DL1720/DL1740

Digital Oscilloscope
Communication Interface

USER'S MANUAL

YOKOGAWA ◆
Yokogawa Electric Corporation

IM 701710-17E
2nd Edition

Introduction

Thank you for purchasing YOKOGAWA's DL1720/DL1740 Digital Oscilloscope.
This Communication Interface User's Manual describes the functions and commands of the GP-IB, serial (RS-232, option), USB, and Network (Ethernet, option) interfaces, maily DL1740. To ensure proper use of the GP-IB/serial (RS-232)/USB interfaces, please read this manual thoroughly.
Keep the manual in a safe place for quick reference whenever a question arises.
Three manuals are provided with the DL1720/DL1740 including this Communication Interface User's Manual.

Manual Name	Manual No.	Description
DL1720/DL1740 User's Manual	IM 701710-01E	Describes all functions except for the communications functions and operation procedures of the instrument.
DL1720/DL1740 Communication User's Manual	IM 701710-17E	Describes the communications functions of the GP-IB/serial (RS-232, option)/USB/ Network interface.
DL1720/DL1740 Operation Guide	IM 701710-02E	Explains basic operations only.

Notes

- The contents of this manual are subject to change without prior notice as a result of improvements in instrument's performance and functions.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA representative listed on the back cover of this manual.
- Copying or reproduction of all or any part of the contents of this manual without YOKOGAWA's permission is strictly prohibited.
- A guarantee card is attached to the instrument. The card will not be reissued, so please read it carefully and keep it in a safe place.

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Revisions

1st Edition:	January 2001
2nd Edition:	July 2001 (supports firmware version 1.30 or later)

Disk No. DL32
2nd Edition : July 2001 (YK)

How to Use this Manual

Structure of this Manual

This User's Manual consists of eight chapters, an Appendix and an Index as described below.

Chapter 1 Overview of the GP-IB Interface
Describes the functions and specifications of GP-IB interface.

Chapter 2 Overview of the Serial (RS-232) Interface (Option)
Describes the functions and specifications of serial interface (RS-232).

Chapter 3 Overview of the USB Interface
Describes the functions and specifications of USB interface.

Chapter 4 Overview of the Network Interface (Option)
Describes the functions and specifications of Network interface. (supports firmware version 1.30 or later)

Chapter 5 Before Programming
Describes formats used when sending a command.

Chapter 6 Commands
Describes each command.

Chapter 7 Status Report
Describes the status byte, various registers and queues.

Chapter 8 Sample Programs
Sample programs, written in Visual BASIC, for MS-DOS/V machines equipped with the following GP-IB board: AT-GPIB/TNT IEEE-488.2, from National Instruments.

Appendix
Contains references including the ASCII character code table.

Index
Provides an alphabetically ordered index.

Conventions Used in this Manual

Symbols Used for Notes and Keys

Type	Symbol	Description
Unit	k K	1000 e.g.: 100 kS/s (sample rate) 1024 e.g.: 720 KB (floppy disk memory capacity)
Notes	***Note***	Provides information that is necessary for proper operation of the instrument.
Key	`"Probe"`	Refers to a soft key displayed on the screen.

Symbols Used in Syntax descriptions

Symbols which are used in the syntax descriptions in Chapter 6 are shown below. These symbols are referred to as BNF notation (Backus-Naur Form). For detailed information, refer to page 5-5.

Symbol	Description	Example	Example of Input
<>	Defined value	`CHANnel <x> <x>=1 to 4`	`-> CHANNEL2`
{} |	One of the options in {} is selected. Exclusive OR	`COUPling {AC|DC|DC50|GND}`	`-> COUPLING AC`
[]	Abbreviated	`TRIGger [:SIMPle]:SLOPe`	`-> TRIGger: SLOPe`

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Chapter 7 Status Report

Chapter 8 Sample Program

Appendix

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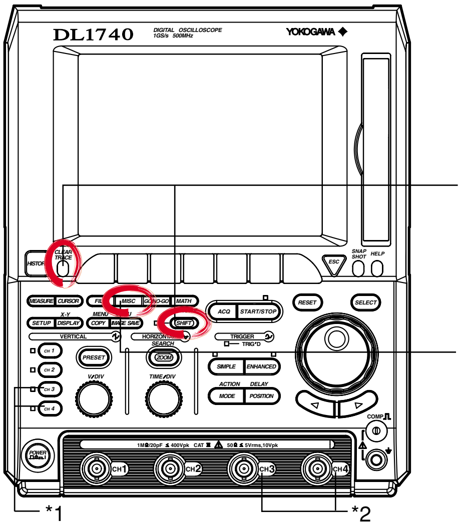
Chapter 1 Overview of the GP-IB Interface

1.1 Names of the Parts and their Function

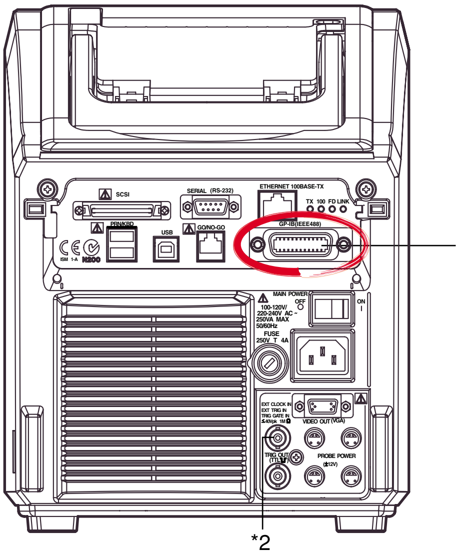
Front Panel



SHIFT Key+CLEAR TRACE Key
Press to switch from remote mode to local mode which allows key operation.
However, this is not possible if Local Lockout has been set by the controller (refer to page 1-7).

MISC Key (Page 1-6)
Press to enter the communication settings such as the address and the timeout.

Rear Panel



GP-IB Connector
This connector is for connecting the controller (such as a PC) with the GP-IB cable. For information on how to connect the GP-IB cable, refer to the following page.

*1 On the DL1720, the CH3 and CH4 keys are disabled.

*2 The DL1720 is not equipped with an input terminal for CH3 or CH4.
Also, the external trigger/external clock/trigger gate input terminal (labeled as EXT. on the DL1720) appears on the front panel in place of the CH4 input terminal shown above.

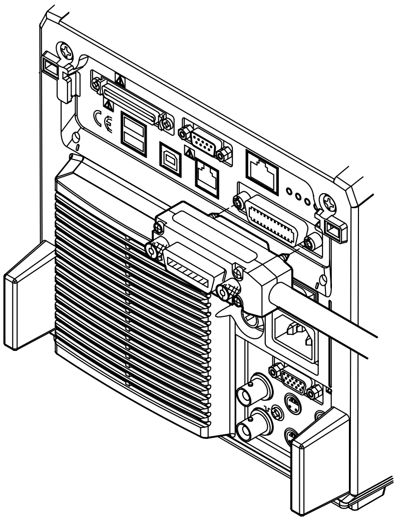
1.2 Connection via the GP-IB Interface

GP-IB Cable

The GP-IB connector on the side panel of the DL1720/DL1740 is a 24-pin connector that conforms to IEEE Standard 488-1978. Use a GP-IB cable that also conforms to IEEE Standard 488-1978.

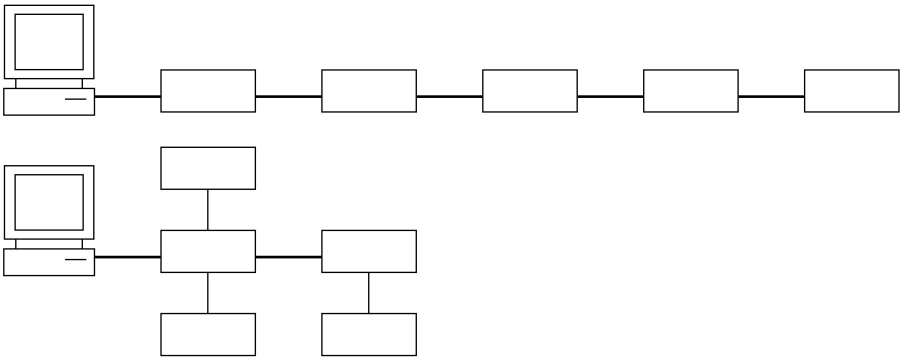
Connection Method

Connect the GP-IB cable as shown below.



Connection Precautions

- Be sure to tighten the screws on the GP-IB cable connector firmly.
- The instrument can be connected to more than one item of equipment (e.g. a personal computer) if more than one GP-IB cable is used. However, it is not possible to connect more than 15 items of equipment (including the controller) to a single bus.
- If you connect the instrument to more than one item of equipment, make sure that a different address is used for each item.
- Each connecting cable must be 2 m or less in length.
- The total length of all the cables must not exceed 20 m.
- While communications are in progress, more than two-thirds of the connected equipment items must be turned ON.
- When connecting more than one item of equipment, connect them so that the connection route forms a star or linear configuration. Loop or parallel wiring is not allowed.



CAUTION

Be sure to switch off power to both your PC and the oscilloscope before connecting or disconnecting cables. Failure to switch power off may cause internal circuit failure or improper operation.

1.3 GP-IB Interface Functions

GP-IB Interface Functions

Listener Function

- Allows you to make the settings which you can make using the panel keys on the instrument, except for the power ON/OFF and GP-IB communications settings.
- Receives commands from a controller requesting output of set-up and waveform data.
- Also receives status report commands.

Talker Function

Outputs set-up and waveform data.

Note

The listen-only, talk-only and controller functions are not available on this instrument.

Switching between Remote and Local Mode

When Switched from Local to Remote Mode

Remote mode is activated when a REN (Remote Enable) message is received from a controller while local mode is active.

- REMOTE is displayed on the upper right of the screen.
- All front panel keys except **SHIFT**+**CLEAR TRACE** can no longer be operated any more.
- Settings entered in local mode are retained.

When Switched from Remote to Local Mode

Pressing **SHIFT**+**CLEAR TRACE** in remote mode puts the instrument in local mode. However, this is not possible if Local Lockout has been set by the controller (page 1-7).

- The REMOTE indicator on the upper right of the screen is turned off.
- All front panel keys are operative.
- Settings entered in remote mode are retained.

Note

The GP-IB interface cannot be used simultaneously with other communications interfaces (serial (RS-232), USB, or network).

1.4 GP-IB Interface Specifications

GP-IB Interface Specifications

Electrical and Mechanical Specifications	: Conforms to IEEE Standard 488-1978.
Interface Functions	: Refer to the table below.
Protocol	: Conforms to IEEE Standard 488.2-1992.
Code	: ISO (ASCII) code
Mode	: Addressable mode
Address Setting	: Addresses 0 to 30 can be selected from the GP-IB setting screen, displayed when you press the MISC key.
Remote Mode Clear	: Remote mode can be cleared by pressing SHIFT key+CLEAR TRACE key. However, this is not possible if Local Lockout has been set by the controller.

Interface Functions

Function	Subset Name	Description
Source Handshaking	SH1	Full source handshaking capability
Acceptor Handshaking	AH1	Full acceptor handshaking capability
Talker	T6	Basic talker capability, serial polling, untalk on MLA (My Listen Address), no talk-only capability
Listener	L4	Basic listener capability, unlisten on MTA (My Talk Address), no listen-only capability
Service Request	SR1	Full service request capability
Remote Local	RL1	Full remote/local capability
Parallel Poll	PP0	No parallel polling capability
Device Clear	DC1	Full device clear capability
Device Trigger	DT0	No device trigger capability
Controller	C0	No controller function
Electrical Characteristic	E1	Open collector

Data Transfer Rate

The table below shows approximate response times for output of waveform data, assuming the following configuration.

Model	: 701710
Controller	: DELL GXMT 5133
GB-IB Board	: NI AT-GPIB/TNT(PNP)
Programming Language	: Visual C++

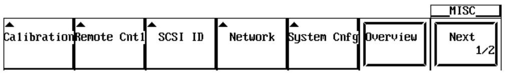
Data Volume	Byte Format	Word Format	ASCII Format
1000	approx. 25 ms	approx. 28 ms	approx. 650 ms
10000	approx. 60 ms	approx. 100 ms	approx. 6.4 s
100000	approx. 410 ms	approx. 950 ms	approx. 63 s
1000000	approx. 4 s	approx. 8.5 s	approx. 622 s

1.5 Setting up this Instrument (GP-IB)

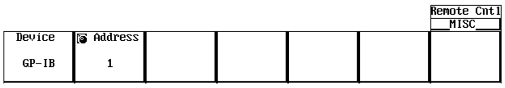
Operationg Procedure

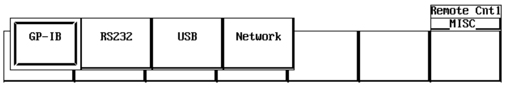
Displaying the GP-IB Menu

1. Press **MISC**.
2. Press the **Remote Cntl** soft key.



3. Press the **Device** soft key to select **GP-IB**.



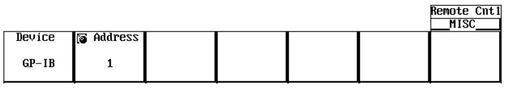


Note

Only the communications interfaces selected under Device are available. If commands are sent using an unselected communications interface, the command will not be received.

Setting the Address

4. Turn the jog shuttle to set the desired address.



Explanation

When you make settings which can be made using the front panel keys of the instrument or when you output set-up data or waveform data using the controller, the following settings must be made.

Setting the Address

This function allows you to set the instrument's address for addressable mode within the range of 0 to 30. Each item of equipment connected via a GP-IB interface has its own address, by which it can be identified. Care must be taken to ensure that all interconnected devices are assigned unique addresses.

Note

Do not change the address while the GP-IB interface is being used by the controller.

1.6 Response to Interface Messages

Response to Interface Message

Response to a Uni-line Message

IFC (InterFace Clear)

Clears the talker and listener. Stops output if data is being output.

REN (Remote ENable)

Switches between remote and local modes.

IDY (Identify) is not supported.

Response to a Multi-Line Message (Address Command)

GTL (Go To Local)

Switches to local mode.

SDC (Selected Device Clear)

Clears the program message (command) which is currently being output. Also clears the output queue (page 7-5).
`*OPC` and `*OPC?` will be disabled if they are currently being executed.
`*WAI` and `COMMunicate:WAIT` will be stopped immediately.

PPC (Parallel Poll Configure), GET (Group Execute Trigger) and TCT (Take Control) are not supported.

Response to a Multi-Line Message (Universal Command)

LLO (Local LockOut)

Invalidates **SHIFT**+**CLEAR** on the front panel to disable switching to local mode.

DCL (Device CLear)

Same as SDC.

SPE (Serial Poll Enable)

Sets the talker function to serial poll mode for all equipment connected to the communications bus. The controller performs polling on equipment sequentially.

SPD (Serial Poll Disable)

Clears serial poll mode as the talker function for all equipment connected to the communications bus.

PPU (Parallel Poll Unconfigure) is not supported.

What is an Interface Message?

An interface message is also called an interface command or bus command, and is issued by the controller. Interface messages are classified as follows.

Uni-Line Messages

Messages are transferred through a single control line. The following three types of uni-line message are available.
IFC (InterFace Clear)
REN (Remote ENable)
IDY (IDentifY)

Multi-Line Message

Eight data lines are used to transmit a message. Multi-line messages are classified as follows.

Address Commands

Valid when the equipment is designated as a listener or a talker. The following five address commands are available.

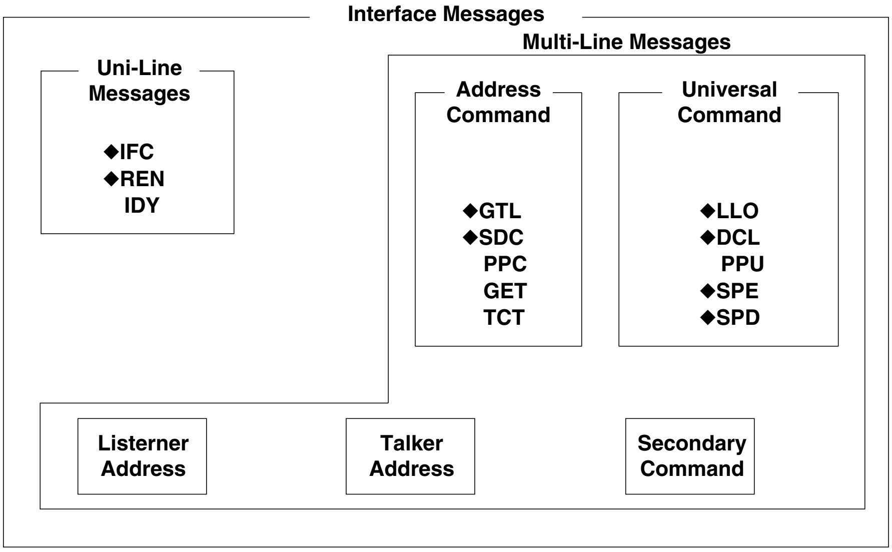
- Commands valid for equipment designated as a listener;
  GTL (Go To Local)
  SDC (Selected Device Clear)
  PPC (Parallel Poll Configure)
  GET (Group Execute Trigger)
- Command valid for equipment designated as a talker;
  TCT (Take ConTrol)

Universal Commands

Valid for any item of equipment, irrespective of whether the item is designated as a listener or a talker. The following five universal commands are available.

LLO (Local LockOut)
DCL (Device CLear)
PPU(Parallel Poll Unconfigure)
SPE (Serial Poll Enable)
SPD (Serial Poll Disable)

In addition to the above commands, a listener address, talker address on secondary command can be sent in an interface message.



Messages marked with a “◆” are interface messages supported by the DL1720/DL1740.

Note

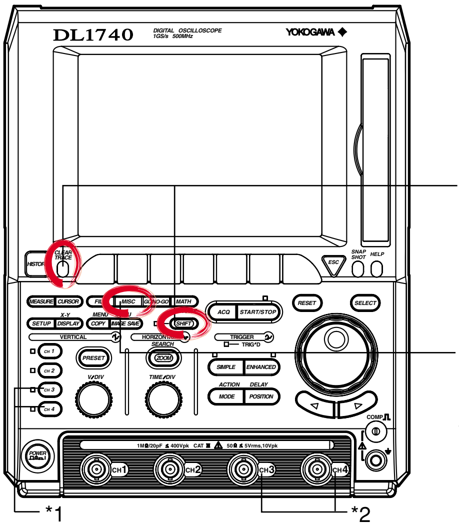
Differences between SDC and DCL

The SDC command is an address command and requires that both the talker and listener be designated; however DCL is a universal command and does not require that the talker and listener be designated. Therefore, SDC is used for particular items of equipment, while DCL can be used for any equipment connected to the communications bus.

Chapter 2 Overview of the Serial (RS-232) Interface (Option)

2.1 Names of the Parts and their Function

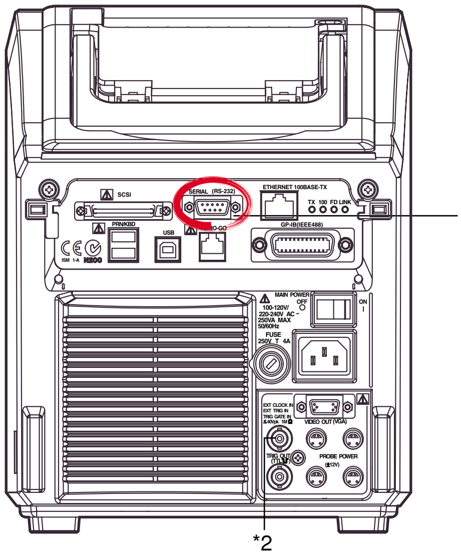
Front Panel



SHIFT key+CLEAR TRACE Key
Press to switch from remote mode to local mode which allows key operation.
However, this is not possible if Local Lockout has been set by the controller (refer to page 2-2).

MISC Key (Page 2-8)
Press to enter the communication settings such as the baud rate, data format, and the handshaking method.

Rear Panel



SERIAL (RS-232) Connector
This connector is for connecting the controller (such as a PC) with the RS-232 cable. For information on how to connect the RS-232 cable, refer to page 2-3.

*1 On the DL1720, the CH3 and CH4 keys are disabled.

*2 The DL1720 is not equipped with an input terminal for CH3 or CH4.
Also, the external trigger/external clock/trigger gate input terminal (labeled as EXT. on the DL1720) appears on the front panel in place of the CH4 input terminal shown above.

2.2 Serial (RS-232) Interface Functions and Specifications

Receiving Function

It is possible to make the same settings via the serial (RS-232) interface as can be made using the front panel keys.

Measured/computed data, panel set-up information and error codes can be received.

Sending Function

Measured/computed data can be output.

Panel set-up information and the status byte can be output.

Error codes which have occurred can be output.

Serial (RS-232) Interface Specifications

Electrical Characteristics	:	Conforms to EIA 574 Standard (EIA-232 (RS-232) Standard for 9-pin)
Connection	:	Point-to-point
Communications	:	Full-duplex
Synchronization	:	Start-stop system
Baud Rate	:	1200, 2400, 4800, 9600, 19200, 38400, 57600
Start Bit	:	1 bit (fixed)
Data Length	:	7 or 8 bits
Parity	:	Even, odd or no parity
Stop Bit	:	1 or 2 bits
Connector	:	DELC-J9PAF-13L6 (JAE or equivalent)
Hardware Handshaking	:	User can select whether CA or CB signals will always be True, or will be used for control.
Software Handshaking	:	User can control both transmission and reception using X-on and X-off signals. (X-on (ASCII 11H), X-off (ASCII 13H))
Receive Buffer Size	:	256 bytes

Switching between Remote and Local Mode

When Switched from Local to Remote Mode

Remote mode is activated when the "COMMunicate:REMote ON" command is received from a controller while local mode is active.

- REMOTE is displayed on the upper right of the screen.
- All front panel keys except **SHIFT**+**CLEAR TRACE** can no longer be operated any more.
- Settings entered in local mode are retained.

When Switched from Remote to Local Mode

Pressing **SHIFT**+**CLEAR TRACE** in remote mode puts the instrument in local mode. However, this is not possible of Local Lockout (when the "COMMunicate:LOCKout ON" command is received) has been set by the controller.

Local mode is activated when the "COMMunicate:REMote OFF" command regardless of Local Lockout.

- The REMOTE indicator on the upper right of the screen is turned off.
- All front panel keys are operative.
- Settings entered in remote mode are retained.

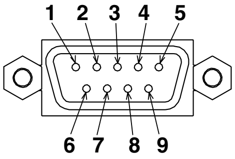
Note

The serial interface cannot be used simultaneously with other communications interface (GP-IB, USB, or network)

2.3 Connection via the Serial (RS-232) Interface

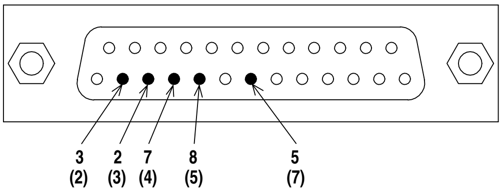
When connecting this instrument to a computer, make sure that the handshaking method, data transmission rate and data format selected for the instrument match those selected for the computer.
For details, refer to the following pages. Also make sure that the correct interface cable is used.

Connector and Signal Names



2 RD (Received Data) : Data received from personal computer.
Signal direction...Input.
3 SD (Send Data) : Data transmitted to a personal computer.
Signal direction...Output.
5 SG (Signal Ground) : Ground for signals.
7 RS (Request to Send) : Signal used for handshaking when receiving data from a personal computer.
Signal direction...Output.
8 CS (Clear to Send) : Signal used for handshaking when transmitting data to a personal computer.
Signal direction...Input.
* Pin Nos. 1, 4, 6, and 9 are not used.

9-25 Pin Connector



The number between brackets refer to the pin No. of the 25-pin connector.

Signal Direction

The figure below shows the direction of the signals used by the serial (RS-232) interface.

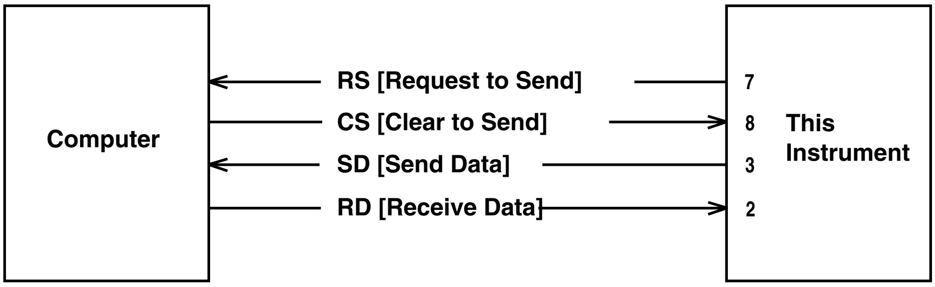


Table of RS-232 Standard Signals and their JIS and CCITT Abbreviations

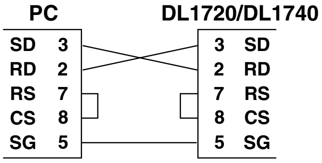
Pin No. (9-Pin Connector)	Abbreviation			Description
	RS-232	CCITT	JIS	
5	AB (GND)	102	SG	Signal ground
3	BA (TXD)	103	SD	Transmitted data
2	BB (RXD)	104	RD	Received data
7	CA (RTS)	105	RS	Request to send
8	CB (CTS)	106	CS	Clear to send

Signal Line Connection Examples

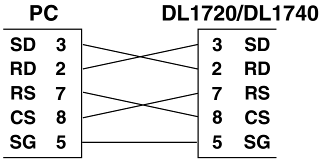
The pin numbers shown are that of 9-pin connectors.

In general, use a cross cable.

• OFF-OFF / XON-XON



• CTS-RTS(CS-RS)



2.4 Handshaking

To use an serial (RS-232) interface for transferring data between this instrument and a computer, it is necessary to use certain procedures by mutual agreement to ensure the proper transfer of data. These procedures are called “handshaking.” Various handshaking systems are available depending on the computer to be used; the same handshaking system must be used for both the computer and this instrument.

This instrument allows you to choose any handshaking mode from the following three modes.

Handshake Format Descriptions→ ○

Handshake Method		Data Sending Control (Control Method When Sending Data to a Computer)			Data Receiving Control (Control Method When Receiving Data from a Computer)		
		Software Handshake	**Hardware Handshake**	No handshake	**Software Handshake**	**Hardware Handshake**	No handshake
	The Menu of this Instrument	Sending stops when X-off is received, and sending is resumed when X-on is received.	Sending stops when CB(CTS) is False, and sending is resumed when CB is True.		X-off is sent when received data buffer becomes 3/4-full, and X-on is sent when the received data buffer is only 1/4-full.	CA (RTS) is set to False when received data buffer is only 3/4-full, and is set to True when received data buffer is only 1/4-full.	
OFF-OFF	NO-NO			○			○
XON-XON	XON-XON	○			○		
CS-RS	CTS-RTS		○			○	

OFF-OFF

- **Transmission Data Control**
  There is no handshake status between the instrument and host computer. The X-OFF and X-ON signal from the host computer is processed as data, and the CS signal is ignored.
- **Reception Data Control**
  There is no handshake status between the recorder and host computer. When the recorder reception buffer becomes full, the excess data is discarded. RS = True (fixed).

XON-XON

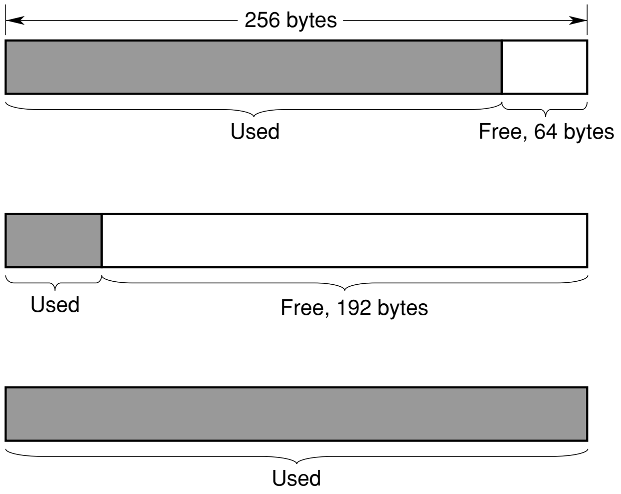
- **Transmission Data Control**
  A software handshake status is established between the instrument and host computer. The instrument will stop a data transmission when an X-OFF signal is received from the host computer, and will resume transmission when the next X-ON signal is received. A CS signal from the host computer is ignored.
- **Reception Data Control**
  A software handshake status is established between the instrument and host computer. When the intstruments reception buffer vacancy reaches 64 bytes, the X-OFF signal will be sent to the host computer. When the reception buffer vacancy reaches 192 bytes, the X-ON signal will be sent. RS = True (fixed).

CS-RS

- **Transmission Data Control**
  A software handshake status is established between the instrument and host computer. The instrument will stop a data transmission if a “CS = False” status is established, and will resume the transmission when a “CS = True” status is established. The X-OFF and X-ON signals from the host computer are processed as data.
- **Reception Data Control**
  A hardware handshake status is established between the instrument and host computer. When the intstruments reception buffer vacancy reaches 64 bytes, an “RS=False” status will be established. When the reception buffer vacancy reaches 192 bytes, an “RS=True” status will be established.

Precautions Regarding Data Receiving Control

When handshaking is used to control the reception of data, data may still be sent from the computer even if the free space in the receive buffer drops below 64 bytes. In this case, after the receive buffer becomes full, the excess data will be lost, whether handshaking is in effect or not. Data storage to the buffer will begin again when there is free space in the buffer.



When handshaking is in use, reception of data will stop when the free space in the buffer drops to 64 bytes since data cannot be passed to the main program fast enough to keep up with the transmission.

After reception of data stops, data continues to be passed to the internal program. Reception of data starts again when the free space in the buffer increases to 192 bytes.

Whether handshaking is in use or not, if the buffer becomes full, any additional data received is no longer stored and is lost.

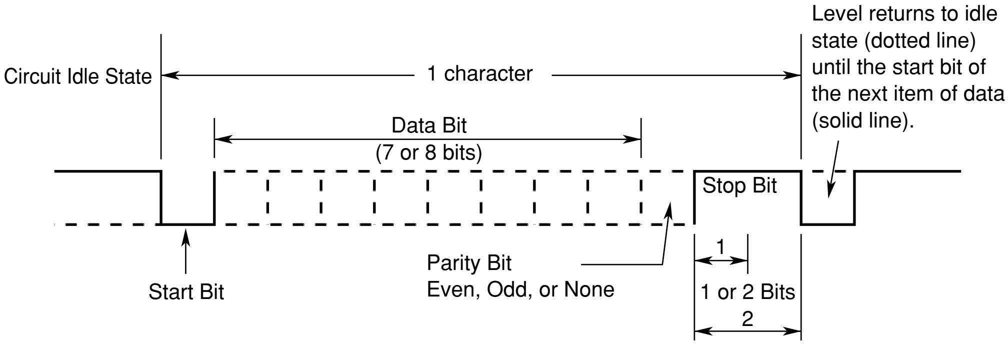
Data Receiving Control Using Handshaking

Note

It is necessary to create a host computer program which prevents the buffers of both the intrument and the computer from becoming full.

2.5 Matching the Data Format

The serial (RS-232) interface of this instrument performs communications using start-stop synchronization. In start-stop synchronization, one character is transmitted at a time. Each character consists of a start bit, data bits, a parity bit, and a stop bit. Refer to the figure below.

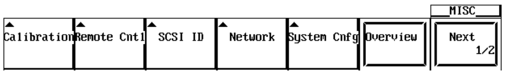


2.6 Setting up this Instrument (Serial)

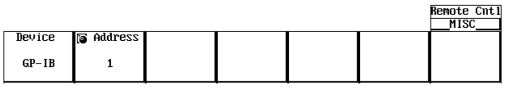
Operating Procedure

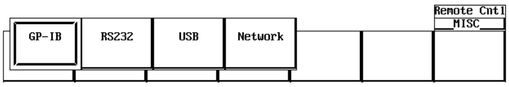
Displaying the Serial (RS-232) Menu

1. Press **MISC**.
2. Press the **Remote Cntl** soft key.



3. Press the **Device** soft key to select **RS232**.



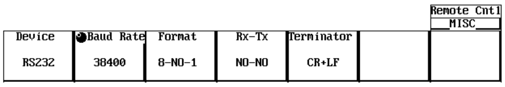


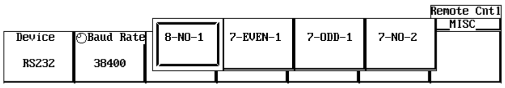
Note

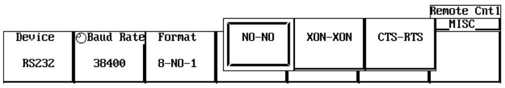
Only the communications interfaces selected under Device are available. If commands are sent using an unselected communications interface, the command will not be received.

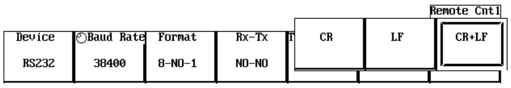
Selecting the Baud Rate, the Data Format and etc.

4. Press the **Baud Rate** (baud rate), **Format** (data format), **Rx-Tx** (handshaking method), and the **Terminator** (terminator) soft keys individually, and turn the jog shuttle to set each item.









Explanation

When using the controller to set the items which can be set locally using the keys on the instrument, or when outputting the setup information or the waveform data to the controller, set the following items.

Baud Rate

Select from the following choices.

1200, 2400, 4800, 9600, 19200, 38400, 57600

Data Format

Select the combination of the data length and the stop bit from the following choices.

8-NO-1, 7-EVEN-1, 7-ODD-1, 7-NO-2

Handshaking Method

Select the transmit data control and the receive data control from the following choices.

NO-NO, XON-XON, CTS-RTS

Terminator

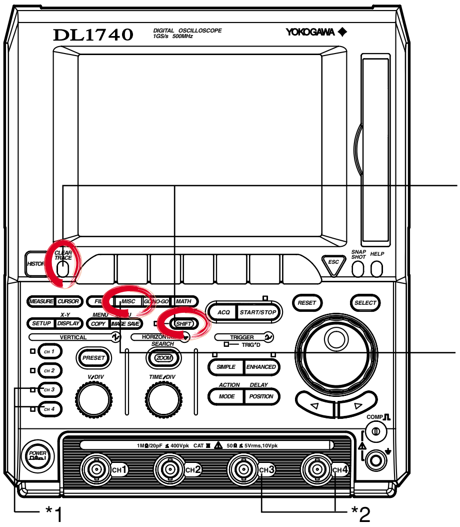
Select from the following choices. The terminator used when sending the data from this instrument is selected on the menu. Use either “LF” or “CR+LF” for the terminator in receiving the data.

CR, LF, CR+LF

Chapter 3 USB Interface

3.1 Names of the Parts and their Function

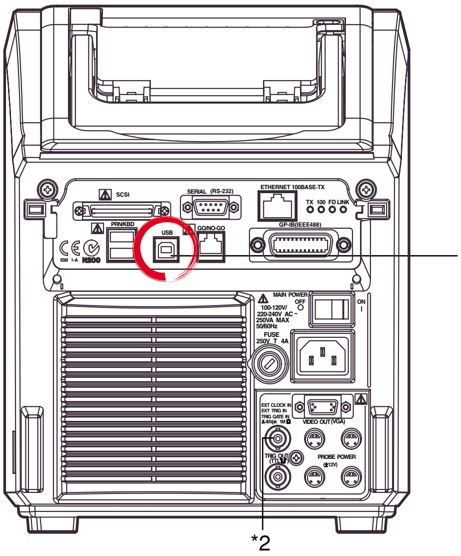
Front Panel



SHIFT Key+CLEAR TRACE Key
Press to switch from remote mode to local mode which allows key operation.
However, this is not possible if Local Lockout has been set by the controller (refer to page 3-2).

MISC Key (Page 3-4)
Press to enter the communication settings such as the ID value.

Rear Panel



USB Interface Connector
This connector is for connecting the controller (such as a PC) with the USB cable. For information on how to connect the USB cable, refer to page 3-3.

*1 On the DL1720, the CH3 and CH4 keys are disabled.

*2 The DL1720 is not equipped with an input terminal for CH3 or CH4.
Also, the external trigger/external clock/trigger gate input terminal (labeled as EXT. on the DL1720) appears on the front panel in place of the CH4 input terminal shown above.

3.2 USB Interface Functions and Specifications

Reception Functions

You can specify the same settings as those specified by front panel key operations.

Receives output requests for measured and computed data, setting parameters of the panel, and error codes.

Transmission Functions

Outputs measured and computed data.

Outputs setting parameters of the panel and the status byte.

Outputs error codes that are generated.

USB Interface Specifications

Electrical and Mechanical Specifications	:	Conforms to USB Rev.1.0
Connector	:	Type B connector (receptacle)
Number of Ports	:	1
Power Supply	:	Self-powered

Switching between Remote and Local Mode

When Switching from Local to Remote Mode

If the DL1720/DL1740 receives a `":COMMunicate:REMote ON"` command from the PC when it is in the local mode, it switches to the remote mode.

- REMOTE is displayed at the lower left corner of the screen.
- All keys except **SHIFT+CLEAR TRACE** are disabled.
- The settings that existed in the local mode are maintained even when the DL1720/ DL1740 switches to the remote mode.

When Switching from Remote to Local Mode

Pressing **SHIFT+CLEAR TRACE** when the instrument is in the remote mode causes the instrument to switch to the local mode. However, this is void when the DL1720/DL1740 has received a `":COMMunicate:LOCKout ON"` command from the PC (local lockout condition). When the DL1720/DL1740 receives a `":COMMunicate:REMote OFF"` command from the PC, the DL1720/DL1740 switches to the local mode regardless of the local lock condition.

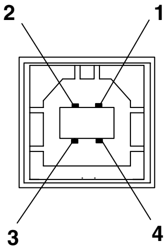
- REMOTE indication at the lower right corner disappears.
- Key operations are enabled.
- The settings that existed in the remote mode are maintained even when the instrument switches to the local mode.

Note

The USB interface cannot be used simultaneously with other communications interface (GP-IB, serial (RS-232), or network).

3.3 Connection via the USB Interface

Connector and Signal Names



Pin No.	Signal Name	
1	V_{BUS}:	+5 V
2	D–:	–Data
3	D+:	+Data
4	GND:	Ground

Connection Precautions

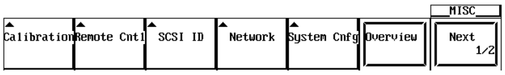
- Connect the USB cable by inserting the connector firmly into the USB connector.
- When connecting multiple devices using USB hubs, connect the DL1720/DL1740 to the USB hub that is closest to the controller.
- Do not mistakenly insert the USB cable to the GO/NO-GO output terminal. This may cause damage to the DL1720/DL1740.

3.4 Setting up this Instrument (USB)

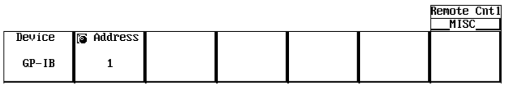
Operating Procedure

Displaying the USB Menu

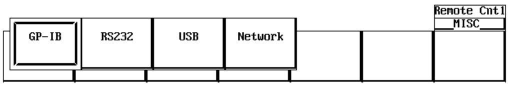
1. Press **MISC**.
2. Press the **Remote Cntl** soft key.



3. Press the **Device** soft key to select **USB**.



Device GP-IB
Address 1

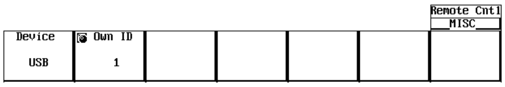


Note

Only the communications interfaces selected under Device are available. If commands are sent using an unselected communications interface, the command will not be received.

Setting the ID Value

4. Turn the jog shuttle to set the ID value.



Device USB
Own ID 1

Explanation

Carry out the following settings when using a controller to set information that can be specified through key operation on the DL1720/DL1740 or when outputting setting parameters or output waveform data to the controller.

Setting the ID Value

Set the ID value of the DL1720/DL1740 within the following range:
1 to 127
You can connect multiple devices to a host controller on the USB. If the DL1720/DL1740 is connected to multiple devices in a single USB system, the ID value is used by the host controller to identify each device. Therefore, unique ID values must be assigned to the DL1720/DL1740s within a single system.

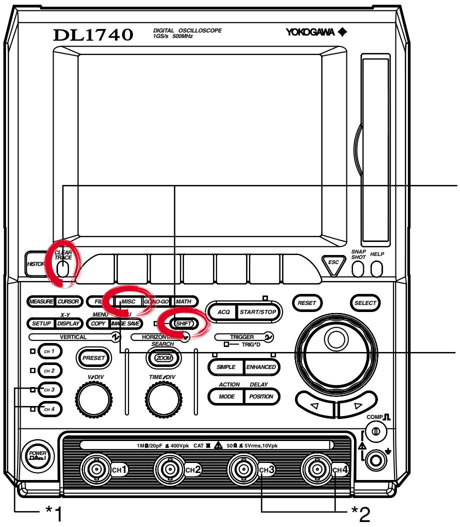
Note

Do not change the ID value while using the USB.

Chapter 4 Network Interface (Option): Supports Firmware Version 1.30 or Later

4.1 Names of the Parts and their Function

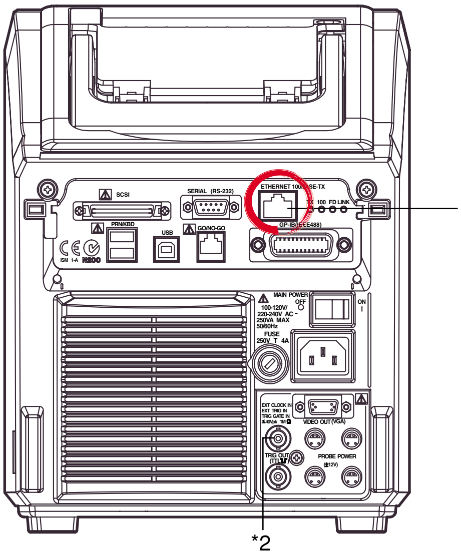
Front Panel



SHIFT Key+CLEAR TRACE Key
Press to switch from remote mode to local mode which allows key operation.
However, this is not possible if Local Lockout has been set by the controller (refer to page 4-2).

MISC Key (Page 4-5)
Press to confirm the user name and password.

Rear Panel



Ethernet Interface Connector
This connector is for connecting the controller (such as a PC) with the Ethernet cable. For information on how to connect the USB cable, refer to page 4-4

*1 On the DL1720, the CH3 and CH4 keys are disabled.

*2 The DL1720 is not equipped with an input terminal for CH3 or CH4.
Also, the external trigger/external clock/trigger gate input terminal (labeled as EXT. on the DL1720) appears on the front panel in place of the CH4 input terminal shown above.

4.2 Network Interface Functions and Specifications

Receiving Function

It is possible to make the same settings via the RS-232 interface as can be made using the front panel keys.

Measured or computed data, panel setup information, and error codes can be received.

Sending Function

Measured/computed data can be output.

Panel setup information and the status byte can be output.

Error codes which have occurred can be output.

Network Interface Specifications

Electrical and Mechanical Specifications	:	IEEE802.3 Compliant
No. of simultaneous connections	:	1
Port No.	:	10001/tcp

Data Transfer Rate

The table below shows approximate response times for output of waveform data, assuming the following configuration.

Model	:	701710
Controller	:	EPSON DIRECT MT-4000 (Pentium III, 1 GHz)
Network Adaptor	:	3Com 3C920
Programming Language	:	Visual C++

Data Volume	Byte Format	Word Format	ASCII Format
1000	approx. 5.3 ms	approx. 6.6 ms	approx. 208 ms
10000	approx. 21.1 ms	approx. 32.9 ms	approx. 2.05 s
100000	approx. 182 ms	approx. 304 ms	approx. 20.52 s
1000000	approx. 1859 ms	approx. 3015 ms	approx. 224.2 s

Switching between Remote and Local Mode

When Switched from Local to Remote

Remote mode is activated when the `:COMMunicate:REMote ON` command is received from a controller while local mode is active.

- REMOTE is displayed on the upper right of the screen.
- All front panel keys except **SHIFT** +**CLEAR TRACE** can no longer be operated.
- Settings entered in local mode are retained even when switching to remote mode.

When Switched from Remote to Local Mode

Pressing **SHIFT** +**CLEAR TRACE** in remote mode puts the instrument in local mode. However, this is not possible when the `:COMMunicate:REMote ON` command is received from the computer while Local Lockout mode is active. Local mode is activated when the `:COMMunicate:REMote OFF` command is received regardless of Local Lockout.

- The REMOTE indicator on the upper right of the screen is turned off.
- All front panel keys are operative.
- Settings entered in remote mode are retained even when switching to local mode.

Note

The network interface cannot be used simultaneously with other communications interfaces (GP-IB, serial (RS-232), or USB).

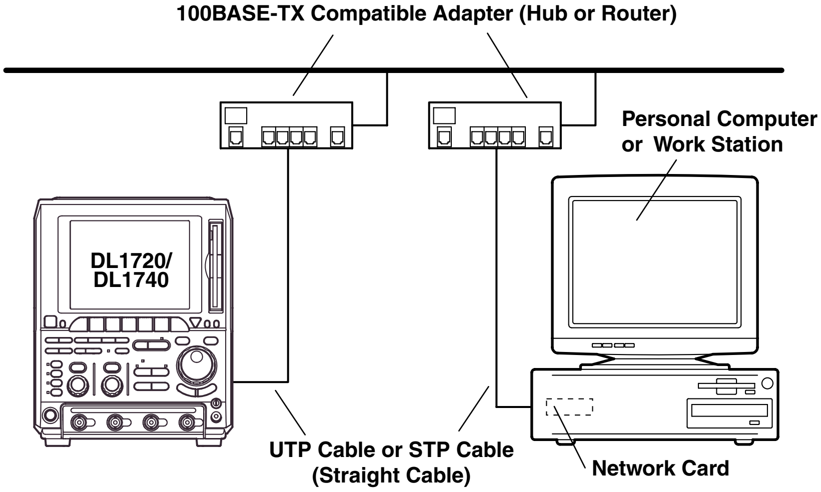
User Verification Function

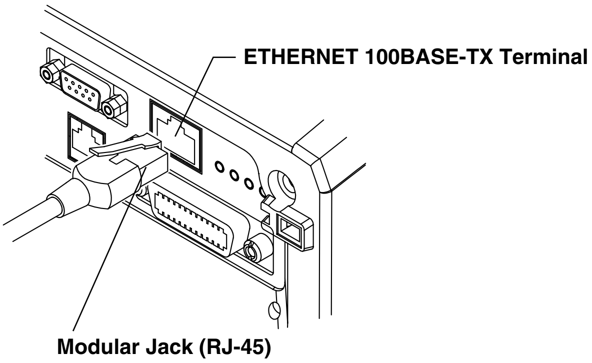
The user must enter a user name and password for the interface when connecting to the network. The user name and password is set on the instrument in the Remote Cntl setting screen under the MISC menu. For details, see section 4.4, “Setting up this Instrument (Network).”

4.3 Connection via the Network Interfece

Connection Method

Connect a UTP (Unshielded Twisted-Pair) or STP (Shielded Twisted-Pair) cable that has been connected to a hub to the 100BASE-TX port on the rear panel of the unit.


100BASE-TX Compatible Adapter (Hub or Router)
Personal Computer or Work Station
DL1720/ DL1740
UTP Cable or STP Cable (Straight Cable)
Network Card



Connection Precautions

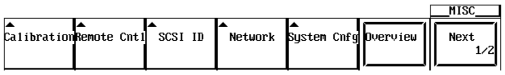
- You must use a straight cable when connecting the unit to a personal computer or a work station. We cannot guarantee results using a cross cable.
- When using a UTP cable (straight cable), be sure to use only a category 5 cable.

4.4 Setting up this Instrument (Network)

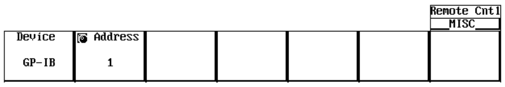
Operating Procedure

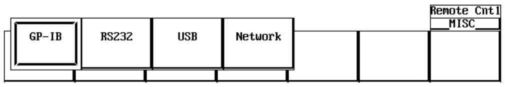
Displaying the Network Menu

1. Press **MISC**.
2. Press the **Remote Cntl** soft key.



3. Press the **Device** soft key, and select **Network**.



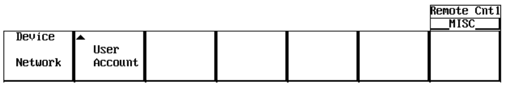


Note

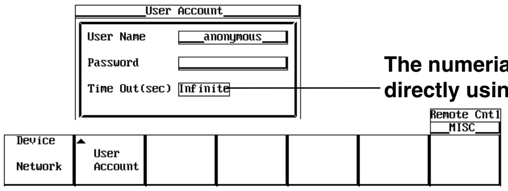
Only the communications interfaces selected under Device are available. If commands are sent using an unselected communications interface, the command will not be received.

Setting the User Name, Password, and Timeout Time

4. Press the **User Account** soft key.



5. Use the jog shuttle to move the cursor to User Name, then press **Select** to display the keyboard.



User Account
User Name anonymous
Password
Time Out(sec) Infinite

The numerial values for this item can be input directly using a USB keyboard. (⌨)

6. Enter the user name. If you do not wish to limit access, use the anonymous setting. If access is to be limited, enter a user name of 15 characters or less.
7. Use the jog shuttle to move the cursor to Password, then press **SELECT** to display the keyboard.
8. Enter a password of 15 characters or less. Reenter the password to confirm.
9. Use the jog shuttle to move the cursor to Time Out, then press **SELECT** to display the keyboard.
10. Enter the Timeout time using the jog shuttle.

Note

- For (soft) keyboard operation, see section 4.1, “Entering Values and Character Strings” in user’s manual IM701710-01E.
- The user name and password are case sensitive.

TCP/IP Settings

The following TCP/IP settings must be entered in order to use the network interface functions.

- IP Address
- Subnet Mask
- Default Gateway

For details about how to enter these settings, see section 13.2, “Configuring the Ethernet Interface (TCP/IP)” in user’s manual IM701710-01E.

Description

Use the settings below to setup communications so that you can input settings on the instrument using the controller, or output settings or values to the controller.

Setting the User Name and Password

There is a user verification function for the Network interface. The user name and password are set on the instrument ahead of time.

- User Name Setting
  15 characters or less may be used. The default value is anonymous.

- Password Setting
  15 characters or less may be used.

Setting the Timeout Time

If the unit is not being accessed at the specified timeout time, the connection to the network will be automatically closed.

TCP/IP Settings

For details, see section 13.2, “Configuring the Ethernet Interface (TCP/IP)” in user’s manual IM701710-01E.

Note

- If a user verification error occurs, the connection to the instrument is cut.
- If the login name is anonymous, it is not necessary to enter a password.
- When changing the user name, password, timeout time, or TCP/IP settings, the settings will not take effect until the unit is turned OFF then back ON again.

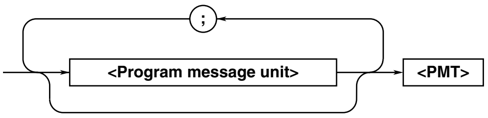
Chapter 5 Before Programming

5.1 Messages

Blocks of message data are transferred between the controller and this instrument during communications. Messages sent from the controller to this instrument are called program messages, and messages sent back from this instrument to the controller are called response messages.
If a program message contains a query command, i.e. a command which requests a response, this instrument returns a response message. A single response message is always returned in reply to a program message.

Program Messages

The format of a program message is shown below.



<Program Message Unit>

A program message consists of zero or more program message units; each unit corresponds to one command. This instrument executes commands one by one according to the order in which they are received.
Program message units are delimited by a ";."
For a description of the format of the program message unit, refer to the explanation given further below.

Example $\underbrace{\texttt{:ACQuire:MODE NORMal}}_{\text{Unit}};\underbrace{\texttt{COUNt 1}}_{\text{Unit}}\texttt{<PMT>}$

<PMT>

PMT is a terminator used to terminate each program message. The following three types of terminator are available.

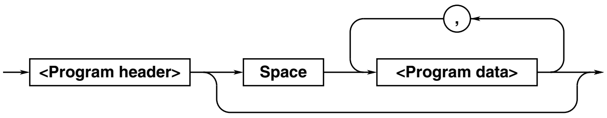
NL (New Line) : Same as LF (Line Feed). ASCII code "0AH" is used.

^END : END message defined in IEEE488.1. (EOI signal)
(The data byte sent with an END message will be the final item of the program message unit.)

NL^END : NL with an END message attached
(NL is not included in the program message unit.)

Program Message Unit Format

The format of a program message unit is shown below.



<Program Header>

A program header is used to indicate the command type. For details, refer to page 5-3.

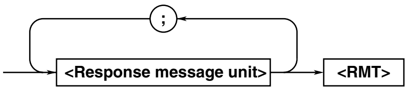
<Program Data>

If certain conditions are required for the execution of a command, program data must be added. Program data must be separated from the header by a space (ASCII code "20H"). If multiple items of program data are included, they must be separated by a "," (comma). For details, refer to page 5-5.

Example $\underbrace{\texttt{:ACQuire:MODE}}_{\text{Header}}\ \underbrace{\texttt{NORMal}}_{\text{Data}}\texttt{<PMT>}$

Response Messages

The format of a response message is shown below.



<Response Message Units>

A response message consists of one or more response message units: each response message unit corresponds to one response.
Response message units are delimited by a ";."
For the response message format, refer to the next page.

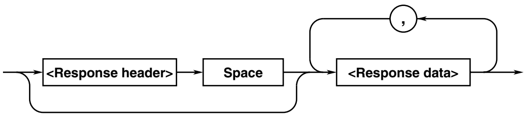
Example $\underbrace{\texttt{:ACQUIRE:MODE NORMAL}}_{\text{Unit}};\underbrace{\texttt{COUNT 1}}_{\text{Unit}}\texttt{<RMT>}$

<RMT>

RMT is the terminator used for every response message. Only one type of response message is available; NL^END.

Response Message Unit Format

The format of a program message unit is shown below.



<Response Header>

A response header sometimes precedes the response data. Response data must be separated from the header by a space. For details, refer to page 5-5.

<Response Data>

Response data is used to define a response. If multiple items of response data are used, they must be separated by a "," (comma). For details, refer to page 5-5.

Example

$\underbrace{\texttt{1.25E-02<RMT>}}_{\text{Data}} \qquad \underbrace{\texttt{:ACQUIRE:MODE}}_{\text{Header}}\ \underbrace{\texttt{NORMAL}}_{\text{Data}}\texttt{<RMT>}$

If a program message contains more than one query, responses are made in the same order as the queries. Normally, each query returns only one response message unit, but there are some queries which return more than one response message unit. The first response message unit always responds to the first query, but it is not always true that the 'n'th unit always responds to the 'n'th query. Therefore, if you want to make sure that a response is made to each query, the program message must be divided up into individual messages.

Points to Note Concerning Message Transmission

- It is always possible to send a program message if the previous message which was sent did not contain any queries.
- If the previous message contained a query, it is not possible to send another program message until a response message has been received. An error will occur if a program message is sent before a response message has been received in its entirety. A response message which has not been received will be discarded.
- If an attempt is made by the controller to receive a response message, even if there it no response message, an error will occur. An error will also occur if the controller makes an attempt to receive a response message before transmission of a program message has been completed.
- If a program message of more than one unit is sent and some of the units are incomplete, this instrument receives program message units which the instrument thinks complete and attempts to execute them. However, these attempts may not always be successful and a response may not always be returned, even if the program message contains queries.

Dead Lock

This instrument has a buffer memory in which both program and response messages of 1024 bytes or more can be stored. (The number of bytes available will vary depending on the operating state of the instrument.) If both buffer memories become full at the same time, this instrument becomes inoperative. This state is called deadlock. In this case, operation can be resumed by discarding the response message.
No dead lock will occur, if the size of the program message including the PMT is kept below 1024 bytes. Furthermore, no deadlock will occur if the program message does not contain a query.

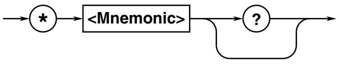
5.2 Commands

There are three types of command (program header) which can be sent from the controller to this instrument. They differ in the format of their program headers.

They are
- Common command header
- Compound header
- Simple header

Common Command Header

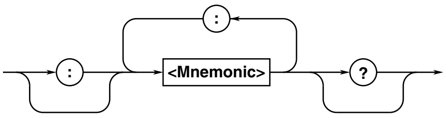
Commands defined in IEEE 488.2-1987 are called common commands. The header format of a common command is shown below. An asterisk (*) must always be attached to the beginning of a command.



An example of a common command
`*CLS`

Compound Header

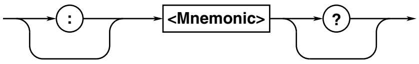
Commands designed to be used only with this instrument are classified and arranged in a hierarchy according to their function. The format of a compound header is illustrated below. A colon (:) must be used when specifying a lower-level header.



An example of a compound header
`:ACQuire:MODE`

Simple Header

These commands (headers) are functionally independent of each other and are not arranged hierarchically. The format of a simple header is shown below.



An example of a simple header
`:STARt`

Note

A mnemonic is a character string made up of alphanumeric characters.

When Concatenating Commands

Command Group

A command group is a group of commands which have the same compound header. A command group may contain sub-groups.

Example Commands relating to acquisition settings

```
:ACQuire:AVERage:COUNt
:ACQuire:MODE
:ACQuire:AVERage:EWEight
:ACQuire:REPetitive
:ACQuire:CLOCK
:ACQuire:RLENgth
:ACQuire:COUNt
:ACQuire:INTerleave
```

When Concatenating Commands of the Same Group

This instrument stores the hierarchical level of the command which is currently being executed, and performs analysis on the assumption that the next command to be sent will also belong to the same level. Therefore, it is possible to omit the header if the commands belong to the same group.

Example `:ACQuire:MODE NORMal;`
`COUNt 1<PMT>`

When Concatenating Commands of Different Groups

A colon (:) must be included before the header of a command, if the command does not belong to the same group as the preceding command. It is impossible to omit a colon (:).

Example `:ACQuire:MODE NORMal;:DISPlay:`
`FORMat SINGle<PMT>`

When Concatenating Simple Headers

When you type in a simple header after another command, you must include a colon (:) before the simple header. It is impossible to omit a colon (:).

Example `:ACQuire:MODE NORMal;:STARt<PMT>`

When Concatenating Common Commands

Common commands defined in IEEE 488.2-1987 are independent of hierarchical level. Thus, it is not necessary to add a colon (:) before a common command.

Example `:ACQuire:MODE NORMal;*CLS;`
`COUNt 1<PMT>`

When Separating Commands with <PMT>

If a terminator is used to separate two commands, each command is a separate message. Therefore, the common header must be typed in for each command even when commands of the same command group are being concatenated.

Example `:ACQuire:MODE NORMal<PMT>:ACQuire:COUNt 1<PMT>`

Upper-level Query

An upper-level query is a compound header to which a question mark is appended. Execution of an upper-level query allows all a group's settings to be output at once. Some query groups comprising more than three hierarchical levels can output all their lower level settings.

Example
```
:CHANnel1?<PMT> -> :CHANNEL1:
DISPLAY ON;LABEL "CH1    ";
COUPLING DC;POSITION 0.00;
PROBE 10;VDIV 50.0E+00;
BWIDTH FULL;OFFSET 0.0E+00;
LSCALE:MODE 0
```

In reply to a query, a response can be returned as a program message to this instrument. Transmitting a response can restore the settings made when the query was executed. However, some upper-level queries will not return set-up data which is not currently in use. Note that not all a group's information will necessarily be sent out as a response.

Header Interpretation Rules

This instrument interprets the header received according to the following rules.

- Mnemonics are not case sensitive.
  Example "CURSor" can also be written as "cursor" or "Cursor."
- The lower-case part of a header can be omitted.
  Example "CURSor" can also be written as "CURSO" or "CURS."
- If the header ends with a question mark, the command is a query. It is not possible to omit the question mark.
  Example "CURSor?" cannot be abbreviated to anything shorter than "CURS?."
- If the "x" at the end of a mnemonic is omitted, it is assumed to be "1."
  Example If "CHANnel<x>" is written as "CHAN," this represents "CHANnel1."
- Any part of a command enclosed by [ ] can be omitted.
  Example "TRIGger[:SIMPLle]:LEVel" can be written as "TRIG:LEV."
  However, a part enclosed by [ ] cannot be omitted if it is located at the end of an upper-level query.
  Example "TRIGger?" and "TRIGger:SIMPle?" belong to different upper-level query levels.

5.3 Response

On receiving a query from the controller, this instrument returns a response message to the controller. A response message is sent in one of the following two forms.

- Response Consisting of a Header and Data
  If the query can be used as a program message without any change, a command header is attached to the query, which is then returned.
  Example `:ACQUire:MODE?<PMT> ->`
  `:ACQUire:MODE NORMAL<RMT>`

- Response Consisting of Data Only
  If the query cannot be used as a program message unless changes are made to it (i.e. it is a query-only command), no header is attached and only the data is returned. Some query-only commands can be returned after a header is attached to them.
  Example `:MEASure:CHANnel1:PTOPeak:`
  `VALue?<PMT> -> 10.0E+00<RMT>`

When Returning a Response without a Header

It is possible to remove the header from a response consisting of a header and data. The "COMMunicate:HEADer" command is used to do this.

Abbreviated Form

Normally, the lower-case part is removed from a response header before the response is returned to the controller. Naturally, the full form of the header can also be used. For this, the "COMMunicate:VERBose" command is used. The part enclosed by [ ] is also omitted in the abbreviated form.

5.4 Data

Data

A data section comes after the header. A space must be included between the header and the data. The data contains conditions and values. Data is classified as below.

Data	Description
<Decimal>	Value expressed as a decimal number (Example: CH2's probe attenuation -> CHANnel2:PROBe 100)
<Voltage><Time> <Frequency>	Physical value (Example: Time axis range -> TIMebase:TDIV 1US)
<Register>	Register value expressed as either binary,octal, decimal or hexadecimal (Example: Extended event register value -> STATus:EESE #HFE)
<Character data>	Specified character string (mnemonic). Can be selected from { } (Example: CH2 input coupling -> CHANnel2:COUPling {AC|DC|DC50|GND})
<Boolean>	Indicates ON/OFF. Set to ON, OFF or value (Example: CH2 display ON -> CHANnel2:DISPlay ON)
<Character string data>	Arbitrary character string (Example: Comment on screen-data output -> HCOPy:COMMent "ABCDEF")
<Filename>	Gives the name of a file. (Example: Name of file to be saved -> FILE:SAVE:WAVeform:NAME "CASE1")
<Block data>	Arbitrary 8-bit data (Example: Response to acquired waveform data -> #800000010ABCDEFGHIJ)

<Decimal>

<Decimal> indicates a value expressed as a decimal number, as shown in the table below. Decimal values are given in the NR form specified in ANSI X3. 42-1975.

Symbol	Description	Example
<NR1>	Integer	125 -1 +1000
<NR2>	Fixed point number	125.0 -.90 +001.
<NR3>	Floating point number	125.0E+0 -9E-1 +.1E4
<NRf>	Any of the forms <NR1> to <NR3> is allowed.	

- Decimal values which are sent from the controller to this instrument can be sent in any of the forms to <NR3>. In this case, <NRf> appears.
- For response messages which are returned from this instrument to the controller, the form (<NR1> to <NR3> to be used) is determined by the query. The same form is used, irrespective of whether the value is large or small.
- In the case of <NR3>, the "+" after the "E" can be omitted, but the "-" cannot.
- If a value outside the setting range is entered, the value will be normalized so that it is just inside the range.
- If the value has more than the significant number of digits, the value will be rounded.

<Voltage>, <Time>, <Frequency>

<Voltage>, <Time>, and <Frequency> indicate decimal values which have physical significance. <Multiplier> or <Unit> can be attached to <NRf>. They can be entered in any of the following forms.

Form	Example
<NRf><Multiplier><Unit>	5MV
<NRf><Unit>	5E-3V
<NRf><Multiplier>	5M
<NRf>	5E-3

<Multiplier>

Multipliers which can be used are shown below.

Symbol	Word	Description
EX	Exa	10^{18}
PE	Peta	10^{15}
T	Tera	10^{12}
G	Giga	10^{9}
MA	Mega	10^{6}
K	Kilo	10^{3}
M	Mili	10^{-3}
U	Micro	10^{-6}
N	Nano	10^{-9}
P	Pico	10^{-12}
F	Femto	10^{-15}
A	Atto	10^{-18}

<Unit>

Units which can be used are shown below.

Symbol	Word	Description
V	Volt	Voltage
S	Second	Time
HZ	Hertz	Frequency
MHZ	Megahertz	Frequency

- <Multiplier> and <Unit> are not case sensitive.
- "U" is used to indicate "μ."
- "MA" is used for Mega (M) to distinguish it from Mili, except for in the case of Megahertz, which is expressed as "MHZ." Hence, it is not permissible to use "M" (Mili) for Hertz.
- If both <Multiplier> and <Unit> are omitted, the default unit will be used.
- Response messages are always expressed in <NR3> form. Neither <Multiplier> nor <Unit> is used, therefore the default unit is used.

<Register>

<Register> indicates an integer, and can be expressed in hexadecimal, octal, or binary as well as as a decimal number. <Register> is used when each bit of a value has a particular meaning. <Register> is expressed in one of the following forms.

Form	Example
<NRf>	1
#H<Hexadecimal value made up of the digits 0 to 9, and A to F>	#H0F
#Q<Octal value made up of the digits 0 to 7>	#Q777
#B<Binary value made up of the digits 0 and 1>	#B001100

- <Register> is not case sensitive.
- Response messages are always expressed as <NR1>.

<Character Data>

<Character data> is a specified string of character data (a mnemonic). It is mainly used to indicate options, and is chosen from the character strings given in { }. For interpretation rules, refer to “Header Interpretation Rules” on page 5-4.

Form	Example
{AC|DC|DC50|GND}	AC

- As with a header, the "COMMunicate:VERBose" command can be used to return a response message in its full form. Alternatively, the abbreviated form can be used.
- The "COMMunicate:HEADer" command does not affect <character data>.

<Boolean>

<Boolean> is data which indicates ON or OFF, and is expressed in one of the following forms.

Form	Example
{ON|OFF|<NRf>}	ON OFF 1 0

- When <Boolean> is expressed in <NRf> form, OFF is selected if the rounded integer value is "0" and ON is selected if the rounded integer is "Not 0."
- A response message is always "1" if the value is ON and "0" if it is OFF.

<Character String Data>

<Character string data> is not a specified character string like <Character data>. It is an arbitrary character string. A character string must be enclosed in single quotation marks (') or double quotation marks (").

Form	Example
<Character string data>	'ABC' "IEEE488.2-1987"

- Response messages are always enclosed in double quotation marks.

- If a character string contains a double quotation mark ("), the double quotation mark will be replaced by two concatenated double quotation marks (""). This rule also applies to a single quotation mark within a character string.
- <Character string data> is an arbitrary character string, therefore this instrument assumes that the remaining program message units are part of the character string if no single (') or double quotation mark (") is encountered. As a result, no error will be detected if a quotation mark is omitted.

<Filename>

Gives the name of a file. The format is as follows.

Form	Example
{<NRf>|<Character data>|<Character string>}	1 CASE "CASE"

- If you input an <NRf> value, the system converts the value (after rounding to the nearest integer) to the corresponding 8-character ASCII string. (If you set the value to 1, the name becomes "00000001".) Note that negative values are not allowed.
- If you enter a <character data> or <character string> argument that is longer than eight characters, only the first eight characters are used.
- Response messages always return filenames as <character string> arguments.

<Block Data>

<Block data> is arbitrary 8-bit data. <Block data> is only used for response messages. Response messages are expressed in the following form.

Form	Example
#N<N-digit decimal value><Data byte string>	#800000010ABCDEFGHIJ

- #N
  Indicates that the data is <Block data>. "N" is an ASCII character string number (digits) which indicates the number of data bytes that follow.
- <N-digits decimal value>
  Indicates the number of bytes of data. (Example: 00000010=10 bytes)
- <Data byte string>
  The actual data. (Example: ABCDEFGHIJ)
- Data is comprised of 8-bit values (0 to 255). This means that the ASCII code "0AH," which stands for "NL," can also be a code used for data. Hence, care must be taken when programming the controller.

5.5 Synchronization with the Controller

Overlap Commands and Sequential Commands

There are two kinds of command; overlap commands and sequential commands. Execution of an overlap command may start before execution of the previously sent command is completed.

The "CHANnel1:VDIV" command, for example, is a sequential command. Assume that you set a new V/div value and immediately request return of the new value, as follows:

```
:CHANnel1:VDIV 5V;VIDV?<PMT>
```

In this case, the oscilloscope always returns the newest setting ("5V"). This is because it always completes processing of the current sequential command (in this case, "VDIV 5V") before moving on to the next command ("VDIV?").

