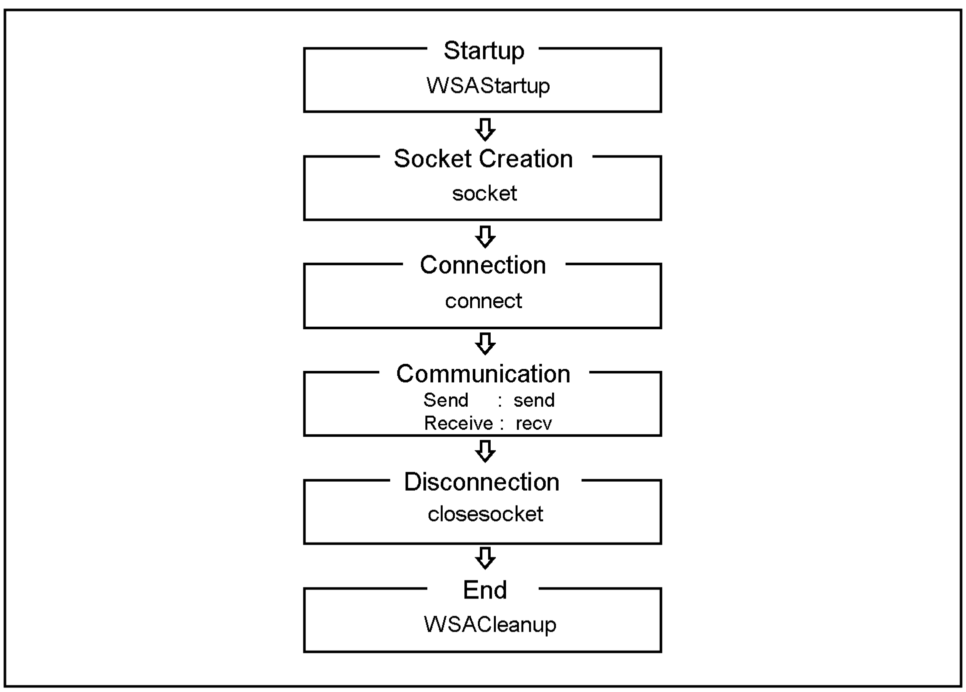
```
'Setup the structure for the information returned from
'the WSAStartup() function.
Type WSAData
   wVersion As Integer
   wHighVersion As Integer
   szDescription As String * WSA_DescriptionSize
   szSystemStatus As String * WSA_SysStatusSize
   iMaxSockets As Integer
   iMaxUdpDg As Integer
   lpVendorInfo As String * 200
End Type

'Define socket return codes
Public Const INVALID_SOCKET = &HFFFF
Public Const SOCKET_ERROR = -1

'Define socket types
Public Const SOCK_STREAM = 1            'Stream socket
Public Const SOCK_DGRAM = 2             'Datagram socket
Public Const SOCK_RAW = 3               'Raw data socket
Public Const SOCK_RDM = 4               'Reliable Delivery socket
Public Const SOCK_SEQPACKET = 5         'Sequenced Packet socket


'Define address families
Public Const AF_UNSPEC = 0              'unspecified
Public Const AF_UNIX = 1                'local to host (pipes, portals)
Public Const AF_INET = 2                'internetwork: UDP, TCP, etc.
Public Const AF_IMPLINK = 3             'arpanet imp addresses
Public Const AF_PUP = 4                 'pup protocols: e.g. BSP
Public Const AF_CHAOS = 5               'mit CHAOS protocols
Public Const AF_NS = 6                  'XEROX NS protocols
Public Const AF_ISO = 7                 'ISO protocols
Public Const AF_OSI = AF_ISO            'OSI is ISO
Public Const AF_ECMA = 8                'european computer manufacturers
Public Const AF_DATAKIT = 9             'datakit protocols
Public Const AF_CCITT = 10              'CCITT protocols, X.25 etc
Public Const AF_SNA = 11                'IBM SNA
Public Const AF_DECnet = 12             'DECnet
Public Const AF_DLI = 13                'Direct data link interface
Public Const AF_LAT = 14                'LAT
Public Const AF_HYLINK = 15             'NSC Hyperchannel
Public Const AF_APPLETALK = 16          'AppleTalk
Public Const AF_NETBIOS = 17            'NetBios-style addresses
Public Const AF_MAX = 18                'Maximum # of address families


'Setup sockaddr data type to store Internet addresses
Type sockaddr
  sa_family As Integer
  sa_data As String * 14
End Type
Public Const SADDRLEN = 16


'Declare Socket functions

Public Declare Function closesocket Lib "wsock32.dll" (ByVal s As Long)
As Long

Public Declare Function connect Lib "wsock32.dll" (ByVal s As Long, addr
As sockaddr_in, ByVal namelen As Long) As Long

Public Declare Function htons Lib "wsock32.dll" (ByVal hostshort As Long)
```

13. Sample Application Programs

```
As Integer

Public Declare Function inet_addr Lib "wsock32.dll" (ByVal cp As String)
As Long

Public Declare Function recv Lib "wsock32.dll" (ByVal s As Long, ByVal
buf As Any, ByVal buflen As Long, ByVal flags As Long) As Long

Public Declare Function recvB Lib "wsock32.dll" Alias "recv" (ByVal s As
Long, buf As Any, ByVal buflen As Long, ByVal flags As Long) As Long

Public Declare Function send Lib "wsock32.dll" (ByVal s As Long, buf As
Any, ByVal buflen As Long, ByVal flags As Long) As Long

Public Declare Function socket Lib "wsock32.dll" (ByVal af As Long, ByVal
socktype As Long, ByVal protocol As Long) As Long

Public Declare Function WSAStartup Lib "wsock32.dll" (ByVal
wVersionRequired As Long, lpWSAData As WSAData) As Long

Public Declare Function WSACleanup Lib "wsock32.dll" () As Long

Public Declare Function WSAUnhookBlockingHook Lib "wsock32.dll" () As
Long

Public Declare Sub CopyMemory Lib "kernel32" Alias "RtlMoveMemory"
(hpvDest As Any, hpvSource As Any, ByVal cbCopy As Long)
```

Basic control flow with WinSock API is shown in Figure 13-5.

Figure 13-5 **Control flow with WinSock API**



e5070ape029

Procedures in each step in Figure 13-5 are described below.

Startup

The procedure corresponding to Startup is StartIt (Example 13-5). StartIt launches and initialize WinSock API with **WSAStartup** in WinSock API, whose version is in the part 1 of Figure 13-4. The function WSAStartup should be always used when initiating WinSock. This function takes version number (input) and launching information (output) as its parameters.

Example 13-5 **StartIt**

```
Sub StartIt()

    Dim StartUpInfo As WSAData

    'Version 1.1 (1*256 + 1) = 257
    'version 2.0 (2*256 + 0) = 512

    'Get WinSock version
    Sheets("Sheet1").Select
    Range("C2").Select
    version = ActiveCell.FormulaR1C1

    'Initialize Winsock DLL
    x = WSAStartup(version, StartUpInfo)

End Sub
```

Socket Creation and Connection

The procedure for Socket Creation and Connection is OpenSocket (Example 13-6). OpenSocket makes a connection to an instrument associated with the IP address specified with the input parameter Hostname. It uses a socket of the port specified with the input parameter PortNumber. Each functional part of OpenSocket is described below.

In (1), the inet_aadr function of WinSock API is used to convert an IP address delimited by "." to an Internet address.

In (2), a new socket is created with **socket** function of WinSock API and its socket descriptor is obtained. If an error occurs, the control returns to the main program with a message. socket function takes parameters for an address family (input), a socket type (input), and a protocol number (input).

In (3), the socket address is specified. Note that htons, which is used for specifying the port number, is a function of WinSock API. The function converts a 2-byte integer from the Windows byte order (little endian) to the network byte order (big endian).

In (4), a connection to the E5070A/E5071A is made using **connect** function of WinSock API. If an error occurs, the control returns to the main program with a message. connect function takes parameters for a socket descriptor (input), a socket address (input), and size of the socket address (input).

Example 13-6 **OpenSocket**

```
Function OpenSocket(ByVal Hostname As String, ByVal PortNumber As Intege
r) As Integer

    Dim I_SocketAddress As sockaddr_in
    Dim ipAddress As Long

    ipAddress = inet_addr(Hostname)                        '...........(1)

    'Create a new socket
    socketId = socket(AF_INET, SOCK_STREAM, 0)             '
    If socketId = SOCKET_ERROR Then                        '
        MsgBox ("ERROR: socket = " + Str$(socketId))       '...........(2)
        OpenSocket = COMMAND_ERROR                         '
        Exit Function                                      '
    End If                                                 '

    'Open a connection to a server

    I_SocketAddress.sin_family = AF_INET                   '
    I_SocketAddress.sin_port = htons(PortNumber)           '...........(3)
    I_SocketAddress.sin_addr = ipAddress                   '
    I_SocketAddress.sin_zero = String$(8, 0)               '

    x = connect(socketId, I_SocketAddress, Len(I_SocketAddress))  '
    If socketId = SOCKET_ERROR Then                               '
        MsgBox ("ERROR: connect = " + Str$(x))                    '..(4)
        OpenSocket = COMMAND_ERROR                                '
        Exit Function                                             '
    End If                                                        '

    OpenSocket = socketId

End Function
```

Communication

The procedure corresponding to Communication is SendCommand (Example 13-7). SendCommand transmits a message (SCPI command) specified with the input parameter “command” to the E5070A/E5071A using **send** function of WinSock API. send function takes parameters for a socket descriptor (input), a message to be transmitted (input), message length (input) and a flag (input).

Example 13-7 **SendCommand**

```
Function SendCommand(ByVal command As String) As Integer

    Dim strSend As String

    strSend = command + vbCrLf

    count = send(socketId, ByVal strSend, Len(strSend), 0)

    If count = SOCKET_ERROR Then
        MsgBox ("ERROR: send = " + Str$(count))
        SendCommand = COMMAND_ERROR
        Exit Function
    End If

    SendCommand = NO_ERROR

End Function
```

The procedure corresponding to a receiving part of communication is RecvAscii (Example 13-8) and other functions. RecvAscii receives a message as ASCII format and stores it in the dataBuf output parameter. Maximum length of the message is specified with the maxLength input parameter. Each functional part of RecvAscii is described below.

In (1), a message (a response to a query for SCPI command) is received from the E5070A/E5071A as a series of characters using **recv** function of WinSock API. If an error occurs, the control returns to the main program with a message. recv function takes parameters for a socket descriptor (input), a message to be received (input), message length (input) and a flag (input).

In (2), it is determined whether each received character is LF (ASCII code: 10). When it is LF, receiving is terminated adding NULL (ASCII code: 0) to the end of dataBuf string and the control returns to the main program.

In (3), number of the last characters that was read out is added to the count value for checking a number of received characters, and append the characters to the end of dataBuf string.

Example 13-8 **RecvAscii**

```
Function RecvAscii(dataBuf As String, ByVal maxLength As Integer) As
Integer

    Dim c As String * 1
    Dim length As Integer

    dataBuf = ""
    While length < maxLength
        DoEvents
        count = recv(socketId, c, 1, 0)                 '
        If count < 1 Then                               '
            RecvAscii = RECV_ERROR                      '............(1)
            dataBuf = Chr$(0)                           '
            Exit Function                               '
        End If                                          '

        If c = Chr$(10) Then                            '
           dataBuf = dataBuf + Chr$(0)                  '............(2)
           RecvAscii = NO_ERROR                         '
           Exit Function                                '
        End If                                          '

        length = length + count                         '............(3)
        dataBuf = dataBuf + c                           '
    Wend

    RecvAscii = RECV_ERROR

End Function
```

Disconnection

The procedure corresponding to Disconnection is CloseConnection (Example 13-9). CloseConnection disconnects communication and removes a socket using **closesocket** function of WinSock API. closesocket function takes a parameter for a socket descriptor (input).

Example 13-9 **CloseConnection**

```
Sub CloseConnection()

    x = closesocket(socketId)

    If x = SOCKET_ERROR Then
        MsgBox ("ERROR: closesocket = " + Str$(x))
        Exit Sub
    End If

End Sub
```

End

The procedure corresponding to End is EndIt (Example 13-10). EndIt disconnects WinSock API using **WSACleanup** function of WinSock API. The function WSACleanup should be always used when terminating WinSock.

Example 13-10 **EndIt**

```
Sub EndIt()

    'Shutdown Winsock DLL
    x = WSACleanup()

End Sub
```

Example of control

The E5070A/E5071A can be controlled by executing the above procedures in order, following the control flow in Figure 13-5. This is demonstrated by the procedure autoscale (a procedure which is executed when the Auto Scale button is clicked) as described in Example 13-11.

Example 13-11 **autoscale**

```
Sub autoscale()
'
' auto scaling
'
    Call StartIt
    Call get_hostname
    x = OpenSocket(Hostname$, ScpiPort)

    x = SendCommand(":DISP:WIND1:TRAC1:Y:AUTO")

    Call CloseConnection
    Call EndIt

End Sub
```

NOTE When you execute more than one command by connecting and disconnecting a socket for every command, the sequence of execution may change.

- ❏ Connection → Command 1 → Command 2 → Disconnection

  Commands 1 and 2 are always executed in this sequence.

- ❏ Connection → Command 1 → Disconnection → Connection → Command 2 → Disconnection

  These commands may be in the sequence of Command 2 → command 1.

13. Sample Application Programs

14 SCPI Command Reference

This chapter describes the SCPI command reference for the Agilent E5070A/E5071A. It describes the commands using their abbreviated format in alphabetical order. If you want to look up commands using their fully qualified format, refer to the index for the desired SCPI command. If you want to look up commands by their function, refer to SCPI command list by function.

Notational conventions in this command reference

This section describes the rules to read the description of the commands in this chapter.

Syntax

Part with heading “Syntax” describes the syntax to send a command from the external controller to the E5070A/E5071A. A syntax consists of a command part and a parameter part. The separator between the command part and the parameter part is a space.

If there are several parameters, the separator between adjacent parameters is a comma (,). 3 points (…) between commas indicate that parameters in that part are omitted. For example, <numeric 1>,…,<numeric 4> indicates that 4 parameters, <numeric 1>,<numeric 2>, <numeric 3>,<numeric 4>, are required.

String-type parameters, <string>, <string 1>, and so on, must be enclosed in double quotation marks ("). <block> shows block format data.

You can omit the lowercase letters in syntax. For example, ":CALibration:CABLe" can be shortened as ":CAL:CABL."

The definition of symbols used in the syntax is as follows:

<>	Characters enclosed in this pair of symbols are necessary parameters when sending the command.
[]	Part enclosed in this parenthesis pair can be omitted.
{}	Part enclosed in this parenthesis pair indicates that you must select one of the items in this part. Individual items are separated by a vertical bar (|).

For example, ":CALC:CORR:EDEL:TIME 0.1," ":CALCULATE1:SELECTED:CORR:EDEL:TIME 25E-3," and so on are valid for the syntax given below.

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:CORRection:EDELay:TIME <numeric>

Description

Part with heading “Description” describes how to use the command or the operation when executed.

Parameters

Part with heading "Parameters" describes necessary parameters when sending the command. When a parameter is a value type or a string type enclosed with <>, its description, allowable setup range, preset (factory-set) value, and so on are given; when a parameter is a selection type enclosed with {}, the description of each selection item is given.

Query response

Part with heading "Query response" describes the data format read out when query (reading out data) is available with the command.

Each readout parameter is enclosed with {}. If there are several items within {} separated by the pipe (|), only one of them is read out.

When several parameters are read out, they are separated with a comma (,). Note that, 3 points (…) between commas indicate that the data of that part is omitted. For example, {numeric 1},…,{numeric 4} indicates that 4 data items, {numeric 1}, {numeric 2}, {numeric 3}, and {numeric 4}, are read out.

<newline><^END> after the parameters is the program message terminator.

Related commands

Part with heading "Related commands" describes the commands related to this command.

Equivalent key

Part with heading "Equivalent key" shows the operational procedure of the front panel keys that has the same effect as this command.

[Key]	Indicates that you press the key named Key.
[Key] - **Item**	Indicates a series of key operation in which you press the **[Key]** key, select (highlight) the item called **Item** on the displayed menu using the **[↓]** key and so on, and then press the **[Enter]** key.

IEEE Common Commands

This section describes the IEEE common commands.

*CLS

Syntax *CLS

Description Clears the followings. (No query)

- Error Queue
- Status Byte Register
- Standard Event Status Register
- Operation Status Event Register
- Questionable Status Event Register
- Questionable Limit Status Event Register
- Questionable Limit Channel{1-9} Status Event Register

Example of use

```
10   OUTPUT 717;"*CLS"
```

Equivalent key No equivalent key is available on the front panel.

*ESE

Syntax

*ESE <numeric>

*ESE?

Description

Sets the value of the Standard Event Status Enable Register.

Parameters

	<numeric>
Description	Setup value of the register
Range	0 to 255
Preset value	0
Resolution	1

If the specified parameter is out of the allowable setup range, the result of bitwise AND with 255 (0xff) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;"*ESE 16"
20   OUTPUT 717;"*ESE?"
30   ENTER 717;A
```

Related commands

*SRE on page 214

Equivalent key

No equivalent key is available on the front panel.

*ESR?

Syntax

*ESR?

Description

Reads out the value of the Standard Event Status Register. Executing this command clears the register value. (Query only)

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;"*ESR?"
20   ENTER 717;A
```

Equivalent key

No equivalent key is available on the front panel.

*IDN?

Syntax

*IDN?

Description

Reads out the product information (manufacturer, model number, serial number, and firmware version number) of the E5070A/E5071A. (Query only)

Query response

{string 1},{string 2},{string 3},{string 4}<newline><^END>

Readout data is as follows:

{string 1}	Manufacturer. Agilent Technologies is always read out.
{string 2}	Model number (example: E5070A).
{string 3}	10-digit serial number (example: JP1KI00101).
{string 4}	Firmware version number (example: 01.00).

Example of use

```
10   OUTPUT 717;"*IDN?"
20   ENTER 717;A$
```

Equivalent key

[System] - **Firmware Revision**

[System] - **Service Menu** - **Enable Options** - **Serial Number**

*OPC

Syntax

*OPC

Description

Sets the OPC bit (bit 0) of the Standard Event Status Register at the completion of all pending operations. (No query)

Example of use

```
10   OUTPUT 717;"*OPC"
```

Equivalent key

No equivalent key is available on the front panel.

*OPC?

Syntax

*OPC?

Description

1 is read out at the completion of all pending operations. (Query only)

Query response

{1}<newline><^END>

Example of use

```
10   OUTPUT 717;"*OPC?"
20   ENTER 717;A
```

Equivalent key

No equivalent key is available on the front panel.

*OPT?

Syntax: *OPT?

Description: Reads out the identification number of an option installed in the E5070A/E5071A. (Query only)

Query response: {numeric}<newline><^END>

If there is no installed option, 0 is read out.

Example of use:

```
10   OUTPUT 717;"*OPT?"
20   ENTER 717;A$
```

Equivalent key: No equivalent key is available on the front panel.

*RST

Syntax: *RST

Description: Performs preset. There is the following difference from the setting state preset with the :SYST:PRES command. (No query)

- The continuous initiation mode of channel 1 is set to OFF.

Example of use:

```
10   OUTPUT 717;"*RST"
```

Related commands: :SYST:PRES on page 462

:INIT{1-9}:CONT on page 352

Equivalent key: No equivalent key is available on the front panel.

*SRE

Syntax

*SRE <numeric>

*SRE?

Description

Sets the value of the Service Request Enable Register.

Parameters

	<numeric>
Description	Setup value of the register
Range	0 to 255
Preset value	0
Resolution	1

If the specified parameter is out of the allowable setup range, the result of bitwise AND with 255 (0xff) is set. Note that bit 6 cannot be set to 1.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;"*SRE 128"
20   OUTPUT 717;"*SRE?"
30   ENTER 717;A
```

Related commands

*ESE on page 211

:STAT:OPER:ENAB on page 441

:STAT:QUES:ENAB on page 445

Equivalent key

No equivalent key is available on the front panel.

*STB?

Syntax: *STB?

Description: Reads out the value of the Status Byte Register. (Query only)

Query response: {numeric}<newline><^END>

Example of use:

```
10   OUTPUT 717;"*STB?"
20   ENTER 717;A
```

Equivalent key: No equivalent key is available on the front panel.

*TRG

Syntax: *TRG

Description: If the trigger source is set to GPIB/LAN (set to BUS with the :TRIG:SOUR command), triggers the E5070A/E5071A waiting for a trigger. (No query)

Example of use:

```
10   OUTPUT 717;"*TRG"
```

Related commands: :TRIG:SOUR on page 466

Equivalent key: No equivalent key is available on the front panel.

*WAI

Syntax: *WAI

Description: Waits for the execution of all commands sent before this command to be completed. (No query)

Example of use:

```
10   OUTPUT 717;"*WAI"
```

Equivalent key: No equivalent key is available on the front panel.

E5070A/E5071A commands

This section describes the commands specific to the E5070A/E5071A.

:ABOR

Syntax
:ABORt

Description
Aborts the measurement and changes the trigger sequence for all channels to idle state. (No query)

After the change to the idle state, the channels for which the continuous initiation mode is set to ON (set to ON with the :INIT{1-9}:CONT command) change into the initiate state.

For details about the trigger system, refer to “Trigger system” on page 74. (No query)

Example of use

```
10   OUTPUT 717;":ABOR"
```

Related commands
:INIT{1-9} on page 351

:INIT{1-9}:CONT on page 352

Equivalent key
[Trigger] - **Restart**

:CALC{1-9}:CONV

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:CONVersion[:STATe] {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:CONVersion[:STATe]?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), turns ON/OFF the parameter conversion function.

Parameters

	Description
ON or 1	Turns ON the parameter conversion function.
OFF or 0 (preset value)	Turns OFF the parameter conversion function.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:CONV ON"
20   OUTPUT 717;":CALC1:CONV?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:CONV:FUNC on page 218

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Conversion** - **Conversion**

14. SCPI Command Reference

:CALC{1-9}:CONV:FUNC

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:CONVersion:FUNCtion {ZREFlection|ZTRansmit|YREFlection|YTRansmit|INVersion}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:CONVersion:FUNCtion?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), select the parameter after conversion using the parameter conversion function.

Parameters

	Description
ZREFlection (preset value)	Specifies the equivalent impedance in reflection measurement.
ZTRansmit	Specifies the equivalent impedance in transmission measurement.
YREFlection	Specifies the equivalent admittance in reflection measurement.
YTRansmit	Specifies the equivalent admittance in transmission measurement.
INVersion	Specifies the inverse S-parameter.

Query response

{ZREF|ZTR|YREF|YTR|INV}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:CONV:FUNC ZTR"
20   OUTPUT 717;":CALC1:CONV:FUNC?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:CONV on page 217

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Conversion** - **Z:Reflection**|**Z:Transmission**|**Y:Reflection**|**Y:Transmission**|**1/S**

:CALC{1-9}:CORR:EDEL:TIME

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:CORRection:EDELay:TIME <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:CORRection:EDELay:TIME?

Description

Sets the electrical delay time of the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command).

Parameters

	<numeric>
Description	Electrical delay time
Range	-10 to 10
Preset value	0
Unit	s (second)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:CORR:EDEL:TIME 0.2"
20   OUTPUT 717;":CALC1:CORR:EDEL:TIME?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Scale] - **Electrical Delay**

14. SCPI Command Reference

:CALC{1-9}:CORR:OFFS:PHAS

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:CORRection:OFFSet:PHASe <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:CORRection:OFFSet:PHASe?

Description

Sets the phase offset of the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command).

Parameters

	<numeric>
Description	Phase offset
Range	-360 to 360
Preset value	0
Unit	° (degree)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:CORR:OFFS:PHAS 2.5"
20   OUTPUT 717;":CALC1:CORR:OFFS:PHAS?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Scale] - **Phase Offset**

:CALC{1-9}:DATA:FDAT

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:DATA:FDATa <numeric 1>,…,<numeric NOP×2>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:DATA:FDATa?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets/reads out the formatted data array. (It is the data array for which processing such as format has been performed for corrected data array. For details, refer to “Formatted data array” on page 110.)

The data transfer format when this command is executed depends on the setting with the :FORM:DATA command.

Parameters

	Description
<numeric n×2-1>	Data (primary value) at the n-th measurement point.
<numeric n×2>	Data (secondary value) at the n-th measurement point. Always 0 when the data format is not the Smith chart format or the polar format.

Where NOP is the number of measurement points and n is an integer between 1 and NOP.

Query response

{numeric 1},…,{numeric NOP×2}<newline><^END>

Example of use

```
10   DIM A(1:201,1:2)
20   OUTPUT 717;":CALC1:DATA:FDAT?"
30   ENTER 717;A(*)
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

:CALC{1-9}:DATA:FMEM on page 222

:CALC{1-9}:DATA:SDAT? on page 223

:FORM:DATA on page 349

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:DATA:FMEM

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:DATA:FMEMory <numeric 1>,…,<numeric NOP×2>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:DATA:FMEMory?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets/reads out the formatted memory array. (It is the data array for which processing such as format has been performed for corrected memory array. For details, refer to “Formatted memory arrays” on page 110.)

The data transfer format when this command is executed depends on the setting with the :FORM:DATA command.

Parameters

	Description
<numeric n×2-1>	Data (primary value) at the n-th measurement point.
<numeric n×2>	Data (secondary value) at the n-th measurement point. Always 0 when the data format is not the Smith chart format or the polar format.

Where NOP is the number of measurement points and n is an integer between 1 and NOP.

Query response

{numeric 1},…,{numeric NOP×2}<newline><^END>

Example of use

```
10   DIM A(1:201,1:2)
20   OUTPUT 717;":CALC1:DATA:FMEM?"
30   ENTER 717;A(*)
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

:CALC{1-9}:DATA:FDAT on page 221

:CALC{1-9}:DATA:SMEM? on page 224

:FORM:DATA on page 349

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:DATA:SDAT?

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:DATA:SDATa?

Description

Reads out the corrected array of channel 1 (:CALC1) to channel 9 (:CALC9). (It is the data array for which processing such as error correction to measured raw data has been performed. For details, refer to "Formatted data array" on page 110.)

The data transfer format when this command is executed depends on the setting with the :FORM:DATA command. (Query only)

Query response

{numeric 1},…,{numeric NOP×2}<newline><^END>

	Description
{numeric n×2-1}	Real part of the data (complex number) at the n-th measurement point.
{numeric n×2}	Imaginary part of the data (complex number) at the n-th measurement point.

Where NOP is the number of measurement points and n is an integer between 1 and NOP.

Example of use

```
10   DIM A(1:201,1:2)
20   OUTPUT 717;":CALC1:DATA:SDAT?"
30   ENTER 717;A(*)
```

Related commands

:CALC{1-9}:DATA:SMEM? on page 224

:CALC{1-9}:DATA:FDAT on page 221

:FORM:DATA on page 349

Equivalent key

No equivalent key is available on the front panel.

14. SCPI Command Reference

:CALC{1-9}:DATA:SMEM?

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:DATA:SMEMory?

Description

Reads out the corrected memory array of channel 1 (:CALC1) to channel 9 (:CALC9). (It is the copy of the corrected data array when the :CALC{1-9}:MATH:MEM command is executed. For details, refer to “Corrected memory arrays” on page 109.)

The data transfer format when this command is executed depends on the setting with the :FORM:DATA command. (Query only)

Query response

{numeric 1},…,{numeric NOP×2}<newline><^END>

	Description
{numeric n×2-1}	Real part of the data (complex number) at the n-th measurement point.
{numeric n×2}	Imaginary part of the data (complex number) at the n-th measurement point.

Where NOP is the number of measurement points and n is an integer between 1 and NOP.

Example of use

```
10   DIM A(1:201,1:2)
20   OUTPUT 717;":CALC1:DATA:SMEM?"
30   ENTER 717;A(*)
```

Related commands

:CALC{1-9}:MATH:MEM on page 297

:CALC{1-9}:DATA:SDAT? on page 223

:CALC{1-9}:DATA:FMEM on page 222

:FORM:DATA on page 349

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:FILT:TIME

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FILTer[:GATE]:TIME[:TYPE] {BPASs|NOTCh}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FILTer[:GATE]:TIME[:TYPE]?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the gate type used for the gating function of the time domain function.

Parameters

	Description
BPASs (preset value)	Specifies the band-pass type.
NOTCh	Specifies the notch type.

Query response

{BPAS|NOTC}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FILT:TIME NOTC"
20   OUTPUT 717;":CALC1:FILT:TIME?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:FILT:TIME:SHAP on page 227

:CALC{1-9}:FILT:TIME:STAT on page 230

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Gating** - **Type**

:CALC{1-9}:FILT:TIME:CENT

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FILTer[:GATE]:TIME:CENTer <value>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FILTer[:GATE]:TIME:CENTer?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets the center value of the gate used for the gating function of the time domain function.

Parameters

	<value>
Description	The center value of the gate.
Range	Varies depending on the frequency span and the number of points.
Preset value	0
Unit	s (second)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FILT:TIME:CENT 1E-8"
20   OUTPUT 717;":CALC1:FILT:TIME:CENT?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FILT:TIME:SPAN on page 228

:CALC{1-9}:FILT:TIME:STAT on page 230

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Gating** - **Center**

:CALC{1-9}:FILT:TIME:SHAP

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FILTer[:GATE]:TIME:SHAPe {MAXimum|WIDE|NORMal|MINimum}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FILTer[:GATE]:TIME:SHAPe?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the shape of the gate used for the gating function of the time domain function.

Parameters

	Description
MAXimum	Specifies the maximum shape.
WIDE	Specifies the wide shape.
NORMal (preset value)	Specifies the normal shape.
MINimum	Specifies the minimum shape.

Query response

{MAX|WIDE|NORM|MIN}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FILT:TIME:SHAP WIDE"
20   OUTPUT 717;":CALC1:FILT:TIME:SHAP?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:FILT:TIME on page 225

:CALC{1-9}:FILT:TIME:STAT on page 230

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Gating** - **Shape** - **Maximum**|**Wide**|**Normal**|**Minimum**

:CALC{1-9}:FILT:TIME:SPAN

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FILTer[:GATE]:TIME:SPAN <value>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FILTer[:GATE]:TIME:SPAN?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets the span value of the gate used for the gating function of the time domain function.

Parameters

	<value>
Description	The span value of the gate.
Range	Varies depending on the frequency span and the number of points.
Preset value	2E-8
Unit	s (second)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FILT:TIME:SPAN 1E-8"
20   OUTPUT 717;":CALC1:FILT:TIME:SPAN?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FILT:TIME:CENT on page 226

:CALC{1-9}:FILT:TIME:STAT on page 230

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Gating** - **Span**

:CALC{1-9}:FILT:TIME:STAR

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FILTer[:GATE]:TIME:STARt <value>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FILTer[:GATE]:TIME:STARt?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets the start value of the gate used for the gating function of the time domain function.

Parameters

	<value>
Description	The start value of the gate.
Range	Varies depending on the frequency span and the number of points.
Preset value	-1E-8
Unit	s (second)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FILT:TIME:STAR 0"
20   OUTPUT 717;":CALC1:FILT:TIME:STAR?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FILT:TIME:STOP on page 231

:CALC{1-9}:FILT:TIME:STAT on page 230

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Gating** - **Start**

:CALC{1-9}:FILT:TIME:STAT

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FILTer[:GATE]:TIME:STATe {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FILTer[:GATE]:TIME:STATe?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), turns ON/OFF the gating function of the time domain function.

You can turn ON the gating function only when the sweep type is the linear sweep and the number of points is 3 or more. If you execute this command to try to turn ON the gating function when the sweep type is other than the linear sweep or the number of points is less than 3, an error occurs and the command is ignored.

Parameters

	Description
ON or 1	Turns ON the gating function.
OFF or 0 (preset value)	Turns OFF the gating function.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FILT:TIME:STAT ON"
20   OUTPUT 717;":CALC1:FILT:TIME:STAT?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

:SENS{1-9}:SWE:TYPE on page 437

:SENS{1-9}:SWE:POIN on page 435

Equivalent key

[Analysis] - **Gating** - **Gating**

:CALC{1-9}:FILT:TIME:STOP

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FILTer[:GATE]:TIME:STOP <value>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FILTer[:GATE]:TIME:STOP?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets the stop value of the gate used for the gating function of the time domain function.

Parameters

	<value>
Description	The stop value of the gate.
Range	Varies depending on the frequency span and the number of points.
Preset value	1E-8
Unit	s (second)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FILT:TIME:STOP 2E-8"
20   OUTPUT 717;":CALC1:FILT:TIME:STOP?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FILT:TIME:STAR on page 229

:CALC{1-9}:FILT:TIME:STAT on page 230

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Gating** - **Stop**

:CALC{1-9}:FORM

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FORMat {MLOGarithmic|PHASe|GDELay|SLINear|SLOGarithmic|SCOMplex|SMITh|SADMittance|PLINear|PLOGarithmic|POLar|MLINear|SWR|REAL|IMAGinary|UPHase|PPHase}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FORMat?

Description

Selects the data format of the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command).

Parameters

	Description
MLOGarithmic (preset value)	Specifies the logarithmic magnitude format.
PHASe	Specifies the phase format.
GDELay	Specifies the group delay format.
SLINear	Specifies the Smith chart format (Lin/Phase).
SLOGarithmic	Specifies the Smith chart format (Log/Phase).
SCOMplex	Specifies the Smith chart format (Real/Imag).
SMITh	Specifies the Smith chart format (R+jX).
SADMittance	Specifies the Smith chart format (G+jB).
PLINear	Specifies the polar format (Lin).
PLOGarithmic	Specifies the polar format (Log).
POLar	Specifies the polar format (Re/Im).
MLINear	Specifies the linear magnitude format.
SWR	Specifies the SWR format.
REAL	Specifies the real format.
IMAGinary	Specifies the imaginary format.
UPHase	Specifies the expanded phase format.
PPHase	Specifies the positive phase format.

Query response

{MLOG|PHAS|GDEL|SLIN|SLOG|SCOM|SMIT|SADM|PLIN|PLOG|POL|MLIN|SWR|REAL|IMAG|UPH|PPH}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FORM SLIN"
20   OUTPUT 717;":CALC1:FORM?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Format] - **Log Mag**|**Phase**|**Group Delay**|**Lin Mag**|**SWR**|**Real**|**Imaginary**|**Expand Phase**|**Positive Phase**

[Format] - **Smith** - **Lin/Phase**|**Log/Phase**|**Real/Imag**|**R+jX**|**G+jB**

[Format] - **Polor** - **Lin/Phase**|**Log/Phase**|**Real/Imag**

:CALC{1-9}:FSIM:BAL:CZC:BPOR{1-2}:Z0

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:CZConversion:BPORt{[1]|2}:Z0[:R] <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:CZConversion:BPORt{[1]|2}:Z0[:R]?

Description

For balance port 1 (:BPOR1) or balance port 2 (:BPOR2) of channel 1 (:CALC1) to channel 9 (:CALC9), sets the impedance value for the common port impedance conversion function.

Parameters

	<numeric>
Description	Impedance value
Range	1E-3 to 1E7
Preset value	25
Unit	Ω (ohm)
Resolution	0.001

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:CZC:BPOR1:Z0 30"
20   OUTPUT 717;":CALC1:FSIM:BAL:CZC:BPOR1:Z0?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:BAL:CZC:STAT on page 234

Equivalent key

[Analysis] - **Fixture Simulator** - **Cmn ZConversion** - **Port1(bal)**|**Port2(bal)**|**Port3(bal)**

:CALC{1-9}:FSIM:BAL:CZC:STAT

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:CZConversion:STATe {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:CZConversion:STATe?

Description

For all the balance ports of channel 1 (:CALC1) to channel 9 (:CALC9), turns ON/OFF the common port impedance conversion function when the fixture simulator function is ON (ON is specified with the :CALC{1-9}:FSIM:STAT command).

Parameters

	Description
ON or 1	Turns ON the common impedance conversion function.
OFF or 0 (preset value)	Turns OFF the common impedance conversion function.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:CZC:STAT ON"
20   OUTPUT 717;":CALC1:FSIM:BAL:CZC:STAT?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:STAT on page 264

:CALC{1-9}:FSIM:BAL:CZC:BPOR{1-2}:Z0 on page 233

Equivalent key

[Analysis] - **Fixture Simulator** - **Cmn ZConversion** - **Cmn ZConversion**

:CALC{1-9}:FSIM:BAL:DEV

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DEVice {SBALanced|BBALanced|SSBalanced}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DEVice?

Description

For channel 1 (:CALC1) to channel 9 (:CALC9), selects the balance device type of the fixture simulator function.

For details about the balance device type, see Figure 6-1 on page 96.

Parameters

	Description
SBALanced (preset value)	Specifies the unbalance-balance (3 ports).
BBALanced	Specifies the balance-balance (4 ports).
SSBalanced	Specifies the unbalance-unbalance-balance (4 ports).

Query response

{SBAL|BBAL|SSB}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:DEV BBAL"
20   OUTPUT 717;":CALC1:FSIM:BAL:DEV?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:FSIM:BAL:TOP:SBAL on page 250

:CALC{1-9}:FSIM:BAL:TOP:BBAL on page 249

:CALC{1-9}:FSIM:BAL:TOP:SSB on page 251

Equivalent key

[Analysis] - **Fixture Simulator** - **Topology** - **Device**

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DMCircuit:BPORt{[1]|2}[:TYPE] {NONE|PLPC|USER}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DMCircuit:BPORt{[1]|2}[:TYPE]?

Description

For balance port 1 (:BPOR1) or balance port 2 (:BPOR2) of channel 1 (:CALC1) to channel 9 (:CALC9), selects the type of the differential matching circuit.

If you want to select the user-defined circuit, you must specify the 2-port touchstone file in which the proper information on the user-defined circuit is saved in advance. If you do not specify the appropriate file and you select the user-defined circuit, an error occurs and NONE is automatically selected.

For details about the balance port number, see figure Figure 6-1 on page 96.

Parameters

	Description
NONE (preset value)	Specifies no-circuit.
PLPC	Specifies the circuit that consists of shunt L and shunt C.
USER	Specifies the user-defined circuit*1.

*1. The information on the circuit is read out from the 2-port touchstone file specified with the :CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:USER:FIL command.

For more information on the circuits, refer to "*User's Guide*."

Query response

{NONE|PLPC|USER}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:DMC:BPOR1 PLPC"
20   OUTPUT 717;":CALC1:FSIM:BAL:DMC:BPOR1?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:FSIM:BAL:DMC:STAT on page 242

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:C on page 237

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:G on page 238

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:L on page 239

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:R on page 240

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:USER:FIL on page 241

Equivalent key

[Analysis] - **Fixture Simulator** - **Diff Matching** - **Select Circuit**

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:C

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DMCircuit:BPORt{[1]|2}:PARameters:C <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DMCircuit:BPORt{[1]|2}:PARameters:C?

Description

For balance port 1 (:BPOR1) or balance port 2 (:BPOR2) of channel 1 (:CALC1) to channel 9 (:CALC9), sets the C value of the differential matching circuit.

For details about the balance port number, see figure Figure 6-1 on page 96.

Parameters

	<numeric>
Description	C value of the differential matching circuit
Range	-1E18 to 1E18
Preset value	0
Unit	F (farad)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:DMC:BPOR1:PAR:C 12.3"
20   OUTPUT 717;":CALC1:FSIM:BAL:DMC:BPOR1:PAR:C?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:BAL:DMC:STAT on page 242

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2} on page 236

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:G on page 238

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:L on page 239

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:R on page 240

Equivalent key

[Analysis] - **Fixture Simulator** - **Diff Matching** - **C**

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:G

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DMCircuit:BPORt{[1]|2}:PARameters:G <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DMCircuit:BPORt{[1]|2}:PARameters:G?

Description

For balance port 1 (:BPOR1) or balance port 2 (:BPOR2) of channel 1 (:CALC1) to channel 9 (:CALC9), sets the G value of the differential matching circuit.

For details about the balance port number, see Figure 6-1 on page 96.

Parameters

	<numeric>
Description	G value of the differential matching circuit
Range	-1E18 to 1E18
Preset value	0
Unit	S (siemens)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:DMC:BPOR1:PAR:G 12.3"
20   OUTPUT 717;":CALC1:FSIM:BAL:DMC:BPOR1:PAR:G?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:BAL:DMC:STAT on page 242

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2} on page 236

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:C on page 237

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:L on page 239

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:R on page 240

Equivalent key

[Analysis] - **Fixture Simulator** - **Diff Matching** - **G**

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:L

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DMCircuit:BPORt{[1]|2}:PARameters:L <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DMCircuit:BPORt{[1]|2}:PARameters:L?

Description

For balance port 1 (:BPOR1) or balance port 2 (:BPOR2) of channel 1 (:CALC1) to channel 9 (:CALC9), sets the L value of the differential matching circuit.

Parameters

	<numeric>
Description	L value of the differential matching circuit
Range	-1E18 to 1E18
Preset value	0
Unit	H (henry)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:DMC:BPOR1:PAR:L 12.3"
20   OUTPUT 717;":CALC1:FSIM:BAL:DMC:BPOR1:PAR:L?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:BAL:DMC:STAT on page 242

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2} on page 236

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:C on page 237

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:G on page 238

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:R on page 240

Equivalent key

[Analysis] - **Fixture Simulator** - **Diff Matching** - **L**

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:R

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DMCircuit:BPORt{[1]|2}:PARameters:R <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DMCircuit:BPORt{[1]|2}:PARameters:R?

Description

For balance port 1 (:BPOR1) or balance port 2 (:BPOR2) of channel 1 (:CALC1) to channel 9 (:CALC9), sets the R value of the differential matching circuit.

Parameters

	<numeric>
Description	R value of the differential matching circuit
Range	-1E18 to 1E18
Preset value	0
Unit	Ω (ohm)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:DMC:BPOR1:PAR:R 12.3"
20   OUTPUT 717;":CALC1:FSIM:BAL:DMC:BPOR1:PAR:R?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:BAL:DMC:STAT on page 242

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2} on page 236

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:C on page 237

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:G on page 238

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:L on page 239

Equivalent key

[Analysis] - **Fixture Simulator** - **Diff Matching** - **R**

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:USER:FIL

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DMCircuit:BPORt{[1]|2}:USER:FILename <string>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DMCircuit:BPORt{[1]|2}:USER:FILename?

Description

For balance port 1 (:BPOR1) or balance port 2 (:BPOR2) of channel 1 (:CALC1) to channel 9 (:CALC9), specifies the file in which the information on the user-defined differential matching circuit is saved (2-port touchstone file).

Specify the file name with the .s2p extension. If you want to specify a file on the floppy disk drive, you need to add “A:” at the beginning of the file name. When you use directory names and file name, separate them with “/” (slash) or “\” (backslash).

Even if the specified file does not exist, no error occurs when you execute this command[*1]. However, when you set the type of the differential matching circuit to the user-defined circuit with the :CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2} command, an error occurs.

Parameters

	<string>
Description	2-port touchstone file name
Range	254 characters or less
Preset value	""

Query response

{string}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:DMC:BPOR1:USER:FIL ""Match_d.s2p"""
20   OUTPUT 717;":CALC1:FSIM:BAL:DMC:BPOR1:USER:FIL?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:FSIM:BAL:DMC:STAT on page 242

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2} on page 236

Equivalent key

[Analysis] - **Fixture Simulator** - **Diff Matching** - **User File**

*1. If you set the type of the differential matching circuit to the user-defined circuit before you execute this command, an error occurs and the command is ignored when you execute this command.

:CALC{1-9}:FSIM:BAL:DMC:STAT

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DMCircuit:STATe {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DMCircuit:STATe?

Description

For all the balance ports of channel 1 (:CALC1) to channel 9 (:CALC9), turns ON/OFF the differential matching circuit embedding function when the fixture simulator function is ON (ON is specified with the :CALC{1-9}:FSIM:STAT command).

Parameters

	Description
ON or 1	Turns ON the differential matching circuit embedding function.
OFF or 0 (preset value)	Turns OFF the differential matching circuit embedding function.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:DMC:STAT ON"
20   OUTPUT 717;":CALC1:FSIM:BAL:DMC:STAT?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:STAT on page 264

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2} on page 236

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:C on page 237

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:G on page 238

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:L on page 239

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:R on page 240

:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:USER:FIL on page 241

Equivalent key

[Analysis] - **Fixture Simulator** - **Diff Matching** - **Diff Matching**

:CALC{1-9}:FSIM:BAL:DZC:BPOR{1-2}:Z0

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DZConversion:BPORt{[1]|2}:Z0[:R] <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DZConversion:BPORt{[1]|2}:Z0[:R]?

Description

For balance port 1 (:BPOR1) or balance port 2 (:BPOR2) of channel 1 (:CALC1) to channel 9 (:CALC9), sets the impedance value for the differential port impedance conversion function.

Parameters

	<numeric>
Description	Impedance value
Range	1E-3 to 1E7
Preset value	100
Unit	Ω (ohm)
Resolution	0.001

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:DZC:BPOR1:Z0 300"
20   OUTPUT 717;":CALC1:FSIM:BAL:DZC:BPOR1:Z0?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:BAL:DZC:STAT on page 244

Equivalent key

[Analysis] - **Fixture Simulator** - **Diff ZConversion** - **Port1(bal)**|**Port2(bal)**|**Port3(bal)**

:CALC{1-9}:FSIM:BAL:DZC:STAT

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DZConversion:STATe {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:DZConversion:STATe?

Description

For all the balance ports of channel 1 (:CALC1) to channel 9 (:CALC9), turns ON/OFF the differential port impedance conversion function when the fixture simulator function is ON (ON is specified with the :CALC{1-9}:FSIM:STAT command).

Parameters

	Description
ON or 1	Turns ON the differential impedance conversion function.
OFF or 0 (preset value)	Turns OFF the differential impedance conversion function.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:DZC:STAT ON"
20   OUTPUT 717;":CALC1:FSIM:BAL:DZC:STAT?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:STAT on page 264

:CALC{1-9}:FSIM:BAL:DZC:BPOR{1-2}:Z0 on page 243

Equivalent key

[Analysis] - **Fixture Simulator** - **Diff ZConversion** - **Diff ZConversion**

:CALC{1-9}:FSIM:BAL:PAR{1-9}:BBAL

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:PARameter{[1]|2|3|4|5|6|7|8|9}:BBALanced[:DEFine] {SDD11|SDD21|SDD12|SDD22|SCD11|SCD21|SCD12|SCD22|SDC11|SDC21|SDC12|SDC22|SCC11|SCC21|SCC12|SCC22|IMB1|IMB2|CMRR}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:PARameter{[1]|2|3|4|5|6|7|8|9}:BBALanced[:DEFine]?

Description

For channel 1 (:CALC1) to channel 9 (:CALC9), sets the measurement parameters of trace 1 (:PAR1) to trace 9 (:PAR9) when the balance device type is set to “balance-balance” (BBAL is specified with the :CALC{1-9}:FSIM:BAL:DEV command).

Parameters

	Description
SDD11 (preset value)	Specifies Sdd11.
SDD21	Specifies Sdd21.
SDD12	Specifies Sdd12.
SDD22	Specifies Sdd22.
SCD11	Specifies Scd11.
SCD21	Specifies Scd21.
SCD12	Specifies Scd12.
SCD22	Specifies Scd22.
SDC11	Specifies Sdc11.
SDC21	Specifies Sdc21.
SDC12	Specifies Sdc12.
SDC22	Specifies Sdc22.
SCC11	Specifies Scc11.
SCC21	Specifies Scc21.
SCC12	Specifies Scc12.
SCC22	Specifies Scc22.
IMB1	Specifies Imbalance1.
IMB2	Specifies Imbalance2.
CMRR	Specifies CMRR (Sdd21/Scc21).

Query response

{SDD11|SDD21|SDD12|SDD22|SCD11|SCD21|SCD12|SCD22|SDC11|SDC21|SDC12|SDC22|SCC11|SCC21|SCC12|SCC22|IMB1|IMB2|CMRR}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:PAR1:BBAL SDD21"
20   OUTPUT 717;":CALC1:FSIM:BAL:PAR1:BBAL?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:FSIM:BAL:DEV on page 235

:CALC{1-9}:FSIM:BAL:PAR{1-9}:SBAL on page 246

:CALC{1-9}:FSIM:BAL:PAR{1-9}:SSB on page 247

Equivalent key

[Analysis] - Fixture Simulator|[Meas] - Sdd11|Sdd21|Sdd12|Sdd22|Scd11|Scd21|Scd12|Scd22|Sdc11| Sdc21|Sdc12|Sdc22|Scc11|Scc21|Scc12|Scc22|Imbalance1|Imbalance2|Sdd21/Scc21

:CALC{1-9}:FSIM:BAL:PAR{1-9}:SBAL

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:PARameter{[1]|2|3|4|5|6|7|8|9}:SBALanced[:DEFine] {SSS11|SDS21|SSD12|SCS21|SSC12|SDD22|SCD22|SDC22|SCC22|IMB|CMRR}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:PARameter{[1]|2|3|4|5|6|7|8|9}:SBALanced[:DEFine]?

Description

For channel 1 (:CALC1) to channel 9 (:CALC9), sets the measurement parameters of trace 1 (:PAR1) to trace 9 (:PAR9) when the balance device type is set to “unbalance-balance” (SBAL is specified with the :CALC{1-9}:FSIM:BAL:DEV command).

Parameters

	Description
SSS11 (preset value)	Specifies Sss11.
SDS21	Specifies Sds21.
SSD12	Specifies Ssd12.
SCS21	Specifies Scs21.
SSC12	Specifies Ssc12.
SDD22	Specifies Sdd22.
SCD22	Specifies Scd22.
SDC22	Specifies Sdc22.
SCC22	Specifies Scc22.
IMB	Specifies Imbalance.
CMRR	Specifies CMRR (Sds21/Scs21).

Query response

{SSS11|SDS21|SSD12|SCS21|SSC12|SDD22|SCD22|SDC22|SCC22|IMB|CMRR}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:PAR1:SBAL SDS21"
20   OUTPUT 717;":CALC1:FSIM:BAL:PAR1:SBAL?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:FSIM:BAL:DEV on page 235

:CALC{1-9}:FSIM:BAL:PAR{1-9}:BBAL on page 245

:CALC{1-9}:FSIM:BAL:PAR{1-9}:SSB on page 247

Equivalent key

[Analysis] - **Fixture Simulator**|**[Meas]** - **Sss11**|**Sds21**|**Ssd12**|**Scs21**|**Ssc12**|**Sdd22**|**Scd22**|**Sdc22**|**Scc22**|**Imbalance**|**Sds21/Scs21**

:CALC{1-9}:FSIM:BAL:PAR{1-9}:SSB

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:PARameter{[1]|2|3|4|5|6|7|8|9}:SSBalanced[:DEFine] {SSS11|SSS21|SSS12|SSS22|SDS31|SDS32|SSD13|SSD23|SCS31|SCS32|SSC13|SSC23|SDD33|SCD33|SDC33|SCC33|IMB1|IMB2|CMRR1|CMRR2}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:PARameter{[1]|2|3|4|5|6|7|8|9}:SSBalanced[:DEFine]?

Description

For channel 1 (:CALC1) to channel 9 (:CALC9), sets the measurement parameters of trace 1 (:PAR1) to trace 9 (:PAR9) when the balance device type is set to "unbalance-unbalance-balance" (SSB is specified with the :CALC{1-9}:FSIM:BAL:DEV command).

Parameters

	Description
SSS11 (preset value)	Specifies Sss11.
SSS21	Specifies Sss21.
SSS12	Specifies Sss12.
SSS22	Specifies Sss22.
SDS31	Specifies Sds31.
SDS32	Specifies Sds32.
SSD13	Specifies Ssd13.
SSD23	Specifies Ssd23.
SCS31	Specifies Scs31.
SCS32	Specifies Scs32.
SSC13	Specifies Ssc13.
SSC23	Specifies Ssc23.
SDD33	Specifies Sdd33.
SCD33	Specifies Scd33.
SDC33	Specifies Sdc33.
SCC33	Specifies Scc33.
IMB1	Specifies Imbalance1.
IMB2	Specifies Imbalance2.
CMRR1	Specifies CMRR (Sds31/Scs31).
CMRR2	Specifies CMRR (Sds32/Scs32).

Query response

{SSS11|SSS21|SSS12|SSS22|SDS31|SDS32|SSD13|SSD23|SCS31|SCS32|SSC13|SSC23|SDD33|SCD33|SDC33|SCC33|IMB1|IMB2|CMRR1|CMRR2}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:PAR1:SSB SDS31"
20   OUTPUT 717;":CALC1:FSIM:BAL:PAR1:SSB?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:FSIM:BAL:DEV on page 235
:CALC{1-9}:FSIM:BAL:PAR{1-9}:BBAL on page 245
:CALC{1-9}:FSIM:BAL:PAR{1-9}:SBAL on page 246

Equivalent key

[Analysis] - Fixture Simulator|[Meas] - Sss11|Sss21|Sss12|Sss22|Sds31|Sds32|Ssd13|Ssd23|Scs31|Scs32|Ssc13|Ssc23|Sdd33|Scd33|Sdc33|Scc33|Imbalance1|Imbalance2|Sds31/Scs31|Sds32/Scs32

14. SCPI Command Reference

:CALC{1-9}:FSIM:BAL:PAR{1-9}:STAT

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:PARameter{[1]|2|3|4|5|6|7|8|9}:STATe {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:PARameter{[1]|2|3|4|5|6|7|8|9}:STATe?

Description

For channel 1 (:CALC1) to channel 9 (:CALC9), turns ON/OFF the balance-unbalance conversion function for trace 1 (:PAR1) to trace 9 (:PAR9) when the fixture simulator function is ON (ON is specified with the :CALC{1-9}:FSIM:STAT command).

Parameters

	Description
ON or 1	Sets the balance-unbalance conversion function to ON.
OFF or 0 (preset value)	Turn OFF the balance-unbalance conversion function.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:PAR1:STAT ON"
20   OUTPUT 717;":CALC1:FSIM:BAL:PAR1:STAT?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:STAT on page 264

Equivalent key

[Analysis] - **Fixture Simulator** - **BalUn**

:CALC{1-9}:FSIM:BAL:TOP:BBAL

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:TOPology:BBALanced[:PPORts] <numeric 1>, <numeric 2>,<numeric 3>,<numeric 4>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:TOPology:BBALanced[:PPORts]?

Description

For channel 1 (:CALC1) to channel 9 (:CALC9), sets the port assignment when the balance device type is set to “balance-balance” (BBAL is specified with the :CALC{1-9}:FSIM:BAL:DEV command).

For details about the balance device type, see Figure 6-1 on page 96.

Parameters

	<numeric 1>	<numeric 2>	<numeric 3>	<numeric 4>
Description	Port numbers assigned to logical port 1 (balance). (a and b in Figure 6-1)		Port numbers assigned to logical port 2 (balance). (c and d in Figure 6-1)	
Range	1 to 4	1 to 4	1 to 4	1 to 4
Preset value	1	2	3	4
Resolution	1	1	1	1

For each parameter, you must specify a different port number. If you specify the same port number for 2 or more parameters, an error occurs and the command is ignored.

Query response

{numeric 1},{numeric 2},{numeric 3},{numeric 4}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:TOP:BBAL 1,2,3,4"
20   OUTPUT 717;":CALC1:FSIM:BAL:TOP:BBAL?"
30   ENTER 717;A,B,C,D
```

Related commands

:CALC{1-9}:FSIM:BAL:DEV on page 235

Equivalent key

[Analysis] - **Fixture Simulator** - **Topology** - **Port1(bal)**

[Analysis] - **Fixture Simulator** - **Topology** - **Port2(bal)**

NOTE When performing the operation from the front panel, set each logical port separately.

:CALC{1-9}:FSIM:BAL:TOP:SBAL

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:TOPology:SBALanced[:PPORts] <numeric 1>, <numeric 2>,<numeric 3>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:TOPology:SBALanced[:PPORts]?

Description

For channel 1 (:CALC1) to channel 9 (:CALC9), sets the port assignment when the balance device type is set to "unbalance-balance" (SBAL is specified with the :CALC{1-9}:FSIM:BAL:DEV command).

For details about the balance device type, see Figure 6-1 on page 96.

Parameters

	<numeric 1>	<numeric 2>	<numeric 3>
Description	Port number assigned to logical port 1 (unbalance). (a in Figure 6-1)	Port numbers assigned to logical port 2 (balance). (b and c in Figure 6-1)	
Range	1 to 4	1 to 4	1 to 4
Preset value	1	2	3
Resolution	1	1	1

For each parameter, you must specify a different port number. If you specify the same port number for 2 or more parameters, an error occurs and the command is ignored.

Query response

{numeric 1},{numeric 2},{numeric 3}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:TOP:SBAL 1,2,3"
20   OUTPUT 717;":CALC1:FSIM:BAL:TOP:SBAL?"
30   ENTER 717;A,B,C
```

Related commands

:CALC{1-9}:FSIM:BAL:DEV on page 235

Equivalent key

[Analysis] - **Fixture Simulator** - **Topology** - **Port1(se)**

[Analysis] - **Fixture Simulator** - **Topology** - **Port2(bal)**

NOTE When performing the operation from the front panel, set each logical port separately.

:CALC{1-9}:FSIM:BAL:TOP:SSB

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:TOPology:SSBalanced[:PPORts] <numeric 1>,<numeric 2>,<numeric 3>,<numeric 4>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:BALun:TOPology:SSBalanced[:PPORts]?

Description

For channel 1 (:CALC1) to channel 9 (:CALC9), sets the port assignment when the balance device type is set to "unbalance-unbalance-balance" (SSB is specified with the :CALC{1-9}:FSIM:BAL:DEV command).

For details about the balance device type, see Figure 6-1 on page 96.

Parameters

	<numeric 1>	<numeric 2>	<numeric 3>	<numeric 4>
Description	Port number assigned to logical port 1 (unbalance). (a in Figure 6-1)	Port number assigned to logical port 2 (unbalance). (b in Figure 6-1)	Port numbers assigned to logical port 3 (balance). (c and d in Figure 6-1)	
Range	1 to 4	1 to 4	1 to 4	1 to 4
Preset value	1	2	3	4
Resolution	1	1	1	1

For each parameter, you must specify a different port number. If you specify the same port number for 2 or more parameters, an error occurs and the command is ignored.

Query response

{numeric 1},{numeric 2},{numeric 3},{numeric 4}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:BAL:TOP:SSB 1,2,3,4"
20   OUTPUT 717;":CALC1:FSIM:BAL:TOP:SSB?"
30   ENTER 717;A,B,C,D
```

Related commands

:CALC{1-9}:FSIM:BAL:DEV on page 235

Equivalent key

[Analysis] - **Fixture Simulator** - **Topology** - **Port1(se)**

[Analysis] - **Fixture Simulator** - **Topology** - **Port2(se)**

[Analysis] - **Fixture Simulator** - **Topology** - **Port3(bal)**

NOTE When performing the operation from the front panel, set each logical port separately.

:CALC{1-9}:FSIM:SEND:DEEM:PORT{1-4}

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:DEEMbed:PORT{[1]|2|3|4}[:TYPE] {NONE|USER}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:DEEMbed:PORT{[1]|2|3|4}[:TYPE]?

Description

For port 1 (:PORT1) to port 4 (:PORT4) of channel 1 (:CALC1) to channel 9 (:CALC9), selects the type of the network de-embedding.

If you want to select the user-defined network de-embedding, you must specify the 2-port touchstone file in which the information on the user-defined network is saved in advance. If you do not specify the appropriate file and you select the user-defined network de-embedding, an error occurs and NONE is automatically selected.

Parameters

	Description
NONE (preset value)	Specifies no-de-embedding.
USER	Specifies the user-defined network de-embedding[*1].

*1. The information on the network is read out from the 2-port touchstone file specified with the :CALC{1-9}:FSIM:SEND:DEEM:PORT{1-4}:USER:FIL command.

Query response

{NONE|USER}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:SEND:DEEM:PORT1 USER"
20   OUTPUT 717;":CALC1:FSIM:SEND:DEEM:PORT1?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:FSIM:SEND:DEEM:STAT on page 254

:CALC{1-9}:FSIM:SEND:DEEM:PORT{1-4}:USER:FIL on page 253

Equivalent key

[Analysis] - **Fixture Simulator** - **De-Embedding** - **Select Type**

:CALC{1-9}:FSIM:SEND:DEEM:PORT{1-4}:USER:FIL

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:DEEMbed:PORT{[1]|2|3|4}:USER:FILename <string>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:DEEMbed:PORT{[1]|2|3|4}:USER:FILename?

Description

For port 1 (:PORT1) to port 4 (:PORT4) of channel 1 (:CALC1) to channel 9 (:CALC9), specifies the file in which the information on the user-defined network for the network de-embedding function is saved (2-port touchstone file).

Specify the file name with the .s2p extension. If you want to specify a file on the floppy disk drive, you need to add “A:” at the beginning of the file name. When you use directory names and file name, separate them with “/” (slash) or “\” (backslash).

Even if the specified file does not exist, no error occurs when you execute this command.[*1] However, when you set the type of the network de-embedding to the user-defined network with the :CALC{1-9}:FSIM:SEND:DEEM:PORT{1-4} command, an error occurs.

Parameters

	<string>
Description	2-port touchstone file name
Range	254 characters or less
Preset value	""

Query response

{string}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:SEND:DEEM:PORT1:USER:FIL ""Network.s2p"""
20   OUTPUT 717;":CALC1:FSIM:SEND:DEEM:PORT1:USER:FIL?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:FSIM:SEND:DEEM:STAT on page 254

:CALC{1-9}:FSIM:SEND:DEEM:PORT{1-4} on page 252

Equivalent key

[Analysis] - **Fixture Simulator** - **De-Embedding** - **User File**

*1. If you set the type of the network de-embedding to the user-defined network before you execute this command, an error occurs and the command is ignored when you execute this command.

:CALC{1-9}:FSIM:SEND:DEEM:STAT

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:DEEMbed:STATe {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:DEEMbed:STATe?

Description

For all the ports of channel 1 (:CALC1) to channel 9 (:CALC9), turns ON/OFF the network de-embedding function when the fixture simulator function is ON (ON is specified with the :CALC{1-9}:FSIM:STAT command).

Parameters

	Description
ON or 1	Turns ON the network de-embedding function.
OFF or 0 (preset value)	Turns OFF the network de-embedding function.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:SEND:DEEM:STAT ON"
20   OUTPUT 717;":CALC1:FSIM:SEND:DEEM:STAT?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:STAT on page 264

:CALC{1-9}:FSIM:SEND:DEEM:PORT{1-4} on page 252

:CALC{1-9}:FSIM:SEND:DEEM:PORT{1-4}:USER:FIL on page 253

Equivalent key

[Analysis] - **Fixture Simulator** - **De-Embedding** - **De-Embedding**

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:PMCircuit:PORT{[1]|2|3|4}[:TYPE] {NONE|SLPC|PCSL|PLSC|SCPL|PLPC|USER}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:PMCircuit:PORT{[1]|2|3|4}[:TYPE]?

Description

For port 1 (:PORT1) to port 4 (:PORT4) of channel 1 (:CALC1) to channel 9 (:CALC9), selects the type of the matching circuit.

If you want to select the user-defined circuit, you must specify the 2-port touchstone file in which the proper information on the user-defined circuit is saved in advance. If you do not specify the appropriate file and you select the user-defined circuit, an error occurs and NONE is automatically selected.

Parameters

	Description
NONE (preset value)	Specifies no-circuit.
SLPC	Specifies the circuit that consists of series L and shunt C.
PCSL	Specifies the circuit that consists of shunt C and series L.
PLSC	Specifies the circuit that consists of shunt L and series C.
SCPL	Specifies the circuit that consists of series C and shunt L.
PLPC	Specifies the circuit that consists of shunt L and shunt C.
USER	Specifies the user-defined circuit[*1].

*1. The information on the circuit is read out from the 2-port touchstone file specified with the :CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:USER:FIL command.

For more information on the circuits, refer to "*User's Guide*."

Query response

{NONE|SLPC|PCSL|PLSC|SCPL|PLPC|USER}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:SEND:PMC:PORT1 SLPC"
20   OUTPUT 717;":CALC1:FSIM:SEND:PMC:PORT1?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:FSIM:SEND:PMC:STAT on page 261

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:C on page 256

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:G on page 257

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:L on page 258

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:R on page 259

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:USER:FIL on page 260

Equivalent key

[Analysis] - Fixture Simulator - Port Matching - Select Circuit

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:C

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:PMCircuit:PORT{[1]|2|3|4}:PARameters:C <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:PMCircuit:PORT{[1]|2|3|4}:PARameters:C?

Description

For port 1 (:PORT1) to port 4 (:PORT4) of channel 1 (:CALC1) to channel 9 (:CALC9), sets the C value of the matching circuit.

Parameters

	<numeric>
Description	C value of the matching circuit
Range	-1E18 to 1E18
Preset value	0
Unit	F (farad)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:SEND:PMC:PORT1:PAR:C 12.3"
20   OUTPUT 717;":CALC1:FSIM:SEND:PMC:PORT1:PAR:C?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:SEND:PMC:STAT on page 261

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4} on page 255

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:G on page 257

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:L on page 258

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:R on page 259

Equivalent key

[Analysis] - **Fixture Simulator** - **Port Matching** - **C**

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:G

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:PMCircuit:PORT{[1]|2|3|4}:PARameters:G <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:PMCircuit:PORT{[1]|2|3|4}:PARameters:G?

Description

For port 1 (:PORT1) to port 4 (:PORT4) of channel 1 (:CALC1) to channel 9 (:CALC9), sets the G value of the matching circuit.

Parameters

	<numeric>
Description	G value of the matching circuit
Range	-1E18 to 1E18
Preset value	0
Unit	S (siemens)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:SEND:PMC:PORT1:PAR:G 12.3"
20   OUTPUT 717;":CALC1:FSIM:SEND:PMC:PORT1:PAR:G?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:SEND:PMC:STAT on page 261

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4} on page 255

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:C on page 256

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:L on page 258

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:R on page 259

Equivalent key

[Analysis] - **Fixture Simulator** - **Port Matching** - **G**

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:L

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:PMCircuit:PORT{[1]|2|3|4}:PARameters:L <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:PMCircuit:PORT{[1]|2|3|4}:PARameters:L?

Description

For port 1 (:PORT1) to port 4 (:PORT4) of channel 1 (:CALC1) to channel 9 (:CALC9), sets the L value of the matching circuit.

Parameters

	<numeric>
Description	L value of the matching circuit
Range	-1E18 to 1E18
Preset value	0
Unit	H (henry)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:SEND:PMC:PORT1:PAR:L 12.3"
20   OUTPUT 717;":CALC1:FSIM:SEND:PMC:PORT1:PAR:L?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:SEND:PMC:STAT on page 261

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4} on page 255

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:C on page 256

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:G on page 257

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:R on page 259

Equivalent key

[Analysis] - **Fixture Simulator** - **Port Matching** - **L**

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:R

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:PMCircuit:PORT{[1]|2|3|4}:PARameters:R <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:PMCircuit:PORT{[1]|2|3|4}:PARameters:R?

Description

For port 1 (:PORT1) to port 4 (:PORT4) of channel 1 (:CALC1) to channel 9 (:CALC9), sets the R value of the matching circuit.