In contrast, assume that you begin a file load and then immediately query the V/div value:

```
:FILE:LOAD:SETup:EXECute "CASE1";:
CHANnel1:VDIV?
```

Because "FILE:LOAD:SETup:EXECute "CASE1"" is an overlapped command, the oscilloscope will advance to the "CHANNel1:VDIV?" command before it finishes the load. The returned V/div value will not show the newest setting, but will rather show the setting in use before the setup was changed.

Obviously, use of overlapped commands may in some cases produce inappropriate results. Where necessary, you can avoid such problems as described below.

Synchronization with an Overlap Command

Using the *WAI Command

The *WAI command causes the commands which follow it to wait until an overlap command has been executed.

Example
```
:COMMunicate:OPSE #0040;:FILE:
LOAD:SETup:EXECute "CASE1";
*WAI;:CHANnel1:VDIV?<PMT>
```

The "COMMunicate:OPSE" command is used to designate which commands are to be subject to the *WAI command. In the above example, only auto set-up is designated.

Since a *WAI command is executed just before "CHANnel1:VDIV?," "CHANnel1:VDIV?" will not be executed until auto set-up has been completed.

Using the COMMunicate:OVERlap Command

The "COMMunicate:OVERlap" command is used to enable or disable overlap operation.

Example
```
:COMMunicate:OVERlap #HFFBF;:
FILE:LOAD:SETup:
EXECute "CASE1";:CHANnel1:VDIV:
VALue?<PMT>
```

The "COMMunicate:OVERlap #HFFBF" command disables overlapped operation of the medium access command, while enabling all other overlap-type operations. The oscilloscope will therefore handle "FILE:LOAD:SETup:EXECute "CASE1"" as sequential command, ensuring that the "CHANnel1:VIDV?" command (in the above example) will not execute until file loading is completed.

Using the *OPC Command

The *OPC command causes the OPC bit (bit 0) of the standard event register (page 7-3) to be set to "1" when an overlap operation has been completed.

Example
```
:COMMunicate:OPSE #H0040;*ESE 1;
*ESR?;*SRE 32;:FILE:LOAD:SETup:
EXECute "CASE1";*OPC<PMT>
```
(Response to *ESR? is decoded.)
(Service request is awaited.)
```
CHANnel1:VDIV?<PMT>
```

The "COMMunicate:OPSE" command is used to designate which commands are to be subject to the *OPC command. In the above example, only medium access commands are designated.

*ESE 1 and *SRE 32 stipulate that a service request is generated only when the OPC bit is set to "1."

*ESR? is used to clear the standard event register.

In the above example, "CHANnel1:VDIV?" will not be executed until a service request is generated.

Using the *OPC? Query

The *OPC? query generates a response when an overlap operation has been completed.

Example
```
:COMMunicate:OPSE #H0040;:FILE:
LOAD:SETup:EXECute "CASE1";
*OPC?<PMT>
```
(Response to *OPC? is decoded.)
```
:CHANnel1:VDIV?<PMT>
```

The "COMMunicate:OPSE" command is used to designate which commands are to be subject to the *OPC? command. In the above example, only medium access commands are designated.

Since *OPC? does not generate a response until an overlap operation is completed, file loading will have been completed when a response to *OPC? is read.

Note

Most commands are sequential commands. Commands used in Chapter 6 are sequential commands unless otherwise specified.

Synchronization with Non-Overlap Commands

Synchronization is sometimes required for reasons other than communications-related reasons, such as the activation of a trigger, even if a sequential command is used.

For example, if a “next program” message is transmitted to make an inquiry about the waveform data which has been acquired using single mode as the trigger mode, the "WAVeform:SEND?" command is sometimes executed whether acquisition has been completed or not, causing a command execution error.

```
:TRIGger:MODE SINGle;:STARt;:WAVeform:
SEND?<PMT>
```

In this case, synchronization with the time at which acquisition is completed must be accomplished, as shown next.

Using STATus:CONDition? Query

A "STATus:CONDition?" query is used to make an query about the contents of the condition register (page 7-4). It is possible to judge whether acquisition is in progress or not by reading bit 0 of the condition register. Bit 0 is "1" if acquisition is in progress, and "0" if acquisition is stopped.

Example
```
:TRIGger:MODE SINGle;:STARt<PMT>
:STATus:CONDition?<PMT>
```
(Returns to the previous status if bit 0 is found to be "1" when the response is decoded.)
```
:WAVeform:SEND?<PMT>
```

A "WAVeform:SEND?" query will not be executed until bit 0 of the condition register has been set to "0."

Using the Extended Event Register

Changes in the condition register are reflected in the extended event register (page 7-4).

Example
```
:STATus:FILTer1
FALL;:STATus:EESE 1;EESR?;
*SRE 8;:TRIGger:MODE SINGle;:
STARt<PMT>
```
(Response to "STATus:EESR?" is decoded.)

(Service request is awaited.)
```
:WAVeform:SEND?<PMT>
```

The "STATus:FILTer1 FALL" command sets the transition filter such that Bit 0 (FILTer1) of the Extended Event Register sets to 1 when Bit 0 of the Condition Register changes from 1 to 0.

"STATus:EESE 1" is a command used only to reflect the status of bit 0 of the extended event register in the status byte.

"STATus:EESR?" is used to clear the extended event register.

The *SRE command is used to generate a service request caused solely by the extended event register.

"WAVeform:SEND?" will not be executed until a service request is generated.

Using the COMMunicate:WAIT Command

The "COMMunicate:WAIT" command halts communications until a specific event is generated.

Example
```
:STATus:FILTer1 FALL;:STATus:
EESR?;:TRIGger:MODE SINGle;:
STARt<PMT>
```
(Response to "STATus:EESR?" is decoded.)
```
:COMMunicate:WAIT 1;:WAVeform:
SEND?<PMT>
```

For a description of "STATus:FILTer1 FALL" and "STATus:EESR?," refer to “Using the extended event register” on this page.

"COMMunicate:WAIT 1" means that communications is halted until bit 0 of the extended event register is set to "1."

Chapter 6 Commands

6.1 A List of Commands

Command	Function	Page
ACQuire Group		
`:ACQuire?`	Queries all settings related to waveform acquisition.	6-16
`:ACQuire:AVERage?`	Queries all settings related to averaging.	6-16
`:ACQuire:AVERage:COUNt`	Sets the number of waveform acquisitions during averaging or queries the current setting.	6-16
`:ACQuire:AVERage:EWEight`	Sets the attenuation constant for exponential averaging or queries the current setting.	6-17
`:ACQuire:CLOCk`	Sets the time base or queries the current setting.	6-17
`:ACQuire:COUNt`	Sets the number of waveform acquisitions during normal mode, average mode, and box average or queries the current setting.	6-17
`:ACQuire:INTerleave`	Turns the interleave mode ON/OFF or queries the current setting.	6-17
`:ACQuire:MODE`	Sets the waveform acquisition mode or queries the current setting.	6-17
`:ACQuire:REPetitive`	Turns the repetitive sampling mode ON/OFF or queries the current setting.	6-17
`:ACQuire:RLENgth`	Sets the record length or queries the current setting.	6-17
ASETup Group		
`:ASETup:EXECute`	Executes auto setup.	6-17
`:ASETup:UNDO`	Cancels the previous auto setup operation.	6-17
CALibrate Group		
`:CALibrate?`	Queries all settings related to calibration.	6-18
`:CALibrate:DESKew?`	Queries all settings related to skew compensation.	6-18
`:CALibrate:DESKew:MODE`	Turns the skew compensation ON/OFF or queries the current setting.	6-18
`:CALibrate:DESKew:TARGet`	Sets the channel on which skew compensation is to be performed or queries the current setting.	6-18
`:CALibrate:DESKew:TIME`	Sets the skew adjustment time that are common to all channels or queries the current setting.	6-18
`:CALibrate[:EXECute]`	Executes the calibration.	6-18
`:CALibrate:MODE`	Turns auto calibration ON/OFF or queries the current setting.	6-18
CHANnel Group		
`:CHANnel<x>?`	Queries all settings related to the vertical axis of each channel.	6-20
`:CHANnel<x>:BWIDth`	Sets the input filter of each channel or queries the current setting.	6-20
`:CHANnel<x>:COUPling`	Sets the input coupling of each channel or queries the current setting.	6-20
`:CHANnel<x>:DISPlay`	Turns the display of each channel ON/OFF or queries the current setting.	6-20
`:CHANnel<x>:LABel`	Sets a waveform label on each channel or queries the current setting.	6-20
`:CHANnel<x>:LSCale?`	Queries all settings related to the linear scaling of each channel.	6-20
`:CHANnel<x>:LSCale:AVALue`	Sets scaling constant A or queries the current setting.	6-20
`:CHANnel<x>:LSCale:BVALue`	Sets offset value B or queries the current setting.	6-20
`:CHANnel<x>:LSCale:MODE`	Turns linear scaling ON/OFF or queries the current setting.	6-20
`:CHANnel<x>:LSCale:UNIT`	Sets the measurement unit to be added to the result of the linear scaling or queries the current setting.	6-21
`:CHANnel<x>:MODE`	Turns the display of each channel ON/OFF or queries the current setting.	6-21
`:CHANnel<x>:OFFSet`	Sets the offset voltage of each channel or queries the current setting.	6-21
`:CHANnel<x>:POSition`	Sets the vertical position of each channel or queries the current setting.	6-21
`:CHANnel<x>:PROBe`	Sets the probe attenuation of each channel or queries the current setting.	6-21
`:CHANnel<x>:VARiable`	Sets the voltage sensitivity in units of 0.01 of the V/div setting for each channel or queries the current setting.	6-21
`:CHANnel<x>:VDIV`	Sets the V/div value of each channel or queries the current setting.	6-21
CLEar Group		
`:CLEar`	Clears the trace.	6-22

Command	Function	Page
COMMunicate Group		
:COMMunicate?	Queries all settings related to communications.	6-22
:COMMunicate:HEADer	Sets whether or not to add a header to the response data or queries the current setting.	6-23
:COMMunicate:LOCKout	Sets or clears the local lockout.	6-23
:COMMunicate:OPSE	Sets the overlap commands that are subject to *OPC, *OPC?, and *WAI or queries the current setting.	6-23
:COMMunicate:OPSR?	Queries the operation pending status register value.	6-23
:COMMunicate:OVERlap	Sets the commands that will operate as overlap commands or queries the current setting.	6-23
:COMMunicate:REMote	Switches to remote/local mode.	6-23
:COMMunicate:STATus?	Queries the line status.	6-23
:COMMunicate:VERBose	Sets the response messages to full form or abbreviated form or queries the current setting.	6-24
:COMMunicate:WAIT	Waits for a specified extended event.	6-24
:COMMunicate:WAIT?	Creates a response that is returned when the specified event occurs.	6-24
CURSor Group		
:CURSor?	Queries all settings related to cursor measurements.	6-27
:CURSor:TY?	Queries all settings related to the cursor in the T-Y display.	6-27
:CURSor:TY:DEGRee?	Queries all settings related to angle cursors.	6-27
:CURSor:TY:DEGRee:DX?	Queries the angle difference, ΔD, between angle cursors.	6-27
:CURSor:TY:DEGRee:DY?	Queries the angle difference, ΔV, between angle cursors.	6-27
:CURSor:TY:DEGRee:JUMP	Moves the angle cursor to the zoomed waveform.	6-27
:CURSor:TY:DEGRee:POSition<x>	Sets the position of the angle cursor or queries the current setting.	6-27
:CURSor:TY:DEGRee:REFerence<x>	Sets the position of the angle reference start point (Reference1) or the end point (Reference2) or queries the current setting.	6-28
:CURsor:TY:DEGRee:RVALue	Sets the angle reference width or queries the current setting.	6-28
:CURSor:TY:DEGRee:TRACe	Sets the waveform on which to use the angle cursor or queries the current setting.	6-28
:CURSor:TY:DEGRee:X<x>?	Queries the angle at the angle cursor.	6-28
:CURSor:TY:DEGRee:Y<x>?	Queries the voltage value at the angle cursor.	6-28
:CURSor:TY:HORizontal?	Queries all settings related to H cursors.	6-28
:CURSor:TY:HORizontal:DY?	Queries the Y-axis value between the H cursors.	6-28
:CURSor:TY:HORizontal:POSition<x>	Sets the H cursor position or queries the current setting.	6-28
:CURSor:TY:HORizontal:TRACe	Sets the waveform on which to use the H cursor or queries the current setting.	6-28
:CURSor:TY:HORizontal:Y<x>?	Queries the Y-axis value of the H cursor.	6-29
:CURSor:TY:MARKer?	Queries all settings related to marker cursors.	6-29
:CURSor:TY:MARKer:DX<x>?	Queries the X-axis value between the marker cursors.	6-29
:CURSor:TY:MARKer:DY<x>?	Queries the physical value of the Y-axis difference between the marker cursors.	6-29
:CURSor:TY:MARKer:M<x>?	Queries all settings related to the specified marker cursor.	6-29
:CURSor:TY:MARKer:M<x>:JUMP	Moves the marker cursor to the zoomed waveform.	6-29
:CURSor:TY:MARKer:M<x>:POSition<x>	Sets the X-axis position of the marker cursor or queries the current setting.	6-29
:CURSor:TY:MARKer:M<x>:TRACe	Sets the waveform on which to use the marker cursor or queries the current setting.	6-29
:CURSor:TY:MARKer:X<x>?	Queries the X-axis position of the marker cursor.	6-30
:CURSor:TY:MARKer:Y<x>?	Queries the Y-axis position of the marker cursor.	6-30
:CURSor:TY:TYPE	Sets the cursor type or queries the current setting.	6-30
:CURSor:TY:VERTical?	Queries all settings related to V cursors.	6-30
:CURSor:TY:VERTical:DX?	Queries the X-axis value between V cursors.	6-30
:CURSor:TY:VERTical:DY?	Queries the Y-axis value between V cursors.	6-30
:CURSor:TY:VERTical:JUMP	Moves the V cursor to the zoomed waveform.	6-30
:CURSor:TY:VERTical:PERDt?	Queries the 1/DT value between V cursors.	6-30
:CURSor:TY:VERTical:POSition<x>	Sets the V cursor position or queries the current setting.	6-30

Command	Function	Page
:CURSor:TY:VERTical:TRACe	Sets the waveform on which to use the V cursor or queries the current setting.	6-31
:CURSor:TY:VERTical:X<x>?	Queries the X-axis position of the V cursor.	6-31
:CURSor:TY:VERTical:Y<x>?	Queries the Y-axis position of the V cursor.	6-31
:CURSor:XY?	Queries all settings related to the cursors in the X-Y display.	6-31
:CURSor:XY:HORizontal?	Queries all settings related to the H cursors in the X-Y display.	6-31
:CURSor:XY:HORizontal:DY?	Queries the Y-axis value of the H cursor of the X-Y display.	6-31
:CURSor:XY:HORizontal:POSition<x>	Sets the H cursor position of the X-Y display or queries the current setting.	6-31
:CURSor:XY:HORizontal:TRACe	Sets the waveform on which to use the H cursor in the X-Y display or queries the current setting. (DL1740 only)	6-31
:CURSor:XY:HORizontal:Y?	Queries the Y-axis value of the H cursor of the X-Y display.	6-31
:CURSor:XY:MARKer?	Queries all settings related to the marker cursors in the X-Y display.	6-31
:CURSor:XY:MARKer:POSition	Sets the X-axis position of the marker cursor in the X-Y display or queries the current setting.	6-32
:CURSor:XY:MARKer:T?	Queries the time value of the marker cursor in the X-Y display.	6-32
:CURSor:XY:MARKer:TRACe	Sets the waveform on which to use the marker cursor in the X-Y display or queries the current setting. (DL1740 only)	6-32
:CURSor:XY:MARKer:X?	Queries the X-axis position of the marker cursor in the X-Y display.	6-32
:CURSor:XY:MARKer:Y?	Queries the Y-axis position of the marker cursor in the X-Y display.	6-32
:CURSor:XY:TYPE	Sets the cursor type of the X-Y display or queries the current setting.	6-32
:CURSor:XY:VERTical?	Queries all settings related to V cursors in the X-Y display.	6-32
:CURSor:XY:VERTical:DX?	Queries the X-axis value between the V cursors in the X-Y display.	6-32
:CURSor:XY:VERTical:POSition<x>	Sets the V cursor position of the X-Y display or queries the current setting.	6-32
:CURSor:XY:VERTical:TRACe	Sets the waveform on which to use the V cursor in the X-Y display or queries the current setting. (DL1740 only)	6-32
:CURSor:XY:VERTical:X<x>?	Queries the X-axis position of the V cursor in the X-Y display.	6-32
DISPlay Group		
:DISPlay?	Queries all settings related to the display.	6-35
:DISPlay:ACCumulate?	Queries all settings related to the accumulation display.	6-35
:DISPlay:ACCumulate:COLor	Sets the color grade width or queries the current setting.	6-35
:DISPlay:ACCumulate:MODE	Sets the accumulation mode or queries the current setting.	6-35
:DISPlay:ACCumulate:PERSistence	Sets the accumulation time or queries the current setting.	6-35
:DISPlay:COLor	Sets whether to change the screen color using RGB or brightness or queries the current setting.	6-35
:DISPlay:RGB?	Queries all settings related to the screen color.	6-35
:DISPlay:RGB:MENU?	Queries all settings related to colors used in the menu.	6-35
:DISPlay:RGB:MENU:{BACK|DIALog|FOCus|FORE|LINE|SELect|SHADow}	Sets the color of the characters, background, dialog, and lines of the menu screen or queries the current setting.	6-36
:DISPlay:RGB:OTHers?	Queries all settings related to the colors of other items.	6-36
:DISPlay:RGB:OTHers:{CURSor|GRID|MARKer|SNAP|ZONE<x>}	Sets the color for cursors, grid, markers, and snapshot waveforms or queries the current setting.	6-36
:DISPlay:RGB:WAVeform?	Queries all settings related to the waveform colors.	6-36
:DISPlay:RGB:WAVeform:{CHANnel<x>|BACK|MATH<x>}	Sets the colors for waveform and computation channels or queries the current setting.	6-36
:DISPlay:FORMat	Sets the display format or queries the current setting.	6-36
:DISPlay:GRATicule	Sets the graticule type or queries the current setting.	6-36
:DISPlay:INTENsity?	Queries all settings related to the brightness of the displayed items.	6-36
:DISPlay:INTENsity:{CURSor|MENU|GRID|SNAP|WAVeform}	Sets the brightness of each display item or queries the current setting.	6-37
:DISPlay:INTERpolate	Sets the interpolation method or queries the current setting.	6-37
:DISPlay:MAPPing	Sets the mapping mode used to allocate the waveforms to the divided windows or queries the current setting.	6-37

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:DISPlay:SMAPping?	Queries the mapping of all waveforms to the divided windows.	6-37
:DISPlay:SMAPping:{CHANnel<x>|MATH<x>}	Maps waveforms to the divided windows or queries the current setting.	6-37
:DISPlay:SVALue	Turns the scale value display ON/OFF or queries the current setting.	6-37
:DISPlay:TLABel	Turns the display of waveform labels ON/OFF or queries the current setting.	6-37
:DISPlay:TRANslucent	Turns the popup menu's transparent mode ON/OFF or queries the current setting.	6-37
FILE Group		
:FILE?	Queries all settings related to the specified medium.	6-41
:FILE:DELete:{ASCii|BINary|BMP|FLOat|MEASure|POSTscript|SETup|SNAP|TIFF}:[EXECute]	Deletes various types of data files.	6-41
:FILE:DIRectory?	Queries all settings related to the current medium.	6-41
:FILE[:DIRectory]:CDIRectory	Changes the current directory.	6-41
:FILE[:DIRectory]:DRIVe	Selects the current medium.	6-41
:FILE[:DIRectory]:FILTer	Sets a filter or queries the current setting.	6-41
:FILE[:DIRectory]:FREE?	Queries the free space (number of bytes) on the current medium.	6-41
:FILE[:DIRectory]:MDIRectory	Creates a directory in the current directory.	6-41
:FILE[:DIRectory]:PATH?	Queries the current path.	6-41
:FILE:FORMat?	Queries all settings related to the formatting of the floppy disk.	6-41
:FILE:FORMat:EXECute	Formats the floppy disk.	6-42
:FILE:FORMat:TYPE	Sets the format type for the floppy disk or queries the current setting.	6-42
:FILE:LOAD?	Queries all settings related to file loading.	6-42
:FILE:LOAD:{BINary|SETup|SNAP}:ABORt	Aborts loading the data.	6-42
:FILE:LOAD:{BINary|SETup|SNAP}[:EXECute]	Loads the data.	6-42
:FILE:LOAD:SNAP?	Queries all settings related to the loading of the snapshot waveform data.	6-42
:FILE:LOAD:SNAP:PLANe	Sets the plane number of the snapshot waveform data or queries the current setting.	6-42
:FILE:SAVE?	Queries all settings related to file saving.	6-42
:FILE:SAVE:ANAMing	Turns the auto naming function of files ON/OFF or queries the current setting.	6-42
:FILE:SAVE:{ASCii|BINary|FLOat}?	Queries all settings related to various types of data.	6-42
:FILE:SAVE:{ASCii|BINary|FLOat|MEASure|SETup|SNAP}:ABORt	Aborts saving the data.	6-42
:FILE:SAVE:{ASCii|BINary|FLOat|MEASure|SETup|SNAP}[:EXECute]	Saves the file.	6-42
:FILE:SAVE:{ASCii|BINary|FLOat}:HISTory	Sets the number of histories to save or queries the current setting.	6-42
:FILE:SAVE:{ASCii|BINary|FLOat}:RANGe	Sets the range of data to be saved or queries the current setting.	6-43
:FILE:SAVE:{ASCii|BINary|FLOat}:TRACe	Sets the waveform to be saved or queries the current setting.	6-43
:FILE:SAVE:BINary:COMPression	Sets data compression on the waveform to be saved or queries the current setting.	6-43
:FILE:SAVE:COMMent	Sets comments or queries the current setting.	6-43
:FILE:SAVE:NAME	Sets the name of the file to be saved or queries the current setting.	6-43
:FILE:UNLoad?	Queries all settings related to canceling the loaded data.	6-43
:FILE:UNLoad:{BINary|SNAP}?	Queries all settings related to canceling of loaded data.	6-43
:FILE:UNLoad:{BINary|SNAP}[:EXECute]	Clears the loaded data.	6-43
:FILE:UNLoad:BINary:TRACe	Sets the waveform to be cleared from the loaded data or queries the current setting.	6-43
:FILE:UNLoad:SNAP:PLANe	Sets the plane number to be cleared from the loaded data or queries the current setting.	6-43

Command	Function	Page
GONogo Group		
:GONogo?	Queries all settings related to GO/NO-GO determination.	6-46
:GONogo:ABORt	Aborts GO/NO-GO determination.	6-46
:GONogo:ACTion?	Queries all settings related to the action to be performed when the result of the determination is NO-GO and also the determination criteria.	6-46
:GONogo:ACTion:BUZZer	Sets whether or not to sound an alarm when the determination is NO-GO or queries the current setting.	6-46
:GONogo:ACTion:HCOPy	Sets whether or not to make a hard copy to the built-in printer (option) when the determination results in NO-GO or queries the current setting.	6-46
:GONogo:ACTion:IMAGe	Sets whether or not to save the screen image to the external storage medium for NO-GO determination or queries the current setting.	6-46
:GONogo:ACTion:MAIL?	Queries all setting values for mail reports sent when NO-GO is determined.	6-46
:GONogo:ACTion:MAIL:COUNt	Sets/queries the maximum number of e-mail is to be sent when the determination is NO-GO.	6-46
:GONogo:ACTion:MAIL:MODE	Sets/queries whether and e-mail report is sent when the determination is NO-GO.	6-46
:GONogo:ACTion:SAVE	Sets whether or not to save the NO-GO result to the medium or queries the current setting.	6-47
:GONogo:COUNt?	Queries the GO/NO-GO determination count.	6-47
:GONogo:EXECute	Executes GO/NO-GO determination.	6-47
:GONogo:LOGic	Sets the GO/NO-GO determination logic or queries the current setting.	6-47
:GONogo:MODE	Sets the GO/NO-GO determination type or queries the current setting.	6-47
:GONogo:NGCount?	Queries the number of NO-GO results.	6-47
:GONogo:PARameter?	Queries all settings related to the parameter determination.	6-47
:GONogo:PARameter:ITEM<x>?	Queries all settings related to waveform parameters.	6-47
:GONogo:PARameter:ITEM<x>:CAUSe?	Queries whether or not the waveform parameter is the cause of the NO-GO result.	6-47
:GONogo:PARameter:ITEM<x>:CONDition	Sets the criteria for each waveform parameter or queries the current setting.	6-47
:GONogo:PARameter:ITEM<x>:MODE	Turns the waveform parameter ON/OFF or queries the current setting.	6-48
:GONogo:PARameter:ITEM<x>:TRACe	Sets the waveform on which to use the waveform parameter or queries the current setting.	6-48
:GONogo:PARameter:ITEM<x>:TYPE?	Queries the waveform parameter and the upper and lower limits.	6-48
:GONogo:PARameter:ITEM<x>:TYPE:<parameter>	Sets the upper and lower limits of each waveform parameter or queries the current setting.	6-48
:GONogo:PARameter:ITEM<x>:VALue?	Queries the measured value of each waveform parameter.	6-48
:GONogo:SEQuence	Selects single or continuous action or queries the current setting.	6-48
:GONogo:STOPcount	Sets the number of waveform acquisitions on which to perform GO/NO-GO determination or queries the current setting.	6-49
:GONogo:TLINkage	Turns ON/OFF the linked movement of the determination range cursor of the GO/NO-GO determination.	6-49
:GONogo:TRANge	Sets the range over which to perform GO/NO-GO determination or queries the current setting.	6-49
:GONogo:WAIT?	Waits for the GO/NO-GO determination to complete with a timeout.	6-49
:GONogo:ZONE?	Queries all settings related to zone determination.	6-49
:GONogo:ZONE:EDIT<x>:EXIT	Exits from the edit menu of the zone for zone determination.	6-49
:GONogo:ZONE:EDIT<x>:PART	Edits a portion of the zone for zone determination.	6-49
:GONogo:ZONE:EDIT<x>:WHOLe	Edits the zone for zone determination.	6-50
:GONogo:ZONE:ZONE<x>?	Queries all settings related to zone determination of the specified zone.	6-50
:GONogo:ZONE:ZONE<x>:CAUSe?	Queries whether or not the specified zone for zone determination is the cause of the NO-GO result.	6-50
:GONogo:ZONE:ZONE<x>:CONDition	Sets the criteria for the zone for zone determination or queries the current setting.	6-50
:GONogo:ZONE:ZONE<x>:MODE	Turns ON/OFF the determination of the zone or queries the current setting.	6-50

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:GONogo:ZONE:ZONE<x>:SEND	Sets the zone data specified for the determination zone or queries the current setting.	6-50
:GONogo:ZONE:ZONE<x>:TRACe	Sets the target trace for the zone for zone determination or queries the current setting.	6-50
HCOPy Group		
:HCOPy?	Queries all settings related to the hard copy of the screen data.	6-52
:HCOPy:ABORt	Aborts data output or paper feeding.	6-52
:HCOPy:COMMent	Sets comments at the upper section of the screen or queries the current setting.	6-52
:HCOPy:DIRection	Sets the data output destination or queries the current setting.	6-52
:HCOPy:EXECute	Executes data output.	6-52
:HCOPy:EXTPrinter?	Queries all settings related to the output to the external printer.	6-52
:HCOPy:EXTPrinter:PRINter?	Queries the addresses of the printers that are currently connected.	6-52
:HCOPy:EXTPrinter:SELect	Sets the address of the printer or queries the current setting.	6-53
:HCOPy:EXTPrinter:TONE	Sets the half tone on the external printer output or queries the current setting.	6-53
:HCOPy:EXTPrinter:TYPE	Sets the type of output commands to send to the external printer or queries the current setting.	6-53
:HCOPy:NETPrint?	Queries all setting values involving output to network printers.	6-53
:HCOPy:NETPrint:TONE	Sets/queries halftones for output to network printers.	6-53
:HCOPy:NETPrint:TYPE	Sets/queries command types for output to network printers.	6-53
:HCOPy:PRINter?	Queries all settings related to the output to the built-in printer.	6-53
:HCOPy:PRINter:MAG	Sets the zoom rate to use during long copy or queries the current setting.	6-53
:HCOPy:PRINter:RANGe	Sets the output range during long copy or queries the current setting.	6-53
:HCOPy:PRINter:REPort	Sets whether or not to output additional information to the built-in printer or queries the current setting.	6-53
:HCOPy:PRINter:TLINkage	Turns ON/OFF the linked movement of the output range cursor during long copy.	6-54
:HCOPy:PRINter:TYPE	Selects short copy or long copy or queries the current setting.	6-54
HISTory Group		
:HISTory?	Queries all settings related to the history memory function.	6-56
:HISTory:ABORt	Aborts the search.	6-56
:HISTory:DISPlay	Sets the start/end number of the display record or queries the current setting.	6-56
:HISTory:EXECute	Executes zone search.	6-56
:HISTory:DMODe	Sets whether to display one record or all records or queries the current setting.	6-56
:HISTory:PARameter?	Queries all settings related to the parameter search.	6-57
:HISTory:PARameter:ITEM<x>?	Queries all settings related to the specified parameter of the parameter search.	6-57
:HISTory:PARameter:ITEM<x>:CONDition	Sets the criteria for the specified parameter of the parameter search or queries the current setting.	6-57
:HISTory:PARameter:ITEM<x>:SOURce	Sets the trace on which to perform the parameter search of the specified parameter or queries the current setting.	6-57
:HISTory:PARameter:ITEM<x>:TYPE:<parameter>	Sets the upper and lower limits for the specified parameter of the parameter search or queries the current setting.	6-57
:HISTory:PARameter:ITEM<x>:VALue?	Queries the measured value of the specified parameter of the parameter search or queries the current setting.	6-57
:HISTory:PARameter:LOGic	Sets the determination logic of the parameter search or queries the current setting.	6-57
:HISTory:PARameter:TLINkage	Turns ON/OFF the linked movement of the determination range cursor of the parameter search.	6-58
:HISTory:PARameter:TRANge	Sets the range over which to perform the parameter search or queries the current setting.	6-58
:HISTory:RECord	Sets the target record or queries the current setting.	6-58

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:HISTory:RECord? MINimum	Queries the minimum record number.	6-58
:HISTory:SMODe	Sets the history memory's search mode or queries the current setting.	6-58
:HISTory:TIME?	Queries the time of the specified record number.	6-58
:HISTory:ZONE?	Queries all settings related to zone search.	6-58
:HISTory:ZONE:EDIT<x>	Queries all settings related to all zone cursors.	6-58
:HISTory:ZONE:EDIT<x>:CONDition	Sets the search condition of the zone cursor or queries the current setting.	6-58
:HISTory:ZONE:EDIT<x>:HORizontal	Sets the vertical position of the zone cursor or queries the current setting.	6-59
:HISTory:ZONE:EDIT<x>:SOURce	Sets the waveform on which to use the zone cursor or queries the current setting.	6-59
:HISTory:ZONE:EDIT<x>:VERTical	Sets the horizontal position of the zone cursor or queries the current setting.	6-59
:HISTory:ZONE:LOGic	Sets the search logic between zone cursors or queries the current setting.	6-59
IMAGe Group		
:IMAGe?	Queries all settings related to the screen image data output.	6-61
:IMAGe:ABORt	Aborts saving the screen image data to the storage medium.	6-61
:IMAGe:COMMent	Sets the comment on the screen or queries the current setting.	6-61
:IMAGe:COMPression	Sets the screen data compression of the TIFF format or queries the current setting.	6-61
:IMAGe:EXECute	Saves the screen image data to the storage medium.	6-61
:IMAGe:FORMat	Sets the output format of the screen image or queries the current setting.	6-61
:IMAGe:SAVE	Queries all settings related to the save operation of the screen image data to the storage medium.	6-61
:IMAGe:SAVE:ANAMing	Turns ON/OFF the auto naming function of file names or queries the current setting.	6-61
:IMAGe:SAVE:CDIRectory	Changes the directory in which to create the file.	6-61
:IMAGe:SAVE:DRIVe	Sets the storage medium on which to create the file or queries the current setting.	6-61
:IMAGe:SAVE:NAME	Sets the name of the file to be created or queries the current setting.	6-61
:IMAGe:SEND?	Queries the screen image data.	6-61
:IMAGe:TONE	Sets the color tone of the output screen image data or queries the current setting.	6-62
INITialize Group		
:INITialize:EXECute	Executes initialization.	6-62
:INITialize:UNDO	Cancels the initialization that was executed.	6-62
MATH Group		
:MATH<x>?	Queries all settings related to computations.	6-64
:MATH<x>:BINary?	Queries all settings related to binary computations.	6-64
:MATH<x>:BINary:{CHANnel<x>|MATH<x>}	Sets the threshold level for each channel of the binary computation or queries the current setting.	6-64
:MATH<x>:DISPlay	Sets whether or not to display computation waveforms or queries the current setting.	6-64
:MATH<x>:FFT?	Queries all settings related to the FFT.	6-64
:MATH<x>:FFT:POINt	Sets the number of points for the FFT or queries the current setting.	6-64
:MATH<x>:FFT:SPOint	Sets the start point of the FFT or queries the current setting.	6-64
:MATH<x>:FFT:WINDow	Sets the window function of the FFT or queries the current setting.	6-64
:MATH<x>:INTegral?	Queries all settings related to integration.	6-64
:MATH<x>:INTegral:SPOint	Sets the start point of the integration or queries the current setting.	6-65
:MATH<x>:LABel	Sets/queries the math's label.	6-65
:MATH<x>:OPERation	Sets the type of computation or queries the current setting.	6-65
:MATH<x>:SCALe?	Queries all settings related to scaling.	6-65
:MATH<x>:SCALe:MODE	Sets the scaling method or queries the current setting.	6-65
:MATH<x>:SCALe:VALue	Sets the upper and lower limits during manual scaling or queries the current setting.	6-65
:MATH<x>:SMOothing	Turns smoothing ON/OFF or queries the current setting.	6-65

Command	Function	Page
:MATH<x>:UNIT	Sets the unit to be added to the computed result or queries the current setting.	6-65
MEASure Group		
:MEASure?	Queries all settings related to the automated measurement of waveform parameters.	6-69
:MEASure:AMODe	Sets the normal automated measurement of parameters (NORMal) and the automated measurement of parameters on dual areas (AREA2) or queries the current setting.	6-71
:MEASure:{CHANnel<x>|MATH<x>}?	Queries the ON/OFF state of every parameter of the waveform.	6-71
:MEASure:{CHANnel<x>|MATH<x>}:ALL	Turns all the measurement parameters of the waveform ON/OFF at once.	6-71
:MEASure:{CHANnel<x>|MATH<x>}:COPY	Copies the ON/OFF state of all measurement parameters of one waveform to all other waveforms.	6-71
:MEASure:{CHANnel<x>|MATH<x>}:DELay?	Queries all settings related to the delay between waveform channels.	6-71
:MEASure:{CHANnel<x>|MATH<x>}:DELay:MEASure?	Queries all settings related to the measured waveform when measuring the delay between channels.	6-72
:MEASure:{CHANnel<x>|MATH<x>}:DELay:MEASure:COUNt	Sets the edge count of the measured waveform when measuring the delay between channels or queries the current setting.	6-72
:MEASure:{CHANnel<x>|MATH<x>}:DELay:MEASure:SLOPe	Sets the slope of the measured waveform when measuring the delay between channels or queries the current setting.	6-72
:MEASure:{CHANnel<x>|MATH<x>}:DELay:REFerence?	Queries all settings related to the reference waveform when measuring the delay between channels.	6-72
:MEASure:{CHANnel<x>|MATH<x>}:DELay:REFerence:COUNt	Sets the edge count of the reference waveform when measuring the delay between channels or queries the current setting.	6-72
:MEASure:{CHANnel<x>|MATH<x>}:DELay:REFerence:SLOPe	Sets the slope of the reference waveform when measuring the delay between channels or queries the current setting.	6-72
:MEASure:{CHANnel<x>|MATH<x>}:DELay:REFerence:SOURce	Sets whether or not to set the reference to the trigger point or the waveform when measuring the delay between channels or queries the current setting.	6-73
:MEASure:{CHANnel<x>|MATH<x>}:DELay:REFerence:TRACe	Sets the reference trace when measuring the delay between channels or queries the current setting.	6-73
:MEASure:{CHANnel<x>|MATH<x>}:DELay:STATe	Turns the delay parameter ON/OFF and sets the display format or queries the current setting.	6-73
:MEASure:{CHANnel<x>|MATH<x>}:DPRoximal?	Queries all settings related to distal, mesial, and proximal values.	6-73
:MEASure:{CHANnel<x>|MATH<x>}:DPRoximal:MODE	Sets the distal, mesial, and proximal mode or queries the current setting.	6-73
:MEASure:{CHANnel<x>|MATH<x>}:DPRoximal:PERCent	Sets the distal, mesial, and proximal points or queries the current setting. (%)	6-73
:MEASure:{CHANnel<x>|MATH<x>}:DPRoximal:UNIT	Sets the distal, mesial, and proximal points or queries the current setting. (voltage)	6-74
:MEASure:{CHANnel<x>|MATH<x>}:METHod	Sets the High and Low points or queries the current setting.	6-74
:MEASure:{CHANnel<x>|MATH<x>}:<parameter>?	Queries all settings related to the parameters of each waveform.	6-74

Command	Function	Page
:MEASure:{CHANnel<x>|MATH<x>}:<parameter>:COUNt?	Queries the number of statistical processing of each parameter.	6-74
:MEASure:{CHANnel<x>|MATH<x>}:<parameter>:{MAXimum|MEAN|MINimum|SDEViation}?	Queries the statistics of each parameter.	6-75
:MEASure:{CHANnel<x>|MATH<x>}:<parameter>:STATe	Turns the parameter ON/OFF or queries the current setting. (one by one)	6-75
:MEASure:{CHANnel<x>|MATH<x>}:<parameter>:VALue?	Queries the value of the automated measurement of each parameter.	6-75
:MEASure:CONSt<x>	Sets the constants to be used during automated measurements on dual areas or queries the current setting.	6-75
:MEASure:CYCLe?	Queries all settings related to the periodic statistical processing of the automated measurement of waveform parameters.	6-75
:MEASure:CYCLe:ABORt	Aborts the periodic statistical processing of the automated measurement of waveform parameters.	6-75
:MEASure:CYCLe:EXECute	Executes the periodic statistical processing of the automated measurement of waveform parameters.	6-76
:MEASure:CYCLe:TRACe	Sets the waveform used to determine the period for the periodic statistical processing of automated measurement of waveform parameters or queries the current setting.	6-76
:MEASure:HISTory:ABORt	Aborts the statistical processing within the historical data of the automated measurement of waveform parameters.	6-76
:MEASure:HISTory:EXECute	Executes the statistical processing within the historical data of the automated measurement of waveform parameters.	6-76
:MEASure:MODE	Turns the automated measurement of waveform parameters ON/OFF and sets the statistical processing or queries the current setting.	6-76
:MEASure:ONECycle	Turns ON/OFF the automated measurement in the one-cycle mode or queries the current setting.	6-76
:MEASure:TLINkage<x>	Turns ON/OFF the linked movement of the determination range cursor.	6-76
:MEASure:TRANge<x>(Time Range)	Sets the measurement range or queries the current setting.	6-76
:MEASure:USER<x>?	Queries all settings related to the automated measurement of dual areas.	6-76
:MEASure:USER<x>:AREA<y>?	Queries all settings related to the specified area of the automated measurement of dual areas.	6-77
:MEASure:USER<x>:AREA<y>:ITEM	Sets parameters of the specified area of the automated measurement of dual areas or queries the current setting.	6-77
:MEASure:USER<x>:AREA<y>:TRACe	Sets the trace of the specified area of the automated measurement of dual areas or queries the current setting.	6-77
:MEASure:USER<x>:COUNt?	Queries the number of statistical processing of the automated measured values of dual areas.	6-77
:MEASure:USER<x>:{MAXimum?|MEAN?|MINimum?|SDEViation?}	Queries the statistics of the automated measured values of dual areas.	6-77
:MEASure:USER<x>:OPERation	Sets the computing equation of the automated measurements of dual areas or queries the current setting.	6-77
:MEASure:USER<x>:STATe	Turns ON/OFF the automated measurements of dual areas or queries the current setting.	6-77
:MEASure:USER<x>:UNIT	Sets the display unit of the automated measurements of dual areas or queries the current setting.	6-77
:MEASure:USER<x>:VALue?	Queries the measured value of the automated measurement of dual areas.	6-77
:MEASure:WAIT?	Waits for the completion of the automated measurement with a timeout.	6-78

PHASe Group

Command	Function	Page
:PHASe?	Queries all settings related to the phase shift function.	6-78
:PHASe:CHANnel<x>	Sets the amount of phase shift of the waveform or queries the current setting.	6-78
:PHASe:MODE	Turns the phase shift function ON/OFF or queries the current setting.	6-78

PRESet Group

Command	Function	Page
:PRESet?	Queries all settings related to the preset function.	6-80
:PRESet:ALL:PROBe	Sets the preset values of the probe attenuation of all channels.	6-80

Command	Function	Page
:PRESet:ALL:TYPE	Sets preset values to all channels.	6-80
:PRESet:ALL:USERdefine:LEVel	Sets the preset trigger level of all channels.	6-80
:PRESet:ALL:USERdefine:OFFSet	Sets the preset offset voltage of all channels.	6-80
:PRESet:ALL:USERdefine:VDIV	Sets the preset V/div value of all channels.	6-80
:PRESet:CHANnel<x>?	Queries the preset information of an arbitrary channel.	6-80
:PRESet:CHANnel<x>:PROBe	Sets the preset probe attenuation of an arbitrary channel or queries the current setting.	6-80
:PRESet:CHANnel<x>:TYPE	Sets the preset type to the channel or queries the current setting.	6-80
:PRESet:CHANnel<x>:USERdefine?	Queries all preset values when using User preset.	6-80
:PRESet:CHANnel<x>:USERdefine:LEVel	Sets the preset trigger level or queries the current setting.	6-81
:PRESet:CHANnel<x>:USERdefine:OFFSet	Sets the preset offset voltage or queries the current setting.	6-81
:PRESet:CHANnel<x>:USERdefine:VDIV	Sets the preset V/div value or queries the current setting.	6-81
:PRESet:EXECute	Executes preset.	6-81
:PRESet:SELectch	Sets the channel to be preset or queries the current setting.	6-81

RECall Group

Command	Function	Page
:RECall:SETup<x>:EXECute	Recalls the setting parameters from the internal memory.	6-81

SEARch Group

Command	Function	Page
:SEARch?	Queries all settings related to the search function.	6-85
:SEARch:ASCRoll?	Queries all settings related to the auto scroll function.	6-85
:SEARch:ASCRoll:DIRection	Sets the direction for moving the zoom box of the auto scroll or queries the current setting.	6-85
:SEARch:ASCRoll:SPEed	Sets the speed for moving the zoom box of the auto scroll or queries the current setting.	6-85
:SEARch:EDGE?	Queries all settings related to the edge search.	6-85
:SEARch:EDGE:COUNt	Sets the edge search count or queries the current setting.	6-85
:SEARch:EDGE:HYSTeresis	Sets the hysteresis on the edge search level or queries the current setting.	6-85
:SEARch:EDGE:LEVEl	Sets the edge search level or queries the current setting.	6-85
:SEARch:EDGE:SLOPe	Sets the slope or queries the current setting.	6-86
:SEARch:EDGE:SOURce	Sets the waveform on which to perform the edge search or queries the current setting.	6-86
:SEARch:EXECute	Executes the search.	6-86
:SEARch:MLINkage	Turns the link ON/OFF when changing the zoom rate or queries the current setting.	6-86
:SEARch:MAG<x>	Sets the zoom rate of the zoom window or queries the current setting.	6-86
:SEARch:PLINkage	Turns the link ON/OFF when moving the zoom box or queries the current setting.	6-86
:SEARch:POSition<x>	Sets the zoom box position or queries the current setting.	6-86
:SEARch:PPATtern?	Queries all settings related to the parallel pattern search.	6-86
:SEARch:PPATtern:{CHANnel<x>|MATH<x>}?	Queries all settings related to the waveform of the parallel pattern search.	6-86
:SEARch:PPATtern:{CHANnel<x>|MATH<x>}:HYSTeresis	Sets the hysteresis on the waveform on which to perform the parallel pattern search or queries the current setting.	6-87
:SEARch:PPATtern:{CHANnel<x>|MATH<x>}:LEVel	Sets the search level on the waveform on which to perform the parallel pattern search or queries the current setting.	6-87
:SEARch:PPATtern:{CHANnel<x>|MATH<x>}:PATTern	Sets the search pattern on the waveform on which to perform the parallel pattern search or queries the current setting.	6-87
:SEARch:PPATtern:CLOCk?	Queries all settings related to the clock channel of the parallel pattern search.	6-87
:SEARch:PPATtern:CLOCk:HYSTeresis	Sets the hysteresis on the clock channel of the parallel pattern search or queries the current setting.	6-87

Command	Function	Page
:SEARch:PPATtern:CLOCk:LEVel	Sets the search level of the clock channel of the parallel pattern search or queries the current setting.	6-88
:SEARch:PPATtern:CLOCk:SLOPe	Sets the slope of the clock channel of the parallel pattern search or queries the current setting.	6-88
:SEARch:PPATtern:CLOCk:SOURce	Sets the waveform used as the clock channel of the parallel pattern search or queries the current setting.	6-88
:SEARch:SELect	Queries the storage number of the found position and the position that is stored in the specified storage number.	6-88
:SEARch:SELect? MAXimum	Queries the maximum storage number of the found positions.	6-88
:SEARch:SPATtern?	Queries all settings related to the serial pattern search.	6-88
:SEARch:SPATtern:CLEar	Clears all search patterns (Don't care).	6-88
:SEARch:SPATtern:CLOCk?	Queries all settings related to the clock channel.	6-88
:SEARch:SPATtern:CLOCk:HYSTeresis	Sets the hysteresis of the clock channel or queries the current setting.	6-88
:SEARch:SPATtern:CLOCk:LEVEl	Sets the level of the clock channel or queries the current setting.	6-89
:SEARch:SPATtern:CLOCk:SLOPe	Sets the slope of the clock channel or queries the current setting.	6-89
:SEARch:SPATtern:CLOCk:SOURce	Sets the clock channel source waveform or queries the current setting.	6-89
:SEARch:SPATtern:INTerval	Sets the search interval of the waveform to be searched or queries the current setting.	6-89
:SEARch:SPATtern:LEVel	Sets the upper and lower limits of the search level of the waveform to be searched or queries the current setting.	6-89
:SEARch:SPATtern:PATTern<x>	Sets the search pattern or queries the current setting.	6-89
:SEARch:SPATtern:PSELect	Selects the pattern number to which the search pattern is to be set or queries the current setting.	6-90
:SEARch:SPATtern:SOURce	Sets the waveform on which to perform the serial pattern search or queries the current setting.	6-90
:SEARch:SPOint	Sets the start position of the search or queries the current setting.	6-90
:SEARch:TWINdow	Sets the zoom window in which to display the sections that are found or queries the current setting.	6-90
:SEARch:TYPE	Sets the search type or queries the current setting.	6-90
:SEARch:WIDTh?	Queries all settings related to the pulse width search.	6-90
:SEARch:WIDTh:HYSTeresis	Sets the hysteresis on the pulse width search level or queries the current setting.	6-90
:SEARch:WIDTh:LEVel	Sets the pulse width search level or queries the current setting.	6-90
:SEARch:WIDTh:POLarity	Sets the pulse width search level's polarity or queries the current setting.	6-90
:SEARch:WIDTh:SOURce	Sets the search source for the pulse width search or queries the current setting.	6-90
:SEARch:WIDTh:TIME<x>	Sets the pulse width when using the pulse width search or queries the current setting.	6-91
:SEARch:WIDTh:TYPE	Sets the search type when using the pulse width search or queries the current setting.	6-91
SNAP Group		
:SNAP	Executes snapshot.	6-91
SSTARt Group		
:SSTARt?	Starts the data acquisition with the trigger mode set to single.	6-91
STARt Group		
:STARt	Starts waveform acquisition.	6-92
STATus Group		
:STATus?	Queries all settings related to the communication status function.	6-92
:STATus:CONDition?	Queries the status register.	6-92
:STATus:EESE	Sets the extended event enable register or queries the current setting.	6-93
:STATus:EESR?	Queries the extended event register and clears the register.	6-93
:STATus:ERRor?	Queries the error code and the details of the error.	6-93
:STATus:FILTer<x>	Sets the transition filter or queries the current setting.	6-93

Command	Function	Page
:STATus:QENable	Sets whether or not to store messages other than errors in the error queue or queries the current setting.	6-93
:STATus:QMESsage	Sets whether or not to attach message information to the response to the ":STATus:ERRor?" query or queries the current setting.	6-93
:STATus:SPOLl?	Executes serial polling.	6-93
STOP Group		
:STOP	Stops the waveform acquisition.	6-93
STORe Group		
:STORe?	Queries information about the setting parameters that are stored to the internal memory.	6-94
:STORe:SETup<x>?	Queries information about the setting parameters that are stored to the internal memory at the specified number.	6-94
:STORe:SETup<x>:COMMent	Sets comments for the setting parameters that are to be stored to the internal memory at the specified number or queries the current setting.	6-94
:STORe:SETup<x>:DATE?	Queries the date and time for the setting parameters that are stored to the internal memory at the specified number.	6-94
:STORe:SETup<x>:EXECute	Saves the setting parameters to the internal memory at the specified number.	6-94
:STORe:SETup<x>:LOCK	Turns ON/OFF the protection for the setting parameters that are stored to the internal memory at the specified number or queries the current setting.	6-94
SYSTem Group		
:SYSTem?	Queries all settings related to the system.	6-96
:SYSTem:BATTery?	Queries the lithium battery level.	6-96
:SYSTem:CLICk	Turns the click sound ON/OFF or queries the current setting.	6-96
:SYSTem:CLOCk?	Queries all settings related to date and time.	6-96
:SYSTem:CLOCk:DATE	Sets the date or queries the current setting.	6-96
:SYSTem:CLOCk:MODE	Turns the date and time display ON/OFF or queries the current setting.	6-96
:SYSTem:CLOCk:TIME	Sets the time or queries the current setting.	6-96
:SYSTem:LANGuage	Sets the message language or queries the current setting.	6-96
:SYSTem:LCD?	Queries all settings related to the LCD monitor.	6-96
:SYSTem:LCD:AUTO?	Queries all settings related to the LCD backlight auto-off function.	6-96
:SYSTem:LCD:AUTO:MODE	Turns the LCD backlight ON/OFF or queries the current setting.	6-96
:SYSTem:LCD:AUTO:TIME	Sets the time for the LCD backlight auto-off function or queries the current setting.	6-96
:SYSTem:LCD:BRIGhtness	Sets the brightness of the LCD monitor or queries the current setting.	6-97
:SYSTem:LCD:MODE	Turns the LCD backlight ON/OFF or queries the current setting.	6-97
:SYSTem:OCANcel(Offset Cancel)	Sets whether or not to reflect the offset voltage to the measured results or the computed results or queries the current setting.	6-97
:SYSTem:OVERview	Displays the system information.	6-97
:SYSTem:SCSI?	Queries all settings related to the SCSI-ID.	6-97
:SYSTem:SCSI:INITialize	Initializes SCSI-related settings.	6-97
:SYSTem:SCSI:OWNid	Sets the SCSI-ID of the instrument or queries the current setting.	6-97
:SYSTem:SINFormation	Display setting parameters.	6-97
:SYSTem:TGATe	Sets the external trigger gate or queries the current setting.	6-97
TIMebase Group		
:TIMebase?	Queries all settings related to the time base.	6-98
:TIMebase:SOURce	Sets the time base or queries the current setting.	6-98
:TIMebase:SRATe?	Queries the sample rate.	6-98
:TIMebase:TDIV	Sets the T/div value or queries the current setting.	6-98
TRIGger Group		
:TRIGger?	Queries all settings related to the trigger.	6-103
:TRIGger:ABN?	Queries all settings related to the A -> B (n) trigger.	6-103
:TRIGger:ABN:COUNt	Sets the number of times condition B is to be met or queries the current setting.	6-103

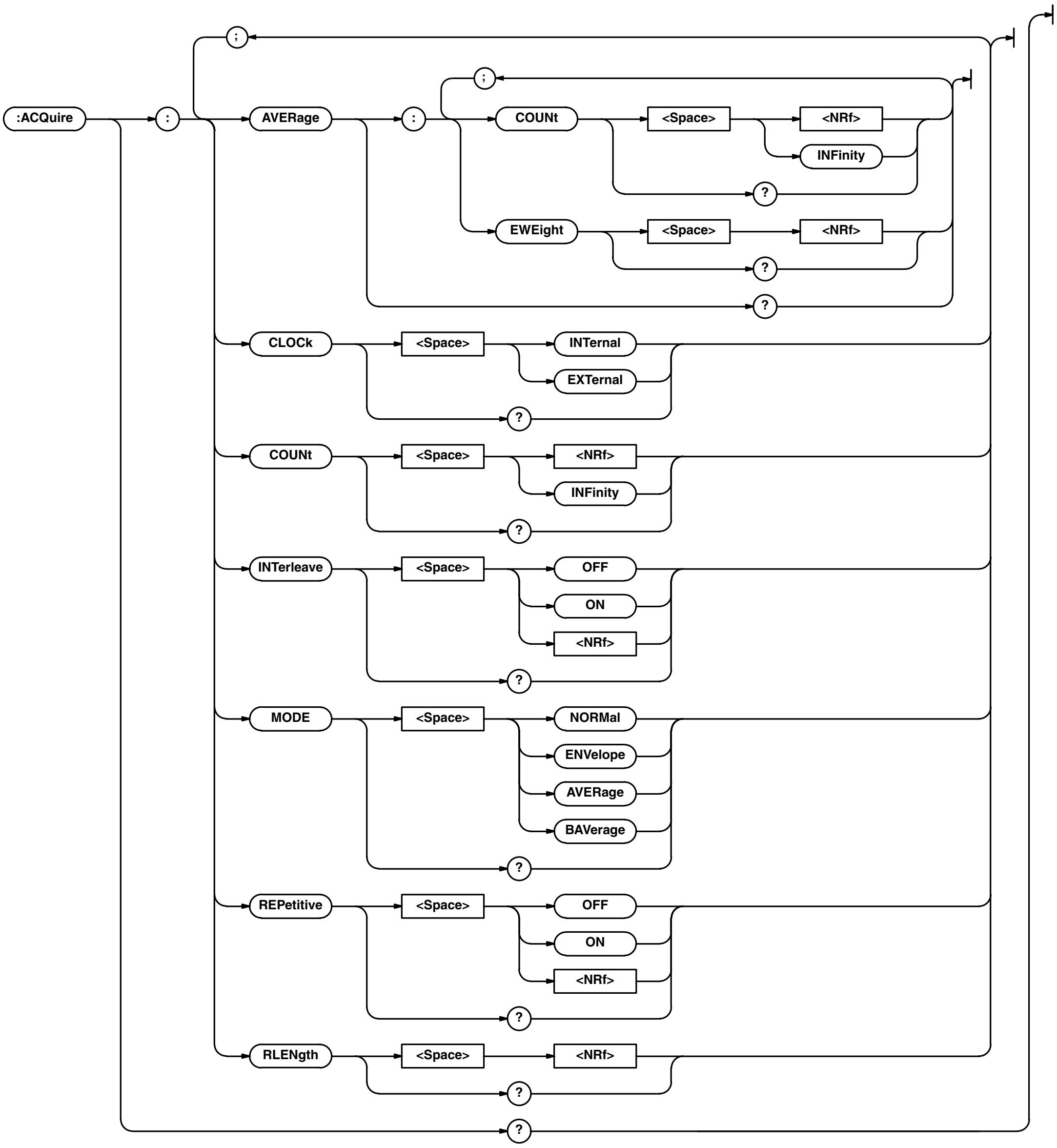
Command	Function	Page
:TRIGger:ACTion?	Queries all settings related to the action-on-trigger.	6-103
:TRIGger:ACTion:ACQCount	Sets the number of times to perform the action for the action-on-trigger or queries the current setting.	6-103
:TRIGger:ACTion:BUZZer	Sets whether or not to sound an alarm when the action is enabled or queries the current setting.	6-103
:TRIGger:ACTion:HCOPy	Sets whether or not to make a hard copy of the screen image data when the action is enabled or queries the current setting.	6-103
:TRIGger:ACTion:IMAGe	Sets whether or not to save the screen image to the external storage medium when action is activated or queries the current setting.	6-103
:TRIGger:ACTion:MAIL?	Queries all the setting values for mail reports sent as an ACTion.	6-104
:TRIGger:ACTion:MAIL:COUNt	Sets/queries the limit for the number of reports that are sent as an ACTion.	6-104
:TRIGger:ACTion:MAIL:MODE	Sets/queries whether mail reports are sent as an ACTion.	6-104
:TRIGger:ACTion:SAVE	Sets whether or not to save the waveform data when the action is enabled or queries the current setting.	6-104
:TRIGger:ACTion:STARt	Starts action-on-trigger.	6-104
:TRIGger:ACTion:STOP	Aborts action-on-trigger.	6-104
:TRIGger:ADB?	Queries all settings related to the A Delay B trigger.	6-104
:TRIGger:ADB:DELay	Sets the delay time of condition B or queries the current setting.	6-104
:TRIGger:ATRigger?	Queries all settings related to condition A.	6-104
:TRIGger:ATRigger:CHANnel<x>	Sets the condition of each channel for condition A or queries the current setting.	6-104
:TRIGger:ATRigger:CONDition	Sets the conditions for condition A or queries the current setting.	6-105
:TRIGger:BTRigger?	Queries all settings related to condition B.	6-105
:TRIGger:BTRigger:CHANnel<x>	Sets the condition of each channel for condition B or queries the current setting.	6-105
:TRIGger:BTRigger:CONDition	Sets the conditions for condition B or queries the current setting.	6-105
:TRIGger:DELay	Sets the delay or queries the current setting.	6-105
:TRIGger:HOLDoff?	Queries all settings related to the hold off.	6-105
:TRIGger:HOLDoff:TIME	Sets the hold off time or queries the current setting.	6-105
:TRIGger:MODE	Sets the trigger mode or queries the current setting.	6-105
:TRIGger:OR?	Queries all settings related to the OR trigger.	6-105
:TRIGger:OR:CHANnel<x>	Sets the edge of each channel or queries the current setting.	6-106
:TRIGger:OR:WINDow	Turns the window ON/OFF or queries the current setting.	6-106
:TRIGger:PATTern?	Queries all settings related to the pattern trigger.	6-106
:TRIGger:PATTern:CHANnel<x>	Sets the state of each channel or queries the current setting.	6-106
:TRIGger:PATTern:CLOCk?	Queries all settings related to the clock channel.	6-106
:TRIGger:PATTern:CLOCk:SLOPe	Sets the slope of the clock channel or queries the current setting.	6-106
:TRIGger:PATTern:CLOCk:SOURce	Sets the clock channel or queries the current setting.	6-106
:TRIGger:PATTern:CONDition	Sets the trigger condition or queries the current setting.	6-106
:TRIGger:POSition	Sets the trigger position or queries the current setting.	6-106
:TRIGger:SCOunt	Sets the number of times the trigger is activated when the trigger mode is set to Single (N) or queries the current setting.	6-107
:TRIGger[:SIMPle]?	Queries all settings related to the simple trigger.	6-107
:TRIGger[:SIMPle]:COUPling	Sets the trigger coupling or queries the current setting.	6-107
:TRIGger[:SIMPle]:HFRejection	Turns the low-pass filter (HF rejection) ON/OFF or queries the current setting.	6-107
:TRIGger[:SIMPle]:HYSTeresis	Sets the hysteresis on the search level or queries the current setting.	6-107
:TRIGger[:SIMPle]:LEVel	Sets the trigger level of the specified channel or queries the current setting.	6-107
:TRIGger[:SIMPle]:PROBe	Sets the probe when the trigger source is set to "EXTernal" or queries the current setting.	6-107
:TRIGger[:SIMPle]:RANGe	Sets the external trigger input range and queries the current setting (DL1720 only)	6-107
:TRIGger[:SIMPle]:SLOPe	Sets the trigger slope of the specified channel or queries the current setting.	6-108
:TRIGger[:SIMPle]:SOURce	Sets the trigger source or queries the current setting.	6-108
:TRIGger:SOURce?	Queries all settings related to the trigger source for the enhanced trigger.	6-108
:TRIGger:SOURce:CHANnel<x>?	Queries all settings related to the trigger source of the specified channel.	6-108

Command	Function	Page
:TRIGger:SOURce:CHANnel<x>:COUPling	Sets the trigger coupling of each channel or queries the current setting.	6-108
:TRIGger:SOURce:CHANnel<x>:HFRejection	Sets the low-pass filter or queries the current setting.	6-108
:TRIGger:SOURce:CHANnel<x>:HYSTeresis	Sets the hysteresis on the search level or queries the current setting.	6-108
:TRIGger:SOURce:CHANnel<x>:LEVel	Sets the trigger level of each channel or queries the current setting.	6-109
:TRIGger:SOURce:CHANnel<x>:WIDTh	Sets the width of the window trigger or queries the current setting.	6-109
:TRIGger:TV?	Queries all settings related to the TV trigger.	6-109
:TRIGger:TV:FIELd	Sets the field or queries the current setting.	6-109
:TRIGger:TV:FRAMe	Sets the frame skip function or queries the current setting.	6-109
:TRIGger:TV:LEVel	Sets the trigger level or queries the current setting.	6-109
:TRIGger:TV:LINE	Sets the line or queries the current setting.	6-109
:TRIGger:TV:POLarity	Sets the input polarity or queries the current setting.	6-109
:TRIGger:TV:TYPE	Sets the trigger input type or queries the current setting.	6-109
:TRIGger:TYPE	Sets the trigger type or queries the current setting.	6-109
:TRIGger:WIDTh?	Queries all settings related to the pulse width trigger.	6-110
:TRIGger:WIDTh:CHANnel<x>	Sets the trigger condition of each channel or queries the current setting.	6-110
:TRIGger:WIDTh:CONDition	Sets the trigger condition or queries the current setting.	6-110
:TRIGger:WIDTh:TIME<x>	Sets the pulse width or queries the current setting.	6-110
:TRIGger:WIDTh:TLINkage	Turns the link ON/OFF when changing the pulse width for the pulse width trigger or queries the current setting.	6-110
:TRIGger:WIDTh:TYPE	Sets the trigger type or queries the current setting.	6-110
:TRIGger:WIDTh:WINDow	Turns the window ON/OFF or queries the current setting.	6-110
WAVeform Group		
:WAVeform?	Queries all information related to the waveform data.	6-111
:WAVeform:BITS?	Queries the bit length of the specified waveform data.	6-111
:WAVeform:BYTeorder	Sets the transmission byte order or queries the current setting.	6-112
:WAVeform:DATaselect	Sets whether to use the ACQ data or P-P data when querying the waveform data or queries the current setting.	6-112
:WAVeform:END	Sets which point of the specified waveform is to be the last data point or queries the current setting.	6-112
:WAVeform:FORMat	Sets the transmission data format or queries the current setting.	6-112
:WAVeform:LENGth?	Queries the total data length of the specified waveform.	6-112
:WAVeform:OFFSet?	Queries the offset voltage of the specified waveform.	6-112
:WAVeform:RANGe?	Queries the range that is used when converting the waveform specified by the ":WAVeform:TRACe" command to physical values.	6-112
:WAVeform:RECord	Sets the target record number of the waveform group or queries the current setting.	6-112
:WAVeform:RECord? MINimum	Queries the smallest record number.	6-112
:WAVeform:SEND?	Queries the specified waveform data.	6-113
:WAVeform:SIGN?	Queries the existence of a sign.	6-113
:WAVeform:SRATe?	Queries the sample rate of the specified record.	6-113
:WAVeform:STARt	Sets which point of the specified waveform is to be the start data point or queries the current setting.	6-113
:WAVeform:TRACe	Sets the target waveform of the WAVeform group or queries the current setting.	6-113
:WAVeform:TRIGger?	Queries the trigger position of the specified record.	6-113
:WAVeform:TYPE?	Queries the acquisition mode of the specified waveform.	6-113
XY Group		
:XY<x>?	Queries all settings related to the X-Y display.	6-114
:XY<x>:DISPlay	Sets whether or not to display the X-Y waveform or queries the current setting.	6-114
:XY<x>:MODE	Sets the display mode or queries the current setting.	6-114
:XY<x>:TLINkage	Turns ON/OFF the linked movement of the determination range cursor.	6-114

Command	Function	Page
:XY<x>:TRANge	Sets the range of the T-Y waveform to be used in the X-Y display or queries the current setting.	6-115
:XY<x>:XAXis	Sets whether or not use the same channel for the X-axis for XY1 and XY2. (DL1740 only)	6-115
:XY<x>:XTRace	Sets the channel that is to be assigned to the X-axis or queries the current setting.	6-115
:XY<x>:YTRace	Sets the channel that is to be assigned to the Y-axis or queries the current setting.	6-115
ZOOM Group		
:ZOOM?	Queries all settings related to the zooming of the waveform.	6-117
:ZOOM:ALLOcation?	Queries all settings related to the waveform being zoomed.	6-117
:ZOOM:ALLOcation:ALL	Selects all waveforms to be zoomed.	6-117
:ZOOM:ALLOcation:{CHANnel<x>|MATH<x>}	Sets the waveform to be zoomed or queries the current setting.	6-117
:ZOOM:FITMeasure	Changes the range of the automated measurement of waveform parameters to the ends of the zoom box.	6-117
:ZOOM:FORMat	Sets the zoom waveform display format or queries the current setting.	6-117
:ZOOM:MLINkage	Turns the zoom rate link ON/OFF or queries the current setting.	6-117
:ZOOM:MAG<x>	Sets the zoom rate of the zoomed waveform display or queries the current setting.	6-117
:ZOOM:MODE	Sets the zoomed waveform display mode or queries the current setting.	6-117
:ZOOM:PLINkage	Turns the link ON/OFF when moving the zoom box or queries the current setting.	6-117
:ZOOM:POSition<x>	Sets the zoom box position or queries the current setting.	6-117
Common Command Group		
*CAL?	Executes calibration and queries the result.	6-118
*CLS	Clears the standard event register, extended event register, and error queue.	6-118
*ESE	Sets the standard event enable register or queries the current setting.	6-118
*ESR?	Queries the standard event register and clears the register.	6-119
*IDN?	Queries the instrument model.	6-119
*LRN?	Queries all current settings of the command group.	6-119
*OPC	Sets the OPC event after the completion of the specified overlap command.	6-120
*OPC?	Creates a response upon the completion of the specified overlap command.	6-120
*OPT?	Queries the installed options.	6-120
*PSC	Sets whether or not to clear the registers at power up or queries the current setting.	6-120
*RST	Initializes the command group’s settings.	6-120
*SRE	Sets the service request enable register or queries the current setting.	6-120
*STB?	Queries the status byte register.	6-120
*TST?	Executes self test and queries the result.	6-121
*WAI	Holds the subsequent command until the completion of the specified overlap operation.	6-121

6.2 ACQuire Group

The commands in the ACQuire group are used for making settings and queries about acquisition. This allows you to make the same settings that you can make using **ACQ** on the front panel.



:ACQuire?

Function Queries all the acquisition settings.

Syntax :ACQuire?

Example :ACQUIRE? -> :ACQUIRE:RLENGTH 1000; MODE NORMAL;AVERAGE:COUNT INFINITY; EWEIGHT 16;:ACQUIRE:COUNT INFINITY: INTERLEAVE 0;REPETITIVE 0;CLOCK INTERNAL

:ACQuire:AVERage?

Function Queries all the averaging and acquisition count settings.

Syntax :ACQuire:AVERage?

Example :ACQUIRE:AVERAGE? -> :ACQUIRE: AVERAGE:COUNT INFINITY;EWEIGHT 16

:ACQuire:AVERage:COUNt

Function Sets/queries the acquisition count in averaging mode.

Syntax :ACQuire:AVERage:COUNt {<NRf>| INFinity}
:ACQuire:AVERage:COUNt?
<NRf>=2 to 65536 (in steps of 2n)

Example :ACQUIRE:AVERAGE:COUNT INFINITY
:ACQUIRE:AVERAGE:COUNT? ->
:ACQUIRE:AVERAGE:COUNT INFINITY

:ACQuire:AVERage:EWEight (Exponent WEIGHT)

Function Sets/queries the average weight for infinite averaging mode.

Syntax :ACQuire:AVERage:EWEight {<NRf>}
:ACQuire:AVERage:EWEight?
<NRf>=2 to 256 (in steps of 2n)

Example :ACQUIRE:AVERAGE:EWEIGHT 16
:ACQUIRE:AVERAGE:EWEIGHT? ->
:ACQUIRE:AVERAGE:EWEIGHT 16

:ACQuire:CLOCk

Function Sets/queries the time base.

Syntax :ACQuire:{INTernal|EXTernal}
:ACQuire:CLOCk?

Example :ACQUIRE:CLOCK INTERNAL
:ACQUIRE:CLOCK? -> :ACQUIRE:
CLOCK INTERNAL

:ACQuire:COUNt

Function Sets the number of waveform acquisitions during normal mode, envelope mode, and box average or queries the current setting.

Syntax :ACQuire:COUNt {<NRf>|INFinity}
:ACQuire:COUNt?
<NRf>=2 to 65536

Example :ACQUIRE:COUNT INFINITY
:ACQUIRE:COUNT? -> :ACQUIRE:
COUNT INFINITY

:ACQuire:INTerleave

Function Turns the interleave mode ON/OFF or queries the current setting.

Syntax :ACQuire:INTerleave {<Boolean>}
:ACQuire:INTerleave?

Example :ACQUIRE:INTERLEAVE ON
:ACQUIRE:INTERLEAVE? -> :ACQUIRE:
INTERLEAVE ON

:ACQuire:MODE

Function Sets/queries the acquisition mode.

Syntax :ACQuire:MODE{AVERage|BAVerage|
ENVelope|NORMal}
:ACQuire:MODE?

Example :ACQUIRE:MODE NORMAL
:ACQUIRE:MODE? -> :ACQUIRE:MODE
NORMAL

:ACQuire:REPetitive

Function Turns the repetitive sampling mode ON/OFF or queries the current setting.

Syntax :ACQuire:REPetitive {<Boolean>}
:ACQuire:REPetitive?

Example :ACQUIRE:REPETITIVE OFF
:ACQUIRE:REPETITIVE? -> :ACQUIRE:
REPETITIVE 0

:ACQuire:RLENgth

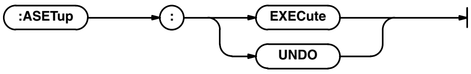
Function Sets/queries the record length.

Syntax :ACQuire:RLENgth {<NRf>}
:ACQuire:RLENgth?
<NRf>=1000 to 1000000

Example :ACQUIRE:RLENGTH 1000
:ACQUIRE:RLENGTH? -> :ACQUIRE:
RLENGTH 1000

6.3 ASETup Group

The commands in the ASETup group are used for setting and querying auto-setup. This allows you to make the same settings and queries that you can make using the Auto Setup menu of **SETUP** on the front panel.



:ASETup:EXECute

Function Executes auto-setup.

Syntax :ASETup:EXECute

Example :ASETUP:EXECUTE

:ASETup:UNDO

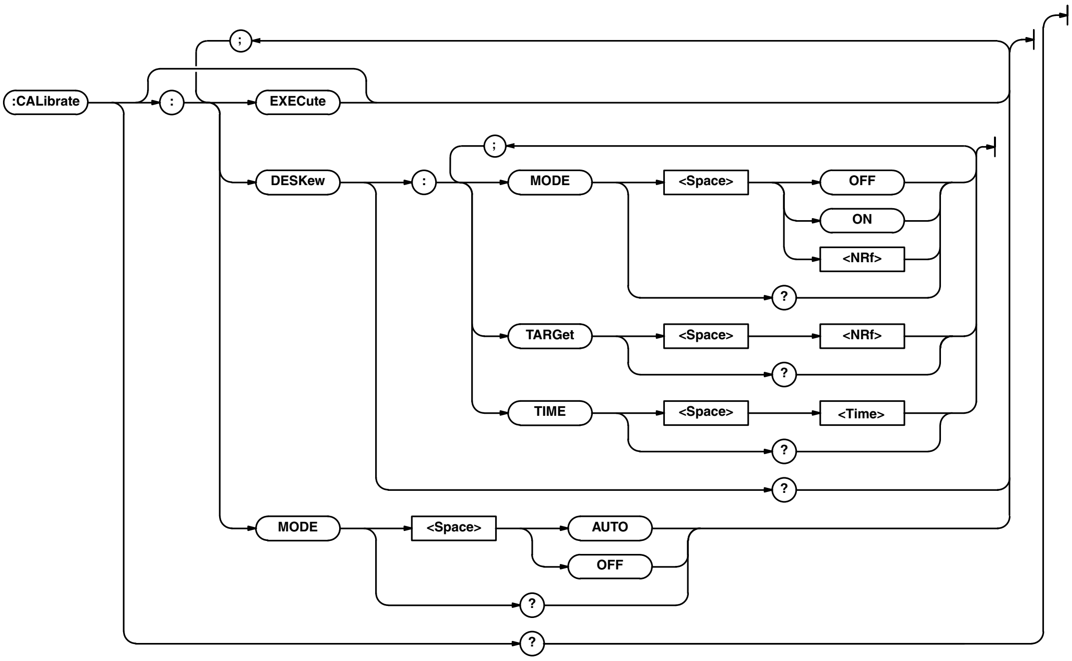
Function Cancels auto set-up settings.

Syntax :ASETup:UNDO

Example :ASETUP:UNDO

6.4 CALibrate Group

The commands in the CALibrate group are used for setting and querying the calibration. This allows you to make the same settings that you can make using the Calibration menu of **MISC** on the front panel.



:CALibrate?

Function Queries all calibration settings.

```
Syntax     :CALibrate?
Example    :CALIBRATE? -> :CALIBRATE:
           MODE OFF;DESKEW:MODE 0;TARGET 1;
           TIME 0.0E+00
```

:CALibrate:DESKew?

Function Queries all settings related to skew compensation.

```
Syntax     :CALibrate:DESKew?
Example    :CALIBRATE:DESKEW? -> :CALIBRATE:
           DESKEW:MODE 0;TARGET 1;TIME 0.0E+00
```

:CALibrate:DESKew:MODE

Function Turns the skew compensation ON/OFF or queries the current setting.

```
Syntax     :CALibrate:DESKew:MODE {<Boolean>}
           :CALibrate:DESKew:MODE?
Example    :CALIBRATE:DESKEW:NODE ON
           :CALIBRATE:DESKEW:MODE? ->
           :CALIBRATE:DESKEW:MODE 0
```

:CALibrate:DESKew:TARGet

Function Sets the channel on which skew compensation is to be performed or queries the current setting.

```
Syntax     CALibrate:DESKew:TARGet {<NRf>}
           :CALibrate:DESKew:TARGet?
           <NRf>=1 to 4 (or 1-2 for the DL1720)
Example    :CALIBRATE:DESKEW:TARGET 1
           :CALIBRATE:DESKEW:TARGET? ->
           :CALIBRATE:DESKEW:TRAGET 1
```

:CALibrate:DESKew:TIME

Function Sets the skew adjustment time that are common to all channels or queries the current setting.

```
Syntax     :CALibrate:DESKew:TIME {<time>}
           :CALibrate:DESKew:TIME?
           <time>=-100 ns to 100 ns
Example    :CALIBRATE:DESKEW:TIME 1NS
           :CALIBRATE:DESKEW:TIME? ->
           :CALIBRATE:DESKEW:TIME 1.000E-09
```

:CALibrate[:EXECute]

Function Executes calibration.

```
Syntax     :CALibrate[:EXECute]
Example    :CALIBRATE:EXECUTE
```

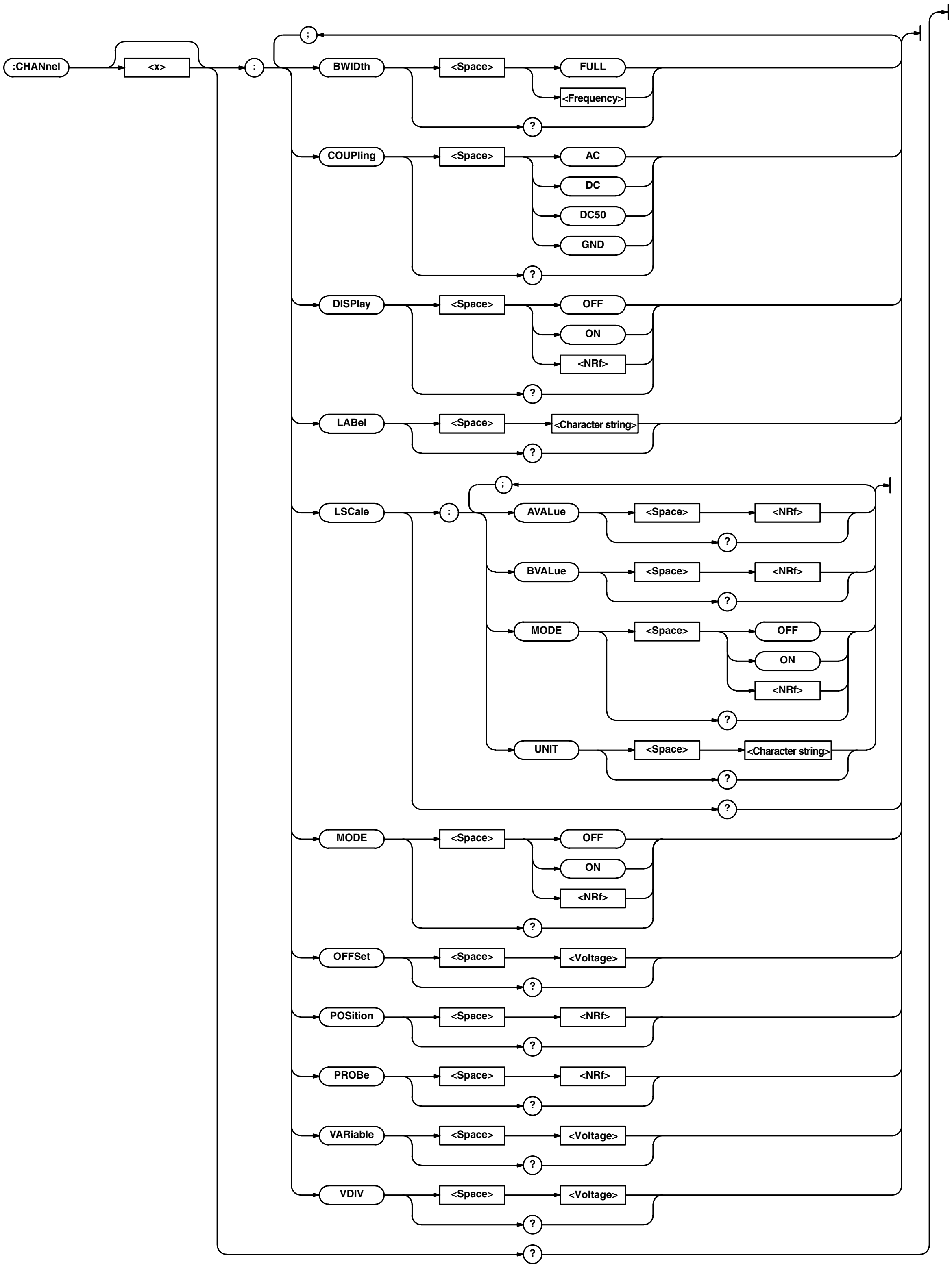
:CALibrate:MODE

Function Sets/queries the ON/OFF of the auto calibration.

```
Syntax     :CALibrate:MODE {AUTO|OFF}
           :CALibrate?
Example    :CALIBRATE:MODE AUTO
           :CALIBRATE? -> :CALIBRATE:MODE AUTO
```

6.5 CHANnel Group

The commands in the CHANnel group are used to make settings and queries about the vertical axis of the specified channel. This allows you to make the same settings that you can make using **VERTICAL** (**CH**, **V/DIV**).



:CHANnel<x>?

Function Queries all vertical axis settings for the specified channel.

Syntax
```
:CHANnel<x>?
<x>=1 to 4 (or 1-2 for the DL1720)
```

Example
```
:CHANNEL? -> :CHANNEL1:DISPLAY 1;
VDIV 50.000E+00;POSITION 0.00;
COUPLING DC;PROBE 10;
OFFSET 0.0E+00;BWIDTH FULL;
VARIABLE 50.000E+00;LSCALE:MODE 0;
AVALUE 1.00000E+00;
BVALUE 0.00000E+00;UNIT "V";:
CHANNEL1:LABEL "CH1"
```

:CHANnel<x>:BWIDth

Function Sets the input filter of each channel or queries the current setting.

Syntax
```
:CHANnel<x>:BWIDth {FULL|
<frequency>}
:CHANnel<x>:BWIDth?
<x>=1 to 4 (or 1-2 for the DL1720)
{<frequency>}=20 MHz, 100 MHz
```

Example
```
:CHANNEL1:BWIDTH FULL
:CHANNEL1:BWIDTH? -> :CHANNEL1:
BWIDTH FULL
```

:CHANnel<x>:COUPling

Function Sets the input coupling of each channel or queries the current setting.

Syntax
```
:CHANnel<x>:COUPling {AC|DC|DC50|
GND}
:CHANnel<x>:COUPling?
<x>=1 to 4 (or 1-2 for the DL1720)
```

Example
```
:CHANNEL1:COUPLING DC
:CHANNEL1:COUPLING? -> :CHANNEL1:
COUPLING DC
```

:CHANnel<x>:DISPlay

Function Sets/queries display ON/OFF for the specified channel.

Syntax
```
:CHANnel<x>:DISPlay {<Boolean>}
:CHANnel<x>:DISPlay?
<x>=1 to 4 (or 1-2 for the DL1720)
```

Example
```
:CHANNEL1:DISPLAY ON
:CHANNEL1:DISPLAY? -> :CHANNEL1:
DISPLAY 1
```

Description The same function can be performed using "CHANnel<x>:MODE."

:CHANnel<x>:LABel

Function Sets/queries the channel's waveform label.

Syntax
```
:CHANnel<x>:LABel {<Character
string>}
:CHANnel<x>:LABel?
<x>=1 to 4 (or 1-2 for the DL1720)
<Character string>=Within 8
characters.
```

Example
```
:CHANNEL1:LABEL "CH1"
:CHANNEL1:LABEL? -> :CHANNEL1:
LABEL "CH1"
```

Description
- Only characters and symbols on the displayed keyboard are available for use in the label.
- ASCII codes for "Ω" and "μ" are 1EH and 1FH, respectively.

:CHANnel<x>:LSCale?

Function Queries all linear scaling settings.

Syntax
```
:CHANnel<x>:LSCale?
<x>=1 to 4 (or 1-2 for the DL1720)
```

Example
```
:CHANNEL1:LSCALE:MODE 1;
AVALUE 1.00000E+00;
BVALUE 0.00000E+00;UNIT "V"
```

:CHANnel<x>:LSCale:AVALue

Function Sets/queries the constant (coefficient) A of linear scaling.

Syntax
```
:CHANnel<x>:LSCale:AVALue {<NRf>}
:CHANnel<x>:LSCale:AVALue?
<x>=1 to 4 (or 1-2 for the DL1720)
<NRf>=-9.9999E+30 to 9.9999E+30
```

Example
```
:CHANNEL1:LSCALE:AVALUE 10
:CHANNEL1:LSCALE:AVALUE? ->
:CHANNEL:LSCALE:AVALUE 10.0000E+00
```

:CHANnel<x>:LSCale:BVALue

Function Sets/queries the offset value B of linear scaling.

Syntax
```
:CHANnel<x>:LSCale:BVALue {<NRf>}
:CHANnel<x>:LSCale:BVALue?
<x>=1 to 4 (or 1-2 for the DL1720)
<NRf>=-9.9999E+30 to 9.9999E+30
```

Example
```
:CHANNEL1:LSCALE:BVALUE 10
:CHANNEL1:LSCALE:BVALUE? ->
:CHANNEL:LSCALE:BVALUE 10.0000E+00
```

:CHANnel<x>:LSCale:MODE

Function Sets/queries the ON/OFF condition of linear scaling.

Syntax
```
:CHANnel<x>:LSCale:MODE {<Boolean>}
:CHANnel<x>:LSCale:MODE?
<x>=1 to 4 (or 1-2 for the DL1720)
```

Example
```
:CHANNEL1:LSCALE:MODE ON
:CHANNEL1:LSCALE:MODE? ->
:CHANNEL1:LSCALE:MODE 1
```

:CHANnel<x>:LSCale:UNIT

Function Sets/queries the dimensional unit which is appended to the linear scaling result.

Syntax
```
:CHANnel<x>:LSCale:UNIT {<Character
string>}
:CHANnel<x>:LSCale:UNIT?
<x>=1 to 4 (or 1-2 for the DL1720)
<Character string>=Within to 4
characters.
```

Example
```
:CHANNEL1:LSCALE:UNIT "EU"
:CHANNEL1:LSCALE:UNIT? ->
:CHANNEL1:LSCALE:UNIT "EU"
```

Description
- Only the characters and symbols on the keyboard that appear on the instrument’s screen can be used.
- ASCII codes for "Ω" and "μ" are 1EH and 1FH, respectively.
- This unit will not affect the scaled value in any way.

:CHANnel<x>:MODE

Function Sets/queries display ON/OFF for the specified channel.

Syntax
```
:CHANnel<x>:MODE {<Boolean>}
:CHANnel<x>:MODE?
<x>=1 to 4 (or 1-2 for the DL1720)
```

Example
```
:CHANNEL1:MODE ON
:CHANNEL1:MODE? -> :CHANNEL1:MODE 1
```

Description The same function can be performed using "CHANnel<x>:DISPlay."

:CHANnel<x>:OFFSet

Function Sets/queries the offset voltage, when the voltage module is installed at the channel (slot).

Syntax
```
:CHANnel<x>:OFFSet {<Voltage>}
:CHANnel<x>:OFFSet?
<x>=1 to 4 (or 1-2 for the DL1720)
<Voltage>=See the IM701710-01E
User's Manual.
```

Example
```
:CHANNEL1:OFFSET 0V
:CHANNEL1:OFFSET? -> :CHANNEL1:
OFFSET 0.000E+00
```

:CHANnel<x>:POSition

Function Sets/queries the vertical position, when the voltage module is installed at the channel (slot).

Syntax
```
:CHANnel<x>:POSition {<NRf>}
:CHANnel<x>:POSition?
<x>=1 to 4 (or 1-2 for the DL1720)
<NRf>=-4.00 to 4.00div (in 1/100
steps)
```

Example
```
:CHANNEL1:POSITION 1
:CHANNEL1:POSITION? -> :CHANNEL1:
POSITION 1.00E+00
```

:CHANnel<x>:PROBe

Function Sets/queries the probe attenuation.

Syntax
```
:CHANnel<x>:PROBe {<NRf>}
:CHANnel<x>:PROBe?
<x>=1 to 4 (or 1-2 for the DL1720)
<NRf>=1,10,100,1000 (See the
IM701710-01E User's Manual)
```

Example
```
:CHANNEL1:PROBE 1
:CHANNEL1:PROBE? -> :CHANNEL1:
PROBE 1
```

:CHANnel<x>:VARiable

Function Sets the voltage sensitivity in units of 0.01 of the V/div setting for each channel or queries the current setting.

Syntax
```
:CHANnel<x>:VARiable {<voltage>}
:CHANnel<x>:VARiable?
<x>=1 to 4 (or 1-2 for the DL1720)
<voltage>=See the IM701710-01E
User's Manual.
```

Example
```
:CHANNEL1:VARIABLE 1V
:CHANNEL1:VARIABLE? -> :CHANNEL1:
VARIABLE 1.000E+00
```

:CHANnel<x>:VDIV

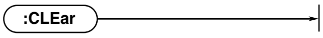
Function Sets/queries the voltage sensitivity (V/div).

Syntax
```
:CHANnel<x>:VDIV {<Voltage>}
:CHANnel<x>:VDIV?
<x>=1 to 4 (or 1-2 for the DL1720)
<Voltage>=2 mV to 10 V
(Probe attenuation 1:1, See the
IM701710-01E User's Manual)
```

Example
```
:CHANNEL1:VDIV 2V
:CHANNEL1:VDIV? -> :CHANNEL1:
VDIV 2.000E+00
```

6.6 CLEar Group

The CLEar command is used to clear the trace. This allows you to perform the same operation that you can perform using **CLEAR TRACE** on the front panel.



:CLEar

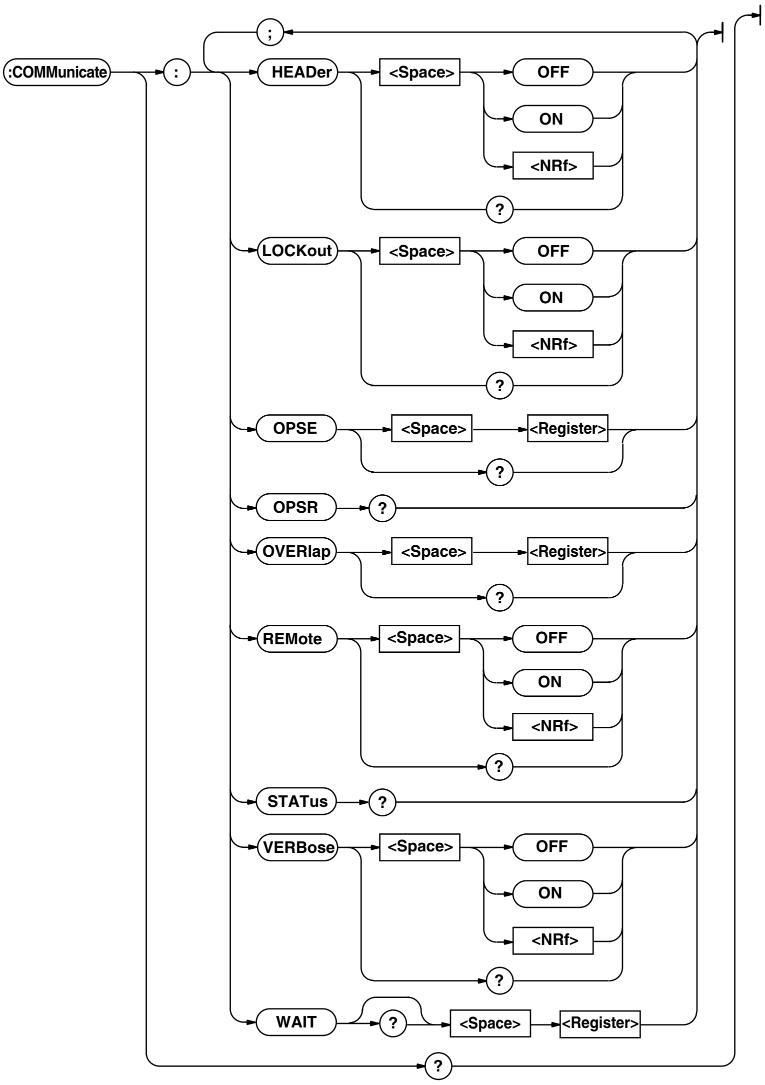
Function Clears trace.

Syntax `:CLEar`

Example `:CLEAR`

6.7 COMMunicate Group

The commands in the COMMunicate group are used to make settings and queries about communications. There is no front panel key with this function.



:COMMunicate?

Function Queries all communication settings.

Syntax `:COMMunicate?`

Example `:COMMUNICATE? -> :COMMUNICATE:`
`HEADER 1;OPSE 352;OVERLAP 352;`
`VERBOSE 1`

:COMMunicate:HEADer

Function Determines whether a header is to be added (for example: `CHANNEL1:VOLTAGE:PROBE 10`) or not (example: `10`) when sending a response to a query; or queries the current setting.

Syntax `:COMMunicate:HEADer {<Boolean>}`
`:COMMunicate:HEADer?`

Example `:COMMUNICATE:HEADER ON`
`:COMMUNICATE:HEADER? ->`
`:COMMUNICATE:HEADER 1`

:COMMunicate:LOCKout

Function Sets/releases the local lockout.

Syntax `:COMMunicate:LOCKout {<Boolean>}`
`:COMMunicate:LOCKout?`

Example `:COMMUNICATE:LOCKOUT ON`
`:COMMUNICATE:LOCKOUT? ->`
`:COMMUNICATE:LOCKOUT 1`

Description This is an exclusive command for the serial (RS-232) interface (option), USB interface, or network interface.

:COMMunicate:OPSE (Operation Pending Status Enable register)

Function Sets the overlap command to be used with `*OPC`, `*OPC?`, and `*WAI`, or queries the current setting.

Syntax `:COMMunicate:OPSE <Register>`
`:COMMunicate:OPSE?`
`<Register>=0 to 65535, refer to the figure on the next page.`

Example `:COMMUNICATE:OPSE 65535`
`:COMMUNICATE:OPSE? -> :COMMUNICATE: OPSE 352`

Description In the above example, all bits are masked to "1" so that all overlap commands can be used by this command. However, bits that are fixed as "0" cannot be set to "1," so only bits 5, 6 and 8 are actually set to "1" and appears as "1" when a query is made.

:COMMunicate:OPSR? (Operation Pending Status Register)

Function Inquires about the value in the operation pending status register.

Syntax `:COMMunicate:OPSR?`

Example `:COMMUNICATE:OPSR? -> 0`

Description For a description of the operation pending status register, refer to the figure on the next page.

:COMMunicate:OVERlap

Function Selects/queries the commands enabled for overlap.

Syntax `:COMMunicate:OVERlap <Register>`
`:COMMunicate:OVERlap?`
`<Register>=0 to 65535, refer to the figure on the next page.`

Example `:COMMUNICATE:OVERLAP 65535`
`:COMMUNICATE:OVERLAP? ->`
`:COMMUNICATE:OVERLAP 352`

Description
- In the above example, all bits are set to "1" so that all overlap commands can be used by this command. However, bits that are fixed as "0" cannot be set to "1," so only bits 5, 6 and 8 are actually set to "1" and appears as "1" when a query is made.
- COMMunicate: For the synchronization method using "OVERlap," refer to page 5-8.
- In the above example, bits 5, 6 and 8 are set to "1" so that all overlap commands can be used by this command. (Refer to the figure on the next page.)

:COMMunicate:REMote

Function Sets remote/local. It is in remote mode when it is set to ON.

Syntax `:COMMunicate:REMote {<Boolean>}`
`:COMMunicate:REMote?`

Example `:COMMUNICATE:REMOTE ON`
`:COMMUNICATE:REMOTE? ->`
`:COMMUNICATE:REMOTE 1`

Description This is an exclusive command for the serial (RS-232) interface (option), USB interface, or network interface.

:COMMunicate:STATus?

Function Queries the circuit status.

Syntax `:COMMunicate:STATus?`

Example `:COMMUNICATE:STATUS? ->`
`:COMMUNICATE:STATUS 0`

Description Status-bit meanings are as follows.

Bit	GP-IB	Serial (RS-232)
0	Unrecoverable transmission error	Parity error
1	Always 0	Framing error
2	Always 0	Break character detected
3 to	Always 0	Always 0
USB/Network interface:		Always 0

Status bit sets when cause occurs, and clears when read.

:COMMunicate:VERBose

Function Determines whether a response to a query is to be returned in full form (for example: `CHANNEL1:VOLTAGE:PROBE 10`) or in abbreviated form (for example: `CHAN:PROB 10`), or queries the current setting.

Syntax `:COMMunicate:VERBose {<Boolean>}`
`:COMMunicate:VERBose?`

Example `:COMMUNICATE:VERBOSE ON`
`:COMMUNICATE:VERBOSE? ->`
`:COMMUNICATE:VERBOSE 1`

:COMMunicate:WAIT

Function Waits until one of the specified extended events occurs.

Syntax `:COMMunicate:WAIT <Register>`
`<Register>=0 to 65535 (Extended event register; refer to page 7-4.)`

Example `:COMMUNICATE:WAIT 65535`

Description `COMMunicate:` For a description of the synchronizing method using `"WAIT,"` refer to page 5-8.

:COMMunicate:WAIT?

Function Generates a response when one of the specified extended events occurs.

Syntax `:COMMunicate:WAIT? <Register>`
`<Register>=0 to 65535 (Extended event register; refer to page 7-4.)`

Example `:COMMUNICATE:WAIT? 65535 -> 1`

Operation pending status register/overlap enable register

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	HST	0	ACS	PRN	0	0	0	0	0

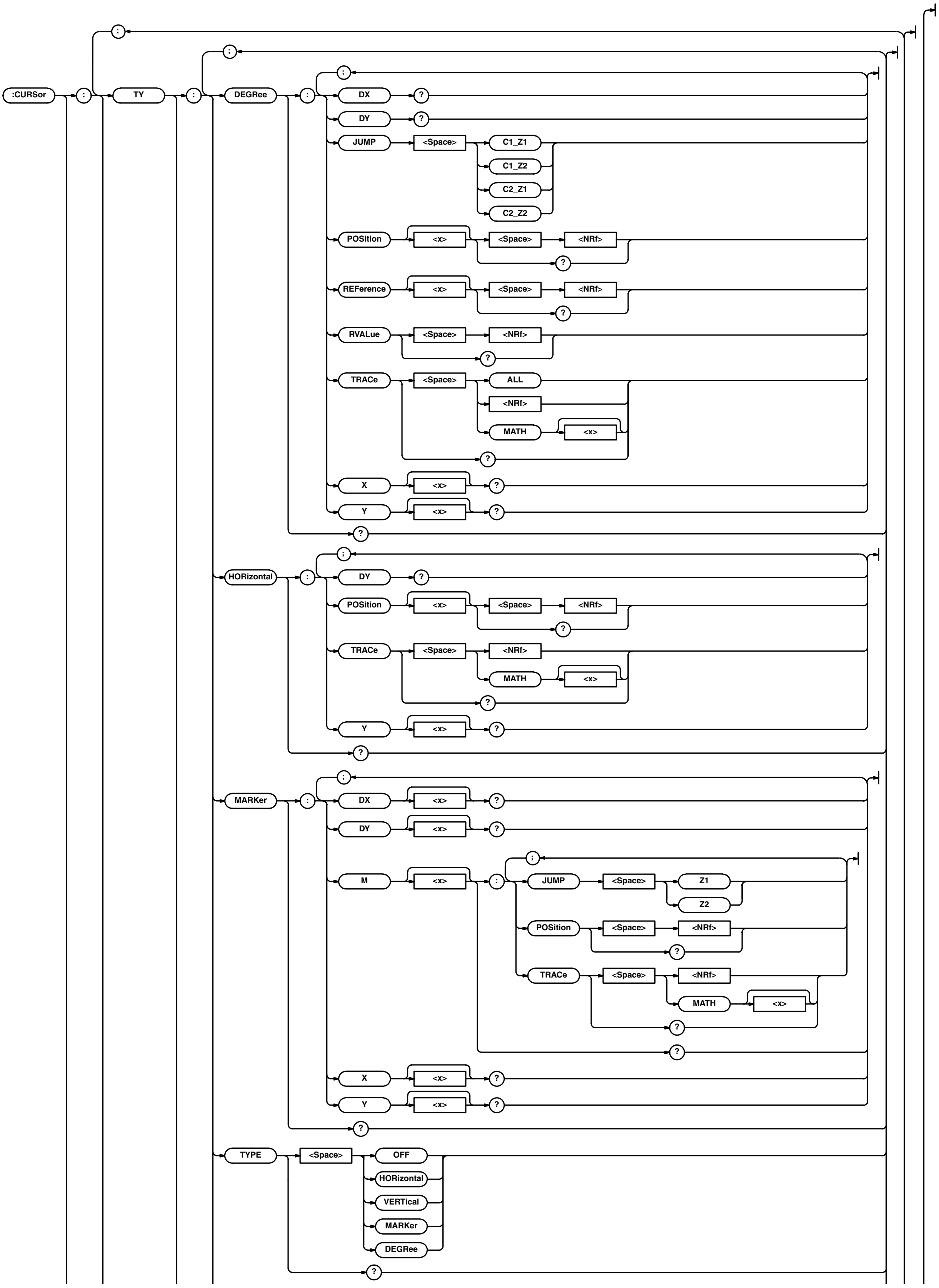
When bit 5 (PRN)=1:
Printer operation not completed

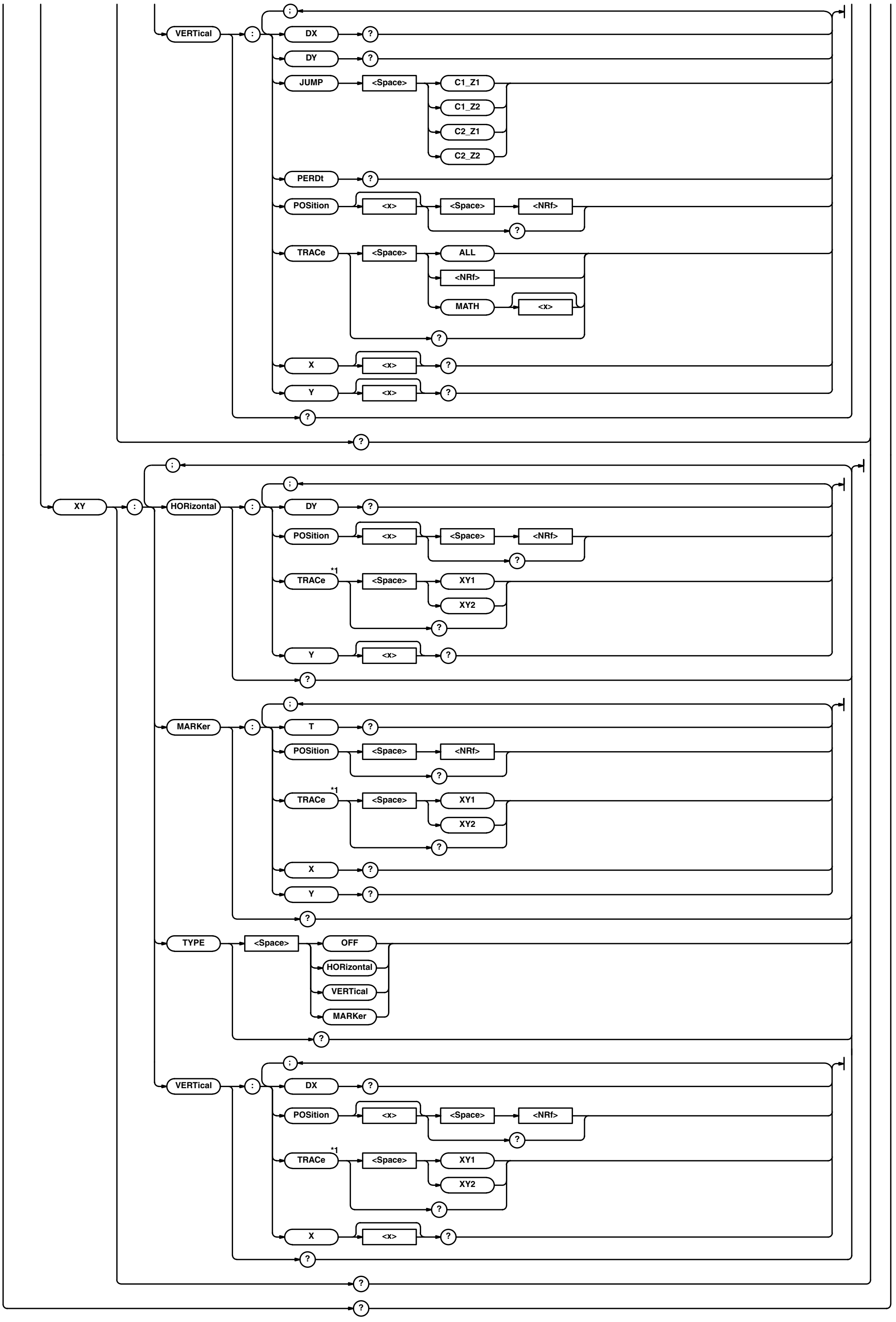
When bit 6 (ACS)=1:
Medium not accessed

When bit 8 (HST)=1:
History search not completed

6.8 CURSor Group

The commands in the CURSor group are used to make cursor measurement settings and queries. This allows you to make the same settings that you can make using **CURSOR** on the front panel.





*1 For use on the DL1740

:CURSor?

Function Queries all settings related to cursor measurements.

```
Syntax    :CURSor?
Example   :CURSOR? -> :CURSOR:TY:TYPE OFF;
          HORIZONTAL:TRACE 1;POSITION1 3.00;
          POSITION2 3.00;:CURSOR:TY:VERTICAL:
          TRACE 1;POSITION1 -4.0000000;
          POSITION2 4.0000000;:CURSOR:TY:
          MARKER:M1:TRACE 1;
          POSITION -3.0000000;:CURSOR:
          TY:MARKER:M2:TRACE 2;
          POSITION -1.0000000;:CURSOR:TY:
          MARKER:M3:TRACE 3;
          POSITION 1.0000000;:CURSOR:TY:
          MARKER:M4:TRACE 4;
          POSITION 3.0000000;:CURSOR:TY:
          DEGREE:TRACE 1;
          POSITION1 -4.0000000;
          POSITION2 4.0000000;
          REFERENCE1 -2.0000000;
          REFERENCE2 2.0000000;RVALUE 90;:
          CURSOR:XY:TYPE OFF;HORIZONTAL:
          TRACE XY1;POSITION1 3.00;
          POSITION2 -3.00;:CURSOR:XY:
          VERTICAL:TRACE XY1;POSITION1 -3.00;
          POSITION2 3.00;:CURSOR:XY:MARKER:
          TRACE XY1;POSITION -3.0000000
```

:CURSor:TY?

Function Queries all settings related to the cursor in the T-Y display.

```
Syntax    :CURSor:TY?
Example   :CURSOR:TY? -> :CURSOR:TY:TYPE OFF;
          HORIZONTAL:TRACE 1;POSITION1 3.00;
          POSITION2 -3.00;:CURSOR:TY:
          VERTICAL:TRACE 1;
          POSITION1 -4.0000000;
          POSITION2 4.0000000;:CURSOR:TY:
          MARKER:M1:TRACE 1;
          POSITION -3.0000000;:CURSOR:TY:
          MARKER:M2:TRACE 2;
          POSITION -1.0000000;:CURSOR:TY:
          MARKER:M3:TRACE 3;
          POSITION 1.0000000;:CURSOR:TY:
          MARKER:M4:TRACE 4;
          POSITION 3.0000000;:
          CURSOR:TY:DEGREE:TRACE 1;
          POSITION1 -4.0000000;
          POSITION2 4.0000000;
          REFERENCE1 -2.0000000;
          REFERENCE2 2.0000000;RVALUE 90
```

:CURSor:TY:DEGRee?

Function Queries all settings related to angle cursors in the T-Y display.

```
Syntax    :CURSor:TY:DEGree?
Example   :CURSOR:TY:DEGREE? -> :CURSOR:TY:
          DEGREE:TRACE 1;
          POSITION1 -4.0000000;
          POSITION2 4.0000000;
          REFERENCE1 -2.0000000;
          REFERENCE2 2.0000000;RVALUE 90
```

:CURSor:TY:DEGRee:DX?

Function Queries the angle difference, DD, between angle cursors in the T-Y display.

```
Syntax    :CURSor:TY:DEGRee:DX?
Example   :CURSOR:TY:DEGREE:DX? ->:CURSOR:TY:
          DEGREE:DX 180.00000E+00
```

:CURSor:TY:DEGRee:DY?

Function Queries the angle difference, DV, between angle cursors in the T-Y display.

```
Syntax    :CURSor:TY:DEGRee:DY?
Example   :CURSOR:TY:DEGREE:DY? ->:CURSOR:TY:
          DEGREE:DY 6.2500000E-03
```

:CURSor:TY:DEGRee:JUMP

Function Moves the angle cursor in the T-Y display to the specified zoomed waveform.

```
Syntax    :CURSor:TY:DEGRee:JUMP {C1_Z1|
          C1_Z2|C2_Z1|C2_Z2}
Example   :CURSOR:TY:DEGREE:JUMP C1_Z1
```

Description The cursor jumps to the center position of the zoomed waveform.

C1 and C2 represent Cursor1 and Cursor2, respectively.

:CURSor:TY:DEGRee:POSition<x>

Function Sets the position of the angle cursor in the T-Y display or queries the current setting.

```
Syntax    :CURSor:TY:DEGRee:POSition<x>
          {<NRf>}
          :CURSor:TY:DEGRee:POSition<x>?
          <x>=1 or 2
          <NRf>=-5 to 5 (10 div/displayed
          record length steps)
Example   :CURSOR:TY:DEGREE:POSITION1 2
          :CURSOR:TY:DEGREE:POSITION1? ->
          :CURSOR:TY:DEGREE:
          POSITION1 2.0000000
```

:CURSor:TY:DEGRee:REFerence<x>

Function Sets the position of the angle reference start point (Reference1) or the end point (Reference2) in the T-Y display or queries the current setting.

```
Syntax   :CURSor:TY:DEGRee:REFerence<x>
         {<NRf>}
         :CURSor:TY:DEGRee:REFerence<x>?
         <x>=1 or 2
         <NRf>=–5 to 5 (10 div/displayed
         record length steps)
Example  :CURSOR:TY:DEGREE:REFERENCE1 -1
         :CURSOR:TY:DEGREE:REFERENCE1? ->
         :CURSOR:TY:DEGREE:
         REFERENCE1 -1.0000000
```

:CURsor:TY:DEGRee:RVALue

Function Sets the angle reference width or queries the current setting.

```
Syntax   :CURSor:TY:DEGRee:RVALue {<NRf>}
         :CURSor:TY:DEGRee:RVALue?
         <NRf>=1 to 720
Example  :CURSOR:TY:DEGREE:RVALUE 180
         :CURSOR:TY:DEGREE:RVALUE? ->
         :CURSOR:TY:DEGREE:RVALUE 180
```

:CURSor:TY:DEGRee:TRACe

Function Sets the waveform on which to use the angle cursor in the T-Y display or queries the current setting.

```
Syntax   :CURSor:TY:DEGRee:TRACe {<NRf>|
         MATH<x>|ALL}
         :CURSor:TY:DEGRee:TRACe?
         <NRf>=1 to 4 (or 1-2 for the
         DL1720)
         <x>=1 or 2 (or 1 for the DL1720)
Example  :CURSOR:TY:DEGREE:TRACE 1
         :CURSOR:TY:DEGREE:TRACE? ->:CURSOR:
         TY:DEGREE:TRACE 1
```

:CURSor:TY:DEGRee:X<x>?

Function Queries the angle at the angle cursor in the T-Y display.

```
Syntax   :CURSor:TY:DEGRee:X<x>?
         <x>=1 or 2
Example  (This is an example in which
         Cursor1 is queried.)
         :CURSOR:TY:DEGREE:X1? -> :CURSOR:
         TY:DEGREE:X1 -120.00000E+00
```

:CURSor:TY:DEGRee:Y<x>?

Function Queries the voltage value at the angle cursor in the T-Y display.

```
Syntax   :CURSor:TY:DEGRee:Y<x>?
         <x>=1 or 2
Example  (This is an example in which
         Cursor1 is queried.)
         :CURSOR:TY:DEGREE:Y1? -> :CURSOR:
         TY:DEGREE:Y1 10.000000E-03
```

:CURSor:TY:HORizontal?

Function Queries all settings related to H cursors in the T-Y display.

```
Syntax   :CURSor:TY:HORizontal?
Example  :CURSOR:TY:HORIZONTAL? -> :CURSOR:
         TY:HORIZONTAL:TRACE 1;
         POSITION1 3.00;POSITION2 -3.00
```

:CURSor:TY:HORizontal:DY?

Function Queries the Y-axis value between the H cursors in the T-Y display.

```
Syntax   :CURSor:TY:HORizontal:DY?
Example  :CURSOR:TY:HORIZONTAL:DY? ->
         :CURSOR:TY:HORIZONTAL:
         DY 3.0000000E+00
```

Description When the linear scaling is ON, the scaled value is queried.

:CURSor:TY:HORizontal:POSition<x>

Function Sets the H cursor position in the T-Y display or queries the current setting.

```
Syntax   :CURSor:TY:HORizontal:POSition<x>
         {<NRf>}
         :CURSor:TY:HORizontal:POSition<x>?
         <x>=1 or 2
         <NRf>=–4 to 4div (1/100 steps)
Example  :CURSOR:TY:HORIZONTAL:POSITION1 2
         :CURSOR:TY:HORIZONTAL:POSITION1? ->
         :CURSOR:TY:HORIZONTAL:
         POSITION1 2.00
```

Description The <NRf> value is accurate to two digits beyond the decimal.

:CURSor:TY:HORizontal:TRACe

Function Sets the waveform on which to use the H cursor in the T-Y display or queries the current setting.

```
Syntax   :CURSor:TY:HORizontal:TRACe {<NRf>|
         MATH<x>}
         :CURSor:TY:HORizontal:TRACe?
         <NRf>=1 to 4 (or 1-2 for the
         DL1720)
         <x>=1 or 2 (or 1 for the DL1720)
Example  :CURSOR:TY:HORIZONTAL:TRACE 1
         :CURSOR:TY:HORIZONTAL:TRACE? ->
         :CURSOR:TY:HORIZONTAL:TRACE 1
```

:CURSor:TY:HORizontal:Y<x>?

Function Queries the Y-axis value of the H cursor in the T-Y display.

```
Syntax      :CURSor:TY:HORizontal:Y<x>?
            <x>=1 or 2
Example     :CURSOR:TY:HORIZONTAL:Y1? ->
            :CURSOR:TY:HORIZONTAL:
            Y1 -1.5000000E+00
```

Description When the linear scaling is ON, the scaled value is queried.

:CURSor:TY:MARKer?

Function Queries all settings related to marker cursors in the T-Y display.

```
Syntax      :CURSor:TY:MARKer?
Example     :CURSOR:TY:MARKER? -> :CURSOR:TY:
            MARKER:M1:TRACE 1;
            POSITION -3.0000000;:CURSOR:TY:
            MARKER:M2:TRACE 2;
            POSITION -1.0000000;:CURSOR:TY:
            MARKER:M3:TRACE 3;
            POSITION 1.0000000;:CURSOR:TY:
            MARKER:M4:TRACE 4;
            POSITION 3.0000000
```

:CURSor:TY:MARKer:DX<x>?

Function Queries the X-axis value between the marker cursors in the T-Y display.

```
Syntax      :CURSor:TY:MARKer:DX<x>?
            <x>=1 to 4
Example     :CURSOR:TY:MARKER:DX1? -> :CURSOR:
            TY:MARKER:DX1 0.0000000E+00
```

Description
- When the time base is set to internal clock The query is for the time between the markers in the time domain and the frequency between the markers in the frequency domain.
- When the time base is set to external clock The number of points between the marker cursors is queried.

:CURSor:TY:MARKer:DY<x>?

Function Queries the physical value of the Y-axis difference between the marker cursors in the T-Y display.

```
Syntax      :CURSor:TY:MARKer:DY<x>?
            <x>=1 to 4
Example     :CURSOR:TY:MARKER:DY2? -> :CURSOR:
            TY:MARKER:DY2 500.00000E-03
```

Description When the linear scaling is ON, the scaled value is queried.

:CURSor:TY:MARKer:M<x>?

Function Queries all settings related to the specified marker cursor.

```
Syntax      :CURSor:TY:MARKer:M<x>?
            <x>=1 to 4
Example     :CURSOR:TY:MARKER:M1? -> :CURSOR:
            TY:MARKER:M1:TRACE 1:
            POSITION -3.0000000
```

:CURSor:TY:MARKer:M<x>:JUMP

Function Moves the marker cursor in the T-Y display to the specified zoomed waveform.

```
Syntax      :CURSor:MARKer:M<x>:JUMP {Z1|Z2}
            <x>=1 to 4
Example     :CURSOR:TY:MARKER:M1:JUMP Z1
```

Description The cursor jumps to the center position of the zoomed waveform.

:CURSor:TY:MARKer:M<x>:POSition

Function Sets the X-axis position of the marker cursor in the T-Y display or queries the current setting.

```
Syntax      :CURSor:TY:MARKer:M<x>:POSition
            {<NRf>}
            :CURSor:TY:MARKer:M<x>:POSition?
            <x>=1 to 4
            <NRf>=-5 to 5 div (10 div/displayed
            record length steps)
Example     :CURSOR:TY:MARKER:M1:POSITION -1
            :CURSOR:TY:MARKER:M1:POSITION? ->
            :CURSOR:TY:MARKER:M1:
            POSITION -1.0000000
```

:CURSor:TY:MARKer:M<x>:TRACe

Function Sets the waveform on which to use the marker cursor in the T-Y display or queries the current setting.

```
Syntax      :CURSor:TY:MARKer:M<x>:TRACe
            {<NRf>|MATH<x>}
            :CURSor:TY:MARKer:M<x>:TRACe?
            <x>=1 to 4
            <NRf>=1 to 4 (or 1-2 for the
            DL1720)
            The <x> in MATH<x>=1 or 2 (or 1 for
            the DL1720)
Example     :CURSOR:TY:MARKER:M1:TRACE1 1
            :CURSOR:TY:MARKER:M1:TRACE1? ->
            :CURSOR:TY:MARKER:M1:TRACE1 1
```

:CURSor:TY:MARKer:X<x>?

Function Queries the X-axis position of the marker cursor in the T-Y display.

Syntax
```
:CURSor:TY:MARKer:X<x>?
<x>=1 to 4
```

Example
```
:CURSOR:TY:MARKER:X1? -> :CURSOR:
TY:MARKER:X1 -4.5000E-03
```

Description
- **When the time base is set to internal clock**
  The query is for the time in the time domain and frequency in the frequency domain.
- **When the time base is set to external clock**
  The query is for the number of points with respect to delay 0 in the time domain and the number of points from the beginning of the memory in the frequency domain.

:CURSor:TY:MARKer:Y<x>?

Function Queries the Y-axis position of the marker cursor in the T-Y display.

Syntax
```
:CURSor:TY:MARKer:Y<x>?
<x>=1 to 4
```

Example
```
:CURSOR:TY:MARKER:Y1? -> :CURSOR:
TY:MARKER:Y1 1.5000E-03
```

Description When the linear scaling is ON, the scaled value is queried.

:CURSor:TY:TYPE

Function Sets the type of cursor in the T-Y display or queries the current setting.

Syntax
```
:CURSor:TY:TYPE {OFF|HORizontal|
VERTical|MARKer|DEGRee}
:CURSor:TY:TYPE?
```

Example
```
:CURSOR:TY:TYPE HORIZONTAL
:CURSor:TY:TYPE? -> :CURSOR:TY:
TYPE HORIZONTAL
```

:CURSor:TY:VERTical?

Function Queries all settings related to V cursors in the T-Y display.

Syntax
```
:CURSor:TY:VERTical?
```

Example
```
:CURSOR:TY:VERTICAL -> :CURSOR:TY:
VERTICAL:TRACE 1;
POSITION1 -4.0000000;
POSITION2 4.0000000
```

:CURSor:TY:VERTical:DX?

Function Queries the X-axis value between V cursors in the T-Y display.

Syntax
```
:CURSor:TY:VERTical:DX?
```

Example
```
:CURSOR:TY:VERTICAL:DX? -> :CURSOR:
TY:VERTICAL:DX 2.50E-06
```

Description
- **When the time base is set to internal clock**
  The query is for the time between the markers in the time domain and the frequency between the markers in the frequency domain.
- **When the time base is set to external clock**
  The number of points between the marker cursors is queried.

:CURSor:TY:VERTical:DY?

Function Queries the Y-axis value between V cursors in the T-Y display.

Syntax
```
:CURSor:TY:VERTical:DY?
```

Example
```
:CURSOR:TY:VERTICAL:DY? -> :CURSOR:
TY:VERTICAL:DY 1.50E+03
```

Description When the linear scaling of the Y trace is ON, the scaled value is queried.

:CURSor:TY:VERTical:JUMP

Function Moves the V cursor in the T-Y display to the specified zoomed waveform.

Syntax
```
:CURSor:TY:VERTical:JUMP {C1_Z1|
C1_Z2|C2_Z1|C2_Z2}
```

Example
```
:CURSOR:TY:VERTICAL:JUMP C1_Z1
```

Description The cursor jumps to the center position of the zoomed waveform.
C1 and C2 represent V cursors, Cursor1 and Cursor2, respectively.

:CURSor:TY:VERTical:PERDt?

Function Queries the 1/DT value between V cursors in the T-Y display.

Syntax
```
:CURSor:TY:VERTical:PERDt?
```

Example
```
:CURSOR:TY:VERTICAL:PERDT? ->
:CURSOR:TY:VERTICAL:PERDT 2.50E+06
```

Description When the specified trace is in the frequency domain, "NAN(Not A Number)" is returned.

:CURSor:TY:VERTical:POSition<x>

Function Sets the V cursor position in the T-Y display or queries the current setting.

Syntax
```
:CURSor:TY:VERTical:POSition<x>
{<NRf>}
:CURSor:TY:VERTical:POSition<x>?
<x>=1 or 2
<NRf>=-5 to 5 div (10 div/displayed
record length steps)
```

Example
```
:CURSOR:TY:VERTICAL:POSITION1 2
:CURSOR:TY:VERTICAL:POSITION1? ->
:CURSOR:TY:VERTICAL:
POSITION1 2.00E+00
```

:CURSor:TY:VERTical:TRACe

Function Sets the waveform on which to use the V cursor in the T-Y display or queries the current setting.

```
Syntax      :CURSor:TY:VERTical:TRACe {<NRf>|
            MATH<x>|ALL}
            :CURSor:TY:VERTical:TRACe?
            <NRf>=1 to 4 (or 1-2 for the
            DL1720)
            <x>=1 or 2 (or 1 for the DL1720)
Example     :CURSOR:TY:VERTICAL:TRACE 1
            :CURSOR:TY:VERTICAL:TRACE? ->
            :CURSOR:TY:VERTICAL:TRACE 1
```

:CURSor:TY:VERTical:X<x>?

Function Queries the X-axis position of the V cursor in the T-Y display.

```
Syntax      :CURSor:TY:VERTical:X<x>?
            <x>=1 or 2
Example     :CURSOR:TY:VERTICAL:X1?TY::CURSOR:
            TY:VERTICAL:X1 -2.50E-06
```

Description
- **When the time base is set to internal clock**
  The query is for the time in the time domain and frequency in the frequency domain.
- **When the time base is set to external clock**
  The query is for the number of points with respect to delay 0 in the time domain and the number of points from the beginning of the memory in the frequency domain.

:CURSor:TY:VERTical:Y<x>?

Function Queries the Y-axis position of the V cursor in the T-Y display.

```
Syntax      :CURSor:TY:VERTical:Y<x>?
            <x>=1 or 2
Example     :CURSOR:TY:VERTICAL:Y1? -> :CURSOR:
            TY:VERTICAL:Y1 2.50E+03
```

:CURSor:XY?

Function Queries all settings related to the cursors in the X-Y display.

```
Syntax      CURSor:XY?
Example     CURSOR:XY? -> :CURSOR:XY:TYPE OFF;
            HORIZONTAL:TRACE XY1;
            POSITION1 3.00;POSITION2 -3.00;:
            CURSOR:XY:VERTICAL:TRACE XY1;
            POSITION1 -3.00;POSITION2 3.00;:
            CURSOR:XY:MARKER:TRACE XY1;
            POSITION -3.0000000
```

:CURSor:XY:HORizontal?

Function Queries all settings related to the H cursors in the X-Y display.

```
Syntax      :CURSor:XY:HORizontal?
Example     :CURSOR:XY:HORIZONTAL? -> :CURSOR:
            XY:HORIZONTAL:TRACE XY1;
            POSITION1 3.00;POSITION2 -3.00
```

:CURSor:XY:HORizontal:DY?

Function Queries the Y-axis value of the H cursor of the X-Y display.

```
Syntax      :CURSor:XY:HORizontal:DY?
Example     :CURSOR:XY:HORIZONTAL:DY? ->
            :CURSOR:XY:HORIZONTAL:
            DY 3.0000000E+00
```

Description When the linear scaling is ON, the scaled value is queried.

:CURSor:XY:HORizontal:POSition<x>

Function Sets the H cursor position of the X-Y display or queries the current setting.

```
Syntax      :CURSor:XY:HORizontal:POSition<x>
            {<NRf>}
            :CURSor:XY:HORizontal:POSition<x>?
            <x>=1 or 2
            <NRf>=-4 to 4div (1/100 steps)
Example     :CURSOR:XY:HORIZONTAL:POSITION1 2
            :CURSOR:XY:HORIZONTAL:POSITION1? ->
            :CURSOR:XY:HORIZONTAL:
            POSITION1 2.00
```

:CURSor:XY:HORizontal:TRACe

Function Sets the waveform on which to use the H cursor in the X-Y display or queries the current setting. (DL1740 only)

```
Syntax      :CURSor:XY:HORizontal:TRACe {XY1|
            XY2}
            :CURSor:XY:HORizontal:TRACe?
Example     :CURSOR:XY:HORIZONTAL:TRACE XY1
            :CURSOR:XY:HORIZONTAL:TRACE? ->
            :CURSOR:XY:HORIZONTAL:TRACE XY1
```

:CURSor:XY:HORizontal:Y?

Function Queries the Y-axis value of the H cursor of the X-Y display.

```
Syntax      :CURSor:XY:HORizontal:Y?
Example     :CURSOR:TY:HORIZONTAL:Y? ->:CURSOR:
            TY:HORIZONTAL:Y -1.5000000E+00
```

Description When the linear scaling is ON, the scaled value is queried.

:CURSor:XY:MARKer?

Function Queries all settings related to the marker cursors in the X-Y display.

```
Syntax      :CURSor:XY:MARKer?
Example     :CURSOR:XY:MARKER? -> :CURSOR:XY:
            MARKER:DISPLAY 1;TRACE XY1;
            POSITION -3.0000000
```

:CURSor:XY:MARKer:POSition

Function Sets the X-axis position of the marker cursor in the X-Y display or queries the current setting.

Syntax
```
:CURSor:XY:MARKer:POSition {<NRf>}
:CURSor:XY:MARKer:POSition?
<NRf>=-5 to 5 div (10 div/displayed
record length steps)
```

Example
```
:CURSOR:XY:MARKER:POSITION -1
:CURSOR:XY:MARKER:POSITION? ->
:CURSOR:XY:MARKER:
POSITION -1.0000000
```

:CURSor:XY:MARKer:T?

Function Queries the time value of the marker cursor in the X-Y display.

Syntax
```
CURsor:XY:MARKer:T?
```

Example
```
:CURSOR:XY:MARKER:T? -> :CURSOR:XY:
MARKER:T 100.00E-03
```

:CURSor:XY:MARKer:TRACe

Function Sets the waveform on which to use the marker cursor in the X-Y display or queries the current setting. (DL1740 only)

Syntax
```
:CURSor:XY:MARKer:TRACe {XY1|XY2}
:CURSor:XY:MARKer:TRACe?
```

Example
```
:CURSOR:XY:MARKER:TRACE XY1
:CURSOR:XY:MARKER:TRACE? ->:CURSOR:
XY:MARKER:TRACE XY1
```

:CURSor:XY:MARKer:X?

Function Queries the X-axis position of the marker cursor in the X-Y display.

Syntax
```
:CURSor:XY:MARKer:X?
```

Example
```
:CURSOR:XY:MARKER:X1? -> :CURSOR:
XY:MARKER:X -4.5000E-03
```

Description When the linear scaling is ON, the scaled value is queried.

:CURSor:XY:MARKer:Y?

Function Queries the Y-axis position of the marker cursor in the X-Y display.

Syntax
```
:CURSor:XY:MARKer:Y?
```

Example
```
:CURSOR:XY:MARKER:Y? -> :CURSOR:
XY:MARKER:Y 1.5000E-03
```

Description When the linear scaling is ON, the scaled value is queried.

:CURSor:XY:TYPE

Function Sets the cursor type of the X-Y display or queries the current setting.

Syntax
```
:CURSor:XY:TYPE {OFF|HORizontal|
VERTical|MARKer}
:CURSor:XY:TYPE?
```

Example
```
:CURSOR:XY:TYPE VERTICAL
:CURSor:XY:TYPE? -> :CURSOR:XY:
TYPE VERTICAL
```

:CURSor:XY:VERTical?

Function Queries all settings related to V cursors in the X-Y display.

Syntax
```
:CURSor:XY:VERTical?
```

Example
```
:CURSOR:XY:VERTICAL -> :CURSOR:XY:
VERTICAL:TRACE XY1;POSITION1 -3.00;
POSITION2 3.00
```

:CURSor:XY:VERTical:DX?

Function Queries the X-axis value between the V cursors in the X-Y display.

Syntax
```
:CURSor:XY:VERTical:DX?
```

Example
```
:CURSOR:XY:VERTICAL:DX? -> :CURSOR:
XY:VERTICAL:DX 2.50E-06
```

Description When the linear scaling of the X trace is ON, the scaled value is queried.

:CURSor:XY:VERTical:POSition<x>

Function Sets the V cursor position of the X-Y display or queries the current setting.

Syntax
```
:CURSor:XY:VERTical:POSition<x>
{<NRf>}
:CURSor:XY:VERTical:POSition<x>?
<x>=1 or 2
<NRf>=-4 to 4div (1/100 steps)
```

Example
```
:CURSOR:XY:VERTICAL:POSITION1 2
:CURSOR:XY:VERTICAL:POSITION1? ->
:CURSOR:XY:VERTICAL:
POSITION1 2.00E+00
```

:CURSor:XY:VERTical:TRACe

Function Sets the waveform on which to use the V cursor in the X-Y display or queries the current setting. (DL1740 only)

Syntax
```
:CURSor:XY:VERTical:TRACe {XY1|XY2}
:CURSor:XY:VERTical:TRACe?
```

Example
```
:CURSOR:XY:VERTICAL:TRACE
XY1:CURSOR:XY:VERTICAL:TRACE? ->
:CURSOR:XY:VERTICAL:TRACE XY1
```

:CURSor:XY:VERTical:X<x>?

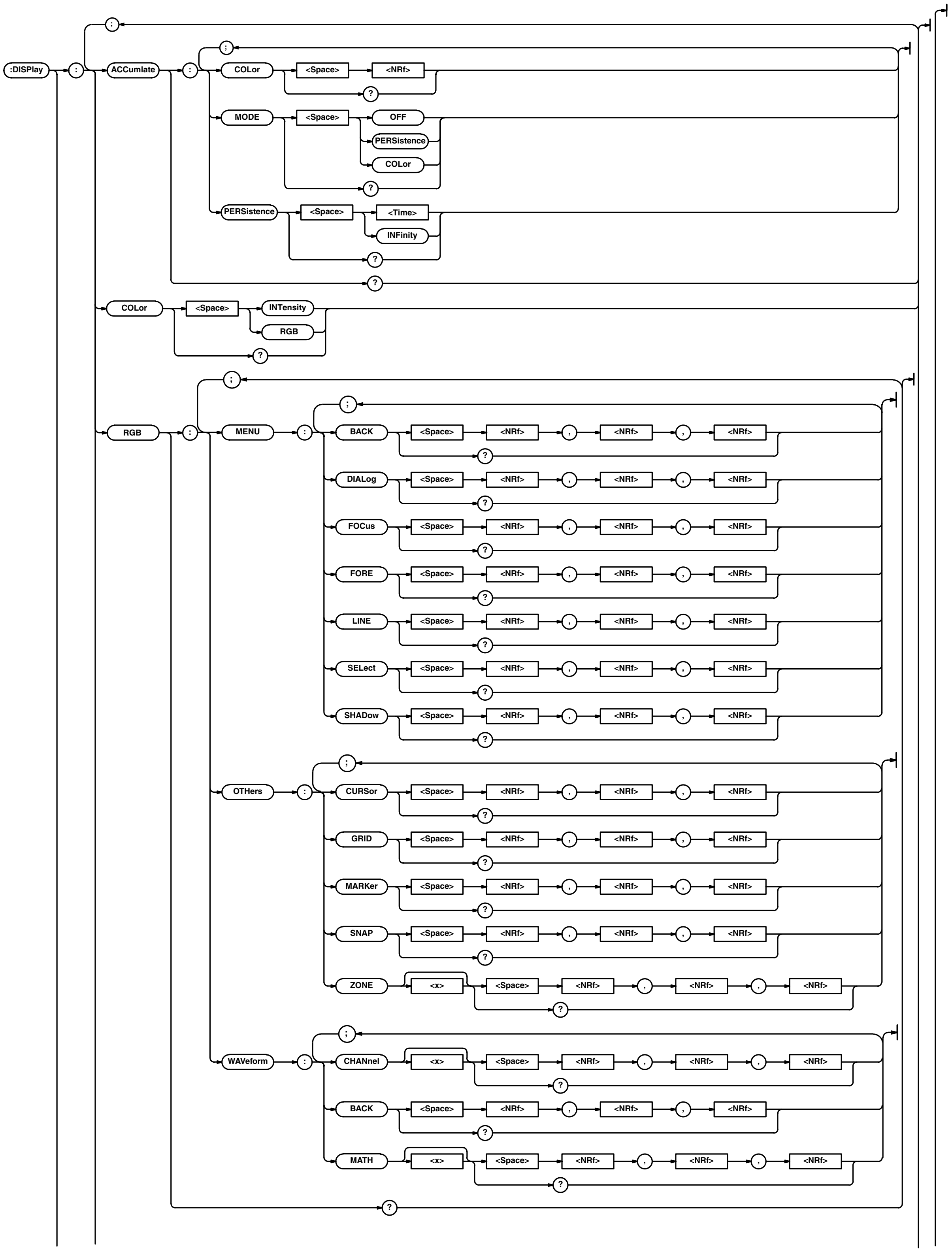
Function Queries the X-axis position of the V cursor in the X-Y display.

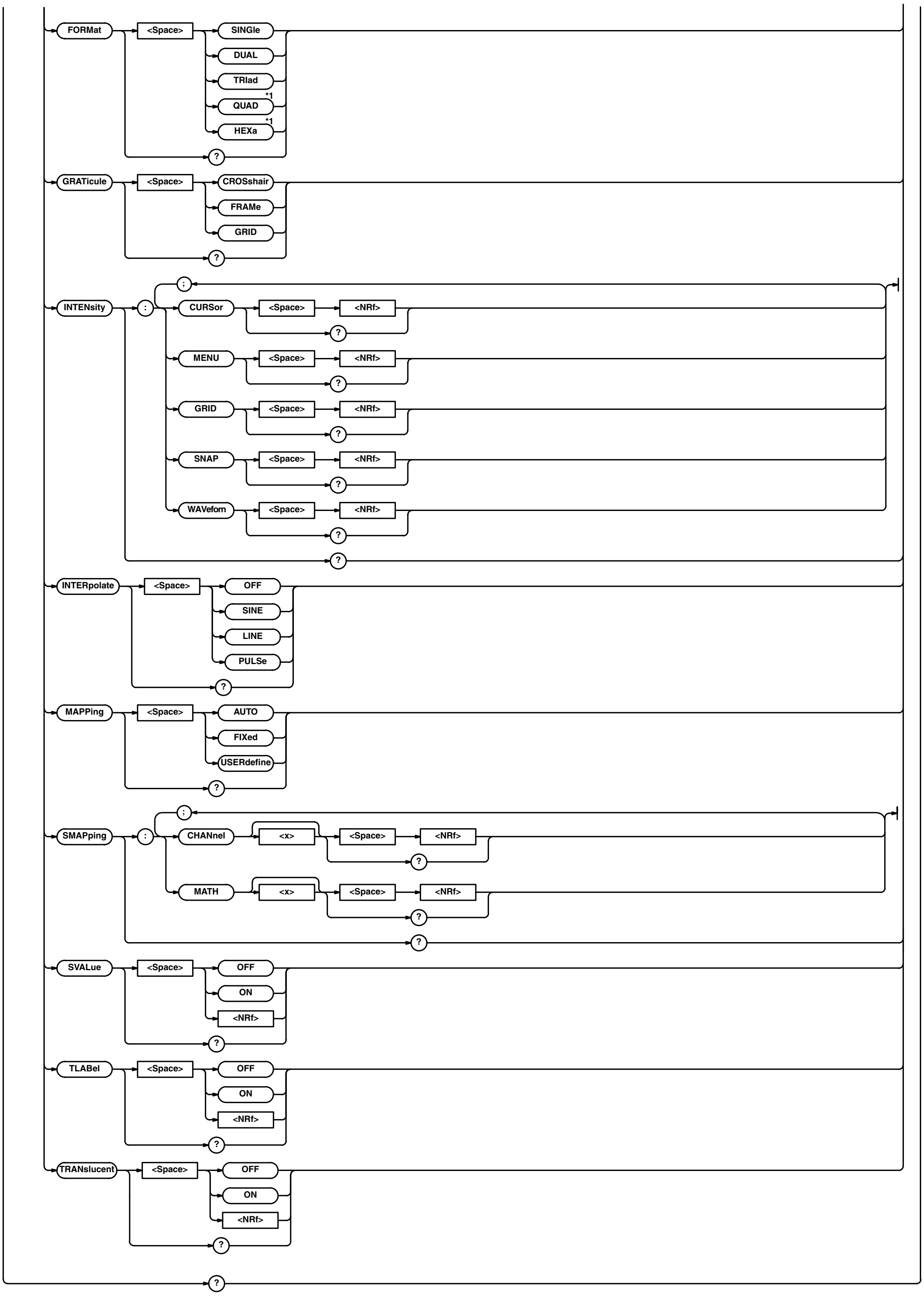
Syntax
```
:CURSor:XY:VERTical:X<x>?
<x>=1 or 2
```

Example
```
:CURSOR:XY:VERTICAL:X1? -> :CURSOR:
XY:VERTICAL:X1 -2.50E-06
```

6.9 DISPlay Group

The commands in the DISPlay group are used to set or query the display parameters. This allows you to make the same settings that can be made using the Graph Color menu of **MISC**.