Parameters

	<numeric>
Description	R value of the matching circuit
Range	-1E18 to 1E18
Preset value	0
Unit	Ω (ohm)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:SEND:PMC:PORT1:PAR:R 12.3"
20   OUTPUT 717;":CALC1:FSIM:SEND:PMC:PORT1:PAR:R?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:SEND:PMC:STAT on page 261

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4} on page 255

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:C on page 256

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:G on page 257

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:L on page 258

Equivalent key

[Analysis] - **Fixture Simulator** - **Port Matching** - **R**

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:USER:FIL

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:PMCircuit:PORT{[1]|2|3|4}:USER:FILename <string>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:PMCircuit:PORT{[1]|2|3|4}:USER:FILename?

Description

For port 1 (:PORT1) to port 4 (:PORT4) of channel 1 (:CALC1) to channel 9 (:CALC9), specifies the file in which the information on the user-defined matching circuit is saved (2-port touchstone file).

Specify the file name with the .s2p extension. If you want to specify a file on the floppy disk drive, you need to add “A:” at the beginning of the file name. When you use directory names and file name, separate them with “/” (slash) or “\” (backslash).

Even if the specified file does not exist, no error occurs when you execute this command.[*1] However, when you set the type of the matching circuit to the user-defined circuit with the :CALC{1-9}:FSIM:SEND:PMC:PORT{1-4} command, an error occurs.

Parameters

	<string>
Description	2-port touchstone file name
Range	254 characters or less
Preset value	""

Query response

{string}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:SEND:PMC:PORT1:USER:FIL ""Match.s2p"""
20   OUTPUT 717;":CALC1:FSIM:SEND:PMC:PORT1:USER:FIL?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:FSIM:SEND:PMC:STAT on page 261

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4} on page 255

Equivalent key

[Analysis] - **Fixture Simulator** - **Port Matching** - **User File**

*1. If you set the type of the matching circuit to the user-defined circuit before you execute this command, an error occurs and the command is ignored when you execute this command.

:CALC{1-9}:FSIM:SEND:PMC:STAT

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:PMCircuit:STATe {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:PMCircuit:STATe?

Description

For all the ports of channel 1 (:CALC1) to channel 9 (:CALC9), turns ON/OFF the matching circuit embedding function when the fixture simulator function is ON (ON is specified with the :CALC{1-9}:FSIM:STAT command).

Parameters

	Description
ON or 1	Turns ON the matching circuit embedding function.
OFF or 0 (preset value)	Turns OFF the matching circuit embedding function.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:SEND:PMC:STAT ON"
20   OUTPUT 717;":CALC1:FSIM:SEND:PMC:STAT?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:STAT on page 264

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4} on page 255

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:C on page 256

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:G on page 257

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:L on page 258

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:R on page 259

:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:USER:FIL on page 260

Equivalent key

[Analysis] - **Fixture Simulator** - **Port Matching** - **Port Matching**

:CALC{1-9}:FSIM:SEND:ZCON:PORT{1-4}:Z0

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:ZCONversion:PORT{[1]|2|3|4}:Z0[:R] <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:ZCONversion:PORT{[1]|2|3|4}:Z0[:R]?

Description

For port 1 (:PORT1) to port 4 (:PORT4) of channel 1 (:CALC1) to channel 9 (:CALC9), sets the impedance value for the port impedance conversion function.

Parameters

	<numeric>
Description	Impedance value
Range	1E-3 to 1E7
Preset value	50
Unit	Ω (ohm)
Resolution	0.001

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:SEND:ZCON:PORT1:Z0 75"
20   OUTPUT 717;":CALC1:FSIM:SEND:ZCON:PORT1:Z0?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:SEND:ZCON:STAT on page 263

Equivalent key

[Analysis] - **Fixture Simulator** - **Port ZConversion** - **Port1 Z0**|**Port2 Z0**|**Port3 Z0**|**Port4 Z0**

:CALC{1-9}:FSIM:SEND:ZCON:STAT

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:ZCONversion:STATe {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:SENDed:ZCONversion:STATe?

Description

For all the ports of channel 1 (:CALC1) to channel 9 (:CALC9), turns ON/OFF the port impedance conversion function when the fixture simulator function is ON (ON is specified with the :CALC{1-9}:FSIM:STAT command).

Parameters

	Description
ON or 1	Turns ON the port impedance conversion function.
OFF or 0 (preset value)	Turns OFF the port impedance conversion function.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:SEND:ZCON:STAT ON"
20   OUTPUT 717;":CALC1:FSIM:SEND:ZCON:STAT?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FSIM:STAT on page 264

:CALC{1-9}:FSIM:SEND:ZCON:PORT{1-4}:Z0 on page 262

Equivalent key

[Analysis] - **Fixture Simulator** - **Port ZConversion** - **Port ZConversion**

:CALC{1-9}:FSIM:STAT

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:STATe {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:FSIMulator:STATe?

Description

Turns ON/OFF the fixture simulator function of channel 1 (:CALC1) to channel 9 (:CALC9).

Parameters

	Description
ON or 1	Turns ON the fixture simulator function.
OFF or 0 (preset value)	Turns OFF the fixture simulator function.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FSIM:STAT ON"
20   OUTPUT 717;":CALC1:FSIM:STAT?"
30   ENTER 717;A
```

Equivalent key

[Analysis] - **Fixture Simulator** - **Fixture Simulator**

:CALC{1-9}:FUNC:DATA?

Syntax
:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:DATA?

Description
For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), reads out the analysis result of the :CALC{1-9}:FUNC:EXEC command.

The data transfer format when this command is executed depends on the setting with the :FORM:DATA command. (Query only)

Query response
{numeric 1},…,{numeric N×2}<newline><^END>

	Description
{numeric n×2-1}	Response value or analysis result of the searched n-th measurement point.
{numeric n×2}	Stimulus value of the searched n-th measurement point. Always set to 0 for the analysis of maximum and minimum values/standard deviation/mean value.

Where N is the number of data pairs (can be read out with :CALC{1-9}:FUNC:POIN? command) and n is an integer between 1 and N.

Example of use
```
10   OUTPUT 717;":CALC1:FUNC:POIN?"
20   ENTER 717;A
30   REDIM B(1:2*A)
40   OUTPUT 717;":CALC1:FUNC:DATA?"
50   ENTER 717;B(*)
```

Related commands
:CALC{1-9}:FUNC:EXEC on page 268

:CALC{1-9}:FUNC:POIN? on page 270

:CALC{1-9}:PAR{1-9}:SEL on page 302

:FORM:DATA on page 349

Equivalent key
No equivalent key is available on the front panel.

:CALC{1-9}:FUNC:DOM

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:DOMain[:STATe] {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:DOMain[:STATe]?

Description

For channel 1 (:CALC1) to channel 9 (:CALC9), sets whether to use an arbitrary range when executing the analysis with the :CALC{1-9}:FUNC:EXEC command.

Parameters

	Description
ON or 1	Specifies an arbitrary range*1.
OFF or 0 (preset value)	Specifies the entire sweep range.

*1. Use the :CALC{1-9}:FUNC:DOM:STAR command and the :CALC{1-9}:FUNC:DOM:STOP command to specify a range.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FUNC:DOM ON"
20   OUTPUT 717;":CALC1:FUNC:DOM?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FUNC:EXEC on page 268

:CALC{1-9}:FUNC:DOM:STAR on page 267

:CALC{1-9}:FUNC:DOM:STOP on page 268

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:FUNC:DOM:STAR

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:DOMain:STARt <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:DOMain:STARt?

Description

For channel 1 (:CALC1) to channel 9 (:CALC9), sets the start value of the analysis range of the :CALC{1-9}:FUNC:EXEC command.

Parameters

	<numeric>
Description	Start value of the analysis range
Preset value	0
Unit	Hz (hertz)[*1]

*1. When the span value of the sweep range is 0, the unit is s (second).

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FUNC:DOM:STAR 1.7E9"
20   OUTPUT 717;":CALC1:FUNC:DOM:STAR?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FUNC:EXEC on page 268

:CALC{1-9}:FUNC:DOM on page 266

:CALC{1-9}:FUNC:DOM:STOP on page 268

Equivalent key

No equivalent key is available on the front panel.

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:CALC{1-9}:FUNC:DOM:STOP

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:DOMain:STOP <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:DOMain:STOP?

Description

For channel 1 (:CALC1) to channel 9 (:CALC9), sets the stop value of the analysis range of the :CALC{1-9}:FUNC:EXEC command.

Parameters

	<numeric>
Description	Stop value of the analysis range
Preset value	0
Unit	Hz (hertz)*1

*1. When the span value of the sweep range is 0, the unit is s (second).

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FUNC:DOM:STOP 1.8E9"
20   OUTPUT 717;":CALC1:FUNC:DOM:STOP?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FUNC:EXEC on page 268

:CALC{1-9}:FUNC:DOM on page 266

:CALC{1-9}:FUNC:DOM:STAR on page 267

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:FUNC:EXEC

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:EXECute

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), executes the analysis specified with the :CALC{1-9}:FUNC:TYPE command. (No query)

Example of use

```
10   OUTPUT 717;":CALC1:FUNC:EXEC"
```

Related commands

:CALC{1-9}:FUNC:TYPE on page 274

:CALC{1-9}:FUNC:DOM on page 266

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:FUNC:PEXC

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:PEXCursion <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:PEXCursion?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets the lower limit for the peak excursion value when executing the peak search with the :CALC{1-9}:FUNC:EXEC command.

Parameters

	<numeric>
Description	Lower limit for the peak excursion value
Range	0 to 5e8
Preset value	3
Unit	Varies depending on the data format as follows: Logarithmic Magnitude: dB (decibel) Phase, Expand Phase: ° (degree) Group Delay: s (second) Others: No unit

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FUNC:PEXC 0.2"
20   OUTPUT 717;":CALC1:FUNC:PEXC?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FUNC:EXEC on page 268

:CALC{1-9}:FUNC:PPOL on page 271

:CALC{1-9}:FUNC:TYPE on page 274

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:FUNC:POIN?

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:POINts?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), reads out the number of data pairs of the analysis result of the :CALC{1-9}:FUNC:EXEC command.

For the analysis of the mean value or the search of the maximum value, 1 is always read out; for the search of all peaks or the search of all targets, the total number of searched measurement points is read out. (Query only)

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FUNC:POIN?"
20   ENTER 717;A
```

Related commands

:CALC{1-9}:FUNC:EXEC on page 268

:CALC{1-9}:FUNC:DATA? on page 265

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:FUNC:PPOL

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:PPOLarity {POSitive|NEGative|BOTH}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:PPOLarity?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the polarity when performing the peak search with the :CALC{1-9}:FUNC:EXEC command.

Parameters

	Description
POSitive (preset value)	Specifies the positive peak.
NEGative	Specifies the negative peak.
BOTH	Specifies both the positive peak and the negative peak.

Query response

{POS|NEG|BOTH}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FUNC:PPOL BOTH"
20   OUTPUT 717;":CALC1:FUNC:PPOL?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:FUNC:EXEC on page 268

:CALC{1-9}:FUNC:PEXC on page 269

:CALC{1-9}:FUNC:TYPE on page 274

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:FUNC:TARG

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:TARGet <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:TARGet?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the target value when performing the target search with the :CALC{1-9}:FUNC:EXEC command.

Parameters

	<numeric>
Description	Target value
Range	-5E8 to 5E8
Preset value	0
Unit	Varies depending on the data format as follows: Logarithmic Magnitude: dB (decibel) Phase, Expand Phase: ° (degree) Group Delay: s (second) Others: No unit

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FUNC:TARG -12.5"
20   OUTPUT 717;":CALC1:FUNC:TARG?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:FUNC:EXEC on page 268

:CALC{1-9}:FUNC:TTR on page 273

:CALC{1-9}:FUNC:TYPE on page 274

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:FUNC:TTR

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:TTRansition {POSitive|NEGative|BOTH}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:TTRansition?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the transition type when performing the target search with the :CALC{1-9}:FUNC:EXEC command.

Parameters

	Description
POSitive	Specifies positive.
NEGative	Specifies negative.
BOTH (preset value)	Specifies both positive and negative.

Query response

{POS|NEG|BOTH}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FUNC:TTR NEG"
20   OUTPUT 717;":CALC1:FUNC:TTR?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:FUNC:EXEC on page 268

:CALC{1-9}:FUNC:TARG on page 272

:CALC{1-9}:FUNC:TYPE on page 274

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:FUNC:TYPE

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:TYPE {PTPeak|STDEV|MEAN|MAXimum|MINimum|PEAK|APEak|ATARget}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:FUNCtion:TYPE?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the type of analysis.

Parameters

	Description
PTPeak (preset value)	Specifies the analysis of the difference between the maximum value and the minimum value (Peak to Peak).
STDEV	Specifies the analysis of the standard deviation.
MEAN	Specifies the analysis of the mean value.
MAXimum	Specifies the search for the maximum value.
MINimum	Specifies the search for the minimum value.
PEAK	Specifies the search for the maximum positive (minimum negative) peak*1.
APEak	Specifies the search for all peaks*1.
ATARget	Specifies the search for all targets*2.

*1. To specify the conditions of the peak, use the :CALC{1-9}:FUNC:PEXC command and the :CALC{1-9}:FUNC:PPOL command.
*2. To specify the conditions of the target, use the :CALC{1-9}:FUNC:TARG command and the :CALC{1-9}:FUNC:TTR command.

Query response

{PTP|STDEV|MEAN|MAX|MIN|PEAK|APE|ATAR}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:FUNC:TYPE PEAK"
20   OUTPUT 717;":CALC1:FUNC:TYPE?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:FUNC:EXEC on page 268

:CALC{1-9}:FUNC:PEXC on page 269

:CALC{1-9}:FUNC:PPOL on page 271

:CALC{1-9}:FUNC:TARG on page 272

:CALC{1-9}:FUNC:TTR on page 273

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:LIM

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:LIMit[:STATe] {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:LIMit[:STATe]?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), turns ON/OFF the limit test function.

Parameters

	Description
ON or 1	Turns ON the limit test.
OFF or 0 (preset value)	Turns OFF the limit test.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:LIM ON"
20   OUTPUT 717;":CALC1:LIM?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

:CALC{1-9}:LIM:DISP on page 277

Equivalent key

[Analysis] - **Limit Test** - **Limit Test**

:CALC{1-9}:LIM:DATA

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:LIMit:DATA <numeric 1>,…,<numeric 1+(N×5)>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:LIMit:DATA?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets the limit table.

Parameters

	Description
<numeric 1>	The number of lines. (0 to 100)
<numeric 1+(n×5)-4>	The type of the n-th line. Specify an integer 0 to 2: 0: Off 1: Upper limit line 2: Lower limit line
<numeric 1+(n×5)-3>	The value on the horizontal axis (frequency) of the start point of the n-th line.
<numeric 1+(n×5)-2>	The value on the horizontal axis (frequency) of the end point of the n-th line.
<numeric 1+(n×5)-1>	The value on the vertical axis of the start point of the n-th line.
<numeric 1+(n×5)>	The value on the vertical axis of the end point of the n-th line.

Where N is the number of lines (specified with <numeric 1>) and n is an integer between 1 and N.

If you set the number of lines to 0 (clear the limit table), this command needs only <numeric 1> as the parameter.

Query response

{numeric 1},…,{numeric 1+(N×5)}<newline><^END>

Example of use

```
10   DIM B(1:2,1:5)
20   OUTPUT 717;":CALC1:LIM:DATA 2,1,1E9,3E9,0,0,2,1E9,3E9,-3,-3"
30   OUTPUT 717;":CALC1:LIM:DATA?"
40   ENTER 717;A,B(*)

10   OUTPUT 717;":CALC1:LIM:DATA 0"  ! Clear Limit Table
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

:CALC{1-9}:LIM on page 275

:CALC{1-9}:LIM:DISP on page 277

Equivalent key

[Analysis] - **Limit Test** - **Edit Limit Line**

:CALC{1-9}:LIM:DISP

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:LIMit:DISPlay[:STATe] {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:LIMit:DISPlay[:STATe]?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), turns ON/OFF the limit line display.

Parameters

	Description
ON or 1	Turns ON the limit line display.
OFF or 0 (preset value)	Turns OFF the limit line display.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:LIM:DISP ON"
20   OUTPUT 717;":CALC1:LIM:DISP?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:LIM on page 275

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Limit Test** - **Limit Line**

14. SCPI Command Reference

:CALC{1-9}:LIM:FAIL?

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:LIMit:FAIL?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), reads out the limit test result. (Query only)

Query response

{1|0}<newline><^END>

	Description
1	The limit test result is FAIL.
0	The limit test result is PASS.

When the limit test is set to OFF, 0 is always read out.

Example of use

```
10   OUTPUT 717;":CALC1:LIM:FAIL?"
20   ENTER 717;A
```

Related commands

:CALC{1-9}:LIM on page 275

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:LIM:REP?

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:LIMit:REPort?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), reads out the frequency values at all the measurement point that failed the limit test. (Query only)

Query response

{numeric 1},…,{numeric N}<newline><^END>

Where N is the number of the measurement points that failed (can be read out with the :CALC{1-9}:LIM:REP:POIN? command).

Example of use

```
10   OUTPUT 717;":CALC1:LIM:REP:POIN?"
20   ENTER 717;A
30   REDIM B(1:A)
40   OUTPUT 717;":CALC1:LIM:REP?"
50   ENTER 717;B(*)
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

:CALC{1-9}:LIM:REP:POIN? on page 279

:CALC{1-9}:LIM on page 275

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:LIM:REP:POIN?

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:LIMit:REPort:POINts?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), reads out the number of the measurement points that failed the limit test. (Query only)

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:LIM:REP:POIN?"
20   ENTER 717;A
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

:CALC{1-9}:LIM on page 275

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:MARK:BWID

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer:BWIDth[:STATe] {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer:BWIDth[:STATe]?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), turns ON/OFF the bandwidth search result display.

Parameters

	Description
ON or 1	Turns ON the bandwidth search result display.
OFF or 0 (preset value)	Turns OFF the bandwidth search result display.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:MARK:BWID ON"
20   OUTPUT 717;":CALC1:MARK:BWID?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:MARK{1-10}:BWID:DATA? on page 285

:CALC{1-9}:MARK{1-10}:BWID:THR on page 286

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Marker Search] - **Bandwidth**

:CALC{1-9}:MARK:COUP

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer:COUPle {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer:COUPle?

Description

For channel 1 (:CALC1) to channel 9 (:CALC9), turns ON/OFF the marker coupling between traces.

Parameters

	Description
ON or 1 (preset value)	Turns ON the marker coupling.
OFF or 0	Turns OFF the marker coupling.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:MARK:COUP OFF"
20   OUTPUT 717;":CALC1:MARK:COUP?"
30   ENTER 717;A
```

Equivalent key

[Marker Fctn] - **Couple**

:CALC{1-9}:MARK:DISC

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer:DISCrete {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer:DISCrete?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), turns ON/OFF the discrete mode (mode in which the marker moves only at the measurement points) of markers.

Parameters

	Description
ON or 1	Turn OFF the discrete mode.
OFF or 0 (preset value)	Turns OFF the discrete mode.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:MARK:DISC OFF"
20   OUTPUT 717;":CALC1:MARK:DISC?"
30   ENTER 717;A
```

Equivalent key

[Marker Fctn] - **Discrete**

:CALC{1-9}:MARK:REF

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer:REFerence[:STATe] {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer:REFerence[:STATe]?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), turns ON/OFF the reference marker mode.

The reference marker mode is turned on or off when you turn on or off the display of the reference marker.

Parameters

	Description
ON or 1	Turns ON the reference marker mode.
OFF or 0 (preset value)	Turns OFF the reference marker mode.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:MARK:REF ON"
20   OUTPUT 717;":CALC1:MARK:REF?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

:CALC{1-9}:MARK{1-10} on page 283

Equivalent key

[Marker] - **Ref Maker Mode**

:CALC{1-9}:MARK{1-10}

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}[:STATe] {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}[:STATe]?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), turns ON/OFF the display of marker 1 (:MARK1) to marker 9 (:MARK9) and reference marker (:MARK10).

The display of the reference marker is turned on or off when you turn on or off the reference marker mode.

Parameters

	Description
ON or 1	Turns ON the display of the marker.
OFF or 0 (preset value)	Turns OFF the display of the marker.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:MARK1 ON"
20   OUTPUT 717;":CALC1:MARK1?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

:CALC{1-9}:MARK:REF on page 282

Equivalent key

When turning ON the display of the marker

[Marker] - Marker 1|Marker 2|Marker 3|Marker 4|Ref Marker

[Marker] - More Markers - Marker 5|Marker 6|Marker 7|Marker 8|Marker 9

NOTE

When performing the operation from the front panel, a marker set to ON is automatically set to the active marker.

When turning OFF the display of the marker

[Marker] - Clear Marker Menu - Marker 1|Marker 2|Marker 3|Marker 4|Marker 5|Marker 6|Marker 7|Marker 8|Marker 9|Ref Marker

14. SCPI Command Reference

:CALC{1-9}:MARK{1-10}:ACT

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:ACTivate

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets marker 1 (:MARK1) to marker 9 (:MARK9) and reference marker (:MARK10) to the active marker. (No query)

NOTE

If you set a marker set to OFF to the active marker, it is automatically set to ON.

Example of use

```
10   OUTPUT 717;":CALC1:MARK1:ACT"
```

Related commands

:DISP:WIND{1-9}:ACT on page 337

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Marker] - **Marker 1**|**Marker 2**|**Marker 3**|**Marker 4**|**Ref Marker**

[Marker] - **More Markers** - **Marker 5**|**Marker 6**|**Marker 7**|**Marker 8**|**Marker 9**

:CALC{1-9}:MARK{1-10}:BWID:DATA?

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:BWIDth:DATA?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), reads out the bandwidth search result of marker 1 (:MARK1) to marker 9 (:MARK9) and reference marker (:MARK10).

If the bandwidth search is impossible, an error occurs and the command is ignored. In this case, no query response is obtained. (Query only)

Query response

{numeric 1},{numeric 2},{numeric 3},{numeric 4}<newline><^END>

	Description
{numeric 1}	The bandwidth.
{numeric 2}	The center frequency.
{numeric 3}	The Q value.
{numeric 4}	The loss.

Example of use

```
10   OUTPUT 717;":CALC1:MARK1:BWID:DATA?"
20   ENTER 717;A,B,C,D
```

Related commands

:CALC{1-9}:MARK:BWID on page 280

:CALC{1-9}:MARK{1-10}:BWID:THR on page 286

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:MARK{1-10}:BWID:THR

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:BWIDth:THReshold <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:BWIDth:THReshold?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets the bandwidth definition value of marker 1 (:MARK1) to marker 9 (:MARK9) and reference marker (:MARK10).

Parameters

	<numeric>
Description	Bandwidth definition value
Range	-5E8 to 5E8
Preset value	-3
Unit	Varies depending on the data format as follows: Logarithmic Magnitude: dB (decibel) Phase, Expand Phase: ° (degree) Group Delay: s (second) Others: No unit

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:MARK1:BWID:THR 6"
20   OUTPUT 717;":CALC1:MARK1:BWID:THR?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:MARK:BWID on page 280

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Marker Search] - **Bandwidth Value**

:CALC{1-9}:MARK{1-10}:FUNC:EXEC

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:FUNCtion:EXECute

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), executes the search with marker 1 (:MARK1) to marker 9 (:MARK9) and reference marker (:MARK10).

To specify the type of the search, use the :CALC{1-9}:MARK{1-10}:FUNC:TYPE command. (No query)

Example of use

```
10   OUTPUT 717;":CALC1:MARK1:FUNC:EXEC"
```

Related commands

:CALC{1-9}:MARK{1-10}:FUNC:TYPE on page 293

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Marker Search] - **Max**|**Min**

[Marker Search] - **Peak** - **Search Peak**|**Search Left**|**Search Right**

[Marker Search] - **Target** - **Search Target**|**Search Left**|**Search Right**

NOTE

When performing the operation from the front panel, you select the search type and execute the search at the same time.

14. SCPI Command Reference

:CALC{1-9}:MARK{1-10}:FUNC:PEXC

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:FUNCtion:PEXCursion <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:FUNCtion:PEXCursion?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets the lower limit for the peak excursion value of marker 1 (:MARK1) to marker 9 (:MARK9) and reference marker (:MARK10).

Parameters

	<numeric>
Description	Lower limit for the peak excursion value
Range	0 to 5E8
Preset value	3
Unit	Varies depending on the data format as follows: Logarithmic Magnitude: dB (decibel) Phase, Expand Phase: ° (degree) Group Delay: s (second) Others: No unit

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:MARK1:FUNC:PEXC 0.2"
20   OUTPUT 717;":CALC1:MARK1:FUNC:PEXC?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:MARK{1-10}:FUNC:PPOL on page 289

:CALC{1-9}:MARK{1-10}:FUNC:TYPE on page 293

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Marker Search] - **Peak** - **Peak Excursion**

:CALC{1-9}:MARK{1-10}:FUNC:PPOL

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:FUNCtion:PPOLarity {POSitive|NEGative|BOTH}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:FUNCtion:PPOLarity?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the polarity of the peak to be searched with marker 1 (:MARK1) to marker 9 (:MARK9) and reference marker (:MARK10).

Parameters

	Description
POSitive (preset value)	Specifies the positive peak.
NEGative	Specifies the negative peak.
BOTH	Specifies both the positive peak and the negative peak.

Query response

{POS|NEG|BOTH}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:MARK1:FUNC:PPOL NEG"
20   OUTPUT 717;":CALC1:MARK1:FUNC:PPOL?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:MARK{1-10}:FUNC:PEXC on page 288

:CALC{1-9}:MARK{1-10}:FUNC:TYPE on page 293

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Marker Search] - **Peak** - **Peak Polarity**

:CALC{1-9}:MARK{1-10}:FUNC:TARG

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:FUNCtion:TARGet <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:FUNCtion:TARGet?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets the target value to be searched with marker 1 (:MARK1) to marker 9 (:MARK9) and reference marker (:MARK10).

Parameters

	<numeric>
Description	Target value for target search
Range	-5E8 to 5E8
Preset value	0
Unit	Varies depending on the data format as follows: Logarithmic Magnitude: dB (decibel) Phase, Expand Phase: ° (degree) Group Delay: s (second) Others: No unit

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:MARK1:FUNC:TARG -12.5"
20   OUTPUT 717;":CALC1:MARK1:FUNC:TARG?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:MARK{1-10}:FUNC:TTR on page 292

:CALC{1-9}:MARK{1-10}:FUNC:TYPE on page 293

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Marker Search] - **Target** - **Target Value**

:CALC{1-9}:MARK{1-10}:FUNC:TRAC

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:FUNCtion:TRACking {ON|OFF|1|0}
:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:FUNCtion:TRACking?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), turns ON/OFF the search tracking (function to repeat the search for each sweep) of marker 1 (:MARK1) to marker 9 (:MARK9) and reference marker (:MARK10).

Parameters

	Description
ON or 1	Turns ON the search tracking.
OFF or 0 (preset value)	Turns OFF the search tracking.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:MARK1:FUNC:TRAC ON"
20   OUTPUT 717;":CALC1:MARK1:FUNC:TRAC?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:MARK{1-10}:FUNC:EXEC on page 287

:CALC{1-9}:MARK{1-10}:FUNC:TYPE on page 293

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Marker Search] - **Tracking**

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:CALC{1-9}:MARK{1-10}:FUNC:TTR

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:FUNCtion:TTRansition {POSitive|NEGative|BOTH}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:FUNCtion:TTRansition?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the transition type when performing the target search with marker 1 (:MARK1) to marker 9 (:MARK9) and reference marker (:MARK10).

Parameters

	Description
POSitive	Specifies positive.
NEGative	Specifies negative.
BOTH (preset value)	Specifies both positive and negative.

Query response

{POS|NEG|BOTH}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:MARK1:FUNC:TTR NEG"
20   OUTPUT 717;":CALC1:MARK1:FUNC:TTR?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:MARK{1-10}:FUNC:TARG on page 290

:CALC{1-9}:MARK{1-10}:FUNC:TYPE on page 293

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Marker Search] - **Target** - **Target Transition**

:CALC{1-9}:MARK{1-10}:FUNC:TYPE

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:FUNCtion:TYPE {MAXimum|MINimum|PEAK|LPEak|RPEak|TARGet|LTARget|RTARget}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:FUNCtion:TYPE?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the search type of marker 1 (:MARK1) to marker 9 (:MARK9) and reference marker (:MARK10).

Parameters

	Description
MAXimum (preset value)	Specifies the maximum value search.
MINimum	Specifies the minimum value search.
PEAK	Specifies the maximum positive (minimum negative) peak*1 search.
LPEak	Specifies the peak*1 search to the left from the marker position.
RPEak	Specifies the peak*1 search to the right from the marker position.
TARGet	Specifies the search for the target*2 closest to the current marker position.
LTARget	Specifies the target*2 search to the left from the marker position.
RTARget	Specifies the target*2 search to the right from the marker position.

*1. To specify the conditions of the peak, use the :CALC{1-9}:MARK{1-10}:FUNC:PEXC command and the :CALC{1-9}:MARK{1-10}:FUNC:PPOL command.

*2. To specify the conditions of the target, use the :CALC{1-9}:MARK{1-10}:FUNC:TARG command and the :CALC{1-9}:MARK{1-10}:FUNC:TTR command.

Query response

{MAX|MIN|PEAK|LPE|RPE|TARG|LTAR|RTAR}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:MARK1:FUNC:TYPE PEAK"
20   OUTPUT 717;":CALC1:MARK1:FUNC:TYPE?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:MARK{1-10}:FUNC:EXEC on page 287

:CALC{1-9}:MARK{1-10}:FUNC:PEXC on page 288

:CALC{1-9}:MARK{1-10}:FUNC:PPOL on page 289

:CALC{1-9}:MARK{1-10}:FUNC:TARG on page 290

:CALC{1-9}:MARK{1-10}:FUNC:TTR on page 292

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Marker Search] - **Max**|**Min**

[Marker Search] - **Peak** - **Search Peak**|**Search Left**|**Search Right**

[Marker Search] - **Target** - **Search Target**|**Search Left**|**Search Right**

NOTE

When performing the operation from the front panel, you select the search type and execute the search at the same time.

:CALC{1-9}:MARK{1-10}:SET

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:SET {STARt|STOP|CENTer|RLEVel}

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets the value of the specified item to the value of the position of marker 1 (:MARK1) to marker 9 (:MARK9) and reference marker (:MARK10).

Regardless of the ON/OFF of the reference marker mode (specified with the :CALC{1-9}:MARK:REF command), the value when the reference marker mode is OFF is always set. (No query)

Parameters

	Description
STARt	Sets the sweep start value to the stimulus value at the marker position.
STOP	Sets the sweep stop value to the stimulus value at the marker position.
CENTer	Sets the sweep center value to the stimulus value at the marker position.
RLEVel	Sets the reference line value to the response value at the marker position.

Example of use

```
10   OUTPUT 717;":CALC1:MARK1:SET CENT"
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

:CALC{1-9}:MARK:REF on page 282

Equivalent key

[Marker Fctn] - **Marker -> Start**|**Marker -> Stop**|**Marker -> Center**|**Marker -> Reference**

:CALC{1-9}:MARK{1-10}:X

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:X <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:X?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets the stimulus value of marker 1 (:MARK1) to marker 9 (:MARK9) and reference marker (:MARK10).

Parameters

	<numeric>
Description	Stimulus value*1
Range	Sweep start value to sweep stop value*2
Preset value	Sweep start value*3
Unit	Hz (hertz)*4

*1. When the reference marker mode is ON (ON is specified with the :CALC{1-9}:MARK:REF command), it is the value relative to the reference marker.
*2. When the span value of the sweep range is 0, the range is from 0 to sweep time value.
*3. When the span value of the sweep range is 0, the unit is 0.
*4. When the span value of the sweep range is 0, the unit is s (second).

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:MARK1:X 1E9"
20   OUTPUT 717;":CALC1:MARK1:X?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:MARK{1-10}:Y? on page 296

:CALC{1-9}:PAR{1-9}:SEL on page 302

:CALC{1-9}:MARK:REF on page 282

Equivalent key

[Marker] - **Marker 1|Marker 2|Marker 3|Marker 4|Ref Marker**

[Marker] - **More Markers** - **Marker 5|Marker 6|Marker 7|Marker 8|Marker 9**

NOTE

When performing the operation from the front panel, you turn ON the marker and set the stimulus value at the same time.

:CALC{1-9}:MARK{1-10}:Y?

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MARKer{[1]|2|3|4|5|6|7|8|9|10}:Y?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), reads out the response value of marker 1 (:MARK1) to marker 9 (:MARK9) and reference marker (:MARK10).

When the reference marker mode is ON (ON is specified with the :CALC{1-9}:MARK:REF command), the readout value is the value relative to the reference marker. (Query only)

Query response

{numeric 1},{numeric 2}<newline><^END>

	Description
{numeric 1}	Response value (primary value) at the marker position.
{numeric 2}	Response value (secondary value) at the marker position. Always 0 when the data format is not the Smith chart format or the polar format.

Example of use

```
10   OUTPUT 717;":CALC1:MARK1:Y?"
30   ENTER 717;A,B
```

Related commands

:CALC{1-9}:MARK{1-10}:X on page 295

:CALC{1-9}:PAR{1-9}:SEL on page 302

:CALC{1-9}:MARK:REF on page 282

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:MATH:FUNC

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MATH:FUNCtion {NORMal|SUBTract|DIVide|ADD|MULTiply}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MATH:FUNCtion?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the data trace display method (math method between measurement data and memory trace data).

The math result according to this setting is displayed on the data trace.

Parameters

	Description
NORMal (preset value)	Specifies *Data* (no math).
DIVide	Specifies *Data* / *Mem*.
MULTiply	Specifies *Data* × *Mem*.
SUBTract	Specifies *Data* - *Mem*.
ADD	Specifies *Data* + *Mem*.

Where *Data* is the measurement data and *Mem* is the data stored in the memory trace.

Query response

{NORM|DIV|MULT|SUBT|ADD}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:MATH:FUNC DIV"
20   OUTPUT 717;":CALC1:MATH:FUNC?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Display] - **Data Math** - **OFF**|**Data / Mem**|**Data * Mem**|**Data – Mem**|**Data + Mem**

:CALC{1-9}:MATH:MEM

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MATH:MEMorize

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), copies the measurement data at the execution of the command to the memory trace. (No query)

Example of use

```
10   OUTPUT 717;":CALC1:MATH:MEM"
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Display] - **Data –> Mem**

:CALC{1-9}:MST

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MSTatistics[:STATe] {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MSTatistics[:STATe]?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), turns ON/OFF the statistics value display (the mean vale, the standard deviation, and the difference between the maximum value and the minimum value).

Parameters

	Description
ON or 1	Turns ON the statistics value display.
OFF or 0 (preset value)	Turns OFF the statistics value display.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:MST ON"
20   OUTPUT 717;":CALC1:MST?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:MST:DATA? on page 299

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Marker Fctn] - **Statistics**

:CALC{1-9}:MST:DATA?

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:MSTatistics:DATA?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), reads out the statistics values (the mean vale, the standard deviation, and the difference between the maximum value and the minimum value) display. (Query only)

Query response

{numeric 1},{numeric 2},{numeric 3}<newline><^END>

	Description
{numeric 1}	Mean value
{numeric 2}	Standard deviation
{numeric 3}	Difference between the maximum value and the minimum value (Peak to Peak)

Example of use

```
10   OUTPUT 717;":CALC1:MST:DATA?"
20   ENTER 717;A,B,C
```

Related commands

:CALC{1-9}:MST on page 298

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

No equivalent key is available on the front panel.

:CALC{1-9}:PAR:COUN

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:PARameter:COUNt <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}:PARameter:COUNt?

Description

Sets the number of traces of channel 1 (:CALC1) to channel 9 (:CALC9).

Parameters

	<numeric>
Description	Number of traces
Range	1 to 9
Preset value	1
Resolution	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:PAR:COUN 4"
20   OUTPUT 717;":CALC1:PAR:COUN?"
30   ENTER 717;A
```

Equivalent key

[Display] - **Num of Traces**

:CALC{1-9}:PAR{1-9}:DEF

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:PARameter{[1]|2|3|4|5|6|7|8|9}:DEFine {S11|S21|S31|S41|S12|S22|S32|S42|S13|S23|S33|S43|S14|S24|S34|S44}

:CALCulate{[1]|2|3|4|5|6|7|8|9}:PARameter{[1]|2|3|4|5|6|7|8|9}:DEFine?

Description

Sets the measurement parameter of trace 1 (:PAR1) to trace 9 (:PAR9) of channel 1 (:CALC1) to channel 9 (:CALC9).

Parameters

	Description
S11 (preset value)	Specifies S11.
S21	Specifies S21.
S31	Specifies S31.
S41	Specifies S41.
S12	Specifies S12.
S22	Specifies S22.
S32	Specifies S32.
S42	Specifies S42.
S13	Specifies S13.
S23	Specifies S23.
S33	Specifies S33.
S43	Specifies S43.
S14	Specifies S14.
S24	Specifies S24.
S34	Specifies S34.
S44	Specifies S44.

Query response

{S11|S21|S31|S41|S12|S22|S32|S42|S13|S23|S33|S43|S14|S24|S34|S44}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:PAR1:DEF S21"
20   OUTPUT 717;":CALC1:PAR1:DEF?"
30   ENTER 717;A$
```

Equivalent key

[Meas] - **S11|S21|S31|S41|S12|S22|S32|S42|S13|S23|S33|S43|S14|S24|S34|S44**

:CALC{1-9}:PAR{1-9}:SEL

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}:PARameter{[1]|2|3|4|5|6|7|8|9}:SELect

Description

Sets trace 1 (:PAR1) to trace 9 (:PAR9) of channel 1 (:CALC1) to channel 9 (:CALC9) to the active trace.

You can set only the displayed trace to the active trace. If you execute this command trying to set a not displayed trace to the active trace, an error occurs and the command is ignored. (No query)

Example of use

```
10   OUTPUT 717;":CALC1:PAR1:SEL"
```

Related commands

:DISP:WIND{1-9}:ACT on page 337

Equivalent key

[Trace Prev] / **[Trace Next]**

:CALC{1-9}:SMO

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:SMOothing[:STATe] {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:SMOothing[:STATe]?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), turns ON/OFF the smoothing.

Parameters

	Description
ON or 1	Turns ON the smoothing.
OFF or 0 (preset value)	Turns OFF the smoothing.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:SMO:STAT ON"
20   OUTPUT 717;":CALC1:SMO:STAT?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

:CALC{1-9}:SMO:APER on page 303

Equivalent key

[Avg] - **Smoothing**

:CALC{1-9}:SMO:APER

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:SMOothing:APERture <numeric>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:SMOothing:APERture?

Description

Sets the smoothing aperture for channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command).

Parameters

	<numeric>
Description	Percentage relative to the sweep span value
Range	1 to 25
Preset value	1.5
Unit	% (percent)
Resolution	1E-14

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:SMO:APER 2.5"
20   OUTPUT 717;":CALC1:SMO:APER?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

:CALC{1-9}:SMO on page 302

Equivalent key

[Avg] - **Smo Aperture**

14. SCPI Command Reference

:CALC{1-9}:TRAN:TIME

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME[:TYPE] {BPASs|LPASs}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME[:TYPE]?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the transformation type used for the transformation function of the time domain function.

Parameters

	Description
BPASs (preset value)	Specifies the band-pass[*1].
LPASs	Specifies the low-pass[*2].

*1. You do not need to select the stimulus type. Impulse is selected automatically.
*2. You need to select the stimulus type (impulse or step) with the :CALC{1-9}:TRAN:TIME:STIM command.

Query response

{BPAS|LPAS}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:TRAN:TIME LPAS"
20   OUTPUT 717;":CALC1:TRAN:TIME?"
30   ENTER 717;A$
```

Related commands

:CALC{1-9}:TRAN:TIME:STIM on page 312

:CALC{1-9}:TRAN:TIME:STAT on page 310

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Transform** - **Type** - **Bandpass**|**Lowpass Step**|**Lowpass Imp.**

NOTE

When performing this operation from the front panel, you select the stimulus type at the same time.

:CALC{1-9}:TRAN:TIME:CENT

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:CENTer <value>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:CENTer?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the center value used for the transformation function of the time domain function.

Parameters

	<value>
Description	Center value
Range	Varies depending on the frequency span and the number of points.
Preset value	0
Unit	s (second)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:TRAN:TIME:CENT 1E-8"
20   OUTPUT 717;":CALC1:TRAN:TIME:CENT?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:TRAN:TIME:SPAN on page 308

:CALC{1-9}:TRAN:TIME:STAT on page 310

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Transform** - **Center**

:CALC{1-9}:TRAN:TIME:IMP:WIDT

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:IMPulse:WIDTh <value>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:IMPulse:WIDTh?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets the shape of the Kayser Bessel window using the impulse width used for the transformation function of the time domain function.

Parameters

	<value>
Description	Impulse width
Range	Varies depending on the frequency span and the transformation type.
Preset value	Varies depending on the frequency span and the transformation type.
Unit	s (second)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:TRAN:TIME:IMP:WIDT 1E-10"
20   OUTPUT 717;":CALC1:TRAN:TIME:IMP:WIDT?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:TRAN:TIME:KBES on page 307

:CALC{1-9}:TRAN:TIME:STEP:RTIM on page 311

:CALC{1-9}:TRAN:TIME:STAT on page 310

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Transform** - **Window** - **User** - **Impulse Width**

:CALC{1-9}:TRAN:TIME:KBES

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:KBESsel <value>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:KBESsel?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets the shape of the Kayser Bessel window using β used for the transformation function of the time domain function.

Parameters

	<value>
Description	The value of β.
Range	0 to 13
Preset value	6

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:TRAN:TIME:KBES 3"
20   OUTPUT 717;":CALC1:TRAN:TIME:KBES?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:TRAN:TIME:IMP:WIDT on page 306

:CALC{1-9}:TRAN:TIME:STEP:RTIM on page 311

:CALC{1-9}:TRAN:TIME:STAT on page 310

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Transform** - **Window** - **User** - **Kaiser Beta**

:CALC{1-9}:TRAN:TIME:LPFR

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:LPFRequency

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), changes the frequency range to match with the low-pass type transformation of the transformation function of the time domain function. (No query)

Related commands

:CALC{1-9}:TRAN:TIME on page 304

:CALC{1-9}:TRAN:TIME:STAT on page 310

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Transform** - **Set Freq Low pass**

:CALC{1-9}:TRAN:TIME:SPAN

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:SPAN <value>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:SPAN?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the span value used for the transformation function of the time domain function.

Parameters

	<value>
Description	Span value
Range	Varies depending on the frequency span and the number of points.
Preset value	2E-8
Unit	s (second)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:TRAN:TIME:SPAN 1E-8"
20   OUTPUT 717;":CALC1:TRAN:TIME:SPAN?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:TRAN:TIME:CENT on page 305

:CALC{1-9}:TRAN:TIME:STAT on page 310

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Transform** - **Span**

:CALC{1-9}:TRAN:TIME:STAR

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:STARt <value>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:STARt?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the start value used for the transformation function of the time domain function.

Parameters

	<value>
Description	Start value
Range	Varies depending on the frequency span and the number of points.
Preset value	-1E-8
Unit	s (second)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:TRAN:TIME:STAR 0"
20   OUTPUT 717;":CALC1:TRAN:TIME:STAR?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:TRAN:TIME:STOP on page 313

:CALC{1-9}:TRAN:TIME:STAT on page 310

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Transform** - **Start**

:CALC{1-9}:TRAN:TIME:STAT

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:STATe {ON|OFF|1|0}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:STATe?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), turns ON/OFF the transformation function of the time domain function.

You can enable the transformation function only when the sweep type is the linear sweep and the number of points is 3 or more. If you execute this command to try to enable the transformation function when the sweep type is other than the linear sweep or the number of points is less than 3, an error occurs and the command is ignored.

Parameters

	Description
ON or 1	Turns ON the transformation function.
OFF or 0 (preset value)	Turns OFF the transformation function.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:TRAN:TIME:STAT ON"
20   OUTPUT 717;":CALC1:TRAN:TIME:STAT?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

:SENS{1-9}:SWE:TYPE on page 437

:SENS{1-9}:SWE:POIN on page 435

Equivalent key

[Analysis] - **Transform** - **Transform**

:CALC{1-9}:TRAN:TIME:STEP:RTIM

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:STEP:RTIMe <value>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:STEP:RTIMe?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), sets the shape of the Kayser Bessel window using the rise time of step signal used for the transformation function of the time domain function.

Parameters

	<value>
Description	The rise time of step signal
Range	Varies depending on the frequency span.
Preset value	Varies depending on the frequency span.
Unit	s (second)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:TRAN:TIME:STEP:RTIM 1E-10"
20   OUTPUT 717;":CALC1:TRAN:TIME:STEP:RTIM?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:TRAN:TIME:IMP:WIDT on page 306

:CALC{1-9}:TRAN:TIME:KBES on page 307

:CALC{1-9}:TRAN:TIME:STAT on page 310

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Transform** - **Window** - **User** - **Rise Time**

14. SCPI Command Reference

:CALC{1-9}:TRAN:TIME:STIM

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:STIMulus {IMPulse|STEP}

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:STIMulus?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the stimulus type used for the transformation function of the time domain function.

Parameters

	Description
IMPulse (preset value)	Specifies the impulse*1.
STEP	Specifies the step*2.

*1. You need to select the transformation type (band-pass or low-pass) with the :CALC{1-9}:TRAN:TIME command.
*2. You do not need to select the transformation type. Low-pass is selected automatically.

Query response

{IMP|STEP}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:TRAN:TIME LPAS"
20   OUTPUT 717;":CALC1:TRAN:TIME:STIM STEP"
30   OUTPUT 717;":CALC1:TRAN:TIME:STIM?"
40   ENTER 717;A$
```

Related commands

:CALC{1-9}:TRAN:TIME on page 304

:CALC{1-9}:TRAN:TIME:STAT on page 310

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Transform** - **Type** - **Bandpass**|**Lowpass Step**|**Lowpass Imp.**

NOTE

When performing this operation from the front panel, you select the transformation type at the same time.

:CALC{1-9}:TRAN:TIME:STOP

Syntax

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:STOP <value>

:CALCulate{[1]|2|3|4|5|6|7|8|9}[:SELected]:TRANsform:TIME:STOP?

Description

For the active trace of channel 1 (:CALC1) to channel 9 (:CALC9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command), selects the stop value used for the transformation function of the time domain function.

Parameters

	<value>
Description	Stop value
Range	Varies depending on the frequency span and the number of points.
Preset value	1E-8
Unit	s (second)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value}<newline><^END>

Example of use

```
10   OUTPUT 717;":CALC1:TRAN:TIME:STOP 2E-8"
20   OUTPUT 717;":CALC1:TRAN:TIME:STOP?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:TRAN:TIME:STAR on page 309

:CALC{1-9}:TRAN:TIME:STAT on page 310

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - Transform - Stop

:CONT:HAND:A

Syntax
:CONTrol:HANDler:A[:DATA] <numeric>

Description
Outputs data to output port A (A0 to A7) of the handler I/O. Data is outputted as 8-bit binary using A0 as LSB and A7 as MSB. (No query)

For details about the handler I/O, see Chapter 10.

Parameters

	<numeric>
Description	Output data
Range	0 to 255
Resolution	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Example of use
```
10   OUTPUT 717;":CONT:HAND:A 15"
```

Equivalent key
No equivalent key is available on the front panel.

:CONT:HAND:B

Syntax
:CONTrol:HANDler:B[:DATA] <numeric>

Description
Outputs data to output port B (B0 to B7) of the handler I/O. Data is outputted as 8-bit binary using B0 as LSB and B7 as MSB. (No query)

For details about the handler I/O, see Chapter 10.

Parameters

	<numeric>
Description	Output data
Range	0 to 255
Resolution	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Example of use
```
10   OUTPUT 717;":CONT:HAND:B 15"
```

Equivalent key
No equivalent key is available on the front panel.

:CONT:HAND:C

Syntax

:CONTrol:HANDler:C[:DATA] <numeric>

:CONTrol:HANDler:C[:DATA]?

Description

When input/output port C of the handler I/O is set to the output port, outputs data to output port C (C0 to C3).

When input/output port C is set to the input port, reads out data inputted to port C (C0 to C3).

Data is outputted as 4-bit binary using C0 as LSB and C3 as MSB.

For details about the handler I/O, see Chapter 10.

Parameters

	<numeric>
Description	Output data/input data
Range	0 to 15
Resolution	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CONT:HAND:C:MODE OUTP"
20   OUTPUT 717;":CONT:HAND:C 15"
```

```
10   OUTPUT 717;":CONT:HAND:C:MODE INP"
20   OUTPUT 717;":CONT:HAND:C?"
30   ENTER 717;A
```

Related commands

:CONT:HAND:C:MODE on page 316

Equivalent key

No equivalent key is available on the front panel.

:CONT:HAND:C:MODE

Syntax

:CONTrol:HANDler:C:MODE {INPut|OUTPut}

:CONTrol:HANDler:C:MODE?

Description

Sets the input/output direction of port C of the handler I/O.

For details about the handler I/O, see Chapter 10.

Parameters

	Description
INPut (preset value)	Specifies input.
OUTPut	Specifies output.

Query response

{INP|OUTP}<newline><^END>

Example of use

```
10   OUTPUT 717;":CONT:HAND:C:MODE OUTP"
20   OUTPUT 717;":CONT:HAND:C:MODE?"
30   ENTER 717;A$
```

Related commands

:CONT:HAND:C on page 315

Equivalent key

No equivalent key is available on the front panel.

:CONT:HAND:D

Syntax

:CONTrol:HANDler:D[:DATA] <numeric>

:CONTrol:HANDler:D[:DATA]?

Description

When input/output port D of the handler I/O is set to the output port, outputs data to output port D (D0 to D3).

When input/output port D is set to the input port, reads out data inputted to port D (D0 to D3).

Data is outputted as 4-bit binary using D0 as LSB and D3 as MSB.

For details about the handler I/O, see Chapter 10.

Parameters

	<numeric>
Description	Output data/input data
Range	0 to 15
Resolution	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CONT:HAND:D:MODE OUTP"
20   OUTPUT 717;":CONT:HAND:D 15"
```

```
10   OUTPUT 717;":CONT:HAND:D:MODE INP"
20   OUTPUT 717;":CONT:HAND:D?"
30   ENTER 717;A
```

Related commands

:CONT:HAND:D:MODE on page 318

Equivalent key

No equivalent key is available on the front panel.

:CONT:HAND:D:MODE

Syntax

:CONTrol:HANDler:C:MODE {INPut|OUTPut}

:CONTrol:HANDler:C:MODE?

Description

Sets the input/output direction of port D of the handler I/O.

For details about the handler I/O, see Chapter 10.

Parameters

	Description
INPut (preset value)	Specifies input.
OUTPut	Specifies output.

Query response

{INP|OUTP}<newline><^END>

Example of use

```
10   OUTPUT 717;":CONT:HAND:D:MODE OUTP"
20   OUTPUT 717;":CONT:HAND:D:MODE?"
30   ENTER 717;A$
```

Related commands

:CONT:HAND:D on page 317

Equivalent key

No equivalent key is available on the front panel.

:CONT:HAND:E

Syntax

:CONTrol:HANDler:E[:DATA] <numeric>

:CONTrol:HANDler:E[:DATA]?

Description

When input/output port E (port C + port D) of the handler I/O is set to the output port, outputs data to output port E.

When input/output port E is set to the input port, reads out data inputted to port E.

Data is outputted as 8-bit binary using C0 as LSB and D3 as MSB.

For details about the handler I/O, see Chapter 10.

Parameters

	<numeric>
Description	Output data/input data
Range	0 to 255
Resolution	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":CONT:HAND:C:MODE OUTP"
20   OUTPUT 717;":CONT:HAND:D:MODE OUTP"
30   OUTPUT 717;":CONT:HAND:E 128"

10   OUTPUT 717;":CONT:HAND:C:MODE INP"
20   OUTPUT 717;":CONT:HAND:D:MODE INP"
30   OUTPUT 717;":CONT:HAND:E?"
40   ENTER 717;A
```

Related commands

:CONT:HAND:C:MODE on page 316

:CONT:HAND:D:MODE on page 318

:CONT:HAND:C on page 315

:CONT:HAND:D on page 317

Equivalent key

No equivalent key is available on the front panel.

:CONT:HAND:F

Syntax :CONTrol:HANDler:F[:DATA] <numeric>

Description Outputs data to output port F (port A + port B) of the handler I/O. Data is outputted as 16-bit binary using A0 as LSB and B7 as MSB. (No query)

For details about the handler I/O, see Chapter 10.

Parameters

	<numeric>
Description	Output data
Range	0 to 65535
Resolution	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Example of use

```
10   OUTPUT 717;":CONT:HAND:F 511"
```

Related commands :CONT:HAND:A on page 314

:CONT:HAND:B on page 314

Equivalent key No equivalent key is available on the front panel.

:CONT:HAND:IND:STAT

Syntax

:CONTrol:HANDler[:EXTension]:INDex:STATe {ON|OFF|1|0}

:CONTrol:HANDler[:EXTension]:INDex:STATe?

Description

Turns ON/OFF outputting the INDEX signal to B6 of the handler I/O.

For details about the handler I/O, see Chapter 10.

Parameters

	Description
ON or 1	Turns ON the INDEX signal output.
OFF or 0 (preset value)	Turns OFF the INDEX signal output.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CONT:HAND:IND:STAT ON"
20   OUTPUT 717;":CONT:HAND:IND:STAT?"
30   ENTER 717;A
```

Related commands

:CONT:HAND:RTR:STAT on page 322

Equivalent key

No equivalent key is available on the front panel.

:CONT:HAND:OUTP{1-2}

Syntax

:CONTrol:HANDler:OUTPut{[1]|2}[:DATA] {1|0}

:CONTrol:HANDler:OUTPut{[1]|2}[:DATA]?

Description

Sets HIGH/LOW of OUTPUT1 (:OUTP1) or OUTPUT2 (:OUTP2) of the handler I/O.

For details about the handler I/O, see Chapter 10.

Parameters

	Description
1	Specifies LOW.
0	Specifies HIGH.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CONT:HAND:OUTP1 1"
20   OUTPUT 717;":CONT:HAND:OUTP1?"
30   ENTER 717;A
```

Equivalent key

No equivalent key is available on the front panel.

:CONT:HAND:RTR:STAT

Syntax

:CONTrol:HANDler[:EXTension]:RTRigger:STATe {ON|OFF|1|0}

:CONTrol:HANDler[:EXTension]:RTRigger:STATe?

Description

Turns ON/OFF outputting the READY FOR TRIGGER signal to B7 of the handler I/O.

For details about the handler I/O, see Chapter 10.

Parameters

	Description
ON or 1	Turns ON the READY FOR TRIGGER signal output.
OFF or 0 (preset value)	Turns OFF the READY FOR TRIGGER signal output.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":CONT:HAND:RTR:STAT ON"
20   OUTPUT 717;":CONT:HAND:RTR:STAT?"
30   ENTER 717;A
```

Related commands

:CONT:HAND:IND:STAT on page 321

Equivalent key

No equivalent key is available on the front panel.

:DISP:ANN:FREQ

Syntax

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

:DISPlay:ANNotation:FREQuency[:STATe]?

Description

Turns ON/OFF the frequency display on the LCD display.

Parameters

	Description
ON or 1 (preset value)	Turns ON the frequency display.
OFF or 0	Turns OFF the frequency display.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:ANN:FREQ OFF"
20   OUTPUT 717;":DISP:ANN:FREQ?"
30   ENTER 717;A
```

Equivalent key

[Display] - **Frequency**

:DISP:CCL

Syntax

:DISPlay:CCLear

Description

Clears the error message display on the instrument status bar (at the bottom of the LCD display). (No query)

Example of use

```
10   OUTPUT 717;":DISP:CCL"
```

Equivalent key

All front panel keys.

:DISP:CLOC

Syntax

:DISPlay:CLOCk {ON|OFF|1|0}

:DISPlay:CLOCk?

Description

Turns ON/OFF the clock display at the right edge of the instrument status bar (at the bottom of the LCD display).

Parameters

	Description
ON or 1 (preset value)	Turns ON the clock display.
OFF or 0	Turns OFF the clock display.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:CLOC OFF"
20   OUTPUT 717;":DISP:CLOC?"
30   ENTER 717;A
```

Equivalent key

[System] - **Misc Setup** - **Clock Setup** - **Show Clock**

:DISP:COL{1-2}:BACK

Syntax

:DISPlay:COLor{[1]|2}:BACK <value 1>,<value 2>,<value 3>

:DISPlay:COLor{[1]|2}:BACK?

Description

Sets the background color for normal display (:COL1) and inverted display (:COL2).

Parameters

	<value 1>	<value 2>	<value 3>
Description	Amount of red	Amount of green	Amount of blue
Range	0 to 5	0 to 5	0 to 5
Resolution	1	1	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value 1},{value 2},{value 3}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:COL:BACK 1,2,3"
20   OUTPUT 717;":DISP:COL:BACK?"
30   ENTER 717;A,B,C
```

Related commands

:DISP:COL{1-2}:RES on page 327

Equivalent key

[System] - **Misc Setup** - **Color Setup** - **Normal|Invert** - **Background**

:DISP:COL{1-2}:GRAT{1-2}

Syntax

:DISPlay:COLor{[1]|2}:GRATicule{[1]|2} <value 1>,<value 2>,<value 3>

:DISPlay:COLor{[1]|2}:GRATicule{[1]|2}?

Description

Sets the color of the graticule label and the outer frame line of the graph (:GRAT1) and the color of the grid line of the graph (:GRAT2) for normal display (:COL1) and inverted display (:COL2).

Parameters

	<value 1>	**<value 2>**	**<value 3>**
Description	Amount of red	Amount of green	Amount of blue
Range	0 to 5	0 to 5	0 to 5
Resolution	1	1	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value 1},{value 2},{value 3}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:COL1:GRAT1 1,2,3"
20   OUTPUT 717;":DISP:COL1:GRAT1?"
30   ENTER 717;A,B,C
```

Related commands

:DISP:COL{1-2}:RES on page 327

Equivalent key

[System] - **Misc Setup** - **Color Setup** - **Normal**|**Invert** - **Graticule Main**|**Graticule Sub**

:DISP:COL{1-2}:LIM{1-2}

Syntax

:DISPlay:COLor{[1]|2}:LIMit{[1]|2} <value 1>,<value 2>,<value 3>

:DISPlay:COLor{[1]|2}:LIMit{[1]|2}?

Description

Sets the fail display color used for the limit test result (:LIM1) and the color of the limit line (:LIM2) for normal display (:COL1) and inverted display (:COL2).

Parameters

	<value 1>	**<value 2>**	**<value 3>**
Description	Amount of red	Amount of green	Amount of blue
Range	0 to 5	0 to 5	0 to 5
Resolution	1	1	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value 1},{value 2},{value 3}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:COL1:LIM1 1,2,3"
20   OUTPUT 717;":DISP:COL1:LIM1?"
30   ENTER 717;A,B,C
```

Related commands

:DISP:COL{1-2}:RES on page 327

Equivalent key

[System] - **Misc Setup** - **Color Setup** - **Normal|Invert** - **Limit Fail|Limit Line**

:DISP:COL{1-2}:RES

Syntax

:DISPlay:COLor{[1]|2}:RESet

Description

Resets the display color settings for all the items to the factory preset state for normal display (:COL1) and inverted display (:COL2). (No query)

Example of use

```
10   OUTPUT 717;":DISP:COL1:RES"
```

Related commands

:DISP:COL{1-2}:BACK on page 325

:DISP:COL{1-2}:GRAT{1-2} on page 326

:DISP:COL{1-2}:LIM{1-2} on page 327

:DISP:COL{1-2}:BACK on page 325

:DISP:COL{1-2}:BACK on page 325

Equivalent key

[System] - **Misc Setup** - **Color Setup** - **Normal|Invert** - **Reset Color** - **OK**

:DISP:COL{1-2}:TRAC{1-9}:DATA

Syntax

:DISPlay:COLor{[1]|2}:TRAC{[1]|2|3|4|5|6|7|8|9}:DATA <value 1>,<value 2>,<value 3>

:DISPlay:COLor{[1]|2}:TRAC{[1]|2|3|4|5|6|7|8|9}:DATA?

Description

Sets the color of the data trace of trace 1 (:TRAC1) to trace 9 (:TRAC9) for normal display (:COL1) and inverted display (:COL2).

Parameters

	<value 1>	<value 2>	<value 3>
Description	Amount of red	Amount of green	Amount of blue
Range	0 to 5	0 to 5	0 to 5
Resolution	1	1	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value 1},{value 2},{value 3}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:COL1:TRAC1:DATA 1,2,3"
20   OUTPUT 717;":DISP:COL1:TRAC1:DATA?"
30   ENTER 717;A,B,C
```

Related commands

:DISP:COL{1-2}:RES on page 327

Equivalent key

[System] - **Misc Setup** - **Color Setup** - **Normal**|**Invert** - **Data Trace 1**|**Data Trace 2**|**Data Trace 3**|**Data Trace 4**|**Data Trace 5**|**Data Trace 6**|**Data Trace 7**|**Data Trace 8**|**Data Trace 9**

:DISP:COL{1-2}:TRAC{1-9}:MEM

Syntax

:DISPlay:COLor{[1]|2}:TRAC{[1]|2|3|4|5|6|7|8|9}:MEMory <value 1>,<value 2>,<value 3>

:DISPlay:COLor{[1]|2}:TRAC{[1]|2|3|4|5|6|7|8|9}:MEMory?

Description

Sets the color of the memory trace of trace 1 (:TRAC1) to trace 9 (:TRAC9) for normal display (:COL1) and inverted display (:COL2).

Parameters

	<value 1>	<value 2>	<value 3>
Description	Amount of red	Amount of green	Amount of blue
Range	0 to 5	0 to 5	0 to 5
Resolution	1	1	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value 1},{value 2},{value 3}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:COL1:TRAC1:MEM 1,2,3"
20   OUTPUT 717;":DISP:COL1:TRAC1:MEM?"
30   ENTER 717;A,B,C
```

Related commands

:DISP:COL{1-2}:RES on page 327

Equivalent key

[System] - **Misc Setup** - **Color Setup** - **Normal**|**Invert** - **Mem Trace 1**|**Mem Trace 2**|**Mem Trace 3**|**Mem Trace 4**|**Mem Trace 5**|**Mem Trace 6**|**Mem Trace 7**|**Mem Trace 8**|**Mem Trace 9**

:DISP:ECHO

Syntax

:DISPlay:ECHO[:DATA] <string>

Description

Displays a character string in the echo window. (No query)

Parameters

	<string>
Description	Character string you want to display
Range	254 characters or less

Example of use

```
10   OUTPUT 717;":DISP:ECHO ""TEST RESULT"""
```

Related commands

:DISP:ECHO:CLE on page 330

:DISP:TABL on page 335

:DISP:TABL:TYPE on page 336

Equivalent key

No equivalent key is available on the front panel.

:DISP:ECHO:CLE

Syntax

:DISPlay:ECHO:CLEar

Description

Clears all character strings displayed in the echo window. (No query)

Example of use

```
10   OUTPUT 717;":DISP:ECHO:CLE"
```

Related commands

:DISP:ECHO on page 330

Equivalent key

[Macro Setup] - **Clear Echo**

:DISP:ENAB

Syntax

:DISPlay:ENABle {ON|OFF|1|0}

:DISPlay:ENABle?

Description

Turns ON/OFF the update of the LCD display.

When the update of the LCD display is OFF, You can update the LCD display once using :DISP:UPD command.

Parameters

	Description
ON or 1 (preset value)	Turns ON the update.
OFF or 0	Turns OFF the update.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:ENAB OFF"
20   OUTPUT 717;":DISP:ENAB?"
30   ENTER 717;A
```

Related commands

:DISP:UPD on page 336

Equivalent key

[Display] - **Update**

:DISP:FSIG

Syntax

:DISPlay:FSIGn {ON|OFF|1|0}

:DISPlay:FSIGn?

Description

Turns on or off the Fail display when the limit test fails.

Parameters

	Description
ON or 1 (preset value)	Turns on the Fail display.
OFF or 0	Turns off the Fail display.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:FSIG OFF"
20   OUTPUT 717;":DISP:FSIG?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:LIM on page 275

Equivalent key

[Analysis] - **Limit Test** - **Fail Sign**

:DISP:IMAG

Syntax

:DISPlay:IMAGe {NORMal|INVert}

:DISPlay:IMAGe?

Description

Selects the display type of the LCD display.

Parameters

	Description
NORMal (preset value)	Specifies the normal display (background color: black).
INVert	Specifies the display in which the color of the normal display is inverted (background color: white).

Query response

{NORM|INV}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:IMAG INV"
20   OUTPUT 717;":DISP:IMAG?"
30   ENTER 717;A$
```

Equivalent key

[Display] - **Invert Color**

:DISP:MAX

Syntax

:DISPlay:MAXimize {ON|OFF|1|0}

:DISPlay:MAXimize?

Description

Turns ON/OFF the window maximization of the active channel (specified with the :DISP:WIND{1-9}:ACT command).

If you turned ON the maximization, only the window of the active channel is maximized on the LCD display and the windows of the other channels are not displayed.

Parameters

	Description
ON or 1	Turns ON the maximization.
OFF or 0 (preset value)	Turns OFF the maximization.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:MAX ON"
20   OUTPUT 717;":DISP:MAX?"
30   ENTER 717;A
```

Related commands

:DISP:WIND{1-9}:ACT on page 337

Equivalent key

[Channel Max]

:DISP:SKEY

Syntax

:DISPlay:SKEY[:STATe] {ON|OFF|1|0}

:DISPlay:SKEY[:STATe]?

Description

Turns ON/OFF the display of the softkey labels.

Parameters

	Description
ON or 1 (preset value)	Specifies ON.
OFF or 0	Specifies OFF.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:MAX ON"
20   OUTPUT 717;":DISP:MAX?"
30   ENTER 717;A
```

Equivalent key

[Entry Off] (**[Softkey On/Off]**)

:DISP:SPL

Syntax

:DISPlay:SPLit {D1|D12|D1_2|D112|D1_1_2|D123|D1_2_3|D12_33|D11_23|D13_23|D12_13|
D1234|D1_2_3_4|D12_34|D123_456|D12_34_56|D1234_5678|D12_34_56_78|D123_456_789}

:DISPlay:SPLit?

Description

Sets the layout of the windows on the LCD display. For details about the window layout, refer to Figure 3-1 on page 40.