*1 For use on the DL1740

:DISPlay?

Function Queries all display settings.

```
Syntax    :DISPlay?
Example   :DISPLAY? -> :DISPLAY:FORMAT QUAD;
          INTERPOLATE SINE;GRATICULE GRID;
          SVALUE 0;TLABEL 0;ACCUMLATE:
          MODE OFF;PERSISTENCE 100.0E-03;
          COLOR 16;:DISPLAY:TRANSLUCENT 0;
          MAPPING AUTO;SMAPPING:CHANNEL1 0;
          CHANNEL2 1;CHANNEL3 2;CHANNEL4 3;
          MATH1 4;MATH2 5;:DISPLAY:
          COLOR INTENSITY;INTENSITY:MENU 10;
          WAVEFORM 10;SNAP 10;GRID 10;
          CURSOR 10;:DISPLAY:RGB:MENU:
          FORE 15,15,15;BACK 0,0,7;
          FOCUS 0,0,7;SELECT 0,7,15;
          DIALOG 7,7,7;SHADOW 0,0,0;
          LINE 15,15,15;:DISPLAY:RGB:
          WAVEFORM:CHANNEL1 15,15,0;
          CHANNEL2 0,15,0;CHANNEL3 15,0,15;
          CHANNEL4 0,15,15;MATH1 15,0,0;
          MATH2 15,7,0;BACK 0,0,0;:DISPLAY:
          RGB:OTHERS:SNAP 15,15,15;
          ZONE1 0,0,15;ZONE2 15,4,11;
          ZONE3 11,15,4;ZONE4 0,7,15;
          GRID 8,8,8;CURSOR 13,13,13;
          MARKER 15,15,15
```

:DISPlay:ACCumulate?

Function Queries all accumulation settings.

Syntax :DISPlay:ACCumulate?

```
Example   :DISPLAY:ACCUMULATE? -> :DISPLAY:
          ACCUMULATE:MODE OFF;
          PERSISTENCE 100.0E-03;COLOR 16
```

:DISPlay:ACCumulate:COLor

Function Sets/queries the color grading width.

```
Syntax    :DISPlay:ACCumulate:COLor {<NRf>}
          :DISPlay:ACCumulate:COLor?
          <NRf>=2 to 2048 (in steps of 2n)
Example   :DISPLAY:ACCUMULATE:COLOR 16
          :DISPLAY:ACCUMULATE:COLOR? ->
          :DISPLAY:ACCUMULATE:COLOR 16
```

:DISPlay:ACCumulate:MODE

Function Selects/queries the accumulation mode.

```
Syntax    :DISPlay:ACCumulate:MODE {COLor|
          OFF|PERSistence}
          :DISPlay:ACCumulate:MODE?
Example   :DISPLAY:ACCUMULATE:
          MODE PERSISTENCE
          :DISPLAY:ACCUMULATE:MODE? ->
          :DISPLAY:ACCUMULATE:
          MODE PERSISTENCE
```

:DISPlay:ACCumulate:PERSistence

Function Sets/queries the accumulation time.

```
Syntax    :DISPlay:ACCumulate:PERSistence
          {<Time>|INFinity}
          :DISPlay:ACCumulate:PERSistence?
          <Time>=100 ms to 50 s (in 1-2-5
          steps)
Example   :DISPLAY:ACCUMULATE:
          PERSISTENCE 100MS
          :DISPLAY:ACCUMULATE:PERSISTENCE? ->
          :DISPLAY:ACCUMULATE:
          PERSISTENCE 100.0E-03
```

:DISPlay:COLor

Function Sets whether to change the screen color using RGB or brightness or queries the current setting.

```
Syntax    :DISPlay:COLor {INTensity|RGB}
          :DISPlay:COLor?
Example   :DISPLAY:COLOR INTENSITY
          :DISPLAY:COLOR? -> :DISPLAY:
          COLOR INTENSITY
```

:DISPlay:RGB?

Function Queries all settings related to the screen color.

```
Syntax    :DISPlay:RGB?
Example   :DISPLAY:RGB? -> :DISPLAY:RGB:MENU:
          FORE 15,15,15;BACK 0,0,7;
          FOCUS 0,0,7;SELECT 0,7,15;
          DIALOG 7,7,7;SHADOW 0,0,0;
          LINE 15,15,15;:DISPLAY:RGB:
          WAVEFORM:CHANNEL1 15,15,0;
          CHANNEL2 0,15,0;CHANNEL3 15,0,15;
          CHANNEL4 0,15,15;MATH1 15,0,0;
          MATH2 15,7,0;BACK 0,0,0;:DISPLAY:
          RGB:OTHERS:SNAP 15,15,15;
          ZONE1 0,0,15;ZONE2 15,4,11;
          ZONE3 11,15,4;ZONE4 0,7,15;
          GRID 8,8,8;CURSOR 13,13,13;
          MARKER 15,15,15
```

:DISPlay:RGB:MENU?

Function Queries all settings related to colors used in the menu.

```
Syntax    :DISPlay:RGB:MENU?
Example   :DISPLAY:RGB:MENU? -> :WAVEFORM::
          DISPLAY:RGB:MENU:FORE 15,15,15;
          BACK 0,0,7;FOCUS 0,0,7;
          SELECT 0,7,15;DIALOG 7,7,7;
          SHADOW 0,0,0;LINE 15,15,15
```

:DISPlay:RGB:MENU:{BACK|DIALog|FOCus|FORE|LINE|SELect|SHADow}

Function Sets the color of the characters, background, focus, select, dialog, shade, and lines of the menu screen or queries the current setting.

```
Syntax      :DISPlay:RGB:MENU:{BACK|DIALog|
            FOCus|FORE|LINE|SELect|SHADow}
            {<NRf>,<NRf>,<NRf>}
            :DISPlay:RGB:MENU:{BACK|DIALog|
            FOCus|FORE|LINE|SELect|SHADow}?
            <NRf>=0 to 15 (R, G, B, in that
            order)
Example     :DISPlay:RGB:MENU:BACK 15,15,15
            :DISPLAY:RGB:MENU:BACK? ->
            :DISPLAY:RGB:MENU:BACK 15,15,15
```

Description Set the ":DISPlay:COLor" command to "RGB" before executing this command.

:DISPlay:RGB:OTHers?

Function Queries all settings related to the colors of other items.

```
Syntax      :DISPlay:RGB:OTHers?
Example     :DISPLAY:RGB:OTHERS? -> :DISPLAY:
            RGB:OTHERS:SNAP 15,15,15;
            ZONE1 0,0,15;ZONE2 15,4,11;
            ZONE3 11,15,4;ZONE4 0,7,15;
            GRID 8,8,8;CURSOR 13,13,13;
            MARKER 15,15,15
```

:DISPlay:RGB:OTHers:{CURSor|GRID|MARKer|SNAP|ZONE<x>}

Function Sets the color for cursors, grid, markers, and snapshot waveforms or queries the current setting.

```
Syntax      :DISPlay:RGB:OTHers:{CURSor|GRID|
            MARKer|SNAP|ZONE<x>} {<NRf>,<NRf>,
            <NRf>}
            :DISPlay:RGB:OTHers:{CURSor|GRID|
            MARKer|SNAP|ZONE<x>}?
            <x>=1 or 2
            <NRf>=0 to 15 (R, G, B, in that
            order)
Example     :DISPLAY:RGB:OTHERS:CURSOR 0,0,0
            :DISPLAY:RGB:OTHERS:CURSOR? ->
            :DISPLAY:RGB:OTHERS:CURSOR 0,0,0
```

Description Set the ":DISPlay:COLor" command to "RGB" before executing this command.

:DISPlay:RGB:WAVeform?

Function Queries all settings related to the waveform colors.

```
Syntax      :DISPlay:RGB:WAVeform?
Example     :DISPLAY:RGB:WAVEFORM? -> :DISPLAY:
            RGB:WAVEFORM:CHANNEL1 15,15,0;
            CHANNEL2 0,15,0;CHANNEL3 15,0,15;
            CHANNEL4 0,15,15;MATH1 15,0,0;
            MATH2 15,7,0;BACK 0,0,0
```

:DISPlay:RGB:WAVeform:{CHANnel<x>|BACK|MATH<x>}

Function Sets the colors for waveform, computation, and logic channels and the background or queries the current setting.

```
Syntax      :DISPlay:RGB:WAVeform:{CHANnel<x>|
            BACK|MATH<x>} {<NRf>,<NRf>,<NRf>}
            :DISPlay:RGB:WAVeform:{CHANnel<x>|
            BACK|MATH<x>}
            The <x> in CHANnel<x>=1 to 4 (or 1-
            2 for the DL1720)
            The <x> in MATH<x>=1 or 2 (or 1 for
            the DL1720)
            <NRf>=0 to 15 (R, G, B, in that
            order)
Example     :DISPLAY:RGB:WAVEFORM:
            CHANNEL1 0,0,0
            :DISPLAY:RGB:WAVEFORM:CHANNEL1? ->
            :DISPLAY:RGB:WAVEFORM:
            CHANNEL1 0,0,0
```

Description Set the ":DISPlay:COLor" command to "RGB" before executing this command.

:DISPlay:FORMat

Function Sets/queries the display format.

```
Syntax      :DISPlay:FORMat {SINGle|DUAL|TRIad|
            QUAD|HEXa}
            :DISPlay:FORMat?
Example     :DISPLAY:FORMAT QUAD
            :DISPLAY:FORMAT? -> :DISPLAY:FORMAT
            QUAD
```

Description QUAD and HEXa cannot be used on the DL1720.

:DISPlay:GRATicule

Function Sets/queries the graticule.

```
Syntax      :DISPlay:GRATicule {CROSshair|
            FRAMe|GRID}
            :DISPlay:GRATicule?
Example     :DISPLAY:GRATICULE GRID
            :DISPLAY:GRATICULE? -> :DISPLAY:
            GRATICULE GRID
```

:DISPlay:INTENsity?

Function Queries all settings related to the brightness of the displayed items.

```
Syntax      :DISPlay:INTENsity?
Example     :DISPLAY:INTENSITY? -> :DISPLAY:
            INTENSITY:MENU 10;WAVeform 10;
            SNAP 10;GRID 10;CURSOR 10
```

:DISPlay:INTENsity:{CURSor|MENU|GRID|SNAP|WAVeform}

Function Sets the brightness of each display item or queries the current setting.

```
Syntax      :DISPlay:INTENsity:{CURSor|MENU|
            GRID|SNAP|WAVeform} {<NRf>}
            :DISPlay:INTENsity:{CURSor|MENU|
            GRID|SNAP|WAVeform}?
            <NRf>=1 to 15
Example     (The following example is for the
            cursor.)
            :DISPLAY:INTENSITY:CURSOR 6
            :DISPLAY:INTENSITY:CURSOR? ->
            :DISPLAY:INTENSITY:CURSOR 6
```

Description Set the ":DISPlay:COLor" command to "INTensity" before executing this command.

:DISPlay:INTERpolate

Function Selects/queries the interpolation method.

```
Syntax      :DISPlay:INTerpolate {LINE|OFF|
            PULSe|SINE}
            :DISPlay:INTerpolate?
Example     :DISPLAY:INTERPOLATE LINE
            :DISPLAY:INTERPOLATE? -> :DISPLAY:
            INTERPOLATE LINE
```

:DISPlay:MAPPing

Function Sets/queries the mapping mode.

```
Syntax      :DISPlay:MAPPing {AUTO|FIXed|
            USERdefine}
            :DISPlay:MAPPing?
Example     :DISPLAY:MAPPING AUTO
            :DISPLAY:MAPPING? -> :DISPLAY:
            MAPPING AUTO
```

:DISPlay:SMAPping?

Function Queries all settings relating to the assignment of the waveforms to the split window.

```
Syntax      :DISPlay:SMAPping?
Example     :DISPLAY:SMAPPING? -> :DISPLAY:
            SMAPPING:CHANNEL1 0;CHANNEL2 1;
            CHANNEL3 2;CHANNEL4 3;MATH1 4;
            MATH2 5
```

:DISPlay:SMAPping:{CHANnel<x>|MATH<x>} (Set Mapping)

Function Sets/queries the assignment of the waveforms to the split window.

```
Syntax      :DISPlay:SMAPping:{CHANnel<x>|
            MATH<x>} {<NRf>}
            :DISPlay:SMAPping:{CHANnel<x>|
            MATH<x>}?
            CHANnel<x>=1 to 4 (or 1-2 for the
            DL1720)
            <x> of MATH<x>=1, 2 (or 1 for the
            DL1720)
            <NRf>=0 to 5 (or 0-2 for the
            DL1720)
Example     (Below is an example of CH1.)
            :DISPLAY:SMAPPING:CHANNEL1
            0:DISPLAY:SMAPPING:CHANNEL1? ->
            :DISPLAY:SMAPPING:CHANNEL1 0
```

:DISPlay:SVALue (Scale VALUE)

Function Selects/queries whether scaling values are displayed.

```
Syntax      :DISPlay:SVALue {<Boolean>}
            :DISPlay:SVALue?
Example     :DISPLAY:SVALUE OFF
            :DISPLAY:SVALUE? -> :DISPLAY:
            SVALUE 0
```

:DISPlay:TLABel (Trace LABEL)

Function Selects/queries whether waveform labels are displayed.

```
Syntax      :DISPlay:TLABel {<Boolean>}
            :DISPlay:TLABel?
Example     :DISPLAY:TLABEL ON
            :DISPLAY:TLABEL? -> :DISPLAY:
            TLABEL 1
```

Description You can set a user defined waveform label using the ":CHANnel<x>:LABel" command.

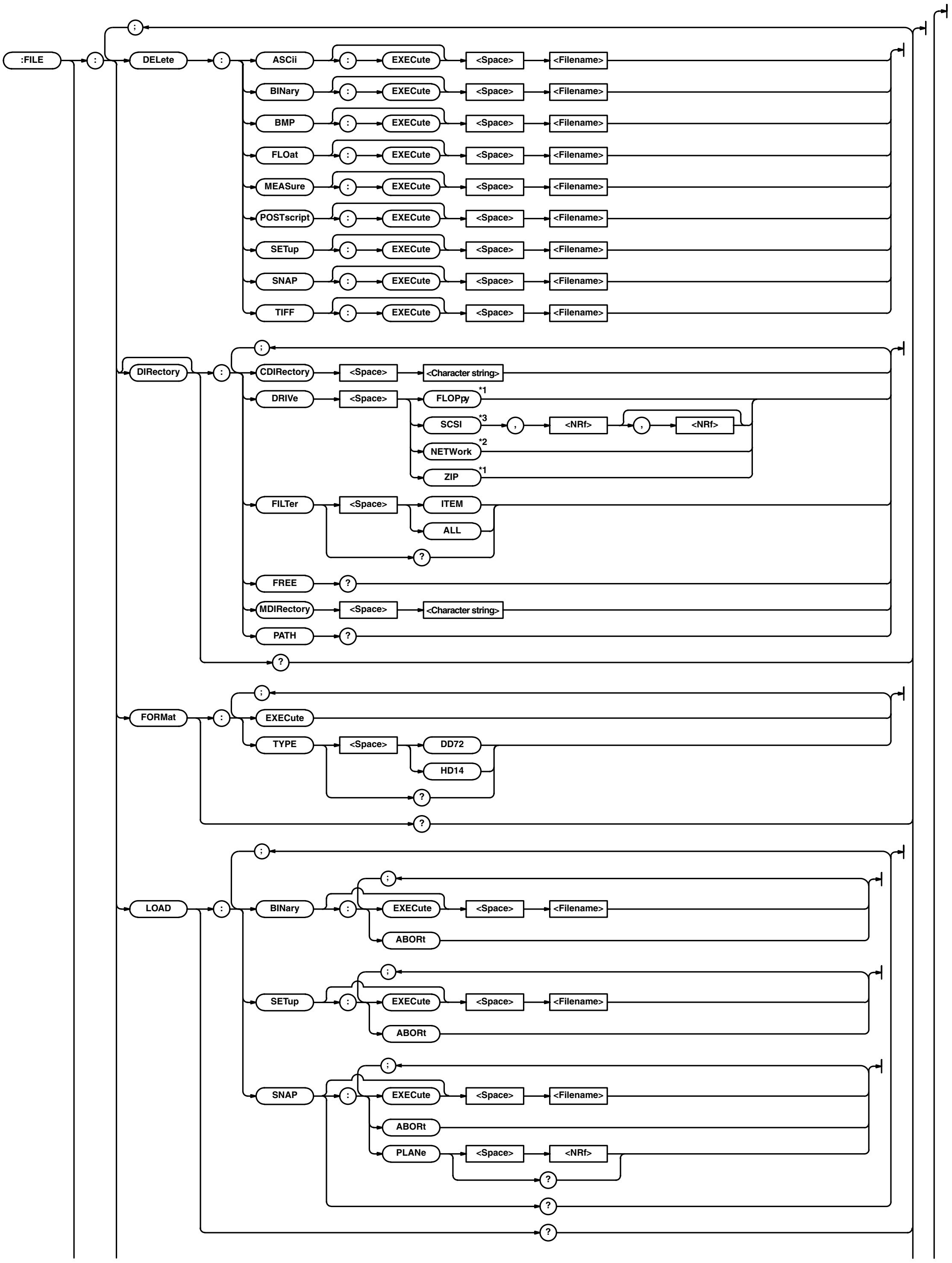
:DISPlay:TRANslucent

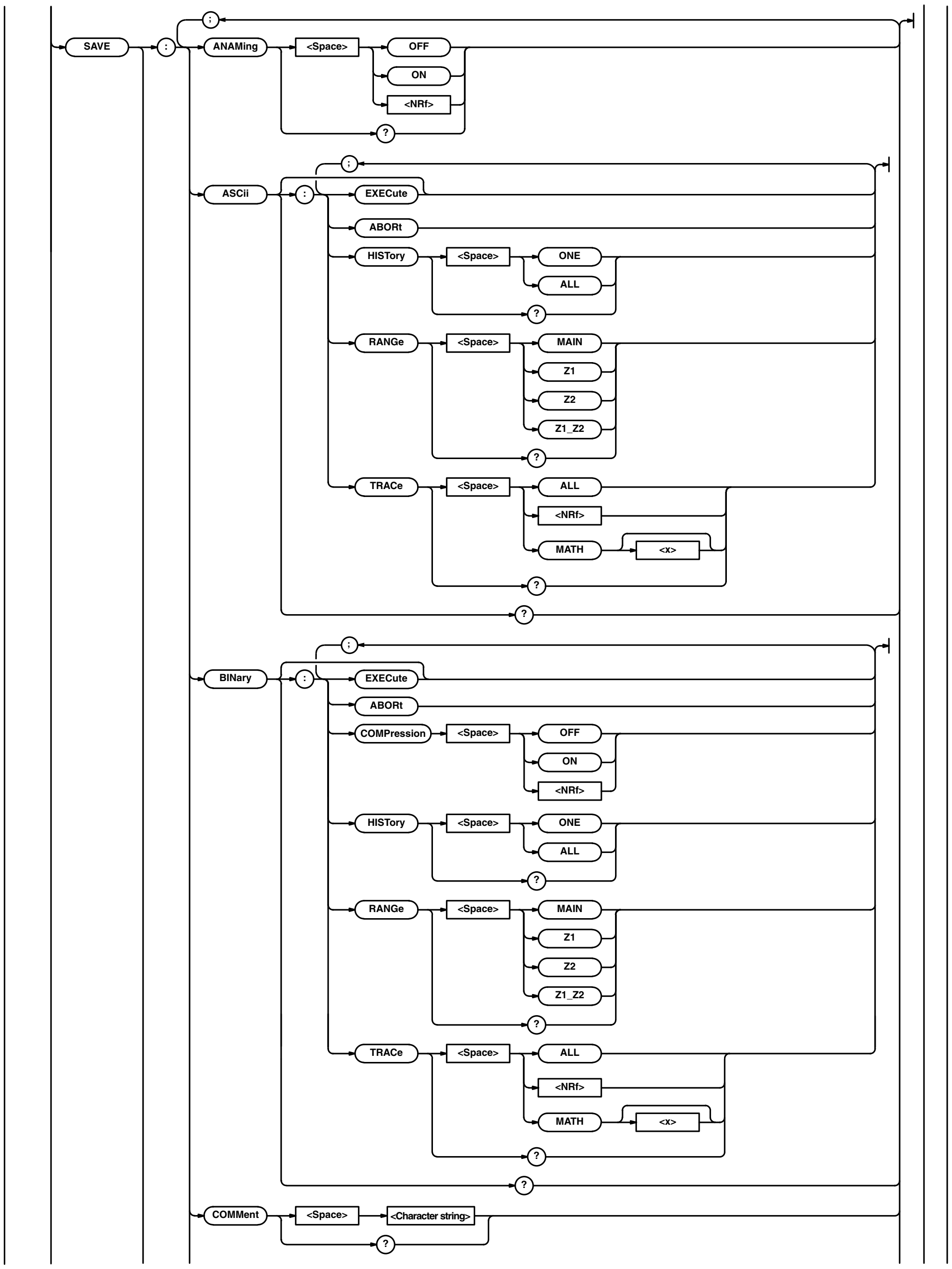
Function Sets/queries the ON/OFF condition of the translucent mode of the pop-up menu.

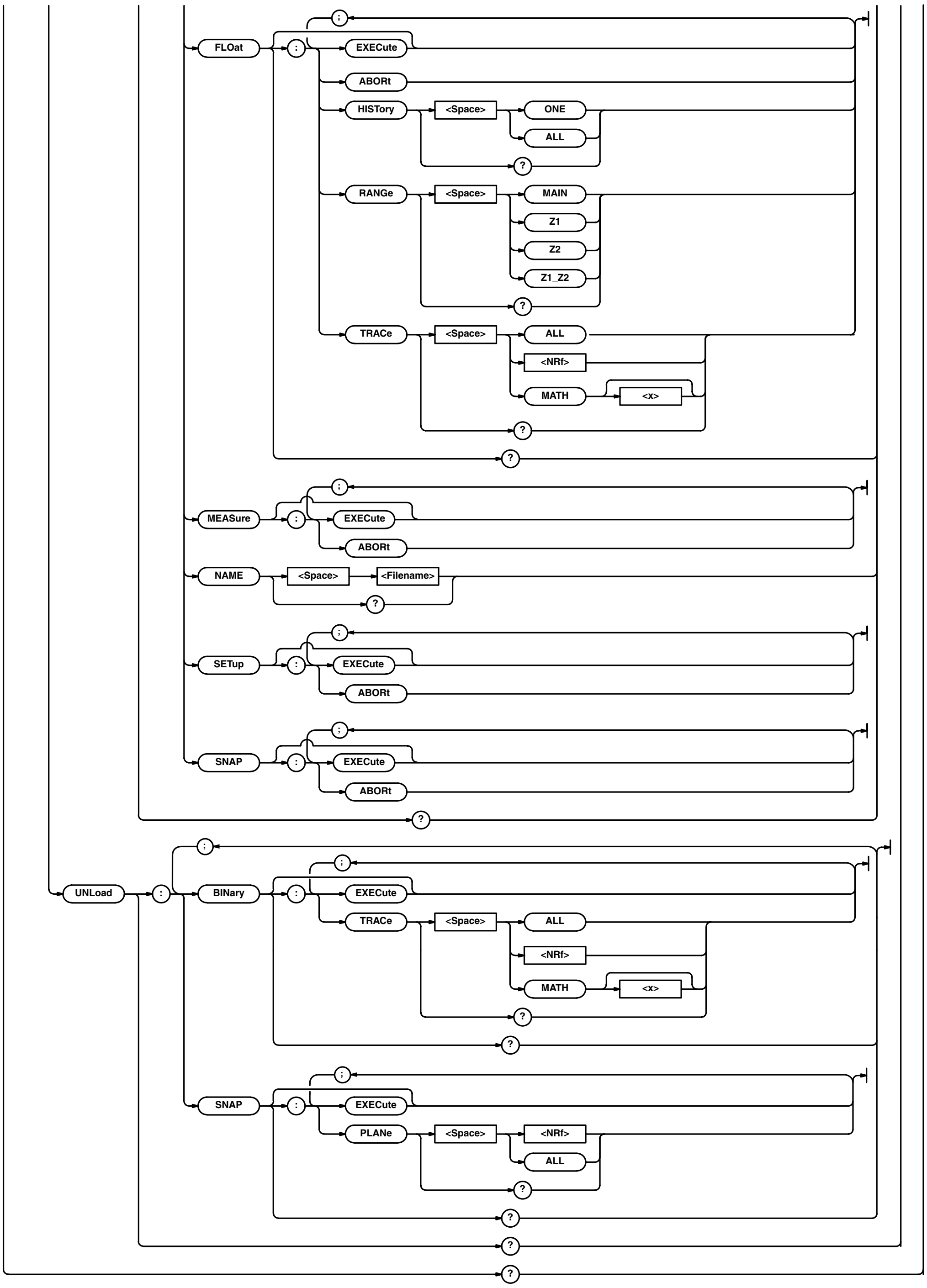
```
Syntax      :DISPlay:TRANslucent {<Boolean>}
            :DISPlay:TRANslucent?
Example     :DISPLAY:TRANSLUCEENT ON
            :DISPLAY:TRANSLUCEENT? -> :DISPLAY:
            TRANSLUCEENT 1
```

6.10 FILE Group

These commands control operation of floppy disks, Zip disks, MO disks, and external SCSI devices. This allows you to make the same settings and queries that can be made using **FILE**.




SAVE
:
;
ANAMing
<Space>
OFF
ON
<NRf>
?
ASCii
:
;
EXECute
ABORt
HISTory
<Space>
ONE
ALL
?
RANGe
<Space>
MAIN
Z1
Z2
Z1_Z2
?
TRACe
<Space>
ALL
<NRf>
MATH
<x>
?
?
BINary
:
;
EXECute
ABORt
COMPression
<Space>
OFF
ON
<NRf>
HISTory
<Space>
ONE
ALL
?
RANGe
<Space>
MAIN
Z1
Z2
Z1_Z2
?
TRACe
<Space>
ALL
<NRf>
MATH
<x>
?
?
COMMent
<Space>
<Character string>
?



*1 "FLOPpy" can be used when the built-in floppy disk drive is available; "ZIP" can be used when the built-in Zip drive is available.

*2 "NETWork" can be used when the Ethernet interface (option) is installed.

*3 "SCSI" can be used when the SCSI + serial interface (option) is installed.

:FILE?

Function Queries the settings for the specified medium.

Syntax `:FILE?`

Example
```
:FILE? -> :FILE:DIRECTORY:
FILTER ITEM;:FILE:SAVE:BINARY:
TRACE 1;RANGE MAIN;HISTORY ONE;
COMPRESSION 0;:FILE:ASCII:TRACE 1;
RANGE MAIN;HISTORY ONE;:FILE:FLOAT:
TRACE 1:RANGE MAIN;HISTORY ONE;:
SAVE:ANAMING 0;:NAME "SAVED1";:
COMMENT "TEST1";:FILE:LOAD:SNAP:
PLANE 1;:FILE:UNLOAD:BINARY:
TRACE 1;FILE:UNLOAD:SNAP:PLANE 1;:
FILE:COPY:DISTINATION:
DRIVE FLOPPY;:FILE:FORMAT:TYPE HD14
```

:FILE:DELete:{ASCii|BINary|BMP|FLOat|MEASure|POSTscript|SETup|SNAP|TIFF}:[EXECute]

Function Deletes various types of data files. This is an overlap command.

Syntax
```
:FILE:DELete:{ASCii|BINary|BMP|
FLOat|MEASure|POSTscript|SETup|
SNAP|TIFF}:[EXECute] <Filename>
```

Example (The following example is for the setup data.)
```
:FILE:DELete:SETUP "COPYED1"
```

Description Select the medium using the `":FILE:DIRectory:DRIVe"` command.

:FILE:DIRectory?

Function Queries all settings related to the current medium.

Syntax `:FILE:DIRectory?`

Example
```
:FILE:DIRECTORY? ->:FILE:DIRECTORY:
FILTER ITEM
```

:FILE[:DIRectory]:CDIRectory (Change Directory)

Function Changes the current directory.

Syntax
```
:FILE[:DIRectory]:CDIRectory
<Character string>
```

Example
```
:FILE[:DIRECTORY]:CDIRECTORY "NO_1"
```

:FILE[:DIRectory]:DRIVe

Function Selects the current medium.

Syntax
```
:FILE[:DIRectory]:DRIVe {FLOPpy|
SCSI,<NRf>[,<NRf>]|NETWork|ZIP}
The first <NRf>=SCSI address (0 to
7)
The second <NRf>=Partitions (0 to
4)
```

Example
```
:FILE[:DIRECTORY]:DRIVE SCSI,0,2
```

Description
- If the drive does not contain partitions, omit the second <NRf>. `"FLOPpy"` can be used when the built-in floppy disk drive is available; `"ZIP"` can be used when the built-in Zip drive is available. `"NETWork"` can be used when the Ethernet interface (option) is installed.
- `"SCSI"` can be used when the SCSI + serial interface (option) is installed.

:FILE[:DIRectory]:FILTer

Function Sets a filter on the current file or queries the current setting.

Syntax
```
:FILE[:DIRectory]:FILTer {ITEM|ALL}
:FILE[:DIRectory]:FILTer?
```

Example
```
:FILE[:DIRECTORY]:FILTER ITEM
:FILE[:DIRECTORY]:FILTER? ->
:FILE[:DIRECTORY]:FILTER ITEM
```

:FILE[:DIRectory]:FREE?

Function Queries the free space (number of bytes) on the current medium.

Syntax `:FILE[:DIRectory]:FREE?`

Example
```
:FILE:DIRECTORY:FREE? -> :FILE:
DIRECTORY:FREE 65536
```

:FILE[:DIRectory]:MDIRectory (Make Directory)

Function Creates a directory in the current directory. This is an overlap command.

Syntax
```
:FILE[:DIRectory]:MDIRectory
<Character string>
```

Example
```
:FILE:DIRECTORY:MDIRECTORY "NO_1"
```

:FILE[:DIRectory]:PATH?

Function Queries the current path.

Syntax `:FILE[:DIRectory]:PATH?`

Example
```
:FILE[:DIRECTORY]:PATH? ->
:FILE[:DIRECTORY]:PATH "PATH=FD0"
```

:FILE:FORMat?

Function Queries all settings related to the formatting of the floppy disk.

Syntax `:FILE:FORMat?`

Example
```
:FILE:FORMAT? -> :FILE:FORMAT:
TYPE HD14
```

:FILE:FORMat:EXECute

Function Formats the floppy disk or the Zip disk. This is an overlap command.

Syntax `:FILE:FORMat:EXECute`

Example `:FILE:FORMAT:EXECUTE`

Description The format of the Zip disk is quick format.

:FILE:FORMat:TYPE

Function Sets the format type for the floppy disk or queries the current setting.

Syntax
```
:FILE:FORMat:TYPE {DD72|HD14}
:FILE:FORMat:TYPE?
```

Example
```
:FILE:FORMAT:TYPE HD14
:FILE:FORMAT:TYPE? -> :FILE:FORMAT:
TYPE HD14
```

:FILE:LOAD?

Function Queries all settings related to file loading.

Syntax `:FILE:LOAD?`

Example
```
:FILE:LOAD? -> :FILE:LOAD:SNAP:
PLANE 1
```

:FILE:LOAD:{BINary|SETup|SNAP}:ABORt

Function Aborts loading the data.

Syntax
```
:FILE:LOAD:{BINary|SETup|SNAP}:
ABORt
```

Example
```
(The following example is for the
setup data.)
:FILE:LOAD:SETUP:ABORT
```

:FILE:LOAD:{BINary|SETup|SNAP}[:EXECute]

Function Loads the data. This is an overlap command.

Syntax
```
:FILE:LOAD:{BINary|SETup|SNAP}
[:EXECute] <Filename>
```

Example
```
(The following example is for the
setup data.)
:FILE:LOAD:SETUP:EXECUTE "CASE1"
```

:FILE:LOAD:SNAP?

Function Queries all settings related to the loading of the snapshot waveform data.

Syntax `:FILE:LOAD:SNAP?`

Example
```
:FILE:LOAD:SNAP? ->:FILE:LOAD:SNAP:
PLANE 1
```

:FILE:LOAD:SNAP:PLANe

Function Sets the plane number of the snapshot waveform data or queries the current setting.

Syntax
```
:FILE:LOAD:SNAP:PLANe {<NRf>}
:FILE:LOAD:SNAP:PLANe?
<NRf>=1 to 4
```

Example
```
:FILE:LOAD:SNAP:PLANE 1
:FILE:LOAD:SNAP:PLANE? -> :FILE:
LOAD:SNAP:PLANE 1
```

:FILE:SAVE?

Function Queries all settings related to file saving.

Syntax `:FILE:SAVE?`

Example
```
:FILE:SAVE? -> :FILE:SAVE:BINARY:
TRACE 1;RANGE MAIN;HISTORY ONE;
COMPRESSION ON;FILE:ASCII:TRACE 1;
RANGE MAIN;HISTORY ONE;:FILE:FLOAT:
TRACE 1:RANGE MAIN;HISTORY ONE;:
SAVE:ANAMING OFF;:NAME "SAVED1";:
COMMENT "TEST1"
```

:FILE:SAVE:ANAMing

Function Turns the auto naming function of files ON/OFF or queries the current setting.

Syntax
```
:FILE:SAVE:ANAMing  {<Boolean>}
:FILE:SAVE:ANAMing?
```

Example
```
:FILE:SAVE:ANAMING ON
:FILE:SAVE:ANAMING? -> :FILE:SAVE:
ANAMING 1
```

:FILE:SAVE:{ASCii|BINary|FLOat}?

Function Queries all settings related to various types of data.

Syntax `:FILE:SAVE:{ASCii|BINary|FLOat}?`

Example
```
:FILE:SAVE:BINARY? -> :FILE:SAVE:
BINARY:TRACE 1;RANGE MAIN;
HISTORY ONE;COMPRESSION ON
```

:FILE:SAVE:{ASCii|BINary|FLOat|MEASure|SETup|SNAP}:ABORt

Function Aborts saving the data.

Syntax
```
:FILE:SAVE:{ASCii|BINary|FLOat|
MEASure|SETup|SNAP}:ABORt
```

Example
```
(The following example is for the
waveform data.)
:FILE:SAVE:BINARY:ABORT
```

:FILE:SAVE:{ASCii|BINary|FLOat|MEASure|SETup|SNAP}[:EXECute]

Function Saves the data. This is an overlap command.

Syntax
```
:FILE:SAVE:{ASCii|BINary|FLOat|
MEASure|SETup|SNAP}[:EXECute]
```

Example
```
(The following example is for the
waveform data.)
:FILE:SAVE:BINARY:EXECUTE
```

:FILE:SAVE:{ASCii|BINary|FLOat}:HISTory

Function Sets the number of histories to save or queries the current setting.

Syntax
```
:FILE:SAVE:{ASCii|BINary|FLOat}:
HISTory {ONE|ALL}
:FILE:SAVE:{ASCii|BINary|FLOat}:
HISTory?
```

Example
```
:FILE:SAVE:BINARY:HISTORY ALL
:FILE:SAVE:BINARY:HISTORY? ->
:FILE:SAVE:BINARY:HISTORY ALL
```

:FILE:SAVE:{ASCii|BINary|FLOat}:RANGe

Function Sets the range of data to be saved or queries the current setting.

Syntax
```
:FILE:SAVE:{ASCii|BINary|FLOat}:
RANGe {MAIN|Z1|Z2|Z1_Z2}
:FILE:SAVE:{ASCii|BINary|FLOat}:
RANGe?
```

Example
```
:FILE:SAVE:BINARY:RANGE MAIN
:FILE:SAVE:BINARY:RANGE? -> :FILE:
SAVE:BINARY:RANGE MAIN
```

:FILE:SAVE:{ASCii|BINary|FLOat}:TRACe

Function Sets the waveform to be saved or queries the current setting.

Syntax
```
:FILE:SAVE:{ASCii|BINary|FLOat}:
TRACe {ALL|<NRf>|MATH<x>}
:FILE:SAVE:{ASCii|BINary|FLOat}:
TRACe?
<NRf>=1 to 4 (or 1-2 for the
DL1720)
<x>=1 or 2 (or 1 for the DL1720)
```

Example
```
:FILE:SAVE:ASCII:TRACE 1
:FILE:SAVE:ASCII:TRACE? -> :FILE:
SAVE:ASCII:TRACE 1
```

:FILE:SAVE:BINary:COMPression

Function Sets data compression on the waveform to be saved or queries the current setting.

Syntax
```
:FILE:SAVE:BINary:COMPression
{<Boolean>}
:FILE:SAVE:BINary:COMPression?
```

Example
```
:FILE:SAVE:BINARY:COMPRESSION ON
:FILE:SAVE:BINARY:COMPRESSION? ->
:FILE:SAVE:BINARY:COMPRESSION 1
```

Description
- The range of data that is saved is the Main screen.
- Only binary data can be compressed.

:FILE:SAVE:COMMent

Function Sets comments or queries the current setting.

Syntax
```
:FILE:SAVE:COMMent <Character
string>
:FILE:SAVE:COMMent?
<Character string>=Up to 25
characters
```

Example
```
:FILE:SAVE:
COMMENT "THIS IS TEST.   "
:FILE:SAVE:COMMENT? -> :FILE:SAVE:
COMMENT "THIS IS TEST.        "
```

Description Only the characters and symbols on the keyboard that appear on the instrument's screen can be used.
The "Ω" and "µ" symbols are represented by ASCII codes "1EH" and "1FH," respectively.

:FILE:SAVE:NAME

Function Sets the name of the file to be saved or queries the current setting.

Syntax
```
:FILE:SAVE:NAME <Filename>
:FILE:SAVE:NAME?
```

Example
```
:FILE:SAVE:NAME "CASE1"
:FILE:SAVE:NAME? -> :FILE:SAVE:
NAME "CASE1"
```

:FILE:UNLoad?

Function Queries all settings related to clearing the loaded data.

Syntax
```
:FILE:UNLoad?
```

Example
```
:FILE:UNLOAD? -> :FILE:UNLOAD:
BINARY:TRACE 1;SNAP:PLANE 1
```

:FILE:UNLoad:{BINary|SNAP}?

Function Queries all settings related to clearing of loaded data.

Syntax
```
:FILE:UNLoad:{BINary|SNAP}?
```

Example
```
:FILE:UNLOAD:BINARY? -> :FILE:
UNLOAD:BINARY:TRACE 1
```

:FILE:UNLoad:{BINary|SNAP}[:EXECute]

Function Clears the loaded data. This is an overlap command.

Syntax
```
:FILE:UNLoad:{BINary|SNAP}
[:EXECute]
```

Example
```
:FILE:UNLOAD:BINARY:EXECUTE
```

:FILE:UNLoad:BINary:TRACe

Function Sets the waveform to be cleared from the loaded binary data or queries the current setting.

Syntax
```
:FILE:UNLoad:BINary:TRACe {ALL|
<NRf>|MATH<x>}
:FILE:UNLoad:BINary:TRACe?
<NRf>=1 to 4 (or 1-2 for the
DL1720)
<x>=1 or 2 (or 1 for the DL1720)
```

Example
```
:FILE:UNLOAD:BINARY:TRACE 1
:FILE:UNLOAD:BINARY:TRACE? ->
:FILE:UNLOAD:BINARY:TRACE 1
```

:FILE:UNLoad:SNAP:PLANe

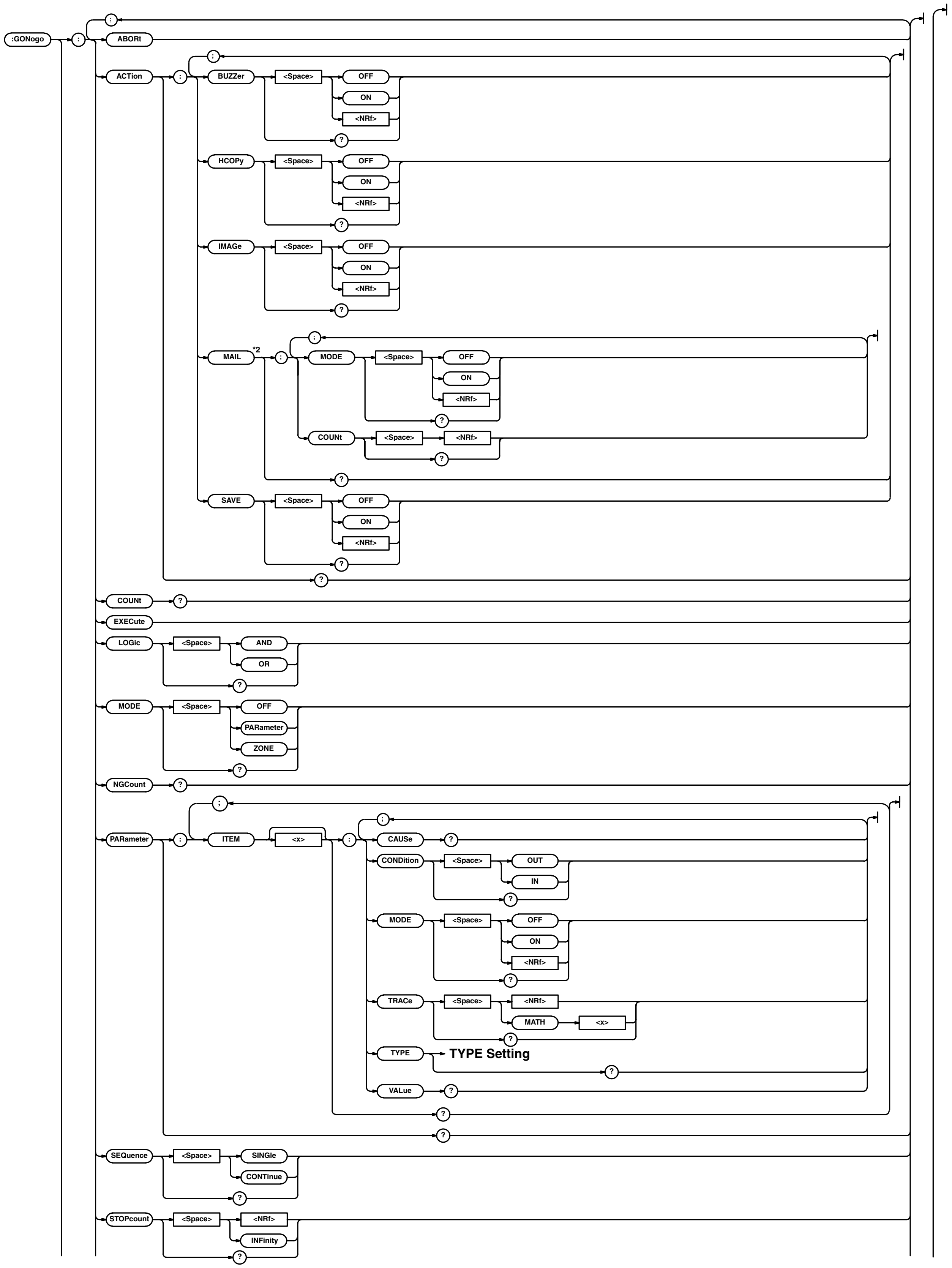
Function Sets the plane number to be cleared from the loaded snapshot data or queries the current setting.

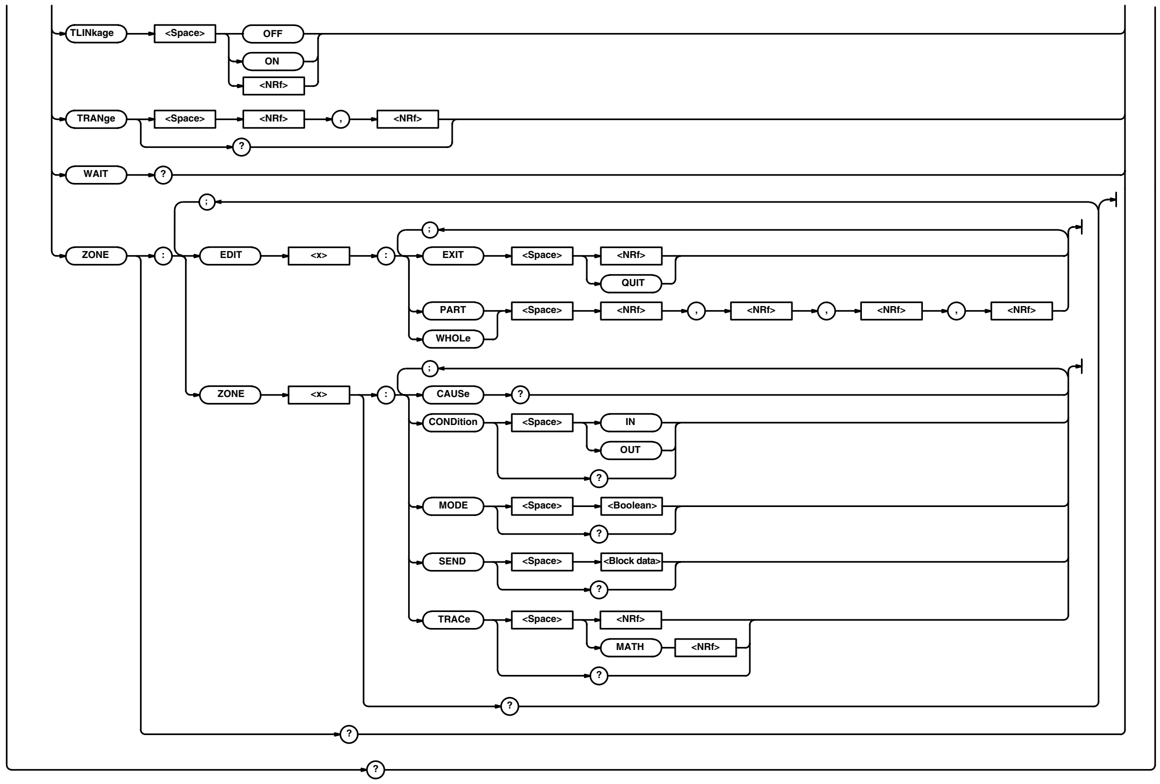
Syntax
```
:FILE:UNLoad:SNAP:PLANe {ALL|<NRf>}
:FILE:UNLoad:SNAP:PLANe?
<NRf>=1 to 4
```

Example
```
:FILE:UNLOAD:SNAP:PLANE ALL
:FILE:UNLOAD:SNAP:PLANE? -> :FILE:
UNLOAD:SNAP:PLANE ALL
```

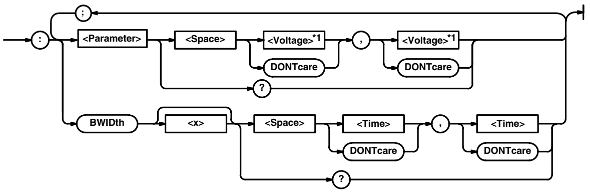
6.11 GONogo Group

The commands in the GONogo group deal with the GO/NO-GO determination. These commands can be used to make the same settings and inquiries as when **GO/NOGO** on the front panel is pressed.





TYPE Setting



*1 The data value is (1) <voltage> when <parameter> is AVERage, HIGH, LOW, MAXimum, MINimum, PTOPeak, RMS, or SDEViation (however, the value is <NRf> when the parameter is being linearly scaled), (2) <time> when <parameter> is AVGPeriod, BWIDth1, BWIDth2, DELay, FALL, NWIDth, PERiod, PWIDth, or RISE, (3) <frequency> when <parameter> is AVGFreq or FREQuency, and (4) <NRf> when <parameter> is DUTYcycle, NOVershoot, PNUMber, POVershoot, TY1Integ, TY2Integ, XY1Integ, or XY2Integ.

*2 Can be used when the Ethernet interface (option) is installed.

:GONogo?

Function Queries all settings related to GO/NO-GO determination.

Syntax :GONogo?

Example :GONOGO? -> :GONOGO:MODE OFF; PARAMETER:ITEM1:MODE 0;TRACE 1; TYPE:MAXIMUM DONTCARE,DONTCARE;: GONOGO:PARAMETER:ITEM1: CONDITION OUT;:GONOGO:PARAMETER: ITEM2:MODE 0;TRACE 1;TYPE: MINIMUM DONTCARE,DONTCARE;:GONOGO: PARAMETER:ITEM2:CONDITION OUT;: GONOGO:PARAMETER:ITEM3:MODE 0; TRACE 1;TYPE:RMS DONTCARE, DONTCARE;:GONOGO:PARAMETER:ITEM3: CONDITION OUT;:GONOGO:PARAMETER: ITEM4:MODE 0;TRACE 1;TYPE: AVERAGE DONTCARE,DONTCARE; HIGH DONTCARE,DONTCARE;:GONOGO: PARAMETER:ITEM4:CONDITION OUT;: GONOGO:ZONE:ZONE1:TRACE 1;MODE 0; CONDITION OUT;:GONOGO:ZONE:ZONE2: TRACE 2;MODE 0;CONDITION OUT;: GONOGO:ZONE:ZONE3:TRACE 3;MODE 0; CONDITION OUT;:GONOGO:ZONE:ZONE4: TRACE 4;MODE 0;CONDITION OUT;: GONOGO:ZONE:ZONE5:TRACE MATH1; MODE 0;CONDITION OUT;:GONOGO:ZONE: ZONE6:TRACE MATH2;MODE 0; CONDITION OUT;:GONOGO:LOGIC AND; SEQUENCE SINGLE;STOPCOUNT INFINITE; ACTION:BUZZER 0;SAVE 0;IMAGE 0; HCOPY 0;MAIL:MODE 0;COUNT 100;: GONOGO:TLINKAGE 0; TRANGE -5.0000000,5.0000000

:GONogo:ABORt

Function Aborts GO/NO-GO determination.

Syntax :GONogo:ABORt

Example :GONOGO:ABORT

:GONogo:ACTion?

Function Queries all settings related to the action to be performed when the result of the determination is NO-GO and also the determination criteria.

Syntax :GONogo:ACTion?

Example :GONOGO:ACTION? -> :GONOGO:ACTION: BUZZER 0;IMAGE 0;HCOPY 0;SAVE 0

:GONogo:ACTion:BUZZer

Function Sets whether or not to sound an alarm when the determination is NO-GO or queries the current setting.

Syntax :GONogo:ACTion:BUZZer {<Boolean>}
:GONogo:ACTion:BUZZer?

Example :GONOGO:ACTION:BUZZER OFF
:GONOGO:ACTION:BUZZER? -> :GONOGO: ACTION:BUZZER 0

:GONogo:ACTion:HCOPy (Hard COPY)

Function Sets whether or not to make a hard copy to the built-in printer (option) or the external printer when the determination results in NO-GO or queries the current setting.

Syntax :GONogo:ACTion:HCOPy {<Boolean>}
:GONogo:ACTion:HCOPy?

Example :GONOGO:ACTION:HCOPY OFF
:GONOGO:ACTION:HCOPY? -> :GONOGO: ACTION:HCOPY 0

:GONogo:ACTion:IMAGe

Function Sets whether or not to save the screen image to the external storage medium for NO-GO determination or queries the current setting.

Syntax :GONogo:ACTion:IMAGe {<Boolean>}
:GONogo:ACTion:IMAGe?

Example :GONOGO:ACTION:IMAGE OFF
:GONOGO:ACTION:IMAGE? -> :GONOGO: ACTION:IMAGE 0

:GONogo:ACTion:MAIL?

Function Queries the all settings for an e-mail to be sent when the determination is NO-GO.

Syntax :GONogo:ACTion:MAIL?

Example :GONOGO:ACTION:MAIL? -> :GONOGO: ACTION:MAIL:MODE 1;COUNT 100

Description Can be used when the Ethernet interface (option) is installed.

:GONogo:ACTion:MAIL:COUNt

Function Sets/queries the maximum number of e-mail to be sent when the determination is NO-GO.

Syntax :GONogo:ACTion:MAIL:COUNt {<NRf>}
:GONogo:ACTion:MAIL:COUNt?
<NRf>=1 to 1000

Example :GONOGO:ACTION:MAIL:COUNT 100
:GONOGO:ACTION:MAIL:COUNT? ->
:GONOGO:ACTION:MAIL:COUNT 100

Description Can be used when the Ethernet interface (option) is installed.

:GONogo:ACTion:MAIL:MODE

Function Sets/queries whether an e-mail report is sent when the determination is NO-GO.

Syntax :GONogo:ACTion:MAIL:MODE {<Boolean>}
:GONogo:ACTion:MAIL:MODE?

Example :GONOGO:ACTION:MAIL:MODE OFF
:GONOGO:ACTION:MAIL:MODE? ->
:GONOGO:ACTION:MAIL:MODE 0

Description Can be used when the Ethernet interface (option) is installed.

:GONogo:ACTion:SAVE

Function Sets whether or not to save the NO-GO result to the medium or queries the current setting.

Syntax `:GONogo:ACTion:SAVE {<Boolean>}`
`:GONogo:ACTion:SAVE?`

Example `:GONOGO:ACTION:SAVE OFF`
`:GONOGO:ACTION:SAVE? -> :GONOGO:ACTION:SAVE 0`

Description Use the ":FILE:DIRECTORY:DRIVE" command to set or query the medium type.

:GONogo:COUNt?

Function Queries the actual number of times the GO/NO-GO determination has been performed.

Syntax `:GONogo:COUNt?`

Example `:GONOGO:COUNT? -> :GONOGO:COUNT 100`

:GONogo:EXECute

Function Executes GO/NO-GO determination. This is an overlap command.

Syntax `:GONogo:EXECute`

Example `:GONOGO:EXECUTE`

:GONogo:LOGic

Function Sets the GO/NO-GO determination logic or queries the current setting.

Syntax `:GONogo:LOGic {AND|OR}`
`:GONogo:LOGic?`

Example `:GONOGO:LOGIC AND`
`:GONOGO:LOGIC? -> :GONOGO:LOGIC AND`

:GONogo:MODE

Function Sets the GO/NO-GO determination type or queries the current setting.

Syntax `:GONogo:MODE {OFF|PARameter|ZONE}`
`:GONogo:MODE?`

Example `:GONOGO:MODE PARAMETER`
`:GONOGO:MODE? -> :GONOGO:MODE PARAMETER`

:GONogo:NGCount?

Function Queries the number of NO-GO results.

Syntax `:GONogo:NGCount?`

Example `:GONOGO:NGCOUNT? -> :GONOGO:NGCOUNT 5`

:GONogo:PARameter?

Function Queries all settings related to the parameter determination.

Syntax `:GONogo:PARameter?`

Example
```
:GONOGO:PARAMETER? -> :GONOGO:
PARAMETER:ITEM1:MODE 0;TRACE 1;
TYPE:MAXIMUM 1.0000E+00,
-1.0000E+00;:GONOGO:PARAMETER:
ITEM1:CONDITION OUT;:GONOGO:
PARAMETER:ITEM2:MODE 0;TRACE 1;
TYPE:MINIMUM 1.0000E+00,
-1.0000E+00;:GONOGO:PARAMETER:
ITEM2:CONDITION OUT;:GONOGO:
PARAMETER:ITEM3:MODE 0;TRACE 1;
TYPE:RMS 1.0000E+00,-1.0000E+00;:
GONOGO:PARAMETER:ITEM3:
CONDITION OUT;:GONOGO:PARAMETER:
ITEM4:MODE 0;TRACE 1;TYPE:
AVERAGE 1.0000E+00,-1.0000E+00;:
GONOGO:PARAMETER:ITEM4:
CONDITION OUT
```

:GONogo:PARameter:ITEM<x>?

Function Queries all settings related to waveform parameters.

Syntax `:GONogo:PARameter:ITEM<x>?`
`<x>=1 to 4`

Example
```
:GONOGO:PARAMETER:ITEM1? ->
:GONOGO:PARAMETER:ITEM1:MODE 0;
TRACE 1;TYPE:MAXIMUM 1.0000E+00,
-1.0000E+00;:GONOGO:PARAMETER:
ITEM1:CONDITION OUT
```

:GONogo:PARameter:ITEM<x>:CAUSe?

Function Queries whether or not the waveform parameter is the cause of the NO-GO result.

Syntax `GONogo:PARameter:ITEM<x>:CAUSe?`
`<x>=1 to 4`

Example `:GONOGO:PARAMETER:ITEM1:CAUSE? ->`
`:GONOGO:PARAMETER:ITEM1:CAUSE 1`

Description The query returns a "1" if the parameter is the cause of the NO-GO result or a "0" if it is not.

:GONogo:PARameter:ITEM<x>:CONDition

Function Sets the criteria for each waveform parameter or queries the current setting.

Syntax `:GONogo:PARameter:ITEM<x>:CONDition {IN|OUT}`
`:GONogo:PARameter:ITEM<x>:CONDition?`
`<x>=1 to 4`

Example `:GONOGO:PARAMETER:ITEM1:CONDITION OUT`
`:GONOGO:PARAMETER:ITEM1:CONDITION? -> :GONOGO:PARAMETER:ITEM1:CONDITION OUT`

:GONogo:PARameter:ITEM<x>:MODE

Function Turns the waveform parameter ON/OFF or queries the current setting.

```
Syntax   :GONogo:PARameter:ITEM<x>:MODE
         {<Boolean>}
         :GONogo:PARameter:ITEM<x>:MODE?
Example  :GONOGO:PARAMETER:ITEM<x>:MODE OFF
         :GONOGO:PARAMETER:ITEM<x>:MODE? ->
         :GONOGO:PARAMETER:ITEM<x>:MODE 0
```

:GONogo:PARameter:ITEM<x>:TRACe

Function Sets the waveform on which to use the waveform parameter or queries the current setting.

```
Syntax   :GONogo:PARameter:ITEM<x>:TRACe
         {<NRf>|MATH<x>}
         :GONogo:PARameter:ITEM<x>:TRACe?
         The <x> in ITEM<x>=1 to 4
         <NRf>=1 to 4 (or 1-2 for the
         DL1720)
         The <x> in MATH<x>=1 or 2 (or 1 for
         the DL1720)
Example  :GONOGO:PARAMETER:ITEM1:TRACE 1
         :GONOGO:PARAMETER:ITEM1:TRACE? ->
         :GONOGO:PARAMETER:ITEM1:TRACE 1
```

:GONogo:PARameter:ITEM<x>:TYPE?

Function Queries the waveform parameter and the upper and lower limits.

```
Syntax   :GONogo:PARameter:ITEM<x>:TYPE?
         <x>=1 to 4
Example  :GONOGO:PARAMETER:ITEM1:TYPE? ->
         :GONOGO:PARAMETER:ITEM1:TYPE:
         PTOPEAK 2.000E+00,1.000E+00
```

:GONogo:PARameter:ITEM<x>:TYPE:<parameter>

Function Sets the upper and lower limits of each waveform parameter or queries the current setting.

```
Syntax   :GONogo:PARameter:ITEM<x>:TYPE:
         <parameter> {<{voltage|DONTcare}>,
         <{voltage|DONTcare}>|<{time|DONTcare}>,
         <{time|DONTcare}>|<{frequency|DONTcare}>,
         <frequency|DONTcare}>|<{{<NRf>}|
         DONTcare}>,<{{<NRf>}|DONTcare}>}
         :GONogo:PARameter:ITEM<x>:TYPE:
         <parameter>?
         <parameter>={AVERage|AVGFreq|
                     AVGPeriod|BWIDth1|
                     BWIDth2|DELay|
                     DUTYcycle|FALL|
                     FREQuency|HIGH|LOW|
                     MAXimum|MINimum|
                     NOVershoot|NWIDth|
                     PERiod|PNUMber|
                     POVershoot|PTOPeak|
                     PWIDth|RISE|RMS|
                     SDEViation|TY1Integ|
                     TY2Integ|XY1Integ|
                     XY2Integ}
         <voltage>,<time>,<frequency>,<NRf>=
         See the IM701710-01E User's Manual.
Example  :GONOGO:PARAMETER:ITEM1:TYPE:
         AVERAGE 100mV,-100mV
         :GONOGO:PARAMETER:ITEM1:TYPE:
         AVERAGE? -> :GONOGO:PARAMETER:
         ITEM1:TYPE:AVERAGE 100.0E-03,
         -100.0E-03
```

Description Only the parameters that are set using this command can be queried.

:GONogo:PARameter:ITEM<x>:VALue?

Function Queries the measured value of each waveform parameter.

```
Syntax   :GONogo:PARameter:ITEM<x>:VALue?
         <x>=1 to 4
Example  :GONOGO:PARAMETER:ITEM1:VALUE? ->
         :GONOGO:PARAMETER:ITEM1:
         VALUE 1.98E-03
```

Description If the measurement is not possible (the mode is OFF, for example), "NAN(Not A Number)" is returned.

:GONogo:SEQuence

Function Selects single or continuous action or queries the current setting.

```
Syntax   :GONogo:SEQuence {CONTinuous|
         SINGle}
         :GONogo:SEQuence?
Example  :GONOGO:SEQUENCE SINGLE
         :GONOGO:SEQUENCE? -> :GONOGO:
         SEQUENCE SINGLE
```

:GONogo:STOPcount

Function Sets the number of waveform acquisitions on which to perform GO/NO-GO determination or queries the current setting.

Syntax
```
:GONogo:STOPcount {<NRf>|INFinity}
:GONogo:STOPcount?
<NRf>=1 to 65536
```

Example
```
:GONOGO:PARAMETER:STOPCOUNT 10
:GONOGO:PARAMETER:STOPCOUNT? ->
:GONOGO:STOPCOUNT 10
```

:GONogo:TLINkage

Function Turns ON/OFF the linked movement of the determination range cursor of the GO/NO-GO determination.

Syntax
```
:GONogo:TLINkage {<Boolean>}
:GONogo:TLINkage?
```

Example
```
:GONOGO:TLINKAGE ON
:GONOGO:TLINKAGE? ->GONOGO:
TLINKAGE 1
```

:GONogo:TRANge

Function Sets the range over which to perform GO/NO-GO determination or queries the current setting.

Syntax
```
:GONogo:TRANge {<NRf>},{<NRf>}
:GONogo:TRANge?
<NRf>=-5.00 to 5.00 (10 div/
displayed record length steps)
```

Example
```
:GONOGO:TRANGE -5.00,5.00
:GONOGO:TRANGE? -> :GONOGO:
TRANGE -5.00,5.00
```

:GONogo:WAIT?

Function Waits for the GO/NO-GO determination to complete with a timeout.

Syntax
```
:GONogo:WAIT? {<NRf>}
<NRf>=0 to 8640000 (in units of 10
ms)
```

Example
```
(Set the timeout to 5 s.)
:GONOGO:WAIT? 500 -> :GONOGO:WAIT 0
```

Description Returns "1" if it times out, "0" if it completes before timing out.

:GONogo:ZONE?

Function Queries all settings related to zone determination.

Syntax
```
:GONogo:ZONE?
```

Example
```
:GONOGO:ZONE? -> :GONOGO:ZONE:ZONE1:
TRACE 1;MODE 0;CONDITION OUT;:
GONOGO:ZONE:ZONE2:TRACE 2;MODE 0;
CONDITION OUT;:GONOGO:ZONE:ZONE3:
TRACE 3;MODE 0;CONDITION OUT;:
GONOGO:ZONE:ZONE4:TRACE 4;MODE 0;
CONDITION OUT;:GONOGO:ZONE:ZONE5:
TRACE MATH1;MODE 0;CONDITION OUT;:
GONOGO:ZONE:ZONE6:TRACE MATH2;
MODE 0;CONDITION OUT
```

:GONogo:ZONE:EDIT<x>:EXIT

Function Exits from the edit menu of the zone for zone determination.

Syntax
```
:GONogo:ZONE:EDIT<x>:EXIT {<NRf>|
QUIT}
<X>= 1 to 12 (1 to 4 are traces; 5
and 6 is MATH1 and 2; 7 to 12 are
determination zones 1 to 6.)
(on the DL1720, <x>=1, 2, 5, 7, 8,
or 9 (1 to 2 for each trace, 5 for
MATH1, and 7 to 9 for zones 1 to 3)
<NRf>=1 to 6 (destination zone No.
for saving the zone being edited
(or <NRf>=1 to 3 for the DL1720))
```

Example
```
:GONOGO:ZONE:EDIT1:EXIT 1
```

Description This command must be issued to keep the zones specified using "GONogo:ZONE:EDIT<x>:{PART|WHOLe}." An error occurs if this command is issued when the zone is not being edited.

:GONogo:ZONE:EDIT<x>:PART

Function Edits a portion of the zone for zone determination.

Syntax
```
:GONogo:ZONE:EDIT<x>:PART
{<NRf>,<NRf>,<NRf>,<NRf>}
<X>= 1 to 12 (1 to 4 are traces; 5
and 6 is MATH1 and 2; 7 to 12 are
determination zones 1 to 6.)
(on the DL1720, <x>=1, 2, 5, 7, 8,
or 9 (1 to 2 for each trace, 5 for
MATH1, and 7 to 9 for zones 1 to 3)
<NRf>=-5.00 to 5.00 (div, 0.01
steps: T1 and T2 cursor)
-8.00 to 8.00 (div, 0.05 steps: up
and down)
(in the order T1, T2, ↑, and ↓)
```

Example
```
:GONOGO:ZONE:EDIT1:PART -
2.50,2.50,1.00,
1.00
```

Description When you finish editing, you must exit the edit mode using the "GONogo:ZONE:EDIT<x>:EXIT" command to keep the new zone.

:GONogo:ZONE:EDIT<x>:WHOLe

Function Edits the zone for zone determination.

Syntax :GONogo:ZONE:EDIT<x>:WHOLe
{<NRf>,<NRf>,<NRf>,<NRf>}
<X>= 1 to 12 (1 to 4 are traces; 5 and 6 is MATH1 and 2; 7 to 12 are determination zones 1 to 6.)
(on the DL1720, <x>=1, 2, 5, 7, 8, or 9 (1 to 2 for each trace, 5 for MATH1, and 7 to 9 for zones 1 to 3)
<NRf>=0 to 5.00 (div, 0.01 steps: left and right)
0 to 8.00 (div, 0.05 steps: up and down)
(in the order <-, ->, ↑, and ↓)

Example :GONOGO:ZONE:EDIT1:WHOLE -2.50,
2.50,1.00,1.00

Description When you finish editing, you must exit the edit mode using the "GONogo:ZONE:EDIT<x>:EXIT" command to keep the new zone.

:GONogo:ZONE:ZONE<x>?

Function Queries all settings related to zone determination of the specified zone.

Syntax :GONogo:ZONE:ZONE<x>?
<x>=1 to 6 (or 1-3 for the DL1720)

Example :GONOGO:ZONE:ZONE1? -> :GONOGO:
ZONE:ZONE1:TRACE 1;MODE 0;
CONDITION OUT

:GONogo:ZONE:ZONE<x>:CAUSe?

Function Queries whether or not the specified zone for zone determination is the cause of the NO-GO result.

Syntax :GONogo:ZONE:ZONE<x>:CAUSe?
<x>=1 to 6 (or 1-3 for the DL1720)

Example :GONOGO:ZONE:ZONE1:CAUSE? ->
:GONOGO:ZONE:ZONE1:CAUSE 1

Description The query returns a "1" if the zone is the cause of the NO-GO result or a "0" if it is not.

:GONogo:ZONE:ZONE<x>:CONDition

Function Sets the criteria for the zone for zone determination or queries the current setting.

Syntax :GONogo:ZONE:ZONE<x>:CONDition {IN
|OUT}
:GONogo:ZONE:ZONE<x>:CONDition?
<x>=1 to 6 (or 1-3 for the DL1720)

Example :GONOGO:ZONE:ZONE1:CONDITION IN
:GONOGO:ZONE:ZONE1:CONDITION? ->
:GONOGO:ZONE:ZONE1:CONDITION IN

:GONogo:ZONE:ZONE<x>:MODE

Function Turns ON/OFF the determination of the zone or queries the current setting.

Syntax :GONogo:ZONE:ZONE<x>:MODE
{<Boolean>}
:GONogo:ZONE:ZONE<x>:MODE?
<x>=1 to 6 (or 1-3 for the DL1720)

Example :GONOGO:ZONE:ZONE1:MODE ON
:GONOGO:ZONE:ZONE1:MODE? ->
:GONOGO:ZONE:ZONE1:MODE 1

:GONogo:ZONE:ZONE<x>:SEND

Function Sets the zone data specified for the determination zone or queries the current setting.

Syntax :GONogo:ZONE:ZONE<x>:SEND #6004028
(data string)
:GONnogo:ZONE:ZONE<x>:SEND?
<x>=1 to 6 (or 1-3 for the DL1720)

Example :GONOGO:ZONE:ZONE1:SEND #6004028
(data string)
:GONOGO:ZONE:ZONE1:SEND? ->
:GONOGO:ZONE:ZONE1:
SEND #6004028(data string)

Description
- The (data string) consists of zone data of length 4028 bytes.
- Zone data consist of 8-bit data (0 to 255). This data string may contain ASCII codes "0AH" or "00H" that stand for "NL." Hence, care must be taken when programming the controller.
- This command is used to save the zone data to the PC and set the data as zone data on the instrument.
- When this command is used to set the zone data to the instrument to perform the determination, issue the "GONogo:ZONE:ZONE<x>:MODE ON" command afterwards.

:GONogo:ZONE:ZONE<x>:TRACe

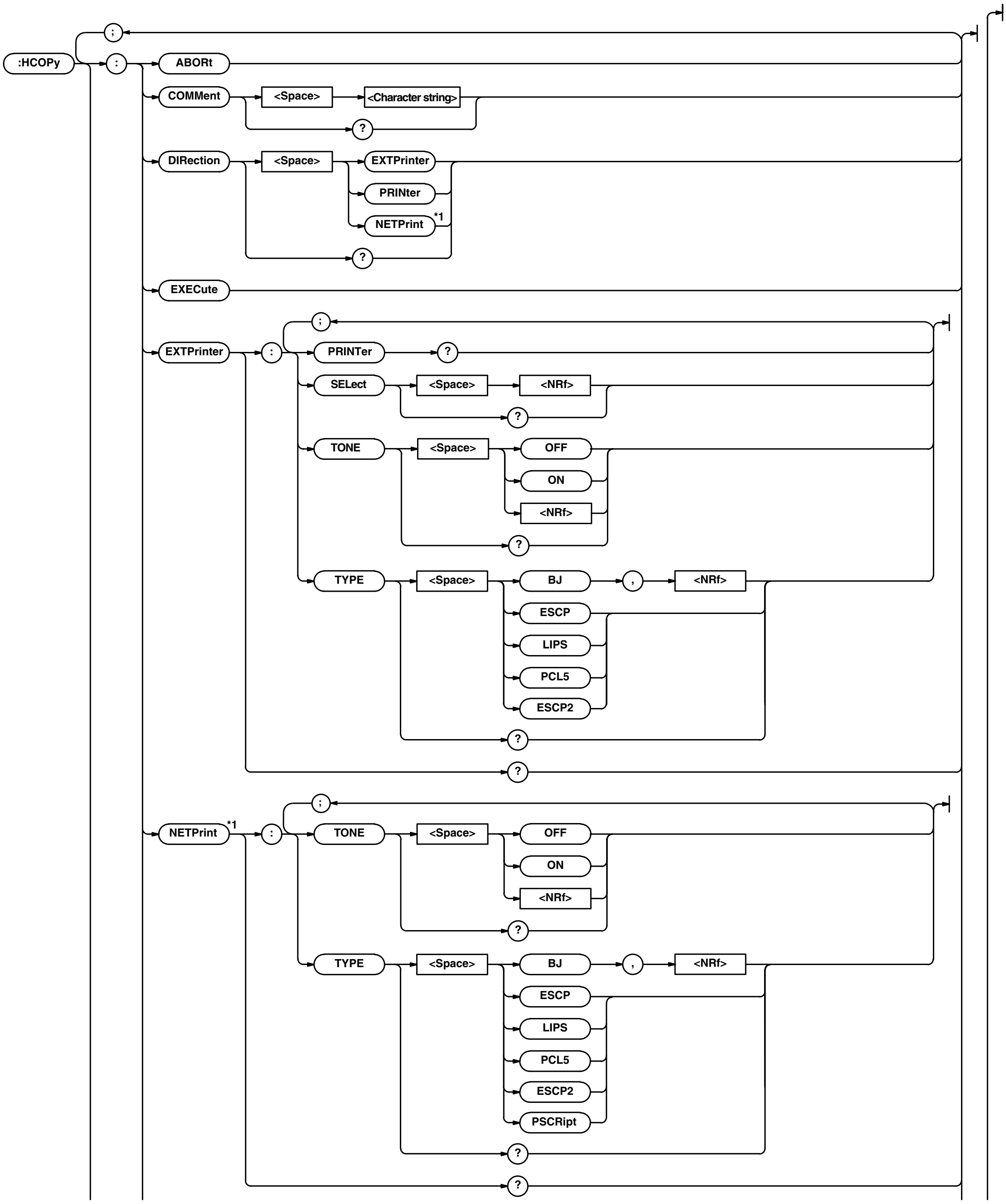
Function Sets the target trace for the zone for zone determination or queries the current setting.

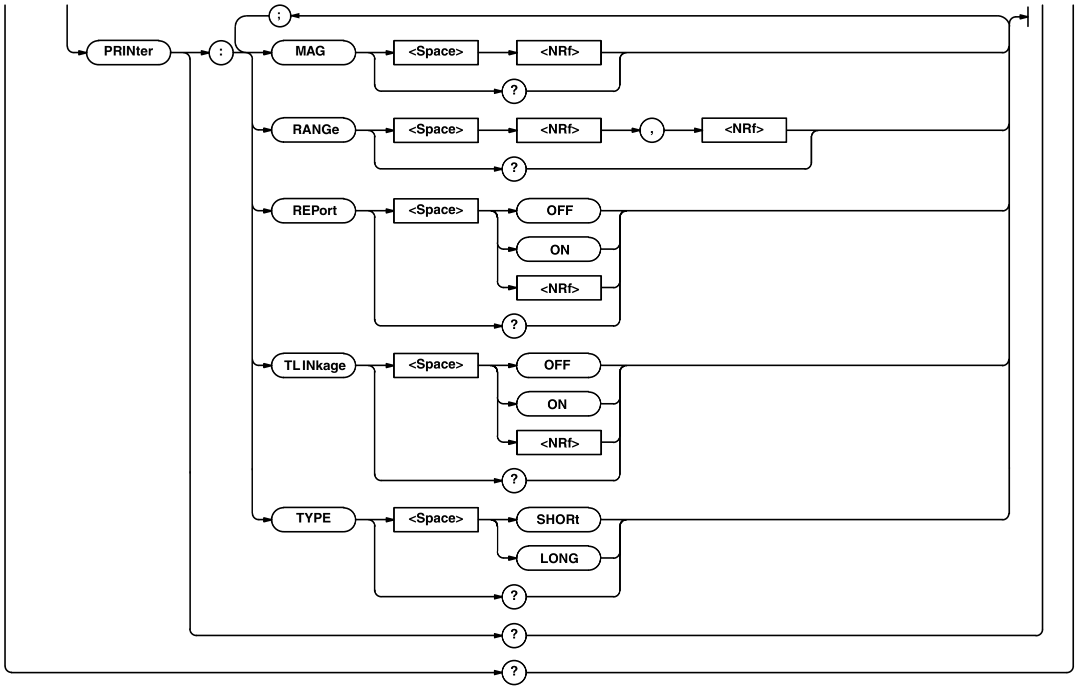
Syntax :GONogo:ZONE:ZONE<x>:TRACe
{<NRf>|MATH<y>}
:GONogo:ZONE:ZONE<x>:TRACe?
<NRf>=1 to 4 (or 1-2 for the DL1720)
<x>=1 to 6 (or 1-3 for the DL1720)
<y>=1,2 (or 1 for the DL1720)

Example :GONOGO:ZONE:ZONE1:TRACE 1
:GONOGO:ZONE:ZONE1:TRACE ->
:GONOGO:ZONE:ZONE1:TRACE 1

6.12 HCOPy Group

The commands in the HCOPy group are used to make settings and queries about screen image data output, for example, output to the optional built-in printer. You can make the same settings that you can make by pressing **SHIFT**, then pressing **COPY**.





*1 Can be used when the Ethernet interface (option) is installed.

:HCOPy? (Hard COPY)

Function Queries all settings relating to output of screen image data.

Syntax :HCOPy?

Example :HCOPY? -> :HCOPY:DIRECTION PRINTER;PRINTER:TYPE SHORT;REPORT 0;MAG 2.0;TLINKAGE 0;RANGE -5.0000000,5.0000000;:HCOPY:EXTPRINTER:TYPE ESCP;TONE 0;SELECT NAN;:HCOPY:NETPRINT:TYPE ESCP;TONE 0;:HCOPY:COMMENT ""

:HCOPy:ABORt

Function Aborts data output and paper feed.

Syntax :HCOPy:ABORt

Example :HCOPY:ABORT

:HCOPy:COMMent

Function Sets/queries the comment to be displayed at the screen.

Syntax :HCOPy:COMMent <Character string>
:HCOPy:COMMent?
<Character string>=Within 20 characters

Example :HCOPY:COMMENT "THIS IS TEST."
:HCOPY:COMMENT? -> :HCOPY:COMMENT "THIS IS TEST."

:HCOPy:DIRection

Function Sets/queries the data output destination.

Syntax :HCOPy:DIRection {EXTPrinter|PRINter|NETPrint}
:HCOPy:DIRection?

Example :HCOPY:DIRECTION PRINTER
:HCOPY:DIRECTION? -> :HCOPY:DIRECTION PRINTER

Description "NETPrint" can be used when the Ethernet interface (option) is installed.

:HCOPy:EXECute

Function Executes data output. This is an overlap command.

Syntax :HCOPy:EXECute

Example :HCOPY:EXECute

:HCOPy:EXTPrinter?

Function Queries all setting values relating to the output to the external printer.

Syntax :HCOPy:EXTPrinter?

Example :HCOPY:EXTPRINTER? -> :HCOPY:EXTPRINTER:TYPE BJ,360;TONE 1

:HCOPy:EXTPrinter:PRINter?

Function Outputs the addresses of all the printers that are currently connected.

Syntax :HCOPy:EXTPrinter:PRINter?

Example (The following is an example when printers are connected to address 2 and 3.)
:HCOPY:EXTPRINTER:PRINTER? ->
:HCOPY:EXTPRINTER:PRINTER 2,3

:HCOPy:EXTPrinter:SELect

Function Sets the printer address or queries the current setting.

Syntax `:HCOPy:EXTPrinter:SELect {<NRf>}`
`:HCOPy:EXTPrinter:SELect?`
`<NRf>=1 to 127`

Example `:HCOPY:EXTPRINTER:SELECT 3`
`:HCOPY:EXTPRINTER:SELECT? ->`
`:HCOPY:EXTPRINTER:SELECT 3`

Description If you specify an address at which no printer is connected, an error occurs. In this case, "NAN (Not A Number)" is returned.

:HCOPy:EXTPrinter:TONE

Function Sets/queries the half tone setting for the external printer.

Syntax `:HCOPy:EXTPrinter:TONE {<Boolean>}`
`:HCOPy:EXTPrinter:TONE?`

Example `:HCOPY:EXTPRINTER ON`
`:HCOPY:EXTPRINTER? -> :HCOPY:`
`EXTPRINTER TONE 1`

:HCOPy:EXTPrinter:TYPE

Function Sets/queries the command type to output to the external printer.

Syntax `:HCOPy:EXTPrinter:TYPE {BJ,<NRf>|`
`ESCP|LIPS|PCL5|ESCP2}`
`:HCOPy:EXTPrinter:TYPE?`
`<NRf>=180, 300 or 360 (dpi)`

Example `:HCOPY:EXTPRINTER:TYPE BJ,360`
`:HCOPY:EXTPRINTER:TYPE? -> :HCOPY:`
`EXTPRINTER:TYPE BJ,360`

Description <NRf> is specified only when the type is set to "BJ."

:HCOPy:NETprint?

Function Queries all settings values involving output to network printers.

Syntax `:HCOPy:NETPrint?`

Example `:HCOPY:NETPRINT? -> :HCOPY:`
`NETPRINT:TYPE POSTSCRIPT;TONE 1`

Description Can be used when the Ethernet interface (option) is installed.

:HCOPy:NETprint:TONE

Function Sets/queries halftones for output to network printers.

Syntax `:HCOPy:NETPrint:TONE {<Boolean>}`
`:HCOPy:NETPrint:TONE?`

Example `:HCOPY:NETPRINT:TONE ON`
`:HCOPY:NETPRINT:TONE? -> :HCOPY:`
`NETPRINT:TONE 1`

Description Can be used when the Ethernet interface (option) is installed.

:HCOPy:NETprint:TYPE

Function Sets/queries command types for output to network printers.

Syntax `:HCOPy:NETPrint:TYPE {BJ,<NRf>|`
`ESCP|LIPS|PCL5|ESCP2|PSCRipt}`
`:HCOPy:NETPrint:TYPE?`

Example `:HCOPY:NETPRINT:TYPE PSCRIPT`
`:HCOPY:NETPRINT:TYPE? -> :HCOPY:`
`NETPRINT:TYPE PSCRIPT`

Description <NRf> is specified only when the type is set to "BJ." Can be used when the Ethernet interface (option) is installed.

:HCOPy:PRINter?

Function Queries all settings relating to the built-in printer.

Syntax `:HCOPy:PRINter?Example`
`:HCOPY:PRINTER? -> :HCOPY:PRINTER:`
`TYPE SHORT;REPORT 0;TLINKAGE 0;`
`RANGE -5.00,5.00;MAG 2`

:HCOPy:PRINter:MAG

Function Sets the zoom rate to use when using the long copy function to print to the built-in printer or queries the current setting.

Syntax `:HCOPy:PRINter:MAG {<NRf>}`
`:HCOPy:PRINter:MAG?`
`<NRf>=2 to 25000 (See the IM701710-`
`01E User's Manual.)`

Example `:HCOPY:PRINTER:MAG 1`
`:HCOPY:PRINTER:MAG? -> :HCOPY:`
`PRINTER:MAG 1`

:HCOPy:PRINter:RANGe

Function Sets the output range when using the long copy function to print to the built-in printer or queries the current setting.

Syntax `:HCOPy:PRINter:RANGe`
`{<NRf>},{<NRf>}`
`:HCOPy:PRINter:RANGe?`
`<NRf>=-5.00 to 5.00 (10 div/`
`displayed record length steps)`

Example `:HCOPY:PRINTER:RANGE -2.50,2.50`
`:HCOPY:PRINTER:RANGE? -> :HCOPY:`
`PRINTER:RANGE -2.50,2.50`

:HCOPy:PRINter:REPort

Function Sets whether or not to output additional information to the built-in printer or queries the current setting.

Syntax `:HCOPy:PRINter:REPort {<Boolean>}`
`:HCOPy:PRINter:REPort?`

Example `:HCOPY:PRINTER:REPORT ON`
`:HCOPY:PRINTER:REPORT? -> :HCOPY:`
`PRINTER:REPORT 1`

:HCOPy:PRINter:TLINkage

Function Turns ON/OFF the linked movement of the output range cursor during long copy.

```
Syntax     :HCOPy:PRINter:TLINkage {<Boolean>}
           :HCOPy:PRINter:TLINkage?
Example    :HCOPY:PRINTER:TLINKAGE ON
           :HCOPY:PRINTER:TLINKAGE -> :HCOPY:
           PRINTER:TLINKAGE 1
```

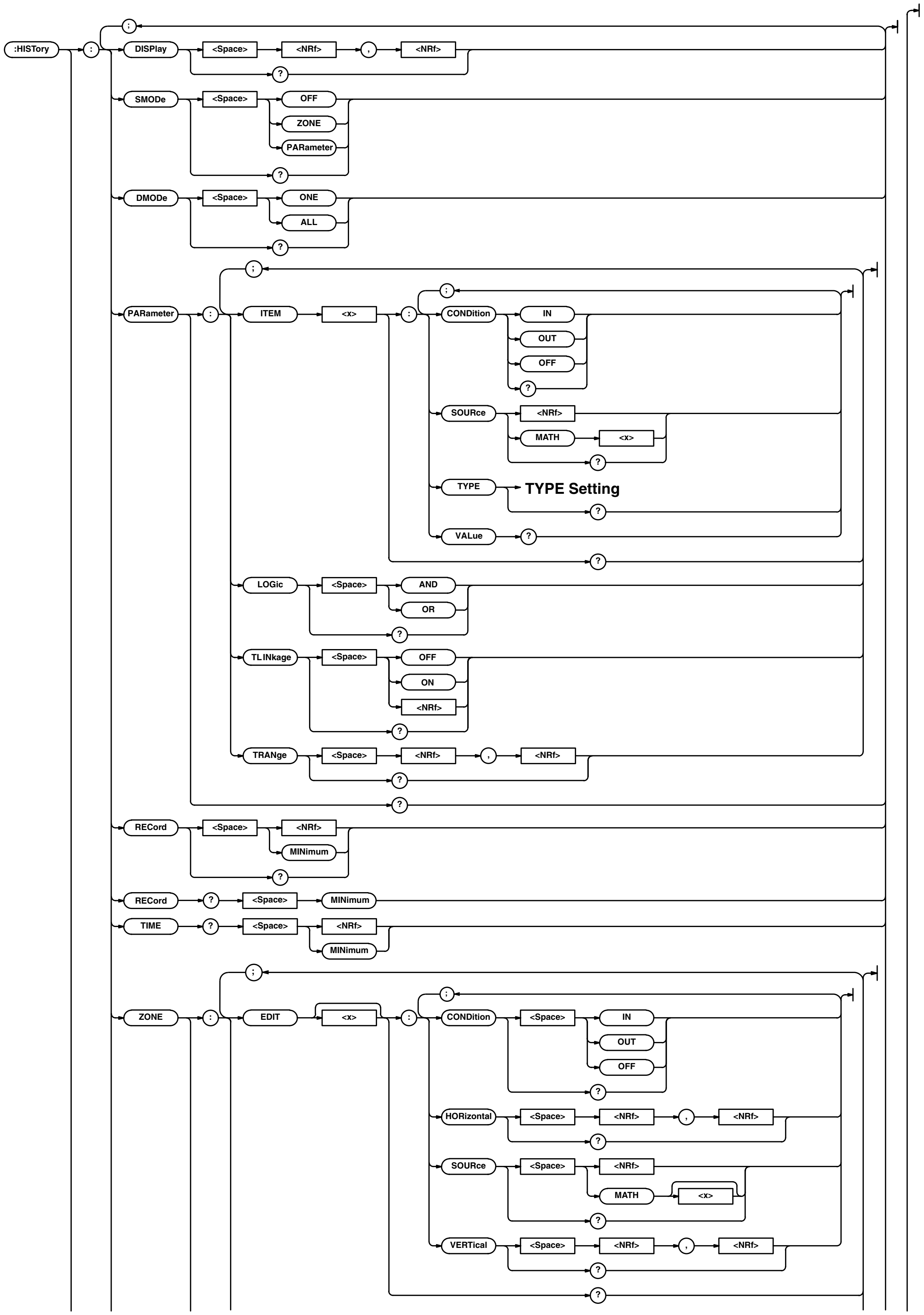
:HCOPy:PRINter:TYPE

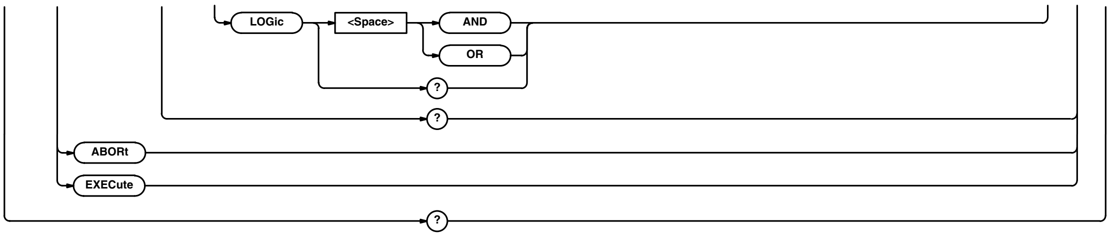
Function Selects short copy or long copy when printing to the built-in printer or queries the current setting.

```
Syntax     :HCOPy:PRINter:TYPE {LONG|SHORt}
           :HCOPy:PRINter:TYPE?
Example    :HCOPY:PRINTER:TYPE SHORT
           :HCOPY:PRINTER:TYPE? -> :HCOPY:
           PRINTER:TYPE SHORT
```

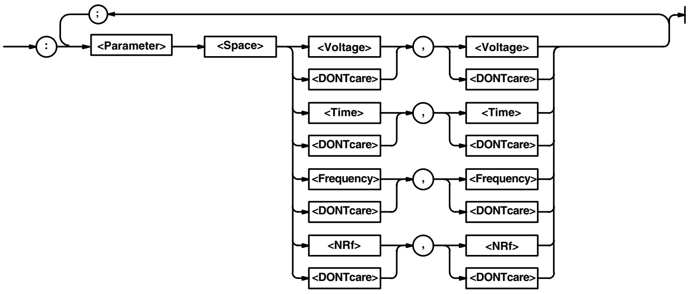
6.13 HISTory Group

The commands in the HISTory group are used to make settings and queries about recalling of data from the history memory. You can make the same settings that you can make using **HISTORY** on the front panel.





TYPE Setting



:HIStory?

Function Queries all settings relating to the history memory function.

Syntax `:HIStory?`

Example

```
:HISTORY? -> :HISTORY:RECORD 0;
DMODE ONE;DISPLAY 0,-127;SMODE OFF;
ZONE:EDIT1:CONDITION OFF;SOURCE 1;
HORIZONTAL 0.50,-0.50;
VERTICAL -3.0000000,-2.5000000;:
HISTORY:ZONE:EDIT2:CONDITION OFF;
SOURCE 1;HORIZONTAL 0.50,-0.50;
VERTICAL -1.0000000,-0.5000000;:
HISTORY:ZONE:EDIT3:CONDITION OFF;
SOURCE 1;HORIZONTAL 0.50,-0.50;
VERTICAL 1.0000000,1.5000000;:
HISTORY:ZONE:EDIT4:CONDITION OFF;
SOURCE 1;HORIZONTAL 0.50,-0.50;
VERTICAL 3.0000000,3.5000000;:
HISTORY:ZONE:LOGIC AND;:HISTORY:
PARAMETER:ITEM1:CONDITION OFF;
SOURCE 1;TYPE:PTOPEAK DONTCARE,
DONTCARE;:HISTORY:PARAMETER:ITEM2:
CONDITION OFF;SOURCE 1;TYPE:
MAXIMUM DONTCARE,DONTCARE;:HISTORY:
PARAMETER:ITEM3:CONDITION OFF;
SOURCE 1;TYPE:MINIMUM DONTCARE,
DONTCARE;:HISTORY:PARAMETER:ITEM4:
CONDITION OFF;SOURCE 1;TYPE:RMS
DONTCARE,DONTCARE;:HISTORY:
PARAMETER:LOGIC AND;TLINKAGE 0;
TRANGE -5.0000000,5.0000000
```

:HIStory:ABORt

Function Aborts the search.

Syntax `:HIStory:ABORt`

Example `:HISTORY:ABORT`

:HIStory:DISPlay

Function Sets the start/end number of the display record or queries the current setting.

Syntax

```
:HIStory:DISPlay {<NRf>,<NRf>}
:HIStory:DISPlay?
<NRf>=0 to -2047
```

Example

```
:HISTORY:DISPLAY 0,-100
:HISTORY:DISPLAY? -> :HISTORY:
DISPLAY 0,-100
```

Description The number of records that can be specified varies depending on the acquisition setting. For details, see the IM701710-01E User's Manual.

:HIStory:EXECute

Function Executes the search. This is an overlap command.

Syntax `:HIStory:EXECute`

Example `:HISTORY:EXECUTE`

:HIStory:DMODe (Display Mode)

Function Sets whether to display one record or all records or queries the current setting.

Syntax

```
:HIStory:DMODe {ONE|ALL}
:HIStory:DMODe?
```

Example

```
:HISTORY:DMODE ALL
:HISTORY:DMODE? -> :HISTORY:
DMODE ALL
```

Description If `"ALL"` is specified, the records that are specified with the `":HIStory:DISPlay"` command are accumulated on the screen.

:HISTory:PARameter?

Function Queries all settings related to the parameter search.

```
Syntax    :HISTory:PARameter?
Example   :HISTORY:PARAMETER? -> :HISTORY:
          PARAMETER:ITEM1:CONDITION OFF;
          SOURCE 1;TYPE:PTOPEAK DONTCARE,
          DONTCARE;:HISTORY:PARAMETER:ITEM2:
          CONDITION OFF;SOURCE 1;TYPE:
          MAXIMUM DONTCARE,DONTCARE;:HISTORY:
          PARAMETER:ITEM3:CONDITION OFF;
          SOURCE 1;TYPE:MINIMUM DONTCARE,
          DONTCARE;:HISTORY:PARAMETER:ITEM4:
          CONDITION OFF;SOURCE 1;TYPE:
          RMS DONTCARE,DONTCARE;:HISTORY:
          PARAMETER:LOGIC AND;TLINKAGE 0;
          TRANGE -5.0000000,5.0000000
```

:HISTory:PARameter:ITEM<x>?

Function Queries all settings related to the specified parameter of the parameter search.

```
Syntax    :HISTory:PARameter:ITEM<x>?
          <x>=1 to 4
Example   :HISTORY:PARAMETER:ITEM1? ->
          :HISTORY:PARAMETER:ITEM1:
          CONDITION OFF;SOURCE 1;TYPE:
          PTOPEAK DONTCARE,DONTCARE
```

:HISTory:PARameter:ITEM<x>:CONDition

Function Sets the criteria for the specified parameter of the parameter search or queries the current setting.

```
Syntax    :HISTory:PARameter:ITEM<x>:
          CONDition {OFF|IN|OUT}
          :HISTory:PARameter:ITEM<x>:
          CONDition?
          <x>=1 to 4
Example   :HISTORY:PARAMETER:ITEM1:
          CONDITION IN
          :HISTORY:PARAMETER:ITEM1:CONDITION?
          -> :HISTORY:PARAMETER:ITEM1:
          CONDITION IN
```

:HISTory:PARameter:ITEM<x>:SOURce

Function Sets the trace on which to perform the parameter search of the specified parameter or queries the current setting.

```
Syntax    :HISTory:PARameter:ITEM<x>:SOURce
          {<NRf>|MATH<x>}
          :HISTory:PARameter:ITEM<x>:SOURce?
          The <x> in ITEM<x>=1 to 4
          <NRf>=1 to 4 (or 1-2 for the
          DL1720)
          The <x> in MATH<x>=1 or 2. (or 1
          for the DL1720)
Example   :HISTORY:PARAMETER:ITEM1:SOURCE 1
          :HISTORY:PARAMETER:ITEM1:SOURCE? ->
          :HISTORY:PARAMETER:ITEM1:SOURCE 1
```

:HISTory:PARameter:ITEM<x>:TYPE:<parameter>

Function Sets the upper and lower limits for the specified parameter of the parameter search or queries the current setting.

```
Syntax    :HISTory:PARameter:ITEM<x>:TYPE:
          <parameter> {<{voltage|DONTcare}>,
          <{voltage|DONTcare}>|<{time|DONTcare}>,
          <{time|DONTcare}>|<{frequency|
          DONTcare}>,<frequency|DONTcare}>|
          <{{<NRf>}|DONTcare}>,<{{<NRf>}|
          DONTcare}>}
          :HISTory:PARameter:ITEM<x>:TYPE?
          <x>=1 to 4
          <parameter>= {AVERage|AVGFreq|
                       AVGPeriod|BWIDth1|
                       BWIDth2|DELay|DUTYcycle|
                       FALL|FREQuency|HIGH|LOW|
                       MAXimum|MINimum|
                       NOVershoot|NWIDth|
                       PERiod|PNUMber|POVershoot|
                       PTOPeak|PWIDth|RISE|RMS|
                       SDEViation|xcY1Integ|
                       xcY2Integ|XY1Integ|
                       XY2Integ}
          <voltage>,<time>,<frequency>,<NRf>=
          See the IM701710-01E User's Manual.
Example   :HISTORY:PARAMETER:ITEM1:TYPE:
          AVERAGE 1.00,-1.00
```

:HISTory:PARameter:ITEM<x>:VALue?

Function Queries the measured value of the specified parameter of the parameter search or queries the current setting.

```
Syntax    :HISTory:PARameter:ITEM<x>:VALue?
          <x>=1 to 4
Example   :HISTORY:PARAMETER:ITEM1:VALUE? ->
          :HISTORY:PARAMETER:ITEM1:
          VALUE 1.00E-03
```

:HISTory:PARameter:LOGic

Function Sets the determination logic of the parameter search or queries the current setting.

```
Syntax    :HISTory:PARameter:LOGic {AND|OR}
          :HISTory:PARameter:LOGic?
Example   :HISTORY:PARAMETER:LOGIC AND
          :HISTORY:PARAMETER:LOGIC? ->
          :HISTORY:PARAMETER:LOGIC AND
```

:HISTory:PARameter:TLINkage

Function Turns ON/OFF the linked movement of the determination range cursor of the parameter search.

Syntax
```
:HISTory:PARameter:TLINkage
{<Boolean>}
:HISTory:PARameter:TLINkage?
```

Example
```
:HISTORY:PARAMETER:TLINKAGE ON
:HISTORY:PARAMETER:TLINKAGE ->
:HISTORY:PARAMETER:TLINKAGE 1
```

:HISTory:PARameter:TRANge

Function Sets the range over which to perform the parameter search or queries the current setting.

Syntax
```
:HISTory:PARameter:TRANge
{<NRf>,<NRf>}
:HISTory:PARameter:TRANge?
<NRf>=-5.00 to 5.00 (10 div/
displayed record length steps)
```

Example
```
:HISTORY:PARAMETER:
TRANGE -5.00,5.00
:HISTORY:PARAMETER:TRANGE? ->
:HISTORY:PARAMETER:TRANGE -5.00,5.00
```

:HISTory:RECord

Function Sets the target record or queries the current setting.

Syntax
```
:HISTory:RECord {<NRf>|MINimum}
:HISTory:RECord?
<NRf>=0 to -2047
```

Example
```
:HISTORY:RECORD 0
:HISTORY:RECORD? -> :HISTORY:
RECORD 0
```

Description
- If "MINimum" is specified, the minimum record number is selected.
- The selectable target record varies depending on record length, and interleave mode settings. For details, see the IM701710-01E User's Manual.

:HISTory:RECord? MINimum

Function Queries the minimum record number.

Syntax
```
:HISTory:RECord? MINimum
```

Example
```
:HISTORY:RECORD? MINIMUM -> -999
```

Description The minimum record number varies depending on record length, and interleave mode settings. For details, see the IM701710-01E User's Manual.

:HISTory:SMODe (Search Mode)

Function Sets the history memory's search mode or queries the current setting.

Syntax
```
:HISTory:SMODe {OFF|ZONE|PARameter}
:HISTory:SMODe?
```

Example
```
:HISTORY:SMODE ZONE
:HISTORY:SMODE? -> :HISTORY:
SMODE ZONE
```

:HISTory:TIME?

Function Queries the time of the specified record number.

Syntax
```
:HISTory:TIME? {<NRf>|MINimum}
```

Example
```
:HISTORY:TIME? -100 -> :HISTORY:
TIME "-0100 10:20:30.40"
```

Description If "MINimum" is specified, the minimum record number is selected.

:HISTory:ZONE?

Function Queries all settings related to zone search.

Syntax
```
:HISTory:ZONE?
```

Example
```
:HISTORY:ZONE? -> :HISTORY:ZONE:
EDIT1:CONDITION OFF;SOURCE 1;
HORIZONTAL 0.50,-0.50;
VERTICAL -3.0000000,-1.0000000;:
HISTORY:ZONE:EDIT2:CONDITION OFF;
SOURCE 1;HORIZONTAL 0.50,-0.50;
VERTICAL -1.0000000,1.0000000;:
HISTORY:ZONE:EDIT3:CONDITION OFF;
SOURCE 1;HORIZONTAL 0.50,-0.50;
VERTICAL 1.0000000,3.0000000;:
HISTORY:ZONE:EDIT4:CONDITION OFF;
SOURCE 1;HORIZONTAL 0.50,-0.50;
VERTICAL 3.0000000,-2.5000000;:
HISTORY:ZONE:LOGIC AND
```

:HISTory:ZONE:EDIT<x>

Function Queries all settings related to all zone cursors.

Syntax
```
:HISTory:ZONE:EDIT<x>?
<x>=1 to 4
```

Example
```
:HISTORY:ZONE:EDIT1? -> :HISTORY:
ZONE:EDIT1:CONDITION OFF;SOURCE 1;
HORIZONTAL 0.50,-0.50;
VERTICAL -3.0000000,-1.0000000
```

:HISTory:ZONE:EDIT<x>:CONDition

Function Sets the search condition of the zone cursor or queries the current setting.

Syntax
```
:HISTory:ZONE:EDIT<x>:CONDition
{OFF|IN|OUT}
:HISTory:ZONE:EDIT<x>:CONDition?
<x>=1 to 4
```

Example
```
:HISTORY:ZONE:EDIT1:CONDITION IN
:HISTORY:ZONE:EDIT1:CONDITION? ->
:HISTORY:ZONE:EDIT1:CONDITION IN
```

Description Use EDIT<x> to specify the zone cursor.

:HISTory:ZONE:EDIT<x>:HORizontal

Function Sets the vertical position (upper and lower values) of the specified zone cursor or queries the current setting.

```
Syntax      :HISTory:ZONE:EDIT<x>:HORizontal
            {<NRf>,<NRf>}
            :HISTory:ZONE:EDIT<x>:HORizontal?
            <x>=1 to 4
            <NRf>=-4 to 4 div (0.01 steps, in
            the order Upper and Lower)
Example     :HISTORY:ZONE:EDIT1:
            HORIZONTAL 4.00,-4.00
            :HISTORY:ZONE:EDIT1:HORIZONTAL? ->
            :HISTORY:ZONE:EDIT1:
            HORIZONTAL 4.00,-4.00
```

Description Use EDIT<x> to specify the zone cursor.

:HISTory:ZONE:EDIT<x>:SOURce

Function Sets the waveform on which to use the specified zone cursor or queries the current setting.

```
Syntax      :HISTory:ZONE:EDIT<x>:SOURce
            {<NRf>|MATH<x>}
            :HISTory:ZONE:EDIT<x>:SOURce?
            <x>=1 to 4
            <NRf>=1 to 4 (or 1-2 for the
            DL1720)
            The <x> in MATH<x>=1 or 2 (or 1 for
            the DL1720)
Example     :HISTORY:ZONE:EDIT1:SOURCE 1
            :HISTORY:ZONE:EDIT1:SOURCE? ->
            :HISTORY:ZONE:EDIT1:SOURCE 1
```

Description Use EDIT<x> to specify the zone cursor.

:HISTory:ZONE:EDIT<x>:VERTical

Function Sets the horizontal position (left and right values) of the specified zone cursor or queries the current setting.

```
Syntax      :HISTory:ZONE:EDIT<x>:VERTical
            {<NRf>,<NRf>}
            :HISTory:ZONE:EDIT<x>:VERTical?
            <x>=1 to 4
            <NRf>=-5 to 5 div (10 div/displayed
            record length steps, in the order
            left and right)
Example     :HISTORY:ZONE:EDIT1:VARTICAL -2,2
            :HISTORY:ZONE:EDIT1:VARTICAL? ->
            :HISTORY:ZONE:EDIT1:
            VARTICAL -2.0000000,2.0000000
```

Description Use EDIT<x> to specify the zone cursor.

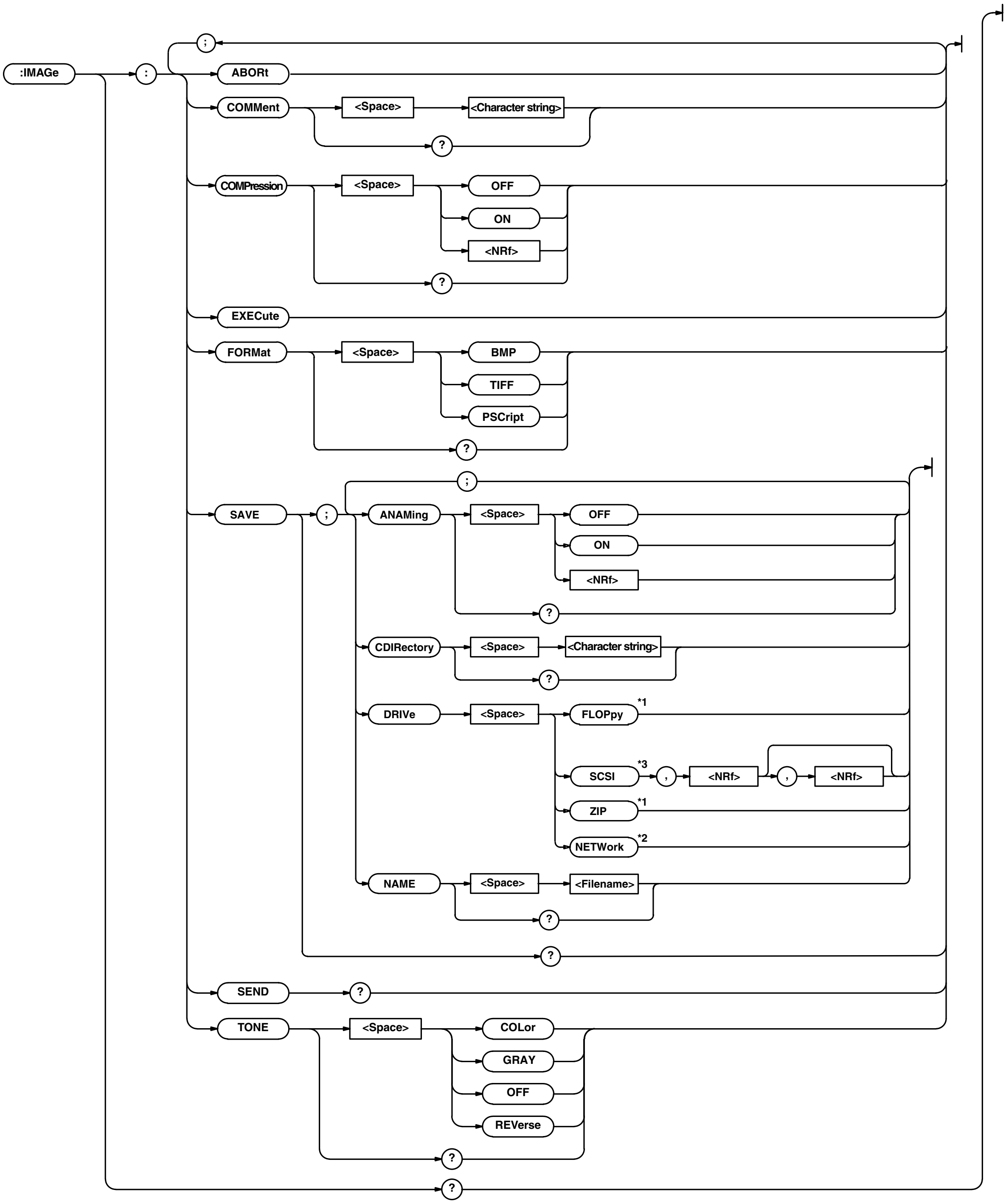
:HISTory:ZONE:LOGic

Function Sets the search logic between zone cursors or queries the current setting.

```
Syntax      :HISTory:ZONE:LOGic {AND|OR}
            :HISTory:ZONE:LOGic?
Example     :HISTORY:ZONE:LOGIC AND
            :HISTORY:ZONE:LOGIC? -> :HISTORY:
            ZONE:LOGIC AND
```

6.14 IMAGe Group

Use this group to set or query the screen image data output settings. You can make the same settings, execute the same operations, and make the same inquiries of settings as when (**SHIFT**+) **IMAGE SAVE** on the front panel is used.



*1 "FLOPpy" can be used when the built-in floppy disk drive is available; "ZIP" can be used when the built-in Zip drive is available.

*2 "NETWork" can be used when the Ethernet interface (option) is installed.

*3 "SCSI" can be used when the SCSI + serial interface (option) is installed.

:IMAGe?

Function Queries all screen image data output settings.

Syntax `IMAGe?`

Example `:IMAGE? -> :IMAGE:FORMAT TIFF;TONE OFF;COMMENT "";COMPRESSION 0;SAVE:ANAMING 1;NAME ""`

:IMAGe:ABORt

Function Aborts saving the screen image data to the storage medium.

Syntax `:IMAGe:ABORt`

Example `:IMAGE:ABORT`

:IMAGe:COMMent

Function Sets the comment at the lower right corner of the screen or queries the current setting.

Syntax `:IMAGe:COMMent <Character string>`
`:IMAGe:COMMent?`

Example `:IMAGE:COMMENT "THIS IS TEST."`
`:IMAGE:COMMENT? -> :IMAGE:COMMENT "THIS IS TEST."`

:IMAGe:COMPression

Function Enables or disables the screen data compression of the BMP format or queries the current setting.

Syntax `:IMAGe:COMPression {<Boolean>}`
`:IMAGe:COMPression?`

Example `:IMAGE:COMPRESSION ON`
`:IMAGE:COMPRESSION? -> :IMAGE:COMPRESSION 1`

Description This setting is valid when saving to the external storage medium.

:IMAGe:EXECute

Function Stores the screen image data to the storage medium.

Syntax `:IMAGe:EXECute`

Example `:IMAGE:EXECUTE`

:IMAGe:FORMat

Function Sets/queries the screen image data output format.

Syntax `:IMAGe:FORMat {TIFF|BMP|PSCRipt}`
`:IMAGe:FORMat?`

Example `:IMAGE:FORMAT TIFF`
`:IMAGE:FORMAT? -> :IMAGE:FORMAT TIFF`

:IMAGe:SAVE?

Function Queries all settings related to file output.

Syntax `:IMAGe:SAVE?`

Example `:IMAGE:SAVE? -> :IMAGE:SAVE:DRIVE FLOPPY;DIRECTORY "NO_1";ANAMING 0;NAME "DISP_1"`

:IMAGe:SAVE:ANAMing

Function Turns ON/OFF the auto naming function of output file names or queries the current setting.

Syntax `:IMAGe:ANAMing {<Boolean>}`
`:IMAGe:SAVE:ANAMing?`

Example `:IMAGE:ANAMING ON`
`:IMAGE:SAVE:ANAMING? -> :IMAGE:SAVE:ANAMING 1`

:IMAGe:SAVE:CDIRectory

Function Changes the file directory.

Syntax `:IMAGe:SAVE:DIRectory <Character string>`
`<Character string>= Up to eight characters.`

Example `:IMAGE:SAVE:DIRECTORY "NO_1"`

:IMAGe:SAVE:DRIVe

Function Sets the medium on which to create the file.

Syntax `:IMAGe:SAVE:DRIVe {FLOPpy|SCSI,<NRf>,[<NRf>]|ZIP|NETWork}`
`:IMAGe:SAVE:DRIVe?`
`The first <NRf> of SCSI=SCSI address (0 to 7)`
`The second <NRf> of SCSI=Partitions (0 to 4)`

Example `:IMAGE:SAVE:DRIVE FLOPPY`
`:IMAGE:SAVE:DRIVE? -> :IMAGE:SAVE:DRIVE FLOPPY`

Description If the drive does not contain partitions, omit the <NRf> corresponding to partitions. `"NETWork"` can be used when the Ethernet interface (option) is installed. `"SCSI"` can be used when the SCSI + serial interface (option) is installed.

:IMAGe:SAVE:NAME

Function Sets the name of the file to be created or queries the current setting.

Syntax `:IMAGe:SAVE:NAME <Filename>`
`:IMAGe:SAVE:NAME?`

Example `:IMAGE:SAVE:NAME "DISP_1"`
`:IMAGE:SAVE:NAME? -> :IMAGE:SAVE:NAME "DISP_1"`

:IMAGe:SEND?

Function Queries screen image data.

Syntax `:IMAGe:SEND?`

Example `:IMAGE:SEND? -> #6 (number of bytes[6-digit value]) (Data byte string) (Block data)`

Description

- Number of bytes in <block data> is {(2+6+Number of data+1(delimiter)}. For information about block data, refer to page 5-6.
- If you specify `":IMAGe:FORMat PSCRipt,"` data are not output. `"#6000000"` is returned.

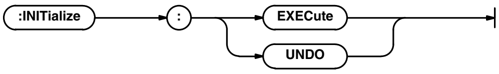
:IMAGe:TONE

Function Sets/queries the color tone of the BMP (TIFF) format of the screen image data to output.

```
Syntax   :IMAGe:TONE {COLor|OFF|REVerse|
         GRAY}
         :IMAGe:TONE?
Example  :IMAGE:TONE COLOR
         :IMAGE:TONE? -> :IMAGE:TONE COLOR
```

6.15 INITialize Group

The commands in the INITialize group are related to initializing. You can make the same settings using the Initialize menu of **SETUP** on the front panel.



:INITialize:EXECute

Function Executes initializing.

```
Syntax   :INITialize:EXECute
Example  :INITIALIZE:EXECUTE
```

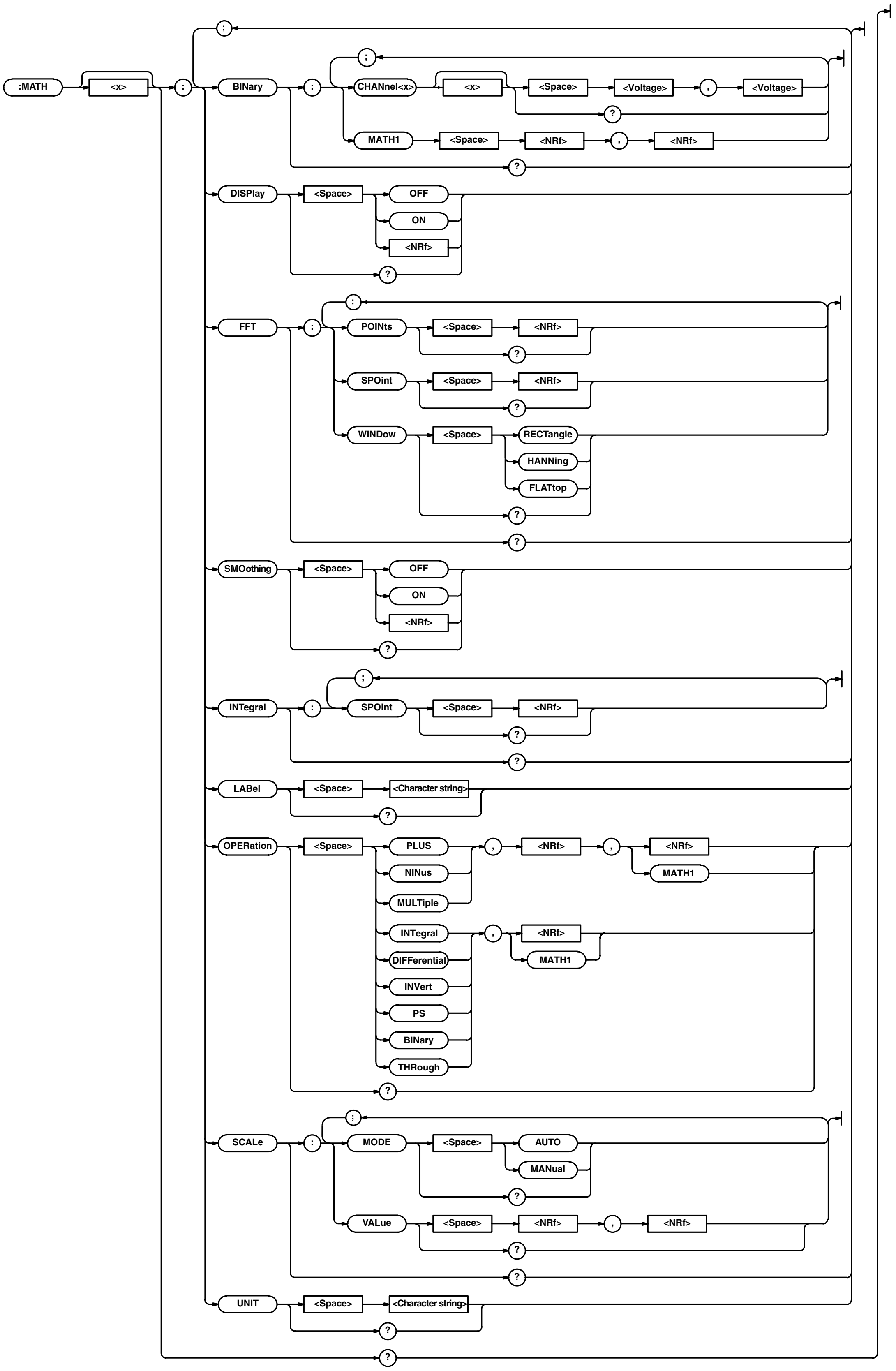
:INITialize:UNDO

Function Nullifies initializing.

```
Syntax   :INITialize:UNDO
Example  :INITIALIZE:UNDO
```

6.16 MATH Group

The commands in the MATH group are used to make settings and queries about computation. You can make the same settings that you can make using **MATH** on the front panel.



:MATH<x>?

Function Queries all settings relating to computation.

Syntax
```
:MATH<x>?
<x>=1, 2 (or 1 for the DL1720)
```

Example
```
:MATH1? -> :MATH1:DISPLAY 0;SCALE:
MODE AUTO;VALUE 400.000E+00,
-400.000E+00;:MATH1:OPERATION PLUS,
1,2;FFT:POINTS 1000;WINDOW HANNING;
SPOINT -5.0000000;:MATH1:BINARY:
CHANNEL1 0.0E+00,0.0E+00;
CHANNEL2 0.0E+00,0.0E+00;
CHANNEL3 0.0E+00,0.0E+00;
CHANNEL4 0.0E+00,0.0E+00;
MATH1 0.00,0.00;:MATH1:INTEGRAL:
SPOINT -5.0000000;:MATH1:
SMOOTHING 0;UNIT "EU";LABEL "Math1"
```

:MATH<x>:BINary?

Function Queries all settings relating to binary computation.

Syntax
```
:MATH<x>:BINary?
<x>=1 or 2 (or 1 for the DL1720)
```

Example
```
:MATH1:BINARY? -> :MATH1:BINARY:
CHANNEL1 0.0E+00,0.0E+00;
CHANNEL2 0.0E+00,0.0E+00;
CHANNEL3 0.0E+00,0.0E+00;
CHANNEL4 0.0E+00,0.0E+00;MATH1
0.00,0.00
```

:MATH<x>:BINary:{CHANnel<x>|MATH1}

Function Sets/queries the threshold level for binary computation of the channel.

Syntax
```
:MATH<x>:BINary:{CHANnel<x>|MATH1}
{<Voltage>,<Voltage>|<NRf>,<NRf>}
:MATH<x>:BAINary:{CHANnel<x>|
MATH1}?
The <x> in MATH <x>=1 or 2 (or 1
for the DL1720)
The <x> in CHANnel <x>=1 to 4 (or
1-2 for the DL1720)
<Voltage>=8 div on the screen (0.01
div steps)
<NRf>=-4 to 4 div (0.01 div steps)
```

Example
```
:MATH1:BINARY:CHANNEL1 0V,0V
:MATH1:BINARY:CHANNEL1? -> :MATH1:
BINARY:CHANNEL1 0.000E+00,0.000E+00
```

Description The ":MATH<x>:BINary:MATH1" command can be used when <x>=2. If <x>=1 an error occurs. (There is no MATH2 on the DL1720 so this command cannot be used.)

:MATH<x>:DISPlay

Function Sets whether or not to display computation waveforms or queries the current setting.

Syntax
```
:MATH<x>:DISPlay {<Boolean>}
:MATH<x>:DISPlay?
<x>=1 or 2 (or 1 for the DL1720)
```

Example
```
:MATH1:DISPLAY ON
:MATH1:DIPSLAY? -> :MATH1:DISPLAY 1
```

:MATH<x>:FFT?

Function Queries all FFT computation settings.

Syntax
```
:MATH<x>:FFT?
<x>=1 or 2 (or 1 for the DL1720)
```

Example
```
:MATH1:FFT? -> :MATH1:FFT:
POINTS 1000;WINDOW RECTANGLE;
SPOINT -5.0000000
```

:MATH<x>:FFT:POINt

Function Sets/queries the number of points for FFT computation.

Syntax
```
:MATH<x>:FFT:POINt {<NRf>}
:MATH<x>:FFT:POINt?
<x>=1 or 2 (or 1 for the DL1720)
<NRf>=1000, 10000
```

Example
```
:MATH1:FFT:POINT 1000
:MATH1:FFT:POINT? -> :MATH1:FFT:
POINT 1000
```

:MATH<x>:FFT:SPOint (Start Point)

Function Sets the start point of the FFT or queries the current setting.

Syntax
```
:MATH<x>:FFT:SPOint {<NRf>}
:MATH<x>:FFT:POINt?
<x>=1 or 2 (or 1 for the DL1720)
<NRf>=-5 to 5 div (10 div/displayed
record length steps)
```

Example
```
:MATH1:FFT:SPOINT 1.5
:MATH1:FFT:SPOINT? -> :MATH1:FFT:
SPOINT 1.5000000
```

:MATH<x>:FFT:WINDow

Function Sets/queries FFT window function.

Syntax
```
:MATH<x>:FFT:WINDow {FLATtop|
HANNing|RECTangle}
:MATH<x>:FFT:WINDow?
<x>=1 or 2 (or 1 for the DL1720)
```

Example
```
:MATH1:FFT:WINDOW HANNING
:MATH1:FFT:WINDOW? -> :MATH1:FFT:
WINDOW HANNING
```

:MATH<x>:INTegral?

Function Queries all settings related to integration.

Syntax
```
:MATH<x>:INTegral?
<x>=1 or 2 (or 1 for the DL1720)
```

Example
```
:MATH1:INTEGRAL? ->:MATH1:INTEGRAL:
SPOINT -5.0000000
```

:MATH<x>:INTegral:SPOint (Start Point)

Function Sets the start point of the integration or queries the current setting.

Syntax
```
:MATH<x>:INTegral:SPOint {<NRf>}
:MATH<x>:INTegral:POINt?
<x>=1 or 2 (or 1 for the DL1720)
<NRf>=-5 to 5 div (10 div/displayed
record length steps)
```

Example
```
:MATH1:INTEGRAL:SPOINT 1.5
:MATH1:INTEGARL:SPOINT? -> :MATH1:
INTEGARL:SPOINT 1.5000000
```

:MATH<x>:LABel

Function Sets/queries the math's label.

Syntax
```
:MATH<x>:LABel {<Character string>}
:MATH<x>:LABel?
<x>=1 or 2 (or 1 for the DL1720)
<Character string>=Within 8
characters
```

Example
```
:MATH1:LABEL "MATH1"
:MATH1:LABEL? -> :MATH1:
LABEL "MATH1"
```

:MATH<x>:OPERation

Function Sets the type of computation or queries the current setting.

Syntax
```
:MATH<x>:OPERation {PLUS|MINus|
MULTiple|BINary|INVert|
DIFFerential|INTegral|PS|THRough},
{<NRf>}[,{<NRf>|MATH1}]
:MATH<x>:OPERation?
<x>=1 or 2 (or 1 for the DL1720)
<NRf>=1 to 4 (or 1-2 for the
DL1720)
```

Example
```
:MATH1:OPERATION PLUS,1,2
:MATH1:OPERATION? -> :MATH1:
OPERATION PLUS,1,2
```

Description
- For unary operators (BINary|INVert|DIFFerential|INTegral|PS|THRough), select the waveform in the first <NRf>.
- For binomial operators (PLUS|MINus|MULTiple), select the first waveform in the first <NRf> and the second waveform in the second <NRf>. However, MATH1 can be selected for the second <NRf> only when using the DL1740.

:MATH<x>:SCALe?

Function Queries all scaling setting values.

Syntax
```
:MATH<x>:SCALe?
<x>=1 to 2 (or 1 for the DL1720)
```

Example
```
:MATH1:SCALE? -> :MATH1:SCALE:
MODE AUTO;VALUE 200.000E+00,0.0E+00
```

:MATH<x>:SCALe:MODE

Function Sets/queries the scaling method.

Syntax
```
:MATH<x>:SCALe:MODE {AUTO|MANual}
:MATH<x>:SCALe:MODE?
<x>=1 or 2 (or 1 for the DL1720)
```

Example
```
:MATH1:SCALE:MODE AUTO
:MATH1:SCALE:MODE? -> :MATH1:SCALE:
MODE AUTO
```

:MATH<x>:SCALe:VALue

Function Sets/queries the upper and lower limits for the manual scaling.

Syntax
```
:MATH<x>:SCALe:VALue {<NRf>,<NRf>}
:MATH<x>:SCALe:VALue?
<x>=1 or 2 (or 1 for the DL1720)
<NRf>=-1.0000E+30 to 1.0000E+30
```

Example
```
:MATH1:SCALE:VALUE 1,-1
:MATH1:SCALE:VALUE? -> :MATH1:
SCALE:VALUE 1.0000E+00,-1.0000E+00
```

Description The larger of the two values automatically becomes the upper limit.

:MATH<x>:SMOothing

Function Turns smoothing ON/OFF or queries the current setting.

Syntax
```
:MATH<x>:SMOothing {<Boolean>}
:MATH<x>:SMOothing?
<x>=1 or 2 (or 1 for the DL1720)
```

Example
```
:MATH1:SMOOTHING ON
:MATH1:SMOOTHING? -> :MATH1:
SMOOTHING 1
```

Description This command is void, if "PS" is selected with the "MATH<x>:OPERation" command.

:MATH<x>:UNIT

Function Sets/queries the dimensional unit appended to computation result.

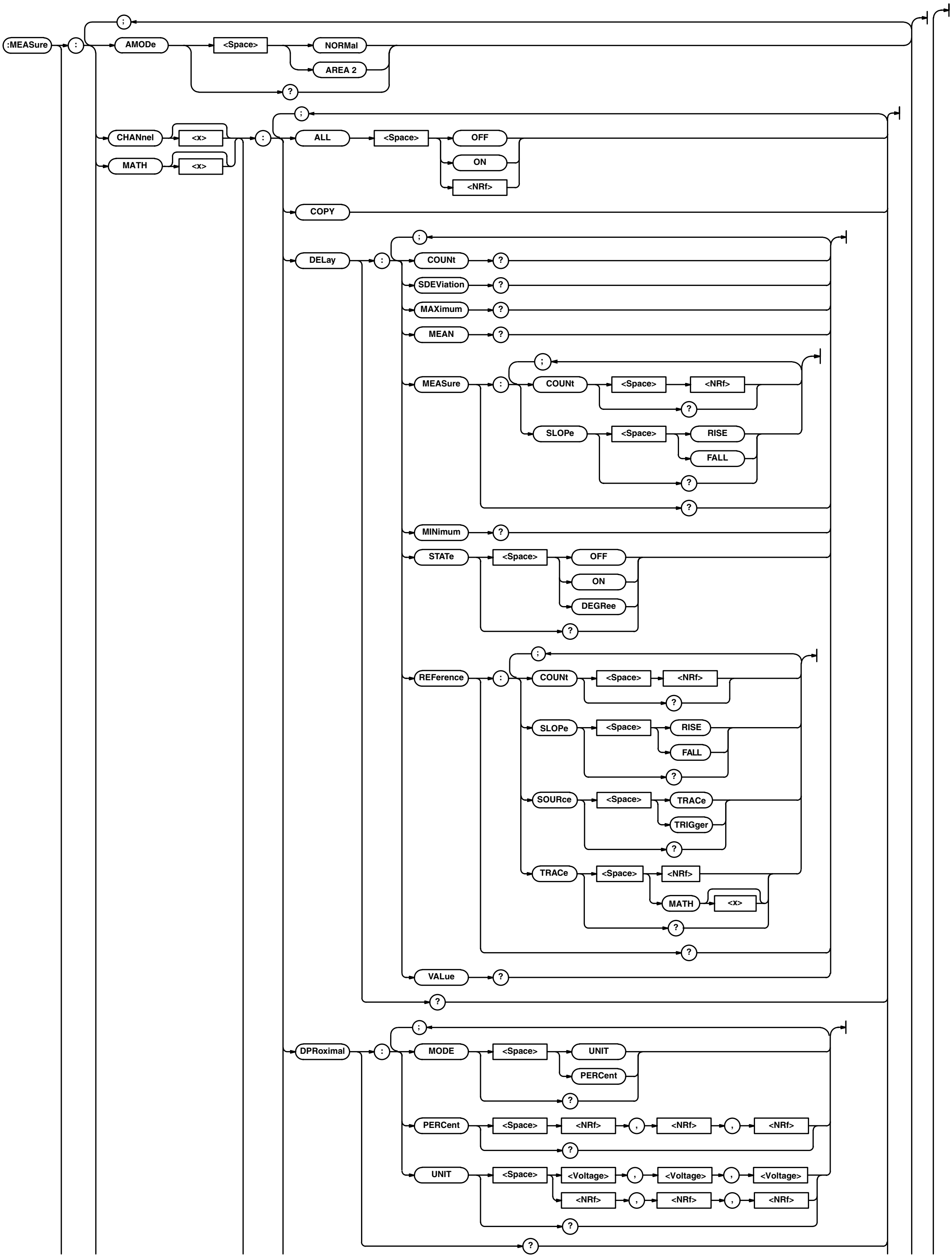
Syntax
```
:MATH<x>:UNIT {<Character string>}
:MATH<x>:UNIT?
<x>=1 or 2 (or 1 for the DL1720)
<Character string>=Within 4
characters
```

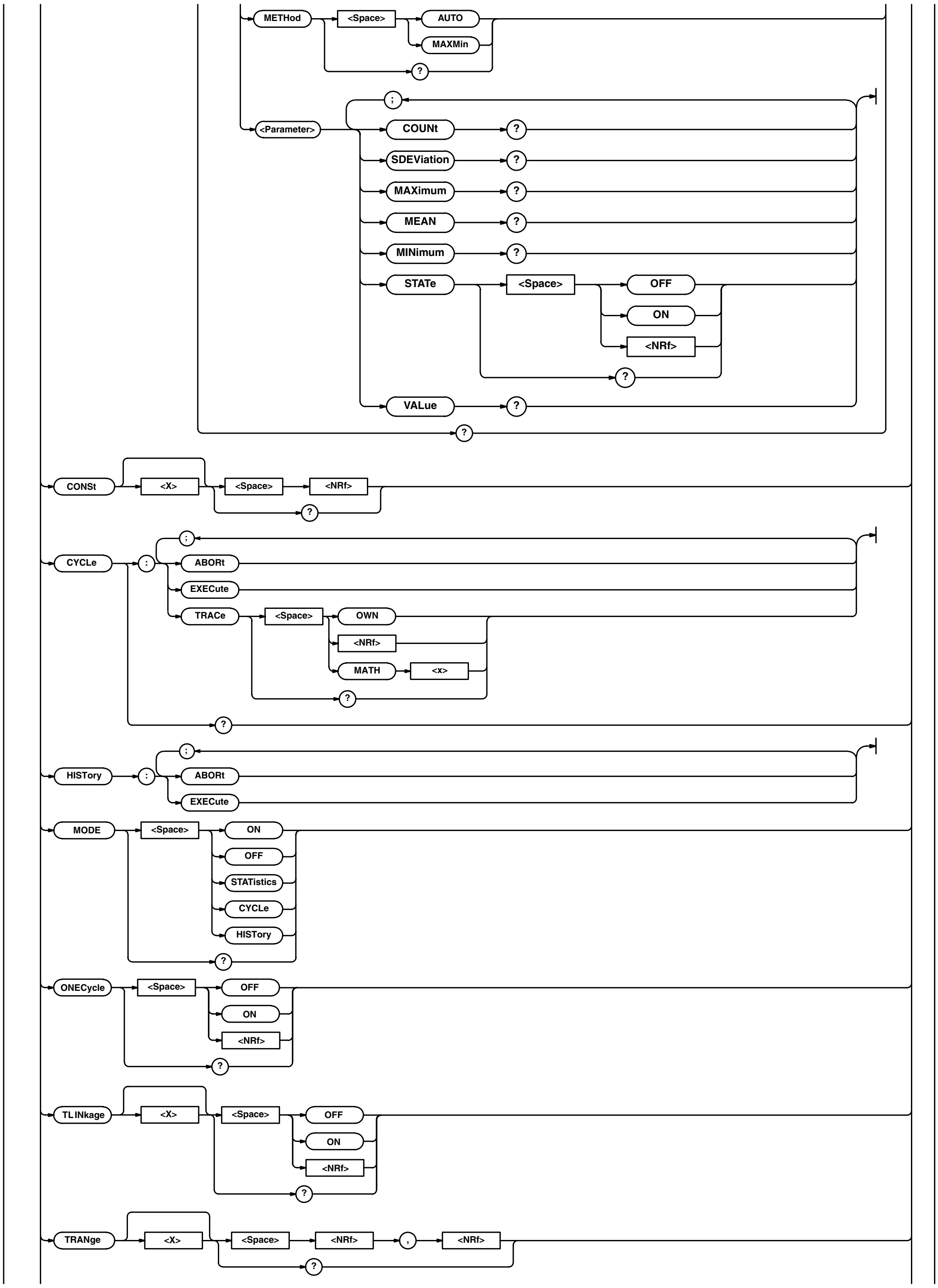
Example
```
:MATH1:UNIT "EU"
:MATH1:UNIT? -> :MATH1:UNIT "EU"
```

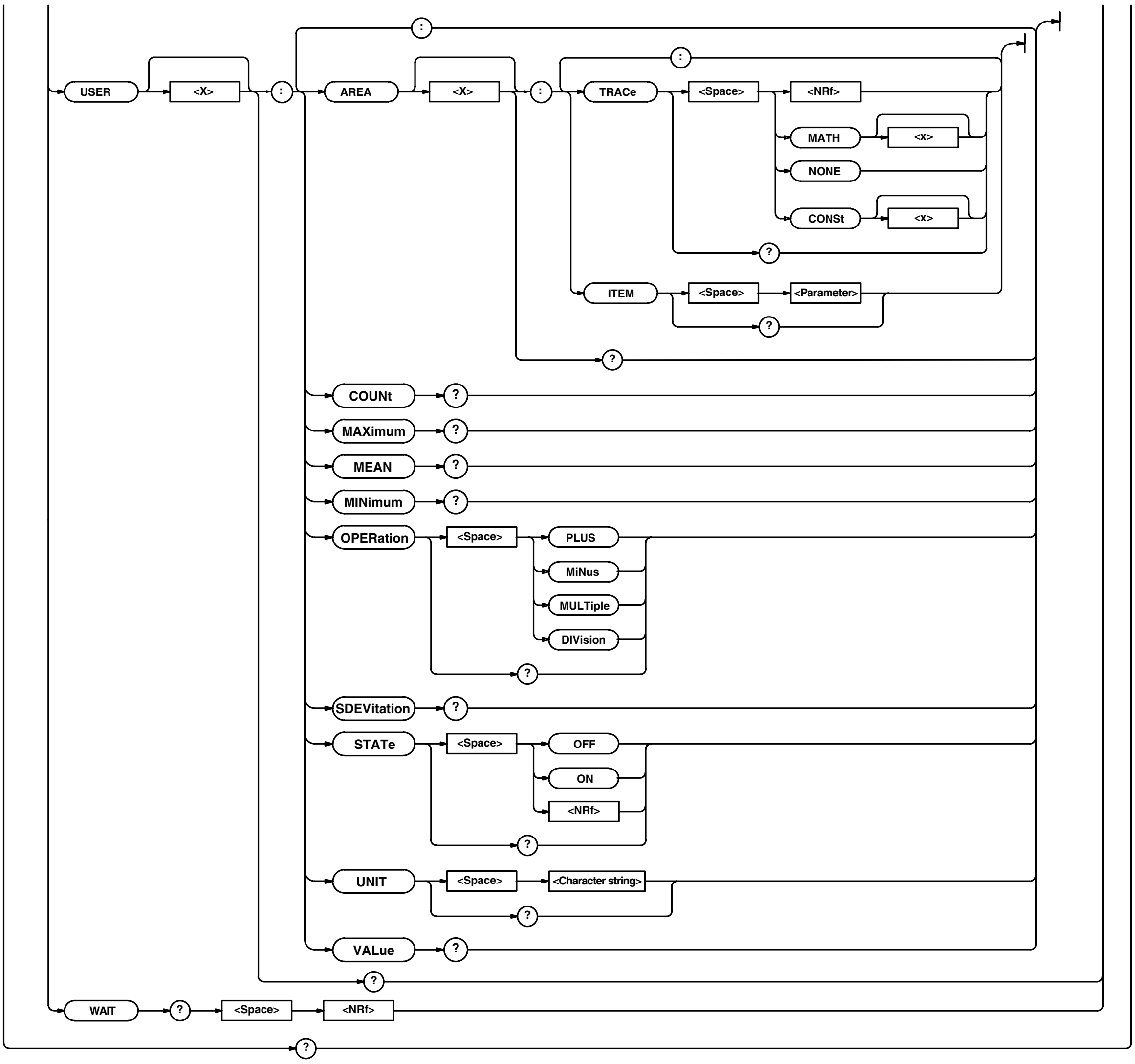
Description The unit is reflected in the scale value. The unit setting has no effect on the calculation result.