Parameters

	Description
D1 (preset value)	Specifies the layout in which the window for channel 1 only is displayed on the entire display.
D12	Specifies the layout in which the window for channel 1 is displayed on the left side of the display area and the window for channel 2 on the right side.
D1_2	Specifies the layout in which the window for channel 1 is displayed in the upper part and the window for channel 2 in the lower part.
D112	Specifies the layout in which the window for channel 1 is displayed on the left side of 2/3 and the window for channel 2 on the right side of 1/3.
D1_1_2	Specifies the layout in which the window for channel 1 is displayed in the upper part of 2/3 and the window for channel 2 in the lower part of 1/3.
D123	Specifies the layout in which the windows for channel 1, 2, and 3 are displayed in the left side, middle part, and right side, respectively.
D1_2_3	Specifies the layout in which the windows for channel 1, 2, and 3 are displayed in the upper part, middle part, and the lower part, respectively.
D12_33	Specifies the layout in which the windows for channel 1, 2, and 3 are displayed in the upper left, upper right, and lower part, respectively.
D11_23	Specifies the layout in which the windows for channel 1, 2, and 3 are displayed in the upper part, lower left, and lower right, respectively.
D13_23	Specifies the layout in which the windows for channel 1, 2, and 3 are displayed in the upper left, lower left, and right side, respectively.
D12_13	Specifies the layout in which the windows for channel 1, 2, and 3 are displayed in the left side, upper right, and lower right, respectively.
D1234	Specifies the layout in which the windows for channel 1, 2, 3 and 4 are displayed by splitting the screen horizontally into four equal parts.
D1_2_3_4	Specifies the layout in which the windows for channel 1, 2, 3 and 4 are displayed by splitting the screen vertically into four equal parts.
D12_34	Specifies the layout in which the windows for channel 1, 2, 3, and 4 are displayed in the upper left, upper right, lower left, and lower right, respectively.
D123_456	Specifies the layout in which the windows for channel 1, 2, 3, 4, 5 and 6 are displayed in the upper left, upper middle, upper right, lower left, lower middle, and lower right, respectively.
D12_34_56	Specifies the layout in which the windows for channel 1, 2, 3, 4, 5 and 6 are displayed in the upper left, upper right, middle left, middle right, lower left, and lower right, respectively.
D1234_5678	Specifies the layout in which the windows for channel 1, 2, 3 and 4 are displayed in the upper part and the windows for channel 5, 6, 7 and 8 are displayed in the lower part of the window.
D12_34_56_78	Specifies the layout in which the windows for channel 1, 3, 5 and 7 are displayed on the left side and the windows for channel 2, 4, 6 and 8 are displayed on the right side of the window.
D123_456_789	Specifies the layout in which the windows for channel 1, 2, 3, 4, 5, 6, 7, 8 and 9 are displayed in the left, middle, and right of the upper part of the window, in the left, middle, and right of the middle part, and in the left, middle, and right of the lower part, respectively.

Query response {D1|D12|D1_2|D112|D1_1_2|D123|D1_2_3|D12_33|D11_23|D13_23|D12_13|D1234|D1_2_3_4|D12_34|D123_456|D12_34_56|D1234_5678|D12_34_56_78|D123_456_789}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:SPL D1_2"
20   OUTPUT 717;":DISP:SPL?"
30   ENTER 717;A$
```

Related commands :DISP:WIND{1-9}:SPL on page 339

Equivalent key **[Display] - Allocate Channels**

:DISP:TABL

Syntax :DISPlay:TABLe[:STATe] {ON|OFF|1|0}

:DISPlay:TABLe[:STATe]?

Description Turns ON/OFF the display of the window selected with the :DISP:TABL:TYPE command.

Parameters

	Description
ON or 1	Turns ON the display.
OFF or 0 (preset value)	Turns OFF the display.

Query response {1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:TABL ON"
20   OUTPUT 717;":DISP:TABL?"
30   ENTER 717;A
```

Related commands :DISP:TABL:TYPE on page 336

Equivalent key **[Sweep Setup] - Edit Segment Table**

[Marker] - Marker Table

[Analysis] - Limit Test - Edit Limit Line

[Macro Setup] - Echo Window

NOTE When performing the operation from the front panel, you select the window and turn ON/OFF the display at the same time.

:DISP:TABL:TYPE

Syntax

:DISPlay:TABLe:TYPE {MARKer|LIMit|SEGMent|ECHO}

:DISPlay:TABLe:TYPE?

Description

Selects the window whose display is turned ON/OFF with the :DISP:TABL command.

Parameters

	Description
MARKer (preset value)	Specifies the marker table window.
LIMit	Specifies the limit test table window.
SEGMent	Specifies the segment table window.
ECHO	Specifies the echo window.

Query response

{MARK|LIM|SEGM|ECHO}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:TABL:TYPE ON"
20   OUTPUT 717;":DISP:TABL:TYPE?"
30   ENTER 717;A$
```

Related commands

:DISP:TABL on page 335

Equivalent key

[Sweep Setup] - **Edit Segment Table**

[Marker] - **Marker Table**

[Analysis] - **Limit Test** - **Edit Limit Line**

[Macro Setup] - **Echo Window**

NOTE When performing the operation from the front panel, you select the window and turn ON/OFF the display at the same time.

:DISP:UPD

Syntax

:DISPlay:UPDate[:IMMediate]

Description

Updates the LCD display once when the update of the LCD display is OFF (OFF is specified with the :DISP:ENAB command). (No query)

Example of use

```
10   OUTPUT 717;":DISP:UPD"
```

Related commands

:DISP:ENAB on page 331

Equivalent key

No equivalent key is available on the front panel.

:DISP:WIND{1-9}:ACT

Syntax

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:ACTivate

Description

Sets one of channel 1 (:WIND1) to channel 9 (:WIND9) to the active channel.

You can set only the displayed channel to the active channel. If you execute this command trying to set a not displayed channel to the active channel, an error occurs and the command is ignored. (No query)

Example of use

```
10   OUTPUT 717;":DISP:WIND1:ACT"
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Channel Prev] / **[Channel Next]**

:DISP:WIND{1-9}:LAB

Syntax

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:LABel {ON|OFF|1|0}

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:LABel?

Description

Turns ON/OFF the display of the graticule label of channel 1 (:WIND1) to channel 9 (:WIND9).

Parameters

	Description
ON or 1 (preset value)	Turns ON the graticule label display.
OFF or 0	Turns OFF the graticule label display.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:WIND1:LAB ON"
20   OUTPUT 717;":DISP:WIND1:LAB?"
30   ENTER 717;A
```

Equivalent key

[Display] - **Graticule Label**

:DISP:WIND{1-9}:MAX

Syntax

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:MAXimize {ON|OFF|1|0}

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:MAXimize?

Description

Turns ON/OFF the maximization of the active trace of channel 1 (:WIND1) to channel 9 (:WIND9) (specified with the :CALC{1-9}:PAR{1-9}:SEL command).

If you turned ON the maximization, only the maximized active trace is displayed in the window and the other traces are not displayed.

Parameters

	Description
ON or 1	Turns ON the maximization.
OFF or 0 (preset value)	Turns OFF the maximization.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:WIND1:MAX ON"
20   OUTPUT 717;":DISP:WIND1:MAX?"
30   ENTER 717;A
```

Related commands

:CALC{1-9}:PAR{1-9}:SEL on page 302

:DISP:MAX on page 333

Equivalent key

[Trace Max]

:DISP:WIND{1-9}:SPL

Syntax

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:SPLit {D1|D12|D1_2|D112|D1_1_2|D123|D1_2_3|D12_33|D11_23|D13_23|D12_13|D1234|D1_2_3_4|D12_34|D123_456|D12_34_56|D1234_5678|D12_34_56_78|D123_456_789}

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:SPLit?

Description

Sets the graph layout of channel 1 (:WIND1) to channel 9 (:WIND9). For details about the graph layout, refer to Figure 3-1 on page 40.

Parameters

	Description
D1 (preset value)	Specifies the layout in which one graph is displayed in the entire window.
D12	Specifies the layout in which 2 graphs in total are displayed on the left side and right side of the window.
D1_2	Specifies the layout in which 2 graphs in total are displayed in the upper part and lower part of the window.
D112	Specifies the layout in which 2 graphs in total are displayed on the left side of 2/3 and right side of 1/3 of the window.
D1_1_2	Specifies the layout in which 2 graphs in total are displayed in the upper part of 2/3 and lower part of 1/3 of the window.
D123	Specifies the layout in which 3 graphs in total are displayed on the left side, middle part, and right side of the window.
D1_2_3	Specifies the layout in which 3 graphs in total are displayed in the upper part, middle part, and lower part of the window.
D12_33	Specifies the layout in which 3 graphs in total are displayed in the upper left, upper right, and lower part of the window.
D11_23	Specifies the layout in which 3 graphs in total are displayed in the upper part, lower left, and lower right of the window.
D13_23	Specifies the layout in which 3 graphs in total are displayed in the upper left, lower left, and right side of the window.
D12_13	Specifies the layout in which 3 graphs in total are displayed in the left side, upper right, and lower right of the window.
D1234	Specifies the layout in which 4 graphs in total are displayed by splitting the window horizontally into four equal parts.
D1_2_3_4	Specifies the layout in which 4 graphs in total are displayed by splitting the window vertically into four equal parts.
D12_34	Specifies the layout in which 4 graphs in total are displayed in the upper left, upper right, lower left, and lower right of the window.
D123_456	Specifies the layout in which 6 graphs in total are displayed in the upper left, upper middle, upper right, lower left, lower middle, and lower right of the window.
D12_34_56	Specifies the layout in which 6 graphs in total are displayed in the upper left, upper right, middle left, middle right, lower left, and lower right of the window.
D1234_5678	Specifies the layout in which 8 graphs in total (4 in the upper part and 4 in the lower part of the window) are displayed.
D12_34_56_78	Specifies the layout in which 8 graphs in total (4 on the left side and 4 on the right side of the window) are displayed.
D123_456_789	Specifies the layout in which 9 graphs in total (in the left, middle, and right of the upper part of the window, in the left, middle, and right of the middle part, and in the left, middle, and right of the lower part) are displayed.

Query response

{D1|D12|D1_2|D112|D1_1_2|D123|D1_2_3|D12_33|D11_23|D13_23|D12_13|D1234|D1_2_3_4|D12_34|D123_456|D12_34_56|D1234_5678|D12_34_56_78|D123_456_789}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:WIND:SPL D1_2"
20   OUTPUT 717;":DISP:WIND:SPL?"
30   ENTER 717;A$
```

Related commands

:DISP:SPL on page 334

Equivalent key

[Display] - Allocate Traces

:DISP:WIND{1-9}:TITL

Syntax

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:TITLe[:STATe] {ON|OFF|1|0}

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:TITLe[:STATe]?

Description

Turns ON/OFF the display of the title label of channel 1 (:WIND1) to channel 9 (:WIND9) in the title area.

Parameters

	Description
ON or 1	Turns ON the title label display.
OFF or 0 (preset value)	Turns OFF the title label display.

Query response

```
10   OUTPUT 717;":DISP:WIND1:TITL ON"
20   OUTPUT 717;":DISP:WIND1:TITL?"
30   ENTER 717;A
```

Related commands

:DISP:WIND{1-9}:TITL:DATA on page 341

Equivalent key

[Display] - Title Label

:DISP:WIND{1-9}:TITL:DATA

Syntax

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:TITLe:DATA <string>

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:TITLe:DATA?

Description

Sets the title label displayed in the title area of channel 1 (:WIND1) to channel 9 (:WIND9).

Parameters

	<string>
Description	Title label
Range	254 characters or less
Preset value	""

Query response

{string}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:WIND1:TITL:DATA ""Title"""
20   OUTPUT 717;":DISP:WIND1:TITL?"
30   ENTER 717;A$
```

Related commands

:DISP:WIND{1-9}:TITL on page 340

Equivalent key

[Display] - **Edit Title Label**

:DISP:WIND{1-9}:TRAC{1-9}:MEM

Syntax

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:TRACe{[1]|2|3|4|5|6|7|8|9}:MEMory[:STATe] {ON|OFF|1|0}

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:TRACe{[1]|2|3|4|5|6|7|8|9}:MEMory[:STATe]?

Description

For trace 1 (:TRAC1) to trace 9 (:TRAC9) of channel 1 (:WIND1) to channel 9 (:WIND9), turns ON/OFF the display of the memory trace.

Parameters

	Description
ON or 1	Turns ON the memory trace display.
OFF or 0 (preset value)	Turns OFF the memory trace display.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:WIND1:TRAC1:MEM ON"
20   OUTPUT 717;":DISP:WIND1:TRAC1:MEM?"
30   ENTER 717;A
```

Related commands

:DISP:WIND{1-9}:TRAC{1-9}:STAT on page 342

:CALC{1-9}:MATH:MEM on page 297

Equivalent key

[Display] - **Display** - **Mem** (when the data trace display is OFF)

[Display] - **Display** - **Data & Mem** (when the data trace display is ON)

:DISP:WIND{1-9}:TRAC{1-9}:STAT

Syntax

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:TRACe{[1]|2|3|4|5|6|7|8|9}:STATe {ON|OFF|1|0}

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:TRACe{[1]|2|3|4|5|6|7|8|9}:STATe?

Description

For trace 1 (:TRAC1) to trace 9 (:TRAC9) of channel 1 (:WIND1) to channel 9 (:WIND9), turns ON/OFF the display of the data trace.

Parameters

	Description
ON or 1 (preset value)	Turns ON the data trace display.
OFF or 0	Turns OFF the data trace display.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:WIND1:TRAC1:STAT ON"
20   OUTPUT 717;":DISP:WIND1:TRAC1:STAT?"
30   ENTER 717;A
```

Related commands

:DISP:WIND{1-9}:TRAC{1-9}:MEM on page 341

Equivalent key

[Display] - **Display** - **Data** (when the memory trace display is OFF)

[Display] - **Display** - **Data & Mem** (when the memory trace display is ON)

:DISP:WIND{1-9}:TRAC{1-9}:Y:AUTO

Syntax

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:TRACe{[1]|2|3|4|5|6|7|8|9}:Y[:SCALe]:AUTO

Description

For trace 1 (:TRAC1) to trace 9 (:TRAC9) of channel 1 (:WIND1) to channel 9 (:WIND9), executes the auto scale (function to automatically adjust the value of the reference graticule line and the scale per division to display the trace appropriately). (No query)

Example of use

```
10   OUTPUT 717;":DISP:WIND1:TRAC1:Y:AUTO"
```

Related commands

:DISP:WIND{1-9}:TRAC{1-9}:Y:PDIV on page 343

:DISP:WIND{1-9}:TRAC{1-9}:Y:RLEV on page 344

Equivalent key

[Scale] - **Auto Scale**

:DISP:WIND{1-9}:TRAC{1-9}:Y:PDIV

Syntax

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:TRACe{1|2|3|4|5|6|7|8|9}:Y[:SCALe]:PDIVision <numeric>

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:TRACe{1|2|3|4|5|6|7|8|9}:Y[:SCALe]:PDIVision?

Description

For trace 1 (:TRAC1) to trace 9 (:TRAC9) of channel 1 (:WIND1) to channel 9 (:WIND9): when the data format is not the Smith chart format or the polar format, sets the scale per division; when the data format is the Smith chart format or the polar format, sets the full scale value (the value of the outermost circle).

Parameters

	<numeric>
Description	Scale value
Range	1E-18 to 1E8
Preset value	Varies depending on the data format as follows: Logarithmic Magnitude: 10 Phase, Expand Phase: 90 Group Delay: 1E-8 Smith, Polar, SWR: 1 Linear Magnitude: 0.1 Real, Imaginary: 0.2
Unit	Varies depending on the data format as follows: Logarithmic Magnitude: dB (decibel) Phase, Expand Phase: ° (degree) Group Delay: s (second) Others: No unit

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:WIND1:TRAC1:Y:PDIV 2.5"
20   OUTPUT 717;":DISP:WIND1:TRAC1:Y:PDIV?"
30   ENTER 717;A
```

Related commands

:DISP:WIND{1-9}:Y:DIV on page 347

:DISP:WIND{1-9}:TRAC{1-9}:Y:RLEV on page 344

:DISP:WIND{1-9}:TRAC{1-9}:Y:RPOS on page 345

Equivalent key

[Scale] - **Scale/Div**

:DISP:WIND{1-9}:TRAC{1-9}:Y:RLEV

Syntax

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:TRACe{[1]|2|3|4|5|6|7|8|9}:Y[:SCALe]:RLEVel <numeric>

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:TRACe{[1]|2|3|4|5|6|7|8|9}:Y[:SCALe]:RLEVel?

Description

For trace 1 (:TRAC1) to trace 9 (:TRAC9) of channel 1 (:WIND1) to channel 9 (:WIND9), sets the value of the reference graticule line.

Parameters

	<numeric>
Description	Value of reference graticule line
Range	-5E8 to 5E8
Preset value	0*1
Unit	Varies depending on the data format as follows: Logarithmic Magnitude: dB (decibel) Phase, Expand Phase: ° (degree) Group Delay: s (second) Others: No unit

*1. When the data format is "SWR," the preset value is 1.

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:WIND1:TRAC1:Y:RLEV 1E2"
20   OUTPUT 717;":DISP:WIND1:TRAC1:Y:RLEV?"
30   ENTER 717;A
```

Related commands

:DISP:WIND{1-9}:Y:DIV on page 347

:DISP:WIND{1-9}:TRAC{1-9}:Y:PDIV on page 343

:DISP:WIND{1-9}:TRAC{1-9}:Y:RPOS on page 345

Equivalent key

[Scale] - **Reference Value**

:DISP:WIND{1-9}:TRAC{1-9}:Y:RPOS

Syntax

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:TRACe{[1]|2|3|4|5|6|7|8|9}:Y[:SCALe]:RPOSition <numeric>

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:TRACe{[1]|2|3|4|5|6|7|8|9}:Y[:SCALe]:RPOSition?

Description

For trace 1 (:TRAC1) to trace 9 (:TRAC9) of channel 1 (:WIND1) to channel 9 (:WIND9), specifies a reference graticule line with its number (an integer assigned starting from 0 from the lowest division).

Parameters

	<numeric>
Description	Number of graticule line
Range	0 to the number of divisions*1
Preset value	5*2
Resolution	1

*1. Set with the :DISP:WIND{1-9}:Y:DIV commands.
*2. When the data format is “Linear Magnitude” or “SWR,” the preset value is 1.

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:WIND1:TRAC1:Y:RPOS 6"
20   OUTPUT 717;":DISP:WIND1:TRAC1:Y:RPOS?"
30   ENTER 717;A
```

Related commands

:DISP:WIND{1-9}:Y:DIV on page 347

:DISP:WIND{1-9}:TRAC{1-9}:Y:PDIV on page 343

:DISP:WIND{1-9}:TRAC{1-9}:Y:RLEV on page 344

Equivalent key

[Scale] - **Reference Position**

:DISP:WIND{1-9}:X:SPAC

Syntax

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:X:SPACing {LINear|OBASe}

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:X:SPACing?

Description

Selects the display method of the graph horizontal axis of channel 1 (:WIND1) to channel 9 (:WIND9) for segment sweep.

Parameters

	Description
LINear	Specifies the frequency base (linear frequency axis with the minimum frequency at the left edge and the maximum frequency at the right edge).
OBASe (preset value)	Specifies the order base (axis in which the measurement point numbers are positioned evenly in the order of measurement).

Query response

{LIN|OBAS}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:WIND1:X:SPAC OBAS"
20   OUTPUT 717;":DISP:WIND1:X:SPAC?"
30   ENTER 717;A$
```

Related commands

:SENS{1-9}:SWE:TYPE on page 437

Equivalent key

[Sweep Setup] - **Segment Display**

:DISP:WIND{1-9}:Y:DIV

Syntax

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:Y[:SCALe]:DIVisions <numeric>

:DISPlay:WINDow{[1]|2|3|4|5|6|7|8|9}:Y[:SCALe]:DIVisions?

Description

Sets the number of divisions of all the graphs of channel 1 (:WIND1) to channel 9 (:WIND9).

The number of graticule line (specified with the :DISP:WIND{1-9}:TRAC{1-9}:Y:RPOS command) depends on this setting.

Parameters

	<numeric>
Description	Divisions
Range	4 to 30
Preset value	10
Resolution	2

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":DISP:WIND1:Y:DIV 12"
20   OUTPUT 717;":DISP:WIND1:Y:DIV?"
30   ENTER 717;A
```

Related commands

:DISP:WIND{1-9}:TRAC{1-9}:Y:PDIV on page 343

:DISP:WIND{1-9}:TRAC{1-9}:Y:RLEV on page 344

:DISP:WIND{1-9}:TRAC{1-9}:Y:RPOS on page 345

Equivalent key

[Scale] - **Divisions**

:FORM:BORD

Syntax

:FORMat:BORDer {NORMal|SWAPped}

:FORMat:BORDer?

Description

When the data transfer format is set to the binary transfer format, sets the transfer order of each byte in data (byte order).

For details about the data transfer format, refer to “Data Transfer Format” on page 106.

Parameters

	Description
NORMal (preset value)	Specifies the byte order in which transfer starts from the byte including MSB (Most Significant Bit).
SWAPped	Specifies the byte order in which transfer starts from the byte including LSB (Least Significant Bit).

Query response

{NORM|SWAP}<newline><^END>

Example of use

```
10   OUTPUT 717;":FORM:BORD SWAP"
20   OUTPUT 717;":FORM:BORD?"
30   ENTER 717;A$
```

Related commands

:FORM:DATA on page 349

Equivalent key

No equivalent key is available on the front panel.

:FORM:DATA

Syntax

:FORMat:DATA {ASCii|REAL}

:FORMat:DATA?

Description

Use the following commands to set the format to transfer data.

- :CALC{1-9}:DATA:FDAT on page 221
- :CALC{1-9}:DATA:FMEM on page 222
- :CALC{1-9}:DATA:SDAT? on page 223
- :CALC{1-9}:DATA:SMEM? on page 224
- :CALC{1-9}:FUNC:DATA? on page 265
- :SENS{1-9}:FREQ:DATA? on page 421

For details about the data transfer format, refer to “Data Transfer Format” on page 106.

Parameters

	Description
ASCii (preset value)	Specifies the ASCII transfer format.
REAL	Specifies the binary transfer format.

Query response

{ASC|REAL}<newline><^END>

Example of use

```
10   OUTPUT 717;":FORM:DATA REAL"
20   OUTPUT 717;":FORM:DATA?"
30   ENTER 717;A$
```

Related commands

:FORM:BORD on page 348

Equivalent key

No equivalent key is available on the front panel.

:HCOP

Syntax

:HCOPy[:IMMediate]

Description

Outputs the display image on the LCD display to the printer connected to the E5070A/E5071A. (No query)

Example of use

```
10   OUTPUT 717;":HCOP"
```

Related commands

:HCOP:ABOR on page 350

:HCOP:IMAG on page 350

Equivalent key

[System] - Print

:HCOP:ABOR

Syntax

:HCOPy:ABORt

Description

Aborts the print output. (No query)

Example of use

```
10   OUTPUT 717;":HCOP:ABOR"
```

Related commands

:HCOP on page 350

Equivalent key

[System] - Abort Printing

:HCOP:IMAG

Syntax

:HCOPy:IMAGe {NORMal|INVert}

:HCOPy:IMAGe?

Description

Selects the print color for output to the printer.

Parameters

	Description
NORMal	Specifies printing in close color to the display color.
INVert (preset value)	Specifies printing in the inverted color of the display color.

Query response

{NORM|INV}<newline><^END>

Example of use

```
10   OUTPUT 717;":HCOP:IMAG NORM"
20   OUTPUT 717;":HCOP:IMAG?"
30   ENTER 717;A$
```

Related commands

:HCOP on page 350

Equivalent key

[System] - Invert Image

:INIT{1-9}

Syntax

:INITiate{[1]|2|3|4|5|6|7|8|9}[:IMMediate]

Description

Changes the state of each channel of channel 1 (:INIT1) to channel 9 (:INIT9) to the startup state in the trigger system.

When this command is executed for a channel in the idle state, it goes into the initiate state immediately. Then, after measurement is executed once, it goes back to the idle state.

If this command is executed for a channel that is not in the idle state or for which the continuous initiation mode is set to ON (ON is specified with the :INIT{1-9}:CONT command), an error occurs and the command is ignored.

For details about the trigger system, refer to "Trigger system" on page 74. (No query)

Example of use

```
10   OUTPUT 717;":INIT1"
```

Related commands

:INIT{1-9}:CONT on page 352

Equivalent key

[Trigger] - **Single**

:INIT{1-9}:CONT

Syntax

:INITiate{[1]|2|3|4|5|6|7|8|9}:CONTinuous {ON|OFF|1|0}

:INITiate{[1]|2|3|4|5|6|7|8|9}:CONTinuous?

Description

Turns ON/OFF of the continuous initiation mode of channel 1 (:INIT1) to channel 9 (:INIT9) in the trigger system.

For details about the trigger system, refer to “Trigger system” on page 74.

Parameters

	Description
ON or 1	Turns ON the continuous initiation mode.
OFF or 0	Turns OFF the continuous initiation mode.

Regarding to this setting, only channel 1 is initialized to ON with the :SYST:PRES command; all the channels are initialized to OFF with the *RST command.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":INIT1:CONT OFF"
20   OUTPUT 717;":INIT1:CONT?"
30   ENTER 717;A
```

Related commands

:INIT{1-9} on page 351

Equivalent key

[Trigger] - **Continuous** (continuous initiation mode ON)

[Trigger] - **Hold** (continuous initiation mode OFF)

:MMEM:CAT?

Syntax

:MMEMory:CATalog? <string 1>

Description

Reads out the following information on the built-in storage device of the E5070A/E5071A.

To read out the information in the root directory (folder), specify “\” (backslash). If you want to specify a directory on the floppy disk drive, you need to add “A:” at the beginning of the file name. Separate directory names with “/” (slash) or “\” (backslash). (Query only)

- Space in use
- Available space
- Name and size of all files (including directories) in the specified directory.

Parameters

	<string 1>
Description	Directory name whose information you want to read out
Range	254 characters or less

Query response

{string 2}<newline><^END>

The format of the readout character string is as follows:

"{used_size},{free_size},{name 1},,{size 1},…,{name N},,{size N}"

Where N is the number of all files in the specified directory and n is an integer between 1 and N.

{used_size}:	Space in use of the built-in storage device (byte)[*1].
{free_size}:	Available space of the built-in storage device (byte)[*1].
{name n}:	Name of the n-th file (directory).
{size n}:	Size (byte) of the n-th file (directory). Always 0 for directories.

Example of use

```
10   DIM A$[1000]
20   OUTPUT 717;":MMEM:CAT? ""\"""
30   ENTER 717;A$
```

Equivalent key

No equivalent key is available on the front panel.

*1. If you specify a directory on the floppy disk drive, it is the capacity of the floppy disk in the drive.

:MMEM:COPY

Syntax

:MMEMory:COPY <string 1>,<string 2>

Description

Copies a file.

Specify the file name with the extension. If you want to specify a file on the floppy disk drive, you need to add “A:” at the beginning of the file name. When you use directory (folder) names and file name, separate them with “/” (slash) or “\” (backslash).

If the specified copy source file does not exist, an error occurs and the command is ignored. Notice that, if a file with the same name as the specified copy destination file name exists, its contents are overwritten. (No query)

Parameters

	<string 1>	**<string 2>**
Description	Copy source file name	Copy destination file name
Range	254 characters or less	254 characters or less

Example of use

```
10 OUTPUT 717;":MMEM:COPY ""Test1/State01.sta"",""A:Test1_01.sta"""
```

Equivalent key

[Save/Recall] - **Save State** - **File Dialog...**

:MMEM:DEL

Syntax

:MMEMory:DELete <string>

Description

Deletes an existing file or directory (folder).

When you delete a directory, all the files and directories in it are deleted.

Specify the file name with the extension. If you want to specify a file or directory on the floppy disk drive, you need to add "A:" at the beginning of its name. When you specify a file (directory) under an existing directory, separate them with "/" (slash) or "\" (backslash).

If the specified file or directory does not exist, an error occurs and the command is ignored. (No query)

Parameters

	<string>
Description	File name or directory name you want to delete
Range	254 characters or less

Example of use

```
10   OUTPUT 717;":MMEM:DEL ""Test1/State01.sta"""
10   OUTPUT 717;":MMEM:DEL ""A:State01.sta"""
```

Equivalent key

[Save/Recall] - **Save State** - **File Dialog...**

14. SCPI Command Reference

:MMEM:LOAD

Syntax

:MMEMory:LOAD[:STATe] <string>

Description

Recalls the specified instrument state file (file with the .sta extension saved with the :MMEM:STOR command).

Specify the file name with the extension. If you want to specify a file on the floppy disk drive, you need to add “A:” at the beginning of the file name. When you use directory names and file name, separate them with “/” (slash) or “\” (backslash).

If the specified file does not exist, an error occurs and the command is ignored. (No query)

Parameters

	<string>
Description	Instrument state file name
Range	254 characters or less

Example of use

```
10   OUTPUT 717;":MMEM:LOAD ""Test1/State01.sta"""
10   OUTPUT 717;":MMEM:LOAD ""A:State01.sta"""
```

Related commands

:MMEM:STOR on page 362

Equivalent key

[Save/Recall] - **Recall State**

:MMEM:LOAD:CHAN

Syntax

:MMEMory:LOAD:CHANnel[:STATe] {A|B|C|D}

Description

Recalls the instrument state for an individual channel (saved with the :MMEM:STOR:CHAN command) from the specified register as the setting of the active channel (specified with the :DISP:WIND{1-9}:ACT command).

It is possible to recall the register from a different channel where it was saved.

If no instrument state has been saved in the specified register, an error occurs and the command is ignored. (No query)

Parameters

	Description
A	Specifies register A.
B	Specifies register B.
C	Specifies register C.
D	Specifies register D.

Example of use

```
10   OUTPUT 717;":MMEM:LOAD:CHAN A"
```

Related commands

:MMEM:STOR:CHAN on page 363

:DISP:WIND{1-9}:ACT on page 337

Equivalent key

[Save/Recall] - **Recall Channel** - **A**|**B**|**C**|**D**

14. SCPI Command Reference

:MMEM:LOAD:LIM

Syntax

:MMEMory:LOAD:LIMit <string>

Description

As the limit table for the active trace (specified with the :CALC{1-9}:PAR{1-9}:SEL command) of the active channel (specified with the :DISP:WIND{1-9}:ACT command), recalls the specified limit table file (file with the .csv extension saved with the :MMEM:STOR:LIM command).

Specify the file name with the extension. If you want to specify a file on the floppy disk drive, you need to add “A:” at the beginning of the file name. When you use directory names and file name, separate them with “/” (slash) or “\” (backslash).

If the specified file does not exist, an error occurs and the command is ignored. (No query)

Parameters

	<string>
Description	File name of limit table
Range	254 characters or less

Example of use

```
10   OUTPUT 717;":MMEM:LOAD:LIM ""Test1/Limit01.csv"""
10   OUTPUT 717;":MMEM:LOAD:LIM ""A:Limit01.csv"""
```

Related commands

:MMEM:STOR:LIM on page 366

:DISP:WIND{1-9}:ACT on page 337

Equivalent key

[Analysis] - **Limit Test** - **Edit Limit Line** - **Import from CSV File**

:MMEM:LOAD:PROG

Syntax

:MMEMory:LOAD:PROGram <string>

Description

Loads (or imports) a VBA project (a file with the .vba extension), a module (a file with the .bas extension), a user form (a file with the .frm extension) or a class module (a file with the .cls extension).

Specify the file name with the extension. If you want to specify a file on the floppy disk drive, you need to add “A:” at the beginning of the file name. When you use directory names and file name, separate them with “/” (slash) or “\” (backslash).

If the specified file does not exist, an error occurs and the command is ignored. (No query)

Parameters

	<string>
Description	File name
Range	254 characters or less

Example of use

```
10   OUTPUT 717;":MMEM:LOAD:PROG ""Test1/Test1_01.vba"""
10   OUTPUT 717;":MMEM:LOAD:PROG ""A:Test1_01.vba"""
```

Related commands

:MMEM:STOR:PROG on page 367

Equivalent key

[Macro Setup] - **Load VBA Project**

14. SCPI Command Reference

:MMEM:LOAD:SEGM

Syntax

:MMEMory:LOAD:SEGMent <string>

Description

As the segment sweep table for the active channel (specified with the :DISP:WIND{1-9}:ACT command), recalls the specified segment sweep table file (a file with the .csv extension saved with the :MMEM:STOR:SEGM command).

Specify the file name with the extension. If you want to specify a file on the floppy disk drive, you need to add "A:" at the beginning of the file name. When you use directory names and file name, separate them with "/" (slash) or "\" (backslash).

If the specified file does not exist, an error occurs and the command is ignored. (No query)

Parameters

	<string>
Description	File name of segment sweep table
Range	254 characters or less

Example of use

```
10   OUTPUT 717;":MMEM:LOAD:SEGM ""Test1/Segm01.csv"""
10   OUTPUT 717;":MMEM:LOAD:SEGM ""A:Segm01.csv"""
```

Related commands

:MMEM:STOR:SEGM on page 368

:DISP:WIND{1-9}:ACT on page 337

Equivalent key

[Sweep Setup] - **Edit Segment Table** - **Import from CSV File**

:MMEM:MDIR

Syntax

:MMEMory:MDIRectory <string>

Description

Creates a new directory (folder).

If you want to create a directory on the floppy disk drive, you need to add “A:” at the beginning of the directory name. When you create a directory under an existing directory, separate between the directory names with “/” (slash) or “\” (backslash).

If a directory with the same name as the specified directory name exists, an error occurs and the command is ignored. (No query)

Parameters

	<string>
Description	Directory name you want to create
Range	254 characters or less

Example of use

```
10   OUTPUT 717;":MMEM:MDIR ""Test1"""
10   OUTPUT 717;":MMEM:MDIR ""A:Test1"""
```

Equivalent key

[Save/Recall] - **Save State** - **File Dialog...**

:MMEM:STOR

Syntax :MMEMory:STORe[:STATe] <string>

Description Saves the instrument state (data to be saved specified with the :MMEM:STOR:STYP command) into a file.

Specify the file name with the .sta extension. If you want to specify a file on the floppy disk drive, you need to add "A:" at the beginning of the file name. When you use directory names and file name, separate them with "/" (slash) or "\" (backslash).

Notice that, if a file with the specified file name exists, its contents are overwritten. (No query)

NOTE The instrument setting file saved with the autorec.sta (or A:autorec.sta) file name is automatically recalled when turning on the E5070A/E5071A.

Parameters

	<string>
Description	File name in which you want to save the instrument state
Range	254 characters or less

Example of use

```
10   OUTPUT 717;":MMEM:STOR ""Test1/State01.sta"""
10   OUTPUT 717;":MMEM:STOR ""A:State01.sta"""
```

Related commands :MMEM:LOAD on page 356

:MMEM:STOR:STYP on page 369

Equivalent key **[Save/Recall]** - **Save State**|**Re-Save State**

:MMEM:STOR:CHAN

Syntax
:MMEMory:STORe:CHANnel[:STATe] {A|B|C|D}

Description
Saves the instrument state of the items set for the active channel (specified with the :DISP:WIND{1-9}:ACT command) specific to that channel only into the specified register (volatile memory).

Notice that, if an instrument state has been saved already in the specified register, its contents are overwritten. (No query)

Parameters

	Description
A	Specifies register A.
B	Specifies register B.
C	Specifies register C.
D	Specifies register D.

Example of use
```
10   OUTPUT 717;":MMEM:SAVE:CHAN A"
```

Related commands
:MMEM:LOAD:CHAN on page 357
:DISP:WIND{1-9}:ACT on page 337

Equivalent key
[Save/Recall] - **Save Channel** - **A**|**B**|**C**|**D**

:MMEM:STOR:CHAN:CLE

Syntax
:MMEMory:STORe:CHANnel:CLEar

Description
Deletes the instrument state for each channel (saved with the :MMEM:STOR:CHAN command) in all the registers. (No query)

Example of use
```
10   OUTPUT 717;":MMEM:SAVE:CHAN:CLE"
```

Related commands
:MMEM:STOR:CHAN on page 363

Equivalent key
[Save/Recall] - **Save Channel** - **Clear States** - **OK**

14. SCPI Command Reference

:MMEM:STOR:FDAT

Syntax

:MMEMory:STORe:FDATa <string>

Description

Saves the formatted data array of the active trace (specified with the :CALC{1-9}:PAR{1-9}:SEL command) of the active channel (specified with the :DISP:WIND{1-9}:ACT command) into a file in the CSV format.

Specify the file name with the .csv extension. If you want to specify a file on the floppy disk drive, you need to add “A:” at the beginning of the file name. When you use directory names and file name, separate them with “/” (slash) or “\” (backslash).

Notice that, if a file with the specified file name exists, its contents are overwritten. (No query)

Parameters

	<string>
Description	File name in which you want to save the formatted data array
Range	254 characters or less

Example of use

```
10   OUTPUT 717;":MMEM:STOR:FDAT ""Result/Trace01.csv"""
10   OUTPUT 717;":MMEM:STOR:FDAT ""A:Trace01.csv"""
```

Related commands

:DISP:WIND{1-9}:ACT on page 337

:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Save/Recall] - **Save Trace Data**

:MMEM:STOR:IMAG

Syntax

:MMEMory:STORe:IMAGe <string>

Description

Saves the display image on the LCD display at the execution of the command into a file in the bitmap (.bmp) or portable network graphics (.png) format.

Specify the file name with the .bmp or .png extension. If you want to specify a file on the floppy disk drive, you need to add “A:” at the beginning of the file name. When you use directory names and file name, separate them with “/” (slash) or “\” (backslash).

Notice that, if a file with the specified file name exists, its contents are overwritten. (No query)

Parameters

	<string>
Description	File name in which you want to save the display image on the LCD display
Range	254 characters or less

Example of use

```
10   OUTPUT 717;":MMEM:STOR:IMAG ""Result/Image01.bmp"""
10   OUTPUT 717;":MMEM:STOR:IMAG ""A:Image01.png"""
```

Equivalent key

[System] - Dump Screen Image

When performing the operation from the front panel, the image on the LCD display memorized in the volatile memory (clipboard) (the image on the LCD display when the **[Capture]** key is pressed) is saved. Notice that, if no image is memorized in the clipboard, in the same way as the command, the image on the LCD display at the execution is memorized in the clipboard and then it is saved.

:MMEM:STOR:LIM

Syntax

:MMEMory:STORe:LIMit <string>

Description

Saves the limit table for the active trace (specified with the :CALC{1-9}:PAR{1-9}:SEL command) of the active channel (specified with the :DISP:WIND{1-9}:ACT command) into a file in the CSV format.

Specify the file name with the .csv extension. If you want to specify a file on the floppy disk drive, you need to add "A:" at the beginning of the file name. When you use directory names and file name, separate them with "/" (slash) or "\" (backslash).

Notice that, if a file with the specified file name exists, its contents are overwritten. (No query)

Parameters

	<string>
Description	File name in which you want to save the limit table
Range	254 characters or less

Example of use

```
10   OUTPUT 717;":MMEM:STOR:LIM ""Test1/Limit01.csv"""
10   OUTPUT 717;":MMEM:STOR:LIM ""A:Limit01.csv"""
```

Related commands

:DISP:WIND{1-9}:ACT on page 337
:CALC{1-9}:PAR{1-9}:SEL on page 302

Equivalent key

[Analysis] - **Limit Test** - **Edit Limit Line** - **Export to CSV File**

:MMEM:STOR:PROG

Syntax

:MMEMory:STORe:PROGram <string>

Description

Saves a VBA project opened on the VBA editor into a file.

Specify the file name with the .vba extension. If you want to specify a file on the floppy disk drive, you need to add “A:” at the beginning of the file name. When you use directory names and file name, separate them with “/” (slash) or “\” (backslash).

Notice that, if a file with the specified file name exists, its contents are overwritten. (No query)

Parameters

	<string>
Description	File name in which you want to save the VBA project
Range	254 characters or less

Example of use

```
10   OUTPUT 717;":MMEM:STOR:PROG ""Test1/Test1_01.vba"""
10   OUTPUT 717;":MMEM:STOR:PROG ""A:Test1_01.vba"""
```

Related commands

:MMEM:LOAD:PROG on page 359

Equivalent key

[Macro Setup] - **Save VBA Project**

:MMEM:STOR:SEGM

Syntax

:MMEMory:STORe:SEGMent <string>

Description

Saves the segment sweep table for the active channel (specified with the :DISP:WIND{1-9}:ACT command) into a file in the CSV format.

Specify the file name with the .csv extension. If you want to specify a file on the floppy disk drive, you need to add “A:” at the beginning of the file name. When you use directory names and file name, separate them with “/” (slash) or “\” (backslash).

Notice that, if a file with the specified file name exists, its contents are overwritten. (No query)

Parameters

	<string>
Description	File name in which you want to save the segment sweep table
Range	254 characters or less

Example of use

```
10   OUTPUT 717;":MMEM:STOR:SEGM ""Test1/Segm01.csv"""
10   OUTPUT 717;":MMEM:STOR:SEGM ""A:Segm01.csv"""
```

Related commands

:MMEM:LOAD:SEGM on page 360

:DISP:WIND{1-9}:ACT on page 337

Equivalent key

[Sweep Setup] - **Edit Segment Table** - **Export to CSV File**

:MMEM:STOR:STYP

Syntax

:MMEMory:STORe:STYPe {STATe|CSTate|DSTate|CDSTate}

:MMEMory:STORe:STYPe?

Description

Selects the contents saved when saving the instrument state into a file with the :MMEM:STOR command.

Parameters

	Description
STATe	Specifies the save of the measurement conditions*1 only.
CSTate (preset value)	Specifies the save of the measurement conditions*1 and the calibration state.
DSTate	Specifies the save of the measurement conditions*1 and the formatted data array.
CDSTate	Specifies the save of the measurement conditions*1, the calibration state, and the formatted data array.

*1. For details about the measurement conditions that can be saved, refer to Appendix E.

Query response

{STAT|CST|DST|CDST}<newline><^END>

Example of use

```
10   OUTPUT 717;":MMEM:STOR:STYP CDST"
20   OUTPUT 717;":MMEM:STOR:STYP?"
30   ENTER 717;A$
```

Related commands

:MMEM:STOR on page 362

Equivalent key

[Save/Recall] - **Save Type** - **State Only**|**State & Cal**|**State & Trace**|**All**

14. SCPI Command Reference

:MMEM:TRAN

Syntax

:MMEMory:TRANsfer <string>,<block>

:MMEMory:TRANsfer? <string>

Description

Writes/reads data to/from a file on the built-in storage device of the E5070A/E5071A.

By reading out data with this command and writing it to a file on the external controller, file transfer from the E5070A/E5071A to the external controller can be realized. On the other hand, by reading out data from the external controller and writing it to a file on the E5070A/E5071A with this command, file transfer from the external controller to the E5070A/E5071A can be realized.

Specify the file name with the extension. If you want to specify a file on the floppy disk drive, you need to add "A:" at the beginning of the file name. When you use directory names and file name, separate them with "/" (slash) or "\" (backslash).

If a file with the specified file name already exists for writing or if the specified file does not exist for reading out (Query), an error occurs and the command is ignored.

Parameters

	<string>	<block>
Description	File name on the E5070A/E5071A	Data written on/read out from the file.
Range	254 characters or less	GPIB: 20 Mbytes or less LAN: 100 Kbytes or less

Query response

{block}<newline><^END>

Example of use

```
10   OUTPUT 717;":MMEM:TRAN ""Trace01.csv"",#6012345";Dat$
```

```
10   OUTPUT 717;":MMEM:TRAN? ""Trace01.csv"""
20   ENTER 717 USING "#,A";A$
30   ENTER 717 USING "#,A";Digit$
40   Img$="#,"&Digit$&"A"
50   ENTER 717 USING Img$;Byte$
60   Img$=Byte$&"A"
70   ALLOCATE Dat$[VAL(Byte$)]
80   ENTER 717 USING Img$;Dat$
```

Equivalent key

No equivalent key is available on the front panel.

:PROG:CAT?

Syntax

:PROGram:CATalog?

Description

Reads out the list of all executable VBA macros (procedures defined by Public including the VBA project loaded on the VBA editor). (Query only)

Query response

{string}<newline><^END>

The character string in the following format, in which each macro is separated by a comma (.), is read out.

"{macro 1},{macro 2},…,{macro N}"

Where N is the total number of VBA macros.

{macro n}: VBA macro name (module name.procedure name)

Example of use

```
10   DIM A$[1000]
20   OUTPUT 717;":PROG:CAT?"
30   ENTER 717;A$
```

Equivalent key

[Macro Setup] - Select Macro

:PROG:NAME

Syntax

:PROGram[:SELected]:NAME <string>

:PROGram[:SELected]:NAME?

Description

Selects the VBA macro controlled with the :PROG:STAT command.

Selectable VBA macro names can be read out with the :PROG:CAT? command.

Parameters

	<string>
Description	VBA macro name (module name.procedure name)
Range	254 characters or less
Preset value	""

Query response

{string}<newline><^END>

Example of use

```
10   OUTPUT 717;":PROG:NAME ""Module1.main"""
20   OUTPUT 717;":PROG:NAME?"
30   ENTER 717;A$
```

Related commands

:PROG:CAT? on page 371

:PROG:STAT on page 373

Equivalent key

[Macro Setup] - **Select Macro**

NOTE

When performing the operation from the front panel, you select the VBA macro and execute it at the same time.

:PROG:STAT

Syntax

:PROGram[:SELected]:STATe {STOP|RUN}

:PROGram[:SELected]:STATe?

Description

Reads out the control/state of the VBA macro selected with the :PROG:STAT command.

Parameters

	Description
STOP (preset value)	Specifies stop.
RUN	Specifies run.

Query response

{STOP|RUN}<newline><^END>

Example of use

```
10   OUTPUT 717;":PROG:STAT RUN"
20   OUTPUT 717;":PROG:STAT?"
30   ENTER 717;A$
```

Related commands

:PROG:NAME on page 372

Equivalent key

[Macro Break] (to stop)

[Macro Setup] - **Select Macro** (to run)

NOTE

When performing the operation from the front panel, you select the VBA macro and execute it at the same time.

:SENS:CORR:COLL:ECAL:PATH?

Syntax

:SENSe:CORRection:COLLect:ECAL:PATH? <numeric>

Description

Reads out which port of the ECal module is connected with the specified port of the E5070A/E5071A. (Query only)

Parameters

	<numeric>
Description	Port number
Range	1 to 4
Resolution	1

Query response

{0|1|2|3|4}<newline><^END>

	Description
0	Nothing is connected.
1	Port A is connected.
2	Port B is connected.
3	Port C is connected.
4	Port D is connected.

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:ECAL:PATH? 1"
20   ENTER 717;A
```

Equivalent key

No equivalent key is available on the front panel.

:SENS:MULT{1-2}:COUN?

Syntax

:SENSe:MULTiplexer{[1]|2}:COUNt?

Description

Reads the number of ports (7 or 9) of the E5091A whose ID is 1 (:MULT1) or 2 (:MULT2). (Query only)

Query response

{value}<newline><^END>

0 is read when the E5091A is not connected.

Example of use

```
10   OUTPUT 717;":SENS:MULT1:COUN?"
20   ENTER 717;A
```

Equivalent key

No equivalent key is available on the front panel.

:SENS:MULT{1-2}:DISP

Syntax

:SENSe:MULTiplexer{[1]|2}:DISPlay[:STATe] {ON|OFF|1|0}

:SENSe:MULTiplexer{[1]|2}:DISPlay[:STATe]?

Description

Turns ON/OFF the property display (the state of the port assignment) of the E5091A whose ID is 1 (:MULT1) or 2 (:MULT2).

Parameters

	Description
ON or 1	Turns ON the property display.
OFF or 0 (preset value)	Turns OFF the property display.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS:MULT1:DISP ON"
20   OUTPUT 717;":SENS:MULT1:DISP?"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:MULT{1-2}:TSET9:PORT1 on page 426

:SENS{1-9}:MULT{1-2}:TSET9:PORT2 on page 427

:SENS{1-9}:MULT{1-2}:TSET9:PORT3 on page 428

:SENS{1-9}:MULT{1-2}:TSET9:PORT4 on page 429

Equivalent key

[System] - **E5091A Setup** - **E5091A Property**

:SENS:MULT{1-2}:STAT

Syntax

:SENSe:MULTiplexer{[1]|2}:STATe {ON|OFF|1|0}

:SENSe:MULTiplexer{[1]|2}:STATe?

Description

Turns ON/OFF the control (switching the internal switch that connects between the ports and changing control line output) of the E5091A whose ID is 1 (:MULT1) or 2 (:MULT2).

Parameters

	Description
ON or 1	Turns ON the control.
OFF or 0 (preset value)	Turns OFF the control.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS:MULT1:STAT ON"
20   OUTPUT 717;":SENS:MULT1:STAT?"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:MULT{1-2}:TSET9:PORT1 on page 426

:SENS{1-9}:MULT{1-2}:TSET9:PORT2 on page 427

:SENS{1-9}:MULT{1-2}:TSET9:PORT3 on page 428

:SENS{1-9}:MULT{1-2}:TSET9:PORT4 on page 429

:SENS{1-9}:MULT{1-2}:TSET9:OUTP on page 425

Equivalent key

[System] - **E5091A Setup** - **E5091A Control**

:SENS{1-9}:AVER:CLE

Syntax :SENSe{[1]|2|3|4|5|6|7|8|9}:AVERage:CLEar

Description Clears the measurement data used for averaging of channel 1 (:SENS1) to channel 9 (:SENS9). Measurement data before the execution of this command is not used for averaging. (No query)

Example of use

```
10   OUTPUT 717;":SENS1:AVER:CLE"
```

Related commands :SENS{1-9}:AVER on page 377

:SENS{1-9}:AVER:COUN on page 378

Equivalent key **[Avg]** - **Averaging Restart**

:SENS{1-9}:AVER

Syntax :SENSe{[1]|2|3|4|5|6|7|8|9}:AVERage[:STATe] {ON|OFF|1|0}

:SENSe{[1]|2|3|4|5|6|7|8|9}:AVERage[:STATe]?

Description Turns ON/OFF the averaging function of channel 1 (:SENS1) to channel 9 (:SENS9).

Parameters

	Description
ON or 1	Turns ON the averaging function.
OFF or 0 (preset value)	Turns OFF the averaging function.

Query response {1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:AVER ON"
20   OUTPUT 717;":SENS1:AVER?"
30   ENTER 717;A
```

Related commands :SENS{1-9}:AVER:CLE on page 377

:SENS{1-9}:AVER:COUN on page 378

Equivalent key **[Avg]** - **Averaging**

:SENS{1-9}:AVER:COUN

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:AVERage:COUNt <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:AVERage:COUNt?

Description

Sets the averaging factor of channel 1 (:SENS1) to channel 9 (:SENS9).

Parameters

	<numeric>
Description	Averaging factor
Range	1 to 999
Preset value	16
Resolution	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:AVER:COUN 4"
20   OUTPUT 717;":SENS1:AVER:COUN?"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:AVER on page 377

:SENS{1-9}:AVER:CLE on page 377

Equivalent key

[Avg] - **Avg Factor**

:SENS{1-9}:BAND

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:BANDwidth[:RESolution] <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:BANDwidth[:RESolution]?

Description

Sets the IF bandwidth of channel 1 (:SENS1) to channel 9 (:SENS9).

This command provides the same function as the :SENS{1-9}:BWID command.

Parameters

	<numeric>
Description	IF bandwidth
Range	10 to 100000
Preset value	100000
Unit	Hz (hertz)
Resolution	In steps of 1, 1.5, 2, 3, 4, 5, or 7

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:BAND 1.5E3"
20   OUTPUT 717;":SENS1:BAND?"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:BWID on page 380

Equivalent key

[Avg] - **IF Bandwidth**

:SENS{1-9}:BWID

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:BWIDth[:RESolution] <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:BWIDth[:RESolution]?

Description

Sets the IF bandwidth of channel 1 (:SENS1) to channel 9 (:SENS9).

This command provides the same function as the :SENS{1-9}:BAND command.

Parameters

	<numeric>
Description	IF bandwidth
Range	10 to 100000
Preset value	70000
Unit	Hz (hertz)
Resolution	In steps of 1, 1.5, 2, 3, 4, 5, or 7

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:BWID 1.5E3"
20   OUTPUT 717;":SENS1:BWID?"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:BAND on page 379

Equivalent key

[Avg] - **IF Bandwidth**

:SENS{1-9}:CORR:COLL:CKIT

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT[:SELect] <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT[:SELect]?

Description

Selects the calibration kit of channel 1 (:SENS1) to channel 9 (:SENS9).

Parameters

	<numeric>
Description	Number of calibration kit*1
Range	1 to 10
Preset value	1
Resolution	1

*1. The numbers of 1 to 10 assigned from the top to the calibration kit names displayed on the softkey labels when performing **[Cal]** - **Cal Kit**.

If the specified parameter is out of the allowable setup range, an error occurs and the command is ignored.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT 3"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Cal Kit**

:SENS{1-9}:CORR:COLL:CKIT:LAB

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:LABel <string>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:LABel?

Description

Sets a calibration kit name for the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9).

Parameters

	<string>
Description	Calibration kit name
Range	254 characters or less
Preset value	Varies depending on the calibration kit number as follows: 1: "85033E" 2: "85033D" 3: "85052D" 4: "85032F" 5: "85032B" 6 to 10: "User"

Query response

{string}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:LAB ""OPEN"""
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:LAB?"
30   ENTER 717;A$
```

Related commands

:SENS{1-9}:CORR:COLL:CKIT on page 381

Equivalent key

[Cal] - **Modify Cal Kit** - **Label Kit**

:SENS{1-9}:CORR:COLL:CKIT:ORD:LOAD

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:ORDer:LOAD <numeric 1>,<numeric 2>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:ORDer:LOAD? <numeric 1>

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), selects the standard used for the load measurement of the specified port.

Parameters

	<numeric 1>	**<numeric 2>**
Description	Port number	Standard number
Range	1 to 4	1 to 21
Resolution	1	1

If the specified parameter is out of the allowable setup range, an error occurs and the command is ignored.

Query response

{numeric 2}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:ORD:LOAD 1,9"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:ORD:LOAD? 1"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:CORR:COLL:CKIT on page 381

Equivalent key

[Cal] - **Modify Cal Kit** - **Specify CLSs** - **Load** - **Port 1**|**Port 2**|**Port 3**|**Port 4**

14. SCPI Command Reference

:SENS{1-9}:CORR:COLL:CKIT:ORD:OPEN

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:ORDer:OPEN <numeric 1>,<numeric 2>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:ORDer:OPEN? <numeric 1>

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), selects the standard used for the open measurement of the specified port.

Parameters

	<numeric 1>	**<numeric 2>**
Description	Port number	Standard number
Range	1 to 4	1 to 21
Resolution	1	1

If the specified parameter is out of the allowable setup range, an error occurs and the command is ignored.

Query response

{numeric 2}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:ORD:OPEN 1,2"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:ORD:OPEN? 1"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:CORR:COLL:CKIT on page 381

Equivalent key

[Cal] - **Modify Cal Kit** - **Specify CLSs** - **Open** - **Port 1**|**Port 2**|**Port 3**|**Port 4**

:SENS{1-9}:CORR:COLL:CKIT:ORD:SHOR

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:ORDer:SHORt <numeric 1>,<numeric 2>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:ORDer:SHORt? <numeric 1>

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), selects the standard used for the short measurement of the specified port.

Parameters

	<numeric 1>	**<numeric 2>**
Description	Port number	Standard number
Range	1 to 4	1 to 21
Resolution	1	1

If the specified parameter is out of the allowable setup range, an error occurs and the command is ignored.

Query response

{numeric 2}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:ORD:SHOR 1,1"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:ORD:SHOR? 1"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:CORR:COLL:CKIT on page 381

Equivalent key

[Cal] - **Modify Cal Kit** - **Specify CLSs** - **Short** - **Port 1**|**Port 2**|**Port 3**|**Port 4**

:SENS{1-9}:CORR:COLL:CKIT:ORD:THRU

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:ORDer:THRU <numeric 1>,<numeric 2>,<numeric 3>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:ORDer:THRU? <numeric 1>,<numeric 2>

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), selects the standard used for the thru measurement between the specified 2 ports.

Parameters

	<numeric 1>	**<numeric 2>**	**<numeric 3>**
Description	Port number 1	Port number 2	Standard number
Range	1 to 4	1 to 4	1 to 21
Resolution	1	1	1

For <numeric 1> and <numeric 2>, you must specify a different port number. If you specify the same port number, an error occurs and the command is ignored.

If the specified parameter is out of the allowable setup range, an error occurs and the command is ignored.

Query response

{numeric 3}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:ORD:THRU 1,2,11"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:ORD:THRU? 1,2"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:CORR:COLL:CKIT on page 381

Equivalent key

[Cal] - **Modify Cal Kit** - **Specify CLSs** - **Thru** - **Port 1-2**|**Port 1-3**|**Port 1-4**|**Port 2-3**|**Port 2-4**|**Port 3-4**

:SENS{1-9}:CORR:COLL:CKIT:RES

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:RESet

Description

Resets the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9) to the factory setting state. (No query)

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:RES"
```

Related commands

:SENS{1-9}:CORR:COLL:CKIT on page 381

Equivalent key

[Cal] - **Modify Cal Kit** - **Restore Cal Kit**

:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:ARB

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:ARBitrary <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:ARBitrary?

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), sets the value of the arbitrary impedance of the standard1 (:STAN1) to standard 21 (:STAN21).

Parameters

	<numeric>
Description	Arbitrary impedance
Range	-1E18 to 1E18
Preset value	Varies depending on the calibration kit and the standard.
Unit	Ω (ohm)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:ARB 50.5"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:ARB?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Modify Cal Kit** - **Define STDs** - **no. name**[*1] - **Arb. Impedance**

*1. no: standard number (1 to 21), name: standard name (variable)

14. SCPI Command Reference

:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C0

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:C0 <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:C0?

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), sets the value of the C0 of the standard1 (:STAN1) to standard 21 (:STAN21).

Parameters

	<numeric>
Description	C0
Range	-1E18 to 1E18
Preset value	Varies depending on the calibration kit and the standard.
Unit	fF (femtofarad)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:C0 12.3"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:C0?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Modify Cal Kit** - **Define STDs** - **no. name**[*1] - **C0**

*1. no: standard number (1 to 21), name: standard name (variable)

:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C1

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:C1 <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:C1?

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), sets the value of the C1 of the standard1 (:STAN1) to standard 21 (:STAN21).

Parameters

	<numeric>
Description	C1
Range	-1E18 to 1E18
Preset value	Varies depending on the calibration kit and the standard.
Unit	1E-27 F/Hz (1E-27 farad/hertz)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:C1 12.3"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:C1?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Modify Cal Kit** - **Define STDs** - **no. name**[*1] - **C1**

*1. no: standard number (1 to 21), name: standard name (variable)

:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C2

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:C2 <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:C2?

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), sets the value of the C2 of the standard1 (:STAN1) to standard 21 (:STAN21).

Parameters

	<numeric>
Description	C2
Range	-1E18 to 1E18
Preset value	Varies depending on the calibration kit and the standard.
Unit	1E-36 F/Hz^2 (1E-36 farad/hertz^2)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:C2 12.3"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:C2?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Modify Cal Kit** - **Define STDs** - **no. name**[*1] - **C2**

*1. no: standard number (1 to 21), name: standard name (variable)

:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C3

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:C3 <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:C3?

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), sets the value of the C3 of the standard1 (:STAN1) to standard 21 (:STAN21).

Parameters

	<numeric>
Description	C3
Range	-1E18 to 1E18
Preset value	Varies depending on the calibration kit and the standard.
Unit	1E-45 F/Hz^3 (1E-45 farad/hertz^3)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:C3 12.3"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:C3?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Modify Cal Kit** - **Define STDs** - **no. name**[*1] - **C3**

*1.no: standard number (1 to 21), name: standard name (variable)

:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:DEL

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:DELay <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:DELay?

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), sets the value of the offset delay of the standard1 (:STAN1) to standard 21 (:STAN21).

Parameters

	<numeric>
Description	Offset delay
Range	-1E18 to 1E18
Preset value	Varies depending on the calibration kit and the standard.
Unit	s (second)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:DEL 12.3"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:DEL?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Modify Cal Kit** - **Define STDs** - **no. name**[*1] - **Offset Delay**

*1.no: standard number (1 to 21), name: standard name (variable)

:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L0

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:L0 <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:L0?

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), sets the value of the L0 of the standard1 (:STAN1) to standard 21 (:STAN21).

Parameters

	<numeric>
Description	L0
Range	-1E18 to 1E18
Preset value	Varies depending on the calibration kit and the standard.
Unit	pH (picohenry)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:L0 12.3"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:L0?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Modify Cal Kit** - **Define STDs** - **no. name**[*1] - **L0**

*1. no: standard number (1 to 21), name: standard name (variable)

14. SCPI Command Reference

:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L1

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:L1 <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:L1?

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), sets the value of the L1 of the standard1 (:STAN1) to standard 21 (:STAN21).

Parameters

	<numeric>
Description	L1
Range	-1E18 to 1E18
Preset value	Varies depending on the calibration kit and the standard.
Unit	1E-24 H/Hz (1E-24 henry/hertz)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:L1 12.3"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:L1?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Modify Cal Kit** - **Define STDs** - **no. name**[*1] - **L1**

*1.no: standard number (1 to 21), name: standard name (variable)

:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L2

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:L2 <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:L2?

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), sets the value of the L2 of the standard1 (:STAN1) to standard 21 (:STAN21).

Parameters

	<numeric>
Description	L2
Range	-1E18 to 1E18
Preset value	Varies depending on the calibration kit and the standard.
Unit	1E-33 H/Hz^2 (1E-33 $henry/hertz^2$)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:L2 12.3"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:L2?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Modify Cal Kit** - **Define STDs** - **no. name**[*1] - **L2**

*1. no: standard number (1 to 21), name: standard name (variable)

14. SCPI Command Reference

:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L3

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:L3 <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:L3?

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), sets the value of the L3 of the standard1 (:STAN1) to standard 21 (:STAN21).

Parameters

	<numeric>
Description	L3
Range	-1E18 to 1E18
Preset value	Varies depending on the calibration kit and the standard.
Unit	1E-42 H/Hz^3 (1E-42 henry/hertz^3)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:L3 12.3"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:L3?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Modify Cal Kit** - **Define STDs** - **no. name**[*1] - **L3**

*1. no: standard number (1 to 21), name: standard name (variable)

:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:LAB

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:LABel <string>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:LABel?

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), sets the name of the standard1 (:STAN1) to standard 21 (:STAN21).

Parameters

	<string>
Description	Standard name
Range	254 characters or less
Preset value	Varies depending on the calibration kit and the standard.

Query response

{string}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:LAB ""OPEN"""
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:LAB?"
30   ENTER 717;A$
```

Equivalent key

[Cal] - **Modify Cal Kit** - **Define STDs** - **no. name**[*1] - **Label**

*1. no: standard number (1 to 21), name: standard name (variable)

14. SCPI Command Reference

:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:LOSS

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:LOSS <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:LOSS?

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), sets the value of the offset loss of the standard1 (:STAN1) to standard 21 (:STAN21).

Parameters

	<numeric>
Description	Offset Loss
Range	-1E18 to 1E18
Preset value	Varies depending on the calibration kit and the standard.
Unit	Ω/s (ohm/second)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:LOSS 12.3"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:LOSS?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Modify Cal Kit** - **Define STDs** - **no. name**[*1] - **Offset Loss**

*1. no: standard number (1 to 21), name: standard name (variable)

:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:TYPE

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:TYPE {OPEN|SHORt|LOAD|THRU|ARBI|NONE}

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:TYPE?

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), sets the standard type of the standard1 (:STAN1) to standard 21 (:STAN21).

Parameters

	Description
OPEN	Specifies open.
SHORt	Specifies short.
LOAD	Specifies load.
THRU	Specifies thru.
ARBI	Specify arbitrary impedance.
NONE	Specifies DUT of which theoretical values are 0.

Query response

{OPEN|SHORt|LOAD|THRU|ARBI|NONE}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:TYPE OPEN"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:TYPE?"
30   ENTER 717;A$
```

Equivalent key

[Cal] - **Modify Cal Kit** - **Define STDs** - **no. name**[*1] - **STD Type**

*1. no: standard number (1 to 21), name: standard name (variable)

:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:Z0

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:Z0 <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:CKIT:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}:Z0?

Description

For the calibration kit selected for channel 1 (:SENS1) to channel 9 (:SENS9), sets the value of the Offset Z0 of the standard1 (:STAN1) to standard 21 (:STAN21).

Parameters

	<numeric>
Description	Offset Z0
Range	-1E18 to 1E18
Preset value	Varies depending on the calibration kit and the standard.
Unit	Ω (ohm)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:Z0 50"
20   OUTPUT 717;":SENS1:CORR:COLL:CKIT:STAN1:Z0?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Modify Cal Kit** - **Define STDs** - **no. name**[*1] - **Offset Z0**

*1.no: standard number (1 to 21), name: standard name (variable)

:SENS{1-9}:CORR:COLL:ECAL:ISOL

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:ECAL:ISOLation[:STATe] {ON|OFF|1|0}

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:ECAL:ISOLation[:STATe]?

Description

For channel 1 (:SENS1) to channel 9 (:SENS9), turns ON/OFF the isolation measurement when executing Ecal (Electrical Calibration).

Parameters

	Description
ON or 1	Turns ON the isolation measurement.
OFF or 0 (preset value)	Turns OFF the isolation measurement.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:ECAL:ISOL ON"
20   OUTPUT 717;":SENS1:CORR:COLL:ECAL:ISOL?"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:CORR:COLL:ECAL:SOLT1 on page 402
:SENS{1-9}:CORR:COLL:ECAL:SOLT2 on page 402
:SENS{1-9}:CORR:COLL:ECAL:SOLT3 on page 403
:SENS{1-9}:CORR:COLL:ECAL:SOLT4 on page 403
:SENS{1-9}:CORR:COLL:ECAL:THRU on page 404

Equivalent key

[Cal] - **ECal** - **Isolation**

:SENS{1-9}:CORR:COLL:ECAL:SOLT1

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:ECAL:SOLT1 <numeric>

Description

Executes full 1-port calibration of the specified port of channel 1 (:SENS1) to channel 9 (:SENS9) using the ECal (Electrical Calibration) module.

If you execute this command when the ECal module is not connected, an error occurs and the command is ignored. (No query)

Parameters

	<numeric>
Description	Port number
Range	1 to 4
Resolution	1

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:ECAL:SOLT1 1"
20   OUTPUT 717;"*OPC?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **ECal** - **1Port ECal** - **Port 1**|**Port 2**|**Port 3**|**Port 4**

:SENS{1-9}:CORR:COLL:ECAL:SOLT2

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:ECAL:SOLT2 <numeric 1>,<numeric 2>

Description

Executes full 2-port calibration between the 2 specified ports of channel 1 (:SENS1) to channel 9 (:SENS9) using the ECal (Electrical Calibration) module.

If you execute this command when the ECal module is not connected, an error occurs and the command is ignored. (No query)

Parameters

	<numeric 1>	**<numeric 2>**
Description	Port number	Port number
Range	1 to 4	1 to 4
Resolution	1	1

For each parameter, you must specify a different port number. If you specify the same port number for 2 or more parameters, an error occurs and the command is ignored.

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:ECAL:SOLT2 1,2"
20   OUTPUT 717;"*OPC?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **ECal** - **2Port ECal** - **Port 1-2**|**Port 1-3**|**Port 1-4**|**Port 2-3**|**Port 2-4**|**Port 3-4**

:SENS{1-9}:CORR:COLL:ECAL:SOLT3

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:ECAL:SOLT3 <numeric 1>,<numeric 2>,<numeric 3>

Description

Executes full 3-port calibration between the 3 specified ports of channel 1 (:SENS1) to channel 9 (:SENS9) using the ECal (Electrical Calibration) module.

If you execute this command when the 4 ports ECal module is not connected, an error occurs and the command is ignored. (No query)

Parameters

	<numeric 1>	<numeric 2>	<numeric 3>
Description	Port number	Port number	Port number
Range	1 to 4	1 to 4	1 to 4
Resolution	1	1	1

For each parameter, you must specify a different port number. If you specify the same port number for 2 or more parameters, an error occurs and the command is ignored.