6.17 MEASure Group

The commands in the MEASure group are used to make settings and queries about automatic measurement of waveform parameters. You can make the same settings which you can make using **MEASURE** on the front panel.




METHod
<Space>
AUTO
MAXMin
?
;
<Parameter>
COUNt
?
SDEViation
?
MAXimum
?
MEAN
?
MINimum
?
STATe
<Space>
OFF
ON
<NRf>
?
VALue
?
?
CONSt
<X>
<Space>
<NRf>
?
;
CYCLe
:
ABORt
EXECute
TRACe
<Space>
OWN
<NRf>
MATH
<x>
?
?
;
HISTory
:
ABORt
EXECute
MODE
<Space>
ON
OFF
STATistics
CYCLe
HISTory
?
ONECycle
<Space>
OFF
ON
<NRf>
?
TLINkage
<X>
<Space>
OFF
ON
<NRf>
?
TRANge
<X>
<Space>
<NRf>
,
<NRf>
?


USER
<X>
:
AREA
<X>
:
TRACe
<Space>
<NRf>
MATH
<x>
NONE
CONSt
<x>
?
ITEM
<Space>
<Parameter>
?
?
COUNt
?
MAXimum
?
MEAN
?
MINimum
?
OPERation
<Space>
PLUS
MiNus
MULTiple
DIVision
?
SDEVitation
?
STATe
<Space>
OFF
ON
<NRf>
?
UNIT
<Space>
<Character string>
?
VALue
?
?
WAIT
?
<Space>
<NRf>
?

:MEASure?

Function Queries all settings relating to automatic measurement of waveform parameters.

Syntax `:MEASure?`

Example
```
:MEASURE? -> :MEASURE:MODE ON;
AMODE NORMAL;CHANNEL1:AVERAGE:
STATE 0;:MEASURE:CHANNEL1:AVGFREQ:
STATE 0;:MEASURE:CHANNEL1:
AVGPERIOD:STATE 0;:MEASURE:
CHANNEL1:BWIDTH1:STATE 0;:MEASURE:
CHANNEL1:BWIDTH2:STATE 0;:MEASURE:
CHANNEL1:DUTYCYCLE:STATE 0;:
MEASURE:CHANNEL1:FALL:STATE 0;:
MEASURE:CHANNEL1:FREQUENCY:
STATE 0;:MEASURE:CHANNEL1:HIGH:
STATE 0;:MEASURE:CHANNEL1:LOW:
STATE 0;:MEASURE:CHANNEL1:MAXIMUM:
STATE 0;:MEASURE:CHANNEL1:MINIMUM:
STATE 0;:MEASURE:CHANNEL1:
NOVERSHOOT:STATE 0;:MEASURE:
CHANNEL1:NWIDTH:STATE 0;:MEASURE:
CHANNEL1:PERIOD:STATE 0;:MEASURE:
CHANNEL1:PNUMBER:STATE 0;:MEASURE:
CHANNEL1:POVERSHOOT:STATE 0;:
MEASURE:CHANNEL1:PTOPEAK:STATE 1;:
MEASURE:CHANNEL1:PWIDTH:STATE 0;:
MEASURE:CHANNEL1:RISE:STATE 0;:
MEASURE:CHANNEL1:RMS:STATE 0;:
MEASURE:CHANNEL1:SDEVIATION:
STATE 0;:MEASURE:CHANNEL1:TY1INTEG:
STATE 0;:MEASURE:CHANNEL1:TY2INTEG:
STATE 0;:MEASURE:CHANNEL1:XY1INTEG:
STATE 0;:MEASURE:CHANNEL1:XY2INTEG:
STATE 0;:MEASURE:CHANNEL1:DELAY:
STATE OFF;MEASURE:SLOPE RISE;
COUNT 1;:MEASURE:CHANNEL1:DELAY:
REFERENCE:SOURCE TRACE;TRACE 1;
SLOPE RISE;COUNT 1;:MEASURE:
CHANNEL1:DPROXIMAL:MODE PERCENT;
PERCENT 10.0,50.0,90.0;
UNIT -150.000E+00,0.0E+00,
150.000E+00;:MEASURE:CHANNEL1:
METHOD AUTO;:MEASURE:CHANNEL2:
AVERAGE:STATE 0;:MEASURE:CHANNEL2:
AVGFREQ:STATE 0;:MEASURE:CHANNEL2:
AVGPERIOD:STATE 0;:MEASURE:
CHANNEL2:BWIDTH1:STATE 0;:MEASURE:
CHANNEL2:BWIDTH2:STATE 0;:MEASURE:
CHANNEL2:DUTYCYCLE:STATE 0;:
MEASURE:CHANNEL2:FALL:STATE 0;:
MEASURE:CHANNEL2:FREQUENCY:
STATE 0;:MEASURE:CHANNEL2:HIGH:
STATE 0;:MEASURE:CHANNEL2:LOW:
STATE 0;:MEASURE:CHANNEL2:MAXIMUM:
STATE 0;:MEASURE:CHANNEL2:MINIMUM:
STATE 0;:MEASURE:CHANNEL2:
NOVERSHOOT:STATE 0;:MEASURE:
CHANNEL2:NWIDTH:STATE 0;:MEASURE:
CHANNEL2:PERIOD:STATE 0;:MEASURE:
CHANNEL2:PNUMBER:STATE 0;:MEASURE:
CHANNEL2:POVERSHOOT:STATE 0;:
MEASURE:CHANNEL2:PTOPEAK:STATE 0;:
MEASURE:CHANNEL2:PWIDTH:STATE 0;:
MEASURE:CHANNEL2:RISE:STATE 0;:
MEASURE:CHANNEL2:RMS:STATE 0;:
MEASURE:CHANNEL2:SDEVIATION:
STATE 0;:MEASURE:CHANNEL2:TY1INTEG:
STATE 0;:MEASURE:CHANNEL2:TY2INTEG:
STATE 0;:MEASURE:CHANNEL2:XY1INTEG:
STATE 0;:MEASURE:CHANNEL2:XY2INTEG:
STATE 0;:MEASURE:CHANNEL2:DELAY:
STATE OFF;MEASURE:SLOPE RISE;
COUNT 1;:MEASURE:CHANNEL2:DELAY:
REFERENCE:SOURCE TRACE;TRACE 2;
SLOPE RISE;COUNT 1;:MEASURE:
CHANNEL2:DPROXIMAL:MODE PERCENT;
PERCENT 10.0,50.0,90.0;
UNIT -150.000E+00,0.0E+00,
150.000E+00;:MEASURE:CHANNEL2:
METHOD AUTO;:MEASURE:CHANNEL3:
AVERAGE:STATE 0;:MEASURE:CHANNEL3:
AVGFREQ:STATE 0;:MEASURE:CHANNEL3:
AVGPERIOD:STATE 0;:MEASURE:
CHANNEL3:BWIDTH1:STATE 0;:MEASURE:
CHANNEL3:BWIDTH2:STATE 0;:MEASURE:
CHANNEL3:DUTYCYCLE:STATE 0;:
MEASURE:CHANNEL3:FALL:STATE 0;:
MEASURE:CHANNEL3:FREQUENCY:
STATE 0;:MEASURE:CHANNEL3:HIGH:
STATE 0;:MEASURE:CHANNEL3:LOW:
STATE 0;:MEASURE:CHANNEL3:MAXIMUM:
STATE 0;:MEASURE:CHANNEL3:MINIMUM:
STATE 0;:MEASURE:CHANNEL3:
NOVERSHOOT:STATE 0;:MEASURE:
CHANNEL3:NWIDTH:STATE 0;:MEASURE:
CHANNEL3:PERIOD:STATE 0;:MEASURE:
CHANNEL3:PNUMBER:STATE 0;:MEASURE:
CHANNEL3:POVERSHOOT:STATE 0;:
MEASURE:CHANNEL3:PTOPEAK:STATE 0;:
MEASURE:CHANNEL3:PWIDTH:STATE 0;:
MEASURE:CHANNEL3:RISE:STATE 0;:
MEASURE:CHANNEL3:RMS:STATE 0;:
MEASURE:CHANNEL3:SDEVIATION:
STATE 0;:MEASURE:CHANNEL3:TY1INTEG:
STATE 0;:MEASURE:CHANNEL3:TY2INTEG:
STATE 0;:MEASURE:CHANNEL3:XY1INTEG:
STATE 0;:MEASURE:CHANNEL3:XY2INTEG:
STATE 0;:MEASURE:CHANNEL3:DELAY:
STATE OFF;MEASURE:SLOPE RISE;
COUNT 1;:MEASURE:CHANNEL3:DELAY:
REFERENCE:SOURCE TRACE;TRACE 3;
SLOPE RISE;COUNT 1;:MEASURE:
CHANNEL3:DPROXIMAL:MODE PERCENT;
PERCENT 10.0,50.0,90.0;
UNIT -150.000E+00,0.0E+00,
150.000E+00;:MEASURE:CHANNEL3:
METHOD AUTO;:MEASURE:CHANNEL4:
AVERAGE:STATE 0;:MEASURE:CHANNEL4:
```

```
AVGFREQ:STATE 0;:MEASURE:CHANNEL4:
AVGPERIOD:STATE 0;:MEASURE:
CHANNEL4:BWIDTH1:STATE 0;:MEASURE:
CHANNEL4:BWIDTH2:STATE 0;:MEASURE:
CHANNEL4:DUTYCYCLE:STATE 0;:
MEASURE:CHANNEL4:FALL:STATE 0;:
MEASURE:CHANNEL4:FREQUENCY:
STATE 0;:MEASURE:CHANNEL4:HIGH:
STATE 0;:MEASURE:CHANNEL4:LOW:
STATE 0;:MEASURE:CHANNEL4:MAXIMUM:
STATE 0;:MEASURE:CHANNEL4:MINIMUM:
STATE 0;:MEASURE:CHANNEL4:
NOVERSHOOT:STATE 0;:MEASURE:
CHANNEL4:NWIDTH:STATE 0;:MEASURE:
CHANNEL4:PERIOD:STATE 0;:MEASURE:
CHANNEL4:PNUMBER:STATE 0;:MEASURE:
CHANNEL4:POVERSHOOT:STATE 0;:
MEASURE:CHANNEL4:PTOPEAK:STATE 0;:
MEASURE:CHANNEL4:PWIDTH:STATE 0;:
MEASURE:CHANNEL4:RISE:STATE 0;:
MEASURE:CHANNEL4:RMS:STATE 0;:
MEASURE:CHANNEL4:SDEVIATION:
STATE 0;:MEASURE:CHANNEL4:TY1INTEG:
STATE 0;:MEASURE:CHANNEL4:TY2INTEG:
STATE 0;:MEASURE:CHANNEL4:XY1INTEG:
STATE 0;:MEASURE:CHANNEL4:XY2INTEG:
STATE 0;:MEASURE:CHANNEL4:DELAY:
STATE OFF;MEASURE:SLOPE RISE;
COUNT 1;:MEASURE:CHANNEL4:DELAY:
REFERENCE:SOURCE TRACE;TRACE 4;
SLOPE RISE;COUNT 1;:MEASURE:
CHANNEL4:DPROXIMAL:MODE PERCENT;
PERCENT 10.0,50.0,90.0;
UNIT -150.000E+00,0.0E+00,
150.000E+00;:MEASURE:CHANNEL4:
METHOD AUTO;:MEASURE:MATH1:AVERAGE:
STATE 0;:MEASURE:MATH1:AVGFREQ:
STATE 0;:MEASURE:MATH1:AVGPERIOD:
STATE 0;:MEASURE:MATH1:BWIDTH1:
STATE 0;:MEASURE:MATH1:BWIDTH2:
STATE 0;:MEASURE:MATH1:DUTYCYCLE:
STATE 0;:MEASURE:MATH1:FALL:
STATE 0;:MEASURE:MATH1:FREQUENCY:
STATE 0;:MEASURE:MATH1:HIGH:
STATE 0;:MEASURE:MATH1:LOW:
STATE 0;:MEASURE:MATH1:MAXIMUM:
STATE 0;:MEASURE:MATH1:MINIMUM:
STATE 0;:MEASURE:MATH1:NOVERSHOOT:
STATE 0;:MEASURE:MATH1:NWIDTH:
STATE 0;:MEASURE:MATH1:PERIOD:
STATE 0;:MEASURE:MATH1:PNUMBER:
STATE 0;:MEASURE:MATH1:POVERSHOOT:
STATE 0;:MEASURE:MATH1:PTOPEAK:
STATE 0;:MEASURE:MATH1:PWIDTH:
STATE 0;:MEASURE:MATH1:RISE:
STATE 0;:MEASURE:MATH1:RMS:
STATE 0;:MEASURE:MATH1:SDEVIATION:
STATE 0;:MEASURE:MATH1:TY1INTEG:
STATE 0;:MEASURE:MATH1:TY2INTEG:
STATE 0;:MEASURE:MATH1:XY1INTEG:
STATE 0;:MEASURE:MATH1:XY2INTEG:
STATE 0;:MEASURE:MATH1:DELAY:
STATE OFF;MEASURE:SLOPE RISE;
COUNT 1;:MEASURE:MATH1:DELAY:
REFERENCE:SOURCE TRACE;TRACE MATH1;
SLOPE RISE;COUNT 1;:MEASURE:MATH1:
DPROXIMAL:MODE PERCENT;
PERCENT 10.0,50.0,90.0;UNIT -3.00,
0.00,3.00;:MEASURE:MATH1:
METHOD AUTO;:MEASURE:MATH2:AVERAGE:
STATE 0;:MEASURE:MATH2:AVGFREQ:
STATE 0;:MEASURE:MATH2:AVGPERIOD:
STATE 0;:MEASURE:MATH2:BWIDTH1:
STATE 0;:MEASURE:MATH2:BWIDTH2:
STATE 0;:MEASURE:MATH2:DUTYCYCLE:
STATE 0;:MEASURE:MATH2:FALL:
STATE 0;:MEASURE:MATH2:FREQUENCY:
STATE 0;:MEASURE:MATH2:HIGH:
STATE 0;:MEASURE:MATH2:LOW:
STATE 0;:MEASURE:MATH2:MAXIMUM:
STATE 0;:MEASURE:MATH2:MINIMUM:
STATE 0;:MEASURE:MATH2:NOVERSHOOT:
STATE 0;:MEASURE:MATH2:NWIDTH:
STATE 0;:MEASURE:MATH2:PERIOD:
STATE 0;:MEASURE:MATH2:PNUMBER:
STATE 0;:MEASURE:MATH2:POVERSHOOT:
STATE 0;:MEASURE:MATH2:PTOPEAK:
STATE 0;:MEASURE:MATH2:PWIDTH:
STATE 0;:MEASURE:MATH2:RISE:
STATE 0;:MEASURE:MATH2:RMS:
STATE 0;:MEASURE:MATH2:SDEVIATION:
STATE 0;:MEASURE:MATH2:TY1INTEG:
STATE 0;:MEASURE:MATH2:TY2INTEG:
STATE 0;:MEASURE:MATH2:XY1INTEG:
STATE 0;:MEASURE:MATH2:XY2INTEG:
STATE 0;:MEASURE:MATH2:DELAY:
STATE OFF;MEASURE:SLOPE RISE;
COUNT 1;:MEASURE:MATH2:DELAY:
REFERENCE:SOURCE TRACE;TRACE MATH2;
SLOPE RISE;COUNT 1;:MEASURE:MATH2:
DPROXIMAL:MODE PERCENT;
PERCENT 10.0,50.0,90.0;UNIT -3.00,
0.00,3.00;:MEASURE:MATH2:
METHOD AUTO;:MEASURE:USER1:STATE 0;
AREA1:TRACE 1;ITEM PTOPEAK;:
MEASURE:USER1:AREA2:TRACE 2;
ITEM MAXIMUM;:MEASURE:USER1:
OPERATION PLUS;UNIT "";:MEASURE:
USER2:STATE 0;AREA1:TRACE 3;
ITEM MINIMUM;:MEASURE:USER2:AREA2:
TRACE 4;ITEM RMS;:MEASURE:USER2:
OPERATION MINUS;UNIT "";:MEASURE:
USER3:STATE 0;AREA1:TRACE MATH1;
ITEM PERIOD;:MEASURE:USER3:AREA2:
TRACE MATH2;ITEM AVGPERIOD;:
MEASURE:USER3:OPERATION MULTIPLE;
UNIT "";:MEASURE:USER4:STATE 0;
AREA1:TRACE NONE;ITEM XY1INTEG;:
```

```
MEASURE:USER4:AREA2:TRACE CONST1;
ITEM XY2INTEG;:MEASURE:USER4:
OPERATION DIVISION;UNIT "";:
MEASURE:CONST1 1.00000E+00;
CONST2 1.00000E+00;
CONST3 1.00000E+00;
CONST4 1.00000E+00;CYCLE:TRACE 1;:
MEASURE:ONECYCLE 0;TLINKAGE1 0;
TLINKAGE2 0;TRANGE1 -5.0000000,
5.0000000;TRANGE2 -5.0000000,
5.0000000
```

:MEASure:AMODe

Function Sets whether to perform the automated measurement of waveform parameters on a normal single area (NORMal) or dual areas (AREA2) or queries the current setting.

Syntax `:MEASure:AMODe {NORMal|AREA2}`
`:MEASure:AMODe?`

Example `:MEASURE:AMODE AREA2:MEASURE:AMODE?`
`-> :MEASURE:AMODE AREA2`

:MEASure:{CHANnel<x>|MATH<x>}?

Function Queries all specified parameter ON/OFF settings.

Syntax `:MEASure:{CHANnel<x>|MATH<x>}?`
`<x> (CHANnel)=1 to 4 (or 1-2 for the DL1720)`
`<x> (MATH)=1 or 2 (or 1 for the DL1720)`

Example (An example for CH1 is given below.)

```
:MEASURE:CHANNEL1? -> :MEASURE:
CHANNEL1:AVERAGE:STATE 0;:MEASURE:
CHANNEL1:AVGFREQ:STATE 0;:MEASURE:
CHANNEL1:AVGPERIOD:STATE 0;:
MEASURE:CHANNEL1:BWIDTH1:STATE 0;:
MEASURE:CHANNEL1:BWIDTH2:STATE 0;:
MEASURE:CHANNEL1:DUTYCYCLE:
STATE 0;:MEASURE:CHANNEL1:FALL:
STATE 0;:MEASURE:CHANNEL1:
FREQUENCY:STATE 0;:MEASURE:
CHANNEL1:HIGH:STATE 0;:MEASURE:
CHANNEL1:LOW:STATE 0;:MEASURE:
CHANNEL1:MAXIMUM:STATE 0;:
MEASURE:CHANNEL1:MINIMUM:STATE 0;:
MEASURE:CHANNEL1:NOVERSHOOT:
STATE 0;:MEASURE:CHANNEL1:NWIDTH:
STATE 0;:MEASURE:CHANNEL1:PERIOD:
STATE 0;:MEASURE:CHANNEL1:PNUMBER:
STATE0;:MEASURE:CHANNEL1:
POVERSHOOT:STATE 0;:MEASURE:
CHANNEL1:PTOPEAK:STATE 0;:MEASURE:
CHANNEL1:PWIDTH:STATE 0;:MEASURE:
CHANNEL1:RISE:STATE 0;:MEASURE:
CHANNEL1:RMS:STATE 0;:MEASURE:
CHANNEL1:SDEVIATION:STATE 0;:
MEASURE:CHANNEL1:TY1INTEG:STATE 0;:
MEASURE:CHANNEL1:TY2INTEG:STATE 0;:
MEASURE:CHANNEL1:XY1INTEG:STATE 0;:
MEASURE:CHANNEL1:XY2INTEG:STATE 0;:
MEASURE:CHANNEL1:DELAY:STATE 0;
MEASURE:SLOPE RISE;COUNT 1;:
MEASURE:CHANNEL1:DELAY:REFERENCE:
TRACE 1;SLOPE RISE;COUNT 1;:
MEASURE:CHANNEL1:DPROXIMAL:
MODE PERCENT;PERCENT 10.0,50.0,
90.0;UNIT -150.000E+00,0.0E+00,
150.000E+00;:MEASURE:CHANNEL1:
METHOD AUTO 0
```

:MEASure:{CHANnel<x>|MATH<x>}:ALL

Function Turns all the measurement parameters of the waveform ON/OFF at once.

Syntax `:MEASure:{CHANnel<x>|MATH<x>}:ALL {<Boolean>}`
`The <x> in CHANnel<x>=1 to 4 (or 1-2 for the DL1720)`
`The <x> in MATH<x>=1 or 2 (or 1 for the DL1720)`

Example `(The following example is for CH1.)`
`:MEASURE:CHANNEL1:ALL OFF`

:MEASure:{CHANnel<x>|MATH<x>}:COPY

Function Copies the ON/OFF state of all measurement parameters of one waveform to all other waveforms.

Syntax `:MEASure:{CHANnel<x>|MATH<x>}:COPY`
`The <x> in CHANnel<x>=1 to 4 (or 1-2 for the DL1720)`
`The <x> in MATH<x>=1 or 2 (or 1 for the DL1720)`

Example `:MEASURE:CHANNEL1:COPY`

:MEASure:{CHANnel<x>|MATH<x>}:DELay?

Function Queries all settings related to the delay between waveform channels.

Syntax `:MEASure:{CHANnel<x>|MATH<x>}:DELay?`
`The <x> in CHANnel<x>=1 to 4 (or 1-2 for the DL1720)`
`The <x> in MATH<x>=1 or 2 (or 1 for the DL1720)`

Example

```
:MEASURE:CHANNEL1:DELAY? ->
:MEASURE:CHANNEL1:DELAY:STATE 0;
MEASURE:SLOPE RISE;COUNT 1;:
MEASURE:CHANNEL1:DELAY:REFERENCE:
TRACE 1;SLOPE RISE;COUNT 1
```

:MEASure:{CHANnel<x>|MATH<x>}:DELay:MEASure?

Function Queries all settings related to the measured waveform when measuring the delay between channels.

Syntax
```
:MEASure:{CHANnel<x>|MATH<x>}:
DELay:MEASure?
The <x> in CHANnel<x>=1 to 4 (or 1-
2 for the DL1720)
The <x> in MATH<x>=1 or 2 (or 1 for
the DL1720)
```

Example
```
:MEASURE:CHANNEL1:DELAY:MEASURE? ->
:MEASURE:CHANNEL1:MEASURE:
SLOPE RISE;COUNT 1
```

:MEASure:{CHANnel<x>|MATH<x>}:DELay:MEASure:COUNt

Function Sets the edge count of the measured waveform when measuring the delay between channels or queries the current setting.

Syntax
```
:MEASure:{CHANnel<x>|MATH<x>}:
DELay:MEASure:COUNt {<NRf>}
:MEASure:{CHANnel<x>|MATH<x>}:
DELay:MEASure:COUNt?
The <x> in CHANnel<x>=1 to 4 (or 1-
2 for the DL1720)
The <x> in MATH<x>=1 or 2 (or 1 for
the DL1720)
<NRf>=1 to 9
```

Example
```
:MEASURE:CHANNEL1:DELAY:MEASURE:
COUNT 2
:MEASURE:CHANNEL1:DELAY:MEASURE:
COUNT? -> :MEASURE:CHANNEL1:DELAY:
MEASURE:COUNT 2
```

:MEASure:{CHANnel<x>|MATH<x>}:DELay:MEASure:SLOPe

Function Sets the slope of the measured waveform when measuring the delay between channels or queries the current setting.

Syntax
```
:MEASure:{CHANnel<x>|MATH<x>}:
DELay:MEASure:SLOPe {RISE|FALL}
:MEASure:{CHANnel<x>|MATH<x>}:
DELay:MEASure:SLOPe?
The <x> in CHANnel<x>=1 to 4 (or 1-
2 for the DL1720)
The <x> in MATH<x>=1 or 2 (or 1 for
the DL1720)
```

Example
```
:MEASURE:CHANNEL1:DELAY:MEASURE:
SLOPE RISE
:MEASURE:CHANNEL1:DELAY:MEASURE:
SLOPE? -> :MEASURE:CHANNEL1:DELAY:
MEASURE:SLOPE RISE
```

:MEASure:{CHANnel<x>|MATH<x>}:DELay:REFerence?

Function Queries all settings related to the reference waveform when measuring the delay between channels.

Syntax
```
:MEASure:{CHANnel<x>|MATH<x>}:
DELay:REFerence?
The <x> in CHANnel<x>=1 to 4 (or 1-
2 for the DL1720)
The <x> in MATH<x>=1 or 2 (or 1 for
the DL1720)
```

Example
```
:MEASURE:CHANNEL1:DELAY:REFERENCE?
-> :MEASURE:CHANNEL1:DELAY:
REFERENCE:TRACE 1;SLOPE RISE;
COUNT 1
```

:MEASure:{CHANnel<x>|MATH<x>}:DELay:REFerence:COUNt

Function Sets the edge count of the reference waveform when measuring the delay between channels or queries the current setting.

Syntax
```
:MEASure:{CHANnel<x>|MATH<x>}:
DELay:REFerence:COUNt {<NRf>}
:MEASure:{CHANnel<x>|MATH<x>}:
DELay:REFerence:COUNt?
The <x> in CHANnel<x>=1 to 4 (or 1-
2 for the DL1720)
The <x> in MATH<x>=1 or 2 (or 1 for
the DL1720)
<NRf>=1 to 9
```

Example
```
:MEASURE:TRACE1:DELAY:REFERENCE:
COUNT 2
:MEASURE:TRACE1:DELAY:REFERENCE:
COUNT? -> :MEASURE:TRACE1:DELAY:
REFERENCE:COUNT 2
```

:MEASure:{CHANnel<x>|MATH<x>}:DELay:REFerence:SLOPe

Function Sets the slope of the reference waveform when measuring the delay between channels or queries the current setting.

Syntax
```
:MEASure:{CHANnel<x>|MATH<x>}:
DELay:REFerence:SLOPe {RISE|FALL}
:MEASure:{CHANnel<x>|MATH<x>}:
DELay:REFerence:SLOPe?
The <x> in CHANnel<x>=1 to 4 (or 1-
2 for the DL1720)
The <x> in MATH<x>=1 or 2 (or 1 for
the DL1720)
```

Example
```
:MEASURE:CHANNEL1:DELAY:REFERENCE:
SLOPE RISE
:MEASURE:CHANNEL1:DELAY:REFERENCE:
SLOPE? -> :MEASURE:CHANNEL1:DELAY:
REFERENCE:SLOPE RISE
```

:MEASure:{CHANnel<x>|MATH<x>}:DELay:REFerence:SOURce

Function Sets whether or not to set the reference to the trigger point or the waveform when measuring the delay between channels or queries the current setting.

```
Syntax   :MEASure:{CHANnel<x>|MATH<x>}:
         DELay:REFerence:SOURce {TRACe|
         TRIGger}
         :MEASure:{CHANnel<x>|MATH<x>}:
         DELay:REFerence:SOURce?
         The <x> in CHANnel<x>=1 to 4 (or 1-
         2 for the DL1720)
         The <x> in MATH<x>=1 or 2 (or 1 for
         the DL1720)
Example  :MEASURE:CHANNEL1:DELAY:REFERENCE:
         SOURCE TRACE
         :MEASURE:CHANNEL1:DELAY:REFERENCE:
         SOURCE? -> :MEASURE:CHANNEL1:DELAY:
         REFERENCE:SOURCE TRACE
```

:MEASure:{CHANnel<x>|MATH<x>}:DELay:REFerence:TRACe

Function Sets the reference trace when measuring the delay between channels or queries the current setting.

```
Syntax   :MEASure:{CHANnel<x>|MATH<x>}:
         DELay:REFerence:TRACe {<NRf>|
         MATH<x>}
         :MEASure:{CHANnel<x>|MATH<x>}:
         DELay:REFerence:TRACe?
         The <x> in CHANnel<x>=1 to 4 (or 1-
         2 for the DL1720)
         The <x> in MATH<x>=1 or 2 (or 1 for
         the DL1720)
Example  :MEASURE:CHANNEL1:DELAY:REFERENCE:
         TRACE 2
         :MEASURE:CHANNEL1:DELAY:REFERENCE:
         TRACE? -> :MEASURE:CHANNEL1:DELAY:
         REFERENCE:TRACE 2
```

:MEASure:{CHANnel<x>|MATH<x>}:DELay:STATe

Function Turns the delay parameter ON/OFF and sets the display format or queries the current setting.

```
Syntax   :MEASure:{CHANnel<x>|MATH<x>}:
         DELay:STATe {OFF|ON|DEGRee}
         :MEASure:{CHANnel<x>|MATH<x>}:
         DELay:STATe?
         The <X> in CHANnel<x>=1 to 4 (or 1-
         2 for the DL1720)
         The <X> in MATH<x>=1 or 2 (or 1 for
         the DL1720)
Example  :MEASURE:CHANNEL1:DELAY:STATE ON
         :MEASURE:CHANNEL1:DEALY:STATE? ->
         :MEASURE:CHANNEL1:DELAY:STATE ON
```

:MEASure:{CHANnel<x>|MATH<x>}:DPRoximal?

Function Queries all settings related to distal, mesial, and proximal values.

```
Syntax   MEASure:{CHANnel<x>|MATH<x>}:
         DPRoximal?
         The <x> in CHANnel<x>=1 to 4 (or 1-
         2 for the DL1720)
         The <x> in MATH<x>=1 or 2 (or 1 for
         the DL1720)
Example  :MEASURE:CHANNEL1:DPROXIMAL? ->
         :MEASURE:CHANNEL1:DPROXIMAL:
         MODE PERCENT;PERCENT 10.0,50.0,
         90.0;UNIT -2.000E+00,0.0E+00,
         2.000E+00
```

:MEASure:{CHANnel<x>|MATH<x>}:DPRoximal:MODE

Function Sets the distal, mesial, and proximal mode or queries the current setting.

```
Syntax   :MEASure:{CHANnel<x>|MATH<x>}:
         DPRoximal:MODE {PERCent|UNIT}
         :MEASure:{CHANnel<x>|MATH<x>}:
         DPRoximal:MODE?
         The <x> in CHANnel<x>=1 to 4 (or 1-
         2 for the DL1720)
         The <x> in MATH<x>=1 or 2 (or 1 for
         the DL1720)
Example  :MEASURE:CHANNEL1:DPROXIMAL:MODE
         PERCENT
         :MEASURE:CHANNEL1:DPROXIMAL:MODE?
         -> :MEASURE:CHANNEL1:DPROXIMAL:
         MODE PERCENT
```

:MEASure:{CHANnel<x>|MATH<x>}:DPRoximal:PERCent

Function Sets the distal, mesial, and proximal points in terms of a percentage or queries the current setting.

```
Syntax   :MEASure:{CHANnel<x>|MATH<x>}:
         DPRoximal:PERCent {<NRf>,<NRf>,
         <NRf>}
         :MEASure:{CHANnel<x>|MATH<x>}:
         DPRoximal:PERCent?
         The <x> in CHANnel<x>=1 to 4 (or 1-
         2 for the DL1720)
         The <x> in MATH<x>=1 or 2 (or 1 for
         the DL1720)
         <NRf>=0 to 100 (%, 1% steps)
Example  :MEASURE:CHANNEL1:DPROXIMAL:PERCENT
         80,60,40
         :MEASURE:CHANNEL1:DPROXIMAL:
         PERCENT? -> :MEASURE:CHANNEL1:
         DPROXIMAL:PERCENT 80,60,40
```

:MEASure:{CHANnel<x>|MATH<x>}:DProximal:UNIT

Function Sets the distal, mesial, and proximal points in terms of a voltage or queries the current setting.

```
Syntax   :MEASure:{CHANnel<x>|MATH<x>}:
         DProximal:UNIT{<voltage>,<voltage>,
         <voltage>|<NRf>,<NRf>,<NRf>}
         :MEASure:{CHANnel<x>|MATH<x>}:
         DProximal:UNIT?
         The <x> in CHANnel<x>=1 to 4 (or 1-
         2 for the DL1720)
         The <x> in MATH<x>=1 or 2 (or 1 for
         the DL1720)
         <voltage>=8 div on the screen (0.01
         div steps)
         <NRf>=-4 to 4 div (0.01 div steps)
Example  :MEASURE:CHANNEL1:DPROXIMAL:UNIT
         50V,0V,-50V
         :MEASURE:CHANNEL1:DPROXIMAL:UNIT?
         -> :MEASURE:CHANNEL1:DPROXIMAL:
         UNIT 50.0E+00,0.0E+00,-50.0E+00
```

:MEASure:{CHANnel<x>|MATH<x>}:METHod

Function Sets the High and Low points or queries the current setting.

```
Syntax   :MEASure:{CHANnel<x>|MATH<x>}:
         METHod {AUTO|MAXMin}
         :MEASure:{CHANnel<x>|MATH<x>}:
         METHod?
         The <x> in CHANnel<x>=1 to 4 (or 1-
         2 for the DL1720)
         The <x> in MATH<x>=1 or 2 (or 1 for
         the DL1720)
Example  :MEASURE:CHANNEL1:METHOD AUTO
         :MEASURE:CHANNEL1:METHOD? ->
         :MEASURE:CHANNEL1:METHOD AUTO
```

:MEASure:{CHANnel<x>|MATH<x>}:<parameter>?

Function Queries all settings related to the parameters of each waveform.

```
Syntax   :MEASure:{CHANnel<x>|MATH<x>}:
         <parameter>?
         The <x> in CHANnel<x>=1 to 4 (or 1-
         2 for the DL1720)
         The <x> in MATH<x>=1 or 2 (or 1 for
         the DL1720)
         <parameter>= {AVERage|AVGFreq|
                      AVGPeriod|BWIDth1|
                      BWIDth2|DUTYcycle|FALL|
                      FREQuency|HIGH|LOW|
                      MAXimum|MINimum|
                      NOVershoot|NWIDth|
                      PERiod|PNUMber|POVershoot|
                      PTOPeak|PWIDth|RISE|RMS|
                      SDEViation|TY1Integ|
                      TY2Integ|XY1Integ|
                      XY2Integ}
Example  (The following example is for the
         average value of CH1.)
         :MEASURE:CHANNEL1:AVERAGE? ->
         :MEASURE:CHANNEL1:AVERAGE:STATE 1
```

:MEASure:{CHANnel<x>|MATH<x>}:<parameter>:COUNt?

Function Queries the number of statistical processing of each parameter.

```
Syntax   :MEASure:{CHANnel<x>|MATH<x>}:
         <parameter>:COUNt?
         The <x> in CHANnel<x>=1 to 4 (or 1-
         2 for the DL1720)
         The <x> in MATH<x>=1 or 2 (or 1 for
         the DL1720)
         <parameter>= {AVERage|AVGFreq|
                      AVGPeriod|BWIDth1|
                      BWIDth2|DELay|DUTYcycle|
                      FALL|FREQuency|HIGH|LOW|
                      MAXimum|MINimum|
                      NOVershoot|NWIDth|
                      PERiod|PNUMber|
                      POVershoot|PTOPeak|
                      PWIDth|RISE|RMS|
                      SDEViation|TY1Integ|
                      TY2Integ|XY1Integ|
                      XY2Integ}
Example  (The following example is for the
         average value of CH1.)
         :MEASURE:CHANNEL1:AVERAGE:COUNT? ->
         :MEASURE:CHANNEL1:AVERAGE:COUNT 100
```

:MEASure:{CHANnel<x>|MATH<x>}:<parameter>:{MAXimum|MEAN|MINimum|SDEViation}?

Function Queries the statistics of each parameter.

Syntax
```
:MEASure:{CHANnel<x>|MATH<x>}:
<parameter>:{MAXimum|MEAN|MINimum|
SDEViation}?
The <x> in CHANnel<x>=1 to 4 (or 1-
2 for the DL1720)
The <x> in MATH<x>=1 or 2 (or 1 for
the DL1720)
<parameter>= {AVERage|AVGFreq|
             AVGPeriod|BWIDth1|
             BWIDth2|DELay|DUTYcycle|
             FALL|FREQuency|HIGH|LOW|
             MAXimum|MINimum|
             NOVershoot|NWIDth|
             PERiod|PNUMber|
             POVershoot|PTOPeak|
             PWIDth|RISE|RMS|
             SDEViation|TY1Integ|
             TY2Integ|XY1Integ|
             XY2Integ}
```

Example
```
(The following example is for the
maximum value.)
:MEASURE:CHANNEL1:AVERAGE:MAXIMUM?
-> :MEASURE:CHANNEL1:AVERAGE:
MAXIMUM -40.0000E-06
```

Description If the statistics cannot be found, "NAN(Not A Number)" is returned.

:MEASure:{CHANnel<x>|MATH<x>}:<parameter>:STATe

Function Turns the parameter ON/OFF one by one or queries the current setting.

Syntax
```
:MEASure:{CHANnel<x>|MATH<x>}:
<parameter>:STATe {<Boolean>}
:MEASure:{CHANnel<x>|MATH<x>}:
<parameter>:STATe?
The <x> in CHANnel<x>=1 to 4 (or 1-
2 for the DL1720)
The <x> in MATH<x>=1 or 2 (or 1 for
the DL1720)
<parameter>= {AVERage|AVGFreq|
             AVGPeriod|BWIDth1|
             BWIDth2|DUTYcycle|FALL|
             FREQuency|HIGH|LOW|
             MAXimum|MINimum|
             NOVershoot|NWIDth|
             PERiod|PNUMber|
             POVershoot|PTOPeak|PWIDth|
             RISE|RMS|SDEViation|
             TY1Integ|TY2Integ|
             XY1Integ|XY2Integ}
```

Example
```
(The following example is for the
average value of CH1.)
:MEASURE:CHANNEL1:AVERAGE:STATE ON
:MEASURE:CHANNEL1:AVERAGE:STATE? ->
:MEASURE:CHANNEL1:AVERAGE:STATE 1
```

:MEASure:{CHANnel<x>|MATH<x>}:<parameter>:VALue?

Function Queries the value of the automated measurement of each parameter.

Syntax
```
:MEASure:{CHANnel<x>|MATH<x>}:
<parameter>:VALue?
The <x> in CHANnel<x>=1 to 4 (or 1-
2 for the DL1720)
The <x> in MATH<x>=1 or 2 (or 1 for
the DL1720)
<parameter>= {AVERage|AVGFreq|
             AVGPeriod|BWIDth1|
             BWIDth2|DELay|DUTYcycle|
             FALL|FREQuency|HIGH|LOW|
             MAXimum|MINimum|
             NOVershoot|NWIDth|
             PERiod|PNUMber|
             POVershoot|PTOPeak|PWIDth|
             RISE|RMS|SDEViation|
             TY1Integ|TY2Integ|
             XY1Integ|XY2Integ}
```

Example
```
(The following example is for the
average value of CH1.)
:MEASURE:CHANNEL1:AVERAGE:VALUE? ->
:MEASURE:CHANNEL1:AVERAGE:
VALUE 4.950E+00
```

Description If the measurement is not possible, "NAN(Not A Number)" is returned.

:MEASure:CONSt<x>

Function Sets the constants to be used during the computation of automated measurements on dual areas or queries the current setting.

Syntax
```
:MEASure:CONSt<x> {<NRf>}
:MEASure:CONSt<x>?
<NRf>=-9.9999E+30 to 9.9999E+30
<x>=1 to 4
```

Example
```
:MEASURE:CONST1 1.0000E+00
:MEASURE:CONST1? -> :MEASURE:
CONST1 1.0000E+00
```

:MEASure:CYCLe?

Function Queries all settings related to the periodic statistical processing of the automated measurement of waveform parameters.

Syntax `:MEASure:CYCLe?`

Example
```
:MEASURE:CYCLE? -> :MEASURE:CYCLE:
TRACE 1
```

:MEASure:CYCLe:ABORt

Function Aborts the periodic statistical processing of the automated measurement of waveform parameters.

Syntax `:MEASure:CYCLe:ABORt`

Example `:MEASURE:CYCLE:ABORT`

:MEASure:CYCLe:EXECute

Function Executes the periodic statistical processing of the automated measurement of waveform parameters.

Syntax
```
:MEASure:CYCLe:EXECute
```
Example
```
:MEASURE:CYCLE:EXECUTE
```

:MEASure:CYCLe:TRACe

Function Sets the waveform used to determine the period for the periodic statistical processing of automated measurement of waveform parameters or queries the current setting.

Syntax
```
:MEASure:CYCLe:TRACe {OWN|<NRf>|
MATH<x>}
:MEASure:CYCLe:TRACe?
<NRf>=1 to 4 (or 1-2 for the
DL1720)
<x>=1 or 2 (or 1 for the DL1720)
```
Example
```
:MEASURE:CYCLE:TRACE 1
:MEASURE:CYCLE:TRACE? -> :MEASURE:
CYCLE:TRACE 1
```

:MEASure:HISTory:ABORt

Function Aborts the statistical processing within the historical data of the automated measurement of waveform parameters.

Syntax
```
:MEASure:HISTory:ABORt
```
Example
```
:MEASURE:HISTORY:ABORT
```

:MEASure:HISTory:EXECute

Function Executes the statistical processing within the historical data of the automated measurement of waveform parameters.

Syntax
```
:MEASure:HISTory:EXECute
```
Example
```
:MEASURE:HISTORY:EXECUTE
```

:MEASure:MODE

Function Turns the automated measurement of waveform parameters ON/OFF and sets the statistical processing or queries the current setting.

Syntax
```
:MEASure:MODE {OFF|ON|STATistics|
CYCLE|HISTory}
:MEASure:MODE?
```
Example
```
:MEASURE:MODE ON
:MEASURE:MODE? -> :MEASURE:MODE ON
```

:MEASure:ONECycle

Function Turns ON/OFF the automated measurement in the one-cycle mode or queries the current setting.

Syntax
```
:MEASure:ONECycle {<Boolean>}
:MEASure:ONECycle?
```
Example
```
:MEASURE:ONECYCLE ON
:MEASURE:ONECYCLE -> :MEASURE:
ONECYCLE 1
```

:MEASure:TLINkage<x>

Function Turns ON/OFF the linked movement of the determination range cursor.

Syntax
```
:MEASure:TLINkage<x> {<Boolean>}
:MEASure:TLINkage<x>?
<x>=1,2
```
Example
```
:MEASURE:TLINKAGE1 ON
:MEASURE:TLINKAGE1 -> :MEASURE:
TLINKAGE1 1
```
Description ":MEASURE:TLINKAGE1" sets the links for T-Range1 and T-Range2 or queries the current settings. ":MEASURE:TLINKAGE2" sets the links for T-Range3 and T-Range4 or queries the current settings.

:MEASure:TRANge<x> (Time Range)

Function Sets the measurement range or queries the current setting.

Syntax
```
:MEASure:TRANge<x> {<NRf>,<NRf>}
:MEASure:TRANge<x>?
<x>=1,2
<NRf>=-5 to 5 div (10 div/displayed
record length steps)
```
Example
```
:MEASURE:TRANGE1 -4,4
:MEASURE:TRANGE1? -> :MEASURE:
TRANGE1 -4.00E+00,4.00E+00
```
Description ":Measure:TRANge1" sets the measurement range of Area1 during normal measurement and during measurement on dual areas or queries the current setting.
":Measure:TRANge2" sets the measurement range of Area2 during the measurement on dual areas or queries the current setting.

:MEASure:USER<x>?

Function Queries all settings related to the automated measurement of dual areas.

Syntax
```
:MEASure:USER<x>?
<x>=1 to 4
```
Example
```
:MEASURE:USER1? -> :MEASURE:USER1:
AREA1:TRACE 1;ITEM PTOPEAK;:
MEASURE:USER1:AREA2:TRACE 2;
ITEM MAXIMUM;:MEASURE:USER2:AREA1:
TRACE 3;ITEM MINIMUM;:MEASURE:
USER2:AREA2:TRACE 4;ITEM RMS;:
MEASURE:USER3:AREA1:TRACE MATH1;
ITEM PERIOD;:MEASURE:USER3:AREA2:
TRACE MATH2;ITEM AVGPERIOD;:
MEASURE:USER4:AREA1:TRACE CONST1;
ITEM TY1INTEG:MEASURE:USER4:
AREA2:TRACE NONE;ITEM XY2INTEG
```

:MEASure:USER<x>:AREA<y>?

Function Queries all settings related to the specified area of the automated measurement of dual areas.

Syntax
```
:MEASure:USER<x>:AREA<y>?
<x>=1 to 4
<y>=1,2
```

Example
```
:MEASURE:USER1:AREA1? -> :MEASURE:
USER1:AREA1:TRACE 1;ITEM PTOPEAK
```

:MEASure:USER<x>:AREA<y>:ITEM

Function Sets parameters of the specified area of the automated measurement of dual areas or queries the current setting.

Syntax
```
:MEASure:USER<x>:AREA<y>:ITEM
{<Parameter>}
:MEASure:USER<x>:AREA<y>:ITEM?
<x>=1 to 4
<y>=1,2
<Parameter>= {AVERage|AVGFreq|
             AVGPeriod|BWIDth1|
             BWIDth2|DUTYcycle|FALL|
             FREQuency|HIGH|LOW|
             MAXimum|MINimum|
             NOVershoot|NWIDth|
             PERiod|PNUMber|POVershoot|
             PTOPeak|PWIDth|RISE|RMS|
             SDEViation|TY1Integ|
             TY2Integ|XY1Integ|
             XY2Integ}
```

Example
```
:MEASURE:USER1:AREA1:ITEM PTOPEAK
:MEASURE:USER1:AREA1:ITEM? ->
:MEASURE:USER1:AREA1:ITEM PTOPEAK
```

:MEASure:USER<x>:AREA<y>:TRACe

Function Sets the target trace of the specified area of the automated measurement of dual areas or queries the current setting.

Syntax
```
:MEASure:USER<x>:AREA<y>:TRACe
{<NRf>|MATH<z>|NONE|CONSt<w>}
:MEASure:USER<x>:AREA<y>:TRACe?
<x>=1 to 4
<y>=1,2
<NRf>=1 to 4 (or 1-2 for the
DL1720)
<z>=1,2 (or 1 for the DL1720)
<w>=1 to 4
```

Example
```
:MEASURE:USER1:AREA1:TRACE 1
:MEASURE:USER1:AREA1:TRACE ->
:MEASURE:USER1:AREA1:TRACE 1
```

:MEASure:USER<x>:COUNt?

Function Queries the number of statistical processing of the automated measured values of dual areas.

Syntax
```
:MEASure:USER<x>:COUNt?
<x>=1 to 4
```

Example
```
:MEASURE:USER1:COUNT? -> :MEASURE:
USER1:COUNT 100
```

:MEASure:USER<x>:{MAXimum|MEAN|MINimum|SDEViation}?

Function Queries the statistics of the automated measured values of dual areas.

Syntax
```
:MEASure:USER<x>:{MAXimum|MEAN|
MINimum|SDEViation}?
<x>=1 to 4
```

Example
```
(The following is an example for
the maximum value.)
:MEASURE:USER1:MAXIMUM? ->
:MEASURE:USER1:MAXIMUM 1.000E+00
```

Description If the statistics cannot be determined, "NAN (Not A Number" is returned.

:MEASure:USER<x>:OPERation

Function Sets the computing equation between the areas of the automated measurements of dual areas or queries the current setting.

Syntax
```
:MEASure:USER<x>:OPERation {PLUS|
MINus|MULTiple|DIVision}
:MEASure:USER<x>:OPERation?
<x>=1 to 4
```

Example
```
:MEASURE:USER1:OPERATION PLUS
:MEASURE:USER1:OPERATION ->
:MEASURE:USER1:OPERATION PLUS
```

:MEASure:USER<x>:STATe

Function Turns ON/OFF the automated measurements of dual areas or queries the current setting.

Syntax
```
:MEASure:USER<x>:STATe {<Boolean>}
:MEASure:USER<x>:STATe?
<x>=1 to 4
```

Example
```
:MEASURE:USER1:STATE ON
:MEASURE:USER1:STATE -> :MEASURE:
USER1:STATE 1
```

:MEASure:USER<x>:UNIT

Function Sets the unit to be added to the display of the automated measured values of dual areas or queries the current setting.

Syntax
```
:MEASure:USER<x>:UNIT <Character
string>
:MEASure:USER<x>:UNIT?
<x>=1 to 4
```

Example
```
:MEASURE:USER1:UNIT "UNIT"
:MEASURE:USER1:UNIT -> :MEASURE:
USER1:UNIT "UNIT"
```

:MEASure:USER<x>:VALue?

Function Queries the measured values of the automated measurement of dual areas.

Syntax
```
:MEASure:USER<x>:VALue?
<x>=1 to 4
```

Example
```
:MEASURE:USER1:VALUE? -> :MEASURE:
USER1:VALUE 1.000E+00
```

:MEASure:WAIT?

Function Waits for the completion of the automated measurement with a timeout.

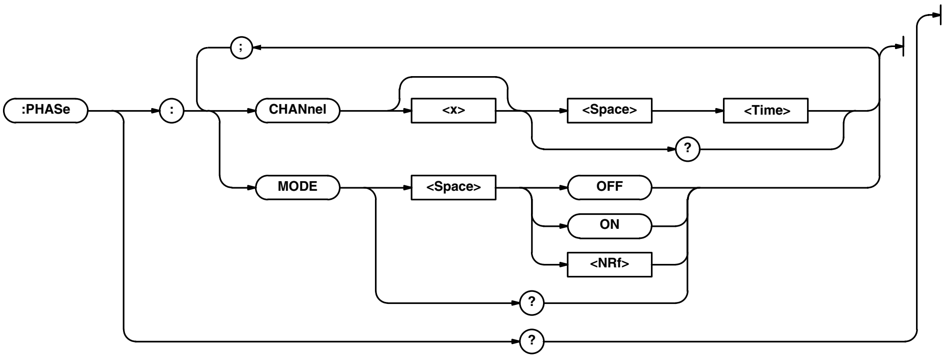
Syntax `:MEASure:WAIT? {<NRf>}`
`<NRf>=1 to 360000 (timeout period, 10 ms steps)`

Example `:MEASURE:WAIT? 100 -> :MEASURE:WAIT 1`

Description
- Returns "0" if the automated measurement completes within the timeout period or "1" if it is not complete or automated measurement is not in progress.
- Even if the timeout period is sufficiently long, "0" is returned when the automated measurement completes.

6.18 PHASe Group

The commands in the PHASe group deal with the phase shift function. These commands can be used to make the same settings and inquiries as when **SHIFT** + **MATH** on the front panel is pressed.



:PHASe?

Function Queries all settings related to the phase shift function.

Syntax `:PHASe?`

Example `:PHASe? -> :PHASE:MODE 0;CHANNEL1 0.0E+00;CHANNEL2 0.0E+00;CHANNEL3 0.0E+00;CHANNEL4 0.0E+00`

:PHASe:CHANnel<x>

Function Sets the amount of phase shift of the waveform or queries the current setting.

Syntax `:PHASe:CHANnel<x> {<time>}`
`:PHASe:CHANnel<x>?`
`<x>=1 to 4 (or 1-2 for the DL1720)`
`<time>=time between -T/div*5 and T/div*5`

Example `:PHASE:CHANNEL2 1us`
`:PHASE:CHANNEL2? -> :PHASE:CHANNEL2 1.000000E-06`

Description
- Phase shift may not be possible on some channels depending on the interleave mode setting.
- When the time base is set to external clock, an error results.

:PHASe:MODE

Function Turns the phase shift function ON/OFF or queries the current setting.

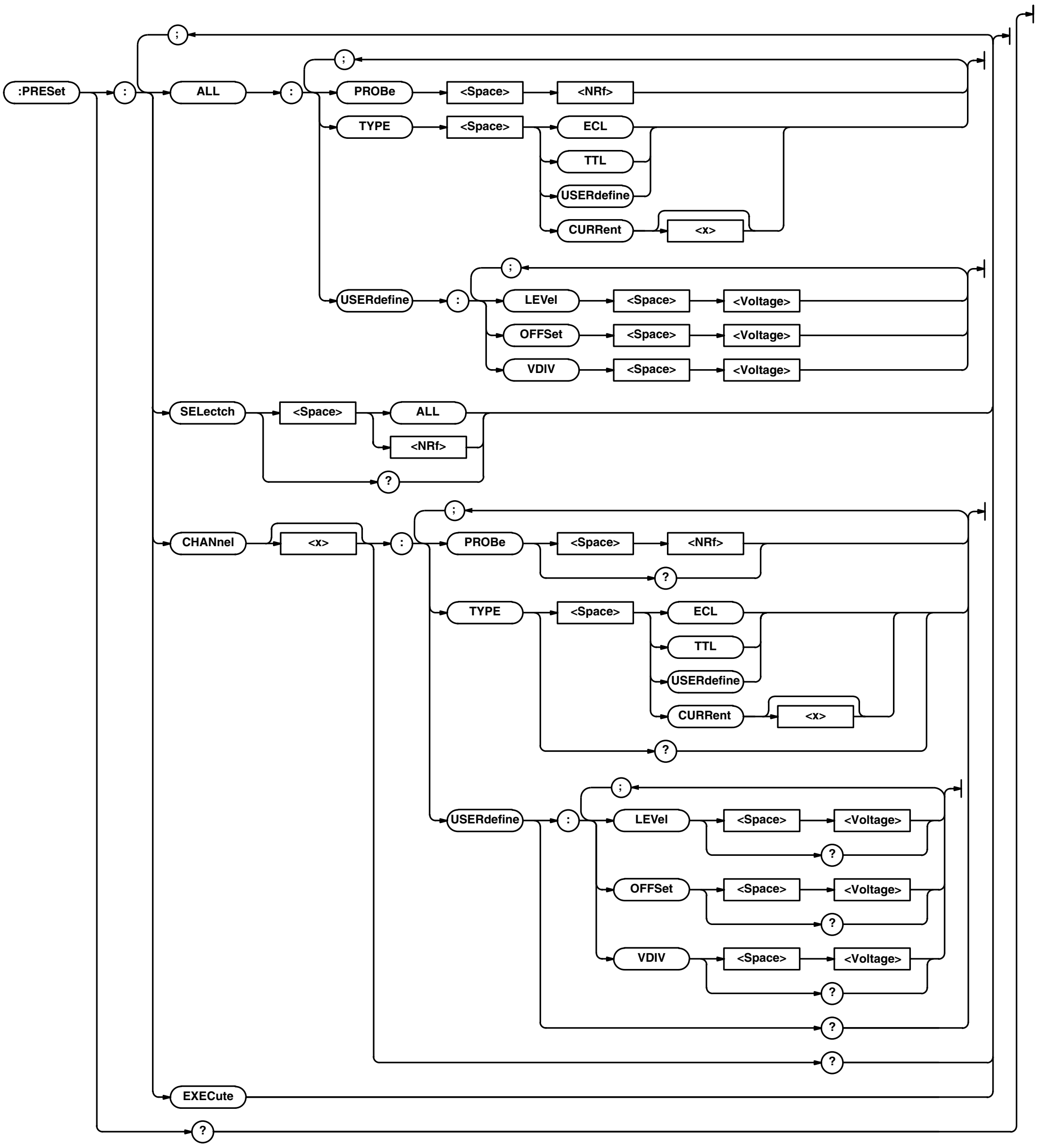
Syntax `:PHASe:MODE {<Boolean>}`
`:PHASe:MODE?`

Example `:PHASE:MODE ON`
`:PHASE:MODE? -> :PHASE:MODE 1`

Description When the time base is set to external clock, an error results.

6.19 PRESet Group

The commands in the PRESet group deal with the preset function. These commands can be used to make the same settings and inquiries as when **PRESET** on the front panel is pressed.



:PRESet?

Function Queries all settings related to the preset function.

Syntax `:PRESet?`

Example `:PRESET? -> :PRESET:SELECTCH 1;CHANNEL1:TYPE TTL;USERDEFINE:VDIV 50.000E+00;LEVEL 0.0E+00;OFFSET 0.0E+00;:PRESET:CHANNEL1:PROBE 10;:PRESET:CHANNEL2:TYPE TTL;USERDEFINE:VDIV 50.000E+00;LEVEL 0.0E+00;OFFSET 0.0E+00;:PRESET:CHANNEL2:PROBE 10;:PRESET:CHANNEL3:TYPE TTL;USERDEFINE:VDIV 50.000E+00;LEVEL 0.0E+00;OFFSET 0.0E+00;:PRESET:CHANNEL3:PROBE 10;:PRESET:CHANNEL4:TYPE TTL;USERDEFINE:VDIV 50.000E+00;LEVEL 0.0E+00;OFFSET 0.0E+00;:PRESET:CHANNEL4:PROBE 10`

:PRESet:ALL:PROBe

Function Sets the preset values of the probe attenuation of all channels.

Syntax `:PRESet:ALL:PROBe {<NRf>}`
`<NRf>=1,10,100,1000`

Example `:PRESET:ALL:PROBE 10`

:PRESet:ALL:TYPE

Function Sets preset values to all channels.

Syntax `:PRESet:ALL:TYPE {ECL|TTL|USERdefine|CURRent<x>}`
`<x>=1,2`

Example `:PRESET:ALL:TYPE USERDEFINE`

Description "`CURRent1`" is the curretn probe(700937), "`CURRent2`" is the curretn probe(701930).

:PRESet:ALL:USERdefine:LEVel

Function Sets the preset trigger level of all channels.

Syntax `:PRESet:ALL:USERdefine:LEVel {<voltage>}`
`<voltage>=8 div on the screen (0.01 div steps)`

Example `:PRESET:ALL:USERDEFINE:LEVEL 0V`

:PRESet:ALL:USERdefine:OFFSet

Function Sets the preset offset voltage of all channels.

Syntax `:PRESet:ALL:USERdefine:OFFSet {<voltage>}`
`<voltage>=See the IM701710-01E User's Manual.`

Example `:PRESET:ALL:USERDEFINE:OFFSET 0V`

:PRESet:ALL:USERdefine:VDIV

Function Sets the preset V/div value of all channels.

Syntax `:PRESet:ALL:USERdefine:VDIV {<voltage>}`
`<voltage>=2 mV to 10 V (when the probe attenuation is 1:1, See the IM701710-01E User's Manual.)`

Example `:PRESET:ALL:USERDEFINE:VDIV 2V`

:PRESet:CHANnel<x>?

Function Queries the preset information of an arbitrary channel.

Syntax `:PRESet:CHANnel<x>?`
`<x>=1 to 4 (or 1-2 for the DL1720)`

Example `:PRESET:CHANNEL1? -> :PRESET:CHANNEL1:TYPE TTL;USERDEFINE:VDIV 50.000E+00;LEVEL 0.0E+00;OFFSET 0.0E+00;:PRESET:CHANNEL1:PROBE 10`

:PRESet:CHANnel<x>:PROBe

Function Sets the preset probe attenuation of an arbitrary channel or queries the current setting.

Syntax `:PRESet:CHANnel<x>:PROBe {<NRf>}`
`:PRESet:CHANnel<x>:PROBe?`
`<x>=1 to 4 (or 1-2 for the DL1720)`
`<NRf>=1,10,100,1000`

Example `:PRESET:CHANNEL1:PROBE 1`
`:PRESET:CHANNEL1:PROBE? -> :PRESET:CHANNEL1:PROBE 1`

:PRESet:CHANnel<x>:TYPE

Function Sets the preset type to the channel or queries the current setting.

Syntax `:PRESet:CHANnel<x>:TYPE {ECL|TTL|USERdefine|CURRent<y>}`
`:PRESet:CHANnel<x>:TYPE?`
`<x>=1 to 4 (or 1-2 for the DL1720)`
`<y>=1,2`

Example `:PRESET:CHANNEL1:TYPE USERDEFINE`
`:PRESET:CHANNEL1:TYPE? -> :PRESET:CHANNEL1:TYPE USERDEFINE`

Description "`CURRent1`" is the curretn probe(700937), "`CURRent2`" is the curretn probe(701930).

:PRESet:CHANnel<x>:USERdefine?

Function Queries all preset values when using User preset.

Syntax `:PRESet:CHANnel<x>:USERdefine?`
`<x>=1 to 4 (or 1-2 for the DL1720)`

Example `:PRESET:CHANNEL1:USERDEFINE? -> :PRESET:CHANNEL1:USERDEFINE:VDIV 50.000E+00;LEVEL 0.0E+00;OFFSET 0.0E+00`

:PRESet:CHANnel<x>:USERdefine:LEVel

Function Sets the preset trigger level of the channel or queries the current setting.

Syntax
```
:PRESet:CHANNEL<x>:USERdefine:LEVel
{<voltage>}
:PRESet:CHANNEL<x>:USERdefine:
LEVel?
<x>=1 to 4 (or 1-2 for the DL1720)
<voltage>=8 div on the screen (0.01
div steps)
```

Example
```
:PRESET:CHANNEL1:USERDEFINE:LEVEL
0V
:PRESET:CHANNEL1:USERDEFINE:LEVEL?
-> :PRESET:CHANNEL1:USERDEFINE:
LEVEL 0.000E+00
```

:PRESet:CHANnel<x>:USERdefine:OFFSet

Function Sets the preset offset voltage of the channel or queries the current setting.

Syntax
```
:PRESet:CHANNEL<x>:USERdefine:
OFFSet {<voltage>}
:PRESet:CHANNEL<x>:USERdefine:
OFFSet?
<x>=1 to 4 (or 1-2 for the DL1720)
<voltage>=See the IM701710-01E
User's Manual.
```

Example
```
:PRESET:CHANNEL1:USERDEFINE:OFFSET
0V
:PRESET:CHANNEL1:USERDEFINE:OFFSET?
-> :PRESET:CHANNEL1:USERDEFINE:
OFFSET 0.000E+00
```

:PRESet:CHANnel<x>:USERdefine:VDIV

Function Sets the preset V/div value of the channel or queries the current setting.

Syntax
```
:PRESet:CHANNEL<x>:USERdefine:VDIV
{<voltage>}
:PRESet:CHANNEL<x>:USERdefine:VDIV?
<x>=1 to 4 (or 1-2 for the DL1720)
<voltage>=2 mV to 10 V(when the
probe attenuation is 1:1, See the
IM701710-01E User's Manual.)
```

Example
```
:PRESET:CHANNEL1:USERDEFINE:VDIV 2V
:PRESET:CHANNEL1:USERDEFINE:VDIV?
-> :PRESET:CHANNEL1:USERDEFINE:
VDIV 2.000E+00
```

:PRESet:EXECute

Function Executes preset.

Syntax `:PRESet:EXECute`

Example `:PRESET:EXECUTE`

Description Preset the channel which is selected by the "`PRESet:SELectch`" command.

:PRESet:SELectch

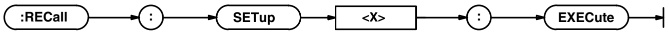
Function Sets the channel to be preset or queries the current setting.

Syntax
```
:PRESet:SELectch {ALL|<NRf>}
:PRESet:SELectch?
<NRf>=1 to 4 (or 1-2 for the
DL1720)
```

Example
```
:PRESET:SELECTCH 1
:PRESET:SELECTCH? -> :PRESET:
SELECTCH 1
```

6.20 RECall Group

The commands in the RECall group are used to recall the setup data from the internal memory. These commands can be used to carry out the same operations as when **SETUP** on the front panel is pressed.



:RECall:SETup<x>:EXECute

Function Recalls the setting parameters from the internal memory.

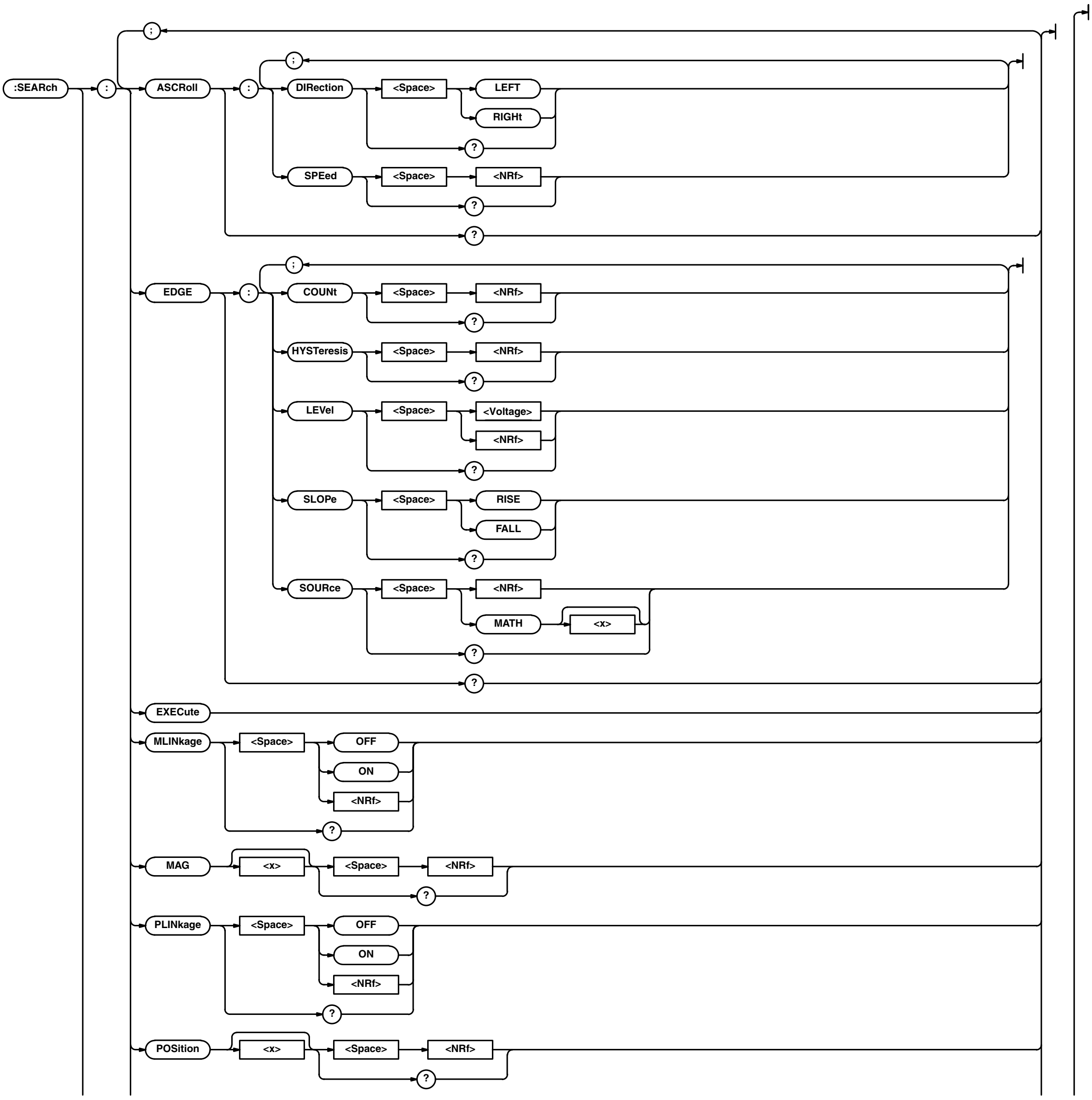
Syntax
```
:RECall:SETup<x>:EXECute
<x>=1 to 3
```

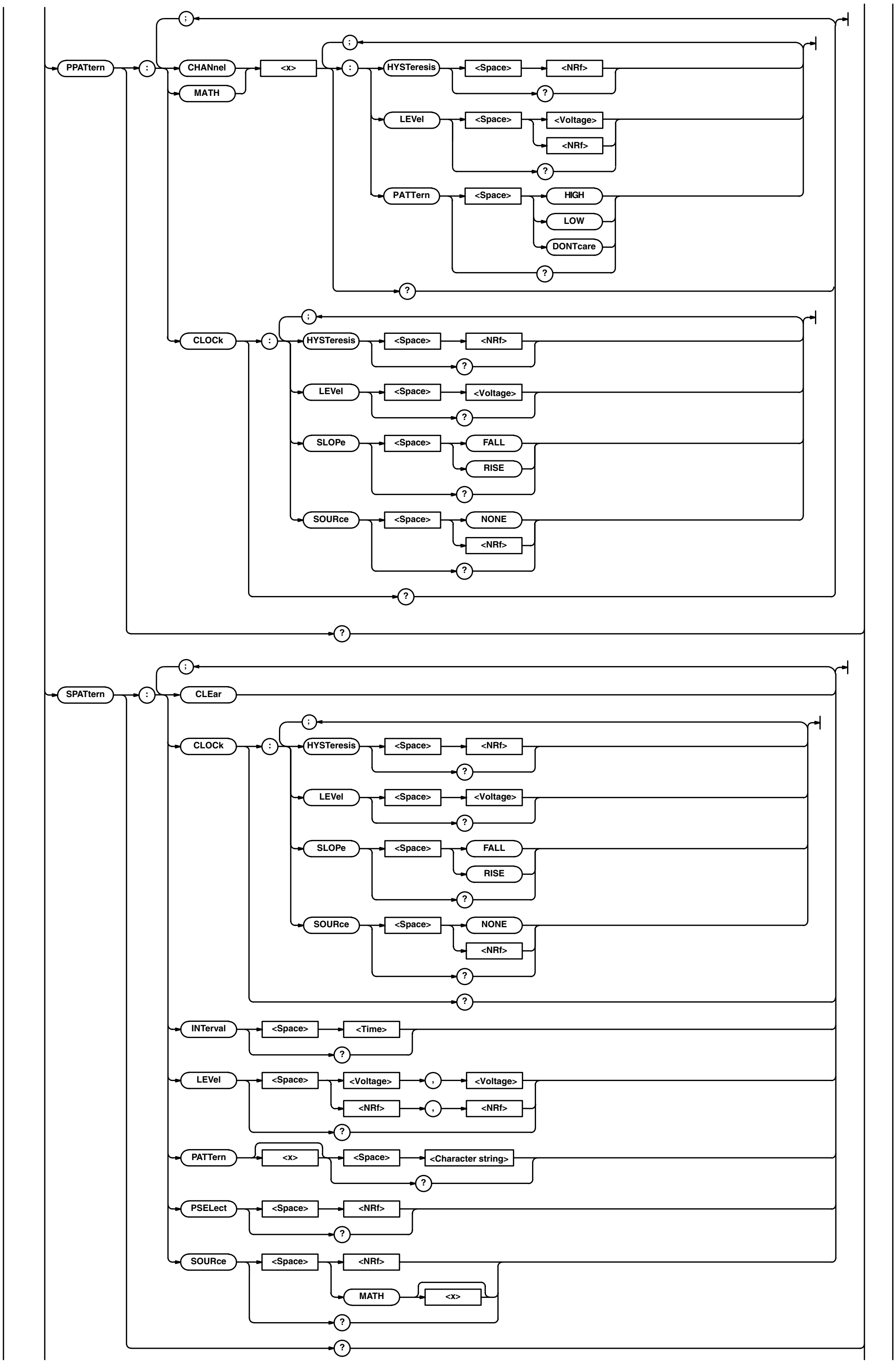
Example `:RECALL:SETUP1:EXECute`

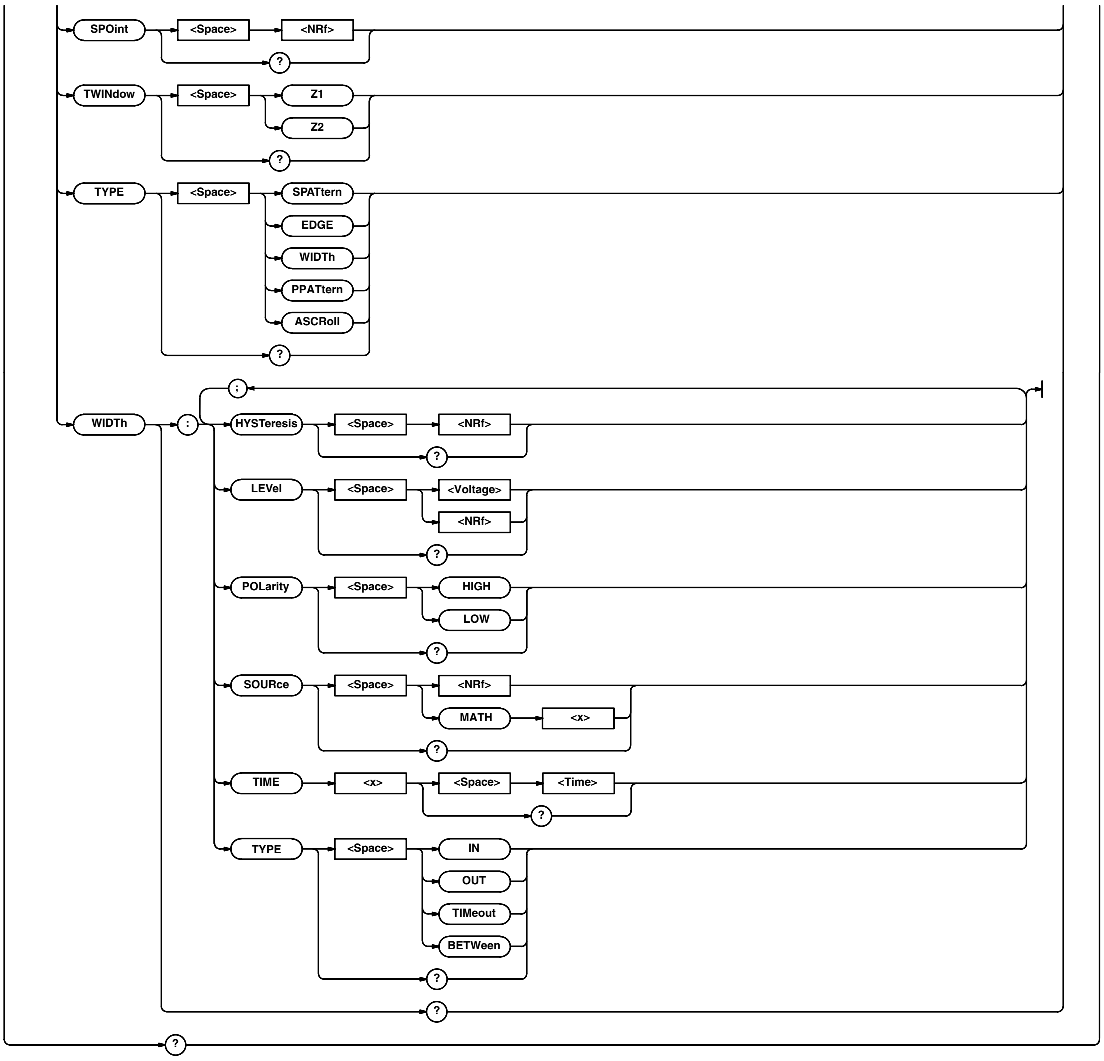
Description If you specify an unsaved number, an error occurs.

6.21 SEARch Group

The commands in the SEARch group are used to search an arbitrary pattern in the acquired waveform. These commands can be used to carry out the same operations or to make the same settings and inquiries as when **SHIFT** + **ZOOM** on the front panel is pressed.




;
PPATtern
:
CHANnel
MATH
<x>
;
:
HYSTeresis
<Space>
<NRf>
?
LEVel
<Space>
<Voltage>
<NRf>
?
PATTern
<Space>
HIGH
LOW
DONTcare
?
?
;
CLOCk
:
HYSTeresis
<Space>
<NRf>
?
LEVel
<Space>
<Voltage>
?
SLOPe
<Space>
FALL
RISE
?
SOURce
<Space>
NONE
<NRf>
?
?
?
;
SPATtern
:
CLEar
;
CLOCk
:
HYSTeresis
<Space>
<NRf>
?
LEVel
<Space>
<Voltage>
?
SLOPe
<Space>
FALL
RISE
?
SOURce
<Space>
NONE
<NRf>
?
?
INTerval
<Space>
<Time>
?
LEVel
<Space>
<Voltage>
,
<Voltage>
<NRf>
,
<NRf>
?
PATTern
<x>
<Space>
<Character string>
?
PSELect
<Space>
<NRf>
?
SOURce
<Space>
<NRf>
MATH
<x>
?
?


SPOint
<Space>
<NRf>
?
TWINdow
<Space>
Z1
Z2
?
TYPE
<Space>
SPATtern
EDGE
WIDTh
PPATtern
ASCRoll
?
WIDTh
:
;
HYSTeresis
<Space>
<NRf>
?
LEVel
<Space>
<Voltage>
<NRf>
?
POLarity
<Space>
HIGH
LOW
?
SOURce
<Space>
<NRf>
MATH
<x>
?
TIME
<x>
<Space>
<Time>
?
TYPE
<Space>
IN
OUT
TIMeout
BETWeen
?
?
?

:SEARch?

Function Queries all settings related to the search function.

```
Syntax    :SEARch?
Example   :SEARCH? -> :SEARCH:TYPE EDGE;EDGE:
          SOURCE 1;LEVEL 0.0E+00;SLOPE RISE;
          HYSTERESIS 0.30;COUNT 1;:SEARCH:
          SPATTERN:CLOCK:SOURCE NONE;:SEARCH:
          SPATTERN:INTERVAL 10.000E-09;
          SOURCE 1;LEVEL 0.0E+00,0.0E+00;
          PSELECT 1;PATTERN1 "HXXXXXXX";
          PATTERN2 "XXXXXXXX";
          PATTERN3 "XXXXXXXX";
          PATTERN4 "XXXXXXXX";
          PATTERN5 "XXXXXXXX";
          PATTERN6 "XXXXXXXX";
          PATTERN7 "XXXXXXXX";
          PATTERN8 "XXXXXXXX";:SEARCH:WIDTH:
          TYPE IN;SOURCE 1;LEVEL 0.0E+00;
          POLARITY HIGH;HYSTERESIS 0.30;
          TIME1 1.000000E-06;
          TIME2 1.000000E-06;:SEARCH:
          PPATTERN:CLOCK:SOURCE NONE;:SEARCH:
          PPATTERN:CHANNEL1:LEVEL 0.0E+00;
          HYSTERESIS 0.30;PATTERN HIGH;:
          SEARCH:PPATTERN:CHANNEL2:
          LEVEL 0.0E+00;HYSTERESIS 0.30;
          PATTERN DONTCARE;:SEARCH:PPATTERN:
          CHANNEL3:LEVEL 0.0E+00;
          HYSTERESIS 0.30;PATTERN DONTCARE;:
          SEARCH:PPATTERN:CHANNEL4:
          LEVEL 0.0E+00;HYSTERESIS 0.30;
          PATTERN DONTCARE;:SEARCH:PPATTERN:
          MATH1:LEVEL 0.00;HYSTERESIS 0.30;
          PATTERN DONTCARE;:SEARCH:ASCROLL:
          DIRECTION RIGHT;SPEED 0;:SEARCH:
          TWINDOW Z1;MLINKAGE 1;MAG1 2.0;
          MAG2 2.0;PLINKAGE 0;
          POSITION1 0.0000000;
          POSITION2 0.0000000;
          SPOINT -5.0000000;SELECT NAN
```

:SEARch:ASCRoll?

Function Queries all settings related to the auto scroll function.

```
Syntax    :SEARch:ASCRoll?
Example   :SEARCH:ASCROLL? -> :SEARCH:
          ASCROLL:DIRECTION RIGHT;SPEED 0
```

:SEARch:ASCRoll:DIRection

Function Sets the direction for moving the zoom box of the auto scroll or queries the current setting.

```
Syntax    :SEARch:ASCRoll:DIRection {LEFT|
          RIGHt}
          :SEARch:ASCRoll:DIRection?
Example   :SEARCH:ASCROLL:DIRECTION LEFT
          :SEARCH:ASCROLL:DIRECTION? ->
          :SEARCH:ASCROLL:DIRECTION LEFT
```

:SEARch:ASCRoll:SPEed

Function Sets the speed for moving the zoom box of the auto scroll or queries the current setting.

```
Syntax    :SEARch:ASCRoll:SPEed {<NRf>}
          :SEARch:ASCRoll:SPEed?
          <NRf>=1 to 7
Example   :SEARCH:ASCROLL:SPEED 1
          :SEARCH:ASCROLL:SPEED? -> :SEARCH:
          ASCROLL:SPEED 1
```

:SEARch:EDGE?

Function Queries all settings related to the edge search.

```
Syntax    :SEARch:EDGE?
Example   :SEARCH:EDGE? -> :SEARCH:EDGE:
          SOURCE 1;LEVEL 0.0E+00;SLOPE RISE;
          HYSTERESIS LOW;COUNT 1
```

:SEARch:EDGE:COUNt

Function Sets the edge search count or queries the current setting.

```
Syntax    :SEARch:EDGE:COUNt {<NRf>}
          :SEARch:EDGE:COUNt?
          <NRf>=1 to 1000000
Example   :SEARCH:EDGE:COUNT 100
          :SEARCH:EDGE:COUNT? -> :SEARCH:
          EDGE:COUNT 100
```

:SEARch:EDGE:HYSTeresis

Function Sets the hysteresis on the edge search level or queries the current setting.

```
Syntax    :SEARch:EDGE:HYSTeresis {<NRf>}
          :SEARch:EDGE:HYSTeresis?
          <NRf>=0.3 to 4 div (0.1 steps)
Example   :SEARCH:EDGE:HYSTERESIS 1
          :SEARCH:EDGE:HYSTERESIS? ->
          :SEARCH:EDGE:HYSTERESIS 1.0
```

:SEARch:EDGE:LEVEl

Function Sets the edge search level or queries the current setting.

```
Syntax    :SEARch:EDGE:LEVEl {<voltage>|
          <NRf>}
          :SEARch:EDGE:LEVEl?
          <voltage>=8 div on the screen (0.01
          div steps)
          <NRf>=-4 to 4 div (0.01 div steps)
Example   :SEARCH:EDGE:LEVEL -10mV
          :SEARCH:EDGE:LEVEL? -> :SEARCH:
          EDGE:LEVEL -10.00E-03
```

Description Specify a voltage when the ":SEARch:EDGE:SOURce" is set to channel, <NRf> when it is set to MATH.

:SEARch:EDGE:SLOPe

Function Sets the slope of the edge search or queries the current setting.

Syntax
```
:SEARch:EDGE:SLOPe {FALL|RISE}
:SEARch:EDGE:SLOPe?
```
Example
```
:SEARCH:EDGE:SLOPE RISE
:SEARCH:EDGE:SLOPE? -> :SEARCH:
EDGE:SLOPE RISE
```

:SEARch:EDGE:SOURce

Function Sets the waveform on which to perform the edge search or queries the current setting.

Syntax
```
:SEARch:EDGE:SOURce {<NRf>|MATH<x>}
:SEARch:EDGE:SOURce?
<NRf>=1 to 4 (or 1-2 for the
DL1720)
<x>=1 or 2 (or 1 for the DL1720)
```
Example
```
:SEARCH:EDGE:SOURCE MATH1
:SEARCH:EDGE:SOURCE? -> :SEARCH:
EDGE:SOURCE MATH1
```

:SEARch:EXECute

Function Executes the search. This is an overlap command.

Syntax
```
:SEARch:EXECute
```
Example
```
:SEARCH:EXECUTE
```

:SEARch:MLINkage (Mag Linkage)

Function Turns the link ON/OFF when changing the zoom rate or queries the current setting.

Syntax
```
:SEARch:MLINkage {<Boolean>}
:SEARch:MLINkage?
```
Example
```
:SEARCH:MLINKAGE ON
:SEARCH:MLINKAGE? -> :SEARCH:
MLINKAGE 1
```

:SEARch:MAG<x>

Function Sets the zoom rate of the zoom window or queries the current setting.

Syntax
```
:SEARch:MAG<x> {<NRf>}
:SEARch:MAG<x>?
<x>=1 or 2
<NRf>=Up to the point in which 40
points are displayed, See the
IM701710-01E User's Manual.
```
Example
```
:SEARCH:MAG1 100
:SEARCH:MAG1? -> :SEARCH:MAG1 100
```

:SEARch:PLINkage (Position Linkage)

Function Turns the link ON/OFF when moving the zoom box or queries the current setting.

Syntax
```
:SEARch:PLINkage {<Boolean>}
:SEARch:PLINkage?
```
Example
```
:SEARCH:PLINKAGE OFF
:SEARCH:PLINKAGE? -> :SEARCH:
PLINKAGE 0
```

:SEARch:POSition<x>

Function Sets the zoom box position or queries the current setting.

Syntax
```
:SEARch:POSition<x> {<NRf>}
:SEARch:POSition<x>?
<x>=1 or 2
<NRf>=-5 to 5 div (10 div/displayed
record length steps)
```
Example
```
:SEARCH:POSITION1 2.5
:SEARCH:POSITION1? -> :SEARCH:
POSITION1 2.5000000
```

:SEARch:PPATtern?

Function Queries all settings related to the parallel pattern search.

Syntax
```
:SEARch:PPATtern?
```
Example
```
:SEARCH:PPATTERN? -> :SEARCH:
PPATTERN:CLOCK:SOURCE NONE;:SEARCH:
PPATTERN:CHANNEL1:LEVEL 0.0E+00;
HYSTERESIS 0.30;PATTERN HIGH;:
SEARCH:PPATTERN:CHANNEL2:
LEVEL 0.0E+00;HYSTERESIS 0.30;
PATTERN DONTCARE;:SEARCH:PPATTERN:
CHANNEL3:LEVEL 0.0E+00;
HYSTERESIS 0.30;PATTERN DONTCARE;:
SEARCH:PPATTERN:CHANNEL4:
LEVEL 0.0E+00;HYSTERESIS 0.30;
PATTERN DONTCARE;:SEARCH:PPATTERN:
MATH1:LEVEL 0.00;HYSTERESIS 0.30;
PATTERN DONTCARE;:SEARCH:PPATTERN:
MATH2:LEVEL 0.00;HYSTERESIS 0.30;
PATTERN DONTCARE
```

:SEARch:PPATtern:{CHANnel<x>|MATH<x>}?

Function Queries all settings related to the waveform of the parallel pattern search.

Syntax
```
:SEARch:PPATtern:{CHANnel<x>|
MATH<x>}?
The <x> in CHANnel<x>=1 to 4 (or 1-
2 for the DL1720)
The <x> in MATH<x>=1 or 2 (or 1 for
the DL1720)
```
Example
```
:SEARCH:PPATTERN:CHANNEL1? ->
:SEARCH:PPATTERN:CHANNEL1:
LEVEL 0.0E+00;HYSTERESIS 0.30;
PATTERN HIGH
```

:SEARch:PPATtern:{CHANnel<x>|MATH<x>}:HYSTeresis

Function Sets the hysteresis on the waveform on which to perform the parallel pattern search or queries the current setting.

Syntax
```
:SEARch:PPATtern:{CHANnel<x>|
MATH<x>}:HYSTeresis {<NRf>}
:SEARch:PPATtern:{CHANnel<x>|
MATH<x>}:HYSTeresis?
The <x> in CHANnel<x>=1 to 4 (or 1-
2 for the DL1720)
The <x> in MATH<x>=1 or 2 (or 1 for
the DL1720)
<NRf>=0.3 to 4 div (0.1 steps)
```

Example
```
:SEARCH:PPATTERN:CHANNEL1:
HYSTERESIS 0.3
:SEARCH:PPATTERN:CHANNEL1:
HYSTERESIS? -> :SEARCH:PPATTERN:
CHANNEL1:HYSTERESIS 0.30
```

:SEARch:PPATtern:{CHANnel<x>|MATH<x>}:LEVel

Function Sets the search level on the waveform on which to perform the parallel pattern search or queries the current setting.

Syntax
```
:SEARch:PPATtern:{CHANnel<x>|
MATH<x>}:LEVel {<voltage>|<NRf>}
:SEARch:PPATtern:{CHANnel<x>|
MATH<x>}:LEVel?
The <x> in CHANnel<x>=1 to 4 (or 1-
2 for the DL1720)
The <x> in MATH<x>=1 or 2 (or 1 for
the DL1720)
<voltage>=8 div on the screen (when
the waveform is CH1 to CH4)
<NRf>=-4 to 4 div (0.01 steps when
the waveform is MATH1 or MATH2)
```

Example
```
:SEARCH:PPATTERN:CHANNEL1:LEVEL 1v
:SEARCH:PPATTERN:CHANNEL1:LEVEL? ->
:SEARCH:PPATTERN:CHANNEL1:
LEVEL 1.000E+00
```

:SEARch:PPATtern:{CHANnel<x>|MATH<x>}:PATTern

Function Sets the search pattern on the waveform on which to perform the parallel pattern search or queries the current setting.

Syntax
```
:SEARch:PPATtern:{CHANnel<x>|
MATH<x>}:PATTern {HIGH|LOW|
DONTcare}
:SEARch:PPATtern:{CHANnel<x>|
MATH<x>}:PATTern?
The <x> in CHANnel<x>=1 to 4 (or 1-
2 for the DL1720)
The <x> in MATH<x>=1 or 2 (or 1 for
the DL1720)
```

Example
```
:SEARCH:PPATTERN:CHANNEL1:PATTERN
HIGH
:SEARCH:PPATTERN:CHANNEL1:PATTERN?
-> :SEARCH:PPATTERN:CHANNEL1:
PATTERN HIGH
```

:SEARch:PPATtern:CLOCk?

Function Queries all settings related to the clock channel of the parallel pattern search.

Syntax
```
:SEARch:PPATtern:CLOCk?
```

Example
```
:SEARCH:PPATTERN:CLOCK? -> :SEARCH:
PPATTERN:CLOCK:SOURCE 1;
LEVEL 1.000E+00;HYSTERESIS 0.30;
SLOPE RISE
```

:SEARch:PPATtern:CLOCk:HYSYeresis

Function Sets the hysteresis on the clock channel of the parallel pattern search or queries the current setting.

Syntax
```
:SEARch:PPATtern:CLOCk:
HYSYeresis {<NRf>}
:SEARch:PPATtern:CLOCk:HYSYeresis?
<NRf>=0.3 to 4 div (0.1 steps)
```

Example
```
:SEARCH:PPATTERN:CLOCK:HYSTERESIS
4.0
:SEARCH:PPATTERN:CLOCK:HYSTERESIS?
-> :SEARCH:PPATTERN:CLOCK:
HYSTERESIS 4.00
```

Description An error occurs if "SEARch:PPATtern:CLOCk:SOURce" is set to "NONE."

:SEARch:PPATtern:CLOCk:LEVel

Function Sets the search level of the clock channel of the parallel pattern search or queries the current setting.

Syntax
```
:SEARch:PPATtern:CLOCk:LEVel
{<voltage>}
:SEARch:PPATtern:CLOCk:LEVel?
8 divisions within the screen (0.01
division steps).
```

Example
```
:SEARCH:PPATTERN:CLOCK:LEVEL 1v
:SEARCH:PPATTERN:CLCOK:LEVEL? ->
:SEARCH:PPATTERN:CLOCK:
LEVEL 1.000E+00
```

Description An error occurs if "SEARch:PPATtern:CLOCk:SOURce" is set to "NONE."

:SEARch:PPATtern:CLOCk:SLOPe

Function Sets the slope of the clock channel of the parallel pattern search or queries the current setting.

Syntax
```
:SEARch:PPATtern:CLOCk:SLOPe
{FALL|RISE}
:SEARch:PPATtern:CLOCk:SLOPe?
```

Example
```
:SEARCH:PPATTERN:CLOCK:SLOPE FALL
:SEARCH:PPATTERN:CLOCK:SLOPE? ->
:SEARCH:PPATTERN:CLOCK:SLOPE FALL
```

Description An error occurs if "SEARch:PPATtern:CLOCk:SOURce" is set to "NONE."

:SEARch:PPATtern:CLOCk:SOURce

Function Sets the waveform used as the clock channel of the parallel pattern search or queries the current setting.

Syntax
```
:SEARch:PPATtern:CLOCk:SOURce
{NONE|<NRf>}
:SEARch:PPATtern:CLOCk:SOURce?
<NRf>=1 to 4 (or 1-2 for the
DL1720)
```

Example
```
:SEARCH:PPATTERN:CLOCK:SOURce 1
:SEARCH:PPATTERN:CLOCK:SOURce? ->
:SEARCH:PPATTERN:CLOCK:SOURCE 1
```

:SEARch:SELect

Function Queries the storage number of the found position and the position that is stored in the specified storage number.

Syntax
```
:SEARch:SELect {<NRf>|MAXimum}
:SEARch:SELect?
<NRf>=1 to 1000
```

Example
```
:SEARCH:SELECT 1
:SEARCH:SELECT? -> :SEARCH:
SELECT 2.5000000
```

Description If no positions are found, "NAN" is returned.

:SEARch:SELect? MAXimum

Function Queries the maximum storage number of the found positions.

Syntax
```
:SEARch:SELect? {MAXimum}
```

Example
```
:SEARCH:SELECT? MAXIMUM -> :SEARCH:
SELECT 100
```

Description If no positions are found, "NAN" is returned.

:SEARch:SPATtern? (Serial Pattern)

Function Queries all settings related to the serial pattern search.

Syntax
```
:SEARch:SPATtern?
```

Example
```
:SEARCH:SPATTERN? -> :SEARCH:
SPATTERN:CLOCK:SOURCE NONE;:
SEARCH:SPATTERN:INTERVAL 1.0E-06;
SOURCE 1;LEVEL 0.0E+00;PSELECT 1;
PATTERN1 "HXXXXXXX";
PATTERN2 "XXXXXXXX";
PATTERN3 "XXXXXXXX";
PATTERN4 "XXXXXXXX";
PATTERN5 "XXXXXXXX";
PATTERN6 "XXXXXXXX";
PATTERN7 "XXXXXXXX";
PATTERN8 "XXXXXXXX"
```

:SEARch:SPATtern:CLEar

Function Clears all search patterns (Don't care).

Syntax
```
:SEARch:SPATtern:CLEar
```

Example
```
:SEARCH:SPATTERN:CLEAR
```

:SEARch:SPATtern:CLOCk?

Function Queries all settings related to the clock channel.

Syntax
```
:SEARch:SPATtern:CLOCk?
```

Example
```
:SEARCH:SPATTERN:CLOCK? -> :SEARCH:
SPATTERN:CLOCK:SOURCE 1;
LEVEL 0.0E+00;SLOPE RISE;
HYSTERESIS 0.3
```

:SEARch:SPATtern:CLOCk:HYSTeresis

Function Sets the hysteresis of the clock channel or queries the current setting.

Syntax
```
:SEARch:SPATtern:CLOCk:
HYSTeresis {<NRf>}
:SEARch:SPATtern:CLOCk:HYSTeresis?
<NRf>=0.3 to 4 div (0.1 steps)
```

Example
```
:SEARCH:SPATTERN:CLOCK:HYSTERESIS 1
:SEARCH:SPATTERN:CLOCK:HYSTERESIS?
-> :SEARCH:SPATTERN:CLOCK:
HYSTERESIS 1.0
```

Description An error occurs if "SEAEch:SPATtern:CLOCk:SOURce" is set to "NONE."

:SEARch:SPATtern:CLOCk:LEVEl

Function Sets the level of the clock channel or queries the current setting.

Syntax
```
:SEARch:SPATtern:CLOCk:LEVEl
{<voltage>}
:SEARch:SPATtern:CLOCk:LEVEl?
<voltage>=8 div on the screen (0.01
div steps)
```

Example
```
:SEARCH:SPATTERN:CLOCK:LEVEL -10mV
:SEARCH:SPATTERN:CLOCK:LEVEL? ->
:SEARCH:SPATTERN:CLOCK:
LEVEL -10.00E-03
```

Description An error occurs if "SEAEch:SPATtern:CLOCk:SOURce" is set to "NONE."

:SEARch:SPATtern:CLOCk:SLOPe

Function Sets the slope of the clock channel or queries the current setting.

Syntax
```
:SEARch:SPATtern:CLOCk:SLOPe
{FALL|RISE}
:SEARch:SPATtern:CLOCk:SLOPe?
```

Example
```
:SEARCH:SPATTERN:CLOCK:SLOPE RISE
:SEARCH:SPATTERN:CLOCK:SLOPE? ->
:SEARCH:SPATTERN:CLOCK:SLOPE RISE
```

Description An error occurs if "SEAEch:SPATtern:CLOCk:SOURce" is set to "NONE."

:SEARch:SPATtern:CLOCk:SOURce

Function Sets the clock channel source waveform or queries the current setting.

Syntax
```
:SEARch:SPATtern:CLOCk:SOURce
{<NRf>|NONE}
:SEARch:SPATtern:CLOCk:SOURce?
<NRf>=1 to 4 (or 1-2 for the
DL1720)
```

Example
```
:SEARCH:SPATTERN:CLOCK:SOURCE 1
:SEARCH:SPATTERN:CLOCK:SOURCE? ->
:SEARCH:SPATTERN:SOURCE 1
```

:SEARch:SPATtern:INTerval

Function Sets the search interval of the waveform to be searched or queries the current setting.

Syntax
```
:SEARch:SPATtern:INTerval {<time>}
:SEARch:SPATtern:INTerval?
<time>=10 ps to 500 s
```

Example
```
:SEARCH:SPATTERN:INTERVAL 100us
:SEARCH:SPATTERN:INTERVAL? ->
:SEARCH:SPATTERN:
INTERVAL 100.00E-06
```

:SEARch:SPATtern:LEVel

Function Sets the upper and lower limits of the search level of the waveform to be searched or queries the current setting.

Syntax
```
:SEARch:SPATtern:LEVel {<voltage>,
<voltage>|<NRf>,NRf>}
:SEARch:SPATtern:LEVel?
<voltage>=8 div on the screen (when
the waveform is CH1 to CH4)
<NRf>=-4 to 4 div (0.01 steps when
the waveform is  MATH1 or MATH2)
```

Example
```
:SEARCH:SPATTERN:LEVEL -1V,1V
:SEARCH:SPATTERN:LEVEL? -> :SEARCH:
SPATTERN:LEVEL -1.000E+00,1.000E+00
```

:SEARch:SPATtern:PATTern<x>

Function Sets the search pattern or queries the current setting.

Syntax
```
:SEARch:SPATtern:PATTern<x>
<Character string>
:SEARch:SPATtern:PATTern<x>?
<x>=1 to 8
<Character string>=8 characters of
the combination of 'H','L', and 'X'
(The left most character represents
the smallest bit.  Total of 8
bits.)
```

Example
```
:SEARCH:SPATTERN:
PATTERN1 "HLXHLXHL"
:SEARCH:SPATTERN:PATTERN1? ->
:SEARCH:SPATTERN:
PATTERN1 "HLXHLXHL"
```

Description
- <x> represents the 8 bit block number. Thus, when <x>=1, the left most character represents bit 0 and the right most character represents bit 7. The relationship between <x> and the character string is as follows.
  <x>=1: <character string>=bits 0 to 7,
  <x>=2: <character string>=bits 8 to 15,
  <x>=3: <character string>=bits 16 to 23,
  <x>=4: <character string>=bits 24 to 31,
  <x>=5: <character string>=bits 32 to 39,
  <x>=6: <character string>=bits 40 to 47,
  <x>=7: <character string>=bits 48 to 55,
  <x>=8: <character string>=bits 56 to 63
- The pattern is assigned the pattern number that is selected with the ":SEARch:SPATtern:PSELect" command.

:SEARch:SPATtern:PSELect (Pattern Select)

Function Selects the pattern number to which the search pattern is to be set or queries the current setting.

Syntax
```
:SEARch:SPATtern:PSELect {<NRf>}
:SEARch:SPATtern:PSELect?
<x>=1 to 4
```
Example
```
:SEARCH:SPATTERN:PSELECT 1
```
Description The values 1 to 4 of <x> correspond to pattern A to D.

:SEARch:SPATtern:SOURce

Function Sets the waveform on which to perform the serial pattern search or queries the current setting.

Syntax
```
:SEARch:SPATtern:SOURce {<NRf>|
MATH<x>}
:SEARch:SPATtern:SOURce?
<NRf>=1 to 4 (or 1-2 for the
DL1720)
<x>=1 or 2 (or 1 for the DL1720)
```
Example
```
:SEARCH:SPATTERN:SOURCE 1
:SEARCH:SPATTERN:SOURCE? ->
:SEARCH:SPATTERN:SOURCE 1
```

:SEARch:SPOint (Start Point)

Function Sets the start position of the search or queries the current setting.

Syntax
```
:SEARch:SPOint {<NRf>}
:SEARch:SPOint?
<NRf>=-5 to 5 div (10 div/displayed
record length steps)
```
Example
```
:SEARCH:SPOINT 3
:SEARCH:SPOINT? -> :SEARCH:
SPOINT 3.0000000
```

:SEARch:TWINdow (Target WINdow)

Function Sets the zoom window in which to display the sections that are found or queries the current setting.

Syntax
```
:SEARch:TWINdow {Z1|Z2}
:SEARch:TWINdow?
```
Example
```
:SEARCH:TWINDOW Z1:SEARCH:TWINDOW?
-> :SEARCH:TWINDOW Z1
```

:SEARch:TYPE

Function Sets the search type or queries the current setting.

Syntax
```
:SEARch:TYPE {SPATtern|EDGE|WIDTh|
PPATtern|ASCRoll}
:SEARch:TYPE?
```
Example
```
:SEARCH:TYPE SPATTERN
:SEARCH:TYPE? -> :SEARCH:
TYPE SPATTERN
```

:SEARch:WIDTh?

Function Queries all settings related to the pulse width search.

Syntax
```
:SEARch:WIDTh?
```
Example
```
:SEARCH:WIDTH? -> :SEARCH:WIDTH:
TYPE IN;SOURCE 1;LEVEL 0.0E+00;
POLARITY HIGH;HYSTERESIS 0.30;
TIME1 1.000000E-06;
TIME2 1.000000E-06
```

:SEARch:WIDTh:HYSTeresis

Function Sets the hysteresis on the pulse width search level or queries the current setting.

Syntax
```
:SEARch:WIDTh:HYSTeresis {<NRf>}
:SEARch:WIDTh:HYSTeresis?
<NRf>=0.3 to 4.0div (0.1 steps)
```
Example
```
:SEARCH:WIDTH:HISTERESIS 0.3
:SEARCH:WIDTH:HISTERESIS? ->
:SEARCH:WIDTH:HYSTERESIS 0.30
```

:SEARch:WIDTh:LEVel

Function Sets the pulse width search level or queries the current setting.

Syntax
```
:SEARch:WIDTh:LEVel {<voltage>|
<NRf>}
:SEARch:WIDTh:LEVel?
<voltage>=8 div on the screen
(0.01div steps)
<NRf>=-4 to 4div(0.01div steps)
```
Example
```
:SEARCH:WIDTH:LEVEL 1V
:SEARCH:WIDTH:LEVEL? ->
:SEARCH:WIDTH:LEVEL 1.000E+00
```

:SEARch:WIDTh:POLarity

Function Sets the pulse width search level's polarity or queries the current setting.

Syntax
```
:SEARch:WIDTh:POLarity {HIGH|LOW}
:SEARch:WIDTh:POLarity?
```
Example
```
:SEARCH:WIDTH:POLARUTY HIGH
:SEARCH:WIDTH:POLARITY? ->
:SEARCH:WIDTH:POLARITY HIGH
```

:SEARch:WIDTh:SOURce

Function Sets the search source for the pulse width search or queries the current setting.

Syntax
```
:SEARch:WIDTh:SOURce {<NRf>|
MATH<x>}
:SEARch:WIDTh:SOURce?
<NRf>=1 to 4 (or 1-2 for the
DL1720)
<x>=1 or 2 (or 1 for the DL1720)
```
Example
```
:SEARCH:WIDTH:SOURCE 1
:SEARCH:WIDTH:SOURCE? -> :SEARCH:
WIDTH:SOURCE 1
```

:SEARch:WIDTh:TIME<x>

Function Sets the pulse width when using the pulse width search or queries the current setting.

Syntax
```
:SEARch:WIDTh:TIME<x> {<time>}
:SEARch:WIDTh:TIME<x>?
<x>=1 or 2
<time>=10ps to 500s(when <x>=1 and
"T1<Pulse<T2" is not true))
10ps to 499.95s(when <x>=1 and
"T1<Pulse<T2" )
20ps to 500s(when <x>=2 and
"T1<Pulse<T2" )
```

Example
```
:SEARCH:WIDTH:TIME1 20ps
:SEARCH:WIDTH:TIME1? -> :SEARCH:
WIDTH:TIME1 20.0E-12
```

:SEARch:WIDTh:TYPE

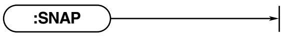
Function Sets the search type when using the pulse width search or queries the current setting.

Syntax
```
:SEARch:WIDTh:TYPE {IN|OUT|TIMeout|
BETWeen}
:SEARch:WIDTh:TYPE?
```

Example
```
:SEARCH:WIDTH:TYPE IN
:SEARCH:WIDTH:TYPE? -> :SEARCH:
WIDTH:TYPE IN
```

6.22 SNAP Group

The SNAP command is used to execute a snapshot. The same function can be performed using **SNAPSHOT** on the front panel.



:SNAP

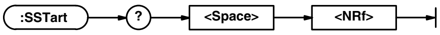
Function Executes a snapshot.

Syntax `:SNAP`

Example `:SNAP`

6.23 SSTart Group

The commands in the SSTart group are used to execute the single start operation. It operates in the same fashion as the single trigger.



:SSTart?

Function Starts the data acquisition with the trigger mode set to single. If the operation is stopped within the specified time period, 0 is returned. Otherwise, 1 is returned.

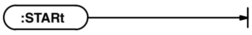
Syntax
```
:SSTart? {<NRf>}
<NRf>=1 to 360000 (10 ms
resolution: wait period, START and
wait)
0 (START only. No wait.)
-360000 to -1 (10 ms resolution:
wait period, START and wait)
```

Example
```
:SSTART? 100 -> :SSTART 0
```

Description
- If the specified time period is positive, data acquisition is started in the SINGLE TRIGGER mode and waits for the operation to stop.
- If the specified time period is 0, data acquisition is started and 0 is returned without waiting for the operation to stop.
- If the specified time period is negative, the instrument simply waits for the operation to stop. Data acquisition is not started.

6.24 STARt Group

The STARt command is used to start acquisition. The same function can be performed by pressing **START/ STOP** on the front panel.



:STARt

Function Starts acquisition.

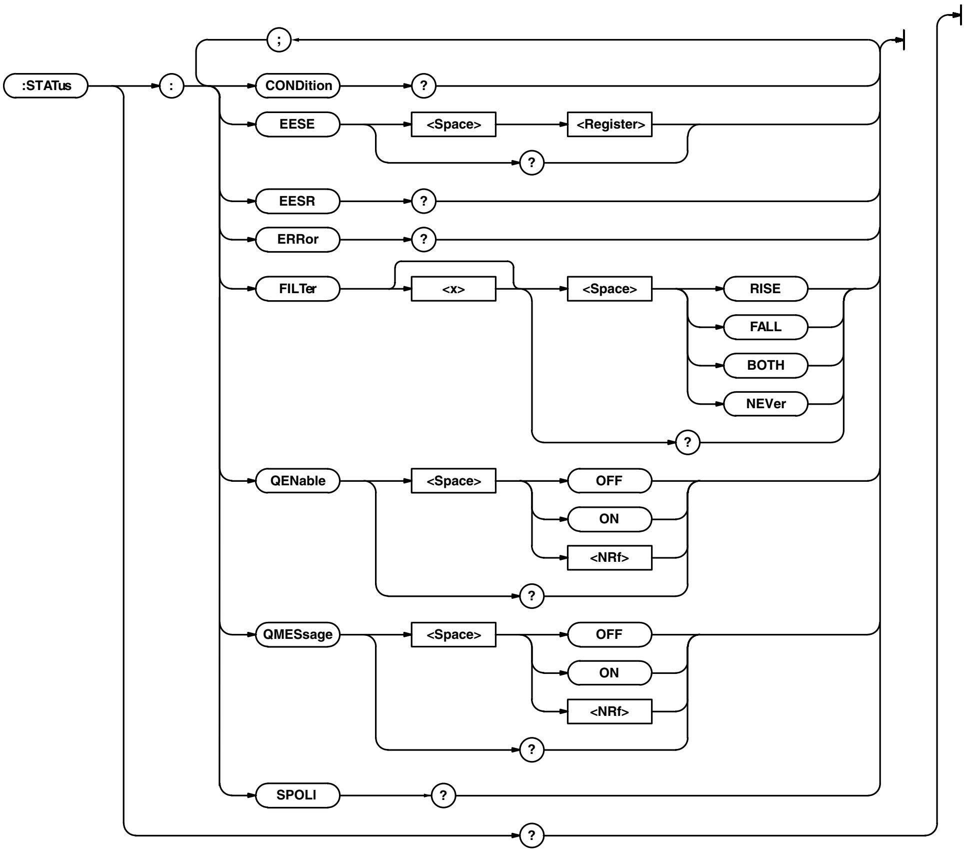
Syntax `:STARt`

Example `:START`

Description To stop acquisition, use `"STOP."`

6.25 STATus Group

The commands in the STATus group are used to make settings and queries about the status report. There is no front panel key for this function. For details of the status report, refer to Chapter 7.



:STATus?

Function Inquires about all the settings relating to the communications status function.

Syntax `:STATus?`

Example
```
:STATUS? -> :STATUS:EESE 0;FILTER1
NEVER;
FILTER2 NEVER;FILTER3 NEVER;
FILTER4 NEVER;FILTER5 NEVER;
FILTER6 NEVER;FILTER7 NEVER;
FILTER8 NEVER;FILTER9 NEVER;
FILTER10 NEVER;FILTER11 NEVER;
FILTER12 NEVER;FILTER13 NEVER;
FILTER14 NEVER;FILTER15 NEVER;
FILTER16 NEVER;QENABLE 1;QMESSAGE 1
```

:STATus:CONDition?

Function Queries the contents of the condition register, and clears the register.

Syntax `:STATus:CONDition?`

Example `:STATUS:CONDITION? -> 16`

Description For a description of the event register, refer to chapter 7.

:STATus:EESE

Function Sets/queries the extended event enable register.

```
Syntax      :STATus:EESE <Register>
            :STATus:EESE?
            <Register>=0 to 65535
Example     :STATUS:EESE #B00000000
            :STATUS:EESE? -> :STATUS:EESE 0
```

Description For a description of the event register, refer to chapter 7.

:STATus:EESR?

Function Queries the content of the extended event register, and clears the register.

```
Syntax      :STATus:EESR?
Example     :STATUS:EESR? -> 1
```

Description For a description of the event register, refer to chapter 7.

:STATus:ERRor?

Function Queries the code and message (at the beginning of the error queue) of the error which has occurred.

```
Syntax      :STATus:ERRor?
Example     :STATUS:ERROR? ->
            113",Undefined header"
```

:STATus:FILTer<x>

Function Sets/queries the transit filter.

```
Syntax      :STATus:FILTer<x> {RISE|FALL|BOTH|
            NEVer}
            :STATus:FILTer<x>?
            <x>=1 to 16
Example     :STATUS:FILTER2 RISE
            :STATUS:FILTER2? -> :STATUS:
            FILTER2 RISE
```

Description For a description of the event register, refer to chapter 7.

:STATus:QENable

Function Selects/queries whether messages other than errors are stored in the error queue.

```
Syntax      :STATus:QENable {<Boolean>}
            :STATus:QENable?
Example     :STATUS:QENABLE ON
            :STATUS:QENABLE? -> :STATUS:
            QENABLE 1
```

:STATus:QMESsage

Function Selects/queries whether message content is appended to responses to "STATus:ERRor?".

```
Syntax      :STATus:QMESsage {<Boolean>}
            :STATus:QMESsage?
Example     :STATUS:QMESSAGE ON
            :STATUS:QMESSAGE? -> :STATUS:
            QMESSAGE 1
```

:STATus:SPOLl? (Serial Poll)

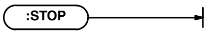
Function Executes the serial polling.

```
Syntax      :STATus:SPOLl?
Example     :STATUS:SPOLL? -> :STATUS:SPOLL 0
```

Description This is an exclusive command for the serial (RS-232) interface (option), USB interface, or the network interface.

6.26 STOP Group

The STOP command is used to stop acquisition. The same function can be performed using **START/STOP** on the front panel.



:STOP

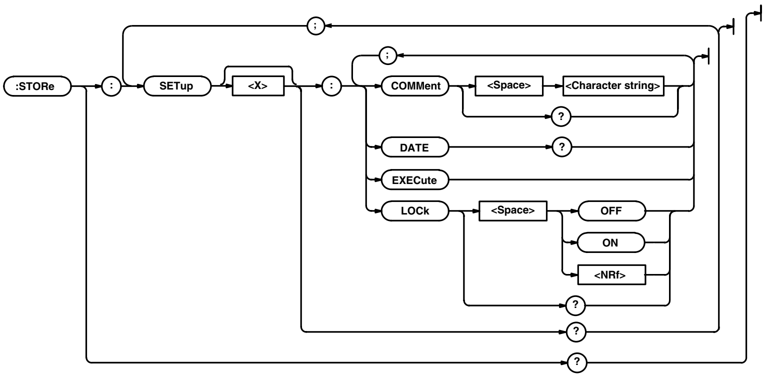
Function Stops acquisition.

```
Syntax      :STOP
Example     :STOP
```

Description To start acquisition, use "STARt."

6.27 STORe Group

The commands in the STORe group are used to store the setup data from the internal memory. These commands can be used to carry out the same operations as when **SETUP** on the front panel is pressed.



:STORe?

Function Queries information about the setting parameters that are stored to the internal memory.

Syntax :STORe?

Example :STORE? -> :STORE:SETUP1:COMMENT "";LOCK 0;:STORE:SETUP2:COMMENT "";LOCK 0;:STORE:SETUP3:COMMENT "";LOCK 0

:STORe:SETup<x>?

Function Queries information about the setting parameters that are stored to the internal memory at the specified number.

Syntax :STORe:SETup<x>?
<x>=1 to 3

Example :STORE:SETUP1? -> :STORE:SETUP1:COMMENT "WAVE1";LOCK 0

:STORe:SETup<x>:COMMent

Function Sets comments for the setting parameters that are to be stored to the internal memory at the specified number or queries the current setting.

Syntax :STORe:SETup<x>:COMMent <Character string>
:STORe:SETup<x>:COMMent?
<x>=1 to 3
<Character string>:Within 8 characters.

Example :STORE:SETUP1:COMMENT "WAVE1"
:STORE:SETUP1:COMMENT? -> :STORE:SETUP1:COMMENT "WAVE1"

:STORe:SETup<x>:DATE?

Function Queries the date and time for the setting parameters that are stored to the internal memory at the specified number.

Syntax :STORe:SETup<x>:DATE?
<x>=1 to 3

Example :STORE:SETUP1:DATE? -> :STORE:SETUP1:DATE? "00/12/04 17:30:34"

:STORe:SETup<x>:EXECute

Function Saves the setting parameters to the internal memory at the specified number.

Syntax :STORe:SETup<x>:EXECute
<x>=1 to 3

Example :STORE:SETUP1:EXECUTE

:STORe:SETup<x>:LOCK

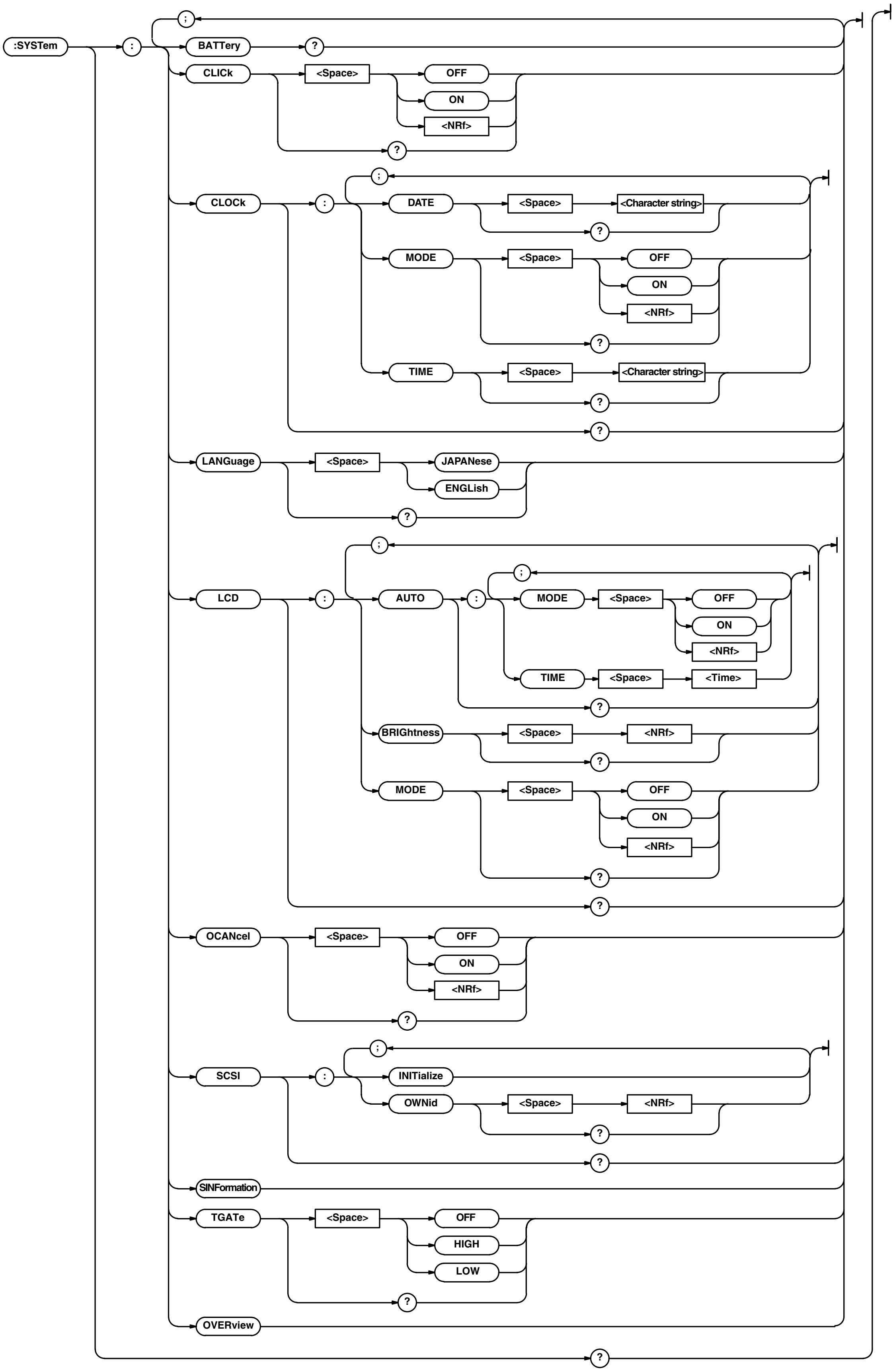
Function Turns ON/OFF the protection for the setting parameters that are stored to the internal memory at the specified number or queries the current setting.

Syntax :STORe:SETup<x>:LOCK {<Boolean>}
:STORe:SETup<x>:LOCK?
<x>=1 to 3

Example :STORE:SETUP1:LOCK ON
:STORE:SETUP1:LOCK? -> :STORE:SETUP1:LOCK 1

6.28 SYSTem Group

The commands in the SYSTem group are used to make settings and queries about the system. The same settings can be made using the System Config menu obtained when **MISC** on the front panel is pressed.



:SYSTem?

Function Queries all system settings.

Syntax
```
:SYSTem?
```

Example
```
:SYSTEM? -> :SYSTEM:SCSI:OWNID 0;:
SYSTEM:CLOCK:MODE 1;
DATE "2000/06/19";TIME "17:47:17";:
SYSTEM:LANGUAGE JAPANESE;
CLICK 1;TGATE OFF;LCD:MODE 1;
BRIGHTNESS 4;AUTO:MODE 0;TIME 1;:
SYSTEM:OCANCEL 0
```

:SYSTem:BATTery?

Function Queries the condition of the internal lithium battery.

Syntax
```
:SYSTem:BATTery?
```

Example
```
:SYSTEM:BATTERY? -> :SYSTEM:
BATTERY 1
```

Description "1" is returned if the battery is functioning, and "0" is returned if the battery has run out.

:SYSTem:CLICk

Function Sets the click sound ON or OFF, or queries the current setting.

Syntax
```
:SYSTem:CLICk {<Boolean>}
:SYSTem:CLICk?
```

Example
```
:SYSTEM:CLICK ON
:SYSTEM:CLICK? -> :SYSTEM:CLICK 1
```

:SYSTem:CLOCk?

Function Queries all settings related to date and time.

Syntax
```
:SYSTem:CLOCk?
```

Example
```
:SYSTEM:CLOCK? -> :SYSTEM:CLOCK:
MODE 1;DATE "2000/06/19";
TIME "17:47:17"
```

:SYSTem:CLOCk:DATE

Function Sets/queries the date.

Syntax
```
:SYSTem:CLOCK:DATE <Character
string>
:SYSTem:CLOCK:DATE?
<Character string>=YY/MM/DD,refer
to User's Manual IM701710-01E
```

Example
```
:SYSTEM:CLOCK:DATE "2000/09/30"
:SYSTEM:CLOCK:DATE? -> :SYSTEM:
CLOCK:DATE "2000/09/30"
```

:SYSTem:CLOCk:MODE

Function Turns the date and time display ON/OFF or queries the current setting.

Syntax
```
:SYSTem:CLOCk:MODE {<Boolean>}
:SYSTem:CLOCk:MODE?
```

Example
```
:SYSTEM:CLOCK:MODE ON
:SYSTEM:CLOCK:MODE? -> :SYSTEM:
CLOCK:MODE 1
```

:SYSTem:CLOCk:TIME

Function Sets the time or queries the current setting.

Syntax
```
:SYSTem:CLOCk:TIME <Character
string>
:SYSTem:CLOCk:TIME?
<Character string>=HH:MM:SS, See
the IM701710-01E User's Manual.
```

Example
```
:SYSTEM:CLOCK:TIME "14:30:00"
:SYSTEM:CLOCK:TIME? -> :SYSTEM:
CLOCK:TIME "14:30:00"
```

:SYSTem:LANGuage

Function Sets/queries the message language.

Syntax
```
:SYSTem:LANGuage {ENGLish|JAPANese}
:SYSTem:LANGuage?
```

Example
```
:SYSTEM:LANGUAGE JAPANESE
:SYSTEM:LANGUAGE? -> :SYSTEM:
LANGUAGE JAPANESE
```

:SYSTem:LCD?

Function Queries all settings related to the LCD monitor.

Syntax
```
:SYSTem:LCD?
```

Example
```
:SYSTEM:LCD? -> :SYSTEM:LCD:MODE 1;
BRIGHTNESS 1;AUTO:MODE 0;TIME 1
```

:SYSTem:LCD:AUTO?

Function Queries all settings related to the LCD backlight auto-off function.

Syntax
```
:SYSTem:LCD:AUTO?
```

Example
```
:SYSTEM:LCD:AUTO? -> :SYSTEM:LCD:
AUTO:MODE 0;TIME 1
```

:SYSTem:LCD:AUTO:MODE

Function Turns the LCD backlight ON/OFF or queries the current setting.

Syntax
```
:SYSTem:LCD:AUTO:MODE {<Boolean>}
:SYSTem:LCD:AUTO:MODE?
```

Example
```
:SYSTEM:LCD:AUTO:MODE ON
:SYSTEM:LCD:AUTO:MODE? -> :SYSTEM:
LCD:AUTO:MODE 1
```

:SYSTem:LCD:AUTO:TIME

Function Sets the time for the LCD backlight to automatically turn OFF or queries the current setting.

Syntax
```
:SYSTem:LCD:AUTO:TIME {<NRf>}
:SYSTem:LCD:AUTO:TIME?
<NRf>=1 to 60 (s)
```

Example
```
:SYSTEM:LCD:AUTO:TIME 1
:SYSTEM:LCD:AUTO:TIME? -> :SYSTEM:
LCD:AUTO:TIME 1
```

:SYSTem:LCD:BRIGhtness

Function Sets/queries the brightness of the screen.

```
Syntax    :SYSTem:LBRightness{<NRf>}
          :SYSTEM:LBRightness?
          <NRf>=1 to 4
Example   :SYSTEM:LCD:BRIGTHNESS 2
          :SYSTEM:LCD:BRIGTHNESS? -> :SYSTEM:
          LCD:BRIGTHNESS 2
```

:SYSTem:LCD:MODE

Function Turns the LCD backlight ON/OFF or queries the current setting.

```
Syntax    :SYSTem:LCD:MODE {<Boolean>}
          :SYSTem:LCD:MODE?
Example   :SYSTEM:LCD:MODE OFF
          :SYSTEM:LCD:MODE? -> :SYSTEM:LCD:
          MODE 0
```

:SYSTem:OCANcel (Offset Cancel)

Function Sets whether or not to reflect the offset voltage to the measured results or the computed results (ON/OFF) or queries the current setting.

```
Syntax    :SYSTem:OCANcel {<Boolean>}
          :SYSTem:OCANcel?
Example   :SYSTEM:OCANCEL ON
          :SYSTEM:OCANCEL? -> :SYSTEM:
          OCANCEL 0
```

:SYSTem:OVERview

Function Displays the system information.

```
Syntax    :SYSTem:OVERview
Example   :SYSTEM:OVERVIEW
```

:SYSTem:SCSI?

Function Queries all SCSI-ID settings.

```
Syntax    :SYSTem:SCSI?
Example   :SYSTEM:SCSI? -> :SYSTEM:SCSI:
          OWNID 0
```

:SYSTem:SCSI:INITialize

Function Initializes the SCSI.

```
Syntax    :SYSTem:SCSI:INITialize
Example   :SYSTEM:SCSI:INITIALIZE
```

Description This command should always be issued following change of the oscilloscope's SCSI-ID (by the ":SYSTem:SCSI:OWNid" command).

:SYSTem:SCSI:OWNid

Function Sets/queries own SCSI-ID.

```
Syntax    :SYSTem:SCSI:OWNid {<NRf>}
          :SYSTem:SCSI:OWNid?
          <NRf>=0 to 7
Example   :SYSTEM:SCSI:OWNID 7
          :SYSTEM:SCSI:OWNID? -> :SYSTEM:
          SCSI:OWNID 7
```

:SYSTem:SINFormation

Function Displays the setting parameters of the device.

```
Syntax    :SYSTem:SINFormation
Example   :SYSTEM:SINFORMATION
```

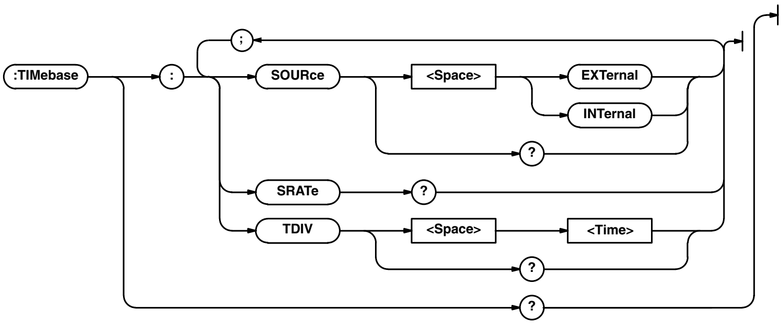
:SYSTem:TGATe (Trigger Gate)

Function Sets the external trigger gate or queries the current setting.

```
Syntax    :SYSTem:TGATe {<OFF|HIGH|LOW>}
          :SYSTem:TGATe?
Example   :SYSTEM:TGATE OFF
          :SYSTEM:TGATE? -> :SYSTEM:TGATE 0
```

6.29 TIMebase Group

The commands in the TIMebase group are used to make settings and queries about the time base. These settings and inquiries can also be made using **TIME/DIV** on the front panel.



:TIMebase?

Function Queries all the time base settings.

```
Syntax   :TIMebase?
Example  :TIMEBASE? -> :TIMEBASE:
         SOURCE INTERNAL;TDIV 500.0E-06
```

:TIMebase:SOURce

Function Sets the time base or queries the current setting.

```
Syntax   :TIMebase:SOURce {EXTernal|
         INTernal}
         :TIMebase:SOURce?
Example  :TIMEBASE:SOURCE INTERNAL
         :TIMEBASE:SOURCE? -> :TIMEBASE:
         SOURCE INTERNAL
```

:TIMebase:SRATe? (Sample RATE)

Function Queries the sampling rate.

```
Syntax   :TIMebase:SRATe?
Example  :TIMEBASE:SRATE? -> :TIMEBASE:
         SRATE 1.0E+09
```

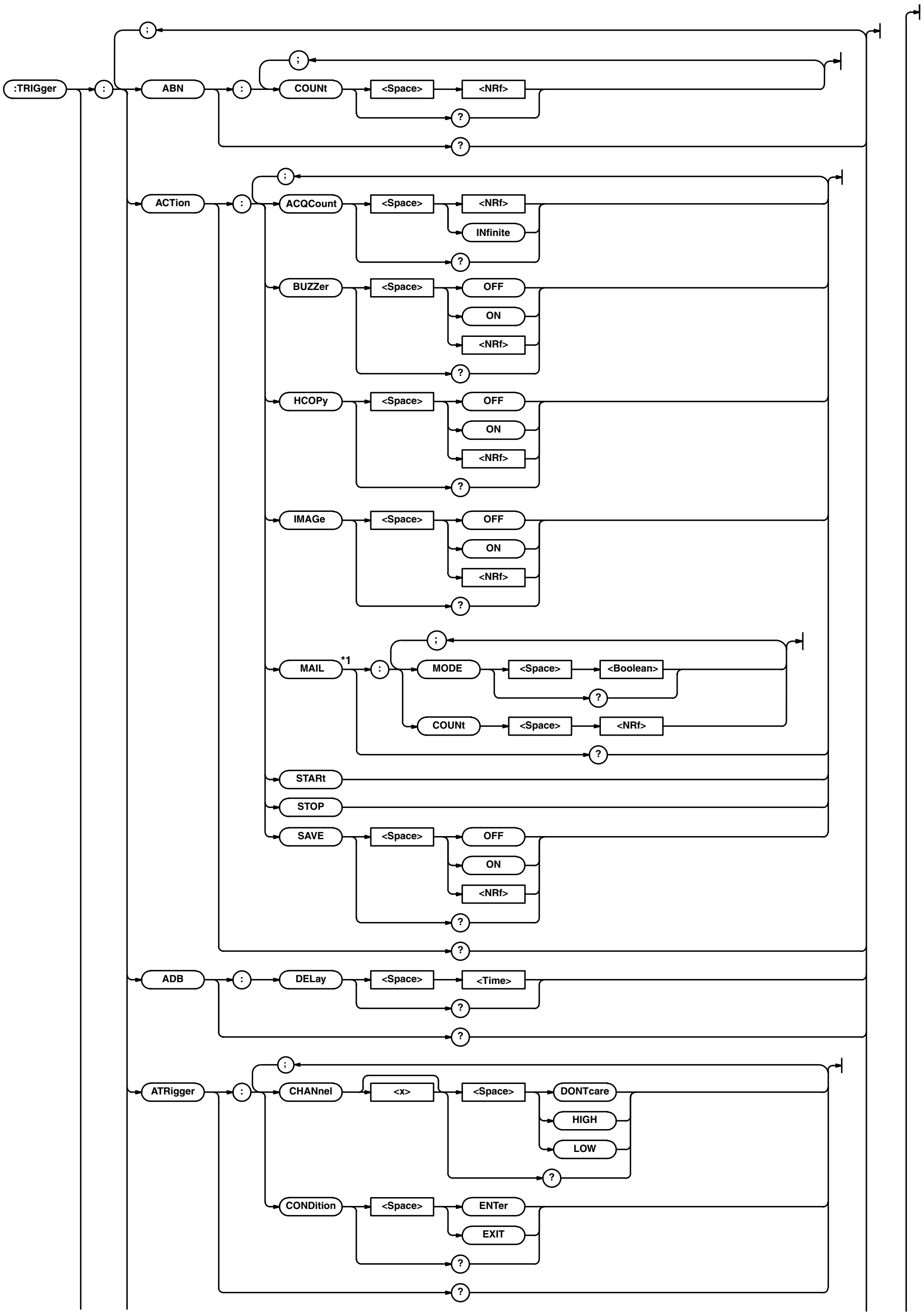
:TIMebase:TDIV

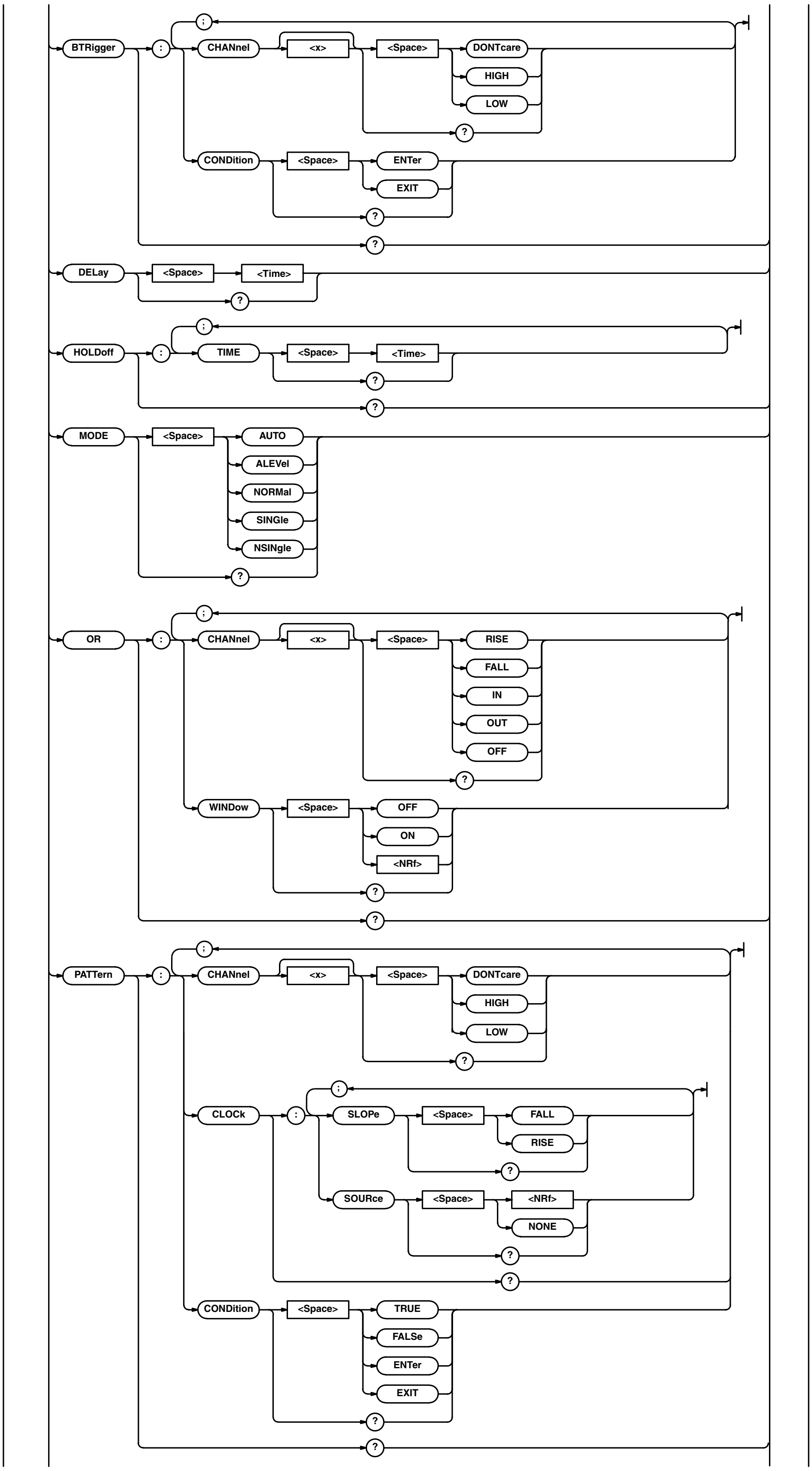
Function Sets/queries the T/div setting.