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:ECAL:SOLT3 1,2,3"
20   OUTPUT 717;"*OPC?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **ECal** - **3Port ECal** - **Port 1-2-3**|**Port 1-2-4**|**Port 1-3-4**|**Port 2-3-4**

:SENS{1-9}:CORR:COLL:ECAL:SOLT4

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:ECAL:SOLT4 1,2,3,4

Description

Executes full 4-port calibration of channel 1 (:SENS1) to channel 9 (:SENS9) using the ECal (Electrical Calibration) module.

If you execute this command when the 4 ports ECal module is not connected, an error occurs and the command is ignored. (No query)

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:ECAL:SOLT4 1,2,3,4"
20   OUTPUT 717;"*OPC?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **ECal** - **4Port ECal**

:SENS{1-9}:CORR:COLL:ECAL:THRU

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:ECAL:THRU <numeric 1>,<numeric 2>

Description

Executes responce calibration (thru) between the 2 specified ports of channel 1 (:SENS1) to channel 9 (:SENS9) using the ECal (Electrical Calibration) module.

If you execute this command when the ECal module is not connected, an error occurs and the command is ignored. (No query)

Parameters

	<numeric 1>	**<numeric 2>**
Description	Response port number	Stimulus port number
Range	1 to 4	1 to 4
Resolution	1	1

For each parameter, you must specify a different port number. If you specify the same port number for 2 or more parameters, an error occurs and the command is ignored.

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:ECAL:SOLT2 1,2"
20   OUTPUT 717;"*OPC?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **ECal** - **Thru ECal** - **2-1 (S21)**|**3-1 (S31)**|**4-1 (S41)**|**1-2 (S12)**|**3-2 (S32)**|**4-2 (S42)**|**1-3 (S13)**|**2-3 (S23)**|**4-3 (S43)**|**1-4 (S14)**|**2-4 (S24)**|**3-4 (S34)**

:SENS{1-9}:CORR:COLL:ISOL

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect[:ACQuire]:ISOLation <numeric 1>,<numeric 2>

Description

For channel 1 (:SENS1) to channel 9 (:SENS9), measure the calibration data of the isolation from the stimulus port to the response port. (No query)

Parameters

	<numeric 1>	**<numeric 2>**
Description	Response port number	Stimulus port number
Range	1 to 4	1 to 4
Resolution	1	1

For each parameter, you must specify a different port number. If you specify the same port number for 2 or more parameters, an error occurs and the command is ignored.

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:ISOL 1,2"
20   OUTPUT 717;"*OPC?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Calibrate** - **Response (Thru)** - **Isolation (Optional)**

[Cal] - **Calibrate** - **n-Port Cal** - **Isolation (Optional)** - **Port m-n Isol**

14. SCPI Command Reference

:SENS{1-9}:CORR:COLL:LOAD

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect[:ACQuire]:LOAD <numeric>

Description

For channel 1 (:SENS1) to channel 9 (:SENS9), measures the calibration data of the load standard of the specified port. (No query)

Parameters

	<numeric>
Description	Port number
Range	1 to 4
Resolution	1

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:LOAD 1"
20   OUTPUT 717;"*OPC?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Calibrate** - **Response (Open)**|**Response (Short)** - **Load (Optional)**

[Cal] - **Calibrate** - **1-Port Cal** - **Load**

[Cal] - **Calibrate** - **n-Port Cal** - **Reflection** - **Port m Load**

:SENS{1-9}:CORR:COLL:METH:OPEN

Syntax
:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:METHod[:RESPonse]:OPEN <numeric>

Description
For channel 1 (:SENS1) to channel 9 (:SENS9), sets the calibration type to the response calibration (open) of the specified port. (No query)

Parameters

	<numeric>
Description	Port number
Range	1 to 4
Resolution	1

Example of use
```
10   OUTPUT 717;":SENS1:CORR:COLL:METH:OPEN 1"
```

Related commands
:SENS{1-9}:CORR:COLL:METH:TYPE? on page 411

Equivalent key
[Cal] - **Calibrate** - **Response (Open)** - **Select Port**

:SENS{1-9}:CORR:COLL:METH:SHOR

Syntax
:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:METHod[:RESPonse]:SHORt <numeric>

Description
For channel 1 (:SENS1) to channel 9 (:SENS9), sets the calibration type to the response calibration (short) of the specified port. (No query)

Parameters

	<numeric>
Description	Port number
Range	1 to 4
Resolution	1

Example of use
```
10   OUTPUT 717;":SENS1:CORR:COLL:METH:SHOR 1"
```

Related commands
:SENS{1-9}:CORR:COLL:METH:TYPE? on page 411

Equivalent key
[Cal] - **Calibrate** - **Response (Short)** - **Select Port**

:SENS{1-9}:CORR:COLL:METH:SOLT1

Syntax :SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:METHod:SOLT1 <numeric>

Description For channel 1 (:SENS1) to channel 9 (:SENS9), sets the calibration type to the full 1-port calibration of the specified port. (No query)

Parameters

	<numeric>
Description	Port number
Range	1 to 4
Resolution	1

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:METH:SOLT1 1"
```

Related commands :SENS{1-9}:CORR:COLL:METH:TYPE? on page 411

Equivalent key **[Cal]** - **Calibrate** - **1-Port Cal** - **Select Port**

:SENS{1-9}:CORR:COLL:METH:SOLT2

Syntax :SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:METHod:SOLT2 <numeric 1>,<numeric 2>

Description For channel 1 (:SENS1) to channel 9 (:SENS9), sets the calibration type to the full 2-port calibration between the 2 specified ports. (No query)

Parameters

	<numeric 1>	<numeric 2>
Description	Port number	Port number
Range	1 to 4	1 to 4
Resolution	1	1

For each parameter, you must specify a different port number. If you specify the same port number for 2 or more parameters, an error occurs and the command is ignored.

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:METH:SOLT2 1,2"
```

Related commands :SENS{1-9}:CORR:COLL:METH:TYPE? on page 411

Equivalent key **[Cal]** - **Calibrate** - **2-Port Cal** - **Select Ports**

:SENS{1-9}:CORR:COLL:METH:SOLT3

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:METHod:SOLT3 <numeric 1>,<numeric 2>,<numeric 3>

Description

For channel 1 (:SENS1) to channel 9 (:SENS9), sets the calibration type to the full 3-port calibration between the 3 specified ports. (No query)

Parameters

	<numeric 1>	**<numeric 2>**	**<numeric 3>**
Description	Port number	Port number	Port number
Range	1 to 4	1 to 4	1 to 4
Resolution	1	1	1

For each parameter, you must specify a different port number. If you specify the same port number for 2 or more parameters, an error occurs and the command is ignored.

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:METH:SOLT3 1,2,3"
```

Related commands

:SENS{1-9}:CORR:COLL:METH:TYPE? on page 411

Equivalent key

[Cal] - **Calibrate** - **3-Port Cal** - **Select Ports**

:SENS{1-9}:CORR:COLL:METH:SOLT4

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:METHod:SOLT4 1,2,3,4

Description

For channel 1 (:SENS1) to channel 9 (:SENS9), sets the calibration type to the full 4-port calibration. (No query)

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:METH:SOLT3 1,2,3,4"
```

Related commands

:SENS{1-9}:CORR:COLL:METH:TYPE? on page 411

Equivalent key

[Cal] - **Calibrate** - **4-Port Cal**

:SENS{1-9}:CORR:COLL:METH:THRU

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:METHod[:RESPonse]:THRU <numeric 1>,<numeric 2>

Description

For channel 1 (:SENS1) to channel 9 (:SENS9), sets the calibration type to the response calibration (thru) between the 2 specified ports. (No query)

Parameters

	<numeric 1>	<numeric 2>
Description	Port number	Port number
Range	1 to 4	1 to 4
Resolution	1	1

For each parameter, you must specify a different port number. If you specify the same port number for 2 or more parameters, an error occurs and the command is ignored.

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:METH:THRU 1,2"
```

Related commands

:SENS{1-9}:CORR:COLL:METH:TYPE? on page 411

Equivalent key

[Cal] - **Calibrate** - **Response (Thru)** - **Select Ports**

:SENS{1-9}:CORR:COLL:METH:TYPE?

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:METHod:TYPE?

Description

For channel 1 (:SENS1) to channel 9 (:SENS9), reads out the calibration type. (Query only)

Query response

{NONE|RESPO|RESPS|RESPT|SOLT1|SOLT2|SOLT3|SOLT4}<newline><^END>

	Description
NONE	The calibration type is set to nothing.
RESPO	The calibration type is the response calibration (open).
RESPS	The calibration type is the response calibration (short).
RESPT	The calibration type is the response calibration (thru).
SOLT1	The calibration type is the full 1-port calibration.
SOLT2	The calibration type is the full 2-port calibration.
SOLT3	The calibration type is the full 3-port calibration.
SOLT4	The calibration type is the full 4-port calibration.

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:METH:TYPE?"
20   ENTER 717;A$
```

Equivalent key

No equivalent key is available on the front panel.

:SENS{1-9}:CORR:COLL:OPEN

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect[:ACQuire]:OPEN <numeric>

Description

For channel 1 (:SENS1) to channel 9 (:SENS9), measures the calibration data of the open standard of the specified port. (No query)

Parameters

	<numeric>
Description	Port number
Range	1 to 4
Resolution	1

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:OPEN 1"
20   OUTPUT 717;"*OPC?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Calibrate** - **Response (Open)**|**1-Port Cal** - **Open**

[Cal] - **Calibrate** - **n-Port Cal** - **Reflection** - **Port m Open**

:SENS{1-9}:CORR:COLL:SAVE

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect:SAVE

Description

From the measured calibration data, calculates the calibration coefficients depending on the calibration type setting.

Calculating the calibration coefficients clears all calibration data whether or not used for the calculation and also clears the calibration type selections.

If you execute this command before all necessary calibration data for calculating the calibration coefficients is measured, an error occurs and the command is ignored. (No query)

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:SAVE"
```

Related commands

:SENS{1-9}:CORR:COLL:METH:OPEN on page 407

:SENS{1-9}:CORR:COLL:METH:SHOR on page 407

:SENS{1-9}:CORR:COLL:METH:THRU on page 410

:SENS{1-9}:CORR:COLL:METH:SOLT1 on page 408

:SENS{1-9}:CORR:COLL:METH:SOLT2 on page 408

:SENS{1-9}:CORR:COLL:METH:SOLT3 on page 409

:SENS{1-9}:CORR:COLL:METH:SOLT4 on page 409

Equivalent key

[Cal] - **Calibrate** - **Response**|**n-Port Cal** - **Done**

:SENS{1-9}:CORR:COLL:SHOR

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect[:ACQuire]:SHORt <numeric>

Description

For channel 1 (:SENS1) to channel 9 (:SENS9), measures the calibration data of the short standard of the specified port. (No query)

Parameters

	<numeric>
Description	Port number
Range	1 to 4
Resolution	1

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:SHOR 1"
20   OUTPUT 717;"*OPC?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Calibrate** - **Response (Short)**|**1-Port Cal** - **Short**

[Cal] - **Calibrate** - **n-Port Cal** - **Reflection** - **Port m Short**

14. SCPI Command Reference

:SENS{1-9}:CORR:COLL:THRU

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:COLLect[:ACQuire]:THRU <numeric 1>,<numeric 2>

Description

For channel 1 (:SENS1) to channel 9 (:SENS9), measure the calibration data of the thru standard from the stimulus port to the response port. (No query)

Parameters

	<numeric 1>	**<numeric 2>**
Description	Response port number	Stimulus port number
Range	1 to 4	1 to 4
Resolution	1	1

For each parameter, you must specify a different port number. If you specify the same port number for 2 or more parameters, an error occurs and the command is ignored.

Example of use

```
10   OUTPUT 717;":SENS1:CORR:COLL:THRU 1,2"
20   OUTPUT 717;"*OPC?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Calibrate** - **Response (Thru)** - **Thru**

[Cal] - **Calibrate** - **n-Port Cal** - **Transmission** - **Port m-n Thru**

:SENS{1-9}:CORR:EXT

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:EXTension[:STATe] {ON|OFF|1|0}

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:EXTension[:STATe]?

Description

For channel 1 (:SENS1) to channel 9 (:SENS9), turns ON/OFF the port extension.

Parameters

	Description
ON or 1	Turns ON the port extension.
OFF or 0 (preset value)	Turns OFF the port extension.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:EXT ON"
20   OUTPUT 717;":SENS1:CORR:EXT?"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:CORR:EXT:PORT{1-4} on page 416

Equivalent key

[Cal] - **Port Extensions** - **Extensions**

14. SCPI Command Reference

:SENS{1-9}:CORR:EXT:PORT{1-4}

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:EXTension:PORT{[1]|2|3|4} <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:EXTension:PORT{[1]|2|3|4}?

Description

For channel 1 (:SENS1) to channel 9 (:SENS9), sets the correction amount for the port extension of port 1 (:PORT1) to port 4 (:PORT4) as the delay time.

Parameters

	<numeric>
Description	Delay time
Range	-10 to 10
Preset value	0
Unit	s (second)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:EXT:PORT1 1E-3"
20   OUTPUT 717;":SENS1:CORR:EXT?"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:CORR:EXT on page 415

Equivalent key

[Cal] - **Port Extensions** - **Extension Port 1**|**Extension Port 2**|**Extension Port 3**|**Extension Port 4**

:SENS{1-9}:CORR:PROP

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:PROPerty {ON|OFF|1|0}

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:PROPerty?

Description

Turns ON/OFF the display of the calibration property of channel 1 (:SENS1) to channel 9 (:SENS9).

Parameters

	Description
ON or 1	Turns ON the calibration property display.
OFF or 0 (preset value)	Turns OFF the calibration property display.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:PROP ON"
20   OUTPUT 717;":SENS1:CORR:PROP?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Property**

:SENS{1-9}:CORR:RVEL:COAX

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:RVELocity:COAX <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:RVELocity:COAX?

Description

For channel 1 (:SENS1) to channel 9 (:SENS9), sets the velocity factor.

Parameters

	<numeric>
Description	Velocity factor
Range	0 to 10
Preset value	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:RVEL:COAX 0.7"
20   OUTPUT 717;":SENS1:CORR:RVEL:COAX?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Velocity Factor**

:SENS{1-9}:CORR:STAT

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:STATe {ON|OFF|1|0}

:SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:STATe?

Description

For channel 1 (:SENS1) to channel 9 (:SENS9), turns ON/OFF the error correction.

Parameters

	Description
ON or 1	Turns ON the error correction.
OFF or 0 (preset value)	Turns OFF the error correction.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:CORR:STAT ON"
20   OUTPUT 717;":SENS1:CORR:STAT?"
30   ENTER 717;A
```

Equivalent key

[Cal] - **Correction**

:SENS{1-9}:CORR:TYPE{1-9}?

Syntax :SENSe{[1]|2|3|4|5|6|7|8|9}:CORRection:TYPE{[1]|2|3|4|5|6|7|8|9}?

Description For trace 1 (:TYPE1) to trace 9 (:TYPE9) of channel 1 (:SENS1) to channel 9 (:SENS9), reads out the applied calibration type.

Query response {NONE|RESPO|RESPS|RESPT|SOLT1|SOLT2|SOLT3|SOLT4},{numeric 1},{numeric 2},{numeric 3},{numeric 4}<newline><^END>

{NONE|RESPO|RESPS|RESPT|SOLT1|SOLT2|SOLT3|SOLT4}:

	Description
NONE	Any calibration is not applied.
RESPO	The response calibration (open) is applied.
RESPS	The response calibration (short) is applied.
RESPT	The response calibration (thru) is applied.
SOLT1	The full 1-port calibration is applied.
SOLT2	The full 2-port calibration is applied.
SOLT3	The full 3-port calibration is applied.
SOLT4	The full 4-port calibration is applied.

{numeric 1}: the calibration port number
(This parameter is 0 when the first parameter is NONE.)

{numeric 2}: the calibration port number
(This parameter is 0 when the first parameter is not RESPT, SOLT2, SOLT3 and SOLT4.)

{numeric 3}: the calibration port number
(This parameter is 0 when the first parameter is not SOLT3 and SOLT4.)

{numeric 4}: the calibration port number
(This parameter is 0 when the first parameter is not SOLT4.)

Example of use

```
10   OUTPUT 717;":SENS1:CORR:TYPE1?"
20   ENTER 717;A$
```

Equivalent key No equivalent key is available on the front panel.

:SENS{1-9}:FREQ:CENT

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:FREQuency:CENTer <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:FREQuency:CENTer?

Description

Sets the center value of the sweep range of channel 1 (:SENS1) to channel 9 (:SENS9).

Parameters

	<numeric>
Description	Center value
Range	3E5 to 8.5E9
Preset value	4.25015E9
Unit	Hz (hertz)
Resolution	0.5 or 1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:FREQ:CENT 2E9"
20   OUTPUT 717;":SENS1:FREQ:CENT?"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:FREQ:SPAN on page 422

Equivalent key

[Center]

:SENS{1-9}:FREQ:DATA?

Syntax
:SENSe{[1]|2|3|4|5|6|7|8|9}:FREQuency:DATA?

Description
For channel 1 (:SENS1) to channel 9 (:SENS9), reads out the frequencies of all measurement point.

The data transfer format when this command is executed depends on the setting with the :FORM:DATA command. (Query only)

Query response
{numeric 1},…,{numeric NOP}<newline><^END>

	Description
{numeric n}	Frequency at the n-th measurement point

Where NOP is the number of measurement points and n is an integer between 1 and NOP.

Example of use

```
10   DIM A(1:201)
20   OUTPUT 717;":SENS1:FREQ:DATA?"
30   ENTER 717;A(*)
```

Related commands
:FORM:DATA on page 349

Equivalent key
No equivalent key is available on the front panel.

:SENS{1-9}:FREQ:SPAN

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:FREQuency:SPAN <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:FREQuency:SPAN?

Description

Sets the span value of the sweep range of channel 1 (:SENS1) to channel 9 (:SENS9).

Parameters

	<numeric>
Description	Span value
Range	0 to 8.4997E9
Preset value	8.4997E9
Unit	Hz (hertz)
Resolution	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:FREQ:SPAN 1E9"
20   OUTPUT 717;":SENS1:FREQ:SPAN?"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:FREQ:CENT on page 420

Equivalent key

[Span]

:SENS{1-9}:FREQ:STAR

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:FREQuency:STARt <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:FREQuency:STARt?

Description

Sets the start value of the sweep range of channel 1 (:SENS1) to channel 9 (:SENS9).

Parameters

	<numeric>
Description	Start value
Range	3E5 to 8.5E9
Preset value	3E5
Unit	Hz (hertz)
Resolution	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:FREQ:STAR 100E6"
20   OUTPUT 717;":SENS1:FREQ:STAR?"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:FREQ:STOP on page 424

Equivalent key

[Start]

14. SCPI Command Reference

:SENS{1-9}:FREQ:STOP

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:FREQuency:STOP <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:FREQuency:STOP?

Description

Sets the stop value of the sweep range of channel 1 (:SENS1) to channel 9 (:SENS9).

Parameters

	<numeric>
Description	Stop value
Range	3E5 to 8.5E9
Preset value	8.5E9
Unit	Hz (hertz)
Resolution	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:FREQ:STOP 100E6"
20   OUTPUT 717;":SENS1:FREQ:STOP?"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:FREQ:STAR on page 423

Equivalent key

[Stop]

:SENS{1-9}:MULT{1-2}:TSET9:OUTP

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:MULTiplexer{[1]|2}:TSET9:OUTPut[:DATA] <value>

:SENSe{[1]|2|3|4|5|6|7|8|9}:MULTiplexer{[1]|2}:TSET9:OUTPut[:DATA]?

Description

Sets the HIGH/LOW of all the control line of the E5091A whose ID is 1 (:MULT1) or 2 (:MULT2) when measuring channel 1 (:SENS1) to channel 9 (:SENS9) in the measurement using the E5091A.

To set the control lines, use values obtained by converting 8-bit binary values expressed by HIGH (1)/LOW (0) of individual lines to decimal values, assuming line 1 as LSB and line 8 as MSB.

Parameters

	<value>
Description	Setting value the control line
Range	0 to 255
Preset value	0
Resolution	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{value}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:MULT1:TSET9:OUTP 5"
20   OUTPUT 717;":SENS1:MULT1:TSET9:OUTP?"
30   ENTER 717;A
```

Related commands

:SENS:MULT{1-2}:STAT on page 376

Equivalent key

[System] - **E5091A Setup** - **Control Lines**

:SENS{1-9}:MULT{1-2}:TSET9:PORT1

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:MULTiplexer{[1]|2}:TSET9:PORT1 {A|T1}

:SENSe{[1]|2|3|4|5|6|7|8|9}:MULTiplexer{[1]|2}:TSET9:PORT1?

Description

Selects a port assigned to Port 1 of the E5091A whose ID is 1 (:MULT1) or 2 (:MULT2) when measuring channel 1 (:SENS1) to channel 9 (:SENS9) in the measurement using the E5091A.

If the port assigned to Port 2 is T1 and you select T1 as the port assigned to Port 1, the port assigned to Port 2 is changed to T2 automatically.

Parameters

	Description
A (preset value)	Specifies A.
T1	Specifies T1.

Query response

{A|T1}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:MULT1:TSET9:PORT1 T1"
20   OUTPUT 717;":SENS1:MULT1:TSET9:PORT1?"
30   ENTER 717;A$
```

Related commands

:SENS:MULT{1-2}:STAT on page 376

:SENS{1-9}:MULT{1-2}:TSET9:PORT2 on page 427

:SENS{1-9}:MULT{1-2}:TSET9:PORT3 on page 428

:SENS{1-9}:MULT{1-2}:TSET9:PORT4 on page 429

Equivalent key

[System] - **E5091A Setup** - **Port1** - **A**|**T1**

:SENS{1-9}:MULT{1-2}:TSET9:PORT2

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:MULTiplexer{[1]|2}:TSET9:PORT2 {T1|T2}

:SENSe{[1]|2|3|4|5|6|7|8|9}:MULTiplexer{[1]|2}:TSET9:PORT2?

Description

Selects a port assigned to Port 2 of the E5091A whose ID is 1 (:MULT1) or 2 (:MULT2) when measuring channel 1 (:SENS1) to channel 9 (:SENS9) in the measurement using the E5091A.

If the port assigned to Port 1 is T1 and you select T1 as the port assigned to Port 2, the port assigned to Port 1 is changed to A automatically.

Parameters

	Description
T1 (preset value)	Specifies T1.
T2	Specifies T2.

Query response

{A|T1}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:MULT1:TSET9:PORT2 T2"
20   OUTPUT 717;":SENS1:MULT1:TSET9:PORT2?"
30   ENTER 717;A$
```

Related commands

:SENS:MULT{1-2}:STAT on page 376

:SENS{1-9}:MULT{1-2}:TSET9:PORT1 on page 426

:SENS{1-9}:MULT{1-2}:TSET9:PORT3 on page 428

:SENS{1-9}:MULT{1-2}:TSET9:PORT4 on page 429

Equivalent key

[System] - **E5091A Setup** - **Port2** - **T1**|**T2**

:SENS{1-9}:MULT{1-2}:TSET9:PORT3

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:MULTiplexer{[1]|2}:TSET9:PORT3 {R1|R2}R3}

:SENSe{[1]|2|3|4|5|6|7|8|9}:MULTiplexer{[1]|2}:TSET9:PORT3?

Description

Selects a port assigned to Port 3 of the E5091A whose ID is 1 (:MULT1) or 2 (:MULT2) when measuring channel 1 (:SENS1) to channel 9 (:SENS9) in the measurement using the E5091A.

Parameters

	Description
R1 (preset value)	Specifies R1+.
R2	Specifies R2+.
R3	Specifies R3+*1.

*1. For Option 007 (7 ports), R2+.

Query response

{R1|R2}R3}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:MULT1:TSET9:PORT3 R2"
20   OUTPUT 717;":SENS1:MULT1:TSET9:PORT3?"
30   ENTER 717;A$
```

Related commands

:SENS:MULT{1-2}:STAT on page 376

:SENS{1-9}:MULT{1-2}:TSET9:PORT1 on page 426

:SENS{1-9}:MULT{1-2}:TSET9:PORT2 on page 427

:SENS{1-9}:MULT{1-2}:TSET9:PORT4 on page 429

Equivalent key

[System] - **E5091A Setup** - **Port3** - **R1+**|**R2+**|**R3+**

:SENS{1-9}:MULT{1-2}:TSET9:PORT4

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:MULTiplexer{[1]|2}:TSET9:PORT4 {R1|R2|R3}

:SENSe{[1]|2|3|4|5|6|7|8|9}:MULTiplexer{[1]|2}:TSET9:PORT4?

Description

Selects a port assigned to Port 4 of the E5091A whose ID is 1 (:MULT1) or 2 (:MULT2) when measuring channel 1 (:SENS1) to channel 9 (:SENS9) in the measurement using the E5091A.

Parameters

	Description
R1 (preset value)	Specifies R1-.
R2	Specifies R2-.
R3	Specifies R3-[*1].

*1. For Option 007 (7 ports), R2-.

Query response

{R1|R2}R3}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:MULT1:TSET9:PORT4 R2"
20   OUTPUT 717;":SENS1:MULT1:TSET9:PORT4?"
30   ENTER 717;A$
```

Related commands

:SENS:MULT{1-2}:STAT on page 376

:SENS{1-9}:MULT{1-2}:TSET9:PORT1 on page 426

:SENS{1-9}:MULT{1-2}:TSET9:PORT2 on page 427

:SENS{1-9}:MULT{1-2}:TSET9:PORT3 on page 428

Equivalent key

[System] - **E5091A Setup** - **Port4** - **R1-|R2-|R3-**

:SENS{1-9}:ROSC:SOUR?

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:ROSCillator:SOURce?

Description

Reads out whether the external reference signal is inputted to the Ref In connector on the rear panel. (Query only)

Query response

{INTernal|EXTernal}<newline><^END>

	Description
INTernal	The external reference signal is not inputted.
EXTernal	The external reference signal is inputted.

Example of use

```
10   OUTPUT 717;":SENS1:ROSC:SOUR?"
20   ENTER 717;A$
```

Equivalent key

Displayed on the instrument status bar (at the bottom of the LCD display).

:SENS{1-9}:SEGM:DATA

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:SEGMent:DATA 5,<mode>,<ifbw>,<pow>,<del>,<time>,<segm>,
<star 1>,<stop 1>,<nop 1>,<ifbw 1>,<pow 1>,<del 1>,<time 1>,. . .,
<star n>,<stop n>,<nop n>,<ifbw n>,<pow n>,<del n>,<time n>,. . .,
<star N>,<stop N>,<nop N>,<ifbw N>,<pow N>,<del N>,<time N>

:SENSe{[1]|2|3|4|5|6|7|8|9}:SEGMent:DATA 6,<mode>,<ifbw>,<pow>,<del>,<swp>,<time>,<segm>,
<star 1>,<stop 1>,<nop 1>,<ifbw 1>,<pow 1>,<del 1>,<swp 1>,<time 1>,. . .,
<star n>,<stop n>,<nop n>,<ifbw n>,<pow n>,<del n>,<swp n>,. . .,
<star N>,<stop N>,<nop N>,<ifbw N>,<pow N>,<del N>,<swp N>

:SENSe{[1]|2|3|4|5|6|7|8|9}:SEGMent:DATA?

Where N is the number of segments (specified with <segm>) and n is an integer between 1 and N.

Description

Creates the segment sweep table for channel 1 (:SENS1) to channel 9 (:SENS9).

Parameters

The first value is 5 or 6 and the parameters listed below follow.

	Description
<mode>	Stimulus setting mode 0: Specifies with start/stop values 1: Specifies with center/span values
<ifbw>	ON/OFF of the IF bandwidth setting for each segment 0: Off, 1: On
<pow>	ON/OFF of the power setting for each segment 0: Off, 1: On
<del>	ON/OFF of the sweep delay time setting for each segment 0: Off, 1: On
<swp>	ON/OFF of the sweep mode setting for each segment 0: Off, 1: On Not required when the first value is 5
<time>	ON/OFF of the sweep time setting for each segment 0: Off, 1: On
<segm>	Number of segments (1 to 201)
<star n>	Start value/center value of the n-th segment
<stop n>	Stop value/span value of the n-th segment
<nop n>	Number of measurement points of the n-th segment
<ifbw n>	IF bandwidth of the n-th segment Not required when the IF bandwidth setting for each segment is OFF (<ifbw> = 0)
<pow n>	Power of the n-th segment Not required when the power setting for each segment is OFF (<pow> = 0)

	Description
<del n>	Sweep delay time of the n-th segment Not required when the sweep delay time setting for each segment is OFF (<del> = 0)
<swp n>	Sweep mode of the n-th segment Not required when the first value is 5 or the sweep mode setting for each segment is OFF (<swp> = 0)
<time n>	Sweep time of the n-th segment (specify 0 If you want to set “auto setting”) Not required when the sweep time setting for each segment is OFF (<time> = 0)

Query response

When the sweep mode setting for each segment is OFF:

5,{mode},{ifbw},{pow},{del},{time},{segm},
{star 1},{stop 1},{nop 1},{pow 1},{del 1},{time 1},…,
{star n},{stop n},{nop n},{pow n},{del n},{time n},…,
{star N},{stop N},{nop N},{pow N},{del N},{time N}<newline><^END>

When the sweep mode setting for each segment is ON:

6,{mode},{ifbw},{pow},{del},{swp},{time},{segm},
{star 1},{stop 1},{nop 1},{pow 1},{del 1},{swp 1},{time 1},…,
{star n},{stop n},{nop n},{pow n},{del n},{swp n},{time n},…,
{star N},{stop N},{nop N},{pow N},{del N},{swp N},{time N}<newline><^END>

Example of use

```
10   DIM H(1:3,1:4)
20   OUTPUT 717;":SENS1:SEGM:DATA 5,0,1,0,0,0,3,";
30   OUTPUT 717;"1E9,3E9,11,70e3,";
40   OUTPUT 717;"3E9,4E9,51,7e3,";
50   OUTPUT 717;"4E9,6E9,11,70e3"
60   OUTPUT 717;":SENS1:SEGM:DATA?"
70   ENTER 717;A,B,C,D,E,F,G,H(*)
```

```
10   DIM H(1:3,1:5)
20   OUTPUT 717;":SENS1:SEGM:DATA 6,0,1,0,0,1,0,3,";
30   OUTPUT 717;"1E9,3E9,11,70e3,3,";
40   OUTPUT 717;"3E9,4E9,51,7e3,2,";
50   OUTPUT 717;"4E9,6E9,11,70e3,3"
60   OUTPUT 717;":SENS1:SEGM:DATA?"
70   ENTER 717;A,B,C,D,E,F,G,H(*)
```

Related commands

:SENS{1-9}:SWE:TYPE on page 437

Equivalent key

[Sweep Setup] - Edit Segment Table

:SENS{1-9}:SEGM:SWE:POIN?

Syntax :SENSe{[1]|2|3|4|5|6|7|8|9}:SEGMent:SWEep:POINts?

Description For the segment sweep table of channel 1 (:SENS1) to channel 9 (:SENS9), reads out the total number of the measurement points of all segments. (Query only)

Query response {numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:SEGM:SWE:POIN?"
20   ENTER 717;A
```

Related commands :SENS{1-9}:SEGM:DATA on page 431

Equivalent key No equivalent key is available on the front panel.

:SENS{1-9}:SEGM:SWE:TIME?

Syntax :SENSe{[1]|2|3|4|5|6|7|8|9}:SEGMent:SWEep:TIME?

Description For the segment sweep table of channel 1 (:SENS1) to channel 9 (:SENS9), reads out the total sweep time of all segments. (Query only)

Query response {numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:SEGM:SWE:TIME?"
20   ENTER 717;A
```

Related commands :SENS{1-9}:SEGM:DATA on page 431

Equivalent key No equivalent key is available on the front panel.

:SENS{1-9}:SWE:ASP

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:SWEep:ASPurious {ON|OFF|1|0}

:SENSe{[1]|2|3|4|5|6|7|8|9}:SWEep:ASPurious?

Description

For channel 1 (:SENS1) to channel 9 (:SENS9), turns ON/OFF the spurious avoidance mode.

Parameters

	Description
ON or 1 (preset value)	Turns ON the spurious avoidance mode.
OFF or 0	Turns OFF the spurious avoidance mode.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:SWE:ASP OFF"
20   OUTPUT 717;":SENS1:SWE:ASP?"
30   ENTER 717;A
```

Equivalent key

[System] - **Service Menu** - **Avoid Spurious**

:SENS{1-9}:SWE:DEL

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:SWEep:DELay <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:SWEep:DELay?

Description

Sets the sweep delay time of channel 1 (:SENS1) to channel 9 (:SENS9).

Parameters

	<numeric>
Description	Sweep delay time
Range	0 to 1
Preset value	0
Unit	s (second)
Resolution	0.001

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:SWE:DEL 0.05"
20   OUTPUT 717;":SENS1:SWE:DEL?"
30   ENTER 717;A
```

Equivalent key

[Sweep Setup] - **Sweep Delay**

:SENS{1-9}:SWE:GEN

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:SWEep:GENeration {STEPped|ANALog|FSTepped|FANalog}

:SENSe{[1]|2|3|4|5|6|7|8|9}:SWEep:GENeration?

Description

Selects the sweep mode of channel 1 (:SENS1) to channel 9 (:SENS9).

Parameters

	Description
STEPped (preset value)	Specifies stepped mode.
ANALog	Specifies swept mode.
FSTepped	Specifies fast stepped mode.
FANalog	Specifies fast swept mode.

Query response

{STEP|ANAL|FST|FAN}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:SWE:GEN ANAL"
20   OUTPUT 717;":SENS1:SWE:GEN?"
30   ENTER 717;A$
```

Equivalent key

[Sweep Setup] - **Sweep Mode** - **Std Stepped**|**Std Swept**|**Fast Stepped**|**Fast Swept**

:SENS{1-9}:SWE:POIN

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:SWEep:POINts <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:SWEep:POINts?

Description

Sets the number of measurement points of channel 1 (:SENS1) to channel 9 (:SENS9).

Parameters

	<numeric>
Description	Number of measurement points
Range	2 to 1601
Preset value	201
Resolution	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:SWE:POIN 801"
20   OUTPUT 717;":SENS1:SWE:POIN?"
30   ENTER 717;A
```

Equivalent key

[Sweep Setup] - **Points**

:SENS{1-9}:SWE:TIME

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:SWEep:TIME[:DATA] <numeric>

:SENSe{[1]|2|3|4|5|6|7|8|9}:SWEep:TIME[:DATA]?

Description

Sets the sweep time of channel 1 (:SENS1) to channel 9 (:SENS9).

When the auto setting of the sweep time is ON, even if you try to set the sweep time to any value with this command, it automatically returns to the value defined by the E5070A/E5071A. Before using this command, turns OFF the auto setting of the sweep time (specify OFF with the :SENS{1-9}:SWE:TIME:AUTO command).

Parameters

	<numeric>
Description	Sweep time
Range	Varies depending on the measurement conditions.
Preset value	Varies depending on the measurement conditions.
Unit	s (second)

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:SWE:TIME 1.5"
20   OUTPUT 717;":SENS1:SWE:TIME?"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:SWE:TIME:AUTO on page 437

Equivalent key

[Sweep Setup] - **Sweep Time**

:SENS{1-9}:SWE:TIME:AUTO

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:SWEep:TIME:AUTO {ON|OFF|1|0}

:SENSe{[1]|2|3|4|5|6|7|8|9}:SWEep:TIME:AUTO?

Description

Sets whether to automatically set the sweep time of channel 1 (:SENS1) to channel 9 (:SENS9).

Parameters

	Description
ON or 1 (preset value)	Turns ON the auto setting.
OFF or 0	Turns OFF the auto setting.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:SWE:TIME:AUTO ON"
20   OUTPUT 717;":SENS1:SWE:TIME:AUTO?"
30   ENTER 717;A
```

Related commands

:SENS{1-9}:SWE:TIME on page 436

Equivalent key

[Sweep Setup] - **Sweep Time**

:SENS{1-9}:SWE:TYPE

Syntax

:SENSe{[1]|2|3|4|5|6|7|8|9}:SWEep:TYPE {LINear|LOGarithmic|SEGMent}

:SENSe{[1]|2|3|4|5|6|7|8|9}:SWEep:TYPE?

Description

Sets the sweep type of channel 1 (:SENS1) to channel 9 (:SENS9).

Parameters

	Description
LINear (preset value)	Specifies the linear sweep.
LOGarithmic	Specifies the logarithmic sweep.
SEGMent	Specifies the segment sweep.

Query response

{LIN|LOG|SEGM}<newline><^END>

Example of use

```
10   OUTPUT 717;":SENS1:SWE:TYPE SEGM"
20   OUTPUT 717;":SENS1:SWE:TYPE?"
30   ENTER 717;A$
```

Equivalent key

[Sweep Setup] - **Sweep Type** - **Lin Freq**|**Log Freq**|**Segment**

:SOUR{1-9}:POW

Syntax

:SOURce{[1]|2|3|4|5|6|7|8|9}:POWer[:LEVel][:IMMediate][:AMPLitude] <numeric>

:SOURce{[1]|2|3|4|5|6|7|8|9}:POWer[:LEVel][:IMMediate][:AMPLitude]?

Description

Sets the power level of channel 1 (:SOUR1) to channel 9 (:SOUR9).

Parameters

	<numeric>
Description	Power level
Range	Varies depending on the power range.
Preset value	0
Unit	dBm
Resolution	0.05

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SOUR1:POW -12.5"
20   OUTPUT 717;":SENS1:POW?"
30   ENTER 717;A
```

Related commands

:SOUR{1-9}:POW:ATT on page 439

Equivalent key

[Sweep Setup] - **Power**

:SOUR{1-9}:POW:ATT

Syntax

:SOURce{[1]|2|3|4|5|6|7|8|9}:POWer:ATTenuation[:DATA] <numeric>

:SOURce{[1]|2|3|4|5|6|7|8|9}:POWer:ATTenuation[:DATA]?

Description

Sets the power range of channel 1 (:SOUR1) to channel 9 (:SOUR9).

The power range is selected depending on the setting of the attenuator. The following table shows the relationship between the attenuator value and the power range.

Attenuator	Power range	Attenuator	Power range
0 dB	-15 to 0 dBm	5 dB	-20 to -5 dBm
10 dB	-25 to -10 dBm	15 dB	-30 to -15 dBm
20 dB	-35 to -20 dBm	25 dB	-40 to -25 dBm
30 dB	-45 to -30 dBm	35 dB	-50 to -35 dBm

If you execute this command when the power range extension function is not installed, an error occurs and the command is ignored.

Parameters

	<numeric>
Description	Attenuator value
Range	0 to 35
Preset value	0
Unit	dB
Resolution	5

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":SOUR1:POW:ATT 15"
20   OUTPUT 717;":SENS1:POW:ATT?"
30   ENTER 717;A
```

Related commands

:SOUR{1-9}:POW on page 438

Equivalent key

[Sweep Setup] - **Power Ranges**

14. SCPI Command Reference

:STAT:OPER?

Syntax :STATus:OPERation[:EVENt]?

Description Reads out the value of the Operation Status Event Register. (Query only)

Query response {numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":STAT:OPER?"
20   ENTER 717;A
```

Related commands *CLS on page 210

Equivalent key No equivalent key is available on the front panel.

:STAT:OPER:COND?

Syntax :STATus:OPERation:CONDition?

Description Reads out the value of the Operation Status Condition Register. (Query only)

Query response {numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":STAT:OPER:COND?"
20   ENTER 717;A
```

Related commands :STAT:OPER:NTR on page 442

:STAT:OPER:PTR on page 443

Equivalent key No equivalent key is available on the front panel.

:STAT:OPER:ENAB

Syntax

:STATus:OPERation:ENABle <numeric>

:STATus:OPERation:ENABle?

Description

Sets the value of the Operation Status Enable Register.

Parameters

	<numeric>
Description	Value of the enable register
Range	0 to 65535
Preset value	0
Resolution	1

Note that bit 0 to bit 3, bit 6 to bit 13 and bit 15 cannot be set to 1.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":STAT:OPER:ENAB 16"
20   OUTPUT 717;":STAT:OPER:ENAB?"
30   ENTER 717;A
```

Related commands

*SRE on page 214

Equivalent key

No equivalent key is available on the front panel.

:STAT:OPER:NTR

Syntax

:STATus:OPERation:NTRansition <numeric>

:STATus:OPERation:NTRansition?

Description

Sets the value of negative transition filter of the Operation Status Register.

Parameters

	<numeric>
Description	Value of the negative transition filter
Range	0 to 65535
Preset value	0
Resolution	1

Note that bit 0 to bit 3, bit 6 to bit 13 and bit 15 cannot be set to 1.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":STAT:OPER:NTR 16"
20   OUTPUT 717;":STAT:OPER:NTR?"
30   ENTER 717;A
```

Related commands

:STAT:OPER? on page 440

:STAT:OPER:PTR on page 443

Equivalent key

No equivalent key is available on the front panel.

:STAT:OPER:PTR

Syntax

:STATus:OPERation:PTRansition <numeric>

:STATus:OPERation:PTRansition?

Description

Sets the value of positive transition filter of the Operation Status Register.

Parameters

	<numeric>
Description	Value of the positive transition filter
Range	0 to 65535
Preset value	16432
Resolution	1

Note that bit 0 to bit 3, bit 6 to bit 13 and bit 15 cannot be set to 1.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":STAT:OPER:PTR 16"
20   OUTPUT 717;":STAT:OPER:PTR?"
30   ENTER 717;A
```

Related commands

:STAT:OPER? on page 440

:STAT:OPER:NTR on page 442

Equivalent key

No equivalent key is available on the front panel.

:STAT:PRES

Syntax
:STATus:PRESet

Description
Initialize the Operation Status Register, Questionable Status Register, Questionable Limit Status Register, and Questionable Limit Channel Status Register. (No query)

Equivalent key
No equivalent key is available on the front panel.

:STAT:QUES?

Syntax
:STATus:QUEStionable[:EVENt]?

Description
Reads out the value of the Questionable Status Event Register. (Query only)

Query response
{numeric}<newline><^END>

Example of use
```
10   OUTPUT 717;":STAT:QUES?"
20   ENTER 717;A
```

Related commands
*CLS on page 210

Equivalent key
No equivalent key is available on the front panel.

:STAT:QUES:COND?

Syntax
:STATus:QUEStionable:CONDition?

Description
Reads out the value of the Questionable Status Condition Register. (Query only)

Query response
{numeric}<newline><^END>

Example of use
```
10   OUTPUT 717;":STAT:QUES:COND?"
20   ENTER 717;A
```

Related commands
:STAT:QUES:NTR on page 453

:STAT:QUES:PTR on page 454

Equivalent key
No equivalent key is available on the front panel.

:STAT:QUES:ENAB

Syntax

:STATus:QUEStionable:ENABle <numeric>

:STATus:QUEStionable:ENABle?

Description

Sets the value of the Questionable Status Enable Register.

Parameters

	<numeric>
Description	Value of the enable register
Range	0 to 65535
Preset value	0
Resolution	1

Note that bit 0 to bit 9 and bit 12 to bit 15 cannot be set to 1.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":STAT:QUES:ENAB 16"
20   OUTPUT 717;":STAT:QUES:ENAB?"
30   ENTER 717;A
```

Related commands

*SRE on page 214

Equivalent key

No equivalent key is available on the front panel.

:STAT:QUES:LIM?

Syntax :STATus:QUEStionable:LIMit[:EVENt]?

Description Reads out the value of the Questionable Limit Status Event Register. (Query only)

Query response {numeric}<newline><^END>

Example of use
```
10   OUTPUT 717;":STAT:QUES:LIM?"
20   ENTER 717;A
```

Related commands *CLS on page 210

Equivalent key No equivalent key is available on the front panel.

:STAT:QUES:LIM:CHAN{1-9}?

Syntax :STATus:QUEStionable:LIMit:CHANnel{[1]|2|3|4|5|6|7|8|9}[:EVENt]?

Description Reads out the value of the Questionable Limit Channel Status Event Register of channel 1 (:CHAN1) to channel 9 (:CHAN9). (Query only)

Query response {numeric}<newline><^END>

Example of use
```
10   OUTPUT 717;":STAT:QUES:LIM:CHAN1?"
20   ENTER 717;A
```

Related commands *CLS on page 210

Equivalent key No equivalent key is available on the front panel.

:STAT:QUES:LIM:CHAN{1-9}:COND?

Syntax :STATus:QUEStionable:LIMit:CHANnel{[1]|2|3|4|5|6|7|8|9}:CONDition?

Description Reads out the value of the Questionable Limit Channel Status Condition Register of channel 1 (:CHAN1) to channel 9 (:CHAN9). (Query only)

Query response {numeric}<newline><^END>

Example of use
```
10   OUTPUT 717;":STAT:QUES:LIM:CHAN1:COND?"
20   ENTER 717;A
```

Related commands :STAT:QUES:LIM:CHAN{1-9}:NTR on page 448

:STAT:QUES:LIM:CHAN{1-9}:PTR on page 449

Equivalent key No equivalent key is available on the front panel.

:STAT:QUES:LIM:CHAN{1-9}:ENAB

Syntax

:STATus:QUEStionable:LIMit:CHANnel{[1]|2|3|4|5|6|7|8|9}:ENABle <numeric>

:STATus:QUEStionable:LIMit:CHANnel{[1]|2|3|4|5|6|7|8|9}:ENABle?

Description

Sets the value of the Questionable Limit Channel Status Enable Register of channel 1 (:CHAN1) to channel 9 (:CHAN9).

Parameters

	<numeric>
Description	Value of the enable register
Range	0 to 65535
Preset value	1022
Resolution	1

Note that bit 0 and bit 10 to bit 15 cannot be set to 1.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":STAT:QUES:LIM:CHAN1:ENAB 16"
20   OUTPUT 717;":STAT:QUES:LIM:CHAN1:ENAB?"
30   ENTER 717;A
```

Related commands

:STAT:QUES:LIM:ENAB on page 450

Equivalent key

No equivalent key is available on the front panel.

14. SCPI Command Reference

:STAT:QUES:LIM:CHAN{1-9}:NTR

Syntax

:STATus:QUEStionable:LIMit:CHANnel{[1]|2|3|4|5|6|7|8|9}:NTRansition <numeric>

:STATus:QUEStionable:LIMit:CHANnel{[1]|2|3|4|5|6|7|8|9}:NTRansition?

Description

Sets the value of the negative transition filter of the Questionable Limit Channel Status Register of channel 1 (:CHAN1) to channel 9 (:CHAN9).

Parameters

	<numeric>
Description	Value of the negative transition filter
Range	0 to 65535
Preset value	0
Resolution	1

Note that bit 0 and bit 10 to bit 15 cannot be set to 1.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":STAT:QUES:LIM:CHAN1:NTR 16"
20   OUTPUT 717;":STAT:QUES:LIM:CHAN1:NTR?"
30   ENTER 717;A
```

Related commands

:STAT:QUES:LIM:CHAN{1-9}? on page 446

:STAT:QUES:LIM:CHAN{1-9}:PTR on page 449

Equivalent key

No equivalent key is available on the front panel.

:STAT:QUES:LIM:CHAN{1-9}:PTR

Syntax

:STATus:QUEStionable:LIMit:CHANnel{[1]|2|3|4|5|6|7|8|9}:PTRansition <numeric>

:STATus:QUEStionable:LIMit:CHANnel{[1]|2|3|4|5|6|7|8|9}:PTRansition?

Description

Sets the value of the positive transition filter of the Questionable Limit Channel Status Register of channel 1 (:CHAN1) to channel 9 (:CHAN9).

Parameters

	<numeric>
Description	Value of the positive transition filter
Range	0 to 65535
Preset value	1022
Resolution	1

Note that bit 0 and bit 10 to bit 15 cannot be set to 1.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":STAT:QUES:LIM:CHAN1:PTR 16"
20   OUTPUT 717;":STAT:QUES:LIM:CHAN1:PTR?"
30   ENTER 717;A
```

Related commands

:STAT:QUES:LIM:CHAN{1-9}? on page 446

:STAT:QUES:LIM:CHAN{1-9}:NTR on page 448

Equivalent key

No equivalent key is available on the front panel.

:STAT:QUES:LIM:COND?

Syntax
:STATus:QUEStionable:LIMit:CONDition?

Description
Reads out the value of the Questionable Limit Status Condition Register. (Query only)

Query response
{numeric}<newline><^END>

Example of use
```
10   OUTPUT 717;":STAT:QUES:LIM:COND?"
20   ENTER 717;A
```

Related commands
:STAT:QUES:LIM:NTR on page 451
:STAT:QUES:LIM:PTR on page 452

Equivalent key
No equivalent key is available on the front panel.

:STAT:QUES:LIM:ENAB

Syntax
:STATus:QUEStionable:LIMit:ENABle <numeric>
:STATus:QUEStionable:LIMit:ENABle?

Description
Sets the value of the Questionable Limit Status Enable Register.

Parameters

	<numeric>
Description	Value of the enable register
Range	0 to 65535
Preset value	1022
Resolution	1

Note that bit 0 and bit 10 to bit 15 cannot be set to 1.

Query response
{numeric}<newline><^END>

Example of use
```
10   OUTPUT 717;":STAT:QUES:LIM:ENAB 16"
20   OUTPUT 717;":STAT:QUES:LIM:ENAB?"
30   ENTER 717;A
```

Related commands
:STAT:QUES:ENAB on page 445

Equivalent key
No equivalent key is available on the front panel.

:STAT:QUES:LIM:NTR

Syntax

:STATus:QUEStionable:LIMit:NTRansition <numeric>

:STATus:QUEStionable:LIMit:NTRansition?

Description

Sets the value of the negative transition filter of the Questionable Limit Status Register.

Parameters

	<numeric>
Description	Value of the negative transition filter
Range	0 to 65535
Preset value	0
Resolution	1

Note that bit 0 and bit 10 to bit 15 cannot be set to 1.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":STAT:QUES:LIM:CHAN1:NTR 16"
20   OUTPUT 717;":STAT:QUES:LIM:CHAN1:NTR?"
30   ENTER 717;A
```

Related commands

:STAT:QUES:LIM? on page 446

:STAT:QUES:LIM:PTR on page 452

Equivalent key

No equivalent key is available on the front panel.

:STAT:QUES:LIM:PTR

Syntax

:STATus:QUEStionable:LIMit:PTRansition <numeric>

:STATus:QUEStionable:LIMit:PTRansition?

Description

Sets the value of the positive transition filter of the Questionable Limit Status Register.

Parameters

	<numeric>
Description	Value of the positive transition filter
Range	0 to 65535
Preset value	1022
Resolution	1

Note that bit 0 and bit 10 to bit 15 cannot be set to 1.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":STAT:QUES:LIM:CHAN1:PTR 16"
20   OUTPUT 717;":STAT:QUES:LIM:CHAN1:PTR?"
30   ENTER 717;A
```

Related commands

:STAT:QUES:LIM? on page 446

:STAT:QUES:LIM:NTR on page 451

Equivalent key

No equivalent key is available on the front panel.

:STAT:QUES:NTR

Syntax

:STATus:QUEStionable:NTRansition <numeric>

:STATus:QUEStionable:NTRansition?

Description

Sets the value of negative transition filter of the Questionable Status Register.

Parameters

	<numeric>
Description	Value of the negative transition filter
Range	0 to 65535
Preset value	0
Resolution	1

Note that bit 0 to bit 9 and bit 12 to bit 15 cannot be set to 1.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":STAT:QUES:NTR 16"
20   OUTPUT 717;":STAT:QUES:NTR?"
30   ENTER 717;A
```

Related commands

:STAT:QUES? on page 444

:STAT:QUES:PTR on page 454

Equivalent key

No equivalent key is available on the front panel.

:STAT:QUES:PTR

Syntax

:STATus:QUEStionable:PTRansition <numeric>

:STATus:QUEStionable:PTRansition?

Description

Sets the value of positive transition filter of the Questionable Status Register.

Parameters

	<numeric>
Description	Value of the positive transition filter
Range	0 to 65535
Preset value	3072
Resolution	1

Note that bit 0 to bit 9 and bit 12 to bit 15 cannot be set to 1.

Query response

{numeric}<newline><^END>

Example of use

```
10   OUTPUT 717;":STAT:QUES:PTR 16"
20   OUTPUT 717;":STAT:QUES:PTR?"
30   ENTER 717;A
```

Related commands

:STAT:QUES? on page 444

:STAT:QUES:NTR on page 453

Equivalent key

No equivalent key is available on the front panel.

:SYST:BACK

Syntax

:SYSTem:BACKlight {ON|OFF|1|0}

:SYSTem:BACKlight?

Description

Turns ON/OFF the backlight of the LCD display.

When the backlight is OFF, you cannot read the information on the display.

Parameters

	Description
ON or 1 (preset value)	Turns ON the backlight.
OFF or 0	Turns OFF the backlight.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SYST:BACK OFF"
20   OUTPUT 717;":SYST:BACK?"
30   ENTER 717;A
```

Equivalent key

[System] - **Backlight**

To turn it ON, press any key on the front panel.

:SYST:BEEP:COMP:IMM

Syntax

:SYSTem:BEEPer:COMPlete:IMMediate

Description

Generates a beep for the notification of the completion of the operation. (No query)

Example of use

```
10   OUTPUT 717;":SYST:BEEP:COMP:IMM"
```

Related commands

:SYST:BEEP:COMP:STAT on page 456
:SYST:BEEP:WARN:IMM on page 457

Equivalent key

[System] - **Misc Setup** - **Beeper** - **Test Beep Complete**

:SYST:BEEP:COMP:STAT

Syntax

:SYSTem:BEEPer:COMPlete:STATe {ON|OFF|1|0}

:SYSTem:BEEPer:COMPlete:STATe?

Description

Turns ON/OFF the beeper for the notification of the completion of the operation.

Parameters

	Description
ON or 1 (preset value)	Turns ON the beeper.
OFF or 0	Turns OFF the beeper.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SYST:BEEP:COMP:STAT OFF"
20   OUTPUT 717;":SYST:BEEP:COMP:STAT?"
30   ENTER 717;A
```

Related commands

:SYST:BEEP:COMP:IMM on page 456
:SYST:BEEP:WARN:STAT on page 457

Equivalent key

[System] - **Misc Setup** - **Beeper** - **Beep Complete**

:SYST:BEEP:WARN:IMM

Syntax

:SYSTem:BEEPer:WARNing:IMMediate

Description

Generates a beep for the notification of warning/limit test result. (No query)

Example of use

```
10   OUTPUT 717;":SYST:BEEP:WARN:IMM"
```

Related commands

:SYST:BEEP:WARN:STAT on page 457

:SYST:BEEP:COMP:IMM on page 456

Equivalent key

[System] - **Misc Setup** - **Beeper** - **Test Beep Warning**

:SYST:BEEP:WARN:STAT

Syntax

:SYSTem:BEEPer:WARNing:STATe {ON|OFF|1|0}

:SYSTem:BEEPer:WARNing:STATe?

Description

Turns ON/OFF the beeper for the notification of warning/limit test result.

Parameters

	Description
ON or 1 (preset value)	Turns ON the beeper.
OFF or 0	Turns OFF the beeper.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SYST:BEEP:WARN:STAT OFF"
20   OUTPUT 717;":SYST:BEEP:WARN:STAT?"
30   ENTER 717;A
```

Related commands

:SYST:BEEP:WARN:IMM on page 457

:SYST:BEEP:COMP:STAT on page 456

Equivalent key

[System] - **Misc Setup** - **Beeper** - **Beep Warning**

:SYST:CORR

Syntax

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

:SYSTem:CORRection[:STATe]?

Description

Turns ON/OFF the system error correction. Chaning this state clears the calibration coefficients.

Parameters

	Description
ON or 1 (preset value)	Turns ON the system error correction.
OFF or 0	Turns OFF the system error correction.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SYST:CORR OFF"
20   OUTPUT 717;":SYST:CORR?"
30   ENTER 717;A
```

Equivalent key

[System] - Service Menu - System Correction

:SYST:DATE

Syntax

:SYSTem:DATE <numeric 1>,<numeric 2>,<numeric 3>

:SYSTem:DATE?

Description

Sets the date of the clock built in the E5070A/E5071A.

Parameters

	<numeric 1>	<numeric 2>	<numeric 3>
Description	Year	Month	Day
Range	1980 to 2099	1 to 12	1 to 31
Resolution	1	1	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric 1},{numeric 2},{numeric 3}<newline><^END>

Example of use

```
10   OUTPUT 717;":SYST:DATE 2002,1,1"
20   OUTPUT 717;":SYST:DATE?"
30   ENTER 717;A,B,C
```

Related commands

:SYST:TIME on page 464

:DISP:CLOC on page 324

Equivalent key

[System] - Misc Setup - Clock Setup - Set Date and Time

:SYST:ERR?

Syntax

:SYSTem:ERRor?

Description

Reads out the oldest error of the errors stored in the error queue of the E5070A/E5071A. The read-out error is deleted from the error queue. The size of the error queue is 100.

Executing the *CLS command clears the errors stored in the error queue. (Query only)

NOTE

This command can not return an error that occurs by the manual operation or the COM object used in controlling the E5070A/E5071A from the VBA Macro.

Query response

{numeric},{string}<newline><^END>

{numeric}: Error number

{string}: Error message (a character string with double quotation marks ("))

If no error is stored in the error queue, 0 and "No error" are read out as the error number and the error message.

Example of use

```
10   OUTPUT 717;":SYST:ERR?"
20   ENTER 717;A,B$
```

Related commands

*CLS on page 210

Equivalent key

No equivalent key is available on the front panel.

14. SCPI Command Reference

:SYST:KLOC:KBD

Syntax

:SYSTem:KLOCk:KBD {ON|OFF|1|0}

:SYSTem:KLOCk:KBD?

Description

Sets whether to lock the operation of the front panel (key and rotary knob) and keyboard.

Parameters

	Description
ON or 1	Specifies lock.
OFF or 0 (preset value)	Specifies unlock.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SYST:KLOC:KBD ON"
20   OUTPUT 717;":SYST:KLOC:KBD?"
30   ENTER 717;A
```

Related commands

:SYST:KLOC:MOUS on page 461

Equivalent key

[System] - **Misc Setup** - **Key Lock** - **Front Panel & Keyboard Lock**

:SYST:KLOC:MOUS

Syntax

:SYSTem:KLOCk:MOUSe {ON|OFF|1|0}

:SYSTem:KLOCk:MOUSe?

Description

Sets whether to lock the operation of the mouse and touch screen.

Parameters

	Description
ON or 1	Specifies lock.
OFF or 0 (preset value)	Specifies unlock.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SYST:KLOC:MOUS ON"
20   OUTPUT 717;":SYST:KLOC:MOUS?"
30   ENTER 717;A
```

Related commands

:SYST:KLOC:KBD on page 460

Equivalent key

[System] - **Misc Setup** - **Key Lock** - **Mouse Lock**

:SYST:POFF

Syntax :SYSTem:POFF

Description Turns OFF the E5070A/E5071A. (No query)

Example of use
```
10   OUTPUT 717;":SYST:POFF"
```

Equivalent key Standby switch

:SYST:PRES

Syntax :SYSTem:PRESet

Description Performs preset.

There is the following difference from the setting state preset with the *RST command. (No query)

- The continuous initiation mode of channel 1 is set to ON.

Example of use
```
10   OUTPUT 717;":SYST:PRES"
```

Related commands *RST on page 213

Equivalent key **[Preset]** - **OK**

:SYST:SERV?

Syntax :SYSTem:SERVice?

Description Reads out whether to be in the service mode. (Query only)

Query response {1|0}<newline><^END>

	Description
1	In the service mode.
0	Not in the service mode.

Example of use
```
10   OUTPUT 717;":SYST:SERV?"
30   ENTER 717;A
```

Equivalent key Displayed on the instrument status bar (at the bottom of the LCD display).

:SYST:TEMP

Syntax

:SYSTem:TEMPerature[:STATe]?

Description

Reads out whether warm-up to satisfy the specifications of the E5070A/E5071A is enough. (Query only)

Query response

{1|0}<newline><^END>

	Description
1	Enough warm-up.
0	Not enough warm-up.

Example of use

```
10   OUTPUT 717;":SYST:TEMP?"
30   ENTER 717;A
```

Equivalent key

Displayed on the instrument status bar (at the bottom of the LCD display).

:SYST:TEMP:HIGH

Syntax

:SYSTem:TEMPerature:HIGH {ON|OFF|1|0}

:SYSTem:TEMPerature:HIGH?

Description

Turns ON/OFF the high temperature measurement mode.

Parameters

	Description
ON or 1	Turns ON the high temperature measurement mode.
OFF or 0 (preset value)	Turns OFF the high temperature measurement mode.

Query response

{1|0}<newline><^END>

Example of use

```
10   OUTPUT 717;":SYST:TEMP:HIGH ON"
20   OUTPUT 717;":SYST:TEMP:HIGH?"
30   ENTER 717;A
```

Equivalent key

[System] - Service Menu - High Temperature

:SYST:TIME

Syntax

:SYSTem:TIME <numeric 1>,<numeric 2>,<numeric 3>

:SYSTem:TIME?

Description

Sets the time of the clock built in the E5070A/E5071A.

Parameters

	<numeric 1>	<numeric 2>	<numeric 3>
Description	Hour (24-hour basis)	Minute	Second
Range	0 to 23	0 to 59	0 to 59
Resolution	1	1	1

If the specified parameter is out of the allowable setup range, the minimum value (if the lower limit of the range is not reached) or the maximum value (if the upper limit of the range is exceeded) is set.

Query response

{numeric 1},{numeric 2},{numeric 3}<newline><^END>

Example of use

```
10   OUTPUT 717;":SYST:TIME 17,30,0"
20   OUTPUT 717;":SYST:TIME?"
30   ENTER 717;A,B,C
```

Related commands

:SYST:DATE on page 458

:DISP:CLOC on page 324

Equivalent key

[System] - **Misc Setup** - **Clock Setup** - **Set Date and Time**

:TRIG

Syntax
:TRIGger[:SEQuence][:IMMediate]

Description
Regardless of the setting of the trigger mode, generates a trigger immediately and executes a measurement.

There is the following difference from the trigger with the :TRIG:SING command.

- The execution of the command finishes at the time of a trigger.

If you execute this command when the trigger system is not in the trigger wait state (trigger event detection state), an error occurs and the command is ignored.

For details about the trigger system, refer to "Trigger system" on page 74. (No query)

Example of use
```
10   OUTPUT 717;":TRIG"
```

Related commands
:TRIG:SING on page 465

Equivalent key
No equivalent key is available on the front panel.

:TRIG:SING

Syntax
:TRIGger[:SEQuence]:SINGle

Description
Regardless of the setting of the trigger mode, generates a trigger immediately and executes a measurement.

There is the following difference from the trigger with the :TRIG command.

- The execution of the command finishes when the measurement (all sweeps) initiated with this command finishes. In other words, you can wait for the end of the measurement using the *OPC? command.

If you execute this command when the trigger system is not in the trigger wait state (trigger event detection state), an error occurs and the command is ignored.

For details about the trigger system, refer to "Trigger system" on page 74. (No query)

Example of use
```
10   OUTPUT 717;":TRIG:SING"
20   OUTPUT 717;"*OPC?"
30   ENTER 717;A
```

Related commands
:TRIG on page 465

*OPC? on page 212

Equivalent key
No equivalent key is available on the front panel.

:TRIG:SOUR

Syntax

:TRIGger[:SEQuence]:SOURce {INTernal|EXTernal|MANual|BUS}

:TRIGger[:SEQuence]:SOURce?

Description

Selects the trigger source from the following 4 types.

Internal	Uses the internal trigger to generate continuous triggers automatically.
External	Generates a trigger when the trigger signal is inputted externally via the Ext Trig connector or the handler interface.
Manual	Generates a trigger when the key operation of **[Trigger]** - **Trigger** is executed from the front panel.
Bus	Generates a trigger when the *TRG command is executed.

When you change the trigger source during sweep, the sweep is canceled.

Parameters

	Description
INTernal (preset value)	Specifies internal.
EXTernal	Specifies external.
MANual	Specifies manual.
BUS	Specifies bus.

Query response

{BUS|EXT|INT|MAN}<newline><^END>

Example of use

```
10   OUTPUT 717;":TRIG:SOUR BUS"
20   OUTPUT 717;":TRIG:SOUR?"
30   ENTER 717;A$
```

Related commands

*TRG on page 215

Equivalent key

[Trigger] - **Trigger Source** - **Internal**|**External**|**Manual**|**Bus**

Command list

List by function

Table 14-1 shows the SCPI command list by function.

Table 14-1 SCPI command list by function

Function	Setting/execution item			Command
Measurement conditions	Preset			*RST on page 213 :SYST:PRES on page 462
	Selecting the active channel			:DISP:WIND{1-9}:ACT on page 337
	Selecting the active trace			:CALC{1-9}:PAR{1-9}:SEL on page 302
	Number of traces			:CALC{1-9}:PAR:COUN on page 300
	Measurement parameter			:CALC{1-9}:PAR{1-9}:DEF on page 301
	Data format			:CALC{1-9}:FORM on page 232
	Power level			:SOUR{1-9}:POW on page 438
	Sweep	Range	Start value	:SENS{1-9}:FREQ:STAR on page 423
			Stop value	:SENS{1-9}:FREQ:STOP on page 424
			Center value	:SENS{1-9}:FREQ:CENT on page 420
			Span value	:SENS{1-9}:FREQ:SPAN on page 422
		Number of measurement points		:SENS{1-9}:SWE:POIN on page 435
		Time	ON/OFF of the auto setting	:SENS{1-9}:SWE:TIME:AUTO on page 437
			Setting	:SENS{1-9}:SWE:TIME on page 436
		Delay time		:SENS{1-9}:SWE:DEL on page 434
		Type		:SENS{1-9}:SWE:TYPE on page 437
		Sweep mode		:SENS{1-9}:SWE:GEN on page 435
	Segment Sweep	Table creation		:SENS{1-9}:SEGM:DATA on page 431
		Reading out the total number of measurement points		:SENS{1-9}:SEGM:SWE:POIN? on page 433
		Reading out the total sweep time		:SENS{1-9}:SEGM:SWE:TIME? on page 433
		Horizontal axis display method (frequency based/order based)		:DISP:WIND{1-9}:X:SPAC on page 346
	IF bandwidth			:SENS{1-9}:BAND on page 379 :SENS{1-9}:BWID on page 380
	Averaging	ON/OFF		:SENS{1-9}:AVER on page 377
		Factor		:SENS{1-9}:AVER:COUN on page 378
		Clearing the count		:SENS{1-9}:AVER:CLE on page 377
	Smoothing	ON/OFF		:CALC{1-9}:SMO on page 302
		Smoothing aperture		:CALC{1-9}:SMO:APER on page 303

Table 14-1 SCPI command list by function

Function	Setting/execution item		Command
Screen display	Window layout		:DISP:SPL on page 334
	Selecting the active channel		:DISP:WIND{1-9}:ACT on page 337
	Maximizing the active channel window		:DISP:MAX on page 333
	Number of traces		:CALC{1-9}:PAR:COUN on page 300
	Measurement parameter		:CALC{1-9}:PAR{1-9}:DEF on page 301
	Data format		:CALC{1-9}:FORM on page 232
	Graph layout		:DISP:WIND{1-9}:SPL on page 339
	Selecting the active trace		:CALC{1-9}:PAR{1-9}:SEL on page 302
	Active trace maximization		:DISP:WIND{1-9}:MAX on page 338
	ON/OFF of the backlight		:SYST:BACK on page 455
	ON/OFF of the display update		:DISP:ENAB on page 331
	Executing the display update		:DISP:UPD on page 336
	Clearing the error message display		:DISP:CCL on page 323
	Data trace	ON/OFF of the display	:DISP:WIND{1-9}:TRAC{1-9}:STAT on page 342
		Data math	:CALC{1-9}:MATH:FUNC on page 297
	Memory trace	ON/OFF of the display	:DISP:WIND{1-9}:TRAC{1-9}:MEM on page 341
		Copying the measurement data	:CALC{1-9}:MATH:MEM on page 297
	ON/OFF of the graticule label display		:DISP:WIND{1-9}:LAB on page 337
	ON/OFF of the clock display		:DISP:CLOC on page 324
	ON/OFF of the frequency display		:DISP:ANN:FREQ on page 323
	ON/OFF of the softkey label display		:DISP:SKEY on page 333
	Title display	ON/OFF	:DISP:WIND{1-9}:TITL on page 340
		Title label setting	:DISP:WIND{1-9}:TITL:DATA on page 341
	Table display	ON/OFF	:DISP:TABL on page 335
		Selection	:DISP:TABL:TYPE on page 336
	Echo window	Data output	:DISP:ECHO on page 330
		Clearing the displayed data	:DISP:ECHO:CLE on page 330
	Display type (normal/inverse)		:DISP:IMAG on page 332
	Display color	Data trace	:DISP:COL{1-2}:TRAC{1-9}:DATA on page 328
		Memory trace	:DISP:COL{1-2}:TRAC{1-9}:MEM on page 329
		Graph	:DISP:COL{1-2}:GRAT{1-2} on page 326
		Limit test	:DISP:COL{1-2}:LIM{1-2} on page 327
		Background	:DISP:COL{1-2}:BACK on page 325
		Resetting color settings	:DISP:COL{1-2}:RES on page 327
	Horizontal axis display method for segment sweep (frequency based/order based)		:DISP:WIND{1-9}:X:SPAC on page 346
	Electrical delay time		:CALC{1-9}:CORR:EDEL:TIME on page 219
	Velocity factor		:SENS{1-9}:CORR:RVEL:COAX on page 417

Table 14-1 SCPI command list by function

Function	Setting/execution item			Command
Screen display (Continued)	Phase offset			:CALC{1-9}:CORR:OFFS:PHAS on page 220
	Scale	Auto scale execution		:DISP:WIND{1-9}:TRAC{1-9}:Y:AUTO on page 342
		Divisions		:DISP:WIND{1-9}:Y:DIV on page 347
		Scale per division		:DISP:WIND{1-9}:TRAC{1-9}:Y:PDIV on page 343
		Specifying the reference graticule line		:DISP:WIND{1-9}:TRAC{1-9}:Y:RPOS on page 345
		Value of the reference graticule line		:DISP:WIND{1-9}:TRAC{1-9}:Y:RLEV on page 344
		Full scale value (when the data format is the Smith chart format or the polar format)		:DISP:WIND{1-9}:TRAC{1-9}:Y:PDIV on page 343
Calibration	ON/OFF			:SENS{1-9}:CORR:STAT on page 418
	Selecting the calibration kit			:SENS{1-9}:CORR:COLL:CKIT on page 381
	Selecting the calibration type	Response calibration (open)		:SENS{1-9}:CORR:COLL:METH:OPEN on page 407
		Response calibration (short)		:SENS{1-9}:CORR:COLL:METH:SHOR on page 407
		Response calibration (thru)		:SENS{1-9}:CORR:COLL:METH:THRU on page 410
		Full 1-port calibration		:SENS{1-9}:CORR:COLL:METH:SOLT1 on page 408
		Full 2-port calibration		:SENS{1-9}:CORR:COLL:METH:SOLT2 on page 408
		Full 3-port calibration		:SENS{1-9}:CORR:COLL:METH:SOLT3 on page 409
		Full 4-port calibration		:SENS{1-9}:CORR:COLL:METH:SOLT4 on page 409
	Reading out the calibration type			:SENS{1-9}:CORR:COLL:METH:TYPE? on page 411
	Reading out the applied calibration type of each trace			:SENS{1-9}:CORR:TYPE{1-9}? on page 419
	Defining the calibration kit	Reset		:SENS{1-9}:CORR:COLL:CKIT:RES on page 386
		Calibration kit name		:SENS{1-9}:CORR:COLL:CKIT:LAB on page 382
		Defining the standard	Standard type	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:TYPE on page 399
			C0	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C0 on page 388
			C1	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C1 on page 389
			C2	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C2 on page 390
			C3	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C3 on page 391
			L0	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L0 on page 393
			L1	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L1 on page 394
			L2	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L2 on page 395
			L3	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L3 on page 396
			Offset delay	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:DEL on page 392
			Offset Loss	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:LOSS on page 398
			Offset Z0	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:Z0 on page 400
			Arbitrary impedance	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:ARB on page 387

Table 14-1 SCPI command list by function

Function	Setting/execution item			Command
Calibration (Continued)	Defining the calibration kit (Continued)	Setting the class	Open	:SENS{1-9}:CORR:COLL:CKIT:ORD:OPEN on page 384
			Short	:SENS{1-9}:CORR:COLL:CKIT:ORD:SHOR on page 385
			Load	:SENS{1-9}:CORR:COLL:CKIT:ORD:LOAD on page 383
			Thru	:SENS{1-9}:CORR:COLL:CKIT:ORD:THRU on page 386
	Measuring the calibration data	Open standard		:SENS{1-9}:CORR:COLL:OPEN on page 412
		Short standard		:SENS{1-9}:CORR:COLL:SHOR on page 413
		Load standard		:SENS{1-9}:CORR:COLL:LOAD on page 406
		Thru standard		:SENS{1-9}:CORR:COLL:THRU on page 414
		Isolation		:SENS{1-9}:CORR:COLL:ISOL on page 405
	Calculating the calibration coefficients			:SENS{1-9}:CORR:COLL:SAVE on page 412
	ON/OFF of the calibration property display			:SENS{1-9}:CORR:PROP on page 417
	Port extension	ON/OFF		:SENS{1-9}:CORR:EXT on page 415
		Correction value		:SENS{1-9}:CORR:EXT:PORT{1-4} on page 416
	Velocity factor			:SENS{1-9}:CORR:RVEL:COAX on page 417
	ECAL	Executing the full 1-port calibration		:SENS{1-9}:CORR:COLL:ECAL:SOLT1 on page 402
		Executing the full 2-port calibration		:SENS{1-9}:CORR:COLL:ECAL:SOLT2 on page 402
		Executing the full 3-port calibration		:SENS{1-9}:CORR:COLL:ECAL:SOLT3 on page 403
		Executing the full 4-port calibration		:SENS{1-9}:CORR:COLL:ECAL:SOLT4 on page 403
		Executing the response calibration (thru)		:SENS{1-9}:CORR:COLL:ECAL:THRU on page 404
		ON/OFF of the isolation measurement		:SENS{1-9}:CORR:COLL:ECAL:ISOL on page 401
		Checking the connected port		:SENS:CORR:COLL:ECAL:PATH? on page 374
Measurement	Sweep abort			:ABOR on page 216
	Trigger system (Sweep mode)	Single startup (Single)		:INIT{1-9} on page 351
		ON/OFF of the continuous initiation mode (Continuous/Hold)		:INIT{1-9}:CONT on page 352
	Generating a trigger when the trigger source setting is BUS			*TRG on page 215
	Generating a trigger regardless of the trigger source setting	Impossible to wait for the end of the sweep using the *OPC? command		:TRIG on page 465
		Possible to wait for the end of the sweep using the *OPC? command		:TRIG:SING on page 465
	Selecting the trigger source			:TRIG:SOUR on page 466
Reading out/ writing the result	Transfer format	Format		:FORM:DATA on page 349
		Byte order		:FORM:BORD on page 348
	Reading out/writing formatted data array			:CALC{1-9}:DATA:FDAT on page 221
	Reading out/writing formatted memory array			:CALC{1-9}:DATA:FMEM on page 222
	Reading out the correct data array			:CALC{1-9}:DATA:SDAT? on page 223
	Reading out the correct memory array			:CALC{1-9}:DATA:SMEM? on page 224
	Reading out the stimulus (frequency) array			:SENS{1-9}:FREQ:DATA? on page 421

Table 14-1 SCPI command list by function

Function	Setting/execution item			Command
Limit test	ON/OFF of the limit test			:CALC{1-9}:LIM on page 275
	ON/OFF of the limit line display			:CALC{1-9}:LIM:DISP on page 277
	ON/OFF of the “Fail” display			:DISP:FSIG on page 332
	Creating the limit table			:CALC{1-9}:LIM:DATA on page 276
	Reading out the test result	Judgment result for each trace		:CALC{1-9}:LIM:FAIL? on page 278
		Frequency values of all fail measurement points		:CALC{1-9}:LIM:REP? on page 279
		Number of measurement points that failed		:CALC{1-9}:LIM:REP:POIN? on page 279
Marker	Selecting the active marker			:CALC{1-9}:MARK{1-10}:ACT on page 284
	ON/OFF of the marker			:CALC{1-9}:MARK{1-10} on page 283
	ON/OFF of the marker coupling between traces			:CALC{1-9}:MARK:COUP on page 281
	ON/OFF of the discrete mode			:CALC{1-9}:MARK:DISC on page 281
	ON/OFF of the reference marker mode			:CALC{1-9}:MARK:REF on page 282
	Reading out marker value	Response value		:CALC{1-9}:MARK{1-10}:Y? on page 296
		Stimulus value		:CALC{1-9}:MARK{1-10}:X on page 295
	Setting the stimulus value of the marker			
	Marker search	Search execution		:CALC{1-9}:MARK{1-10}:FUNC:EXEC on page 287
		Search type		:CALC{1-9}:MARK{1-10}:FUNC:TYPE on page 293
		Peak definition	Lower limit for the peak excursion value	:CALC{1-9}:MARK{1-10}:FUNC:PEXC on page 288
			Polarity	:CALC{1-9}:MARK{1-10}:FUNC:PPOL on page 289
		Target definition	Target value	:CALC{1-9}:MARK{1-10}:FUNC:TARG on page 290
			Polarity	:CALC{1-9}:MARK{1-10}:FUNC:TTR on page 292
		ON/OFF of the tracking		:CALC{1-9}:MARK{1-10}:FUNC:TRAC on page 291
	Bandwidth search	ON/OFF of the result display		:CALC{1-9}:MARK:BWID on page 280
		Bandwidth definition value		:CALC{1-9}:MARK{1-10}:BWID:THR on page 286
		Reading out the result		:CALC{1-9}:MARK{1-10}:BWID:DATA? on page 285
	Setting the start value/stop value/center value/ reference line value to the value at the marker position			:CALC{1-9}:MARK{1-10}:SET on page 294
	Statistic analysis of trace	ON/OFF of the result display		:CALC{1-9}:MST on page 298
		Reading out the result		:CALC{1-9}:MST:DATA? on page 299
Analysis	Analysis execution			:CALC{1-9}:FUNC:EXEC on page 268
	Analysis type			:CALC{1-9}:FUNC:TYPE on page 274
	Peak definition	Lower limit for the peak excursion value		:CALC{1-9}:FUNC:PEXC on page 269
		Polarity		:CALC{1-9}:FUNC:PPOL on page 271
	Target definition	Target value		:CALC{1-9}:FUNC:TARG on page 272
		Polarity		:CALC{1-9}:FUNC:TTR on page 273
	Reading out the analysis result	Data of result		:CALC{1-9}:FUNC:DATA? on page 265
		Number of data pairs of result		:CALC{1-9}:FUNC:POIN? on page 270

Table 14-1 SCPI command list by function

Function	Setting/execution item			Command
Fixture simulator	ON/OFF of the fixture simulator function			:CALC{1-9}:FSIM:STAT on page 264
	Topology	Balance device type		:CALC{1-9}:FSIM:BAL:DEV on page 235
		Port assignment	Unbalance-balance	:CALC{1-9}:FSIM:BAL:TOP:SBAL on page 250
			Balance-balance	:CALC{1-9}:FSIM:BAL:TOP:BBAL on page 249
			Unbalance-unbalance-balance	:CALC{1-9}:FSIM:BAL:TOP:SSB on page 251
	Balance-unbalance conversion	ON/OFF		:CALC{1-9}:FSIM:BAL:PAR{1-9}:STAT on page 248
		Setting the measurement parameter	Unbalance-balance	:CALC{1-9}:FSIM:BAL:PAR{1-9}:SBAL on page 246
			Balance-balance	:CALC{1-9}:FSIM:BAL:PAR{1-9}:BBAL on page 245
			Unbalance-unbalance-balance	:CALC{1-9}:FSIM:BAL:PAR{1-9}:SSB on page 247
	Matching circuit embedding	ON/OFF		:CALC{1-9}:FSIM:SEND:PMC:STAT on page 261
		Circuit type		:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4} on page 255
		Circuit constant	C	:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:C on page 256
			G	:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:G on page 257
			L	:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:L on page 258
			R	:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:R on page 259
		User file		:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:USER:FIL on page 260
	Port impedance conversion	ON/OFF		:CALC{1-9}:FSIM:SEND:ZCON:STAT on page 263
		Z0		:CALC{1-9}:FSIM:SEND:ZCON:PORT{1-4}:Z0 on page 262
	Network de-embedding	ON/OFF		:CALC{1-9}:FSIM:SEND:DEEM:STAT on page 254
		Type		:CALC{1-9}:FSIM:SEND:DEEM:PORT{1-4} on page 252
		User file		:CALC{1-9}:FSIM:SEND:DEEM:PORT{1-4}:USER:FIL on page 253
	Differential matching circuit embedding	ON/OFF		:CALC{1-9}:FSIM:BAL:DMC:STAT on page 242
		Circuit type		:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2} on page 236
		Circuit constant	C	:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:C on page 237
			G	:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:G on page 238
			L	:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:L on page 239
			R	:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:R on page 240
		User file		:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:USER:FIL on page 241
	Differential port impedance conversion	ON/OFF		:CALC{1-9}:FSIM:BAL:DZC:STAT on page 244
		Z0		:CALC{1-9}:FSIM:BAL:DZC:BPOR{1-2}:Z0 on page 243
	Common port impedance conversion	ON/OFF		:CALC{1-9}:FSIM:BAL:CZC:STAT on page 234
		Z0		:CALC{1-9}:FSIM:BAL:CZC:BPOR{1-2}:Z0 on page 233

Table 14-1 SCPI command list by function

Function	Setting/execution item			Command
Time domain	Transform	ON/OFF		:CALC{1-9}:TRAN:TIME:STAT on page 310
		Transformation type		:CALC{1-9}:TRAN:TIME on page 304
		Stimulus type		:CALC{1-9}:TRAN:TIME:STIM on page 312
		Changing the frequency range to match with the low-pass type		:CALC{1-9}:TRAN:TIME:LPFR on page 308
		Window setup	β	:CALC{1-9}:TRAN:TIME:KBES on page 307
			Impulse width	:CALC{1-9}:TRAN:TIME:IMP:WIDT on page 306
			Rise time of step signal	:CALC{1-9}:TRAN:TIME:STEP:RTIM on page 311
		Display range after time domain transformation	Start value	:CALC{1-9}:TRAN:TIME:STAR on page 309
			Stop value	:CALC{1-9}:TRAN:TIME:STOP on page 313
			Center value	:CALC{1-9}:TRAN:TIME:CENT on page 305
			Span value	:CALC{1-9}:TRAN:TIME:SPAN on page 308
	Gating	ON/OFF		:CALC{1-9}:FILT:TIME:STAT on page 230
		Gate type		:CALC{1-9}:FILT:TIME on page 225
		Gate shape		:CALC{1-9}:FILT:TIME:SHAP on page 227
		Gate range	Start value	:CALC{1-9}:FILT:TIME:STAR on page 229
			Stop value	:CALC{1-9}:FILT:TIME:STOP on page 231
			Center value	:CALC{1-9}:FILT:TIME:CENT on page 226
			Span value	:CALC{1-9}:FILT:TIME:SPAN on page 228
Parameter conversion	ON/OFF			:CALC{1-9}:CONV on page 217
	Selecting the conversion prameter			:CALC{1-9}:CONV:FUNC on page 218
Handler I/O control	Data output of port A			:CONT:HAND:A on page 314
	Data output of port B			:CONT:HAND:B on page 314
	Port C	Input/output of data		:CONT:HAND:C on page 315
		Selecting the input/output direction		:CONT:HAND:C:MODE on page 316
	Port D	Input/output of data		:CONT:HAND:D on page 317
		Selecting the input/output direction		:CONT:HAND:D:MODE on page 318
	Data input/output of port E (port C + port D)			:CONT:HAND:E on page 319
	Data input/output of port F (port A + port B)			:CONT:HAND:F on page 320
	Setting/reading out OUTPUT1/OUTPUT2			:CONT:HAND:OUTP{1-2} on page 321
	ON/OFF of the INDEX signal output			:CONT:HAND:IND:STAT on page 321
	ON/OFF of the READY FOR TRIGGER signal output			:CONT:HAND:RTR:STAT on page 322

Table 14-1 SCPI command list by function

Function	Setting/execution item		Command
Status report system	Clearing the event registers		*CLS on page 210
	Reading out the Status Byte Register		*STB? on page 215
	Setting the Service Request Enable Register		*SRE on page 214
	Standard Event Status Register	Reading out the register	*ESR? on page 211
		Setting the enable register	*ESE on page 211
		Setting the OPC bit	*OPC on page 212
	Operation Status Register	Reset	:STAT:PRES on page 444
		Reading out the condition register	:STAT:OPER:COND? on page 440
		Setting the enable register	:STAT:OPER:ENAB on page 441
		Reading out the event register	:STAT:OPER? on page 440
		Setting the positive transition filter	:STAT:OPER:PTR on page 443
		Setting the negative transition filter	:STAT:OPER:NTR on page 442
	Questionable Status Register	Reset	:STAT:PRES on page 444
		Reading out the condition register	:STAT:QUES:COND? on page 444
		Setting the enable register	:STAT:QUES:ENAB on page 445
		Reading out the event register	:STAT:QUES? on page 444
		Setting the positive transition filter	:STAT:QUES:PTR on page 454
		Setting the negative transition filter	:STAT:QUES:NTR on page 453
	Questionable Limit Status Register	Reset	:STAT:PRES on page 444
		Reading out the condition register	:STAT:QUES:LIM:COND? on page 450
		Setting the enable register	:STAT:QUES:LIM:ENAB on page 450
		Reading out the event register	:STAT:QUES:LIM? on page 446
		Setting the positive transition filter	:STAT:QUES:LIM:PTR on page 452
		Setting the negative transition filter	:STAT:QUES:LIM:NTR on page 451
	Questionable Limit Channel Status Register	Reset	:STAT:PRES on page 444
		Reading out the condition register	:STAT:QUES:LIM:CHAN{1-9}:COND? on page 446
		Setting the enable register	:STAT:QUES:LIM:CHAN{1-9}:ENAB on page 447
		Reading out the event register	:STAT:QUES:LIM:CHAN{1-9}? on page 446
		Setting the positive transition filter	:STAT:QUES:LIM:CHAN{1-9}:PTR on page 449
		Setting the negative transition filter	:STAT:QUES:LIM:CHAN{1-9}:NTR on page 448
Controlling the E5091A	ON/OFF of control		:SENS:MULT{1-2}:STAT on page 376
	ON/OFF of the E5091A property display		:SENS:MULT{1-2}:DISP on page 375
	Reading out number of ports		:SENS:MULT{1-2}:COUN? on page 375
	Assigning a port	Port 1	:SENS{1-9}:MULT{1-2}:TSET9:PORT1 on page 426
		Port 2	:SENS{1-9}:MULT{1-2}:TSET9:PORT2 on page 427
		Port 3	:SENS{1-9}:MULT{1-2}:TSET9:PORT3 on page 428
		Port 4	:SENS{1-9}:MULT{1-2}:TSET9:PORT4 on page 429
	Setting up control lines		:SENS{1-9}:MULT{1-2}:TSET9:OUTP on page 425

Table 14-1 SCPI command list by function

Function	Setting/execution item			Command
Save, Recall, and File handling	Save	Instrument Setting	Entire instrument state (file)	:MMEM:STOR on page 362
			State for each channel (register)	:MMEM:STOR:CHAN on page 363
			Selects contents	:MMEM:STOR:STYP on page 369
		Formatted data array		:MMEM:STOR:FDAT on page 364
		Image on the LCD display		:MMEM:STOR:IMAG on page 365
		Segment sweep table		:MMEM:STOR:SEGM on page 368
		Limit table		:MMEM:STOR:LIM on page 366
		VBA project		:MMEM:STOR:PROG on page 367
	Recall	Instrument Setting	Entire instrument state (file)	:MMEM:LOAD on page 356
			State for each channel (register)	:MMEM:LOAD:CHAN on page 357
		Segment sweep table		:MMEM:LOAD:SEGM on page 360
		Limit table		:MMEM:LOAD:LIM on page 358
		VBA project		:MMEM:LOAD:PROG on page 359
	Clearing registers			:MMEM:STOR:CHAN:CLE on page 363
	Directory (folder) creation			:MMEM:MDIR on page 361
	Copying a file			:MMEM:COPY on page 354
	File transfer between the remote controller and the E5070A/E5071A			:MMEM:TRAN on page 370
	Deleting a directory (folder)			:MMEM:DEL on page 355
	Reading out the file information in a directory			:MMEM:CAT? on page 353
Controlling VBA macro	Reading out the list of executable macro names			:PROG:CAT? on page 371
	Selecting the macro to be controlled			:PROG:NAME on page 372
	Controlling macro			:PROG:STAT on page 373
Printer output	Printer output execution			:HCOP on page 350
	Aborting printer output during execution			:HCOP:ABOR on page 350
	Selecting the print color			:HCOP:IMAG on page 350
Locking Input Devices	Locking the front panel and keyboard			:SYST:KLOC:KBD on page 460
	Locking the mouse and touch screen			:SYST:KLOC:MOUS on page 461
Beeper	For notification of the completion of operation	ON/OFF		:SYST:BEEP:COMP:STAT on page 456
		Beep generation		:SYST:BEEP:COMP:IMM on page 456
	For notification of warning/limit test result	ON/OFF		:SYST:BEEP:WARN:STAT on page 457
		Beep generation		:SYST:BEEP:WARN:IMM on page 457
Built-in clock	Setting the date			:SYST:DATE on page 458
	Setting the time			:SYST:TIME on page 464
	ON/OFF of the clock display			:DISP:CLOC on page 324

Table 14-1 SCPI command list by function

Function	Setting/execution item	Command
Others	Shutdown	:SYST:POFF on page 462
	Reading out the product information	*IDN? on page 212
	Reading out the option information	*OPT? on page 213
	Waiting for the completion of command execution	*WAI on page 215
	Reading out 1 at the completion of command execution	*OPC? on page 212
	Reading out an error that occurred	:SYST:ERR? on page 459
	Checking whether the external reference signal is inputted	:SENS{1-9}:ROSC:SOUR? on page 430
	ON/OFF of the spurious avoid mode	:SENS{1-9}:SWE:ASP on page 434
	ON/OFF of the system error correction	:SYST:CORR on page 458
	Checking whether warm-up to satisfy	:SYST:TEMP on page 463
	ON/OFF of the high temperature mode	:SYST:TEMP:HIGH on page 463
	Checking whether to be in the service mode	:SYST:SERV? on page 462

List by front panel key

Table 14-2 shows the SCPI commands that correspond to the front panel keys (in alphabetical order).

Table 14-2 Front panel key tree vs. SCPI commands correspondence table

Key (operation)				Corresponding GPIB command
[Analysis]	**Conversion**	**Conversion**		:CALC{1-9}:CONV on page 217
		Function		:CALC{1-9}:CONV:FUNC on page 218
	Fixture Simulator	**BalUn**		:CALC{1-9}:FSIM:BAL:PAR{1-9}:STAT on page 248
		Balun OFF All Traces		N/A
		Balun ON All Traces		N/A
		Cmn ZCo-nversion	**Cmn ZConversion**	:CALC{1-9}:FSIM:BAL:CZC:STAT on page 234
			Port n (bal)	:CALC{1-9}:FSIM:BAL:CZC:BPOR{1-2}:Z0 on page 233
		De-Embedding	**De- Embedding**	:CALC{1-9}:FSIM:SEND:DEEM:STAT on page 254
			Select Port	:CALC{1-9}:FSIM:SEND:DEEM:PORT{1-4} on page 252
			Select Type	
			User File	:CALC{1-9}:FSIM:SEND:DEEM:PORT{1-4}:USER:FIL on page 253
		Diff Matching	**C**	:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:C on page 237
			Diff Matching	:CALC{1-9}:FSIM:BAL:DMC:STAT on page 242
			G	:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:G on page 238
			L	:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:L on page 239
			R	:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:PAR:R on page 240
			Select Bal Port	:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2} on page 236
			Select Circuit	
			User File	:CALC{1-9}:FSIM:BAL:DMC:BPOR{1-2}:USER:FIL on page 241
		Diff ZConv-ersion	**Diff ZConversion**	:CALC{1-9}:FSIM:BAL:DZC:STAT on page 244
			Port n (bal)	:CALC{1-9}:FSIM:BAL:DZC:BPOR{1-2}:Z0 on page 243
		Measurement		:CALC{1-9}:PAR{1-9}:DEF on page 301 :CALC{1-9}:FSIM:BAL:PAR{1-9}:SBAL on page 246 :CALC{1-9}:FSIM:BAL:PAR{1-9}:BBAL on page 245 :CALC{1-9}:FSIM:BAL:PAR{1-9}:SSB on page 247
		Fixture Simulator		:CALC{1-9}:FSIM:STAT on page 264
		Port Matching	**C**	:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:C on page 256
			G	:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:G on page 257
			L	:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:L on page 258
			Port Matching	:CALC{1-9}:FSIM:SEND:PMC:STAT on page 261
			R	:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:PAR:R on page 259
			Select Port	:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4} on page 255
			Select Circuit	
			User File	:CALC{1-9}:FSIM:SEND:PMC:PORT{1-4}:USER:FIL on page 260
		Port ZConv-ersion	**Port ZConversion**	:CALC{1-9}:FSIM:SEND:ZCON:STAT on page 263
			Port n Z0	:CALC{1-9}:FSIM:SEND:ZCON:PORT{1-4}:Z0 on page 262

Table 14-2 Front panel key tree vs. SCPI commands correspondence table

Key (operation)				Corresponding GPIB command
[Analysis] (Continued)	**Fixture Simulator** (Continued)	**Topology**	**Device**	:CALC{1-9}:FSIM:BAL:DEV on page 235
			Port n (se) Port n (bal)	:CALC{1-9}:FSIM:BAL:TOP:SSB on page 251:CALC{1-9}:FSIM:BAL:TOP:SBAL on page 250:CALC{1-9}:FSIM:BAL:TOP:BBAL on page 249
	Gating	**Center**		:CALC{1-9}:FILT:TIME:CENT on page 226
		Gating		:CALC{1-9}:FILT:TIME:STAT on page 230
		Shape		:CALC{1-9}:FILT:TIME:SHAP on page 227
		Span		:CALC{1-9}:FILT:TIME:SPAN on page 228
		Start		:CALC{1-9}:FILT:TIME:STAR on page 229
		Stop		:CALC{1-9}:FILT:TIME:STOP on page 231
		Type		:CALC{1-9}:FILT:TIME on page 225
	Limit Test	**Edit Limit Line**	**Add / Delete / Clear Limit Table**	:CALC{1-9}:LIM:DATA on page 276
			Export to CSV File	:MMEM:STOR:LIM on page 366
			Import from CSV File	:MMEM:LOAD:LIM on page 358
		Limit Line		:CALC{1-9}:LIM:DISP on page 277
		Limit Test		:CALC{1-9}:LIM on page 275
	Transform	**Center**		:CALC{1-9}:TRAN:TIME:CENT on page 305
		Set Freq Low Pass		:CALC{1-9}:TRAN:TIME:LPFR on page 308
		Span		:CALC{1-9}:TRAN:TIME:SPAN on page 308
		Start		:CALC{1-9}:TRAN:TIME:STAR on page 309
		Stop		:CALC{1-9}:TRAN:TIME:STOP on page 313
		Transform		:CALC{1-9}:TRAN:TIME:STAT on page 310
		Type		:CALC{1-9}:TRAN:TIME on page 304 :CALC{1-9}:TRAN:TIME:STIM on page 312
		Window	**Impulse Width**	:CALC{1-9}:TRAN:TIME:IMP:WIDT on page 306
			Kaiser Beta	:CALC{1-9}:TRAN:TIME:KBES on page 307
			Maximum	
			Minimum	
			Maximum	
			Step Rise	:CALC{1-9}:TRAN:TIME:STEP:RTIM on page 311
[Avg]	**Averaging**			:SENS{1-9}:AVER on page 377
	Averaging Restart			:SENS{1-9}:AVER:CLE on page 377
	Avg Factor			:SENS{1-9}:AVER:COUN on page 378
	Smo Aperture			:CALC{1-9}:SMO:APER on page 303
	Smoothing			:CALC{1-9}:SMO on page 302
	IF Bandwidth			:SENS{1-9}:BAND on page 379 :SENS{1-9}:BWID on page 380

Table 14-2 Front panel key tree vs. SCPI commands correspondence table

Key (operation)					Corresponding GPIB command
[Cal]	**Cal Kit**				:SENS{1-9}:CORR:COLL:CKIT on page 381
	Calibrate	**1-Port Cal**	**Done**		:SENS{1-9}:CORR:COLL:SAVE on page 412
			Load		:SENS{1-9}:CORR:COLL:LOAD on page 406
			Open		:SENS{1-9}:CORR:COLL:OPEN on page 412
			Select Port		:SENS{1-9}:CORR:COLL:METH:SOLT1 on page 408
			Short		:SENS{1-9}:CORR:COLL:SHOR on page 413
		2-Port Cal **3-Port Cal** **4-Port Cal**	**Done**		:SENS{1-9}:CORR:COLL:SAVE on page 412
			Isolation (Optional)		:SENS{1-9}:CORR:COLL:ISOL on page 405
			Reflection	**Port n Load**	:SENS{1-9}:CORR:COLL:LOAD on page 406
				Port n Open	:SENS{1-9}:CORR:COLL:OPEN on page 412
				Port n Short	:SENS{1-9}:CORR:COLL:SHOR on page 413
			Select Ports	(**2-Port Cal**)	:SENS{1-9}:CORR:COLL:METH:SOLT2 on page 408
				(**3-Port Cal**)	:SENS{1-9}:CORR:COLL:METH:SOLT3 on page 409
				(**4-Port Cal**)	:SENS{1-9}:CORR:COLL:METH:SOLT4 on page 409
			Transmission		:SENS{1-9}:CORR:COLL:THRU on page 414
		Response (Open)	**Done**		:SENS{1-9}:CORR:COLL:SAVE on page 412
			Load (Optional)		:SENS{1-9}:CORR:COLL:LOAD on page 406
			Open		:SENS{1-9}:CORR:COLL:OPEN on page 412
			Select Port		:SENS{1-9}:CORR:COLL:METH:OPEN on page 407
		Response (Short)	**Done**		:SENS{1-9}:CORR:COLL:SAVE on page 412
			Load (Optional)		:SENS{1-9}:CORR:COLL:LOAD on page 406
			Select Port		:SENS{1-9}:CORR:COLL:METH:SHOR on page 407
			Short		:SENS{1-9}:CORR:COLL:SHOR on page 413
		Response (Thru)	**Done**		:SENS{1-9}:CORR:COLL:SAVE on page 412
			Isolation (Optional)		:SENS{1-9}:CORR:COLL:ISOL on page 405
			Select Ports		:SENS{1-9}:CORR:COLL:METH:THRU on page 410
			Thru		:SENS{1-9}:CORR:COLL:THRU on page 414
	Correction				:SENS{1-9}:CORR:STAT on page 418
	ECal	**1Port ECal**			:SENS{1-9}:CORR:COLL:ECAL:SOLT1 on page 402
		2Port ECal			:SENS{1-9}:CORR:COLL:ECAL:SOLT2 on page 402
		3Port ECal			:SENS{1-9}:CORR:COLL:ECAL:SOLT3 on page 403
		4Port ECal			:SENS{1-9}:CORR:COLL:ECAL:SOLT4 on page 403
		Thru ECal			:SENS{1-9}:CORR:COLL:ECAL:THRU on page 404
		Isolation			:SENS{1-9}:CORR:COLL:ECAL:ISOL on page 401

Table 14-2 Front panel key tree vs. SCPI commands correspondence table

Key (operation)					Corresponding GPIB command
[Cal] (Continued)	**Modify Cal Kit**	**Define STDs**	**1. XXXX** to **21. XXXX**	**Arb. Impedance**	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:ARB on page 387
				C0	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C0 on page 388
				C1	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C1 on page 389
				C2	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C2 on page 390
				C3	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C3 on page 391
				L0	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L0 on page 393
				L1	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L1 on page 394
				L2	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L2 on page 395
				L3	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:L3 on page 396
				Label	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:LAB on page 397
				Offset Delay	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:DEL on page 392
				Offset Loss	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:LOSS on page 398
				Offset Z0	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:Z0 on page 400
				STD Type	:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:TYPE on page 399
		Label Kit			:SENS{1-9}:CORR:COLL:CKIT:LAB on page 382
		Specify CLSs	**Load**		:SENS{1-9}:CORR:COLL:CKIT:ORD:LOAD on page 383
			Open		:SENS{1-9}:CORR:COLL:CKIT:ORD:OPEN on page 384
			Short		:SENS{1-9}:CORR:COLL:CKIT:ORD:SHOR on page 385
			Thru		:SENS{1-9}:CORR:COLL:CKIT:ORD:THRU on page 386
	Port Extensions	**Extension Port 1**			:SENS{1-9}:CORR:EXT:PORT{1-4} on page 416
		Extension Port 2			
		Extension Port 3			
		Extension Port 4			
		Extensions			:SENS{1-9}:CORR:EXT on page 415
	Property				:SENS{1-9}:CORR:PROP on page 417
	Velocity Factor				:SENS{1-9}:CORR:RVEL:COAX on page 417
[Center]					:SENS{1-9}:FREQ:CENT on page 420
[Channel Prev]					:DISP:WIND{1-9}:ACT on page 337
[Channel Max]					:DISP:MAX on page 333
[Channel Next]					:DISP:WIND{1-9}:ACT on page 337

Table 14-2 Front panel key tree vs. SCPI commands correspondence table

Key (operation)			Corresponding GPIB command
[Display]	**Allocate Channels**		:DISP:SPL on page 334
	Allocate Traces		:DISP:WIND{1-9}:SPL on page 339
	Data - > Mem		:CALC{1-9}:MATH:MEM on page 297
	Data Math		:CALC{1-9}:MATH:FUNC on page 297
	Display		:DISP:WIND{1-9}:TRAC{1-9}:STAT on page 342:DISP:WIND{1-9}:TRAC{1-9}:MEM on page 341
	Edit Title Label		:DISP:WIND{1-9}:TITL:DATA on page 341
	Frequency		:DISP:ANN:FREQ on page 323
	Graticule Label		:DISP:WIND{1-9}:LAB on page 337
	Invert Color		:DISP:IMAG on page 332
	Num of Traces		:CALC{1-9}:PAR:COUN on page 300
	Title Label		:DISP:WIND{1-9}:TITL on page 340
	Update		:DISP:ENAB on page 331
[Format]			:CALC{1-9}:FORM on page 232
[Macro Break]			:PROG:STAT on page 373
[Macro Run]			N/A
[Macro Setup]	**Clear Echo**		:DISP:ECHO:CLE on page 330
	Close Editor		N/A
	Continue		N/A
	Echo Window		:DISP:TABL on page 335 :DISP:TABL:TYPE on page 336
	Load Project		:MMEM:LOAD:PROG on page 359
	New Project		N/A
	Preset User Menu		N/A
	Save Project		:MMEM:STOR:PROG on page 367
	Select Macro		:PROG:NAME on page 372 :PROG:STAT on page 373
	Stop		:PROG:STAT on page 373
	User Menu		N/A
	VBA Editor		N/A
[Marker]	**Clear Marker Menu**		:CALC{1-9}:MARK{1-10} on page 283
	Marker 1 to **Marker 4**		:CALC{1-9}:MARK{1-10} on page 283 :CALC{1-9}:MARK{1-10}:ACT on page 284 :CALC{1-9}:MARK{1-10}:X on page 295
	Marker - > Ref Marker		N/A
	More Markers	**Marker 5** to **Marker 9**	:CALC{1-9}:MARK{1-10} on page 283 :CALC{1-9}:MARK{1-10}:ACT on page 284 :CALC{1-9}:MARK{1-10}:X on page 295
	Ref Marker		:CALC{1-9}:MARK{1-10} on page 283 :CALC{1-9}:MARK{1-10}:ACT on page 284 :CALC{1-9}:MARK{1-10}:X on page 295 :CALC{1-9}:MARK:REF on page 282
	Ref Marker Mode		:CALC{1-9}:MARK:REF on page 282

Table 14-2 Front panel key tree vs. SCPI commands correspondence table

Key (operation)			Corresponding GPIB command
[Marker Func]	Couple		:CALC{1-9}:MARK:COUP on page 281
	Discrete		:CALC{1-9}:MARK:DISC on page 281
	Marker Table		:DISP:TABL on page 335 :DISP:TABL:TYPE on page 336
	Marker - > Center		:CALC{1-9}:MARK{1-10}:SET on page 294
	Marker - > Reference		
	Marker - > Start		
	Marker - > Stop		
	Statistics		:CALC{1-9}:MST on page 298 :CALC{1-9}:MST:DATA? on page 299
[Marker Search]	Bandwidth		:CALC{1-9}:MARK:BWID on page 280 :CALC{1-9}:MARK{1-10}:BWID:DATA? on page 285
	Bandwidth Value		:CALC{1-9}:MARK{1-10}:BWID:THR on page 286
	Max		:CALC{1-9}:MARK{1-10}:FUNC:TYPE on page 293 :CALC{1-9}:MARK{1-10}:FUNC:EXEC on page 287
	Min		
	Peak	Peak Excursion	:CALC{1-9}:MARK{1-10}:FUNC:PEXC on page 288
		Peak Polarity	:CALC{1-9}:MARK{1-10}:FUNC:PPOL on page 289
		Search Left	:CALC{1-9}:MARK{1-10}:FUNC:TYPE on page 293 :CALC{1-9}:MARK{1-10}:FUNC:EXEC on page 287
		Search Peak	
		Search Right	
	Target	Search Left	:CALC{1-9}:MARK{1-10}:FUNC:TYPE on page 293 :CALC{1-9}:MARK{1-10}:FUNC:EXEC on page 287
		Search Right	
		Search Target	
		Target Transition	:CALC{1-9}:MARK{1-10}:FUNC:TTR on page 292
		Target Value	:CALC{1-9}:MARK{1-10}:FUNC:TARG on page 290
	Tracking		:CALC{1-9}:MARK{1-10}:FUNC:TRAC on page 291
[Meas]			:CALC{1-9}:PAR{1-9}:DEF on page 301 :CALC{1-9}:FSIM:BAL:PAR{1-9}:SBAL on page 246 :CALC{1-9}:FSIM:BAL:PAR{1-9}:BBAL on page 245 :CALC{1-9}:FSIM:BAL:PAR{1-9}:SSB on page 247
[Preset]	OK		:SYST:PRES on page 462
[Save/ Recall]	Recall Channel		:MMEM:LOAD:CHAN on page 357
	Recall State		:MMEM:LOAD on page 356
	Save Channel	Clear States	:MMEM:STOR:CHAN:CLE on page 363
		State A - State D	:MMEM:STOR:CHAN on page 363
	Save State		:MMEM:STOR on page 362
	Save Trace Data		:MMEM:STOR:FDAT on page 364
	Save Type		:MMEM:STOR:STYP on page 369

Table 14-2 Front panel key tree vs. SCPI commands correspondence table

Key (operation)			Corresponding GPIB command
[Scale]	**Auto Scale**		:DISP:WIND{1-9}:TRAC{1-9}:Y:AUTO on page 342
	Auto Scale All		N/A
	Divisions		:DISP:WIND{1-9}:Y:DIV on page 347
	Electrical Delay		:CALC{1-9}:CORR:EDEL:TIME on page 219
	Marker - > Reference		:CALC{1-9}:MARK{1-10}:SET on page 294
	Phase Offset		:CALC{1-9}:CORR:OFFS:PHAS on page 220
	Reference Position		:DISP:WIND{1-9}:TRAC{1-9}:Y:RPOS on page 345
	Reference Value		:DISP:WIND{1-9}:TRAC{1-9}:Y:RLEV on page 344
	Scale/Div		:DISP:WIND{1-9}:TRAC{1-9}:Y:PDIV on page 343
[Softkey On/Off]			:DISP:SKEY on page 333
[Span]			:SENS{1-9}:FREQ:SPAN on page 422
[Start]			:SENS{1-9}:FREQ:STAR on page 423
[Stop]			:SENS{1-9}:FREQ:STOP on page 424
[Sweep Setup]	**Edit Segment Table**		:SENS{1-9}:SEGM:DATA on page 431
	Edit Segment Table	**Export to CSV File**	:MMEM:STOR:SEGM on page 368
		Import from CSV File	:MMEM:LOAD:SEGM on page 360
	Points		:SENS{1-9}:SWE:POIN on page 435
	Power		:SOUR{1-9}:POW on page 438
	Power Ranges		:SOUR{1-9}:POW:ATT on page 439
	Segment Display		:DISP:WIND{1-9}:X:SPAC on page 346
	Sweep Delay		:SENS{1-9}:SWE:DEL on page 434
	Sweep Mode		:SENS{1-9}:SWE:GEN on page 435
	Sweep Time		:SENS{1-9}:SWE:TIME on page 436 :SENS{1-9}:SWE:TIME:AUTO on page 437
	Sweep Type		:SENS{1-9}:SWE:TYPE on page 437
[System]	**Abort Printing**		:HCOP:ABOR on page 350
	Backlight		:SYST:BACK on page 455
	Dump Screen Image		:MMEM:STOR:IMAG on page 365
	E5091A Setup	**Control Lines**	:SENS{1-9}:MULT{1-2}:TSET9:OUTP on page 425
		E5091A Setup	:SENS:MULT{1-2}:STAT on page 376
		E5091A Property	:SENS:MULT{1-2}:DISP on page 375
		Port 1	:SENS{1-9}:MULT{1-2}:TSET9:PORT1 on page 426
		Port 2	:SENS{1-9}:MULT{1-2}:TSET9:PORT2 on page 427
		Port 3	:SENS{1-9}:MULT{1-2}:TSET9:PORT3 on page 428
		Port 4	:SENS{1-9}:MULT{1-2}:TSET9:PORT4 on page 429
		Select ID	N/A
	Firmware Revision		*IDN? on page 212
	Invert Image		:HCOP:IMAG on page 350

Table 14-2 Front panel key tree vs. SCPI commands correspondence table

Key (operation)				Corresponding GPIB command
[System] (Continued)	**Misc Setup**	**Beeper**	**Beep Complete**	:SYST:BEEP:COMP:STAT on page 456
			Beep Warning	:SYST:BEEP:WARN:STAT on page 457
			Test Beep Complete	:SYST:BEEP:COMP:IMM on page 456
			Test Beep Warning	:SYST:BEEP:WARN:IMM on page 457
		Clock Setup	**Set Date and Time**	:SYST:DATE on page 458 :SYST:TIME on page 464
			Show Clock	:DISP:CLOC on page 324
		GPIB Setup		N/A
		Key Lock	**Front Panel & Keyboard Lock**	:SYST:KLOC:KBD on page 460
			Touch Screen & Mouse Lock	:SYST:KLOC:MOUS on page 461
		Network Setup		N/A
	Print			:HCOP on page 350
	Printer Setup			N/A
	Service Menu	**Avoid Spurious**		:SENS{1-9}:SWE:ASP on page 434
		High Temperature		:SYST:TEMP:HIGH on page 463
		System Correction		:SYST:CORR on page 458
[Trace Prev]				:CALC{1-9}:PAR{1-9}:SEL on page 302
[Trace Max]				:DISP:WIND{1-9}:MAX on page 338
[Trace Next]				:CALC{1-9}:PAR{1-9}:SEL on page 302
[Trigger]	**Continuous**			:INIT{1-9}:CONT on page 352
	Continuous Disp Channels			N/A
	Hold			:ABOR on page 216 :INIT{1-9}:CONT on page 352
	Hold All Channels			N/A
	Restart			:ABOR on page 216
	Single			:ABOR on page 216 :INIT{1-9}:CONT on page 352 :INIT{1-9} on page 351
	Trigger Source			:TRIG:SOUR on page 466
	Trigger			:TRIG on page 465

Command tree

Table 14-3 shows the SCPI command tree of the E5070A/E5071A.

Table 14-3 E5070A/E5071A SCPI command tree

Command	Parameters	Note
ABORt		[No query]
CALCulate{[1]|2|3|4|5|6|7|8|9}		
:FSIMulator		
:BALun		
:CZConversion		
:BPORt{[1]|2}		
:Z0		
[:R]	<numeric>	
:STATe	{ON|OFF|1|0}	
:DEVice	{SBALanced|BBALanced|SSBalanced}	
:DMCircuit		
:BPORt{[1]|2}		
:PARameters		
:C	<numeric>	
:G	<numeric>	
:L	<numeric>	
:R	<numeric>	
[:TYPE]	{NONE|PLPC|USER}	
:USER		
:FILename	<string>	
:STATe	{ON|OFF|1|0}	
:DZConversion		
:BPORt{[1]|2}		
:Z0		
[:R]	<numeric>	
:STATe	{ON|OFF|1|0}	
:PARameter{[1]|2|3|4|5|6|7|8|9}		
:BBALanced		
[:DEFine]	{SCC11|SCC21|SCC12|SCC22|SDC11|SDC21|SDC12|SDC22|SCD11|SCD21|SCD12|SCD22|SDD11|SDD21|SDD12|SDD22|IMB1|IMB2|CMRR}	
:SBALanced		
[:DEFine]	{SSS11|SCS21|SSC12|SDS21|SSD12|SCC22|SDC22|SCD22|SDD22|IMB|CMRR}	
:SSBalanced		
[:DEFine]	{SSS11|SSS21|SSS12|SSS22|SCS31|SCS32|SSC13|SSC23|SDS31|SDS32|SSD13|SSD23|SCC33|SDC33|SCD33|SDD33|IMB1|IMB2|CMRR1|CMRR2}	
:STATe	{ON|OFF|1|0}	
:TOPology		
:BBALanced		
[:PPORts]	<numeric>,<numeric>,<numeric>,<numeric>	
:SBALanced		
[:PPORts]	<numeric>,<numeric>,<numeric>	
:SSBalanced		
[:PPORts]	<numeric>,<numeric>,<numeric>,<numeric>	

Table 14-3 E5070A/E5071A SCPI command tree

Command	Parameters	Note
CALCulate{[1]|2|3|4|5|6|7|8|9}		
:FSIMulator		
:SENDed		
:DEEMbed		
:PORT{[1]|2|3|4}		
[:TYPE]	{NONE|USER}	
:USER		
:FILename	<string>	
:STATe	{ON|OFF|1|0}	
:PMCircuit		
:PORT{[1]|2|3|4}		
:PARameters		
:C	<numeric>	
:G	<numeric>	
:L	<numeric>	
:R	<numeric>	
[:TYPE]	{NONE|SLPC|PCSL|PLSC|SCPL|PLPC|USER}	
:USER		
:FILename	<string>	
:STATe	{ON|OFF|1|0}	
:ZCONversion		
:PORT{[1]|2|3|4}		
:Z0		
[:R]	<numeric>	
:STATe	{ON|OFF|1|0}	
:STATe	{ON|OFF|1|0}	
:PARameter		
:COUNt	<numeric>	
:PARameter{[1]|2|3|4|5|6|7|8|9}		
:DEFine	{S11|S21|S31|S41|S12|S22|S32|S42|S13|S23|S33|S43|S14|S24|S34|S44}	
:SELect		[No query]
[:SELected]		
:CORRection		
:EDELay		
:TIME	<numeric>	
:OFFSet		
:PHASe	<numeric>	

Table 14-3 E5070A/E5071A SCPI command tree

Command	Parameters	Note
CALCulate{[1]|2|3|4|5|6|7|8|9}		
[:SELected]		
:DATA		
:FDATa	<numeric>,…,<numeric> (number of measurement points × 2 parameters)	
:FMEMory	<numeric>,…,<numeric> (number of measurement points × 2 parameters)	
:SDATa?		[Query only]
:SMEMory?		[Query only]
:FILTer		
[:GATE]		
:TIME		
:CENTer	<numeric>	
:SHAPe	{MAXimum|WIDE|NORMal|MINimum}	
:SPAN	<numeric>	
:STARt	<numeric>	
:STOP	<numeric>	
[:TYPE]	{BPASs|NOTCh}	
:FORMat	{MLOGarithmic|PHASe|GDELay|SLINear|SLOGarithmic|SCOMplex|SMITh|SADMittance|PLINear|PLOGarithmic|POLar|MLINear|SWR|REAL|IMAGinary|UPHase|PPHase}	
:FUNCtion		
:DOMain		
:STARt	<numeric>	
[:STATe]	{ON|OFF|1|0}	
:STOP	<numeric>	
:EXECute		[No query]
:PEXCursion	<numeric>	
:POINts?		[Query only]
:PPOLarity	{POSitive|NEGative|BOTH}	
:TARGet	<numeric>	
:TTRansition	{POSitive|NEGative|BOTH}	
:TYPE	{PTPeak|STDEV|MEAN|MAXimum|MINimum|PEAK|APEak|ATARget}	
:LIMit		
:DATA	<numeric>,…,<numeric> (1 + number of lines × 5 parameters)	
:DISPlay		
[:STATe]	{ON|OFF|1|0}	
:FAIL?		[Query only]
:REPort?		[Query only]
:POINts?		[Query only]
[:STATe]	{ON|OFF|1|0}	

Table 14-3 E5070A/E5071A SCPI command tree

Command	Parameters	Note
CALCulate{[1]|2|3|4|5|6|7|8|9}		
[:SELected]		
:MARKer		
:BWIDth		
[:STATe]	{ON|OFF|1|0}	
:COUPle	{ON|OFF|1|0}	
:DISCrete	{ON|OFF|1|0}	
:REFerence		
[:STATe]	{ON|OFF|1|0}	
:MARKer{[1]|2|3|4|5|6|7|8|9|10}		
:ACTivate		[No query]
:BWIDth		
:DATA?		[Query only]
:THReshhold	<numeric>	
:FUNCtion		
:EXECute		[No query]
:PEXCursion	<numeric>	
:PPOLarity	{POSitive|NEGative|BOTH}	
:TARGet	<numeric>	
:TRACking	{ON|OFF|1|0}	
:TTRansition	{POSitive|NEGative|BOTH}	
:TYPE	{MAXimum|MINimum|PEAK|LPEak|RPEak|TARGet|LTARget|RTARget}	
:SET	{STARt|STOP|CENTer|RLEVel}	[No query]
[:STATe]	{ON|OFF|1|0}	
:X	<numeric>	
:Y?		[Query only]
:MATH		
:FUNCtion	{NORMal|SUBTract|DIVide|ADD|MULTiply}	
:MEMorize		[No query]
:MSTatistics		
:DATA?		[Query only]
[:STATe]	{ON|OFF|1|0}	
:SMOothing		
:APERture	<numeric>	
[:STATe]	{ON|OFF|1|0}	

Table 14-3 E5070A/E5071A SCPI command tree

Command	Parameters	Note
CALCulate{[1]|2|3|4|5|6|7|8|9}		
[:SELected]		
:FILTer		
:TIME		
:CENTer	<numeric>	
:IMPulse		
:WIDTh	<numeric>	
:KBESsel	<numeric>	
:LPFRequency		[No query]
:SPAN	<numeric>	
:STARt	<numeric>	
:STEP		
:RTIMe	<numeric>	
:STIMulus	{IMPulse|STEP}	
:STOP	<numeric>	
[:TYPE]	{BPASs|LPASs}	
CONTrol		
:HANDler		
:A		
[:DATA]	<numeric>	[No query]
:B		
[:DATA]	<numeric>	[No query]
:C		
[:DATA]	<numeric>	
:MODE	{INPut|OUTPut}	
:D		
[:DATA]	<numeric>	
:MODE	{INPut|OUTPut}	
:E		
[:DATA]	<numeric>	
[:EXTension]		
:INDex		
:STATe	{ON|OFF|1|0}	
:RTRigger		
:STATe	{ON|OFF|1|0}	
:F		
[:DATA]	<numeric>	[No query]
:OUTPut{[1]|2}		
[:DATA]	<numeric>	

Table 14-3 E5070A/E5071A SCPI command tree

<table>
<tr><th>Command</th><th>Parameters</th><th>Note</th></tr>
<tr><td>DISPlay</td><td></td><td></td></tr>
<tr><td>:ANNotation</td><td></td><td></td></tr>
<tr><td>:FREQuency</td><td></td><td></td></tr>
<tr><td>[:STATe]</td><td>{ON|OFF|1|0}</td><td></td></tr>
<tr><td>:CLOCk</td><td>{ON|OFF|1|0}</td><td></td></tr>
<tr><td>:COLOr{[1]|2}</td><td></td><td></td></tr>
<tr><td>:BACK</td><td><numeric>,<numeric>,<numeric></td><td></td></tr>
<tr><td>:GRATicule{[1]|2}</td><td><numeric>,<numeric>,<numeric></td><td></td></tr>
<tr><td>:LIMit{[1]|2}</td><td><numeric>,<numeric>,<numeric></td><td></td></tr>
<tr><td>:RESet</td><td></td><td>[No query]</td></tr>
<tr><td>:TRACe{[1]|2|3|4|5|6|7|8|9}</td><td></td><td></td></tr>
<tr><td>:DATA</td><td><numeric>,<numeric>,<numeric></td><td></td></tr>
<tr><td>:MEMory</td><td><numeric>,<numeric>,<numeric></td><td></td></tr>
<tr><td>:ECHO</td><td></td><td></td></tr>
<tr><td>:CLEar</td><td></td><td>[No query]</td></tr>
<tr><td>[:DATA]</td><td><string></td><td>[No query]</td></tr>
<tr><td>:ENABle</td><td>{ON|OFF|1|0}</td><td></td></tr>
<tr><td>:FSIGn</td><td>{ON|OFF|1|0}</td><td></td></tr>
<tr><td>:IMAGe</td><td>{NORMal|INVert}</td><td></td></tr>
<tr><td>:MAXimize</td><td>{ON|OFF|1|0}</td><td></td></tr>
<tr><td>:SKEY</td><td></td><td></td></tr>
<tr><td>[:STATe]</td><td>{ON|OFF|1|0}</td><td></td></tr>
<tr><td>:SPLit</td><td>{D1|D12|D1_2|D112|D1_1_2|D123|D1_2_3|D12_33|D11_23|D13_23|
D12_13|D1234|D1_2_3_4|D12_34|D123_456|D12_34_56|D1234_5678|
D12_34_56_78|D123_456_789}</td><td></td></tr>
<tr><td>:TABLe</td><td></td><td></td></tr>
<tr><td>[:STATe]</td><td>{ON|OFF|1|0}</td><td></td></tr>
<tr><td>:TYPE</td><td>{MARKer|LIMit|SEGMent}</td><td></td></tr>
<tr><td>:UPDate</td><td></td><td></td></tr>
<tr><td>[:IMMediate]</td><td></td><td>[No query]</td></tr>
<tr><td>:WINDow{[1]|2|3|4|5|6|7|8|9}</td><td></td><td></td></tr>
<tr><td>:LABel</td><td>{ON|OFF|1|0}</td><td></td></tr>
<tr><td>:MAXimize</td><td>{ON|OFF|1|0}</td><td></td></tr>
<tr><td>:SPLit</td><td>{D1|D12|D1_2|D112|D1_1_2|D123|D1_2_3|D12_33|D11_23|D13_23|
D12_13|D1234|D1_2_3_4|D12_34|D123_456|D12_34_56|D1234_5678|
D12_34_56_78|D123_456_789}</td><td></td></tr>
<tr><td>:TITLe</td><td></td><td></td></tr>
<tr><td>:DATA</td><td><string></td><td></td></tr>
<tr><td>[:STATe]</td><td>{ON|OFF|1|0}</td><td></td></tr>
<tr><td>:TRACe{[1]|2|3|4|5|6|7|8|9}</td><td></td><td></td></tr>
<tr><td>:MEMory</td><td></td><td></td></tr>
<tr><td>[:STATe]</td><td>{ON|OFF|1|0}</td><td></td></tr>
<tr><td>:STATe</td><td>{ON|OFF|1|0}</td><td></td></tr>
</table>

Table 14-3 E5070A/E5071A SCPI command tree

Command	Parameters	Note
DISPlay		
:WINDow{[1]|2|3|4|5|6|7|8|9}		
:TRACe{[1]|2|3|4|5|6|7|8|9}		
:Y		
[:SCALe]		
:AUTO		[No query]
:PDIVision	<numeric>	
:RLEVel	<numeric>	
:RPOSition	<numeric>	
:X		
:SPACing	{LINear|OBASe}	
:Y		
[:SCALe]		
:DIVisions	<numeric>	
FORMat		
:BORDer	{NORMal|SWAPped}	
:DATA	{ASCii|REAL}	
HCOPy		
:ABORt		[No query]
:IMAGe	{NORMal|INVert}	
[:IMMediate]		[No query]
INITiate{[1]|2|3|4|5|6|7|8|9}		
:CONTinuous	{ON|OFF|1|0}	
[:IMMediate]		[No query]
MMEMory		
:CATalog?	<string>	[Query only]
:COPY	<string>,<string>	[No query]
:DELete	<string>	[No query]
:LOAD		
:CHANnel		
[:STATe]	{A|B|C|D}	[No query]
:LIMit	<string>	[No query]
:PROGram	<string>	[No query]
:SEGMent	<string>	[No query]
[:STATe]	<string>	[No query]
:MDIRectory	<string>	[No query]

Table 14-3 E5070A/E5071A SCPI command tree

Command	Parameters	Note
MMEMory		
:STORe		
:CHANnel		
:CLEar		[No query]
[:STATe]	{A|B|C|D}	[No query]
:FDATa	<string>	[No query]
:IMAGe	<string>	[No query]
:LIMit	<string>	[No query]
:PROGram	<string>	[No query]
:SEGMent	<string>	[No query]
[:STATe]	<string>	[No query]
:STYPe	{STATe|CSTate|DSTate|CDSTate}	
:TRANsfer	<string>,<block>	[No query]
PROGram		
:CATalog?		[Query only]
[:SELected]		
:NAME	<string>	
:STATe	{STOP|RUN}	
SENSe		
:CORRection		
:COLLect		
:ECAL		
:PATH?		[Query only]
:MULTiplexer{[1]|2}		
:COUNt?		[Query only]
:DISPlay		
[:STATe]	{ON|OFF|1|0}	
:STATe	{ON|OFF|1|0}	
SENSe{[1]|2|3|4|5|6|7|8|9}		
:AVERage		
:CLEar		[No query]
:COUNt	<numeric>	
[:STATe]	{ON|OFF|1|0}	
:BANDwidth		
[:RESolution]	<numeric>	
:BWIDth		
[:RESolution]	<numeric>	

Table 14-3 E5070A/E5071A SCPI command tree

Command	Parameters	Note
SENSe{[1]|2|3|4|5|6|7|8|9}		
:CORRection		
:COLLect		
[:ACQuire]		
:ISOLation	<numeric>,<numeric>	
:LOAD	<numeric>	
:OPEN	<numeric>	
:SHORt	<numeric>	
:THRU	<numeric>,<numeric>	
:CKIT		
:LABel	<string>	
:ORDer		
:LOAD	<numeric>,<numeric>	
:OPEN	<numeric>,<numeric>	
:SHORt	<numeric>,<numeric>	
:THRU	<numeric>,<numeric>,<numeric>	
[:SELect]	<numeric>	
:STAN{[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21}		
:ARBitrary	<numeric>	
:C0	<numeric>	
:C1	<numeric>	
:C2	<numeric>	
:C3	<numeric>	
:DELay	<numeric>	
:L0	<numeric>	
:L1	<numeric>	
:L2	<numeric>	
:L3	<numeric>	
:LABel	<string>	
:LOSS	<numeric>	
:TYPE	{OPEN|SHORt|LOAD|THRU|ARBI|NONE}	
:Z0	<numeric>	
:ECAL		
:ISOLation		
[:STATe]	{ON|OFF|1|0}	
:SOLT1	<numeric>	
:SOLT2	<numeric>,<numeric>	
:SOLT3	<numeric>,<numeric>,<numeric>	
:SOLT4	<numeric>,<numeric>,<numeric>,<numeric>	
:THRU	<numeric>,<numeric>	

Table 14-3 E5070A/E5071A SCPI command tree

Command	Parameters	Note
SENSe{[1]|2|3|4|5|6|7|8|9}		
:CORRection		
:COLLect		
:METHod		
[:RESPonse]		
:OPEN	<numeric>	
:SHORt	<numeric>	
:THRU	<numeric>,<numeric>	
:SOLT1	<numeric>	
:SOLT2	<numeric>,<numeric>	
:SOLT3	<numeric>,<numeric>,<numeric>	
:SOLT4	<numeric>,<numeric>,<numeric>,<numeric>	
:TYPE?		[Query only]
:SAVE		[No query]
:EXTension		
:PORT{[1]|2|3|4}		
[:TIME]	<numeric>	
[:STATe]	{ON|OFF|1|0}	
:PROPerty	{ON|OFF|1|0}	
:RVELocity		
:COAX	<numeric>	
:STATe	{ON|OFF|1|0}	
:TYPE{[1]|2|3|4|5|6|7|8|9}?		[Query only]
:FREQuency		
:CENTer	<numeric>	
:DATA?		[Query only]
:SPAN	<numeric>	
:STARt	<numeric>	
:STOP	<numeric>	
:MULTiplexer{[1]|2}		
:TSET9		
:OUTPut		
[:DATA]	<numeric>	
:PORT1	{A|T1}	
:PORT2	{T1|T2}	
:PORT3	{R1|R2|R3}	
:PORT4	{R1|R2|R3}	
:ROSCillator		
:SOURce?		[Query only]
:SEGMent		
:DATA	<numeric>,…,<numeric>	
:SWEep		
:POINts?		[Query only]
:TIME		
[:DATA]?		[Query only]

Table 14-3 E5070A/E5071A SCPI command tree

Command	Parameters	Note
SENSe{[1]|2|3|4|5|6|7|8|9}		
:SWEep		
:ASPurious	{ON|OFF|1|0}	
:DELay	<numeric>	
:GENeration	{STEPped|ANALog}	
:POINts	<numeric>	
:TIME		
:AUTO	{ON|OFF|1|0}	
[:DATA]	<numeric>	
:TYPE	{LINear|SEGMent}	
SOURce{[1]|2|3|4|5|6|7|8|9}		
:POWer		
:ATTenuation		
[:DATA]	<numeric>	
[:LEVel]		
[:IMMediate]		
[:AMPLitude]	<numeric>	
STATus		
:OPERation		
:CONDition?		[Query only]
:ENABle	<numeric>	
[:EVENt]?		[Query only]
:NTRansition	<numeric>	
:PTRansition	<numeric>	
:PRESet		[No query]
:QUEStionable		
:CONDition?		[Query only]
:ENABle	<numeric>	
[:EVENt]?		[Query only]
:LIMit		
:CHANnel{[1]|2|3|4|5|6|7|8|9}		
:CONDition?		[Query only]
:ENABle	<numeric>	
[:EVENt]?		[Query only]
:NTRansition	<numeric>	
:PTRansition	<numeric>	
:CONDition?		[Query only]
:ENABle	<numeric>	
[:EVENt]?		[Query only]
:NTRansition	<numeric>	
:PTRansition	<numeric>	
:NTRansition	<numeric>	
:PTRansition	<numeric>	

Table 14-3 E5070A/E5071A SCPI command tree

Command	Parameters	Note
SYSTem		
:BACKlight	{ON|OFF|1|0}	
:BEEPer		
:COMPlete		
:IMMediate		
:STATe	{ON|OFF|1|0}	
:WARNing		
:IMMediate		
:STATe	{ON|OFF|1|0}	
:CORRection		
[:STATe]	{ON|OFF|1|0}	
:DATE	<numeric>,<numeric>,<numeric>	
:ERRor?		[Query only]
:KLOCk		
:KBD	{ON|OFF|1|0}	
:MOUSe	{ON|OFF|1|0}	
:POFF		[No query]
:PRESet		[No query]
:SERVice?		[Query only]
:TEMPerature		
:HIGH	{ON|OFF|1|0}	
[:STATe]?		[Query only]
:TIME	<numeric>,<numeric>,<numeric>	
TRIGger		
[:SEQuence]		
[:IMMediate]		[No query]
:SINGle		[No query]
:SOURce	{INTernal|EXTernal|MANual|BUS}	

A Manual Changes

This appendix contains the information required to adapt this manual to earlier versions or configurations of the Agilent E5070A/E5071A than that indicated by the current printing date of this manual. The information in this manual applies directly to the E5070A/E5071A model that has the serial number prefix listed on the title page of this manual.

Manual Changes

To adapt this manual to your Agilent E5070A/E5071A, refer to Table A-1 and Table A-2.

Table A-1 **Manual Changes by Serial Number**

Serial Prefix or Number	Make Manual Changes

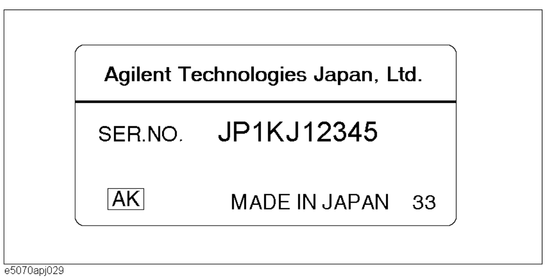
Table A-2 **Manual Changes by Firmware Version**

Version	Make Manual Changes
1.xx	Change 1

Agilent Technologies uses a two-part, ten-character serial number that is stamped on the serial number plate (Figure A-1). The first five characters are the serial prefix and the last five digits are the suffix.

Execute the ***IDN?** command on page 212 to check the firmware version.

Figure A-1 **Serial Number Plate (Example)**



Change 1

The firmware revision 1.xx does not support the following SCPI commands. Please delete their descriptions in this manual.

- **:CALC{1-9}:CONV** on page 217
- **:CALC{1-9}:CONV:FUNC** on page 218
- **:CALC{1-9}:FILT:TIME** on page 225
- **:CALC{1-9}:FILT:TIME:CENT** on page 226
- **:CALC{1-9}:FILT:TIME:SHAP** on page 227
- **:CALC{1-9}:FILT:TIME:SPAN** on page 228
- **:CALC{1-9}:FILT:TIME:STAR** on page 229
- **:CALC{1-9}:FILT:TIME:STAT** on page 230
- **:CALC{1-9}:FILT:TIME:STOP** on page 231
- **:CALC{1-9}:FSIM:BAL:CZC:BPOR{1-2}:Z0** on page 233
- **:CALC{1-9}:FSIM:BAL:CZC:STAT** on page 234
- **:CALC{1-9}:TRAN:TIME** on page 304
- **:CALC{1-9}:TRAN:TIME:CENT** on page 305
- **:CALC{1-9}:TRAN:TIME:IMP:WIDT** on page 306
- **:CALC{1-9}:TRAN:TIME:KBES** on page 307
- **:CALC{1-9}:TRAN:TIME:LPFR** on page 308
- **:CALC{1-9}:TRAN:TIME:SPAN** on page 308
- **:CALC{1-9}:TRAN:TIME:STAR** on page 309
- **:CALC{1-9}:TRAN:TIME:STAT** on page 310
- **:CALC{1-9}:TRAN:TIME:STEP:RTIM** on page 311
- **:CALC{1-9}:TRAN:TIME:STIM** on page 312
- **:CALC{1-9}:TRAN:TIME:STOP** on page 313
- **:DISP:COL{1-2}:BACK** on page 325
- **:DISP:COL{1-2}:GRAT{1-2}** on page 326
- **:DISP:COL{1-2}:LIM{1-2}** on page 327
- **:DISP:COL{1-2}:RES** on page 327
- **:DISP:COL{1-2}:TRAC{1-9}:DATA** on page 328
- **:DISP:COL{1-2}:TRAC{1-9}:MEM** on page 329
- **:MMEM:LOAD:CHAN** on page 357
- **:MMEM:STOR:CHAN** on page 363
- **:MMEM:STOR:CHAN:CLE** on page 363
- **:SENS:CORR:COLL:ECAL:PATH?** on page 374
- **:SENS{1-9}:CORR:COLL:ECAL:THRU** on page 404
- **:SENS:MULT{1-2}:COUN?** on page 375
- **:SENS:MULT{1-2}:DISP** on page 375
- **:SENS:MULT{1-2}:STAT** on page 376
- **:SENS{1-9}:MULT{1-2}:TSET9:OUTP** on page 425
- **:SENS{1-9}:MULT{1-2}:TSET9:PORT1** on page 426
- **:SENS{1-9}:MULT{1-2}:TSET9:PORT2** on page 427
- **:SENS{1-9}:MULT{1-2}:TSET9:PORT3** on page 428
- **:SENS{1-9}:MULT{1-2}:TSET9:PORT4** on page 429
- **:SENS{1-9}:SWE:ASP** on page 434

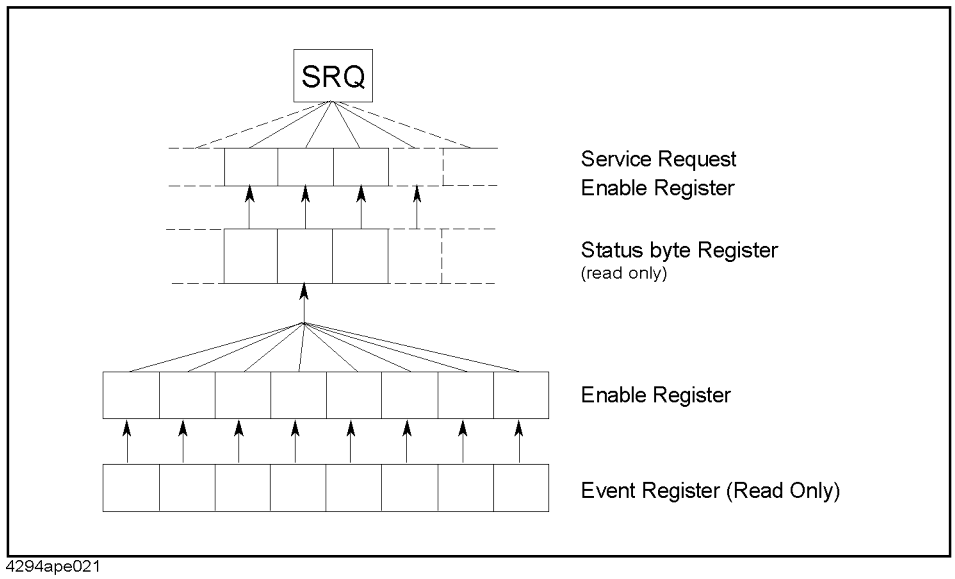
B Status Reporting System

This appendix describes the status reporting system of the Agilent E5070A/E5071A.

General Status Register Model

The Agilent E5070A/E5071A has a status reporting system to report the condition of the instrument.

Figure B-1 **General status register model**



The status reporting system has a hierarchical structure as shown in Figure B-1. When the instrument satisfies a particular condition, the corresponding bit of the event register is set to 1. Therefore, you can check the instrument status by reading the event register.

When the event register bit is set to "1" and a corresponding enable register bit (a bit marked with an arrow in Figure B-1) is also "1," the summary bit of the status byte register is set to "1." You can read the status byte register by using the serial poll.

If the bit of the service request enable register is "1," a service request (SRQ) is generated by the positive transition of the corresponding status byte register bit. By generating SRQ, you can notify the controller that the E5070A/E5071A is requesting service. In other words, interruption by SRQ can be programmed. For more information on using SRQ, see "Using the Status Register" on page 78 in Chapter 5, "Making a Measurement," or "Using the status reporting system" on page 166 in Chapter 11, "Working with Automatic Test Systems."

Event Register

Reflects the corresponding condition of the E5070A/E5071A (e.g., occurrence of an event) as a bit status. These bits continuously monitor changes in the E5070A/E5071A's state and change the bit status when the condition (e.g., change bit status to “1” if a specific event occurs) for each bit is met. You cannot change the bit status by issuing a SCPI command.

Enable Register

Setting the enable register allows you to specify event register bits that can set “1” to the summary bit of the status byte register when an event occurs. The register bits work as mask bits; setting “1” to an enable register will enable a corresponding bit in the event register.

For example, when you want to set “1” as the summary bit in the status byte register by a specific register condition, set the corresponding enable register to “1.”

Status Byte Register

If the enabled event register is set to “1,” a corresponding bit of the status byte register is also set to “1.” This register also indicates the output queue and SRQ status.

The value of the status byte register can be read by using the ***STB?** command on page 215 command or serial poll (SPOLL statement in HTBasic) from the controller.

Reading the status byte register by using the ***STB?** command does not affect the contents of the status byte register. However, reading it with the SPOLL statement of HTBasic will clear the RQS bit in the status byte register.

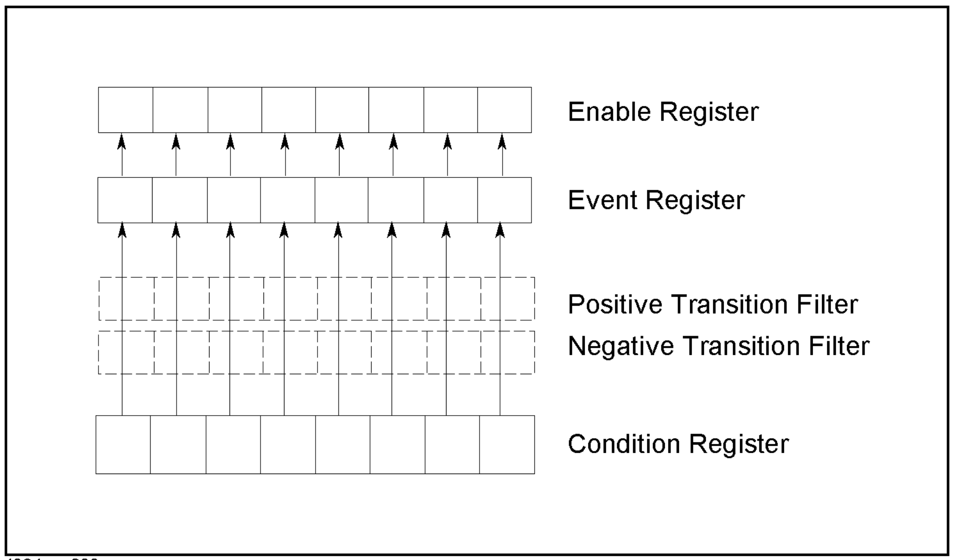
Also, setting the service request enable register using the ***SRE** command on page 214 command can generate a service request synchronously with the status byte register.

Condition Register and Transition Filter

When the status register has a transition filter, there is a lower register called a condition register under the event register. The transition filter is between the event register and the condition register.

The transition filter enables you to select a positive and/or negative transition of the condition register bit in order to set a bit in the corresponding event register. For example, using the negative transition filter to set bit 3 to “1” causes bit 3 of the event register to be set to “1” when bit 3 of the condition register makes a negative transition, that is, changes from 1 to 0.

Figure B-2 Transition filter and condition register



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In the E5070A/E5071A, the following registers provide a condition register and transition filter:

- Operation status register
- Questionable status register
- Questionable limit status register
- Questionable limit channel 1 status register
- Questionable limit channel 2 status register
- Questionable limit channel 3 status register
- Questionable limit channel 4 status register
- Questionable limit channel 5 status register
- Questionable limit channel 6 status register
- Questionable limit channel 7 status register
- Questionable limit channel 8 status register
- Questionable limit channel 9 status register

Status Register Structure

The status reporting system has a hierarchical structure as shown in Figure B-3 and Figure B-4. The status byte register is a summary of registers in the lower level. This section describes the E5070A/E5071A's status registers in each hierarchy. Each bit of the status register is described in Table B-1 through Table B-4.

Figure B-3 **Status Register Structure (1 of 2)**

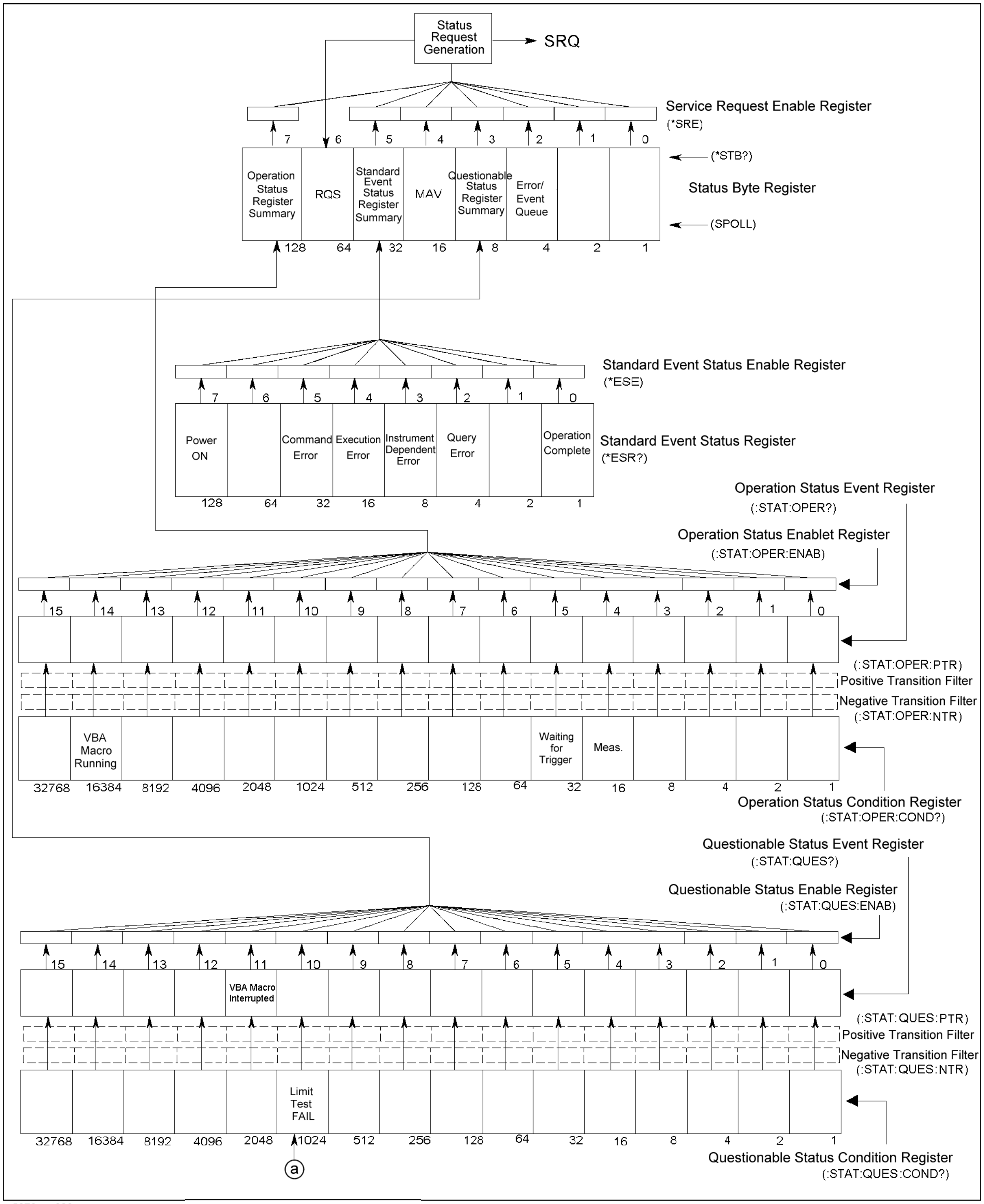

Figure B-4 Status Register Structure (2 of 2)

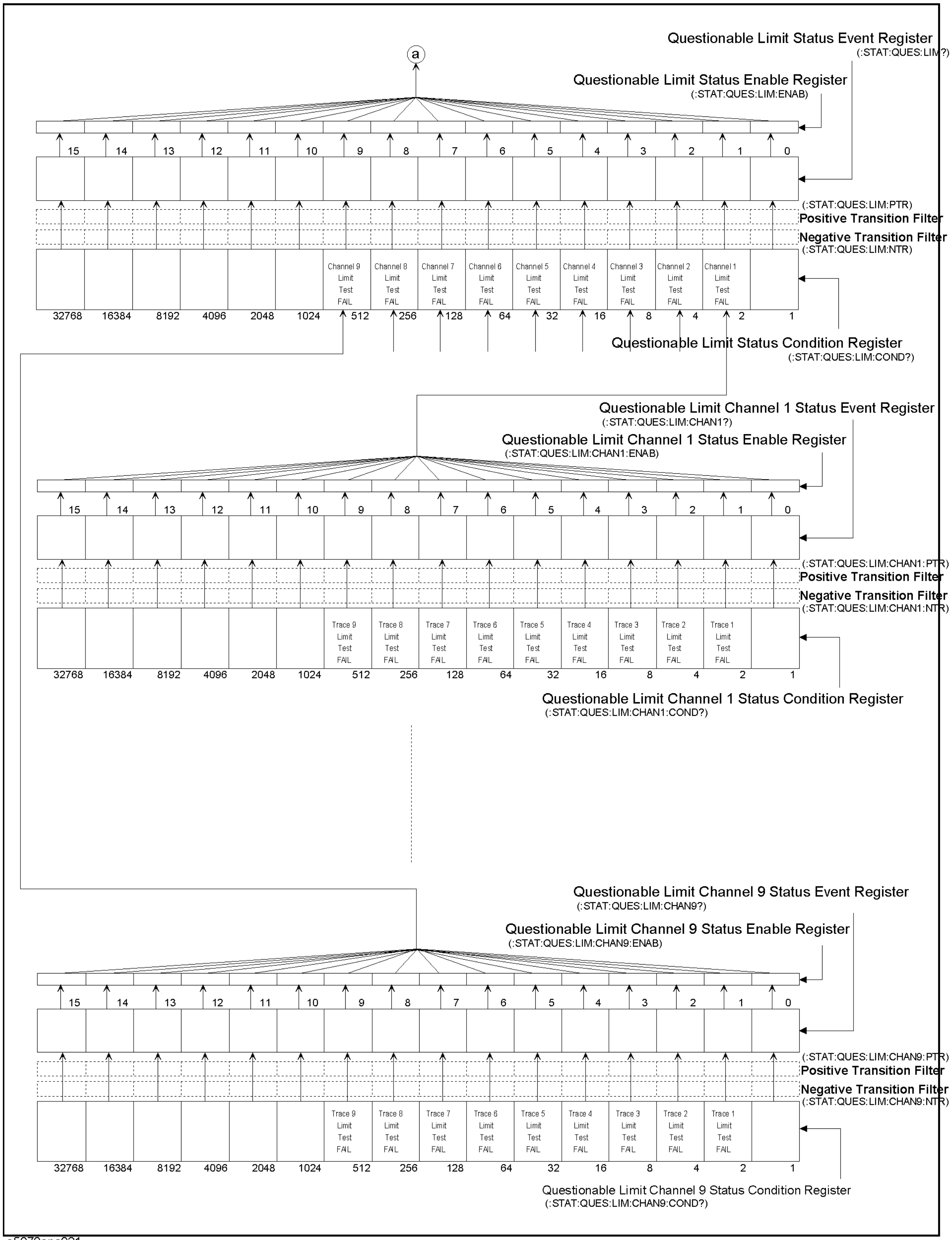

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Table B-1 Status Bit Definitions of Status Byte Register

Bit Position	Name	Description
0, 1	Not used	Always 0
2	Error/Event Queue	Set to “1” if the error/event queue contains data; reset to “0” when all the data has been retrieved.
3	Questionable Status Register Summary	Set to “1” when one of the enabled bits in the status event status register is set to “1.”
4	MAV (Message Available)	Set to “1” when the output queue contains data; reset to “0” when all the data has been retrieved.
5	Standard Event Status Register Summary	Set to “1” when one of the enabled bits in the status event status register is set to “1.”
6	RQS	Set to “1” when any of the status byte register bits enabled by the service request enable register is set to “1”; reset to “0” when all the data has been retrieved through serial polling.
7	Operation Status Register Summary	Set to “1” when one of the enabled bits in the operational status register is set to “1.”

Issuing the ***CLS** command will clear all bits from the status byte register.

Table B-2 Status Bit Definitions of Event Status Register (ESR)

Bit Position	Name	Description
0	Operation Complete	Set to “1” upon completion of all operations done by commands that precede the ***OPC?** command on page 212 command.
1	Not used	Always 0
2	Query Error	1. Set to “1” when the E5070A/E5071A receives a data output request but there is no data to output. 2. Set to “1” when the data of the E5070A/E5071A's output queue has been cleared because of a new message received before the completion of data output.
3	Instrument Dependent Error	Set to “1” when an error has occurred and the error is not a command, query, or execution error.
4	Execution Error	1. Set to “1” when any parameter in an SCPI command exceeds its input range or is inconsistent with the E5070A/E5071A's capabilities. 2. Set to “1” when an SCPI command cannot be properly executed due to some condition of the E5070A/E5071A.
5	Command Error	1. Set to “1” when an IEEE 488.2 syntax error occurs (a command sent to the E5070A/E5071A does not follow the IEEE 488.2 syntax). Possible violations include the command parameter violating the E5070A/E5071A listening formats or being unacceptable. 2. Set to “1” when a semantic error occurs. Possible causes include a command containing misspellings being sent to the E5070A/E5071A or an IEEE 488.2 command not supported by the E5070A/E5071A being sent. 3. Set to “1” when GET (Group Execution Trigger) is input while a program message is being received.
6	Not used	Always 0
7	Power ON	Set to “1” when the E5070A/E5071A is powered ON.

Issuing the ***CLS** command will clear all bits from the standard event status register.

Table B-3 **Status Bit Definitions of the Operation Status Condition Register**

Bit Position	Name	Description
0 - 3	Not used	Always 0
4	Measurement	Set to "1" during measurement*1.
5	Waiting for Trigger	Set to "1" while the instrument is waiting for a trigger*2.
6 - 13	Not used	Always 0
14	VBA Macro Running	Set to "1" while a VBA macro is running.
15	Not used	Always 0

*1. This is the time from the beginning of the first sweep to the end of the last sweep when several sweeps are executed for one measurement.
*2. This is when the trigger system is in "Waiting for Trigger" state. For more information on the trigger system, refer to "Trigger system" on page 74.

Issuing the ***CLS** command will clear all bits from the operation status event register.

Table B-4 **Status Bit Definitions of the Questionable Status Condition Register**

Bit Position	Name	Description
0 - 9	Not used	Always 0
10	Limit Test Fail (Questionable limit status register summary)	Set to "1" while one of the enabled bits in the questionable limit status event register is set to "1."
11 - 15	Not used	Always 0

Table B-5 **Status Bit Definitions of the Questionable Status Condition Register**

Bit Position	Name	Description
0 - 9	Not used	Always 0
10	Limit Test Fail (Questionable limit status register summary)	Set to "1" when a transition of the condition register occurs if the transition filters are set as valid values.
11	VBA Macro Interrupted	Set to "1" when a VBA macro is interrupted by one of the following reasons.*1 • Occurrence of an execution error • Executing "End" statement in the VBA Macro • Executing **:PROG:STAT STOP** • Operating **[Ctrl]**+**[Break]** using the keyboard • Operating **[Macro Break]** or **[Macro Setup]** - **Stop** using the front panel
12 - 15	Not used	Always 0

*1. This setting is made after you click the **End** button in the dialog box displayed when the VBA macro is interrupted.

Issuing the ***CLS** command will clear all bits from the questionable status event register.

Table B-6 **Status Bit Definitions of the Questionable Limit Status Condition Register**

Bit Position	Name	Description
0	Not used	Always 0
1	Channel 1 Limit Test Fail (questionable limit channel 1 status register summary)	Set to “1” while one of the enabled bits in the questionable limit channel 1 status event register is set to “1.”
2	Channel 2 Limit Test Fail (questionable limit channel 2 status register summary)	Set to “1” while one of the enabled bits in the questionable limit channel 2 status event register is set to “1.”
3	Channel 3 Limit Test Fail (questionable limit channel 3 status register summary)	Set to “1” while one of the enabled bits in the questionable limit channel 3 status event register is set to “1.”
4	Channel 4 Limit Test Fail (questionable limit channel 4 status register summary)	Set to “1” while one of the enabled bits in the questionable limit channel 4 status event register is set to “1.”
5	Channel 5 Limit Test Fail (questionable limit channel 5 status register summary)	Set to “1” while one of the enabled bits in the questionable limit channel 5 status event register is set to “1.”
6	Channel 6 Limit Test Fail (questionable limit channel 6 status register summary)	Set to “1” while one of the enabled bits in the questionable limit channel 6 status event register is set to “1.”
7	Channel 7 Limit Test Fail (questionable limit channel 7 status register summary)	Set to “1” while one of the enabled bits in the questionable limit channel 7 status event register is set to “1.”
8	Channel 8 Limit Test Fail (questionable limit channel 8 status register summary)	Set to “1” while one of the enabled bits in the questionable limit channel 8 status event register is set to “1.”
9	Channel 9 Limit Test Fail (questionable limit channel 9 status register summary)	Set to “1” while one of the enabled bits in the questionable limit channel 9 status event register is set to “1.”
10 - 15	Not used	Always 0

Issuing the ***CLS** command will clear all bits from the questionable limit status event register.

Table B-7 Status Bit Definitions of the Questionable Limit Channel 1 Status Condition Register through Questionable Limit Channel 9 Status Condition Register

Bit Position	Name	Description
0	Not used	Always 0
1	Trace 1 Limit Test Fail	Set to “0” when a measurement cycle begins; set to “1” when the measurement cycle finishes and returns “fail” as the limit test result for trace 1.
2	Trace 2 Limit Test Fail	Set to “0” when a measurement cycle begins; set to “1” when the measurement cycle finishes and returns “fail” as the limit test result for trace 2.
3	Trace 3 Limit Test Fail	Set to “0” when a measurement cycle begins; set to “1” when the measurement cycle finishes and returns “fail” as the limit test result for trace 3.
4	Trace 4 Limit Test Fail	Set to “0” when a measurement cycle begins; set to “1” when the measurement cycle finishes and returns “fail” as the limit test result for trace 4.
5	Trace 5 Limit Test Fail	Set to “0” when a measurement cycle begins; set to “1” when the measurement cycle finishes and returns “fail” as the limit test result for trace 5.
6	Trace 6 Limit Test Fail	Set to “0” when a measurement cycle begins; set to “1” when the measurement cycle finishes and returns “fail” as the limit test result for trace 6.
7	Trace 7 Limit Test Fail	Set to “0” when a measurement cycle begins; set to “1” when the measurement cycle finishes and returns “fail” as the limit test result for trace 7.
8	Trace 8 Limit Test Fail	Set to “0” when a measurement cycle begins; set to “1” when the measurement cycle finishes and returns “fail” as the limit test result for trace 8.
9	Trace 9 Limit Test Fail	Set to “0” when a measurement cycle begins; set to “1” when the measurement cycle finishes and returns “fail” as the limit test result for trace 9.
10 - 15	Not used	Always 0

Issuing the ***CLS** command will clear all the bits in the questionable limit channel 1 status event register through questionable limit channel 9 status event register.

Using the Status Reporting System

You can manage the status report system using the following commands in any combination:

- ***CLS** on page 210
- ***SRE** on page 214
- ***STB?** on page 215
- ***ESE** on page 211
- ***ESR?** on page 211
- **:STAT:PRES** on page 444
- **:STAT:OPER:ENAB** on page 441
- **:STAT:OPER:COND?** on page 440
- **:STAT:OPER?** on page 440
- **:STAT:OPER:PTR** on page 443
- **:STAT:OPER:NTR** on page 442
- **:STAT:QUES:ENAB** on page 445
- **:STAT:QUES:COND?** on page 444
- **:STAT:QUES?** on page 444
- **:STAT:QUES:PTR** on page 454
- **:STAT:QUES:NTR** on page 453
- **:STAT:QUES:LIM:ENAB** on page 450
- **:STAT:QUES:LIM:COND?** on page 450
- **:STAT:QUES:LIM?** on page 446
- **:STAT:QUES:LIM:PTR** on page 452
- **:STAT:QUES:LIM:NTR** on page 451
- **:STAT:QUES:LIM:CHAN{1-9}:ENAB** on page 447
- **:STAT:QUES:LIM:CHAN{1-9}:COND?** on page 446
- **:STAT:QUES:LIM:CHAN{1-9}?** on page 446
- **:STAT:QUES:LIM:CHAN{1-9}:PTR** on page 449
- **:STAT:QUES:LIM:CHAN{1-9}:NTR** on page 448

For sample programs that demonstrate the use of the commands listed above, refer to “Using the Status Register” on page 78 in Chapter 5 or “Obtaining Test Results” on page 123 in Chapter 8.

C Comparing Commands on the 8753ES and E5070A/E5071A

The following table presents a comparison of commands on the Agilent 8753ES and Agilent E5070A/E5071A, listed alphabetically by function.

8753ES vs. E5070A/E5071A Command Correspondence (by function)

Function	Item to be specified/executed		Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Measurement	Reset		**PRES**	**:SYST:PRES**	After execution, the ***RST** on the E5070A/E5071A set the trigger state to Hold.
			RST	***RST**	
	Setting up the active channel	Channel 1	**CHAN1**	**:DISP:WIND{1-9}:ACT** (Setting up the active channel)or **:CALC{1-9}:PAR{1-9}:SEL** (Setting up an active trace on each channel)	The outline of channels and traces on the E5070A/E5071A is described in the "User's Guide."
		Channel 2	**CHAN2**		
		Channel 3	**CHAN3**		
		Channel 4	**CHAN4**		
	Reading the active channel		**OUTPCHAN**	**:DISP:WIND{1-9}:ACT?** (Reading the active channel)or **:CALC{1-9}:PAR{1-9}:SEL?** (Reading the active trace on each channel)	
	Selection of measurement parameters	S11	**S11**[*1]	**:CALC{1-9}:PAR{1-9}:DEF S11**[*2]	
			RFLP[*1]		
		S21	**S21**[*1]	**:CALC{1-9}:PAR{1-9}:DEF S21**[*2]	
			TRAP[*1]		
		S12	**S12**[*1]	**:CALC{1-9}:PAR{1-9}:DEF S12**[*2]	
		S22	**S22**[*1]	**:CALC{1-9}:PAR{1-9}:DEF S22**[*2]	
		Aux Input	**ANAI**[*1]	Not available	E5070A/E5071A can select S-parameters only.
		A/R	**AR**[*1]		
		B/R	**BR**[*1]		
		A/B	**AB**[*1]		
		A	**MEASA**[*1]		
		B	**MEASB**[*1]		
		R	**MEASR**[*1]		
		Designates a test port when parameters other than S-parameters are selected.	**TSTP**[*1]		
	S-parameters conversion	Turning off the transformation function	**CONVOFF**[*1]	**:CALC{1-9}:CONV**[*3]	
		Impedance (reflection)	**CONVZREF**[*1]	**:CALC{1-9}:CONV:FUNC ZREF**[*3]	
		Impedance (transmission)	**CONVZTRA**[*1]	**:CALC{1-9}:CONV:FUNC ZTR**[*3]	
		Admittance (reflection)	**CONVYREF**[*1]	**:CALC{1-9}:CONV:FUNC YREF**[*3]	
		Admittance (transmission)	**CONVYTRA**[*1]	**:CALC{1-9}:CONV:FUNC YTR**[*3]	
		1/S	**CONV1DS**[*1]	**:CALC{1-9}:CONV:FUNC INV**[*3]	

Function	Item to be specified/executed		Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Measurement (cont'd.)	Setting up display formats (data formats)	Log magnitude format	**LOGM**[*1]	**:CALC{1-9}:FORM MLOG**[*3]	When the data format for the E5070A/E5071A is defined in Smith chart or polar format, the format for reading marker values is defined at the same time.
		Phase format	**PHAS**[*1]	**:CALC{1-9}:FORM PHAS**[*3]	
		Group delay format	**DELA**[*1]	**:CALC{1-9}:FORM GDEL**[*3]	
		Smith chart format	**SMIC**[*1]	**:CALC{1-9}:FORM SLIN**[*3] **:CALC{1-9}:FORM SLOG** **:CALC{1-9}:FORM SCOM** **:CALC{1-9}:FORM SMI** **:CALC{1-9}:FORM SADM**	
		Polar format	**POLA**[*1]	**:CALC{1-9}:FORM PLIN**[*3] **:CALC{1-9}:FORM PLOG** **:CALC{1-9}:FORM POL**	
		Linear magnitude format	**LINM**[*1]	**:CALC{1-9}:FORM MLIN**[*3]	
		SWR format	**SWR**[*1]	**:CALC{1-9}:FORM SWR**[*3]	
		Real format	**REAL**[*1]	**:CALC{1-9}:FORM REAL**[*3]	
		Imaginary format	**IMAG**[*1]	**:CALC{1-9}:FORM IMAG**[*3]	
	Sweep type selection	Linear sweep	**LINFREQ**[*1*4]	**:SENS{1-9}:SWE:TYPE LIN**[*5]	With the E5070A/E5071A, you cannot select the power level sweep, or CW TIME seep.
		Log sweep	**LOGFREQ**[*1*4]	**:SENS{1-9}:SWE:TYPE LOG**[*5]	
		List sweep	**LISFREQ**[*1*4]	**:SENS{1-9}:SWE:TYPE SEGM**[*5]	
		Power sweep	**POWS**[*1*4]	Not available	
		CW TIME sweep	**CWTIME**[*1*4]	Not available	
	Setting up the sweep range	Start value	**STAR**[*1*4]	**:SENS{1-9}:FREQ:STAR**[*5]	
		Stop value	**STOP**[*1*4]	**:SENS{1-9}:FREQ:STOP**[*5]	
		Center value	**CENT**[*1*4]	**:SENS{1-9}:FREQ:CENT**[*5]	
		Span value	**SPAN**[*1*4]	**:SENS{1-9}:FREQ:SPAN**[*5]	
	Sweep time	Setting up the sweep time	**SWET**[*1*4]	**:SENS{1-9}:SWE:TIME**[*5]	
		Automatic setting to the shortest time	**SWEA**[*1*4]	**:SENS{1-9}:SWE:TIME:AUTO ON**[*5]	
	Specifying the number of points		**POIN**[*1*4]	**:SENS{1-9}:SWE:POIN**[*5]	
	Specifying the IF bandwidth		**IFBW**[*1*4]	**:SENS{1-9}:BAND**[*5]	
	Averaging	On/Off setting	**AVERO**[*1*4]	**:SENS{1-9}:AVER**[*5]	
		Specifying the number of times	**AVERFACT**[*1*4]	**:SENS{1-9}:AVER:COUN**[*5]	
		Restart	**AVERREST**[*1*4]	**:SENS{1-9}:AVER:CLE**[*5]	
	Specifying the power level		**POWE**[*1*4]	**:SOUR{1-9}:POW**[*5]	When the power range setting in one channel differs from that in another channel on the 8753ES, a sweep is not performed on channels whose settings are different from those on the active channel.

Function	Item to be specified/executed			Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Measurement (cont'd.)	Setting the power range	Setting the range		**POWR**[*1*4]	**:SOUR{1-9}:POW:ATT**[*5] (attenuator settings)	The E5070A/E5071A is compatible with Options 214, 314, and 414 only. When the power range setting in one channel differs from that in another channel on the 8753ES, a sweep is not performed on channels whose settings are different from those on the active channel.
				PRAN[*1*4]		
		Auto/Manual setting for range changeover		**PWRR**[*1*4]	Not available	
	Attenuator settings	Port 1		**ATTP1**[*1*4]	**:SOUR{1-9}:POW:ATT**[*5]	
		Port 2		**ATTP2**[*1*4]		
	Power slope	On/Off		**SLOPO**[*1*4]	Not available	
		Specifying values		**SLOPE**[*1*4]	Not available	
	Couple/Uncouple setting for the power level	Between ports		**PORTP**[*1*4]	Not available	On the E5070A/E5071A, coupling works on the same channel but not between channels.
		Between channels		**COUP**	Not available	
	Turning the signal source output On/Off			**POWT**[*6]	Not available	Always On on the E5070A/E5071A.
				SOUP[*6]		
	Editing the list frequency sweep table	Start of editing		**EDITLIST**	**:SENS{1-9}:SEGM:DATA**[*5]	The E5070A/E5071A uses one command to edit segments. A segment table also exists for each channel. The 8753ES uses more than one command to set up a segment. Two types of segments can be set up: one for channels 1 and 3 and the other for channels 2 and 4.
		End of editing		**EDITDONE**		
		Deleting an entire table		**CLEL**		
				CLEAL		
		Editing segments	Selection	**SEDI**		
			End	**SDON**		
			Addition	**SADD**		
			Deletion	**SDEL**		
			Start value	**STAR**		
			Stop value	**STOP**		
			Center value	**CENT**		
			Span value	**SPAN**		
			Number of points	**POIN**		
			Sweep step value	**STPSIZE**		
			IFBW settings are Valid/Not valid.	**LISIFBWM**		
			IFBW settings	**SEGIFBW**		
			Power settings are Valid/Not valid.	**LISPWRM**		
			Power	**SEGPOWER**		

Function	Item to be specified/executed				Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Measurement (cont'd.)	Selecting list mode	Stepped mode			LISTTYPELSTP	:SENS{1-9}:SWE:GEN STEP	On the E5070A/E5071A, the IF bandwidth and power level can be set segment by segment even in swept mode.In addtion, you can select stepped/swept mode for the linear sweep.
		Swept mode			LISTTYPELSWP	:SENS{1-9}:SWE:GEN ANAL	
	Setting up segments for the list frequency sweep	All segments are used.			ASEG	Not available	In its segment sweep operation, the E5070A/E5071A sweeps all segments.
		Only designated segments are used.			SSEG	Not available	
	Smoothing	On/Off setting			SMOOO[*1]	:CALC{1-9}:SMO[*3]	
		Setting up the smoothing aperture			SMOOAPER[*1]	:CALC{1-9}:SMO:APER[*3]	
		Reading the smoothing aperture	%		SMOOAPER?[*1]	:CALC{1-9}:SMO:APER?[*3]	
			Unit for stimulus values		OUTPAPER[*1]	Not available	
	Setting the electrical delay	Setting values			ELED[*1]	:CALC{1-9}:CORR:EDEL:TIME[*3]	
		Setting types	Coaxial cable		COAD[*1]	Not available	The E5070A/E5071A is compatible with coaxial cables only.
			A waveguide is selected and the cut-off frequency is specified.		WAVD[*1]	Not available	
	Specifying the phase offset				PHAO[*1]	:CALC{1-9}:CORR:OFFS:PHAS[*3]	
	Setting sweep conditions at Couple/Uncouple between channels				COUC	Traces are coupled on the same channel and not coupled between channels.	On the 8753ES, coupling between channels 1 and 2 is set at On/Off. Channels 1 and 3 and channels 2 and 4 are always coupled.
	Setting the trigger mode	Continuous sweep			CONT[*1*4]	:INIT{1-9}:CONT ON[*5]	On the E5070A/E5071A, specified number mode cannot be selected.
					FRER[*1*4]		
		Single sweep			SING[*1*4]	:ABOR :INIT{1-9}:CONT OFF[*5] :INIT{1-9} (These commands must be sent.)	
		specifying number of sweeps			NUMG[*1*4]	Not available	
		Hold			HOLD[*1*4]	:INIT{1-9}:CONT OFF[*5]	
		Setting up external trigger	Per sweep		EXTTON	:TRIG:SOUR EXT[*5]	On the E5070A/E5071A, the per-sweep setting is valid when the external trigger mode is ON. A manual trigger at each point is not available. The external trigger line is set to Low.
			Per point		EXTTPOIN	Not available	
			Off		EXTTOFF	In **:TRIG:SOUR**, setting the parameter to **EXT** causes external trigger mode to automatically turn OFF.	
			Trigger line	High	EXTTHIGH	Not available	
				Low	EXTTLOW	Not available	
		Manual (at each point)			MANTRIG	Not available	

Function	Item to be specified/executed		Command (For footnotes, see page 546.) 8753ES	Command E5070A/E5071A	Remarks
Measurement (cont'd.)	Suspend sweep and then resume.		**REST**	Not available	
	Specifying the signal source frequency for the power level sweep or CW TIME sweep		**CWFREQ**[*1*4]	Not available	
Screen display	Setting up the active channel	Channel 1	**CHAN1**	**:DISP:WIND{1-9}:ACT** (Setting up the active channel) or **:CALC{1-9}:PAR{1-9}:SEL** (Setting up the active trace)	The concepts of a channel and a trace on the E5070A/E5071A are different. For more information, refer to the individual ìUserís Guides.
		Channel 2	**CHAN2**		
		Channel 3	**CHAN3**		
		Channel 4	**CHAN4**		
	Reading the active channel		**OUTPCHAN**	**:DISP:WIND{1-9}:ACT?** (Reading the active channel) or **:CALC{1-9}:PAR{1-9}:SEL?** (Reading the active trace)	
	Channel memory	Copying a data trace into the channel memory.	**DATI**[*1]	**:CALC{1-9}:MATH:MEM**[*3]	
		Display a data trace only.	**DISPDATA**[*1]	**:DISP:WIND{1-9}:TRAC{1-9}:STAT ON**[*2] **:DISP:WIND{1-9}:TRAC{1-9}:MEM OFF**[*2] **:CALC{1-9}:MATH:FUNC NORM**[*3] (All three commands above must be sent.)	The last command to be sent by the E5070A/E5071A is the one effective for the active trace. This requires the trace in question to be made the active one before being sent.
		The data trace and memory trace are displayed at the same time.	**DISPDATM**[*1]	**:DISP:WIND{1-9}:TRAC{1-9}:STAT ON**[*2] **:DISP:WIND{1-9}:TRAC{1-9}:MEM ON**[*2] **:CALC{1-9}:MATH:FUNC NORM**[*3] (All three commands above must be sent.)	
		Display the result of dividing the data trace by the memory trace.	**DISPDDM**[*1] / **DIVI**[*1]	**:DISP:WIND{1-9}:TRAC{1-9}:STAT ON**[*2] **:DISP:WIND{1-9}:TRAC{1-9}:MEM OFF**[*2] **:CALC{1-9}:MATH:FUNC DIV**[*3] (All three commands above must be sent.)	
		Display the result of dividing the data trace by the memory trace.	**DISPDMM**[*1] / **MINU**[*1]	**:DISP:WIND{1-9}:TRAC{1-9}:STAT ON**[*2] **:DISP:WIND{1-9}:TRAC{1-9}:MEM OFF**[*2] **:CALC{1-9}:MATH:FUNC SUBT**[*3] (All three commands above must be sent.)	
		Display the memory trace only.	**DISPMEMO**[*1]	**:DISP:WIND{1-9}:TRAC{1-9}:STAT OFF**[*2] **:DISP:WIND{1-9}:TRAC{1-9}:MEM ON**[*2] (Both commands above must be sent.)	
		Sending the title to the memory trace	**TITTMEM**[*1]	Not available	

Function	Item to be specified/executed			Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Screen display (cont'd.)	Turns off the frequency display on the LCD.			**FREO**	**:DISP:ANN:FREQ OFF**	The 8753ES and E5070A/E5071A are both effective on all channels.
	Display channel 2 data/channel 1 data in channel 2.			**D1DIVD2**	Not available	
	On/Off setting for Channels 3 and 4			**AUXC**	**:CALC{1-9}:PAR{1-9}:COUN** (Specifying the number of traces) enables you to perform the equivalent.	
	On/Off setting for simultaneous display of two channels			**DUAC**	**:DISP:SPL** (Setting up a window array in a channel) and **:DISP:WIND{1-9}:SPL** (Setting up an array of trace graphs) are combined to perform the equivalent.	
	Graph layout	On/Off setting for display splitting		**SPLD**	**:DISP:SPL** (Setting up a window array in a channel) and **:DISP:WIND{1-9}:SPL** (Setting up an array of trace graphs) are combined to perform the equivalent.	
		Specifying the number of screens	1	**SPLID1**		
			2	**SPLID2**		
			4	**SPLID4**		
		Upper screen (Channels 1 and 2) and lower screen (Channels 3 and 4)		**D2XUPCH2**	Not available	
		Upper screen (Channels 1 and 3) and lower screen (Channels 2 and 4)		**D2XUPCH3**	**:DISP:SPL** (Setting up a window array in a channel) and **:DISP:WIND{1-9}:SPL** (Setting up an array of trace graphs) are combined to perform the equivalent.	
		Upper left (Channel 1), upper right (Channel 2), lower left (Channel 3), lower right (Channel 4)		**D4XUPCH2**		
		Upper left (Channel 1), upper right (Channel 3), lower left (Channel 2), lower right (Channel 4)		**D4XUPCH3**	Not available	
	Setting up a scale	Executing autoscale		**AUTO***1	**:DISP:WIND{1-9}:TRAC{1-9}:Y:AUTO***2	
		Setting values		**SCAL***1	**:DISP:WIND{1-9}:TRAC{1-9}:Y:PDIV***2	
	Setting the reference line	Position		**REFP***1	**:DISP:WIND{1-9}:TRAC{1-9}:Y:RLEV***2	On the 8753ES, reference lines are set at graticule lines 1 to 10. The E5070A/E5071A allows the number of graticule lines to be changed; you can place as many graticule lines as you need, from zero to the specified number of lines.
		Value		**REFV***1	**:DISP:WIND{1-9}:TRAC{1-9}:Y:RPOS***2	

Function	Item to be specified/executed			Command (For footnotes, see page 546.) 8753ES	Command E5070A/E5071A	Remarks
Screen display (cont'd.)	List display		Start	**LISV**[*1]	Not available	The E5070A/E5071A does not have a list display function.
			To next page	**NEXP**[*1]		
			To previous page	**PREP**[*1]		
			Return to the display of measurement results.	**RESD**[*1]		
	Displaying the softkey area		On	**MENUON**	**:DISP:SKEY ON**	
			Off	**MENUOFF**	**:DISP:SKEY OFF**	
	Title		Read	**OUTPTITL**	**:DISP:WIND{1-9}:TITL:DATA?**[*5]	
			Setup	**TITL**	**:DISP:WIND{1-9}:TITL:DATA**[*5]	
	Display the Instrument State status list.			**OPEP**	Not available	The E5070A/E5071A does not have the function of displaying the Instrument State status list.
	Return the color settings to the initial state.			**DEFC**	**:DISP:COL{1-2}:RES**	
	Selecting the object for which colors are set up	Data trace Limit line	Channel 1	**COLOCH1D**	**:DISP:COL{1-2}:TRAC{1-9}:DATA** **:DISP:COL{1-2}:TRAC{1-9}:MEM** **:DISP:COL{1-2}:LIM{1-2}** **:DISP:COL{1-2}:GRAT{1-2}** **:DISP:COL{1-2}:BACK**	
			Channel 2	**COLOCH2D**		
			Channel 3	**COLOCH3D**		
			Channel 4	**COLOCH4D**		
		Memory trace	Channel 1	**COLOCH1M**		
			Channel 2	**COLOCH2M**		
			Channel 3	**COLOCH3M**		
			Channel 4	**COLOCH4M**		
		Others	Graticule lines	**COLOGRAT**		
			Reference line	**COLOLREF**		
			Character string	**COLOTEXT**		
			Warning message	**COLOWARN**		
	Changing colors		Returning to initial values	**RSCO**		
			Tint	**TINT**		
			Color saturation	**COLOR**		
			Brightness	**CBRI**		
	Specifying the screen brightness			**BACI**	Not available	The E5070A/E5071A allows On/Off setting for backlighting only.
				INTE		
	On/Off setting for the LCD displaying.			**BLAD**	**:SYST:BACK** (On/Off setting for the backlighting)	When the E5070A/E5071A is turned ON, the 8753ES is turned OFF, and vice versa.

Function	Item to be specified/executed		Command (For footnotes, see page 546.)		Remarks
			8753ES	E5070A/E5071A	
Calibration	Displaying the softkeys in the calibration menu		**CAL1**	Not available	
	Selecting a calibration kit	2.4 mm Calibration Kit (85056A/D)	**CALK24MM**[*6]	**:SENS{1-9}:CORR:COLL:CKIT**[*5]	
		2.92 mm Calibration Kit	**CALK292MM**[*6]		
		2.92 mm Calibration Kit (85056K)	**CALK292S**[*6]		
		3.5 mm Calibration Kit (85033C)	**CALK35MC**[*6]		
		3.5 mm Calibration Kit (85033D)	**CALK35MD**[*6]		
		7-16 Calibration Kit (85038)	**CALK716**[*6]		
		7 mm Calibration Kit (85031B)	**CALK7MM**[*6]		
		N-type 50 Calibration Kit (85032B/E)	**CALKN50**[*6]		
		N-type 75 Calibration Kit (85036B/E)	**CALKN75**[*6]		
		TRL 3.5 mm Calibration Kit (85052C)	**CALKTRLK**[*6]		
		User-defined calibration kit	**CALKUSED**[*6]		
	Starting the calibration	Forward enhanced response calibration	**CALIERC**[*1]	Not available (Enhanced response calibration function not available.)	
		Reverse enhanced response calibration	**CALIRERC**[*1]		
		Response calibration	**CALIRESP**[*1]	**:SENS{1-9}:CORR:COLL:METH:OPEN**[*5] **or :SENS{1-9}:CORR:COLL:METH:SHOR**[*5] **or :SENS{1-9}:CORR:COLL:METH:THRU**[*5]	The E5070A/E5071A uses different commands depending on the standard used. Isolation can be performed optionally. Calibration type can be set after measuring standard on the E5070A/E5071A
		Response & isolation calibration	**CALIRAI**[*1]		
		S11 1-port calibration	**CALIS111**[*1]	**:SENS{1-9}:CORR:COLL:METH:SOLT1**[*5]	The E5070A/E5071A requires a port to be assigned to a command parameter.
		S22 1-port calibration	**CALIS221**[*1]		
		Full 2-port calibration	**CALIFUL2**[*1]	**:SENS{1-9}:CORR:COLL:METH:SOLT2**[*5]	
		TRL*/LRM* Calibration	**CALITRL2**[*1]	Not available	The E5070A/E5071A supports the TRL*/LRM* calibration function using VBA.

Function	Item to be specified/executed		Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Calibration (cont'd.)	Finishing the calibration and calculating the calibration coefficients.	Forward enhanced response calibration	**ERCDONE**[*1]	Not available	The E5070A/E5071A does not have the enhanced response calibration function.
			SAVERC[*1]		
		Reverse enhanced response calibration	**RERCDONE**[*1]		
			SAVRERC[*1]		
		Response calibration	**RESPDONE**[*1]	**:SENS{1-9}:CORR:COLL:SAVE**[*5]	The E5070A/E5071A allows you to use the same command to finish calibration regardless of the type of calibration.
		Response & isolation calibration	**RAID**[*1]		
		S11 1-port calibration or S22 1-port calibration	**SAV1**[*1]		
		Full 2-port calibration	**SAV2**[*1]		
		TRL*/LRM* calibration	**SAVT**[*1]	Not available	The E5070A/E5071A supports the TRL* /LRM* calibration function using VBA.
	Starting calibration data measurement	Reflection measurement (Enhanced response calibration)	**REFOP**[*1]	Not available	The E5070A/E5071A does not have the enhanced response calibration function.
		Reflection measurement (2-port calibration)	**REFL**[*1]	Not available	
		Transmission measurement (enhanced response calibration)	**TRAOP**[*1]		
		Transmission measurement (2-port calibration)	**TRAN**[*1]		
		Forward transmission measurement (2-port calibration)	**FWDT**[*1]	**:SENS{1-9}:CORR:COLL:THRU**[*5]	The E5070A/E5071A performs both transmission and of match measurements.
		Forward match measurement (2-port calibration)	**FWDM**[*1]		
		Reverse transmission measurement (2-port calibration)	**REVT**[*1]		
		Forward match measurement (2-port calibration)	**REVM**[*1]		
		Response measurement (response Åï isolation calibration)	**RAIRESP**[*1]	**:SENS{1-9}:CORR:COLL:OPEN**[*5](Open) **:SENS{1-9}:CORR:COLL:SHOR**[*5](Thru) **:SENS{1-9}:CORR:COLL:THRU**[*5](Thru)	The E5070A/E5071A uses different commands depending on the standard used.
		Isolation measurement (response Åïisolation calibration)	**RAIISOL**[*1]	**:SENS{1-9}:CORR:COLL:ISOL**[*5]	
		Isolation measurement (enhanced response calibration)	**ISOOP**[*1]	Not available	

Function	Item to be specified/executed			Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Calibration (cont'd.)	Starting calibration data measurement (cont'd.)	Isolation measurement (2-port calibration)		**ISOL**[*1]	Not available	
		Forward isolation measurement (2-port calibration)		**FWDI**[*1]	**:SENS{1-9}:CORR:COLL:ISOL**[*5]	
		Reverse isolation measurement (2-port calibration)		**REVI**[*1]	**:SENS{1-9}:CORR:COLL:ISOL**[*5]	
		S11A (OPEN) Measurement		**CLASS11A**[*1]	**:SENS{1-9}:CORR:COLL:OPEN**[*5]	
		S11B (SHORT) Measurement		**CLASS11B**[*1]	**:SENS{1-9}:CORR:COLL:SHOR**[*5]	
		S11C (LOAD) Measurement		**CLASS11C**[*1]	**:SENS{1-9}:CORR:COLL:LOAD**[*5]	
		S22A (OPEN) Measurement		**CLASS22A**[*1]	**:SENS{1-9}:CORR:COLL:OPEN**[*5]	
		S22B (SHORT) Measurement		**CLASS22B**[*1]	**:SENS{1-9}:CORR:COLL:SHOR**[*5]	
		S22C (LOAD) Measurement		**CLASS22C**[*1]	**:SENS{1-9}:CORR:COLL:LOAD**[*5]	
		Offset and LOAD measurement	Measurement without offset	**LOAN**[*1]	Not available	The E5070A/E5071A handles LOAD as a fixed load.
			Measurement with offset	**LOAO**[*1]		
		Sliding LOAD measurement	Measurement after sliding	**SLIS**[*1]	Not available	
			End	**SLID**[*1]		
		Selecting the standard to be measured (corresponding to the softkeys)	1st from the top	**STANA**[*1]	Not available	The E5070A/E5071A has only one type of standard that can be registered in each calibration class; therefore, no corresponding command exists.
			2nd from the top	**STANB**[*1]		
			3rd from the top	**STANC**[*1]		
			4th from the top	**STAND**[*1]		
			5th from the top	**STANE**[*1]		
			6th from the top	**STANF**[*1]		
			7th from the top	**STANG**[*1]		
		THRU measurement		**TRLT**[*1]	Not available	The E5070A/E5071A supports the TRL* /LRM* calibration function using VBA.
		S11 Reflection measurement		**TRLR1**[*1]	Not available	
		S22 Reflection measurement		**TRLR2**[*1]	Not available	

Function	Item to be specified/executed		Command (For footnotes, see page 546.)		Remarks
			8753ES	E5070A/E5071A	
Calibration (cont'd.)	Starting calibration data measurement (cont'd.)	Port 1 Line/Match measurement	**TRLL1**[*1]	Not available	The E5070A/E5071A supports the TRL* /LRM* calibration function using VBA.
		Port 2 Line/Match measurement	**TRLL2**[*1]		
		Finishing measuring the standard	**DONE**[*1]	Not available	The 8753ES requires this to be executed when two or more standards exist in the calibration class. The E5070A/E5071A allows only one type of standard to be registered in each calibration class.
	Finishing measuring calibration data	Reflection measurement	**REFD**[*1]	Not available	The E5070A/E5071A has no similar commands.
		Transmission measurement	**TRAD**[*1]	Not available	
		Isolation measurement	**ISOD**[*1]	Not available	
		Offset and LOAD measurement	**OFLD**[*1]	Not available	The E5070A/E5071A does not handle offset and LOAD.
	Setting error correction On/Off	On/Off setting	**CORR**[*1*4]	**:SENS{1-9}:CORR:STAT**[*5]	
		Setting to OFF	**CALN**[*1*4]	**:SENS{1-9}:CORR:STAT OFF**[*5]	
	On/Off setting for error correction by interpolation of calibration coefficients		**CORI**[*1*4]	Not available	Always On on the E5070A/E5071A
	Omitting the isolation measurement		**OMII**[*1]	Not available	On the E5070A/E5071A, isolation measurement is optional.
	Setting up the characteristic impedance of the measurement system		**SETZ**[*6]	**:CALC{1-9}:FSIM:SEND:ZCON: PORT{1-6}:Z0**[*5] (Fixture simulator)	The E5070A/E5071A enables you to do the equivalent by using the fixture simulator.
	Specifying the velocity factor		**VELOFACT**[*6]	**:SENS{1-9}:CORR:RVEL:COAX**[*5]	
	Setting up port extension correction	On/Off	**PORE**[*6]	**:SENS{1-9}:CORR:EXT**[*5]	
		Corrected value for port 1	**PORT1**[*6]	**:SENS{1-9}:CORR:EXT:PORT**[*5]	
		Corrected value for port 2	**PORT2**[*6]		
		Corrected value for input A	**PORTA**[*6]	Not available	The E5070A/E5071A does not have the input port extension function.
		Corrected value for input B	**PORTB**[*6]		

Function	Item to be specified/executed				Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Calibration (cont'd.)	Adapter removal	Calling data		Port 1	**CALSPORT1***6	Not available	The E5070A/E5071A supports the adapter removal function using VBA.
				Port 2	**CALSPORT2***6		
		Setting the electrical delay for the adapter			**ADAP1***6	Not available	
		Selecting the adapter		Coaxial cable	**ADPTCOAX***6	Not available	
				Wave guide	**ADPTWAVE***6	Not available	
		Calculating the calibration set			**MODS***6	Not available	
	Selecting between alternate sweep and chop sweep	Alternate sweep			**ALTAB***6	Not available	On the E5070A/E5071A, traces in the same channel are measured by the same method as the chop sweep. When traces belong to different channels, they are measured by the same method as the alternate sweep.
		Chop sweep			**CHOPAB***6	Not available	
	Take4 mode	Turning Take4 mode On/Off			**TAKE4**	Not available	The E5070A/E5071A does not have the Take4 mode.
		Turning offset correction for the sampler and attenuator On/Off			**RAWOFFS**		
		Turning sampler correction On/Off			**SAMC**		
		Turning spur avoidance On/Off			**SM8**		
		Executing a sweep in Take4 mode			**SWPSTART**		
	Calibrating the receiver	Setting the power reference			**REIC***1	Not available	The E5070A/E5071A does not offer receiver calibration.
		Executing the receiver calibration			**TAKRS***1	Not available	
	Power meter calibration	Display the softkey for the power meter calibration to specify the power level.			**PWRMCAL**	Not available	The E5070A/E5071A does not have the power calibration function.
		Selecting a power meter			**POWM**	Not available	
		Starting a data sweep for power meter calibration			**TAKCS***1	Not available	
		Editing the calibration coefficients table	Editing start	Sensor A	**CALFSENA**	Not available	
				Sensor B	**CALFSENB**		
			Deleting the entire list		**CLEL**	Not available	
					CLEAL	Not available	
			Editing segments	Selection	**SEDI**	Not available	
				Addition	**SADD**	Not available	
				Deletion	**SDEL**	Not available	
				End	**SDON**	Not available	
				Frequency	**CALFCALF**	Not available	
				Calibration coefficients	**CALFFREQ**	Not available	

Function	Item to be specified/executed				Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Calibration (cont'd.)	Power meter calibration (cont'd.)	Power loss list editing	Start		**POWLLIST**	Not available	The E5070A/E5071A does not have the power calibration function.
			Deleting the entire list		**CLEL**		
					CLEAL		
			Editing segments	Selection	**SEDI**		
				Addition	**SADD**		
				Deletion	**SDEL**		
				End	**SDON**		
				Frequency	**POWLFREQ**		
				Loss	**POWLLOSS**		
		Specifying the number of measurements per point			**NUMR**		
		Defining the GPIB reading from the power meter as the title			**PMTRTTIT**		
		Selecting a power sensor		Sensor A	**USESENSA**[*1*4]		
				Sensor B	**USESENSB**[*1*4]		
		Executing a calibration	Per sweep		**PWMCEACS**[*1]		
			One time		**PWMCONES**[*1]		
			Off		**PWMCOFF**[*1]		
		Specifying to Use/Not Use the power loss list			**PWRLOSS**[*1*4]		
	Defining the calibration kit	Start of defining the calibration kit			**MODI1**	Not available	The E5070A/E5071A has no command for starting/ending kit definition. The calibration kit assigned for each channel is already defined.
		End of defining the calibration kit			**STDD**	Not available	
		Setting up the calibration kit label			**LABK**	**:SENS{1-9}:CORR:COLL:CKIT:LAB**	
		Defining the selected calibration kit as a user calibration kit			**SAVEUSEK**	Not available	On the E5070A/E5071A, Any calibration kit numbers can be assigned as user calibration kits.
		Defining the calibration class	S11A (OPEN)		**SPECS11A**	**:SENS{1-9}:CORR:COLL:CKIT:ORD:OPEN**	The E5070A/E5071A uses a parameter to specify a port.
					SPECTRFM		
			S11B (SHORT)		**SPECS11B**	**:SENS{1-9}:CORR:COLL:CKIT:ORD:SHOR**	
					SPECTLFM		
			S11C (LOAD)		**SPECS11C**	**:SENS{1-9}:CORR:COLL:CKIT:ORD:LOAD**	
					SPECTLFT		
			S22A (OPEN)		**SPECS22A**	**:SENS{1-9}:CORR:COLL:CKIT:ORD:OPEN**	
					SPECTRRM		
			S22B (SHORT)		**SPECS22B**	**:SENS{1-9}:CORR:COLL:CKIT:ORD:SHOR**	
					SPECTLRM		
			S22C (LOAD)		**SPECS22C**	**:SENS{1-9}:CORR:COLL:CKIT:ORD:LOAD**	
					SPECTLRT		

Function	Item to be specified/executed			Command (For footnotes, see page 546.)		Remarks
				8753ES	E5070A/E5071A	
Calibration (cont'd.)	Defining the calibration kit (cont'd.)	Defining the calibration class (cont'd.)	Forward match	**SPECFWDM**	**:SENS{1-9}:CORR:COLL:CKIT:ORD:THRU** (definition of the calibration class THRU)	Registering a standard in the THRU calibration class on the E5070A/E5071A is equivalent to registering one standard in four types of calibration classes on the 8753ES.
				SPECTTFM		
			Forward transmission	**SPECFWDT**		
				SPECTTFT		
			Reverse match	**SPECREVM**		
				SPECTTRM		
			Reverse transmission	**SPECREVT**		
				SPECTTRT		
			Response	**SPECRESP**	Not available	The E5070A/E5071A is not provided with any response class.
			Response & isolation	**SPECRESI**		
			TRL line/match	**SPECTRLL**	Not available	The E5070A/E5071A supports the TRL*/LRM* calibration function using VBA.
			TRL thru	**SPECTRLT**		
			TRL reflection	**SPECTRLR**		
			End of definitions	**CLAD**	Not available	
		Editing the calibration class label	S11A (OPEN)	**LABES11A**	Not available	The E5070A/E5071A does not allow you to edit the calibration class label.
				LABETRFM		
			S11B (SHORT)	**LABES11B**		
				LABETLFM		
			S11C (LOAD)	**LABES11C**		
				LABETLFT		
			S22A (OPEN)	**LABES22A**		
				LABETRRM		
			S22B (SHORT)	**LABES22B**		
				LABETLRM		
			S22C (LOAD)	**LABES22C**		
				LABETLRT		
			Forward match	**LABEFWDM**		
				LABETTFM		
			Forward transmission	**LABEFWDT**		
				LABETTFT		
			Reverse match	**LABEREVM**		
				LABETTRM		
			Reverse transmission	**LABEREVT**		
				LABETTRT		
			Response	**LABERESP**		
			Response & isolation	**LABERESI**		
			TRL line/match	**LABETRLL**		
			TRL thru	**LABETRLT**		
			TRL reflection	**LABETRLR**		
		Setting up the reference for the TRL*/LRM* calibration	Reflect	**SETRREFL**	Not available	The E5070A/E5071A supports the TRL*/LRM* calibration function using VBA.
			Thru	**SETRTHRU**		
		Designating the number of the standard to be defined and starting definition of the standards		**DEFS**	Not available	

Function	Item to be specified/executed				Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Calibration (cont'd.)	Defining the calibration kit (cont'd.)	End of defining the standards			**KITD**	Not available	
		Setting up the standard label			**LABS**	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:LAB**	
		Setting up the type of standard	OPEN standard		**STDTOPEN**	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:TYPE OPEN**	
			SHORT standard		**STDTSHOR**	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:TYPE SHOR**	
			LOAD standard		**STDTLOAD**	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:TYPE LOAD**	
			THRU standard		**STDTDELA**	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:TYPE THRU**	
			Arbitrary impedance		**STDTARBI**	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:TYPE ARBI**	
		Specifying the calibrated value of a standard	Offset delay		**OFSD**	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:DEL**	Setup items of the calibrated value are the same as standard type items.
			Offset loss		**OFSL**	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:LOS**	
			Offset impedance		**OFSZ**	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:Z0**	
			C0		**C0**	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C0**	Setup is effective for the OPEN standard only. (8753ES/E5070A/E5071A Common)
			C1		**C1**	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C1**	
			C2		**C2**	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C2**	
			C3		**C3**	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:C3**	
			Terminal impedance		**TERI**	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:ARB**	Setup can be performed only when Arbitrary Impedance is used for setup. (8753ES/E5070A/E5071A Common)
			Types of LOAD standards	Fixed	**FIXE**	Not available	The E5070A/E5071A handles all as fixed load.
				Sliding	**SLIL**		
				Offset	**OFLS**		
			Frequency range	Minimum	**MINF**	Not available	The E5070A/E5071A does not allow you to set the frequency range.
				Maximum	**MAXF**		
			Setting up the offset type	Coaxial cable	**COAX**	Not available	The E5070A/E5071A treats the offset type as a coaxial cable.
				Wave guide	**WAVE**		
		End of defining standards			**STDO**	Not available	The E5070A/E5071A does not have the command for ending definition.
		Options for TRL*/LRM* calibration.	Specifying the characteristic impedance	Standard	**CALZLINE**	Not available	The E5070A/E5071A supports the TRL*/LRM* calibration function using VBA.
				System	**CALZSYST**		

Function	Item to be specified/executed				Command (For footnotes, see page 546.)		Remarks
					8753ES	E5070A/E5071A	
Calibration (cont'd.)	ECal	Setting up the active module		A	**ECALMODSELA**	Not available	E5070A/E5071A activate the ECal module connected first.
				B	**ECALMODSELB**		
		Executing calibration	Forward enhanced response calibration		**ECALERC**	Not available	The E5070A/E5071A does not allow you to perform an enhanced response calibration.
			Reverse enhanced response calibration		**ECALRERC**	Not available	
			1-port calibration	S11	**ECALS11**	**:CALC{1-9}:CORR:COLL:ECAL:SOLT1 1**	
				S22	**ECALS22**	**:CALC{1-9}:CORR:COLL:ECAL:SOLT1 2**	
			Full 2-port calibration		**ECALS22**	**:CALC{1-9}:CORR:COLL:ECAL:SOLT2**	
			Turning the omission of isolation On/Off		**ECALOMII**	**:CALC{1-9}:CORR:COLL:ECAL:ISOL**	When the E5070A/E5071A is turned on, the 8753ES is turned off, and vice versa.
			Designating the averaging factor for isolation		**ECALISOAVG**	Not available	
		Module information	Reading the selected module		**ECALAB?**	Not available	
			Reading the product number and serial number		**ECALMODID**		
		Calibration frequency array	Reading the frequency array		**ECALFREQS**	Not available	
			Designating the size of the frequency array to be read		**ECALNFREQS**		
		Interruption	Turning Manual THRU Measurement On/Off		**ECALMANTHRU**	Not available	E5070A/E5071A can not pause the ECal.
			Reading during Interruption/Execution		**ECALPAUSED**		
			Resuming a suspended ECal		**ECALCONT**		

Function	Item to be specified/executed			Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Reading/Writing data	Transfer format designation	Intra-device binary format		**FORM1**	Not available	
		IEEE 32-bit floating point format		**FORM2**	Not available	
		IEEE 64-bit floating point format		**FORM3**	**:FORM:DATA REAL** **:FORM:BORD NORM**	
		ASCII format		**FORM4**	**:FORM:DATA ASC**	
		PC-DOS 32-bit floating point format		**FORM5**	Not available	
	Raw data array	Array 1 (S11)	Read	**OUTPRAW1**[*1]	Not available	The E5070A/E5071A does not allow you to read/write the raw data array.
				OUTPRAF1[*1]		
			Write	**INPURAW1**[*1]		
		Array 2 (S21)	Read	**OUTPRAW2**[*1]		
				OUTPRAF2[*1]		
			Write	**INPURAW2**[*1]		
		Array 3 (S12)	Read	**OUTPRAW3**[*1]		
				OUTPRAF3[*1]		
			Write	**INPURAW3**[*1]		
		Array 4 (S22)	Read	**OUTPRAW4**[*1]		
				OUTPRAF4[*1]		
			Write	**INPURAW4**[*1]		
	Calibration coefficient array data	Before interpolating	Read	**OUTPCALC**[*1]	Not available	The E5070A/E5071A does not allow you to read/write the calibration coefficient array.
			Write	**INPUCALC**[*1]		
			End of writing	**SAVC**[*1]		
		After interpolating	Read	**OUTPICAL{01-12}**[*1]	Not available	
	Corrected data array	Read		**OUTPDATA**[*1]	**:CALC{1-9}:DATA:SDAT?**	The E5070A/E5071A allows you to only read corrected data arrays. (The high-speed data transfer command does not exist.)
		Read (high-speed data transfer)		**OUTPDATF**[*1]		
		Write		**INPUDATA**[*1]	Not available	
	Memory trace	Read		**OUTPMEMO**[*1]	**:CALC{1-9}:DATA:SMEM?**	The E5070A/E5071A does not have any high-speed data transfer command.
		Read (high-speed data transfer)		**OUTPMEMF**[*1]		
	Formatted data array	Read		**OUTPFORM**[*1]	**:CALC{1-9}:DATA:FDAT?**[*3]	The E5070A/E5071A does not have any high-speed data transfer command.
		Read (high-speed data transfer)		**OUTPFORF**[*1]		
		Write		**INPUFORM**[*1]	**:CALC{1-9}:DATA:FDAT**[*3]	

Function	Item to be specified/executed				Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Reading/Writing data (cont'd.)	Reading trace data at a designated point	Designating the point			**SELPT*1**	Not available	The E5070A/E5071A does not allow you to read trace data in a range that you have limited.
		Read			**OUTPDATP*1**		
	Reading trace data for a designated measurement range	Specifying the range	Upper limit value		**SELMAXPT*1**		
			Lower limit value		**SELMINPT*1**		
		Read			**OUTPDATR*1**		
	Reading a Pre-Raw Data Array (in Take4 mode)				**OUTPPRE*1**	Not available	The E5070A/E5071A does not allow you to read/write pre-raw data array.
	Calibration kit array data	Read			**OUTPCALK**	Not available	The E5070A/E5071A does not allow you to read/write the calibration kit array.
		Write			**INPUCALK**		
	Power meter calibration coefficient array	Port 1	Before interpolating	Read	**OUTPPMCAL1**	Not available	The E5070A/E5071A does not have the power meter calibration function.
				Write	**INPUPMCAL1**		
			After interpolating	Read	**OUTPIPMCL1**		
		Port 2	Before interploating	Read	**OUTPPMCAL2**		
				Write	**INPUPMCAL2**		
			After interpolating	Read	**OUTPIPMCL2**		
	Reading the entry area display				**OUTPACTI**	Not available	
	Reading error information from the error cue				**OUTPERRO**	**:SYST:ERR?**	
	All lists at the time when the lists are displayed				**OUTPPRINALL**	Not available	
	Learn string	Designating revisions			**SELL**	Not available	The E5070A/E5071A does not allow you to read/write the learn string.
		Read			**OUTPLEAS**		
					LRN?		
		Write			**INPULEAS**		
					LRN		
	Reading product information				**OUTPIDEN**	***IDN?**	
	Reading a product's serial number				**OUTPSERN**	Included in the value read from ***IDN?**	
	Reading the firmware revision				**SOFR**		
	Reading the installed options				**OUTPOPTS**	***OPT?**	

Function	Item to be specified/executed		Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Markers	Activate the marker and move it to the designated stimulus value.	Marker 1	**MARK1**[*1]	**:CALC{1-9}:MARK{1-10}:ACT**[*7] (Setting up the active marker) **:CALC{1-9}:MARK{1-10}:X**[*7] (Specifying the stimulus value of the marker) These two commands enables you to perform the equivalent.	
		Marker 2	**MARK2**[*1]		
		Marker 3	**MARK3**[*1]		
		Marker 4	**MARK4**[*1]		
		Marker 5	**MARK5**[*1]		
	Move to the designated point		**MARKBUCK**[*8]	Not available	
	Setting up the marker move mode	Continuous mode	**MARKCONT**[*8]	**:CALC{1-9}:MARK{1-10}:DISC OFF**[*5]	
		Discrete mode	**MARKDISC**[*8]	**:CALC{1-9}:MARK{1-10}:DISC ON**[*5]	
	Specifying Couple/Uncouple between channels	Couple	**MARKCOUP**[*8]	**:CALC{1-9}:MARK{1-10}:COUP ON**[*5]	On the E5070A/E5071A, Couple/Uncouple between traces in the same channel is specified.
		Uncouple	**MARKCOUP**[*8]	**:CALC{1-9}:MARK{1-10}:COUP OFF**[*5]	
	On/Off setting for all marker value displays		**DISM**[*1]	Not available	The E5070A/E5071A always displays all marker values.
	Turning off all markers and the marker function		**MARKOFF**[*1]	**:CALC{1-9}:MARK{1-10}**[*7] can be used to turn off the marker display but the function remains turned on)	
	Delta marker(Reference marker)	Turning off the delta marker	**DELO**[*1]	**:CALC{1-9}:MARK:REF OFF**[*3]	The E5070A/E5071A assigns marker 10 as the delta marker.
		Designating a delta marker	**DELR**[*1]	Not available	
	Designating the position of a fixed marker	Auxiliary measured value	**MARKFAUV**[*1]	Not available	The E5070A/E5071A does not have the fixed marker function.
		Stimulus value	**MARKFSTI**[*1]		
		Designated point	**MARKFVAL**[*1]		
		Position of the active marker	**MARKZERO**[*1]		
		Designating a fixed marker as the reference marker	**DELRFIXM**[*1]		
	Selecting readout format on a Smith chart	Admittance	**SMIMGB**	Not available	On the E5070A/E5071A, readout format is specified when setting up data format.
		Linear magnitude	**SMIMLIN**		
		Log magnitude	**SMIMLOG**		
		Real/Imaginary	**SMIMRI**		
		Impedance	**SMIMRX**		
	Selecting readout format on a polar display	Linear magnitude	**POLMLIN**		
		Log magnitude	**POLMLOG**		
		Real/Imaginary	**POLMRI**		

Function	Item to be specified/executed			Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Markers (cont'd.)	Setting the marker value at a different value	Starting value for the sweep range		**MARKSTAR**[*8]	**:CALC{1-9}:MARK{1-10}:SET STAR**[*7]	
		Ending value for the sweep range		**MARKSTOP**[*8]	**:CALC{1-9}:MARK{1-10}:SET STOP**[*7]	
		Center value of the sweep range		**MARKCENT**[*8]	**:CALC{1-9}:MARK{1-10}:SET CENT**[*7]	
		Span value of the sweep range		**MARKSPAN**[*8]	Not available	
		Reference value		**MARKREF**[*8]	**:CALC{1-9}:MARK{1-10}:SET RLEV**[*7]	
		CW frequency value		**MARKCW**[*8]	Not available	
	Reading the marker value of hte active marker			**OUTPMARK**[*8]	**:CALC{1-9}:MARK{1-10}:X?**[*7] (stimulus value) **:CALC{1-9}:MARK{1-10}:Y?**[*7] (stimulus value) allows you to read the marker value of any marker.	The retrurn value from 8753ES includes the both of stimulus value and response value
	Specify the electrical length so that the group delay becomes zero at the position of the active marker.			**MARKDELA**[*8]	Not available	
	Marker search	Turning off the search function		**SEAOFF**[*8]	Not available	The E5070A/E5071A requires you to send two commands, one for designating the search type and the other for executing the search.
		Maximum		**MARKMAXI**[*8] **SEAMAX**[*8]	**:CALC{1-9}:MARK{1-10}:FUNC:TYPE MAX**[*7] **:CALC{1-9}:MARK{1-10}:FUNC:EXEC**[*7]	
		Minimum		**MARKMINI**[*8] **SEAMIN**[*8]	**:CALC{1-9}:MARK{1-10}:FUNC:TYPE MIN**[*7] **:CALC{1-9}:MARK{1-10}:FUNC:EXEC**[*7]	
		Target search	Left side	**SEAL**[*8]	**:CALC{1-9}:MARK{1-10}:FUNC:TYPE LTAR**[*7] **:CALC{1-9}:MARK{1-10}:FUNC:EXEC**[*7]	
			Right side	**SEAR**[*8]	**:CALC{1-9}:MARK{1-10}:FUNC:TYPE RTAR**[*7] **:CALC{1-9}:MARK{1-10}:FUNC:EXEC**[*7]	
			Specifying the search value	**SEATARG**[*8]	**:CALC{1-9}:MARK{1-10}:FUNC:TARG**[*7]	
		Bandwidth search	On/Off	**WIDT**[*8]	**:CALC{1-9}:MARK:BWID**[*7]	
			Specifying parameters	**WIDV**[*8]	**:CALC{1-9}:MARK{1-10}:BWID:THRU**[*7]	
		Turning the tracking On/Off		**TRACK**[*8]	**:CALC{1-9}:MARK{1-10}:FUNC:TRAC**[*7]	
	Statistics analysis	On/Off		**MEASTAT**[*8]	**:CALC{1-9}:MST**[*3]	
		Reading the results		**OUTPMSTA**[*8]	**:CALC{1-9}:MST:DATA?**[*3]	

Function	Item to be specified/executed				Command (For footnotes, see page 546.) 8753ES	Command (For footnotes, see page 546.) E5070A/E5071A	Remarks
Device test	Limit test	Turning the limit test On/Off			**LIMITEST**[*1]	**:CALC{1-9}:LIM**[*3]	
		Turning the limit line display On/Off			**LIMILINE**[*1]	**:CALC{1-9}:LIM:DISP**[*3]	
		Limit Editing the test list	Start of editing		**EDITLIML**	**:CALC{1-9}:LIM:DATA**[*3] is used to set up the limit test table.	
			End of editing		**EDITDONE**		
			Deleting the entire list		**CLEL**	**:CALC{1-9}:LIM:DATA 0**[*3]	
					CLEAL		
			Setting the marker value at the offset along the Y-axis		**LIMIMAOF**	**:CALC{1-9}:LIM:DATA**[*3] is used to set up the limit test table.	
			Editing segments	Selection	**SEDI**		
				Addition	**SADD**		
				Deletion	**SDEL**		
				End	**SDON**		
				Boundary value	**LIMS**		
				Upper limit value	**LIMU**		
				Lower limit value	**LIML**		
				Delta value	**LIMD**		
				Center valuer	**LIMM**		
				Sloping line	**LIMTSL**		
				Flat line	**LIMTFL**		
				Single point	**LIMTSP**		
				Setting the boundary value at the active marker’s response value	**MARKSTIM**		
				Setting the center value at the active marker’s response value	**MARKMIDD**		
		Specifying the offset	Along the X-axis		**LIMISTIO**	Not available	The E5070A/E5071A does not allow the offset to be specified.
			Along the Y-axis		**LIMIAMPO**		
		Turning the function On/Off that records the maximum and minimum for each segment			**MINMAX**	Not available	

Function	Item to be specified/executed			Command (For footnotes, see page 546.)		Remarks
				8753ES	E5070A/E5071A	
Device test (cont'd.)	Limit test (cont'd.)	Reading the results	Reading the pass/fail of a channel	**OUTPLIM{1-4}**	**:CALC{1-9}:LIM:FAIL?**[*3] (Reading the pass/fail of a active trace)	The E5070A/E5071A has a different returned value.
			Intra-segment maximum measured value	**OUTPAMAX**	Not available	The E5070A/E5071A does not allow you to read data for each segment/each point.
			Intra-segment minimum measured value	**OUTPAMIN**	Not available	
			Number of valid segments and results for each segment	**OUTPSEGAF**	Not available	
			Maximum/minimum in all segments	**OUTPSEGAM**	Not available	
			Designating the segment to be read by **OUTPSEGF** and **OUTPSEGM**	**SELSEG**	Not available	
			Pass/Fail of the designated segment	**OUTPSEGF**	Not available	
			Maximum/Minimum of the designated segment	**OUTPSEGM**	Not available	
			Point information	**OUTPLIML**	Not available	
			Information on the position of the active marker	**OUTPLIMM**	Not available	
			Information on a failed point and the number of failed points	**OUTPLIMF**	Not available	The E5070A/E5071A allows you to read the number of points by using **:CALC{1-9}:LIM:REP :POIN?**, and the stimulus value by using **:CALC{1-9}:LIM:REP ?** , but other values cannot be read.
			Number of failed points, and the stimulus and measured values of the failed points	**OUTPFAIP**	Not available	
	Ripple test	Turning the ripple test On/Off		**RLIMTEST**	Not available	The E5070A/E5071A does not have the ripple test function.
		Turning the limit line display On/Off		**RLIMLINE**		
		Ripple limit editing	Start of editing	**EDITRLIM**		
			End of editing	**EDITDONE**		
			Deleting all of the limits	**CLEL**		
				CLEAL		

Function	Item to be specified/executed				Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Device test (cont'd.)	Ripple test (cont'd.)	Ripple limit editing (cont'd.)	Editing the band	Selection	**SEDI**	Not available	The E5070A/E5071A does not have the ripple test function.
				Addition	**SADD**		
				Deletion	**SDEL**		
				End	**SDON**		
				Upper limit value	**RLIMM**		
				Start value	**RLIMSTR**		
				Stop value	**RLIMSTP**		
			Displaying the ripple value	Absolute value	**RLIMVALABS**		
				Margin	**RLIMVALMAR**		
				Off	**RLIMVALOFF**		
		Reading the results	Information on failed points		**OUTPFARPLPT**		
			Magnitude of ripples in all valid bands		**OUTPRPLBNDALL**		
			Designated band results		**OUTPRPLBNDPF**		
			Magnitude of designated bands ripples		**OUTPRPLBNDVAL**		
	Bandwidth test	Turning the bandwidth test On/Off			**BWLIMTEST**[*1]	Not available	The E5070A/E5071A allows the bandwidth to be displayed but not to be tested.
		Turning the bandwidth display On/Off			**BWLIMDISP**[*1]	**:CALC{1-9}:MARK{1-10}:BWID**[*7]	
		Specifying the bandwidth threshold value (attenuation from the peak)			**BWLIMDB**[*1]	**:CALC{1-9}:MARK{1-10}:BWID:THR**[*7]	
		Specifying the upper limit value for the test			**BWLIMMAX**[*1]	Not available	
		Specifying the lower limit value for the test			**BWLIMMIN**[*1]	Not available	
		Reading the results	Bandwidth, center value, Q value		**OUTPMWID**[*1]	Not available	
			Bandwidth, center value, Q value, loss		**OUTPMWIL**[*1]	**:CALC{1-9}:MARK{1-10}:BWID:DATA?**[*7]	
			Reading the bandwidth value		**BWLIMVAL**[*1]	**:CALC{1-9}:MARK{1-10}:BWID:DATA?**[*7]	
			Reading the results (pass/fail)		**BWLIMSTAT**[*1]	Not available	
Status report	Clearing the status byte register, event status register, and valid register.				**CLES**	***CLS**	
					CLS		
	Reading the status byte register				**OUTPSTAT**	***STB?**	
					STB?	***STB?**	
	Setting up the service request valid register				**SRE**	***SRE**	
	Reading the event status register				**ESR?**	***ESR?**	
	Setting up the event status valid register				**ESE**	***ESE**	

Function	Item to be specified/executed			Command (For footnotes, see page 546.)		Remarks
				8753ES	E5070A/E5071A	
Status report (cont'd.)	Event status register B	Read		**ESB?**	Not available	The E5070A/E5071A have questionable channel limit fail registers, which report result of llimit test.
		Setting up valid registers		**ESNB**	Not available	
	When all operations on standby have been completed, bit 0 of the event status register is set.			**OPC**	***OPC**	8753ES reports the completion of the next command. E5070A/E5071A reports the completion when all commands being executed have been completed.
Save /Recall	Instrument State	Save	Internal register	**SAVE**	**:MMEM:STOR**	On the E5070A/E5071A, the same command is used regardless of the type of media.
				SAVEREG		
			Internal disk	**STOR**		
		Call	Internal register	**RECA**	**:MMEM:LOAD**	
				RECAREG		
			Internal disk	**LOAD**		
	Naming a file to be saved			**TITF**	Designated by using parameters before the file is saved.	
	Selecting the format of the Instrument State file.	ASCII format		**SAVUASCI**	Not availabler	On the E5070A/E5071A, the instrument state file is stored as binary format file.
		Binary format		**SAVUBINA**		
	Selecting the data to be saved in a file	Corrected data array		**EXTMDATA**[*1]	**:MMEM:STOR:STYP**[*3]	The E5070A/E5071A can save the Instrument State plus corrected data array and calibration data. (The 8753ES Instrument State file contains calibration data.)
		Raw data array		**EXTMRAW**[*1]	Not available	
		Trace data		**EXTMFORM**[*1]	Not available	
		LCD screen display		**EXTMGRAP**	Not available	
		Measurement data only		**EXTMDATO**[*1]	Not available	
	Test sequence	Save		**STORSEQ**	Not available	The E5070A/E5071A uses VBA for creating internal programs.
		Load	Floppy disk	**LOADSEQ**		
	LCD screen image	Save		**SAVEJPG**	**:MMEM:STOR:IMAG**	Image files on the E5070A/E5071A are stored in Windows® Bitmap or PNG firmat, while the 8753ES saves files in JPEG format.
	Measurement data (CSV format)	Save		**SAVECSV**[*1]	**:MMEM:STOR:FDAT**[*3]	
	Saving color settings	Save		**SVCO**	Not available	
		Load		**RECO**	Not available	

Function	Item to be specified/executed			Command (For footnotes, see page 546.)		Remarks
				8753ES	E5070A/E5071A	
Save/Recall (cont'd.)	Selecting media for saving files	Internal memory		**INTM**	Not available	The E5070A/E5071A allows the media to be selected by designating the drive name at the time the file is saved. A file can be saved on either the internal hard disk drive or to the floppy disk drive.
		Floppy disk drive		**INTD**	Not available	
		External disk drive		**EXTD**	Not available	
		Designating the external disk number		**DISCUNIT**	Not available	
		Partition on the external disk to be designated		**DISCVOLU**	Not available	
	Designating the storage format		DOS	**FORMATDOS**	Not available	The E5070A/E5071A is compatible with the DOS format only.
			LIF	**FORMATLIF**		
	Initializing the storage medium	Floppy disk		**INID**	Not available	On the E5070A/E5071A, the starage media can be initialized using a mouse.
		Specifying the size of the LIF directory		**DIRS**	Not available	The E5070A/E5071A is compatible with the DOS format only.
		External disk		**INIE**	Not available	
	Save/Recall register	Giving a title		**TITR**	Not available	The E5070A/E5071A stores all data on the hard disk or to a floppy disk.
				TITREG	Not available	
		Clear	Clearing the designated number	**CLEA**	Not available	
				CLEARREG	Not available	
			All clear	**CLEARALL**	Not available	
	File manipulation	Deletion		**PURG**	**:MMEM:DEL**	
	Reading the file title from the disk			**REFT**	Not available	
Test sequence	Creating/Revising a new sequence			**NEWSEQ**	Not available	The E5070A/E5071A does not have the test sequence function. Macros are created using VBA.
	Selecting a test sequence			**Q**	**:PROG:NAME** (Selecting a VBA program)	
				SEQ		
	Reading a test sequence			**OUTPSEQ**	Not available	
	Executing the selected sequence			**DOSEQ**	**:PROG:STAT RUN** (Executing the selected VBA program)	
	Stopping the selected sequencer			**PTOS**	**:PROG:STAT STOP** (Stopping the selected VBA program)	
	Resuming a stopped test sequence			**CONS**	Not available	
	Executing another sequence from the test sequence			**GOSUB**	Not available	
	Naming the test sequence	Name		**TITSEQ**	Not available	
		Displaying the softkey menu for setup		**TITSQ**	Not available	
	Specifying waiting time in the test sequence			**SEQWAIT**	Not available	
	Displaying the softkey menu while the test sequence is in progress.			**SHOM**	Not available	
	Specifying the status bit in the event status register			**ASSS**	Not available	

Function	Item to be specified/executed		Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Test sequence (cont'd.)	GPIO	Designating the bit number of the input port to be used for branching	**PARAIN**	Not available	The E5070A/E5071A does not have a test sequence function. Macros are created using VBA.
		Setting the designated bit	**SETBIT**	Not available	
		Clearing the designated bit	**CLEABIT**	Not available	
		Setting all bits	**PARAOUT**	Not available	
	TTL output	Set to High after ending sweep	**TTLHPULS**	Not available	
		Set to Low after ending sweep	**TTLLPULS**	Not available	
		Always set to High	**TTLOH**	Not available	
		Always set to Low	**TTLOL**	Not available	
	Loop counter	Setting values	**LOOC**	Not available	
		Subtract one.	**DECRLOOC**	Not available	
		Add one.	**INCRLOOC**	Not available	
	Branching	Executes the sequence when the designated GPIO bit is set to High.	**IFBIHIGH**	Not available	
		Executes the sequence when the designated GPIO bit is set to Low.	**IFBILOW**	Not available	
		Executes the sequence when the loop counter is at zero.	**IFLCEQZE**	Not available	
		Executes the sequence when the loop counter is not at zero.	**IFLCNEZE**	Not available	
		Executes the sequence when the limit test fails.	**IFLTFAIL**	Not available	
		Limit test passes, and the sequence executes.	**IFLTPASS**	Not available	
	Specifying the bit for selecting the attenuator in the test set.	Forward	**TSTIOFWD**	Not available	
		Reverse	**TSTIOREV**	Not available	
	Clearing the designated sequence from the register		**CLEASEQ**	Not available	
	Ending editing of the test sequence		**DONM**	Not available	
	Copying the test sequence		**DUPLSEQ**	Not available	

C. Comparing Commands on the 8753ES and E5070A/E5071A

<table>
<tr><th rowspan="2">Function</th><th colspan="3" rowspan="2">Item to be specified/executed</th><th colspan="2">Command (For footnotes, see page 546.)</th><th rowspan="2">Remarks</th></tr>
<tr><th>8753ES</th><th>E5070A/E5071A</th></tr>
<tr><td rowspan="16">System</td><td colspan="3" rowspan="2">Reset</td><td>PRES</td><td>:SYST:PRES</td><td rowspan="2">After execution, the *RST on the E5070A/E5071A set the trigger state to Hold.</td></tr>
<tr><td>RST</td><td>*RST</td></tr>
<tr><td colspan="3">Executes a self-test and returns the results.</td><td>TST?</td><td>Not available</td><td></td></tr>
<tr><td colspan="2" rowspan="4">Internal clock</td><td>Setting the date</td><td>SETDATE</td><td>:SYST:DATE</td><td></td></tr>
<tr><td>Reading the date</td><td>READDATE</td><td>:SYST:DATE?</td><td></td></tr>
<tr><td>Setting the time</td><td>SETTIME</td><td>:SYST:TIME</td><td></td></tr>
<tr><td>Reading the time</td><td>READTIME</td><td>:SYST:TIME?</td><td></td></tr>
<tr><td colspan="2" rowspan="4">Setting up the beep sound</td><td>On/Off operations at the time an action is completed</td><td>BEEPDONE</td><td>:SYST:BEEP:COMP:STAT</td><td></td></tr>
<tr><td>On/Off at the time the limit test fails</td><td>BEEPFAIL</td><td>Not available</td><td>On the E5070A/E5071A, the beep sound for a failed limit test is set up based on the beeper setup for the warning sound.</td></tr>
<tr><td>On/Off at the time a warning occurs</td><td>BEEPWARN</td><td>:SYST:BEEP:WARN:STAT</td><td rowspan="2"></td></tr>
<tr><td>Sounds the beep sound.</td><td>EMIB</td><td>:SYST:BEEP:COMP:IMM (Beep sound when an action completes) or :SYST:BEEP:WARN:IMM (Beep sound when a warning occurs)</td></tr>
<tr><td colspan="2" rowspan="4">Selecting the measurement mode</td><td>Standard network analyzer</td><td>INSMNETA</td><td rowspan="4">Not available</td><td rowspan="4">The E5070A/E5071A is always considered a standard network analyzer.</td></tr>
<tr><td>External source (automatic)</td><td>INSMEXSA</td></tr>
<tr><td>External source (manual)</td><td>INSMEXSM</td></tr>
<tr><td>Tuned receiver</td><td>INSMTUNR</td></tr>
<tr><td style="display:none"></td></tr>
<tr><td rowspan="10">Printer/Plotter output</td><td rowspan="4">Printing</td><td colspan="2">Plotter</td><td>PLOT</td><td>Not available</td><td></td></tr>
<tr><td rowspan="3">Printer</td><td>LCD screen</td><td>PRINALL</td><td>:HCOP</td><td></td></tr>
<tr><td>Test sequence</td><td>PRINSEQ</td><td>Not available</td><td>The E5070A/E5071A does not have the test sequence function.</td></tr>
<tr><td>List display</td><td>PRINTALL</td><td>Not available</td><td>The E5070A/E5071A does not have the list display function.</td></tr>
<tr><td colspan="3">Output the LCD screen to the printer by using a PCL raster dump.</td><td>OUTPPRIN</td><td>:HCOP</td><td></td></tr>
<tr><td colspan="3">The LCD screen in the HP-GL is output from the GPIB port.</td><td>OUTPPLOT</td><td>Not available</td><td>The E5070A/E5071A does not allow output from the GPIB.</td></tr>
<tr><td colspan="2" rowspan="2">Setting the line type</td><td></td><td>LINTDATA</td><td rowspan="2">Not available</td><td rowspan="2">The E5070A/E5071A always gives the data trace in a solid line.</td></tr>
<tr><td>Memory trace</td><td>LINTMEMO</td></tr>
<tr><td rowspan="3">Setting up the printer</td><td colspan="2">Return to the initial state</td><td>DEFLPRINT</td><td>Not available</td><td rowspan="3">On the E5070A/E5071A, the printer setup is executed by using the front panel.</td></tr>
<tr><td rowspan="2">Setting up for printing</td><td>Color</td><td>PRIC</td><td rowspan="2">Not available</td></tr>
<tr><td>Monochrome</td><td>PRIS</td></tr>
</table>

Function	Item to be specified/executed			Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Printer/Plotter output (cont'd.)	Setting up the printer (cont'd.)	Color	Trace data	**PCOLDATA**	Not available	On the E5070A/E5071A, color setup is allowed only for turning highlighting of the entire screen On/Off.
			Graticule lines	**PCOLGRAT**		
			Memory trace	**PCOLMEMO**		
			Reference line	**PCOLREFL**		
			Text	**PCOLTEXT**		
			Warning message	**PCOLWARN**		
		Setting the printer port	GPIB	**PRNPRTHPIB**	Not available	On the E5070A/E5071A, the printer setup is executed by using the front panel.
			Parallel port	**PRNPRTPARA**		
			Serial port	**PRNPRTSERI**		
		Setting the printer type	HP DeskJet 540/850C	**PRNTYP540**	Not available	On the E5070A/E5071A, the printer setup is executed by using the front panel.
			HP DeskJet	**PRNTYPDJ**		
			Epson ESC/P2	**PRNTYPEP**		
			HP LaserJet	**PRNTYPLJ**		
			HP PaintJet	**PRNTYPPJ**		
			HP ThinkJet	**PRNTYPTJ**		
		Handshake mode		**PRNHNDSHK**	Not available	
		Turning the automatic feed On/Off		**PRNTRAUTF**	Not available	
		Serial port baud rate		**PRNTRBAUD**	Not available	
		Sending a form feed		**PRNTRFORF**	Not available	
	Plotter setup	Returning to the initial state		**DFLT**	Not available	The E5070A/E5071A does not support plotters.
		Setting the print scope	Entire sheet	**FULP**		
			Lower-left 1/4 of a sheet	**LEFL**		
			Upper-left 1/4 of a sheet	**LEFU**		
			Lower-right 1/4 of a sheet	**RIGL**		
			Upper-right 1/4 of a sheet	**RIGU**		
		Turning the plot On/Off	Trace data	**PDATA**		
			Graticule lines	**PGRAT**		
			Memory trace	**PMEM**		
			Marker	**PMKR**		
			Softkey	**PSOFT**		
			Text	**PTEXT**		
		Pen number	Trace data	**PENNDATA**		
			Graticule lines	**PENNGRAT**		
			Memory trace	**PENNMARK**		
			Marker	**PENNMEMO**		
			Text	**PENNTEXT**		
		Pen speed	High speed	**PLOSSLOW**		
			Low speed	**PLOSFAST**		
		Setting up the scale	FULL	**SCAPFULL**		
			GRAT	**SCAPGRAT**		

C. Comparing Commands on the 8753ES and E5070A/E5071A

Function	Item to be specified/executed			Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Printer/Plotter output (cont'd.)	Plotter setup (cont'd.)	Plotter port	Disk	**PLTPRTDISK**	Not available	The E5070A/E5071A does not support plotters.
			GPIB	**PLTPRTHPIB**		
			Parallel port	**PLTPRTPARA**		
			Serial port	**PLTPRTSERI**		
		Plotter type	PCL5-compatible	**PLTTYPHPGL**		
			Plotter	**PLTTYPPLTR**		
		Handshake mode		**PLTHNDSHK**		
		Turning the automatic feed On/Off		**PLTTRAUTF**		
		Serial port baud rate		**PLTTRBAUD**		
		Sending a form feed		**PLTTRFORF**		
	Setting up printing	Initialization		**DEFLTCPIO**	Not available	
	Turning the timestamp print On/Off			**TIMESTAM**	Not available	On the E5070A/E5071A, always display the timestamp on LCD.
	Naming a file to receive plot output.			**TITP**	Not available	
Test set	Confirming the test set connection			**TESS**	Not available	
	Switching the changeover for the test set	Setting up Continuous/Stop		**CSWI**	Not available	On the E5070A/E5071A, always continuous.
		Specifying the number of times to change over.		**TSSWI**		
Time domain transformation	Turning the transformation On/Off			**TIMDTRAN**	**:CALC{1-9}:TRAN:TIME:STAT**	
	Selecting the mode	Low-pass impulse		**LOWPIMPU**	**:CALC{1-9}:TRAN:TIME** **:CALC{1-9}:TRAN:TIME:STIM**	
		Low-pass step		**LOWPSTEP**		
		Bandpass		**BANDPASS**		
	Display the softkeys for setting up the gate			**SPEG**	Not available	
	Turning the time-domain gate On/Off			**GATEO**	**:CALC{1-9}:FILT:TIME:STAT**	
	Time-domain gate time	Start		**GATESTAR**	**:CALC{1-9}:FILT:TIME:STAR**	
		Stop		**GATESTOP**	**:CALC{1-9}:FILT:TIME:STOP**	
		Center		**GATECENT**	**:CALC{1-9}:FILT:TIME:CENT**	
		Span		**GATESPAN**	**:CALC{1-9}:FILT:TIME:SPAN**	
	Form of the time-domain gate	Minimum		**GATSMINI**	**:CALC{1-9}:FILT:TIME:SHAP**	
		Normal		**GATSNORM**		
		Wide		**GATSWIDE**		
		Maximum		**GATSMAXI**		
	Demodulation function	Off		**DEMOOFF**	Not available	
		AM modulation		**DEMOAMPL**	Not available	
		Phase modulation		**DEMOPHAS**	Not available	
	Setting up the display	Maximum		**WINDMAXI**	**:CALC{1-9}:TRAN:TIME:KBES**	
		Minimum		**WINDMINI**		
		Normal		**WINDNORM**		
		Specifying values		**WINDOW**		
	Turning use of the memory trace On/Off			**WINDUSEM**	Not available	
	Freq low-pass measurement			**SETF**	**:CALC{1-9}:TRAN:TIME:LPFR**	

Function	Item to be specified/executed			Command (For footnotes, see page 546.) 8753ES	E5070A/E5071A	Remarks
Others (cont'd.)	Mixer measurement	Turning the frequency offset mode On/Off		**FREQOFFS**	Not available	The E5070A/E5071A does not have the mixer measuring function.
		Selecting the down conversion.		**DCONV**		
		Selecting the up conversion.		**UCONV**		
		Reading the frequency of the external RF signal source.		**OUTPRFFR**		
		Specifying LO	Turning control On/Off	**LOCONT**		
			Frequency	**LOFREQ**		
			Setting the frequency in sweep mode	**LOFSWE**		
			Starting frequency	**LOFSTAR**		
			Stop frequency	**LOFSTOP**		
			Power	**LOPOWER**		
			Setting the power in sweep mode	**LOPSTAR**		
			Start power	**LOPSTOP**		
			Stop power	**LOPSWE**		
		Setting the signal source	RF > LO	**RFGTLO**		
			RF < LO	**RFLTLO**		
		Setting up the display	Setup screen	**VIEMOFF**		
			Measurement screen	**VIEMON**		
		LO frequency is used in the offset mode.		**VOFF**		
	Harmonics measurement mode		Turning off the measurement mode.	**HARMOFF**	Not available	The E5070A/E5071A does not have the harmonics measurement mode.
			2nd harmonics measurement	**HARMSEC**		
			3rd harmonics measurement	**HARMTHIR**		
	Key manipulation related commands	Performing the same processing as with the front panel key designated.		**KEY**	Not available	
		Performs the same processing as with the [↑] key on the front panel.		**UP**	Not available	
		Performs the same processing as with the [↓] key on the front panel.		**DOWN**	Not available	
		Returns the code of the last key manipulated on the front panel.		**KOR?**	Not available	
				OUTPKEY	Not available	
		Displaying the softkey menu corresponding to the front panel key.	[Avg]	**MENUAVG**	Not available	
			[Cal]	**MENUCAL**	Not available	
			[Copy]	**MENUCOPY**	Not available	
			[Display]	**MENUDISP**	Not available	
			[Format]	**MENUFORM**	Not available	
			[Marker]	**MENUMARK**	Not available	
			[Meas]	**MENUMEAS**	Not available	

Function	Item to be specified/executed			Command (For footnotes, see page 546.)		Remarks
				8753ES	E5070A/E5071A	
Others (cont'd.)	Key manipulation related commands (cont'd.)	Displaying the softkey menu corresponding to the front panel key. (cont'd.)	[Marker Fctn]	**MENUMRKF**	Not available	
			[Power]	**MENUPOWE**	Not available	
			[Save/Recall]	**MENURECA**	Not available	
			[Save/Recall]	**MENUSAVE**	Not available	
			[Scale Ref]	**MENUSCAL**	Not available	
			[Seq]	**MENUSEQU**	Not available	
			[Marker Search]	**MENUSRCH**	Not available	
			[Sweep Setup]	**MENUSTIM**	Not available	
			[Sweep Setup]	**MENUSWEE**	Not available	
			[System]	**MENUSYST**	Not available	
		Performing the same processing as with the designated softkey.		**SOFT{1-8}**	Not available	
		Editing softkey labels		**WRSK**	Not available	
	GPIB	Turning the debug mode On/Off		**DEBU**	Not available	
		Setting to talker/listener mode		**TALKLIST**	Not available	
		Sending the title character string	Peripherals	**TITTPERI**	Not available	
			Power meter	**TITTPMTR**		
			Printer	**TITTPRIN**		
		pass control		**USEPASC**	Not available	
		Setting the GPIB address	Controller	**ADDRCONT**	Not available	The E5070A/E5071A allows manipulation from the front panel only.
				PCB		
			External disk drive	**ADDRDISC**	Not available	The E5070A/E5071A does not allow these GPIB addresses to be specified.
			LO source	**ADDRLSRC**		
			Peripheral	**ADDRPERI**		
			Plotter	**ADDRPLOT**		
			Power meter	**ADDRPOWM**		
			Printer	**ADDRPRIN**		
	Specifying uses of the parallel port		GPIO use	**PARALGPIO**	Not available	The E5070A/E5071A uses the GPIO for the printer.
			Printer use	**PARALCPY**		
	Service mode		ALC control	**ALC**	Not available	
			Setting the analog bus On/Off	**ANAB**	Not available	

*1. Effective for the active channel (8753ES)
*2. Effective for channels and traces designated in the command. (E5070A/E5071A)
*3. Effective for the active trace designated in the command (E5070A/E5071A)
*4. Effective both for the main and auxiliary channels. (8753ES)
*5. Effective for the channels designated in the command. (E5070A/E5071A)
*6. Effective for all channels (8753ES)
*7. Effective command for the marker number, designated within that command, on the active trace in the channel having the channel number also designated in that command. (E5070A/E5071A)
*8. Effective command for the active marker (8753ES)

8753ES vs. E5070A/E5071A Command Comparison (8753ES-only commands excluded)

8753ES	Function overview	E5070A/E5071A
	[A]	
AB	Select A/B measurement and display the traces.	Not available (A/B measurement not available.)
ADAP1	Set up the electrical delay in the adapter removal calibration.	Not available (Adapter removal function not available.)
ADDRCONT	Specify the controller GPIB address.	Not available
ADDRDISC	Specify the GPIB address of the external disk drive.	Not available
ADDRLSRC	Specify the GPIB address of the LO source.	Not available
ADDRPERI	Specify the GPIB addresses of peripherals.	Not available
ADDRPLOT	Specify the GPIB address of the plotter.	Not available (The GPIB does not have an output function.)
ADDRPOWM	Specify the GPIB address of the power meter.	Not available (Power meter calibration function not available.)
ADDRPRIN	Specify the GPIB address of the printer.	Not available (Not compatible with a GPIB printer.)
ADPTCOAX	Select the adapter-coaxial in the adapter removal calibration.	Not available (Adapter removal function not available.)
ADPTWAVE	Select the adapter-waveguide in the adapter removal calibration.	Not available (Adapter removal function not available.)
ALC	Control ALC (for service use).	Not available
ALTAB	Set to an alternate measurement mode.	Not available (The sweeping of traces on the same channel is performed in chop measurement mode, while traces between different channels is performed in alternate mode.)
ANAB	On/Off setting for the analog bus (for service use)	Not available
ANAI	Select the measurement of the signal input to the AUX Input and display the trace.	Not available (Measurement parameters are S-parameters only.)
AR	Select the A/R measurement and display the traces.	Not available (Measurement parameters are S-parameters only.)
ASEG	All segments are used during the list frequency sweep.	Not available (All segments are always used.)
ASSS	Specify the sequence bit of the event status register.	Not available
ATTP1	Specify the value for the attenuator at port 1.	**:SOUR{1-9}:POW:ATT**
ATTP2	Specify the value for the attenuator at port 2.	(Channels are used for setup.)
AUTO	Perform autoscale.	**:DISP:WIND{1-9}:TRAC{1-9}:Y:AUTO**
AUXC	Set channels 3 and 4 On/Off.	Using the command **:CALC{1-9}:PAR{1-9}:COUN** enables you to do the equivalent.
AVERFACT	Specify the averaging factor.	**:SENS{1-9}:AVER:COUN**
AVERO	Set the averaging On/Off.	**:SENS{1-9}:AVER**
AVERREST	Restart the averaging.	**:SENS{1-9}:AVER:CLE**
	[B]	
BACI	Specify the screen brightness.	**:SYST:BACK** (On/Off setting for the backlight only allowed)
BANDPASS	Select the BANDPASS mode in the time-domain transformation.	**:CALC{1-9}:TRAN:TIME BPAS**
BEEPDONE	Set the beep (n) sound at the end of an action On/Off.	**:SYST:BEEP:COMP:STAT**
BEEPFAIL	Set the beep (n) sound for the limit test FAIL On/Off.	Not available (Setting is the same as for the warning beep sound.)
BEEPWARN	Set the warning beep (n) sound On/Off.	**:SYST:BEEP:WARN:STAT**

8753ES vs. E5070A/E5071A Command Comparison (8753ES-only commands excluded)

8753ES	Function overview	E5070A/E5071A
BLAD	Set the display On/Off.	**:SYST:BACK** (Set the LCD backlight On/Off) The On/Off relation on the 8753ES is opposite that on the E5070A/E5071A.
BR	Select the B/R measurement and display the traces.	Not available
BWLIMDB	Specify the value indicating the position of the bandwidth (attenuation from the peak) in the bandwidth test.	**:CALC{1-9}:MARK{1-10}:BWID:THR**
BWLIMDISP	Set the bandwidth value display in the bandwidth test On/Off.	**:CALC{1-9}:MARK{1-10}:BWID**
BWLIMMAX	Specify the upper limit value in the bandwidth test.	Not available (Can perform the bandwidth search but does not have the test function.)
BWLIMMIN	Specify the lower limit value for the bandwidth test.	
BWLIMSTAT	Read the results of the bandwidth test.	
BWLIMTEST	Set the bandwidth test On/Off.	
BWLIMVAL	Read the bandwidth value during the bandwidth test.	**:CALC{1-9}:MARK{1-10}:BWID:DATA?**
	[C]	
C0	Specify the CO value of the OPEN standard.	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}: C0**
C1	Specify the C1 value of the OPEN standard.	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}: C1**
C2	Specify the C2 value of the OPEN standard.	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}: C2**
C3	Specify the C3 value of the OPEN standard.	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}: C3**
CAL1	Cause the softkey for the calibration menu.	Not available (Can be ignored in the case of replacement)
CALFCALF	Specify the calibration coefficients while editing the calibration coefficients table for the power sensor to be used in power meter calibration.	Not available (Power meter calibration function not available.)
CALFFREQ	Specify the frequency while editing the calibration coefficients table for the power sensor to be used for power meter calibration.	
CALFSENA	Start editing the calibration coefficients table for power sensor A to be used for power meter calibration.	
CALFSENB	Start editing the calibration coefficients table for power sensor B to be used for power meter calibration.	
CALIERC	Start measuring data in forward enhanced response calibration.	Not available (Enhanced response calibration function not available.)
CALIFUL2	Start measuring data in full 2-port calibration.	**:SENS{1-9}:CORR:COLL:METH:SOLT1**
CALIRAI	Start measuring data in response & isolation calibration.	**:SENS{1-9}:CORR:COLL:METH:OPEN** **:SENS{1-9}:CORR:COLL:METH:SHOR** **:SENS{1-9}:CORR:COLL:METH:THRU** (The commands differ depending on the standard used in the isolation calibration.)
CALIRERC	Start measuring data in reverse enhanced response calibration.	Not available (Enhanced response calibration function not available.)
CALIRESP	Start measuring data in response calibration.	**:SENS{1-9}:CORR:COLL:METH:OPEN** or **:SENS{1-9}:CORR:COLL:METH:SHOR** or **:SENS{1-9}:CORR:COLL:METH:THRU** (The commands differ depending on the standard used in the isolation calibration.)
CALIS111	Start measuring data in S11 1-port calibration.	**:SENS{1-9}:CORR:COLL:METH:SOLT1** (You must designate a port with the parameter.)
CALIS221	Start measuring data in S22 1-port calibration.	
CALITRL2	Start measuring data in TRL*/LRM* 2-port calibration.	Not available (The E5070A/E5071A supports the TRL* /LRM* calibration function using VBA.)

8753ES	Function overview	E5070A/E5071A
CALK24MM	Select 2.4 mm Calibration Kit (85056A/D) as the default calibration kit.	**:SENS{1-9}:CORR:COLL:CKIT**
CALK292MM	Select 2.92 mm Calibration Kit as the default calibration kit.	
CALK292S	Select 2.92 mm Calibration Kit (85056K) as the default calibration kit.	
CALK35MC	Select 3.5 mm Calibration Kit (85033C) as the default calibration kit.	
CALK35MD	Select 3.5 mm Calibration Kit (85033D) as the default calibration kit.	
CALK716	Select 7-16 Calibration Kit (85038) as the default calibration kit.	
CALK7MM	Select 7 mm Calibration Kit (85031B) as the default calibration kit.	
CALKN50	Select N-type 50 Calibration Kit (85032B/E) as the default calibration kit.	
CALKN75	Select N-type 75 Calibration Kit (85036B/E) as the default calibration kit.	
CALKTRLK	Select TRL 3.5 mm Calibration Kit (85052C) as the default calibration kit.	
CALKUSED	Select a user-defined calibration kit as the default calibration kit.	
CALN	Set the error correction to Off.	**:SENS{1-9}:CORR:STAT OFF**
CALSPORT1	Call the data on port 1 for adapter removal calibration.	Not available (Adapter removal calibration function not available.)
CALSPORT2	Call the data on port 2 for adapter removal calibration.	
CALZLINE	Set the characteristic impedance for TRL*/LRM* 2-port calibration at the impedance value of the standard.	Not available (The E5070A/E5071A supports the TRL* /LRM* calibration function using VBA.)
CALZSYST	Set the characteristic impedance for TRL*/LRM* 2-port calibration at the characteristic impedance value of the measurement system.	
CBRI	Specify the display color brightness for the items selected.	Not available (Color setup is allowed only for turning highlighting of the entire screen On/Off.)
CENT	Specify the center value of the sweep range.	**:SENS{1-6}:FREQ:CENT** (Cannot be used for segment editing.)
CHAN1	Specify channel 1 as the active channel.	**:DISP:WIND{1-9}:ACT** (Specifying the active channel) or **:CALC{1-9}:PAR{1-9}:SEL** (Specifying the active channel) For an outline of channels and traces, refer to the “Users’ Guide.”
CHAN2	Specify channel 2 as the active channel.	
CHAN3	Specify channel 3 as the active channel.	
CHAN4	Specify channel 4 as the active channel.	
CHOPAB	Set the system to chop measurement mode.	Not available (Traces on the same channel are measured using the same method as the chop sweep. When traces belong to different channels, they are measured using the same method as the alternate sweep.)
CLAD	Complete the class designation in defining the calibration kits.	Not available (Can be ignored in the case of replacement.)
CLASS11A	Measure S11A.	**:SENS{1-9}:CORR:COLL:OPEN**
CLASS11B	Measure S11B.	**:SENS{1-9}:CORR:COLL:SHOR**
CLASS11C	Measure S11C.	**:SENS{1-9}:CORR:COLL:LOAD**
CLASS22A	Measure S22A.	**:SENS{1-9}:CORR:COLL:OPEN**
CLASS22B	Measure S22B.	**:SENS{1-9}:CORR:COLL:SHOR**
CLASS22C	Measure S22C.	**:SENS{1-9}:CORR:COLL:LOAD**
CLEA	Clear the register for saving/recalling the designated number.	Not available
CLEABIT	Clear the designated GPIO bit.	Not available (No GPIO interface)

8753ES	Function overview	E5070A/E5071A
CLEAL	Clear the entire list.	Not available (Define the editing of each list by using one command.)
CLEARALL	Clear all registers for saving/recalling.	Not available (**:MMEM:DEL** can be used to erase files stored on the internal hard disk.)
CLEAREG	Clear the register for saving/recalling the designated number.	
CLEASEQ	Clear the designated sequence.	Not available (Test sequence function not available.)
CLEL	Clear the lists designated.	Not available (The editing of each table is defined by using one command.)
CLER	Clear all limits for the ripple test.	Not available (Ripple test function not available.)
CLES	Clear the status byte register, event status register, and enable register.	***CLS**
CLS		
COAD	Select coaxial as the type of electrical delay.	Not available (Always treated as coaxial.)
COAX	Select coaxial in specifying the offset when defining a standard.	Not available (Always treated as coaxial.)
COLOCH1D	Select the data trace and limit in channel 1 to specify their colors.	**:DISP:COL{1-2}:TRAC{1-9}:DATA** **:DISP:COL{1-2}:TRAC{1-9}:MEM** **:DISP:COL{1-2}:LIM{1-2}** **:DISP:COL{1-2}:GRAT{1-2}** **:DISP:COL{1-2}:BACK**
COLOCH1M	Select the memory trace in channel 1 to specify its color.	
COLOCH2D	Select the data trace and limit line in channel 2 to specify their colors.	
COLOCH2M	Select the memory trace in channel 2 to specify its color.	
COLOCH3D	Select the data trace and limit line in channel 3 to specify their colors.	
COLOCH3M	Select the memory trace in channel 3 to specify its color.	
COLOCH4D	Select the data trace and limit line in channel 4 to specify their colors.	
COLOCH4M	Select the memory trace in channel 4 to specify its color.	
COLOGRAT	Select a graticule line to specify its color.	
COLOTEXT	Select a character string to specify its color.	
COLOR	Specify the saturation of the display colors for the selected items.	
COLOLREF	Select the reference line to specify its color.	
COLOWARN	Select a warning message to specify its color.	
CONS	Resume execution of a suspended test sequence.	Not available (Test sequence function not available.)
CONT	Set the trigger mode to continuous mode.	**:INIT{1-9}:CONT ON**
CONV1DS	Transform the S-parameter measurement data into inverted S-parameters.	**:CALC{1-9}:CONV:FUNC INV** **:CALC{1-9}:CONV ON**
CONVOFF	Set the S-parameter transformation function to Off.	**:CALC{1-9}:CONV OFF**
CONVYREF	Transform the S-parameter measurement data into impedances (refrections).	**:CALC{1-9}:CONV:FUNC YREF** **:CALC{1-9}:CONV ON**
CONVYTRA	Transform the S-parameter measurement data into impedances (transmissions).	**:CALC{1-9}:CONV:FUNC YTR** **:CALC{1-9}:CONV ON**
CONVZREF	Transform the S-parameter measurement data into impedances (refrections).	**:CALC{1-9}:CONV:FUNC ZREF** **:CALC{1-9}:CONV ON**
CONVZTRA	Transform the S-parameter measurement data into impedances (transmissions).	**:CALC{1-9}:CONV:FUNC ZTR** **:CALC{1-9}:CONV ON**
COPYFRFT	Copy a label from the file title.	Not available
COPYFRRT	Copy a label from the register title.	Not available
CORI	Set the error correction by interpolation of calibration coefficients to On/Off.	Not available (Always On)
CORR	Set the error correction On/Off.	**:SENS{1-9}:CORR:STAT**
COUC	Set the sweep condition at Couple/Uncouple between channels.	The sweep condition is not coupled between channels. The sweep condition for traces on the same channel is coupled.

8753ES	Function overview	E5070A/E5071A
COUP	Set the power level at Couple/Uncouple between channels.	You can do the same thing in the channel and trace setup.
CSWI	Set the switch changeover in the test set to Continuous/Stop.	Not available
CWFREQ	Specify the signal source frequency for the power level sweep or CW TIME sweep.	Not available (CW TIME sweep and power level sweep functions not available.)
CWTIME	Set the sweep type to CW TIME.	Not available (CW TIME sweep function not available.)
	[D]	
D1DIVD2	Display on channel 2 the result of dividing the measurement on channel 2 by that on channel 1.	Not available
D2XUPCH2	Places two graphs on the LCD screen: an upper one (for channels 1 and 2) and a lower one (for channels 3 and 4).	Not available
D2XUPCH3	Places two graphs on the LCD screen: an upper one (for channels 1 and 3) and a lower one (for channels 2 and 4).	**:DISP:SPL** (Sets up the channel window layout.) and **:DISP:WIND{1-9}:SPL** (Sets up the trace graph layout.) are combined to enable you to perform the equivalent.
D4XUPCH2	Places four graphs on the LCD screen: one in the upper left (for channel 1), one in the upper right (for channel 2), one in the lower left (for channel 3), and one in the lower right (for channel 4).	
D4XUPCH3	Places four graphs on the LCD screen: one in the upper left (for channel 1), one in the upper right (for channel 3), one in the lower left (for channel 2), and one in the lower right (for channel 4).	Not available
DATI	Save the measurement data in memory.	**:CALC{1-9}:MATH:MEM**
DCONV	Select Down Convert in the mixer measurement.	Not available (Mixer measurement function not available.)
DEBU	Set the GPIB debug mode On/Off.	Not available
DECRLOOC	Subtract one from the loop counter value.	Not available (Test sequence function not available.)
DEFC	Return the color settings of all items to their initial states.	**:DISP:COL{1-2}:REF**
DEFLPRINT	Return the printer setup to its initial state.	Not available
DEFLTCPIO	Return the copy setup to its initial state.	Not available
DEFS	In defining calibration kits, start defining each standard.	Not available (You do not need to send the command for defining a standard.)
DELA	Set the display format to the group delay format.	**:CALC{1-9}:FORM GDEL**
DELO	Turn off the delta marker mode.	**:CALC{1-9}:MARK{1-10}:REF OFF**
DELR	Designate the delta marker as the designated marker.	Not available (Marker 10 is assigned as the delta marker.)
DELRFIXM	Designate the delta marker as a fixed delta marker.	Not available (No functions for fixed markers are available.)
DEMOAMPL	Display the AM modulated component only.	Not available (Demodulation function not available.)
DEMOOFF	Turn off the demodulation function.	
DEMOPHAS	Display the phase-modulated component only.	
DFLT	Return the plotter setup to its initial state.	Not available (Plotters are not supported.)
DIRS	Specify the size of the directory used in initializing a disk with LIF.	Not available (The LIF format is not supported.)
DISCUNIT	Specify the external disk to be used for Save/Recall.	Not available
DISCVOLU	Specify the partition on the external disk to be used for Save/Recall.	Not available
DISM	Set the LCD screen for all marker values to On/Off.	Not available (Always displays all marker values.)
DISPDATA	Display data traces.	**:DISP:WIND{1-9}:TRAC{1-9}:STAT ON** **:DISP:WIND{1-9}:TRAC{1-9}:MEM OFF** **:CALC{1-9}:MATH:FUNC NORM** (All three commands must be sent.)

8753ES	Function overview	E5070A/E5071A
DISPDATM	Display the data trace and memory trace at the same time.	**:DISP:WIND{1-9}:TRAC{1-9}:STAT ON** **:DISP:WIND{1-9}:TRAC{1-9}:MEM ON** **:CALC{1-9}:MATH:FUNC NORM** (All three commands must be sent.)
DISPDDM	Display the result of dividing the data trace by the memory trace.	**:DISP:WIND{1-9}:TRAC{1-9}:STAT ON** **:DISP:WIND{1-9}:TRAC{1-9}:MEM OFF** **:CALC{1-9}:MATH:FUNC DIV** (All three commands must be sent.)
DISPDMM	Display the result of subtracting the memory trace from the data trace.	**:DISP:WIND{1-9}:TRAC{1-9}:STAT ON** **:DISP:WIND{1-9}:TRAC{1-9}:MEM OFF** **:CALC{1-9}:MATH:FUNC SUBT** (All three commands must be sent.)
DISPMEMO	Display the memory trace.	**:DISP:WIND{1-9}:TRAC{1-9}:STAT OFF** **:DISP:WIND{1-9}:TRAC{1-9}:MEM ON** (Both commands must be sent.)
DIVI	Display the result of dividing the data trace by the memory trace.	**:DISP:WIND{1-9}:TRAC{1-9}:STAT ON** **:DISP:WIND{1-9}:TRAC{1-9}:MEM OFF** **:CALC{1-9}:MATH:FUNC DIV** (All three commands must be sent.)
DONE	When two or more standards exist in a calibration class, complete the measurement of the calibration data.	Not available (Only one type of standard is assigned to each calibration class.)
DONM	Complete the editing of the test sequence.	Not available (Test sequence function not available.)
DOSEQ	Start executing the selected test sequence.	Not available (Test sequence function not available.)
DOWN	Performs the same processing as pressing the [↓] key on the front panel.	Not available
DUAC	Set the simultaneous two-channel display On/Off.	**:DISP:SPL** (Sets up the channel window layout.) and **:DISP:WIND{1-9}:SPL** (Sets up the trace graph layout) are combined to enable you to perform the equivalent.
DUPLSEQ	Copy the test sequence.	Not available (Test sequence function not available.)
	[E]	
ECALAB?	Read the selected ECAL module.	Not available
ECALCONT	Resume the suspended ECAL operation.	Not available
ECALDONE	Read to see if the ECal operation has ended.	Not available
ECALERC	Perform ECal forward enhanced response calibration.	Not available (Performing the enhanced response calibration is not allowed.)
ECALFREQS	Read the calibration frequency array store in the ECal module.	Not available
ECALFUL2	Perform ECal full 2-port calibration.	**:CALC{1-9}:CORR:COLL:ECAL:SOLT2**
ECALISOAVG	Specify the averaging factor during isolation measurement using the ECal module.	Not available
ECALMANTHRU	Set the manual THRU measurement for ECal On/Off	Not available (Always performs automatic measurement)
ECALMODID	Read the product number and serial number of the ECal module.	Not available
ECALMODINF	Read the information on the ECal module.	Not available
ECALMODSELA	Select module A as the active module.	Not available
ECALMODSELB	Select module B as the active module.	Not available
ECALNFREQS	Specify the size of the calibration frequency array to be read from the ECal module.	Not available

8753ES	Function overview	E5070A/E5071A
ECALOMII	Set the omission of isolation for ECal On/Off.	**:CALC{1-9}:CORR:COLL:ECAL:ISOL** (The On/Off relation on the 8753ES is opposite that on the E5070A/E5071A.)
ECALPAUSED	Read to see if the ECal operation is interrupted.	Not available
ECALRERC	Perform ECal reverse enhanced response calibration.	Not available (Cannot perform enhanced response calibration.)
ECALS11	Perform ECal S11 1-port calibration.	**:CALC{1-9}:CORR:COLL:ECAL:SOLT1 1**
ECALS22	Perform ECal S22 1-port calibration.	**:CALC{1-9}:CORR:COLL:ECAL:SOLT1 2**
EDITDONE	Complete editing the tables.	Not available (Each table is edited using one command; there is no corresponding command.)
EDITLIML	Start editing the limit test table.	Not available (**:CALC{1-9}:LIM:DATA** is used to edit the limit test table.)
EDITLIST	Start editing the list (segment) sweep table.	Not available (**:SENS{1-9}:SEGM:DATA** is used to edit the segment table.)
EDITRLIM	Start editing the ripple limit.	Not available (Ripple test function not available.)
ELED	Specify the electrical delay value.	**:CALC{1-9}:CORR:EDEL:TIME**
EMIB	Sounds beeps during the test sequence.	**:SYST:BEEP:COMP:IMM** (beep sound when an action completes) or **:SYST:BEEP:WARN:IMM** (beep sound when a warning occurs)
ENTO	Cause the entry area display to disappear from the LCD screen.	Not available (The entry area is not displayed in remote control.)
ERCDONE	Complete the measurement of forward enhanced response calibration and calculate the calibration coefficients on the basis of the data obtained.	Not available (Enhanced response calibration function not available.)
ESB?	Read the value of event status register B.	Not available (Register corresponding to event status register not available.)
ESE	Specify the value of the event status valid register.	***ESE**
ESNB	Specify the value of event status valid register B.	Not available (Register corresponding to event status valid register B not available.)
ESR?	Read the value of the event status register.	***ESR?**
EXTD	Designate the external disk drive as the storage to be manipulated.	Not available (Storing data to the external disk drive is not allowed.)
EXTMDATA	Determine whether or not to save corrected data along with the device status.	**:MMEM:STOR:STYP** (Selection of the contents to be saved (v) in the Instrument State file)
EXTMDATO	Save the data array selected only.	Not available (**:MMEM:STOR:FDAT** can be used to save the formatted memory array for the active trace on the active channel.)
EXTMFORM	Determine whether or not to save trace data along with the device status.	Not available
EXTMGRAP	Determine whether or not to save the LCD screen along with the device status.	Not available (Adding images on the LCD screen to the Instrument State file is not allowed.)
EXTMRAW	Determine whether or not to save raw data along with the device status.	Not available (Adding raw data is not allowed.)
EXTTOFF	Turn off the external trigger mode.	Not available (Automatically turns off if a setting other than external trigger is selected in **:TRIG:SOUR**.)
EXTTON	Set to the external trigger mode (per sweep).	**:TRIG:SOUR EXT**
EXTTHIGH	Set the external trigger line to High.	Not available (The external trigger line is set to Low.)
EXTTLOW	Set the external trigger line to Low.	
EXTTPOIN	Set to the external trigger mode (point by point).	Not available

8753ES	Function overview	E5070A/E5071A
	[F]	
FIXE	In defining the calibration kits, set the type of LOAD to fixed load.	Not available (The LOAD standard is treated as fixed LOAD)
FORM1	Select the intra-device binary format for data transfers.	Not available (Selecting the intra-device binary format is not allowed.)
FORM2	Select the IEEE 32-bit floating point format for data transfers.	Not available (Selecting the IEEE 32-bit floating point format is not allowed.)
FORM3	Select the IEEE 64-bit floating point format for data transfers.	**:FORM:DATA REAL** **:FORM:BORD NORM**
FORM4	Select the ASCII format for data transfers.	**:FORM:DATA ASC**
FORM5	Select the PC-DOS 32-bit floating point format for data transfers.	Not available (Selecting the PC-DOS 32-bit floating point format is not allowed.)
FORMATDOS	Select DOS as the storage format.Çí	Not available (Not compatible with the LIF format)
FORMATLIF	Select LIF as the storage format.	
FREO	Cause the frequency display on the LCD screen to disappear.	**:DISP:ANN:FFREQ OFF** (Executing this command does not increase the coverage of the graph.)
FREQOFFS	Set the frequency offset mode in the mixer measurement On/Off.	Not available (Mixer measurement function not available.)
FRER	Set the trigger mode to continuous mode.	**:INIT{1-9}:CONT ON**
FULP	Set up the system for full page plotting.	Not available (Plotters are not supported.)
FWDI	Start measuring the data from the forward isolation in 2-port calibration.	**:SENS:CORR:COLL:ISOL** (Measures isolation bi-directionally.)
FWDM	Start measuring the data from the forward match in full 2-port calibration.	**:SENS:CORR:COLL:THRU** (Measures both transmission and match.)
FWDT	Start measuring the data from the forward transmission in full 2-port calibration.	
	[G]	
GATECENT	Specify the center value for the time-domain gate.	**:CALC{1-9}:FILT:TIME:CENT**
GATEO	Set the time-domain gate On/Off.	**:CALC{1-9}:FILT:TIME:STAT**
GATESPAN	Specify the span value of the time-domain gate.	**:CALC{1-9}:FILT:TIME:SPAN**
GATESTAR	Specify the start value of the time-domain gate.	**:CALC{1-9}:FILT:TIME:STAR**
GATESTOP	Specify the stop value of the time-domain gate.	**:CALC{1-9}:FILT:TIME:STOP**
GATSMAXI	Set the shape of the time-domain gate to maximum.	**:CALC{1-9}:FILT:TIME:SHAP MAX**
GATSMINI	Set the shape of the time-domain gate to minimum.	**:CALC{1-9}:FILT:TIME:SHAP MIN**
GATSNORM	Set the shape of the time-domain gate to normal.	**:CALC{1-9}:FILT:TIME:SHAP NORM**
GATSWIDE	Set the shape of the time-domain gate to wide.	**:CALC{1-9}:FILT:TIME:SHAP WIDE**
GOSUB	Perform another sequence from the test sequence.	Not available (Test sequence function not available.)
	[H]	
HARMOFF	Set the harmonics measurement mode to Off.	Not available (Harmonics measurement mode not available.)
HARMSEC	Select 2nd harmonics measurement.	
HARMTHIR	Select 3rd harmonics measurement.	
HOLD	Stop the sweep operation (Hold mode)	**:INIT{1-9}:CONT OFF**
	[I]	
IDN?	Read the product information.	***IDN?**
IFBIHIGH	Execute the test sequence when the designated GPIO bit is at High.	Not available (Test sequence function not available.)
IFBILOW	Execute the test sequence when the designated GPIO bit is at Low.	Not available (Test sequence function not available.)
IFBW	Specify the IF bandwidth.	**:SENS{1-9}:BAND**

8753ES	Function overview	E5070A/E5071A
IFLCEQZE	Execute the test sequence when the loop counter is at zero.	Not available (Test sequence function not available.)
IFLCNEZE	Execute the test sequence when the loop counter is at a value other than zero.	Not available (Test sequence function not available.)
IFLTFAIL	Execute the test sequence when the limit test fails.	Not available (Test sequence function not available.)
IFLTPASS	Execute the test sequence when the limit test passes.	Not available (Test sequence function not available.)
IMAG	Set the display format to Imaginary.	**:CALC{1-9}:FORM IMAG**
INCRLOOC	Add one to the loop counter reading.	Not available (Test sequence function not available.)
INID	Initialize the floppy disk.	Not available(Able to execute using a mouse)
INIE	Initialize the external disk.	Not available
INPUCALC	Enter data into the calibration coefficient array.	Not available (No access is allowed to the calibration coefficient array.)
INPUCALK	Enter data into the calibration kit array.	Not available (No access is allowed to the calibration kit array.)
INPUDATA	Enter data into the corrected data array.	Not available (Corrected data array allows calls only.)
INPUFORM	Enter data into the formatted array.	**:CALC{1-9}:DATA:FDAT**
INPULEAS	Enter the learn string.	Not available (Reading/Writing the learn string is not allowed.)
INPUPMCAL1	Enter data into the power meter calibration array for channel 1.	Not available (Power meter calibration function not available.)
INPUPMCAL2	Enter data into the power meter calibration array for channel 2.	
INPURAW1	Enter data into raw data array 1 (S11).	Not available (Reading/Writing the raw data array is not allowed.)
INPURAW2	Enter data into raw data array 2 (S21).	
INPURAW3	Enter data into raw data array 3 (S12).	
INPURAW4	Enter data into raw data array 4 (S22).	
INSMEXSA	Select the external source (auto) as the measuring instrument mode.	Not available (Always a standard network analyzer)
INSMEXSM	Select the external source (manual) as the measuring instrument mode.	
INSMNETA	Select the standard network analyzer as the measuring instrument mode.	
INSMTUNR	Select the tuned receiver as the measuring instrument mode.	
INTD	Designate the floppy disk drive as the storage to be manipulated.	Not available (When the file is saved in drive A using the file save command **:MMEM:SAVE**, it is saved to the floppy disk drive.)
INTE	Specify the brightness of the LCD screen.	Not available (Only On/Off setting for the backlight is allowed.)
INTM	Designate the internal memory as the storage to be manipulated.	Not available (Designated by the file Read/Write command.)
ISOD	Complete the measurement of data from the isolation of full 2-port calibration.	Not available (Data measurement completion command not available.)
ISOL	Start measuring the data from the isolation of full 2-port calibration.	Not available (Data measurement completion command not available.)
ISOOP	Start measuring the data from the isolation of one-bus 2-port calibration.	Not available (Data measurement completion command not available.)

8753ES	Function overview	E5070A/E5071A
	[K]	
KEY	Performs the same processing as pressing the designated key on the front panel.	Not available (No command available equivalent to the front panel key manipulation in terms of processing.)
KITD	Complete the operation for defining calibration kits.	Not available (No command available for ending defining operations.)
KOR?	Read the information for the previous front panel manipulation.	Not available
	[L]	
LABEFWDM	Give an arbitrary name to the Forward Match calibration class.	Not available (Editing of calibration class labels is not allowed.)
LABEFWDT	Give an arbitrary name to the Forward Transmission calibration class.	
LABERESI	Give an arbitrary name to the Response & Isolation calibration class.	
LABERESP	Give an arbitrary name to the Response calibration class.	
LABEREVM	Give an arbitrary name to the Reverse Match calibration class.	
LABEREVT	Give an arbitrary name to the Reverse Transmission calibration class.	
LABES11A	Give an arbitrary name to the S11A (OPEN) calibration class.	
LABES11B	Give an arbitrary name to the S11B (SHORT) calibration class.	
LABES11C	Give an arbitrary name to the S11C (LOAD) calibration class.	
LABES22A	Give an arbitrary name to the S22A (OPEN) calibration class.	
LABES22B	Give an arbitrary name to the S22B (SHORT) calibration class.	
LABES22C	Give an arbitrary name to the S22C (LOAD) calibration class.	
LABETRLL	Give an arbitrary name to the TRL Line/Match calibration class.	
LABETRLT	Give an arbitrary name to the TRL Thru calibration class.	
LABETRLR	Give an arbitrary name to the TRL Reflection calibration class.	
LABETLFM	Give an arbitrary name to the S11B (SHORT) calibration class.	
LABETLFT	Give an arbitrary name to the S11C (LOAD) calibration class.	
LABETLRM	Give an arbitrary name to the S22B (SHORT) calibration class.	
LABETLRT	Give an arbitrary name to the S22C (LOAD) calibration class.	
LABETRFM	Give an arbitrary name to the S11A (OPEN) calibration class.	
LABETRRM	Give an arbitrary name to the S22A (OPEN) calibration class.	
LABETTFM	Give an arbitrary name to the Forward match calibration class.	
LABETTFT	Give an arbitrary name to the Forward Transmission calibration class.	
LABETTRM	Give an arbitrary name to the Reverse Match calibration class.	
LABETTRT	Give an arbitrary name to the Reverse Transmission calibration class.	
LABK	Give an arbitrary name to the user-defined calibration kit label.	**:SENS{1-9}:CORR:COLL:CKIT:LAB**
LABS	Give an arbitrary name to the calibration standard.	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:LAB**
LEFL	Set up the system so the object is output through the plotter onto the lower-left 1/4 of a sheet.	Not available (Plotters are not supported.)
LEFU	Set up the system so the object is output through the plotter onto the upper-left 1/4 of a sheet.	
LIMD	Specify the limit delta value for the limit test.	Not available (**:CALC{1-9}:LIM:DATA** is used to perform all the limit table setup work.)
LIMIAMPO	Specify the offset along the Y-axis in the limit range for the limit test.	
LIMILINE	Set the limit line display On/Off.	**:CALC{1-9}:LIM:DISP**

8753ES	Function overview	E5070A/E5071A
LIMIMAOF	Set the marker value at the offset along the Y-axis in the limit range for the limit test.	Not available
LIMISTIO	Specify the offset along the X-axis in the limit range for the limit test.	Not available
LIMITEST	Set the limit test On/Off.	**:CALC{1-9}:LIM**
LIML	Specify the lowest value of the limit for the limit test.	Not available (**:CALC{1-9}:LIM:DATA** is used to perform all the limit table setup work.)
LIMM	Specify the center value of the limit for the limit test.	
LIMS	Specify the boundary value of the segment in the limit test.	
LIMTFL	Select a flat line as the limit type in the limit test.	
LIMTSL	Select a sloping line as the limit type in the limit test.	
LIMTSP	Select a single point as the limit type in the limit test.	
LIMU	Specify the highest value of the limit in the limit test.	
LINFREQ	Select linear sweep as the type of sweep.	**:SENS{1-9}:SWE:TYPE LIN**
LINM	Select the linear magnitude format as the display format.	**:CALC{1-9}:FORM MLIN**
LINTDATA	Specify the line type for data traces.	Not available (Always a solid line)
LINTMEMO	Specify the line type for memory traces.	
LISFREQ	Select the list frequency sweep as the type of sweep.	**:SENS{1-9}:SWE:TYPE SEGM**
LISIFBWM	Make the segment-by-segment IFBW setup for the list frequency sweep Valid/Invalid.	Not available (The **:SENS{1-9}:SEGM:DATA** command takes care of the entire segment setup.)
LISPWRM	Make the segment-by-segment power level setup for the list frequency sweep Valid/Invalid.	Not available (The **:SENS{1-9}:SEGM:DATA** command takes care of the entire segment setup.)
LISTTYPELSTP	Select the stepped list mode to perform the list frequency sweep.	**:SENS{1-9}:SWE:GEN STEP**(E5070A/E5071A change stepped/swept mode for the linear sweep.)
LISTTYPELSWP	Select the swept list mode to perform the list frequency sweep.	**:SENS{1-9}:SWE:GEN ANAL** (E5070A/E5071A change stepped/swept mode for the linear sweep. The swept mode also allows the IF bandwidth and power level to be specified segment by segment.)
LISV	Display the measurement results in a list.	Not available (List display function not available.)
LOAD	Call the Instrument State from a file on the disk.	**:MMEM:LOAD**
LOADSEQ	Call the test sequence from a file on the disk.	**:MMEM:LOAD:PROG** (Call a macro created with VBA.)
LOAN	If LOAD is defined as offset LOAD, measure LOAD without the offset.	Not available (LOAD is treated as fixed LOAD.)
LOAO	If LOAD is defined as offset LOAD, measure LOAD with the offset.	
LOCONT	Set the LO control On/Off.	Not available (LO control function not available.)
LOFREQ	Specify the LO frequency.	
LOFSTAR	Specify the starting frequency for LO.	
LOFSTOP	Specify the ending frequency for LO.	
LOFSWE	Select the sweep mode for the LO frequency.	
LOGFREQ	Select the log sweep as the type of sweep.	**:SENS{1-9}:SWE:TYPE LOG**
LOGM	Select the log magnitude format as the display format.	**:CALC{1-9}:FORM MLOG**
LOOC	Specify the loop counter reading.	Not available (Test sequence function not available.)
LOPOWER	Specify the power level for LO.	Not available (LO control function not available.)
LOPSTAR	Specify the starting power level for LO.	
LOPSTOP	Specify the ending power level for LO.	
LOPSWE	Select the power sweep mode for LO.	
LOWPIMPU	Select the LOWPASS IMPULSE mode for the time-domain transformation.	**:CALC{1-9}:TRAN:TIME LPAS** **:CALC{1-9}:TRAN:TIME:STIM IMP**

C. Comparing Commands on the 8753ES and E5070A/E5071A

8753ES	Function overview	E5070A/E5071A
LOWPSTEP	Select the LOW PASS STEP mode for the time-domain transformation.	**:CALC{1-9}:TRAN:TIME LPAS** **:CALC{1-9}:TRAN:TIME:STIM STEP**
LRN	Perform Setup/Read of the learn string.	Not available (Setup/Read of the learn string is not allowed.)
	[M]	
MANTRIG	Select the manual trigger mode (point by point).	Not available
MARK1	Activate marker 1 and move it to the designated position.	**:CALC{1-9}:MARK{1-10}** (Marker On/Off) and **:CALC{1-9}:MARK{1-10}:X** (Marker stimulus value) are combined for execution.
MARK2	Activate marker 2 and move it to the designated position.	
MARK3	Activate marker 3 and move it to the designated position.	
MARK4	Activate marker 4 and move it to the designated position.	**:CALC{1-9}:MARK{1-10}** (Marker ON/OFF) and **:CALC{1-9}:MARK{1-10}:X** (Marker stimulus value) are combined for execution.
MARK5	Activate marker 5 and move it to the designated position.	
MARKBUCK	Move the active marker to the designated point.	Not available (Specify the stimulus value when moving the marker.)
MARKCENT	Change the sweep center value to the stimulus value at the position of the active marker.	**:CALC{1-9}:MARK{1-10}:SET CENT**
MARKCONT	Select the mode in which the marker moves on the trace continuously.	**:CALC{1-9}:MARK{1-10}:DISC OFF**
MARKCOUP	Select the mode in which markers are coupled between channels.	**:CALC{1-9}:MARK:COUP ON** (Coupled between traces on the same channel)
MARKCW	Change the CW frequency value to the frequency value at the position of the active marker.	Not available (CW TIME sweep function and power sweep function not available.)
MARKDELA	Specify the electrical length so that the group delay is zero at the position of the active marker.	Not available
MARKDISC	Select the mode in which the marker moves from one point to another on the trace.	**:CALC{1-9}:MARK{1-10}:DISC ON**
MARKFAUV	Move the fixed marker to the position of the designated auxiliary measured value.	Not available (Fixed marker function not available.)
MARKFSTI	Move the fixed marker to the position of the fixed stimulus value.	
MARKFVAL	Move the fixed marker to the position of the designated measured value.	
MARKMAXI	Move the active marker to the position of the maximum value.	**:CALC{1-9}:MARK{1-10}:FUNC:TYPE MAX** **:CALC{1-9}:MARK{1-10}:FUNC:EXEC** (Both commands must be sent.)
MARKMIDD	Set the center value of the limit in the delta limit test to the measured value at the position of the active marker.	Not available
MARKMINI	Move the active marker to the position of the minimum value.	**:CALC{1-9}:MARK{1-10}:FUNC:TYPE MIN** **:CALC{1-9}:MARK{1-10}:FUNC:EXEC** (Both commands must be sent.)
MARKOFF	Set all markers and the marker function to Off.	Not available
MARKREF	Change the reference value to the measured value at the position of the active marker.	**:CALC{1-9}:MARK{1-10}:SET RLEV**
MARKSPAN	Change the span value of the sweep range to the stimulus value at the position of the active marker.	Not available (The stimulus value is not allowed to be set to the span value of the sweep range.)
MARKSTAR	Change the starting value of the sweep range to the stimulus value at the position of the active marker.	**:CALC{1-9}:MARK{1-10}:SET STAR**
MARKSTIM	Set the boundary value of the segment in the limit test to the stimulus value at the position of the active marker.	Not available
MARKSTOP	Change the ending value of the sweep range to the stimulus value at the position of the active marker.	**:CALC{1-9}:MARK{1-10}:SET STOP**
MARKUNCO	Select the mode in which the markers are not coupled between channels.	**:CALC{1-9}:MARK{1-10}:COUP** OFF (Turn off the coupling between traces on the channel.)

8753ES	Function overview	E5070A/E5071A
MARKZERO	Move the fixed marker to the position of the active marker.	Not available (Fixed marker function not available.)
MAXF	In defining calibration kits, specify the maximum frequency value.	Not available
MEASA	Select measurement A and display the traces.	Not available(The E5070A/E5071A does not have absolute value measuring function.)
MEASB	Select measurement B and display the traces.	
MEASR	Select measurement R and display the traces.	
MEASTAT	Set the statistics analysis function On/Off.	**:CALC{1-9}:MST**
MENUAVG	Display the softkey menu appearing when the [Avg] key is pressed.	Not available (No command is available that displays the softkey menu corresponding to each key.)
MENUCAL	Display the softkey menu appearing when the [Cal] key is pressed.	
MENUCOPY	Display the softkey menu appearing when the [Copy] key is pressed.	
MENUDISP	Display the softkey menu appearing when the [Display] key is pressed.	
MENUFORM	Display the softkey menu appearing when the [Format] key is pressed.	
MENUMARK	Display the softkey menu appearing when the [Marker] key is pressed.	
MENUMEAS	Display the softkey menu appearing when the [Meas] key is pressed.	
MENUMRKF	Display the softkey menu appearing when the [Marker Fctn] key is pressed.	
MENUOFF	Set the softkey menu display to Off.	**:DISP{1-9}:SKEY OFF**
MENUON	Set the softkey menu display to On.	**:DISP{1-9}:SKEY ON**
MENUPOWE	Display the softkey menu appearing when the [Power] key is pressed.	Not available (No command is available that displays the softkey menu corresponding to each key.)
MENURECA	Display the softkey menu appearing when the [Save/Recall] key is pressed.	
MENUSAVE	Display the softkey menu appearing when the [Save/Recall] key is pressed.	
MENUSCAL	Display the softkey menu appearing when the [Scale Ref] key is pressed.	
MENUSEQU	Display the softkey menu appearing when the [Seq] key is pressed.	
MENUSRCH	Display the softkey menu appearing when the [Marker Search] key is pressed.	
MENUSTIM	Display the softkey menu appearing when the [Sweep Setup] key is pressed.	
MENUSWEE	Display the softkey menu appearing when the [Sweep Setup] key is pressed.	
MENUSYST	Display the softkey menu appearing when the [System] key is pressed.	
MINF	In defining calibration kits, specify the minimum frequency value.	Not available (Specifying the frequency band is not allowed.)
MINMAX	Set the function for recording the maximum and minimum for each segment in the limit test to On/Off.	Not available
MINU	Display the result of subtracting the memory trace from the data trace.	**:DISP:WIND{1-9}:TRAC{1-9}:STAT ON** **:DISP:WIND{1-9}:TRAC{1-9}:MEM OFF** **:CALC{1-9}:MATH:FUNC SUBT** (All three commands must be sent.)
MODI1	Start defining the calibration kits.	Not available
MODS	Calculate the new calibration set using the adapter removal function.	Not available (Adapter removal function not available.)

8753ES	Function overview	E5070A/E5071A
	[N]	
NEWSEQ	Create/Revise a test sequence.	Not available (Test sequence function not available.)
NEXP	Go to next page while the list is displayed on the LCD screen.	Not available (List display function not available.)
NOOP	Wait for a while without doing anything.	Not available
NUMG	Perform the sweep operation the specified number of times.	Not available
NUMR	Specify the number of power meter readings.	Not available (Power meter calibration function not available.)
	[O]	
OFLD	Complete the offset LOAD measurement.	Not available (The LOAD standard is treated as fixed LOAD.)
OFLS	In defining calibration kits, select the offset LOAD as the type of LOAD.	
OFSD	Specify the offset value of the electrical delay.	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:DEL**
OFSL	Specify the loss offset.	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:LOSS**
OFSZ	Specify the offset value of the characteristic impedance.	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:Z0**
OMII	Omit the isolation measurement when performing calibration.	Not available (Isolation measurement is treated as an option.)
OPC	When the next command have been completed , set bit 0 of the event status register standby.	***OPC**(When all operations on standby have been completed, set bit 0 of the event status register.)
OPEP	Display the list of Instrument State statuses on the LCD screen.	Not available
OUTPACTI	Read the entry area value.	Not available
OUTPAMAX	Read the maximum of the measured values in the segments in the limit test.	Not available
OUTPAMIN	Read the minimum of the measured values in the segments in the limit test.	Not available
OUTPAPER	Read the smoothing aperture value.	**:CALC{1-9}:SMO:APER?**
OUTPCALC{01-12}	Read the calibration coefficient array.	Not available (Reading/Writing the calibration coefficient array is not allowed.)
OUTPCALK	Read the data about the calibration kit setup.	Not available (Reading/Writing the calibration kit array is not allowed.)
OUTPFARPLPT	Read the information about fails in the ripple test.	Not available (Ripple test function not available.)
OUTPCHAN	Read the active channel.	**:DISP:WIND{1-9}:ACT?** (Reading of the active channel) **:CALC{1-9}:PAR{1-9}:SEL?** (Reading of the active trace)
OUTPDATA	Read the corrected data array.	**:CALC{1-9}:DATA:SDAT?**
OUTPDATF	Read the corrected data array. (High-speed data transfer command)	**:CALC{1-9}:DATA:SDAT?** (High-speed data transfer command not available.)
OUTPDATP	Read the trace data at the designated point.	Not available
OUTPDATR	Read the trace data at points within the designated range.	Not available
OUTPERRO	Read error information from the error cue.	**:SYST:ERR?**
OUTPFAIP	Read the number of failed points and the stimulus value at points in the limit test.	Not available (The number of points can be read by **:CALC{1-9}:LIM:REP:POIN?**, and the stimulus value by **:CALC{1-9}:LIM:REP?**, but the measured values cannot be read.)
OUTPFORF	Read the formatted data array. (High-speed data transfer command)	**:CALC{1-9}:DATA:FDAT?** (High-speed data transfer command not available.)
OUTPFORM	Read the formatted data array.	**:CALC{1-9}:DATA:FDAT?**

8753ES	Function overview	E5070A/E5071A
OUTPICAL{01-12}	Read the interpolated calibration coefficient array.	Not available (Reading/Writing the calibration coefficient array is not allowed.)
OUTPIDEN	Read the product information.	***IDN?**
OUTPIPMCL{1-2}	Read the interpolated power meter calibration array.	Not available (Power meter calibration function not available.)
OUTPKEY	Read the code of the key you last pressed.	Not available
OUTPLEAS	Read the learn string.	Not available (Reading/Writing a learn string is not allowed.)
OUTPLIM{1-4}	Read the results of the limit test.	**:CALC{1-9}:LIM:FAIL?** (Read the result of the active trace on the specified channel. The value read from the results is different from that obtained by the 8753ES.)
OUTPLIMF	Read the information on the failed points and the number of failed points in the limit test.	Not available (You can read the number of failed points by using **:CALC{1-9}:LIM:REP:POIN?**.)
OUTPLIML	Read the results of the limit test for each point.	Not available
OUTPLIMM	Read the results of the limit test at the position of the active marker.	Not available
OUTPMARK	Read the value of the active marker.	**:CALC{1-9}:MARK{1-10}:X?** (Stimulus value) **:CALC{1-9}:MARK{1-10}:Y?** (Response value) can be used to read the marker value, but you must designate the channel and marker in the command.
OUTPMEMF	Read the data about the memory trace. (High-speed data transfer command)	**:CALC{1-9}:DATA:SMEM?** (High-speed data transfer command not available.)
OUTPMEMO	Read the data about the memory trace.	**:CALC{1-9}:DATA:SMEM?**
OUTPMSTA	Read the results of the statistics analysis.	**:CALC{1-9}:MST:DATA?**
OUTPMWID	Read the results of the bandwidth search (bandwidth, center value, and Q value).	**:CALC{1-9}:MARK{1-10}:BWID:DATA?** (The array read contains data on the loss value.)
OUTPMWIL	Read the results of the bandwidth search (bandwidth, center value, Q value, and loss value).	**:CALC{1-9}:MARK{1-10}:BWID:DATA?**
OUTPOPTS	Read the information about the installed options.	***OPT?**
OUTPPLOT	Outputs the LCD screen to the GPIB port in HP-GL format.	Not available (The LCD screen is not allowed as output from the GPIB.)
OUTPPMCAL{1-2}	Read the power meter calibration array.	Not available (Power meter calibration function not available.)
OUTPPRE{1-4}	Read the pre-raw data (command for Take4 mode)	Not available (Reading/Writing pre-raw data is not allowed.)
OUTPPRIN	Outputs the LCD screen to the printer in PCL raster dump format.	**:HCOP**
OUTPPRINALL	Prints out all lists when lists are displayed.	Not available (List display function not available.)
OUTPRAF{1-4}	Read the raw data array (High-speed data transfer command).	Not available (Reading/Writing raw data array is not allowed.)
OUTPRAW{1-4}	Read the raw data array.	
OUTPRFFR	Read the frequency of the external RF signal source.	Not available (External RF signal source cannot be used.)
OUTPRPLBNDALL	Read the magnitudes of ripples in the ripple test in all valid bands.	Not available (Ripple test function not available.)
OUTPRPLBNDPF	Read the Pass/Fail of the ripple test in the designated band.	Not available (Ripple test function not available.)
OUTPRPLBNDVAL	Read the results of the ripple test and magnitudes of ripples in the designated band.	Not available (Ripple test function not available.)

8753ES	Function overview	E5070A/E5071A
OUTPSEGAF	Read the number of segments and segment-by-segment test results in the limit test.	Not available (Segment-by-segment test results are not allowed to be read.)
OUTPSEGAM	Read the maximum value/minimum value in all segments in the limit test.	
OUTPSEGF	Display the results in the designated segment in the limit test.	
OUTPSEGM	Display the maximum value/minimum value in the designated segment.	
OUTPSEQ{1-6}	Read the contents of the test sequence.	Not available (Test sequence function not available.)
OUTPSERN	Read the product serial number.	Included in the value read from ***IDN?**
OUTPSTAT	Read the value of the status byte register.	***STB?**
OUTPTITL	Read the title on the LCD screen.	**:DISP:WIND{1-9}:TITL:DATA?**
	[P]	
PDATA	Determine whether or not to output the data trace when plotting.	Not available (Plotters are not supported.)
PGRAT	Determine whether or not to output graticule lines when plotting.	
PMEM	Determine whether or not to output the memory trace when plotting.	
PMKR	Determine whether or not to output markers when plotting.	
PSOFT	Determine whether or not to output softkeys when plotting.	
PTEXT	Determine whether or not to output the text when plotting.	
PARAIN{0-4}	Specify the bit number of the GPIO input port to be used for branching in the test sequence.	Not available (Test sequence function not available.)
PARAOUT{0-255}	Specify the output from the GPIO output port for all bits at the same time.	Not available (GPIO output is not supported.)
PARALGPIO	Set up the parallel port for GPIO use.	Not available (Parallel port is intended for the printer.)
PARALCPY	Set up the parallel port for printer use.	
PAUS	Insert a pause into the test sequence.	Not available (Test sequence function not available.)
PCB{0-30}	Specify the GPIB address where control is returned.	Not available (Pass control function not available)
PCOLDATA{1-4}	Specify the color for the data trace for printing.	Not available (Color setup is allowed only for turning highlighting of the entire screen On/Off.)
PCOLGRAT	Specify the color for graticule lines for printing.	
PCOLMEMO{1-4}	Specify the color for the memory trace for printing.	
PCOLREFL	Specify the color for the reference line for printing.	
PCOLTEXT	Specify the color for text for printing.	
PCOLWARN	Specify the color for warning messages for printing.	
PENNDATA{0-10}	Specify the pen number for the data trace for plotting.	Not available (Plotters are not supported.)
PENNGRAT{0-10}	Specify the pen number for the graticule lines for plotting.	
PENNMARK{0-10}	Specify the pen number for the marker for plotting.	
PENNMEMO{0-10}	Specify the pen number for the memory trace for plotting.	
PENNTEXT{0-10}	Specify the pen number for text for plotting.	
PHAO{0-360}	Specify the phase offset.	**:CALC{1-9}:CORR:OFFS:PHAS**
PHAS	Select the phase format as the display format.	**:CALC{1-9}:FORM PHAS**

8753ES	Function overview	E5070A/E5071A
PLOSSLOW	Set the pen speed for plotting to Slow.	Not available (Plotters are not supported.)
PLOSFAST	Set the pen speed for plotting to Fast.	
PLOT	Start plotting.	
PLTHNDSHK	Select the handshake mode for the plotter.	
PLTPRTDISK	Select the disk as the plotter port.	
PLTPRTHPIB	Select GPIO as the plotter port.	
PLTPRTPARA	Select the parallel port as the plotter port.	
PLTPRTSERI	Select the serial port as the plotter port.	
PLTTRAUTF	Set the plotter auto feed On/Off.	
PLTTRBAUD	Specify the baud rate for the serial port when using the plotter.	
PLTTRFORF	Send a form feed to the plotter.	
PLTTYPHPGL	Select a PCL5-compatible printer as the plotter type.	
PLTTYPPLTR	Set up the plotter type in the plotter.	
PMTRTTIT	Select the GPIB reading from the power meter as the title.	Not available (Power meter calibration function not available.)
POIN	Specify the number of points.	**:SENS{1-9}:SWE:POIN** (Cannot be used for editing segments.)
POLA	Select the polar format as the display format.	**:CALC{1-9}:FORM PLIN** **:CALC{1-9}:FORM PLOG** **:CALC{1-9}:FORM POL** (you have to select the marker value reading format also.)
POLMLIN	Select LIN as the marker value reading format when using the polar format.	Not available (Selected at the same time the polar format is selected as the data format.)
POLMLOG	Select Log as the marker value reading format when using the polar format.	Not available (Selected at the same time the polar format is selected as the data format.)
POLMRI	Select Re/Im as the marker value reading format when using the polar format.	Not available (Selected at the same time the polar format is selected as the data format)
PORE	Set the port extension On/Off.	**:SENS{1-9}:CORR:EXT**
PORT1	Specify the port extension correction value for port 1.	**:SENS{1-9}:CORR:EXT:PORT**
PORT2	Specify the port extension correction value for port 2.	
PORTA	Specify the port extension correction value for input A.	Not available (Port extension correction for input is not allowed.)
PORTB	Specify the port extension correction value for input B.	
PORTP	Select Couple/Uncouple between ports for the power level.	Not available (For the power level, traces are coupled on the same channel and not coupled between channels.)
POWE	Specify the power level.	**:SOUR{1-9}:POW**
POWLFREQ	Create the power loss list for power meter calibration.	Not available (Power meter calibration function not available.)
POWLLIST		
POWLLOSS		
POWM	Specify the type of power meter.	
POWR{00-07}	Specify the power range of the signal source.	Specify the power range by using **:SOUR{1-9}:POW:ATT** to designate the attenuator.
POWS	Select the power level sweep as the type of sweep.	Not available (Power level sweep function not available.)
POWT	Set the signal source output On/Off.	Not available (Always On)

C. Comparing Commands on the 8753ES and E5070A/E5071A

8753ES vs. E5070A/E5071A Command Comparison (8753ES-only commands excluded)

8753ES	Function overview	E5070A/E5071A
PRAN{0-7}	Specify the power range of the signal source.	Specify the power range by using **:SOUR{1-9}:POW:ATT** to designate the attenuator.
PREP	Go back to the previous page while the list is displayed on the LCD screen.	Not available (List display function not available.)
PRES	Reset	**:SYST:PRES** ***RST**(Stop sweeping.)
PRIC	Select color printing.	Not available (Printer setup executed by using the front panel.)
PRIS	Select black-and-white printing.	
PRINALL	Start printing the LCD screen.	**:HCOP**
PRINSEQ	Start printing the test sequence.	Not available (Test sequence function not available.)
PRINTALL	Start printing the list.	Not available (List display function not available.)
PRNHNDSHK	Select the handshake mode for the printer.	Not available
PRNPRTHPIB	Select GPIB as the printer port.	Not available (GPIB printers are not supported.)
PRNPRTPARA	Select the parallel port as the printer port.	Not available
PRNPRTSERI	Select the serial port as the printer port.	Not available
PRNTRAUTF	Set the printer auto feed On/Off.	Not available
PRNTRBAUD	Specify the baud rate of the serial port when using the printer.	Not available
PRNTRFORF	Send a form feed to the printer.	Not available
PRNTYP540	Select the HP DeskJet 540/850C as the printer.	Not available (Printer setup executed by using the front panel.)
PRNTYPDJ	Select the HP DeskJet as the printer.	
PRNTYPEP	Select the Epson ESC/P2 as the printer.	
PRNTYPLJ	Select the HP LaserJet as the printer.	
PRNTYPPJ	Select the HP PaintJet as the printer.	
PRNTYPTJ	Select the HP ThinkJet as the printer.	
PTOS	Stop the designated sequence.	**:PROG:STA STOP**(Stop the VBA program.)
PURG	Delete the file.	**:MMEM:DEL**
PWMCEACS	Calibrate the power meter at every sweep.	Not available (Power meter calibration function not available.)
PWMCOFF	Turn Off the power meter calibration.	
PWMCONES	Calibrate the power meter in one sweep operation.	
PWRLOSS	Determine whether or not to use the power loss list for calibrating the power meter.	
PWRMCAL	Cause the softkey for the power meter calibration menu to appear and specify the power level for calibration.	
PWRR	Set the signal source power range changeover to Manual/Auto.	Not available (Always on Manual)
[Q]		
Q	Select the test sequence.	**:PROG:STA STOP**(Select the VBA program.)
[R]		
RAID	Calculate the calibration coefficients for the response & isolation calibration.	**:SENS{1-9}:CORR:COLL:SAVE**
RAIISOL	Execute the isolation measurement for the response & isolation calibration.	**:SENS{1-9}:CORR:COLL:ISOL**
RAIRESP	Start measuring the response for the response and isolation calibration.	**:SENS{1-9}:CORR:COLL:THRU**
RAWOFFS	Set the offset of the sampler and attenuator On/Off. (Take4 mode)	Not available
READDATE	Read the date from the internal clock.	**:SYST:DATE?**
READTIME	Read the time from the internal clock.	**:SYST:TIME?**
REAL	Select the real format as the display format.	**:CALC{1-9}:FORM REAL**

8753ES	Function overview	E5070A/E5071A
RECA	Recall the Instrument State status from the internal register.	**:MMEM:LOAD**
RECAREG		
RECO	Recall the color settings for the LCD screen.	Not available (Color setup is allowed only for turning highlighting of the entire screen On/Off.)
REFD	Complete the reflection data measurement for the 2-port calibration.	Not available (You do not need to send any completion command.)
REFL	Start measuring the reflection data for the 2-port calibration.	Not available (You do not need to send any start command.)
REFOP	Start measuring the data for reflection in the one-bus 2-port calibration (forward enhanced response calibration).	Not available (Calibration function not available.)
REFP	Specify the position of the reference line.	**:DISP:WIND{1-9}:TRAC{1-9}:Y:RLEV**
REFV	Specify the value for the reference line.	**:DISP:WIND{1-9}:TRAC{1-9}:Y:RPOS**
REFT	Read the title of the file from the disk.	Not available
REIC	Specify the power reference value for the receiver calibration.	Not available (Receiver calibration function not available.)
RERCDONE	Complete the data measurement for the reverse enhanced response calibration and calculate the calibration coefficients on the basis of the data obtained.	Not available (Enhanced response calibration function not available.)
RESC	Resume the measurement of the calibration data interrupted immediately before.	Not available (Calibration resumption function not available.)
RESD	Return the list display screen for the measurement results to the normal graph screen.	Not available (List display function not available.)
RESPDONE	Calculate the calibration coefficients for the response calibration.	**:SENS{1-9}:CORR:COLL:SAVE**
REST	Interrupt the sweep and start sweeping over again.	Not available
REVI	Start measuring the data for reverse isolation of the full 2-port calibration.	**:SENS{1-9}:CORR:COLL:ISOL**
REVM	Start measuring the data for reverse match of the full 2-port calibration.	Not available (You do not need to send any start command.)
REVT	Start measuring the data for reverse transmission of the full 2-port calibration.	
RFGTLO	Set the signal source frequency to a value greater than LO.	Not available (Mixer measurement function not available.)
RFLTLO	Set the signal source frequency to a value smaller than LO.	
RFLP	Select the S11 measurement.	**:CALC{1-9}:PAR{1-9}:DEF S11**
RIGL	Set up the system so the object is output through the plotter onto the lower-right 1/4 of a sheet.	Not available (Entire screen is always output.)
RIGU	Set up the system so the object is output through the plotter onto the upper-right 1/4 of a sheet.	
RLIMLINE	Set the ripple limit line display On/Off.	Not available (Ripple test function not available.)
RLIMM	Specify the upper limit value for the ripple test.	
RLIMSTP	Specify the frequency band stop value for the ripple test.	
RLIMSTR	Specify the frequency band start value for the ripple test.	
RLIMTEST	Set the ripple test On/Off.	
RLIMVALABS	Set the ripple value display (absolute) On.	
RLIMVALMAR	Set the ripple value display (margin) On.	
RLIMVALOFF	Set the ripple value display Off.	
RSCO	Return the color setup to the initial state.	Not available (Color setup is allowed only for turning highlighting of the entire screen On/Off.)
RST	Reset	**:SYST:PRES**
		***RST**(Stop sweeping)

8753ES	Function overview	E5070A/E5071A
	[S]	
S11	Select the S11 measurement.	**:CALC{1-9}:PAR{1-9}:DEF S11**
S12	Select the S12 measurement.	**:CALC{1-9}:PAR{1-9}:DEF S21**
S21	Select the S21 measurement	**:CALC{1-9}:PAR{1-9}:DEF S12**
S22	Select the S22 measurement	**:CALC{1-9}:PAR{1-9}:DEF S22**
SADD	Add segments while editing tables.	Not available (Each table is edited using one command; there is no corresponding command.)
SAMC	Set the sampler correction On/Off.	**:SYST:CORR**
SAV1	Complete the data measurement for 1-port calibration and calculate the calibration coefficients on the basis of the data obtained.	**:SENS{1-9}:CORR:COLL:SAVE**
SAV2	Complete the data measurement for 2-port calibration and calculate the calibration coefficients on the basis of the data obtained.	**:SENS{1-9}:CORR:COLL:SAVE**
SAVC	Finish writing from the external data to the calibration coefficient array.	Not available (Reading/Writing the calibration coefficient array is not allowed.)
SAVE	Save the Instrument State status into the internal register.	**:MMEM:STOR**
SAVECSV	Save the measurement data in CSV format.	**:MMEM:STOR:FDAT**
SAVEJPG	Save the LCD screen image as a JPEG format file.	**:MMEM:STOR:IMAG** (Stored in Windows® Bitmap format/PNG format.)
SAVERC	Complete the data measurement of the forward enhanced response calibration and calculate the calibration coefficients on the basis of the data obtained.	Not available (Enhanced response calibration function not available.)
SAVEREG	Save the Instrument State status in the internal register.	**:MMEM:STOR**
SAVEUSEK	Save the selected calibration kit as a user calibration kit.	Not available
SAVRERC	Complete the data measurement for the reverse enhanced response calibration and calculate the calibration coefficients from the data saved.	Not available (Enhanced response calibration function not available.)
SAVT	Complete the data measurement for the TRL*/LRM* 2-port calibration and calculate the calibration coefficients on the basis of the data obtained.	Not available (The E5070A/E5071A supports the TRL* /LRM* calibration function using VBA.)
SAVUASCI	Select ASCII as the format for saving data.	Not available (Stored in binary format)
SAVUBINA	Select binary as the format for saving data.	
SCAL	Specify the Y-axis scale for displaying traces.	**:DISP:WIND{1-9}:TRAC{1-9}:Y:PDIV**
SCAPFULL	Select FULL as the plotting scale.	Not available (Plotters are not supported.)
SCAPGRAT	Select GRAT as the plotting scale.	
SDEL	Delete segments while editing tables.	Not available (Each table is edited using one command; there is no corresponding command.)
SDON	Complete the editing of segments while editing tables.	Not available (Each table is edited using one command; there is no corresponding command.)
SEAL	Search for the left target value.	**:CALC{1-9}:MARK{1-10}:FUNC:TYPE LTAR** **:CALC{1-9}:MARK{1-10}:FUNC:EXEC** (Both commands must be sent.)
SEAMAX	Search for the maximum value.	**:CALC{1-9}:MARK{1-10}:FUNC:TYPE MAX** **:CALC{1-9}:MARK{1-10}:FUNC:EXEC** (Both commands must be sent.)
SEAMIN	Search for the minimum value.	**:CALC{1-9}:MARK{1-10}:FUNC:TYPE MIN** **:CALC{1-9}:MARK{1-10}:FUNC:EXEC** (Both commands must be sent.)
SEAOFF	Set the marker search function Off.	Not available
SEAR	Search for the right target value.	**:CALC{1-9}:MARK{1-10}:FUNC:TYPE RTAR** **:CALC{1-9}:MARK{1-10}:FUNC:EXEC** (Both commands must be sent.)
SEATARG	Specify the target value.	**:CALC{1-9}:MARK{1-10}:FUNC:TARG**

8753ES	Function overview	E5070A/E5071A
SEDI	Select the number of the segment to be edited while editing tables.	Not available (Each table is edited using one command; there is no corresponding command.)
SEGIFBW	Specify the IFBW of segments while editing tables.	Not available (Each table is edited using one command; there is no corresponding command.)
SEGPOWER	Specify the POWER segment while editing tables.	Not available (Each table is edited using one command; there is no corresponding command.)
SELMAXPT	Specify the point at the upper limit of the range for reading.	Not available (Limiting the range for reading is not allowed.)
SELMINPT	Specify the point at the lower limit of the range for reading.	
SELPT	Specify the point for reading.	
SELSEG	Select the segment for reading.	
SELBND	Select the band for reading.	
SELL	Select REDIVISION of a learn string.	Reading/Writing a learn string is not allowed.
SEQ	Select the test sequence.	Not available (Test sequence function not available.)
SEQWAIT	Specify the waiting time in the test sequence.	
SETBIT	Set the designated bit in the GPIO port to 1.	Not available (GPIO is not supported.)
SETDATE	Set the date of the internal clock.	**:SYST:DATE**
SETF	Measure low pass frequencies.	Not available (Time-domain transformation function not available.)
SETRTHRU	Select THRU as the reference for the TRL*/LRM* 2-port calibration.	Not available (The E5070A/E5071A supports the TRL* /LRM* calibration function using VBA.)
SETRREFL	Select REFLECT as the reference for the TRL*/LRM* 2-port calibration.	
SETTIME	Set the time of the internal clock.	**:SYST:TIME**
SETZ	Specify the characteristic impedance of the measurement system.	**:CALC{1-9}:FSIM:SEND:ZCON:PORT{1-6}:Z0** (Allowed on the fixture simulator)
SHOM	Specify the softkey display in the test sequence.	Not available (Test sequence function not available.)
SING	Perform one sweep operation. (Single mode)	Not available
SLID	Finish measuring a sliding load.	Not available (The LOAD standard is treated as fixed LOAD.)
SLIL	In defining calibration kits, select sliding LOAD as the type of LOAD.	
SLIS	Make measurements after sliding the sliding LOAD.	
SLOPE	Specify the power slope value.	Not available (Power slope function not available.)
SLOPO	Set the power slope On/Off.	
SM8	Set the spur avoidance function On/Off (Take4 mode).	Not available (not in Take4 mode)
SMIC	Select the Smith chart format as the display format.	**:CALC{1-9}:FORM SLIN** **:CALC{1-9}:FORM SLOG** **:CALC{1-9}:FORM SCOM** **:CALC{1-9}:FORM SMI** **:CALC{1-9}:FORM SADM** (Designate any one of the above commands, and select the marker value read format at the same time.Åj

8753ES	Function overview	E5070A/E5071A
SMIMGB	Select G+jB as the marker value read format when using the Smith chart format.	Not available (Selected at the same time the Smith chart format is selected as the data format)
SMIMLIN	Select LIN as the marker value read format when using the Smith chart format.	
SMIMLOG	Select LOG as the marker value read format when using the Smith chart format.	
SMIMRI	Select Re/Im as the marker value read format when using the Smith chart format.	
SMIMRX	Select R+jX as the marker value read format when using the Smith chart format.	
SMOOAPER	Specify the smoothing aperture.	**:CALC{1-9}:SMO:APER**
SMOOO	Set the smoothing On/Off.	**:CALC{1-9}:SMO**
SOFR	Display the firmware version on the screen.	Included in the value read from ***IDN?**
SOFT{1-8}	Perform the same processing as pressing the designated softkey.	Not available
SOUP	Set the signal source output On/Off.	Not available (Always On)
SPAN	Specify the span value of the sweep range.	**:SENS{1-9}:FREQ:SPAN** (Cannot be used for editing segments.)
SPECFWDM	In defining calibration kits, specify the standard for forward match.	**:SENS{1-9}:CORR:COLL:CKIT:ORD:THRU** (Definition of the Thru calibration class) Registering the Thru standard as the calibration class is equivalent to registering one standard in all calibration classes necessary for the thru measurement of full 2-port calibration on the 8753ES.
SPECFWDT	In defining calibration kits, specify the standard for forward transmission.	
SPECRESP	In defining calibration kits, specify the standard for response.	Not available (In the response measurement, the standards defined in the calibration classes of OPEN, SHORT, LOAD, and THRU are used. Therefore, a calibration class for response does not exist.)
SPECRESI	In defining calibration kits, specify the standard for response (response & isolation).	
SPECREVM	In defining calibration kits, designate a standard for reverse match.	**:SENS{1-9}:CORR:COLL:CKIT:ORD:THRU** (Definition of the Thru calibration class) Registering the Thru standard as the calibration class is equivalent to registering one standard in all calibration classes necessary for the thru measurement of full 2-port calibration on the 8753ES.
SPECREVT	In defining calibration kits, designate a standard for reverse transmission.	
SPECS11A	In defining calibration kits, designate a standard for S11A.	**:SENS{1-9}:CORR:COLL:CKIT:ORD:OPEN** (Designate a port by using a parameter.)
SPECS11B	In defining calibration kits, designate a standard for S11B.	**:SENS{1-9}:CORR:COLL:CKIT:ORD:SHOR** (Designate a port by using a parameter.)
SPECS11C	In defining calibration kits, designate a standard for S11C.	**:SENS{1-9}:CORR:COLL:CKIT:ORD:LOAD** (Designate a port by using a parameter.)
SPECS22A	In defining calibration kits, designate a standard for S22A.	**:SENS{1-9}:CORR:COLL:CKIT:ORD:OPEN** (Designate a port by using a parameter.)
SPECS22B	In defining calibration kits, designate a standard for S22B.	**:SENS{1-9}:CORR:COLL:CKIT:ORD:SHOR** (Designate a port by using a parameter.)
SPECS22C	In defining calibration kits, designate a standard for S22C.	**:SENS{1-9}:CORR:COLL:CKIT:ORD:LOAD** (Designate a port by using a parameter.)
SPECTRLL	In defining calibration kits, designate a standard for TRL Line/Match.	Not available (The E5070A/E5071A supports the TRL* /LRM* calibration function using VBA.)
SPECTRLT	In defining calibration kits, designate a standard for TRL Thru.	
SPECTRLR	In defining calibration kits, designate a standard for TRL Reflection.	

8753ES	Function overview	E5070A/E5071A
SPECTRFM	In defining calibration kits, designate a standard for S11A.	**:SENS{1-9}:CORR:COLL:CKIT:ORD:OPEN** (Designate a port by using a parameter.)
SPECTRRM	In defining calibration kits, designate a standard for S22A.	
SPECTLFM	In defining calibration kits, designate a standard for S11B.	**:SENS{1-9}:CORR:COLL:CKIT:ORD:SHOR** (Designate a port by using a parameter.)
SPECTLFT	In defining calibration kits, designate a standard for S11C.	**:SENS{1-9}:CORR:COLL:CKIT:ORD:LOAD** (Designate a port by using a parameter.)
SPECTLRM	In defining calibration kits, designate a standard for S22B.	**:SENS{1-9}:CORR:COLL:CKIT:ORD:SHOR** (Designate a port by using a parameter.)
SPECTLRT	In defining calibration kits, designate a standard for S22C.	**:SENS{1-9}:CORR:COLL:CKIT:ORD:LOAD** (Designate a port by using a parameter.)
SPECTTFM	In defining calibration kits, designate a standard for forward match.	**:SENS{1-9}:CORR:COLL:CKIT:ORD:THRU** (Definition of the Thru calibration class) Registering the Thru standard as the calibration class is equivalent to registering one standard in all calibration classes necessary for the thru measurement of full 2-port calibration on the 8753ES.
SPECTTFT	In defining calibration kits, designate a standard for forward transmission.	
SPECTTRM	In defining calibration kits, designate a standard for reverse match.	
SPECTTRT	In defining calibration kits, designate a standard for reverse transmission.	
SPEG	Cause the softkey in the gate setup menu to appear.	Not available
SPLD	Set the split display On/Off.	**:DISP:SPL** (Setting up the window array for a channel) and **:DISP:WIND{1-9}:SPL** (Setting up the array of trace graphs) are combined to perform the equivalent.
SPLID1	Select one-screen display.	
SPLID2	Select two-screen display.	
SPLID4	Select four-screen display.	
SRE	Specify the value of the service request valid register.	***SRE**
SSEG	Use only the designated segment for the list frequency sweep.	Not available (All segments are always used.)
STANA	Execute measurement of the standard displayed in the first softkey from the top.	Not available (No command for this is available because only one standard can be registered in each calibration class.)
STANB	Execute measurement of the standard displayed in the second softkey from the top.	
STANC	Execute measurement of the standard displayed in the third softkey from the top.	
STAND	Execute measurement of the standard displayed in the fourth softkey from the top.	
STANE	Execute measurement of the standard displayed in the fifth softkey from the top.	
STANF	Execute measurement of the standard displayed in the sixth softkey from the top.	
STANG	Execute measurement of the standard displayed in the seventh softkey from the top.	
STAR	Specify the start value of the sweep range.	**:SENS{1-9}:FREQ:STAR** (Cannot be used for editing segments.)
STB?	Read the value of the status byte register.	***STB?**
STDD	In defining calibration kits, complete the defining job for each standard.	Not available (Takes effect automatically upon sending the setup command.)
STDTARBI	Select Arbitrary Impedance as the type of standard being defined.	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}: TYPE ARBI**
STDTDELA	Select Delay/Thru as the type of standard being defined.	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}: TYPE THRU**
STDTLOAD	Select LOAD as the type of standard being defined.	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}: TYPE LOAD**
STDTOPEN	Select OPEN as the type of standard being defined.	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}: TYPE OPEN**
STDTSHOR	Select SHORT as the type of standard being defined.	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}: TYPE SHOR**

8753ES	Function overview	E5070A/E5071A
STOP	Specify the stop value of the sweep range.	**:SENS{1-9}:FREQ:STOP** (Cannot be used for editing segments.)
STOR	Save the Instrument State status to the file.	**:MMEM:STOR**
STORSEQ	Save the test sequence to the file.	Not available (Test sequence function not available.)
STPSIZE	Specify the sweep step values between points in the segment.	Not available
SVCO	Save the color setup for the LCD screen.	Not available (No function available that saves the setup for colors only.)
SWEA	Automatically sets the sweep time to the shortest possible.	**:SENS{1-9}:SWE:TIME:AUTO ON**
SWET	Specify the sweep time.	**:SENS{1-9}:SWE:TIME**
SWPSTART	Initialize the sweep (in connection with Take4).	Not available (Take4 mode not available.)
SWR	Select the SWR format as the display format.	**:CALC{1-9}:FORM SWR**
	[T]	
TAKCS	Start the sweep to acquire the data for the power meter calibration.	Not available (Power meter calibration function not available.)
TAKRS	Start the sweep to acquire the data for the receiver calibration.	Not available (Receiver calibration function not available.)
TAKE4	Set the system to the Take4 mode.	Not available (Take4 mode not available.)
TALKLIST	Select the talker/listener mode.	Not available (Can be set up from the front panel.)
TERI	Specify the terminal impedance when defining standards.	**:SENS{1-9}:CORR:COLL:CKIT:STAN{1-21}:ARB**
TESS?	Check to see if the test set is connected.	Not available (Test set cannot be used.)
TIMDTRAN	Set the time-domain transformation On/Off.	**:CALC{1-9}:TRAN:TIME:STAT**
TIMESTAM	Set the output time stamp from the printer/plotter On/Off.	Not available (Printed image include the timestamp because LCD always display it).
TINT	Specify the hue of the display color for the selected item.	Not available (Color setup is allowed only for turning highlighting of the entire screen On/Off.)
TITF	Assign a file name to the file for saving.	Not available (Assigned when saved)
TITL	Assign a title to the LCD screen.	**:DISP:WIND{1-9}:TITL:DATA**
TITP	Assign a file name to the file that receives plot output.	Not available (Plot output to a file is not allowed.)
TITR	Assign a name to the register for Save/Recall.	Not available (Register for Save/Recall not available.)
TITREG	Assign a name to the register for Save/Recall.	
TITSEQ	Name the test sequence.	Not available (Test sequence function not available.)
TITSQ	Display the softkey for naming the test sequence.	
TITTMEM	Send the title to the memory trace.	Not available
TITTPERI	Send the title to the GPIBaddresses of the peripherals.	Not available
TITTPMTR	Send the title to the GPIBaddress of the power meter.	Not available
TITTPRIN	Send the title to the GPIB address of the printer.	Not available
TRACK	Set the search tracking function On/Off.	**:CALC{1-9}:MARK{1-10}:FUNC:TRAC**
TRAD	Complete measuring the data to be transmitted on full 2-port calibration or enhanced response calibration.	Not available (Enhanced response calibration function not available.)
TRAN	Start measuring the data to be transmitted on full 2-port calibration or enhanced response calibration.	Not available (Enhanced response calibration function not available.)
TRAOP	Start measuring the data to be transmitted on the one-bus 2-port calibration.	Not available (One-bus 2-port calibration function not available.)
TRAP	Select the S21 measurement.	**:CALC{1-9}:PAR{1-9}:DEF S21**

8753ES	Function overview	E5070A/E5071A
TRLL1	In measuring the data on TRL*/LRM* 2-port calibration, measure the data on Line/Match of port 1.	Not available (The E5070A/E5071A supports the TRL* /LRM* calibration function using VBA.)
TRLL2	In measuring the data on TRL*/LRM* 2-port calibration, measure the data on Line/Match of port 2.	
TRLR1	In measuring the data on TRL*/LRM* 2-port calibration, measure the data on S11 reflection.	
TRLR2	In measuring the data on TRL*/LRM* 2-port calibration, measure the data on S22 reflection.	
TRLT	In measuring the data on TRL*/LRM* 2-port calibration, measure the data on THRU.	
TSSWI	Specify the number of sweep operations in switch changeover in the test set.	Not available (Always continuous)
TST?	Perform the self-test and read the results of the test.	Not available
TSTIOFWD	Specify the bit in the test set in which the forward attenuator is set up.	Not available
TSTIOREV	Specify the bit in the test set in which the reverse attenuator is set up.	
TSTP	Select the port to be used when S-parameters are not measured.	Not available (Only S-parameters can be selected.)
TTLHPULS	Set up the system so that the pulse from Low to High can be output to TTL when sweep operations are finished.	Not available
TTLLPULS	Set up the system so that the pulse from High to Low can be output to TTL when sweep operations are finished.	
TTLOH	Always set TTL output to High.	
TTLOL	Always set TTL output to Low.	
	[U]	
UCONV	Select the Up conversion in the mixer measurement.	Not available (Mixer measurement function not available.)
UP	Perform the same processing as pressing the [↑]key.	Not available
USEPASC	Select the pass control mode.	Not available (Cannot be set in pass control mode.)
USESENSA	Select A as the sensor for the power meter.	Not available (Power meter calibration function not available.)
USESENSB		
	[V]	
VELOFACT	Specify the velocity factor of the transmission line.	**:SENS{1-9}:CORR:RVEL:COAX**
VIEMOFF	Display the mixer measurement setup on the LCD screen.	Not available (Mixer measurement function not available.)
VIEMON	Display the traces of the mixer measurement on the LCD screen.	
VOFF	Use the LO frequency for the offset mode.	
	[W]	
WAIT	Wait for the sweep operation to end.	Not available
WAVD	Select waveguide as the type of electrical delay and specify the cutoff frequency.	Not available (Always treated as coaxial cables)
WAVE	Select waveguide as the offset setting in defining standards.	Not available
WIDT	Set the bandwidth search function On/Off.	**:CALC{1-9}:MARK:BWID**
WIDV	Specify the parameters for the bandwidth search.	**:CALC{1-9}:MARK{1-10}:BWID:THRU**
WINDMAXI	Set the maximum window size for the time-domain transformation.	**:CALC{1-9}:TRAN:TIME:KBES 13**
WINDMINI	Set the minimum window size for the time-domain transformation.	**:CALC{1-9}:TRAN:TIME:KBES 0**
WINDNORM	Set the normal window size for the time-domain transformation.	**:CALC{1-9}:TRAN:TIME:KBES 6**
WINDOW	Set the window size to an arbitrary value for the time-domain transformation.	**:CALC{1-9}:TRAN:TIME:KBES**
WINDUSEM	Set the use of memory traces for the time-domain transformation On/Off.	Not available

8753ES	Function overview	E5070A/E5071A
WRSK	Assign an arbitrary name to the softkey currently displayed.	Not available (Changing the softkeys is not allowed.)

D Error Messages

The Agilent E5070A/E5071A provides error messages to indicate its operating status. This appendix describes the error messages of the E5070A/E5071A in order of error number. To search for error messages alphabetically, refer to the *Operation Manual*.

Error Messages in Increasing Order of Number

An error message is displayed against a red background in the instrument message/warning area in the lower left part of the screen. Pushing a front panel key or executing **:DISP:CCL** command on page 323 clears the error message. Errors caused by the operation of a front panel key simply appear on the display. They are not stored in the error queue with some exceptions.

An error with a positive error number is one uniquely defined for this instrument. On the other hand, an error with a negative error number is basically one defined for common GPIB devices in IEEE488.2

-440 **Query UNTERMINATED after indefinite response**

After a query asking for an indefinite response has been run, another query is received in the same program message (See 6.5.7.5.7, IEEE488.2).

-430 **Query DEADLOCKED**

The state that generates a “DEADLOCKED” Query error (see 6.3.1.7, IEEE488.2). This error occurs when both input and output buffers have become full, preventing the instrument from continuing processing, for example.

-420 **Query UNTERMINATED**

The state that generates an “UNTERMINATED” Query error (see 6.3.2, IEEE488.2). This error occurs when this instrument is designated as the talker and an incomplete program message is received, for example.

-410 **Query INTERRUPTED**

The state that generates a “INTERRUPTED” Query error (see 6.3.2.3, IEEE488.1). This error occurs when data bytes (DAB) or GET are received before the transmission of the response after a query has not been completed, for example.

-400 **Query error**

A comprehensive query error has occurred showing that this instrument cannot detect a more detailed error. This code simply shows that a query error defined in 11.5.1.1.7 and 6.3, IEEE488.2 has occurred.

-310 **System error**

One of the errors designated as “system errors” in this instrument has occurred.

-286 **Program runtime error**

An error occurring when VBA is executed.

-284 **Program currently running**

This error occurs when the PROG:SEL:STAT RUN command is executed with the VBA program in the Run state.

-282 **Illegal program name**

This error occurs when a nonexistent VBA program name is specified by the PROG:SEL:NAME command.

-257 **File name error**

A file name error. This message appears when an error exists in the file name and hence a command is not executed correctly. This error occurs when you try to copy to an unsuitable file name, for example.

-256 **File name not found**

The file name specified is not found and hence the command is not executed correctly. This error occurs when you try to read a file that does not exist in a disk or a disk is not correctly inserted into the drive to read or write a file, for example.

-225 **Out of memory**

Insufficient memory is available in this instrument to perform the required operation.

-224 **Illegal parameter value**

The parameter value is not suitable. This error occurs when the CALC:PAR:DEF command is used to specify an S-parameter that does not exist in the model (S44 in the case of a 2-port model), for example.

-223 **Too much data**

The block-, expression-, or character-string-type program data that has been received conforms with the standard. But it exceeds the amount that can be processed under the condition of the memory or conditions specific to memory-related devices. In this instrument, this error occurs when the number of characters exceeds 254 in a character-string parameter.

-222 **Data out of range**

A data element (not violating the standard) outside the range defined by this instrument has been received. This error occurs when an integer-based command for which the parameter can be rounded exceeds the range of -65536 to +65536 or when a real-number-based command for which the parameter can be rounded exceeds the range of -9.9e37 to +9.9e37, for example.

This error occurs also when a numeric value other than a specified one is entered into a command in which the “port number” and “CalKit number” are specified as parameters and hence the parameters are not rounded. Such commands are, for example, CALC:FSIM:BAL:TOP:BBAL:PPOR, SENS:CORR:COLL:ACQ:OPEN, SENS:CORR:COLL:ECAL:SOLT3, SENS:CORR:COLL:CKIT:ORD:LOAD, etc.

-220 **Parameter error**

When a parameter-related error other than Errors -221 through -229 occurs, that error is displayed.

-213 **Init ignored**

Because another measurement is in progress, the request for initiating a measurement (“INIT” command) is ignored.

-211 **Trigger ignored**

This instrument receives and detects a trigger command (“TRIG”) or an external trigger signal. But it is ignored due to the timing condition (This instrument is not in the wait-for-trigger state, for example). Change the setup so that a trigger command or an external trigger signal can be sent after the instrument has entered the wait-for- trigger state.

-200 **Execution error**

An error associated with execution has been generated for which this instrument cannot specify the error message. This code shows that an error associated with execution defined in 11.5.1.1.5, IEEE488.2 has occurred. This error occurs also when a calibration measurement is aborted.

-178 **Expression data not allowed**

An expression-data element has been received at a position where this instrument does not accept one.

-171 **Invalid expression**

The expression-data element is invalid (see 7.7.7.2, IEEE488.2). Parentheses are not paired, or illegal characters are used, for example.

-170 **Expression error**

When the expression data is put to syntactic analysis, an error not corresponding to one of Error Numbers -171 through -179 occurs.

-168 **Block data not allowed**

An block-data element has been received at a position where this instrument does not accept one.

-161 **Invalid block data**

Block data has been expected, but the block data that appears is invalid for some reason (see 7.7.6.2, IEEE488.2). The END message is received before the length of block data has been filled, for example.

-158 **String data not allowed**

A character-string-data element has been received at a position where this instrument does not accept one.

-151 **Invalid string data**

Character string data has been expected, but the character string data that appears is invalid for some reason (see 7.7.5.2, IEEE488.2). The END message is received before the ending quotation mark character appears, for example.

-150 **String data error**

When a character-string-data element is put to syntactic analysis, an error not corresponding to one of Error Numbers -151 through -159 occurs.

-148 **Character data not allowed**

A character data element (not violating the standard) has been received at a position where this instrument does not accept one. Double quotes (“) are omitted where it is necessary to place a parameter in double quotes (“), for example.

-141 **Invalid character data**

An invalid character is found in the character data element, or the parameter received is not valid.

-138 **Suffix not allowed**

A suffix is attached to a numeric value element to which a suffix is not allowed to be attached.

-134 **Suffix too long**

The unit is too long.

The unit is expressed in 12 or more characters (see 7.7.3.4, IEEE488.2).

-131 **Invalid suffix**

The suffix does not comply with the syntax defined in 7.7.3.2, IEEE488.2. Or it does not suit 4294A.

-128 **Numeric data not allowed**

An numeric-value-data element (not violating the standard) has been received at a position where this instrument does not accept one.

-124 **Too many digits**

The number of digits of the argument of the decimal numeric-value-data element exceeds 255 with the preceding 0 removed (see 7.7.2.4.1, IEEE488.2).

-123 **Exponent too large**

The absolute value of the exponent exceeds 32,000 (see 7.7.2.4.1, IEEE488.2).

-121 **Invalid character in number**

A character that is invalid for the data type subject to syntactic analysis has been received. For example, a letter is found in a decimal numeric value or a numeric character "9" in octal data.

-120 **Numeric data error**

An error resulting from the numeric value data (including numeric value data having no decimal point representation) has occurred. A numeric value error other than Errors -121 through -129 has occurred.

-114 **Header suffix out of range**

The unit of the header is outside the range. The header is invalid in the unit for numeric parameters following a SCPI command.

-113 **Undefined header**

A command not defined in this instrument, though not illegal in the syntactic structure, has been received. For example, when a message ":DISP:WIND1:TABL:MEM ON" is sent to a correct program message ":DISP:WIND1:TRAC1:MEM ON," the message sent is received as an undefined command by this instrument. See the command reference and use correct commands.

This error occurs also when a port not existing on this model is specified in a command specifying a port number as an index. Such commands are CALC:FSIM:SEND:DEEM:PORTn:xxxx, CALC:FSIM:SEND:PMC:PORTn:xxxx, CALC:FSIM:SEND:ZCON:PORTn:Z0:R, and SENS:CORR:EXT:PORTn:TIME; they include PORTn as a part.

-112 **Program mnemonic too long**

The length of the header exceeds 12 characters (see 7.6.1.4.1, IEEE488.2).

-109 **Missing parameter**

The number of parameters is less than that required for the command, or the parameter has not been entered. For example, the command SENS {1 - 6} :SWE:POIN requires one more parameter.

Therefore, when a message "SENS1:SWE:POIN" is sent to a correct program message "SENS1:SWE:POIN 201" this instrument receives the former message as an invalid one because all parameters have not been entered. Enter command parameters correctly.

-108 **Parameter not allowed**

The number of parameters exceeds that required for the command.

For instance, when a program message ":SENS1:SWE:TYPE LIN, SEGM" is sent instead of a correct program message with a command ":SENS1:SWE:TYPE LIN" which requires a parameter, the instrument receives the message as the number of parameters is invalid. See the command reference to confirm the required number of parameters.

-105 **GET not allowed**

A group execution trigger (GET) has been received in the program message (see 7.7, IEEE488.2).

-104 **Data type error**

The parser has recognized a data element that must not exist. Block data has been sent instead of numeric value data or character string data that had been expected, for example.

-103 **Invalid separator**

The parser (a syntactic analysis program) had been expecting a delimiter, but a character that is not a delimiter has been sent.

-102 **Syntax error**

A command or data type that is not recognized exists.

-101 **Invalid character**

An invalid character exists in the program message character string.

-100 **Command error**

A comprehensive syntax error has occurred showing that this instrument cannot detect a more detailed error. This code simply shows that a command error defined in 11.5.1.1.4, IEEE488.2 has occurred.

20 **Additional standard needed**

The GPIB command that turns ON the calibration function has been sent before all of the data measurements needed to calculate the calibration factor have been completed. For instance, the "SENS:CORR:COLL:SAVE" command is sent to calculate calibration coefficients and turn on error correction for 1-Port Calibration when open and short calibration are completed but load calibration is not completed. Be sure to measure all necessary calibration data before sending commands. This error is not generated by front key operations.

21 **Specified ports overlapped**

This error occurs when a port number is duplicated in a command requiring two or more port numbers as parameters. Such commands are, for example, CALC:FSIM:BAL:TOP:SSB:PPOR 1,2,3,3. Specify port setup correctly to avoid duplication of ports. This error is not generated by front key operations.

22 **Calibration method not selected**

This error occurs when the command for validating the calibration, SENS:CORR:COLL:SAVE, is executed before the command for selecting a calibration type, SENS:CORR:COLL:METH:xxxx, is executed. This error is not generated by front key operations.

30 **Valid Ecal module not found**

This error occurs when the number of ports of the ECal module connected is less than the necessary number of ports. This error occurs, for example, when a 4-port Cal executing command, SENS:CORR:COLL:ECAL:SOLT4, is executed with a 2-port ECal module connected. This error is not generated by front key operations.

31 **Failed to configure ECal module**

This error occurs when the control of the ECal module fails at time of executing an ECal command, SENS:CORR:COLL:ECAL:SOLTn. The failure results from the failure to connect the ECal module to the USB port, failure of the ECal module, etc.

32 **Ecal module not in RF path**

This error occurs when an ECal command, SENS:CORR:COLL:ECAL:SOLTn, is executed with the port on the ECal module not connected correctly to the instrument.

40 **Target value not found**

This error occurs when the target is not found during the marker search analysis after specifying the target and executing the CALC:MARK:FUNC:EXEC and CALC:FUNC:EXEC commands. This error occurs also when the bandwidth is not found after executing the bandwidth marker command, CALC:MARK:BWID:DATA?

41 **Peak not found**

This error occurs when, after specifying a peak and executing the CALC:MARK:FUNC:EXEC and CALC:FUNC:EXEC commands, the specified peak is not found in the marker search analysis.

50 **Specified channel hidden**

This error occurs when an attempt is made to activate a channel not on display using the DISP:WIND:ACT command. This error is not generated by front key operations.

53 **Log sweep requires 2 octave minimum span**

The span of sweep range is not satisfied the requirement for logarithmic sweep. The sweep type is automatically changed to linear sweep when this error occurs.

For example, this error occurs when, with the start and stop frequency are set 1 MHz and 2 MHz respectively, the sweep type is changed to logarithmic sweep.

Set the stop frequency to more than four times as many as the start frequency. And then select logarithmic sweep.

54 **Transform, Gate not allowed**

This error occurs when number of points is set 2 or sweep type is set logarithmic/segment sweep, the gating or transform function of time domain function is turned on.

Set number of points to more than 3, the sweep type to linear sweep. And then, turn on the gating or transform function of time domain function.

60 **Cont switching may damage source attenuator**

This error occurs when different source attenuator (power range) settings are present during measurement on two or more channels. Performing such measurement for a long time is not recommended because of the possibility of the source attenuator being damaged. The measurement value is normal. This error occurs only on models with the extended power output (Option 214, 314, and 414).

100 **Failed to read file**

This error occurs when a 2-port touchstone file

(CALC:FSIM:SEND:PMC:PORT:USER:FIL command), the formatted data array (MMEM:LOAD:FDAT command) and limit table (MMEM:STOR:LIM command) for the active trace on the active channel, segment sweep table (MMEM:LOAD:SEGM command) for the active channel, a VBA project file (MMEM:LOAD:PROG command), etc. cannot be read normally.

101 **Failed to write file**

This error occurs when the formatted data array (MMEM:STOR:FDATcommand) and limit table (MMEM:STOR:LIM command) for the active trace on the active channel, segment sweep table (MMEM:STOR:SEGM command) for the active channel, display image (MMEM:STOR:IMAG command) for the LCD screen, a VBA project file (MMEM:STOR:PROG command), etc. cannot be written normally.

102 **Failed to copy file**

This error occurs when copying a file (MMEM:COPY command) fails.

103 **Failed to delete file**

This error occurs when deleting a file (MMEM:DEL command) fails.

104 **Failed to create directory**

This error occurs when creating a directory (MMEM:MDIR command) fails.

105 **Recall failed**

This error occurs when reading an instrument status file (State01.sta, etc.) (MMEM:LOAD:STAT command) fails.

106 **Save failed**

This error occurs when writing an instrument status file (State01.sta, etc.) (MMEM:STOR:STAT command) fails.

107 **File transfer failed**

This error occurs when writing data into or reading data from a file (MMEM:TRAN command) fails.

120 **Printer error**

This error occurs when the previous printing is still in progress or the printer fails (offline, short of paper, etc.) at time of outputting the display image on the LCD screen to the printer (HCOP:IMM command).

121 **Print failed**

This error occurs when printing fails for reasons other than Error 120, Printer error.

200 **Option not installed**

The command received has been ignored because of the mismatch between the contents of an option for this instrument and the command.

For example, this error occurs when the source attenuator (power range) is set at a value other than zero (SOUR:POW:ATT command) in a model not having the extended power output option.

This error is not generated by front key operations.

220 **Phase lock loop unlocked**

This error occurs when the PLL circuit of this instrument becomes unlocked while the measurement is in progress. The measurement value is not correct. This error may occur when an external reference out of specification is connected to this instrument. Should an error occur with an external reference not connected, this instrument is faulty. Contact an Agilent Technology sales office or the company from which you bought the instrument.

221 **Port 1 receiver overload**

The input to Test Port 1 exceeds the maximum input level. The measurement value is not correct. When a DUT is an amplifier or the like, this error may occur, damaging the receiver in the worst case. Should this error occur with a passive part used as the DUT or with nothing connected to the test port, this instrument is faulty. Contact an Agilent Technology sales office or the company from which you bought the instrument.

222 **Port 2 receiver overload**

The input to Test Port 2 exceeds the maximum input level. The measurement value is not correct. When a DUT is an amplifier or the like, this error may occur, damaging the receiver in the worst case. Should this error occur with a passive part used as the DUT or with nothing connected to the test port, this instrument is faulty. Contact an Agilent Technology sales office or the company from which you bought the instrument.

223 **Port 3 receiver overload (for Options 313, 314, 413, and 414 only)**

The input to Test Port 3 exceeds the maximum input level. The measurement value is not correct. When a DUT is an amplifier or the like, this error may occur, damaging the receiver in the worst case. Should this error occur with a passive part used as the DUT or with nothing connected to the test port, this instrument is faulty. Contact an Agilent Technology sales office or the company from which you bought the instrument.

224 **Port 4 receiver overload (For Options 413 and 414 only)**

The input to Test Port 4 exceeds the maximum input level. The measurement value is not correct. When a DUT is an amplifier or the like, this error may occur, damaging the receiver in the worst case. Should this error occur with a passive part used as the DUT or with nothing connected to the test port, this instrument is faulty. Contact an Agilent Technology sales office or the company from which you bought the instrument.

240 **Calibration data lost**

This error occurs when a file containing the system calibration data is not found or in a damaged state at time of the startup of this instrument, indicating a failure of this instrument. Contact an Agilent Technology sales office or the company from which you bought the instrument.

241 **Power on test failed**

This error occurs when the power-on test fails, indicating a failure of this instrument. Contact an Agilent Technology sales office or the company from which you bought the instrument.

Warning Message

A warning message is displayed in the instrument message/Warning area in the lower left part of the display against a gray background. Pushing a front panel key or executing **:DISP:CCL** command on page 323 clears the message.

This message simply appears on the display, being not known to a remote environment such as a GPIB. This message is not displayed when another error (against a red background) has already been displayed in the instrument message/Warning area.

The warning messages for this instrument are as follows:

Peak not found

This warning message is displayed when, with the tracking turned on, the peak specified by the marker search has not been found by the time the sweep is finished (with the tracking executed).

Segment table changed

This warning message is displayed when the setting specified segment by segment in the segment table is automatically changed by a change in the other setting.

For example, this warning message is displayed when, with the power specified segment by segment in the segment table, the power setting for a segment is adjusted by a change in the power range setting.

Target value not found

This warning message is displayed when, with the tracking turned on, the target specified by the marker search has not been found by the time the sweep is finished (with the tracking executed).

This warning message is displayed also when, with the bandwidth marker displayed, the setting for the bandwidth marker is changed at the end of the sweep, or when, with the active marker changed or moved, the bandwidth is not found.

Transform, Gate not allowed

This warning message is displayed when the gating/transform function of time domain function is turned on, number of points is set 2 or sweep type is set logarithmic/segment sweep.

The gating function and transform function are automatically turned off when this warning message is displayed.

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