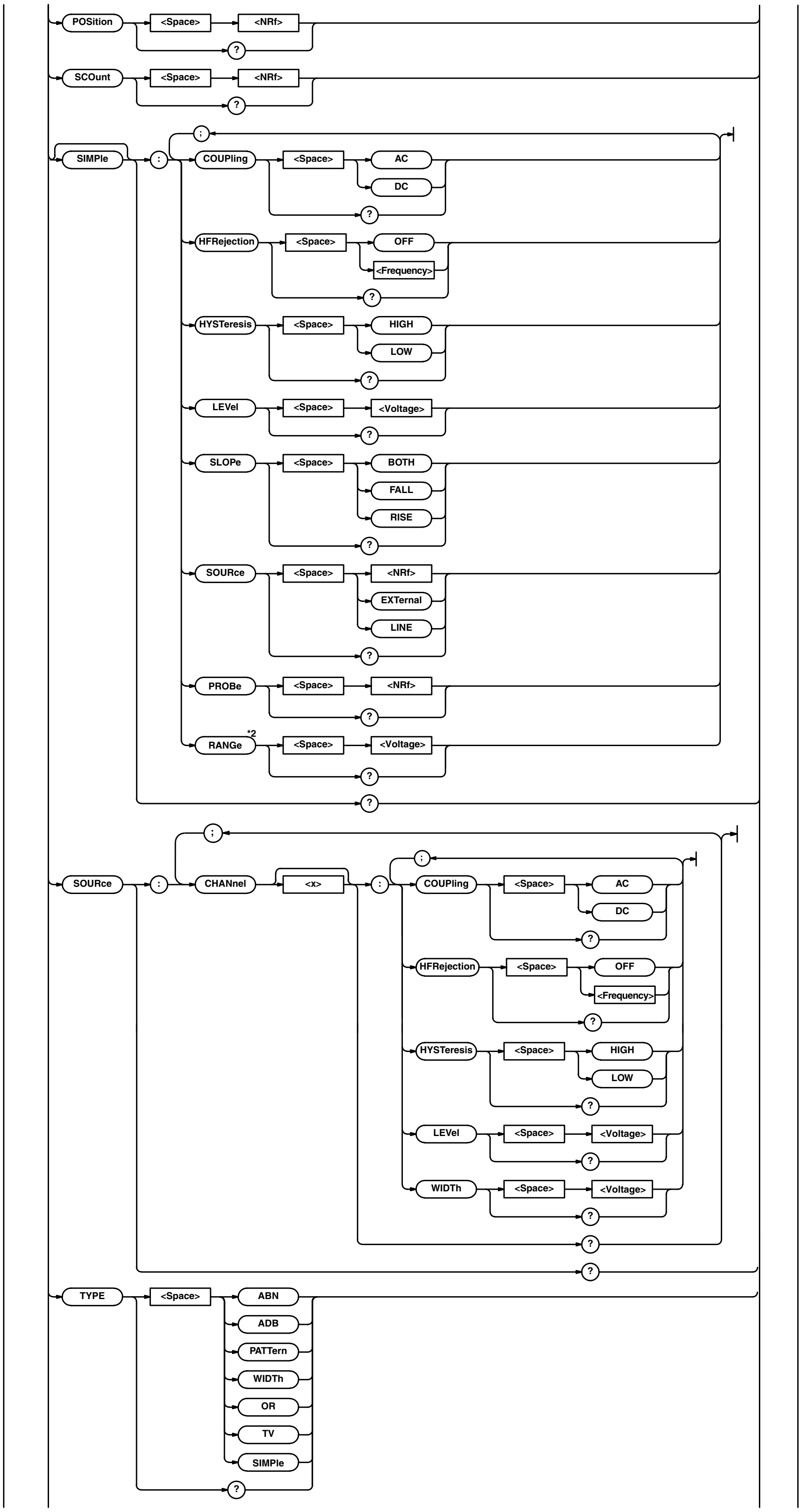
```
Syntax   :TIMebase:TDIV {<Time>}
         :TIMebase:TDIV?
         <Time>=1 ns to 50 s
Example  :TIMEBASE:TDIV 1MS
         :TIMEBASE:TDIV? -> :TIMEBASE:
         TDIV 1.000E-03
```

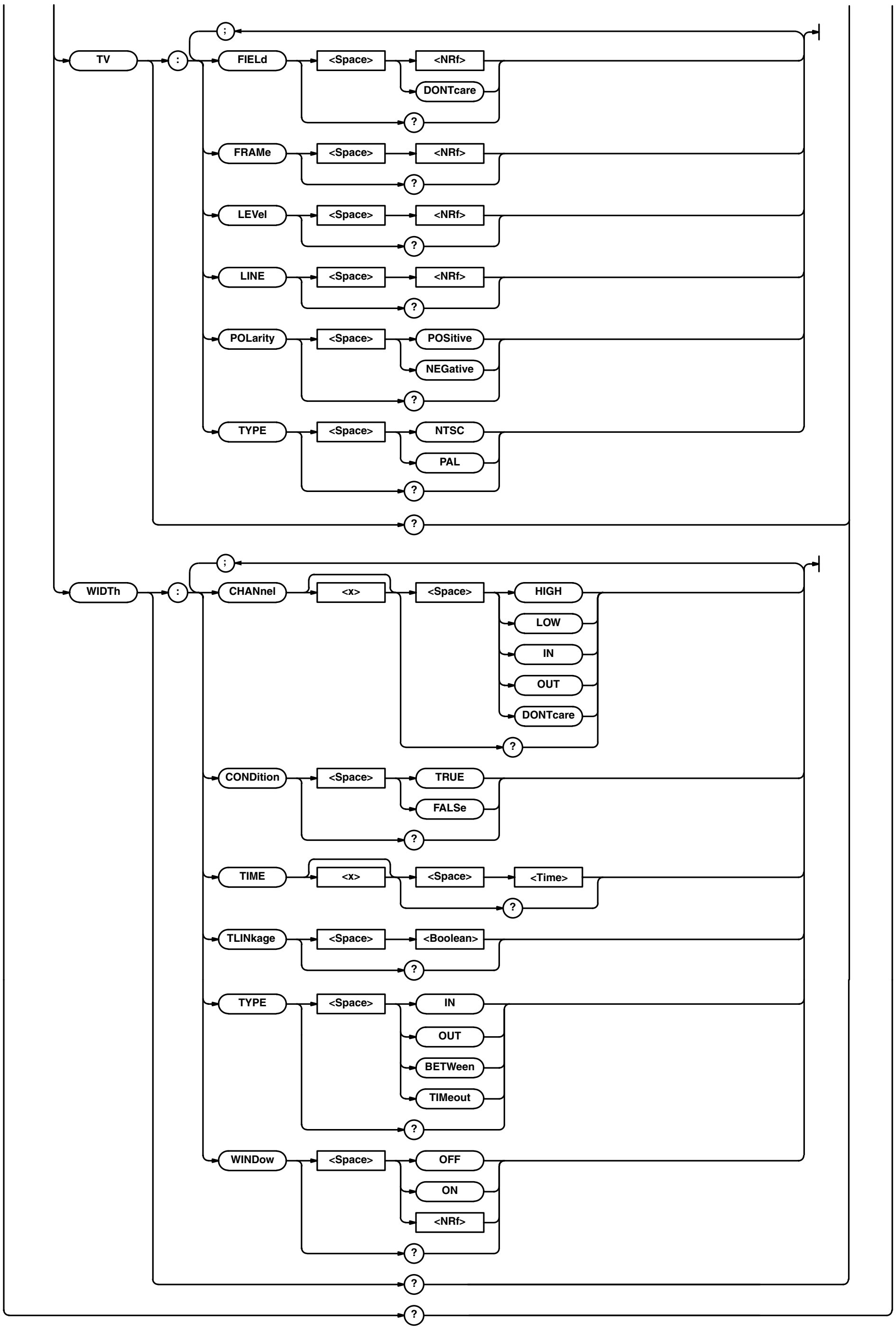
6.30 TRIGger Group

The commands in the TRIGger group are used to make settings and queries about the trigger. The same settings can be made using the TRIGGER group keys (**SIMPLE** and **ENHANCED**, and LEVEL nob, and **POSITION/ DELAY**).




BTRigger
:
CHANnel
<x>
<Space>
DONTcare
HIGH
LOW
?
CONDition
<Space>
ENTer
EXIT
?
?
DELay
<Space>
<Time>
?
HOLDoff
:
TIME
<Space>
<Time>
?
?
MODE
<Space>
AUTO
ALEVel
NORMal
SINGle
NSINgle
?
OR
:
CHANnel
<x>
<Space>
RISE
FALL
IN
OUT
OFF
?
WINDow
<Space>
OFF
ON
<NRf>
?
?
PATTern
:
CHANnel
<x>
<Space>
DONTcare
HIGH
LOW
?
CLOCk
:
SLOPe
<Space>
FALL
RISE
?
SOURce
<Space>
<NRf>
NONE
?
?
CONDition
<Space>
TRUE
FALSe
ENTer
EXIT
?
?


POSition
<Space>
<NRf>
?
SCOunt
<Space>
<NRf>
?
SIMPle
:
;
COUPling
<Space>
AC
DC
?
HFRejection
<Space>
OFF
<Frequency>
?
HYSTeresis
<Space>
HIGH
LOW
?
LEVel
<Space>
<Voltage>
?
SLOPe
<Space>
BOTH
FALL
RISE
?
SOURce
<Space>
<NRf>
EXTernal
LINE
?
PROBe
<Space>
<NRf>
?
RANGe
*2
<Space>
<Voltage>
?
?
SOURce
:
;
CHANnel
<x>
:
;
COUPling
<Space>
AC
DC
?
HFRejection
<Space>
OFF
<Frequency>
?
HYSTeresis
<Space>
HIGH
LOW
?
LEVel
<Space>
<Voltage>
?
WIDTh
<Space>
<Voltage>
?
?
?
TYPE
<Space>
ABN
ADB
PATTern
WIDTh
OR
TV
SIMPle
?



*1 Can be used when the Ethernet interface (option) is installed.

*2 For use on the DL1720.

:TRIGger?

Function Queries all trigger settings.

```
Syntax    :TRIGger?
Example   :TRIGGER? -> :TRIGGER:ACTION:
          BUZZER 0;SAVE 0;HCOPY 0;IMAGE 0;
          ACQCOUNT INFINITE;:TRIGGER:SIMPLE:
          SOURCE 1;LEVEL 0.0E+00;SLOPE RISE;
          COUPLING DC;HFREJECTION OFF;
          HYSTERESIS LOW;PROBE 1;:TRIGGER:
          SOURCE:CHANNEL1:LEVEL 0.0E+00;
          COUPLING DC;HFREJECTION OFF;
          HYSTERESIS LOW;WIDTH 500.000E-03;:
          TRIGGER:SOURCE:CHANNEL2:
          LEVEL 0.0E+00;COUPLING DC;
          HFREJECTION OFF;HYSTERESIS LOW;
          WIDTH 50.000E+00;:TRIGGER:SOURCE:
          CHANNEL3:LEVEL 0.0E+00;COUPLING DC;
          HFREJECTION OFF;HYSTERESIS LOW;
          WIDTH 1.000E+00;:TRIGGER:SOURCE:
          CHANNEL4:LEVEL 0.0E+00;COUPLING DC;
          HFREJECTION OFF;HYSTERESIS LOW;
          WIDTH 50.000E+00;:TRIGGER:ABN:
          COUNT 1;:TRIGGER:HOLDOFF:
          TIME 80.000E-09;:TRIGGER:ADB:
          DELAY 1.000E-09;:TRIGGER:
          DELAY 0.0E+00;PATTERN:CLOCK:
          SOURCE 1;SLOPE RISE;:TRIGGER:
          PATTERN:CHANNEL1 HIGH;
          CHANNEL2 DONTCARE;CHANNEL3
          DONTCARE;CHANNEL4 DONTCARE;
          CONDITION TRUE;:TRIGGER:
          POSITION 50.000;MODE AUTO;WIDTH:
          TYPE IN;CHANNEL1 HIGH;
          CHANNEL2 HIGH;CHANNEL3 HIGH;
          CHANNEL4 HIGH;CONDITION TRUE;
          TLINKAGE 0TIME1 1.000E-09;
          TIME2 1.000E-09;WINDOW 0;:TRIGGER:
          OR:WINDOW 0;CHANNEL1 RISE;
          CHANNEL2 OFF;CHANNEL3 OFF;
          CHANNEL4 OFF;:TRIGGER:SCOUNT 2;TV:
          TYPE NTSC;POLARITY NEGATIVE;
          LEVEL 5000000.0;FIELD 1;LINE 5;
          FRAME 1;:TRIGGER:TYPE SIMPLE;
          ATRIGGER:CHANNEL1 HIGH;
          CHANNEL2 DONTCARE;
          CHANNEL3 DONTCARE;
          CHANNEL4 DONTCARE;CONDITION ENTER;:
          TRIGGER:BTRIGGER:CHANNEL1 DONTCARE;
          CHANNEL2 HIGH;CHANNEL3 DONTCARE;
          CHANNEL4 DONTCARE;CONDITION ENTER
```

:TRIGger:ABN? (A -> B (n))

Function Queries all A -> B (n) trigger settings.

```
Syntax    :TRIGger:ABN?
Example   :TRIGGER:ABN? -> :TRIGGER:ABN:
          COUNT 1
```

:TRIGger:ABN:COUNt

Function Sets/queries the number of times the pattern for the A -> B (n) trigger should become true.

```
Syntax    :TRIGger:ABN:COUNt {<NRf>}
          :TRIGger:ABN:COUNt?
          <NRf>=1 to 100000000
Example   :TRIGGER:ABN:COUNT 1
          :TRIGGER:ABN:COUNT? -> :TRIGGER:
          ABN:COUNT 1
```

:TRIGger:ACTion?

Function Queries all settings relating to the action on trigger.

```
Syntax    :TRIGger:ACTion?
Example   :TRIGGER:ACTION? -> :TRIGGER:
          ACTION:BUZZER 0;SAVE 0;HCOPY 0;
          IMAGE 0;ACQCOUNT INFINITE
```

:TRIGger:ACTion:ACQCount

Function Sets the number of times to perform the action for the action-on-trigger or queries the current setting.

```
Syntax    :TRIGger:ACTion:ACQCount {<NRf|
          INFinite>}
          :TRIGger:ACTion:ACQCount?
          <NRf>=1 to 65536
Example   :TRIGGER:ACTION:ACQCOUNT 10
          :TRIGGER:ACTION:ACQCOUNT? ->
          :TRIGGER:ACTION:ACQCOUNT 10
```

:TRIGger:ACTion:BUZZer

Function Sets/queries the ON/OFF condition of the buzzer at the time of the trigger action.

```
Syntax    :TRIGger:ACTion:BUZZer {<Boolean>}
          :TRIGger:ACTion:BUZZer?
Example   :TRIGGER:ACTION:BUZZER ON
          :TRIGGER:ACTION:BUZZER? ->
          :TRIGGER:ACTION:BUZZER 1
```

:TRIGger:ACTion:HCOPy

Function Sets/queries whether the screen image data is output at the time of the trigger action.

```
Syntax    :TRIGger:ACTion:HCOPy {<Boolean>}
          :TRIGger:ACTion:HCOPy?
Example   :TRIGGER:ACTION:HCOPY ON
          :TRIGGER:ACTION:HCOPY? -> :TRIGGER:
          ACTION:HCOPY 1
```

:TRIGger:ACTion:IMAGe

Function Sets whether or not to save the screen image to the external storage medium when action is activated or queries the current setting.

```
Syntax    :TRIGger:ACTion:IMAGe {<Boolean>}
          :TRIGger:ACTion:IMAGe?
Example   :TRIGGER:ACTION:IMAGE
          ON:TRIGGER:ACTION:IMAGE ->
          :TRIGGER:ACTION:IMAGE 1
```

:TRIGger:ACTion:MAIL?

Function Queries all the setting values for mail reports sent as an ACTion.

```
Syntax   :TRIGger:ACTion:MAIL?
Example  :TRIGGER:ACTION:MAIL:MODE? ->
         :TRIGGER:ACTION:MAIL:MODE 0;
         COUNT 100
```

Description Can be used when the Ethernet interface (option) is installed.

:TRIGger:ACTion:MAIL:COUNt

Function Sets/queries the limit for the number of reports that are sent as an ACTion.

```
Syntax   :TRIGger:ACTion:MAIL:COUNt {<NRf>}
         :TRIGger:ACTion:MAIL:COUNt?
         <NRf>=1 to 1000
Example  :TRIGGER:ACTION:MAIL:COUNT 100
         :TRIGGER:ACTION:MAIL:COUNT? ->
         :TRIGGER:ACTION:MAIL:COUNT 100
```

Description Can be used when the Ethernet interface (option) is installed.

:TRIGger:ACTion:MAIL:MODE

Function Sets/queries whether mail reports are sent as an ACTion.

```
Syntax   :TRIGger:ACTion:MAIL:MODE
         {<Boolean>}
Example  :TRIGGER:ACTION:MAIL:MODE OFF
         :TRIGGER:ACTION:MAIL:MODE? ->
         :TRIGGER:ACTION:MAIL:MODE 0
```

Description Can be used when the Ethernet interface (option) is installed.

:TRIGger:ACTion:SAVE

Function Sets/queries whether the waveform data is saved to the medium at the time of the trigger action.

```
Syntax   :TRIGger:ACTion:SAVE {<Boolean>}
         :TRIGger:ACTion:SAVE?
Example  :TRIGGER:ACTION:SAVE ON
         :TRIGGER:ACTION:SAVE? -> :TRIGGER:
         ACTION:SAVE 1
```

:TRIGger:ACTion:STARt

Function Starts action-on-trigger.

```
Syntax   :TRIGger:ACTion:STARt
Example  :TRIGGER:ACTION:START
```

Description Use `TRIGger:ACTION:STOP` to abort the trigger action.

:TRIGger:ACTion:STOP

Function Aborts action-on-trigger.

```
Syntax   :TRIGger:ACTion:STOP
Example  :TRIGGER:ACTION:STOP
```

Description This command only aborts the trigger action. It does not cancel the settings.

The `TRIGger:ACTION:STARt` command can be used to resume the trigger action.

:TRIGger:ADB? (A Delay B)

Function Queries all A Delay B trigger settings.

```
Syntax   :TRIGger:ADB?
Example  :TRIGGER:ADB? -> :TRIGGER:ADB:
         DELAY 0.000E+00
```

:TRIGger:ADB:DELay

Function Sets/queries the delay time for pattern B for an A Delay B trigger.

```
Syntax   :TRIGger:ADB:DELay {<Time>}
         :TRIGger:ADB:DELay?
         <Time>=3 ns to 5 s
Example  :TRIGGER:ADB:DELAY 1NS
         :TRIGGER:ADB:DELAY? -> :TRIGGER:
         ADB:DELAY 1.0E-09
```

:TRIGger:ATRigger?

Function Queries all the pattern A settings.

```
Syntax   :TRIGger:ATRigger?
Example  :TRIGGER:ATRIGGER? -> :TRIGGER:
         ATRIGGER:CHANNEL1 HIGH;
         CHANNEL2 DONTCARE;
         CHANNEL3 DONTCARE;
         CHANNEL4 DONTCARE;CONDITION ENTER
```

:TRIGger:ATRigger:CHANnel<x>

Function Sets/queries the channel condition for pattern A.

```
Syntax   :TRIGger:ATRigger:CHANnel<x>
         {DONTcare|HIGH|LOW}
         :TRIGger:ATRigger:CHANnel<x>?
         <x>=1 to 4 (or 1-2 for the DL1720)
Example  (An example for CH1 is given
         below.)
         :TRIGGER:ATRIGGER:CHANNEL1 HIGH
         :TRIGGER:ATRIGGER:CHANNEL1? ->
         :TRIGGER:ATRIGGER:CHANNEL1 HIGH
```

:TRIGger:ATRigger:CONDition

Function Sets/queries the conditions under which pattern A should become true.

Syntax
```
:TRIGger:ATRigger:CONDition {ENTer|
EXIT}
:TRIGger:ATRigger:CONDition?
```

Example
```
:TRIGGER:ATRIGGER:CONDITION ENTER
:TRIGGER:ATRIGGER:CONDITION? ->
:TRIGGER:ATRIGGER:CONDITION ENTER
```

Description This command is valid when the trigger type is "ABN" or "ADB."

:TRIGger:BTRigger?

Function Queries all pattern B settings.

Syntax
```
:TRIGger:BTRigger?
```

Example
```
:TRIGGER:BTRIGGER? -> :TRIGGER:
BTRIGGER:CHANNEL1 DONTCARE;
CHANNEL2 HIGH;CHANNEL3 DONTCARE;
CHANNEL4 DONTCARE;CONDITION ENTER
```

:TRIGger:BTRigger:CHANnel<x>

Function Sets/queries the channel condition for pattern B.

Syntax
```
:TRIGger:BTRigger:CHANnel<x>
{DONTcare|HIGH|LOW}
:TRIGger:BTRigger:CHANnel<x>?
<x>=1 to 4 (or 1-2 for the DL1720)
```

Example
```
(An example for CH1 is given
below.)
:TRIGGER:BTRIGGER:CHANNEL1 HIGH
:TRIGGER:BTRIGGER:CHANNEL1? ->
:TRIGGER:BTRIGGER:CHANNEL1 HIGH
```

:TRIGger:BTRigger:CONDition

Function Sets/queries the conditions under which pattern B becomes true.

Syntax
```
:TRIGger:BTRigger:CONDition
{ENTer|EXIT}
:TRIGger:BTRigger:CONDition?
```

Example
```
:TRIGGER:BTRIGGER:CONDITION ENTER
:TRIGGER:BTRIGGER:CONDITION? ->
:TRIGGER:BTRIGGER:CONDITION ENTER
```

Description This command is valid when the trigger type is "ABN" or "ADB."

:TRIGger:DELay

Function Sets/queries the trigger delay (time between trigger point and trigger position).

Syntax
```
:TRIGger:DELay {<Time>}
:TRIGger:DELay?
<Time>=0 to 4 s (1/sampling rate
steps)
```

Example
```
:TRIGGER:DELLAY 2US
:TRIGGER:DELAY? -> :TRIGGER:
DELAY 2.00E-06
```

Description If timebase is external clock, the value is fixed at 0.

On this oscilloscope, the delay is the time difference between the trigger point and the trigger position. You can set/query the trigger position using the ":TRIGger:POSition" command.

:TRIGger:HOLDoff?

Function Queries all settings related to the hold off.

Syntax
```
:TRIGger:HOLDoff?
```

Example
```
:TRIGGER:HOLDOFF? -> :TRIGGER:
HOLDOFF:TIME 80.0E-09
```

:TRIGger:HOLDoff:TIME

Function Sets the hold off time or queries the current setting.

Syntax
```
:TRIGger:HOLDoff:TIME {<time>}
:TRIGger:HOLDoff:TIME?
<time>=80 ns to 10 s
```

Example
```
:TRIGGER:HOLDOFF:TIME 80NS
:TRIGGER:HOLDOFF:TIME? -> :TRIGGER:
HOLDOFF:TIME 80.0E-09
```

:TRIGger:MODE

Function Sets the trigger mode or queries the current setting.

Syntax
```
:TRIGger:MODE {AUTO|ALEVel|NORMal|
SINGle|NSINgle}
:TRIGger:MODE?
```

Example
```
:TRIGGER:MODE AUTO
:TRIGGER:MODE? -> :TRIGGER:
MODE AUTO
```

Description Use the ":TRIGger:SCOunt" command to query the count when "NSINgle" is selected.

:TRIGger:OR?

Function Queries all settings related to the OR trigger.

Syntax
```
:TRIGger:OR?
```

Example
```
:TRIGGER:OR? -> :TRIGGER:OR:
WINDOW 0;CHANNEL1 OFF;CHANNEL2 OFF;
CHANNEL3 OFF;CHANNEL4 OFF
```

:TRIGger:OR:CHANnel<x>

Function Sets the edge of the OR trigger of each channel or queries the current setting.

Syntax
```
:TRIGger:OR:CHANnel<x> {OFF|RISE|
FALL|IN|OUT}
:TRIGger:OR:CHANnel<x>?
<x>=1 to 4 (or 1-2 for the DL1720)
```

Example
```
(The following example is for CH1.)
:TRIGGER:OR:CHANNEL1 RISE
:TRIGGER:OR:CHANNEL1? -> :TRIGGER:
OR:CHANNEL1 RISE
```

Description Select from {IN|OUT} when "TRIGger:OR:WINDow ON" is specified and from {FALL|RISE}, otherwise.

:TRIGger:OR:WINDow

Function Turns the OR trigger window ON/OFF or queries the current setting.

Syntax
```
:TRIGger:OR:WINDow {<Boolean>}
:TRIGger:OR:WINDow?
```

Example
```
:TRIGGER:OR:WINDOW ON
:TRIGGER:OR:WINDOW? -> :TRIGGER:OR:
WINDOW 1
```

:TRIGger:PATTern?

Function Queries all settings related to the pattern trigger.

Syntax
```
:TRIGger:PATTern?
```

Example
```
:TRIGGER:PATTERN? -> :TRIGGER:
PATTERN:CLOCK:SOURCE NONE;:TRIGGER:
PATTERN:CHANNEL1 HIGH;
CHANNEL2 DONTCARE;
CHANNEL3 DONTCARE;
CHANNEL4 DONTCARE;CONDITION ENTER
```

:TRIGger:PATTern:CHANnel<x>

Function Sets the state of each channel when using the pattern trigger or queries the current setting.

Syntax
```
:TRIGger:PATTern:CHANnel<x>
{DONTcare|HIGH|LOW}
:TRIGger:PATTern:CHANnel<x>?
<x>=1 to 4 (or 1-2 for the DL1720)
```

Example
```
:TRIGGER:PATTERN:CHANNEL1 DONTCARE
:TRIGGER:PATTERN:CHANNEL1? ->
:TRIGGER:PATTERN:CHANNEL1 DONTCARE
```

:TRIGger:PATTern:CLOCk?

Function Queries all settings related to the clock channel when using the pattern trigger.

Syntax
```
:TRIGger:PATTern:CLOCk?
```

Example
```
:TRIGGER:PATTERN:CLOCK? ->
:TRIGGER:PATTERN:CLOCK:SOURCE 1;
SLOPE RISE
```

:TRIGger:PATTern:CLOCk:SLOPe

Function Sets the slope of the clock channel when using the pattern trigger or queries the current setting.

Syntax
```
:TRIGger:PATTern:CLOCk:SLOPe{FALL|
RISE}
:TRIGger:PATTern:CLOCk:SLOPe?
```

Example
```
:TRIGGER:PATTERN:CLOCK:SLOPE RISE
:TRIGGER:PATTERN:CLOCK:SLOPE? ->
:TRIGGER:SIMPLE:PATTERN:CLOCK:
SLOPE RISE
```

Description An error results if "TRIGger:PATTern:CLOCk:SOURce NONE" is specified.

:TRIGger:PATTern:CLOCk:SOURce

Function Sets the clock channel when using the pattern trigger or queries the current setting.

Syntax
```
:TRIGger:PATTern:CLOCk:SOURce
{<NRf>|NONE}
:TRIGger:PATTern:CLOCk:SOURce?
<NRf>=1 to 4 (or 1-2 for the
DL1720)
```

Example
```
:TRIGGER:PATTERN:CLOCK:SOURCE 1
:TRIGGER:PATTERN:CLOCK:SOURCE? ->
:TRIGGER:PATTERN:CLOCK:SOURCE 1
```

:TRIGger:PATTern:CONDition

Function Sets the trigger condition when using the pattern trigger or queries the current setting.

Syntax
```
:TRIGger:PATTern:CONDition {ENTer|
EXIT|FALSe|TRUE}
:TRIGger:PATTern:CONDition?
```

Example
```
:TRIGGER:PATTERN:CONDITION ENTER
:TRIGGER:PATTERN:CONDITION? ->
:TRIGGER:PATTERN:CONDITION ENTER
```

Description Select the condition from {ENTer|EXIT} when "TRIGger:PATTERN:CLOCk:SOURce NONE" is specified and from {FALSe|TRUE}, otherwise.

:TRIGger:POSition

Function Sets the trigger position or queries the current setting.

Syntax
```
:TRIGger:POSition {<NRf>}
:TRIGger:POSition?
<NRf>=0 to 100 (%, 0.1 steps)
```

Example
```
:TRIGGER:POSITION 50
:TRIGGER:POSITION? -> :TRIGGER:
POSITION 50.000
```

:TRIGger:SCOunt (Single (N) Count)

Function Sets the number of times the trigger is activated when the trigger mode is set to Single (N) or queries the current setting.

Syntax
```
:TRIGger:SCOunt {<NRf>}
:TRIGger:SCOunt?
<NRf>=1 to 2048
```

Example
```
:TRIGGER:SCOUNT 100
:TRIGGER:SCOUNT? -> :TRIGGER:
SCOUNT 100
```

:TRIGger[:SIMPle]?

Function Queries all settings related to the simple trigger.

Syntax
```
:TRIGger:SIMPle?
```

Example
```
:TRIGGER:SIMPLE? -> :TRIGGER:
SIMPLE:SOURCE 1;LEVEL 0.0E+00;
SLOPE RISE;COUPLING DC;
HFREJECTION OFF;HYSTERESIS LOW
```

:TRIGger[:SIMPle]:COUPling

Function Sets the trigger coupling for the simple trigger or queries the current setting.

Syntax
```
:TRIGger[:SIMPle]:COUPling {AC|DC}
:TRIGger[:SIMPle]:COUPling?
```

Example
```
:TRIGGER:SIMPLE:COUPLING DC
:TRIGGER:SIMPLE:COUPLING? ->
:TRIGGER:SIMPLE:COUPLING DC
```

Description Setting/Querying is not possible when the trigger source is set to `"EXTernal" or "LINE."`

:TRIGger[:SIMPle]:HFRejection (HighFrequencyREJECTION)

Function Turns the low-pass filter (HF rejection) for the trigger signal ON/OFF or queries the current setting.

Syntax
```
:TRIGger[:SIMPle]:HFRejection {OFF|
<frequency>}
:TRIGger[:SIMPle]:HFRejection?
{<frequency>}=20MHz,15KHz
```

Example
```
:TRIGGER:SIMPLE:HFREJECTION 20MHZ
:TRIGGER:SIMPLE:HFREJECTION? ->
:TRIGGER:SIMPLE:
HFREJECTION 20.0E+06
```

Description Setting/Querying is not possible when the trigger source is set to `"EXTernal" or "LINE."`

:TRIGger[:SIMPle]:HYSTeresis

Function Sets the hysteresis on the search level of the simple trigger or queries the current setting.

Syntax
```
:TRIGger[:SIMPle]:HYSTeresis
{HIGH|LOW}
:TRIGger[:SIMPle]:HYSTeresis?
```

Example
```
:TRIGGER:SIMPlE:HYSTERESIS HIGH
:TRIGGER:SIMPlE:HYSTERESIS? ->
:TRIGGER:SIMPlE:HYSTERESIS HIGH
```

Description Setting/Querying is not possible when the trigger source is set to `"EXTernal"` or `"LINE."`

:TRIGger[:SIMPle]:LEVel

Function Sets the trigger level of the channel specified with the `"TRIGger[:SIMPle]:SOURce"` command or queries the current setting.

Syntax
```
:TRIGger[:SIMPle]:LEVel {<voltage>}
:TRIGger[:SIMPle]:LEVel?
<voltage>=See the IM701710-01E
User's Manual.
```

Example
```
:TRIGGER:SIMPLE:LEVEL 0V
:TRIGGER:SIMPLE:LEVEL? -> :TRIGGER:
SIMPLE:LEVEL 0.000E+00
```

Description Setting/Querying is not possible when the trigger source is set to `"LINE."`

:TRIGger[:SIMPle]:PROBe

Function Sets the probe when the trigger source is set to `"EXTernal"` or queries the current setting.

Syntax
```
:TRIGger[:SIMPle]:PROBe {<NRf>}
:TRIGger[:SIMPle]:PROBe?
<NRf>=1,10
```

Example
```
:TRIGGER:SIMPLE:PROBE 1
:TRIGGER:SIMPLE:PROBE -> :TRIGGER:
SIMPLE:PROBE 1
```

Description Setting/Querying is not possible unless the trigger source is set to `"EXTernal."`

:TRIGger[:SIMPle]:RANGe

Function Sets the input range for the external trigger and queries the current setting. (DL1720 only)

Syntax
```
:TRIGger[:SIMPle]:RANGe {<voltage>}
:TRIGger[:SIMPle]:RANGe?
<NRf>=1 to 100 V
```

Example
```
:TRIGGER:SIMPLE:RANGE 1V
:TRIGGER:SIMPLE:RANGE? -> :TRIGGER:
SIMPLE:RANGE 1.0E+00
```

Description Setting/Querying is not possible unless the trigger source is set to "`EXTernal.`"

:TRIGger[:SIMPle]:SLOPe

Function Sets the trigger slope of the channel specified with the "TRIGger[:SIMPle]:SOURce" command or queries the current setting.

```
Syntax      :TRIGger[:SIMPle]:SLOPe {BOTH|FALL|
            RISE}
            :TRIGger[:SIMPle]:SLOPe?
Example     :TRIGGER:SIMPLE:SLOPE RISE
            :TRIGGER:SIMPLE:SLOPE? -> :TRIGGER:
            SIMPLE:SLOPE RISE
```

Description Setting/Querying is not possible when the trigger source is set to "LINE."

:TRIGger[:SIMPle]:SOURce

Function Sets the trigger source for the simple trigger or queries the current setting.

```
Syntax      :TRIGger[:SIMPle]:SOURce {<NRf>|
            EXTernal|LINE}
            :TRIGger[:SIMPle]:SOURce?
            <NRf>=1 to 4 (or 1-2 for the
            DL1720)
Example     :TRIGGER:SIMPLE:SOURCE 1
            :TRIGGER:SIMPLE:SOURCE? ->
            :TRIGGER:SIMPLE:SOURCE 1
```

Description Within the :TRIGger:SIMPle series of commands, "SIMPle" may be omitted except in the case of the :TRIGger:SIMPle:SOURce command.

:TRIGger:SOURce?

Function Enhanced Queries all settings related to the trigger source for the enhanced trigger.

```
Syntax      :TRIGger:SOURce?
Example     :TRIGGER:SOURCE? -> :TRIGGER:
            SOURCE:CHANNEL1:LEVEL 0.0E+00;
            COUPLING DC;HFREJECTION OFF;
            HYSTERESIS HIGH;CENTER0.0E+00;
            WIDTH 2.000E+00;:TRIGGER:SOURCE:
            CHANNEL2:LEVEL 0.0E+00;COUPLING DC;
            HFREJECTION OFF;HYSTERESIS HIGH;
            CENTER 0.0E+00;WIDTH 20.000E+00;:
            TRIGGER:SOURCE:CHANNEL3:
            LEVEL 0.0E+00;COUPLING DC;
            HFREJECTION OFF;HYSTERESIS HIGH;
            CENTER 0.0E+00;WIDTH 2.000E+00;:
            TRIGGER:SOURCE:CHANNEL4:
            LEVEL 0.0E+00;COUPLING DC;
            HFREJECTION OFF;HYSTERESIS HIGH;
            CENTER 0.0E+00;WIDTH 50.000E+00
```

:TRIGger:SOURce:CHANnel<x>?

Function Queries all settings related to the trigger source of the enhanced trigger of the specified channel.

```
Syntax      :TRIGger:SOURce:CHANnel<x>?
            <x>=1 to 4 (or 1-2 for the DL1720)
Example     :TRIGGER:SOURCE:CHANNEL1? ->
            :TRIGGER:SOURCE:CHANNEL1:
            LEVEL 0.0E+00;COUPLING DC;
            HFREJECTION OFF;HYSTERESIS LOW;
            CENTER 0.0E+00;WIDTH 2.000E+00
```

:TRIGger:SOURce:CHANnel<x>:COUPling

Function Sets the trigger coupling of each channel when using the enhanced trigger or queries the current setting.

```
Syntax      :TRIGger:SOURce:CHANnel<x>:COUPling
            {AC|DC}
            :TRIGger:SOURce:CHANnel<x>:
            COUPling?
            <x>=1 to 4 (or 1-2 for the DL1720)
Example     :TRIGGER:SOURCE:CHANNEL1:COUPLING
            DC
            :TRIGGER:SOURCE:CHANNEL1:COUPLING?
            -> :TRIGGER:SOURCE:CHANNEL1:
            COUPLING DC
```

:TRIGger:SOURce:CHANnel<x>:HFRejection (HighFrequencyREJECTION)

Function Sets the low-pass filter when using the enhanced trigger or queries the current setting.

```
Syntax      :TRIGger:SOURce:CHANnel<x>:
            HFRejection {OFF|<frequency>}
            :TRIGger:SOURce:CHANnel<x>:
            HFRejection?
            <x>=1 to 4 (or 1-2 for the DL1720)
            <frequency>=20 MHz, 15 KHz
Example     :TRIGGER:SOURCE:CHANNEL1:
            HFREJECTION 15KHZ
            :TRIGGER:SOURCE:CHANNEL1:
            HFREJECTION? -> :TRIGGER:SOURCE:
            CHANNEL1:HFREJECTION 15.0E+03
```

:TRIGger:SOURce:CHANnel<x>:HYSTeresis

Function Sets the hysteresis on the search level when using the enhanced trigger or queries the current setting.

```
Syntax      :TRIGger:SOURce:CHANnel<x>:
            HYSTeresis {HIGH|LOW}
            :TRIGger:SOURce:CHANnel<x>:
            HYSTeresis?
            <x>=1 to 4(or 1-2 for the DL1720)
Example     :TRIGGER:SOURCE:CHANNEL1:HYSTERESIS
            HIGH
            :TRIGGER:SOURCE:CHANNEL1:
            HYSTERESIS? -> :TRIGGER:SOURCE:
            CHANNEL1:HYSTERESIS HIGH
```

:TRIGger:SOURce:CHANnel<x>:LEVel

Function Sets the trigger level of each channel when using the enhanced trigger or queries the current setting.

Syntax
```
:TRIGger:SOURce:CHANnel<x>:LEVel
{<voltage>}
:TRIGger:SOURce:CHANnel<x>:LEVel?
<x>=1 to 4(or 1-2 for the DL1720)
<voltage>=See the IM701710-01E
User's Manual.
```

Example
```
:TRIGGER:SOURCE:CHANNEL1:LEVEL 0V
:TRIGGER:SOURCE:CHANNEL1:LEVEL? ->
:TRIGGER:SOURCE:CHANNEL1:
LEVEL 0.000E+00
```

:TRIGger:SOURce:CHANnel<x>:WIDTh

Function Sets the width of the window trigger or queries the current setting.

Syntax
```
:TRIGger:SOURce:CHANnel<x>:WIDTh
{<voltage>}
:TRIGger:SOURce:CHANnel<x>:WIDTh?
<x>=1 to 4 (or 1-2 for the DL1720)
<voltage>=one to eight times V/div
(1/100 of V/div steps)
```

Example
```
:TRIGGER:SOURCE:CHANNEL1:WIDTH 5V
:TRIGGER:SOURCE:CHANNEL1:WIDTH? ->
:TRIGGER:SOURCE:CHANNEL1:
WIDTH 5.0E+00
```

:TRIGger:TV?

Function Queries all settings related to the TV trigger.

Syntax
```
:TRIGger:TV?
```

Example
```
:TRIGGER:TV? -> :TRIGGER:TV:
TYPE NTSC;POLARITY NEGATIVE;
LEVEL 0.5;FIELD 1;LINE 5;FRAME 1
```

Description The trigger source for the TV trigger is fixed to CH1.

:TRIGger:TV:FIELd

Function Sets the field on which to activate the TV trigger or queries the current setting.

Syntax
```
:TRIGger:TV:FIELd {DONTcare|<NRf>}
:TRIGger:TV:FIELd?
<NRf>=1 or 2
```

Example
```
:TRIGGER:TV:FIELD DONTCARE
:TRIGGER:TV:FIELD? -> :TRIGGER:TV:
FIELD DONTCARE
```

:TRIGger:TV:FRAMe

Function Sets the frame skip function of the TV trigger or queries the current setting.

Syntax
```
:TRIGger:TV:FRAMe {<NRf>}
:TRIGger:TV:FRAMe?
<NRf>=1, 2, 4, or 8
```

Example
```
:TRIGGER:TV:FRAME 2
:TRIGGER:TV:FRAME? -> :TRIGGER:TV:
FRAME 2
```

:TRIGger:TV:LEVel

Function Sets the trigger level of the TV trigger or queries the current setting.

Syntax
```
:TRIGger:TV:LEVel {<NRf>}
:TRIGger:TV:LEVel?
<NRf>=0.1 to 2 div (0.1 div steps)
```

Example
```
:TRIGGER:TV:LEVEL 0.1
:TRIGGER:TV:LEVEL? -> :TRIGGER:TV:
LEVEL 0.1
```

:TRIGger:TV:LINE

Function Sets the line on which to activate the TV trigger or queries the current setting.

Syntax
```
:TRIGger:TV:LINE {<NRf>}
:TRIGger:TV:LINE?
<NRf>=5 to 1054 (for NTSC)
      2 to 1251 (for PAL)
```

Example
```
:TRIGGER:TV:LINE 5
:TRIGGER:TV:LINE? -> :TRIGGER:TV:
LINE 5
```

:TRIGger:TV:POLarity

Function Sets the TV trigger's input polarity or queries the current setting.

Syntax
```
:TRIGger:TV:POLarity {POSitive|
NEGative}
:TRIGger:TV:POLarity?
```

Example
```
:TRIGGER:TV:POLARITY POSITIVE
:TRIGGER:TV:POLARITY? -> :TRIGGER:
TV:POLARITY POSITIVE
```

:TRIGger:TV:TYPE

Function Sets the TV trigger's input type or queries the current setting.

Syntax
```
:TRIGger:TV:TYPE {NTSC|PAL}
:TRIGger:TV:TYPE?
```

Example
```
:TRIGGER:TV:TYPE NTSC
:TRIGGER:TV:TYPE? -> :TRIGGER:TV:
TYPE NTSC
```

Description The trigger source for the TV trigger is fixed to CH1.

:TRIGger:TYPE

Function Sets the trigger type or queries the current setting.

Syntax
```
:TRIGger:TYPE {ABN|ADB|PATTern|
WIDTh|OR|TV|SIMPle}
:TRIGger:TYPE?
```

Example
```
:TRIGGER:TYPE SIMPLE:TRIGGER:TYPE?
-> :TRIGGER:TYPE SIMPLE
```

:TRIGger:WIDTh?

Function Queries all settings related to the pulse width trigger.

Syntax `:TRIGger:WIDTh?`

Example
```
:TRIGGER:WIDTH? -> :TRIGGER:WIDTH:
TYPE IN;CHANNEL1 HIGH;
CHANNEL2 HIGH;CHANNEL3 HIGH;
CHANNEL4 HIGH;CONDITION TRUE;
TLINKAGE 0;TIME1 1.0E-09;
TIME2 2.0E-09;WINDOW 0
```

:TRIGger:WIDTh:CHANnel<x>

Function Sets the trigger condition of each channel when using the pulse width trigger or queries the current setting.

Syntax
```
:TRIGger:WIDTh:CHANnel<x> {HIGH|
LOW|IN|OUT|DONTcare}
:TRIGger:WIDTh:CHANnel<x>?
<x>=1 to 4 (or 1-2 for the DL1720)
```

Example
```
:TRIGGER:WIDTH:CHANNEL1 IN
:TRIGGER:WIDTH:CHANNEL1? ->
:TRIGGER:WIDTH:CHANNEL1 IN
```

Description Select from {IN|OUT} when "TRIGger:OR:WINDow ON" is specified and from {FALL|RISE}, other wise.

:TRIGger:WIDTh:CONDition

Function Sets the trigger condition when using the pulse width trigger or queries the current setting.

Syntax
```
:TRIGger:WIDTh:CONDition{TRUE|
FALSe}
:TRIGger:WIDTh:CONDition?
```

Example
```
:TRIGGER:WIDTH:CONDITION TRUE
:TRIGGER:WIDTH:CONDITION? ->
:TRIGGER:WIDTH:CONDITION TRUE
```

:TRIGger:WIDTh:TIME<x>

Function Sets the pulse width when using the pulse width trigger or queries the current setting.

Syntax
```
:TRIGger:WIDTh:TIME<x> <time>
:TRIGger:WIDTh:TIME<x>?
<x>=1 or 2
<time>=1 ns to 1 s (when <x>=1 and
"T1<Pulse<T2" is not true)
1 ns to 0.999999999 s (when <x>=1
and "T1<Pulse<T2")
2 ns to 1 s (when <x>=2 and
"T1<Pulse<T2")
```

Example
```
:TRIGGER:WIDTH:TIME1 10NS
:TRIGGER:WIDTH:TIME1? -> :TRIGGER:
WIDTH:TIME1 10.0E-09
```

:TRIGger:WIDTh:TLINkage

Function Turns the link ON/OFF when changing the pulse width for the pulse width trigger or queries the current setting.

Syntax
```
:TRIGger:WIDTh:TLINkage {<Boolean>}
:TRIGger:WIDTh:TLINkage?
```

Example
```
:TRIGGER:WIDTH:TLINKAGE ON
:TRIGGER:WIDTH:TLINKAGE? ->
:TRIGGER:WIDTH:TLINKAGE 1
```

:TRIGger:WIDTh:TYPE

Function Sets the trigger type when using the pulse width trigger or queries the current setting.

Syntax
```
:TRIGger:WIDTh:TYPE {IN|OUT|
BETWeen|TIMeout}
:TRIGger:WIDTh:TYPE?
```

Example
```
:TRIGGER:WIDTH:TYPE BETWEEN
:TRIGGER:WIDTH:TYPE? -> :TRIGGER:
WIDTH:TYPE BETWEEN
```

:TRIGger:WIDTh:WINDow

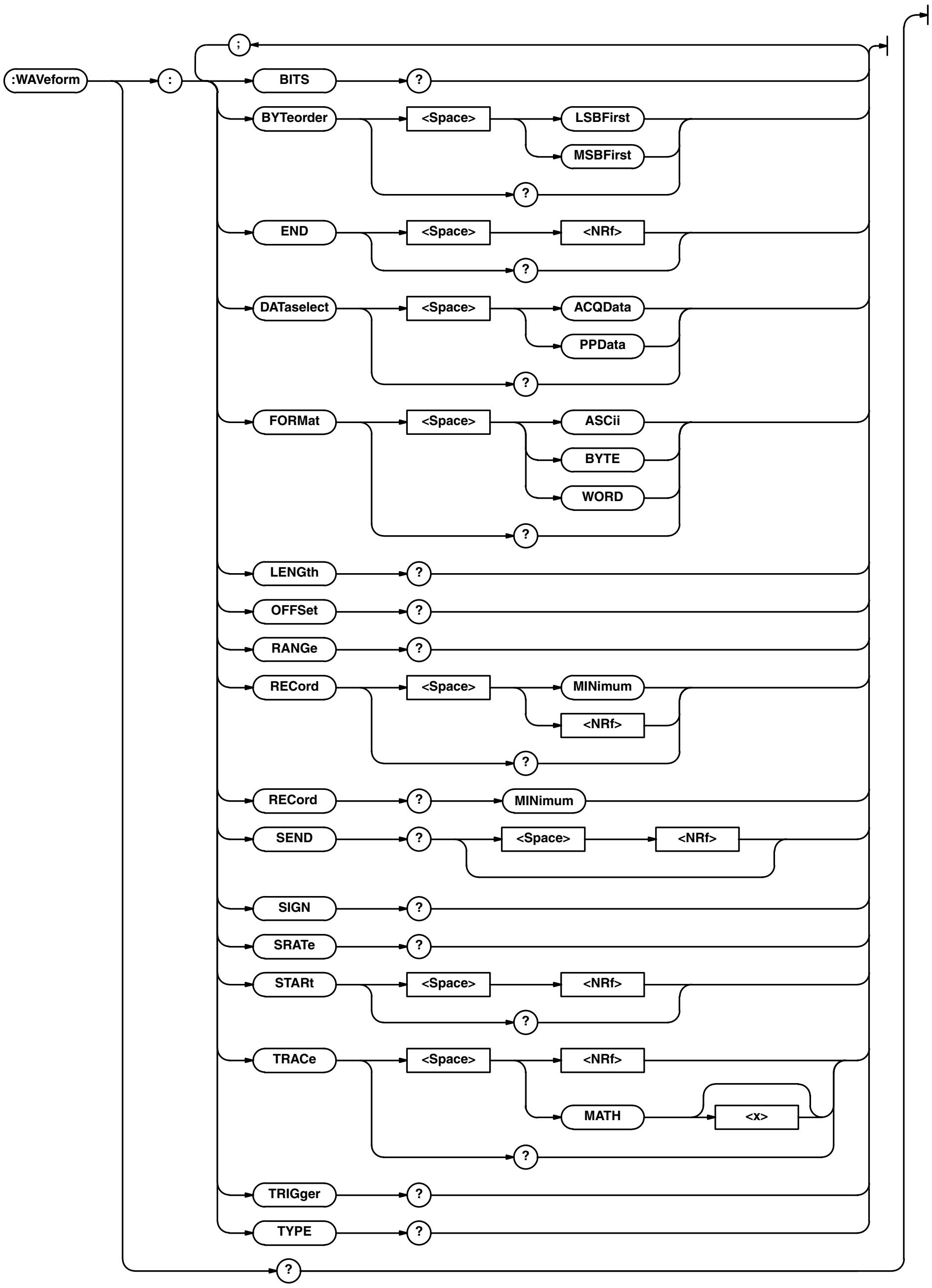
Function Turns the window ON/OFF when using the pulse width trigger or queries the current setting.

Syntax
```
:TRIGger:WIDTh:WINDow {<Boolean>}
:TRIGger:WIDTh:WINDow?
```

Example
```
:TRIGGER:WIDTH:WINDOW ON
:TRIGGER:WIDTH:WINDOW? -> :TRIGGER:
WIDTH:WINDOW 1
```

6.31 WAVeform Group

The commands in the WAVeform group are used to make settings and queries about acquired waveform data. There is no front panel key for this function.



:WAVeform?

Function Queries all information relating to the waveform data.

Syntax `:WAVeform?`

Example `:WAVEFORM? -> :WAVEFORM:TRACE 1;`
`RECORD 0;START 0;END 0;`
`DATASELECT ACQDATA;FORMAT WORD;`
`BYTEORDER LSBFIRST`

:WAVeform:BITS?

Function Queries the bit length of the waveform data designated by "`WAVeform:TRACe.`"

Syntax `:WAVeform:BITS?`

Example `:WAVEFORM:BITS? -> :WAVEFORM:`
`BITS 16`

:WAVeform:BYTeorder

Function Sets/queries the order used to transmit words consisting of multiple bytes.

Syntax `:WAVeform:BYTeorder {LSBFirst|MSBFirst}`
`:WAVeform:BYTeorder?`

Example `:WAVEFORM:BYTEORDER LSBFIRST`
`:WAVEFORM:BYTEORDER? -> :WAVEFORM:BYTEORDER LSBFIRST`

:WAVeform:DATaselect

Function Sets whether to use the ACQ data or P-P data when querying the waveform that is specified with the "`WAVeform:TRACe`" command or queries the current setting.

Syntax `:WAVeform:DATaselect {ACQData|PPData}`
`:WAVeform:DATaselect?`

Example `:WAVEFORM:DATASELECT ACQDATA`
`:WAVEFORM:DATASELECT? -> :WAVEFORM:DATASELECT ACQDATA`

:WAVeform:END

Function Sets/queries the point at which the last item of data of the waveform designated by "`WAVeform:TRACe`" is to be located.

Syntax `:WAVeform:END {<NRf>}`
`:WAVeform:END?`
`<NRf>=0 to 1001999`

Example· `:WAVEFORM:END 1001`
`:WAVEFORM:END? -> :WAVEFORM:END 1001`

Description You can query total data length (points) with the "`:WAVeform:LENgth`" command.

:WAVeform:FORMat

Function Sets/queries the format in which the data is to be transmitted.

Syntax `:WAVeform:FORMat {ASCii|BYTE|WORD}`
`:WAVeform:FORMat?`

Example `:WAVEFORM:FORMAT ASCII`
`:WAVEFORM:FORMAT? -> :WAVEFORM:FORMAT ASCII`

Description For information on the different formats selected with this command, refer to the Description section of "`WAVeform:SEND?.`"

:WAVeform:LENGth?

Function Queries the number of records (total number of data points) in the waveform designated by "`WAVeform:TRACe.`"

Syntax `:WAVeform:LENGth?`

Example `:WAVEFORM:LENGTH? -> :WAVEFORM:LENGTH 1002`

:WAVeform:OFFSet?

Function Queries the offset value that is used when converting the waveform specified by the "`WAVeform:TRACe`" command to physical values.

Syntax `:WAVeform:OFFSet?`

Example `:WAVEFORM:OFFSET? -> 0.000E+00`

Description This offset value is used when converting the <block data> that are output by the "`WAVeform:SEND?`" command to physical values.

:WAVeform:RANGe?

Function Queries the range that is used when converting the waveform specified by the "`:WAVeform:TRACe`" command to physical values.

Syntax `:WAVeform:RANGe?`

Example `:WAVeform:RANGe? -> 5.000E+00`

Description This value is used when converting the <block data> that is output with the "`WAVeform:SEND?`" command to physical values.

:WAVeform:RECord

Function Sets/queries the target record No. for the WAVeform group.

Syntax `:WAVeform:RECord {MINimum|<NRf>}`
`:WAVeform:RECord?`
`<NRf>=0 to -2047`

Example `:WAVEFORM:RECORD 0`
`:WAVEFORM:RECORD? -> :WAVEFORM:RECORD 0`

Description If "`MINimum`" is specified, the record number is set to the minimum value. The record numbers that can be selected vary depending on the acquisition settings. For details, see the IM701710-01E User's Manual.

:WAVeform:RECord? MINimum

Function Queries the smallest record number of the history of the channel.

Syntax `:WAVeform:RECord? MINimum`

Example `:WAVEFORM:RECORD? MINimum -> :WAVEFORM:RECORD -1023`

:WAVeform:SEND?

Function Queries the waveform data specified with the "WAVeform:TRACe" command.

```
Syntax      :WAVeform:SEND? [{<NRf>}]
            <NRf>=0 to 2048
            (depends on the record length
            setting)
Example     :WAVEFORM:SEND? -> #8 (number of
            bytes, 8 digits)(data string) or,
            <NRf>,<NRf>, ....
```

Description The output format of "WAVeform:SEND?" varies depending on the "WAVeform:FORMat" setting.

(1)When set to "ASCii"

- When the "WAVeform:TRACe" is 1 to 4 and the linear scaling is OFF, the values are returned in the following format: <voltage>, <voltage>, ...<voltage>
- For all other cases, the values are returned in the form: <NRf>, <NRf>, ..., <NRf>.

(2)When set to "BYTE" or "WORD"

The values are returned in the <block data> format.

- The following equation can be used to convert the values.
  Voltage (computed value) =
  (Range × data ÷ division*) + offset
  * "BYTE":Division=12
  "WORD":Division=3072
  Query is not possible if "WAVeform:TRACe" set to MATH1 or MATH2 and the computation is turned OFF.
- <NRf> can be omitted. If <NRf> is added, waveform data are queried <NRf> times from the record number specified by the ":WAVeform:RECord" command - <NRf> in order.

:WAVeform:SIGN?

Function Queries the presence of the sign, when querying the waveform specified with "WAVeform:TRACe" in binary data form.

```
Syntax      :WAVeform:SIGN?
Example     :WAVEFORM:SIGN? -> :WAVEFORM:SIGN 1
```

:WAVeform:SRATe? (Sample RATE)

Function Queries the sampling rate for the record designated by "WAVeform:RECord".

```
Syntax      :WAVeform:SRATe?
Example     :WAVEFORM:SRATE? -> :WAVEFORM:
            SRATE 1.0E+09
```

:WAVeform:STARt

Function Sets/queries the point at which the first item of data of the waveform designated by "WAVeform:TRACe" is to be located.

```
Syntax      :WAVeform:STARt {<NRf>}
            :WAVeform:STARt?
            <NRf>=0 to 1001999
Example     :WAVEFORM:START 0
            :WAVEFORM:START? -> :WAVEFORM:
            START 0
```

:WAVeform:TRACe

Function Sets/queries the target waveform for the WAVeform group.

```
Syntax      :WAVeform:TRACe {<NRf>|MATH<x>}
            :WAVeform:TRACe?
            <x>=1 or 2 (or 1 for the DL1720)
            <NRf>=1 to 4 (or 1-2 for the
            DL1720)
Example     :WAVEFORM:TRACE 1
            :WAVEFORM:TRACE? -> :WAVEFORM:
            TRACE 1
```

:WAVeform:TRIGger?

Function Queries the trigger point for the record designated by "WAVeform:RECord".

```
Syntax      :WAVeform:TRIGger?
Example     :WAVEFORM:TRIGGER? -> :WAVEFORM:
            TRIGGER 2000
```

Description Returns the number of points between the record start and the trigger position.

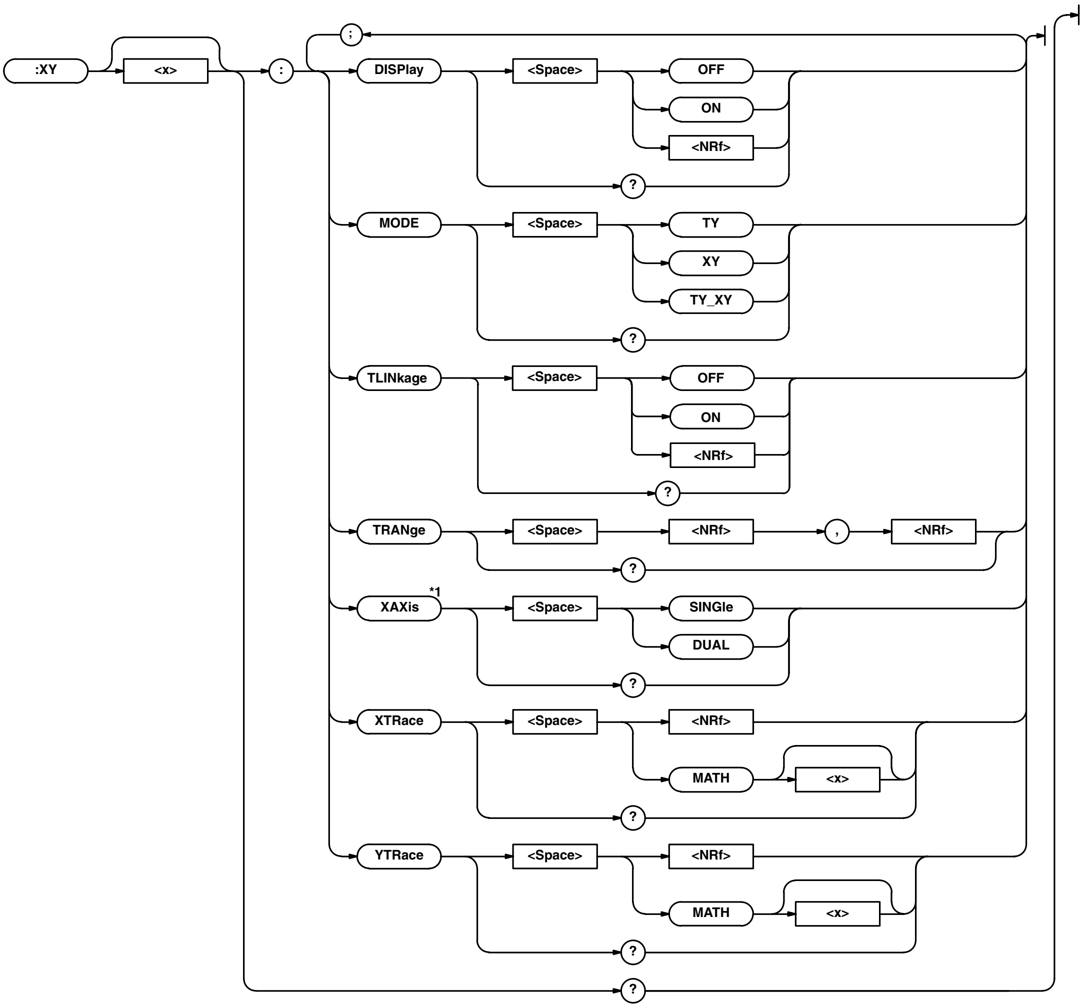
:WAVeform:TYPE?

Function Queries the acquisition mode for the waveform specified by the "WAVeform:TRACe" command.

```
Syntax      :WAVeform:TYPE?
Example     :WAVEFORM:TYPE? -> :WAVEFORM:
            TYPE NORMAL
```

6.32 XY Group

The commands in the XY group are used to make settings and queries about the XY display. You can make the same settings that can make using **SHIFT**+**DISPLAY** on the front panel.



*1 For use on the DL1740

:XY<x>?

Function Queries all settings related to the X-Y display.

```
Syntax    :XY<x>?
          <x>=1 or 2 (or 1 for the DL1720)
Example   :XY1? -> :XY1:MODE XY;XAXIS SINGLE;
          DISPLAY 1;TRANGE -5.00,5.00;
          XTRACE 1;TLINKAGE 0;YTRACE 2
```

:XY<x>:DISPlay

Function Sets whether or not to display the X-Y waveform or queries the current setting.

```
Syntax    :XY<x>:DISPlay {<Boolean>}
          :XY<x>:DISPlay?
          <x>=1 or 2 (or 1 for the DL1720)
Example   :XY1:DISPlay ON
          :XY1:DISPlay? -> :XY1:DISPlay 1
```

:XY<x>:MODE

Function Sets the display mode or queries the current setting.

```
Syntax    :XY<x>:MODE {T-Y|TY_XY|XY}
          :XY<x>:MODE?
          <x>=1 or 2 (or 1 for the DL1720)
Example   :XY1:MODE XY
          :XY1:MODE? -> :XY1:MODE XY
```

Description The setting or query is the same whether <x> is set to 1 or 2.

:XY<x>:TLINkage

Function Turns ON/OFF the linked movement of the determination range cursor.

```
Syntax    :XY<x>:TLINkage {<Boolean>}
          :XY<x>:TLINkage?
          <x>=1 or 2 (or 1 for the DL1720)
Example   :XY1:TLINKAGE ON
          :XY1:TLINKAGE -> :XY1:TLINKAGE 1
```

:XY<x>:TRANGe (Time Range)

Function Sets the range of the T-Y waveform to be used in the X-Y display or queries the current setting.

Syntax
```
:XY<x>:TRANGe {<NRf>,<NRf>}
:XY<x>:TRANGe?
<x>=1 or 2 (or 1 for the DL1720)
<NRf>=-5 to 5 div (10 div/displayed
record length steps)
```

Example
```
:XY1:TRANGE -4,4
:XY1:TRANGE? -> :XY1:
TRANGE -4.00,4.00
```

:XY<x>:XAXis

Function Sets whether or not use the same channel for the X-axis for XY1 and XY2 in the X-Y display. (DL1740 only)

Syntax
```
:XY<x>:XAXis {SINGle|DUAL}
:XY<x>:XAXis?
<x>=1 or 2
```

Example
```
:XY1:XAXIS SINGLE
:XY1:XAXIS? -> :XY1:XAXIS SINGLE
```

Description The setting or query is the same whether <x> is set to 1 or 2.

:XY<x>:XTRace

Function Sets the channel that is to be assigned to the X-axis in the X-Y display or queries the current setting.

Syntax
```
:XY<x>:XTRace {<NRf>|MATH<x>}
:XY<x>:XTRace?
The <x> in XY<x>=1 or 2 (or 1 for
the DL1720)
The <x> in MATH<x>=1 or 2 (or 1 for
the DL1720)
<NRf>=1 to 4 (or 1-2 for the
DL1720)
```

Example
```
:XY1:XTRACE 1
:XY1:XTRACE? -> :XY1:XTRACE 1
```

Description
- When "XY<x>:XAXis" is set to SINGle
  <NRf>=1 to 4
  The <x> in MATH<x>=1 or 2
- When "XY<x>:XAXis" is set to DUAL
  If XY<x>=XY1:
    <NRf>=1 or 2
    The <x> in MATH<x>=1
  If XY<x>=XY2:
    <NRf>=3 or 4
    The <x> in MATH<x>=2

:XY<x>:YTRace

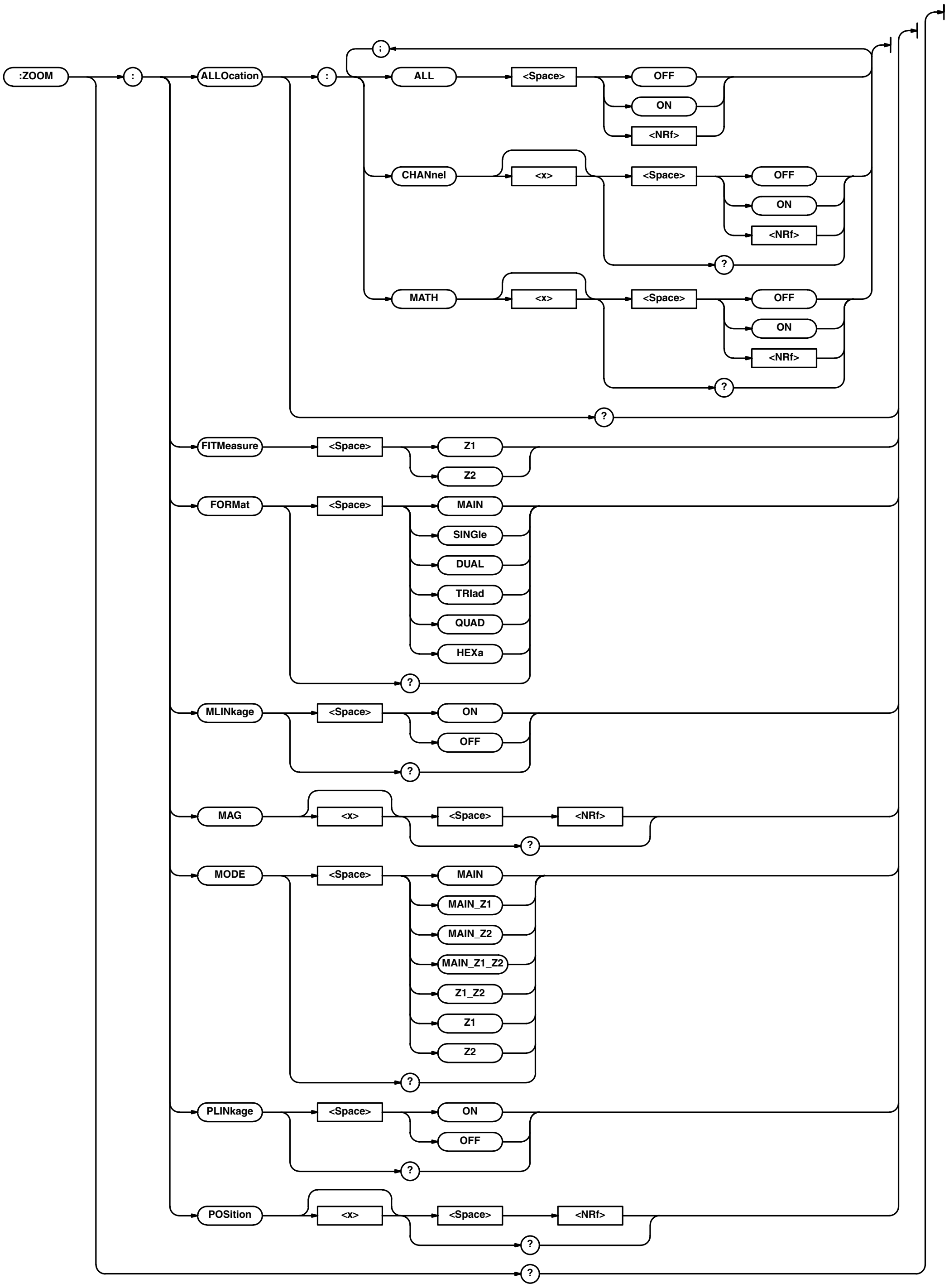
Function Sets the channel that is to be assigned to the Y-axis in the X-Y display or queries the current setting.

Syntax
```
:XY<x>:YTRace {<NRf>|MATH<x>}
:XY<x>:YTRace?
The <x> in XY<x>=1 or 2  (or 1 for
the DL1720)
When the <x> in XY<x> is 1:
  <NRf>=1 or 2
  The <x> in MATH<x>=1
When the <x> in XY<x> is 2: (DL1740
only)
  <NRf>=3, 4
  The <x> in MATH<x>=2
```

Example
```
:XY1:YTRACE 1
:XY1:YTRACE? -> :XY1:YTRACE 1
```

6.33 ZOOM Group

The commands in the ZOOM group are used to make settings and queries about the zoom function. These settings can also be made using **ZOOM** on the front panel.



:ZOOM?

Function Queries all waveform zoom settings.

Syntax
```
:ZOOM?
```

Example
```
:ZOOM? -> :ZOOM:MODE MAIN;
FORMAT MAIN;ALLOCATION:CHANNEL1 1;
CHANNEL2 0;CHANNEL3 0;CHANNEL4 0;
MATH1 0;MATH2 0;:ZOOM:MLINKAGE ON;
MAG1 2.0E+00;MAG2 2.0E+00;
PLINKAGE OFF;POSITION1 0.0000000;
POSITION2 0.0000000
```

:ZOOM:ALLOcation?

Function Queries settings for the zoomed waveform.

Syntax
```
:ZOOM:ALLOcation?
```

Example
```
:ZOOM:ALLOCATION? -> :ZOOM:
ALLOCATION:CHANNEL1 1;CHANNEL2 0;
CHANNEL3 0;CHANNEL4 0;MATH1 0;
MATH2 0
```

:ZOOM:ALLOcation:ALL

Function Selects all waveforms to be zoomed.

Syntax
```
:ZOOM:ALLOcation:ALL {<Boolean>}
```

Example
```
:ZOOM:ALLOCATION:ALL ON
```

:ZOOM:ALLOcation:{CHANnel<x>|MATH<x>}

Function Selects/queries the zoomed waveform.

Syntax
```
:ZOOM:ALLOcation:{CHANnel<x>|
MATH<x>} {<Boolean>}
:ZOOM:ALLOcation:{CHANnel<x>|
MATH<x>}?
<x>(CHANnel)=1 to 4 (or 1-2 for the
DL1720)
<x>(MATH)=1 or 2 (or 1 for the
DL1720)
```

Example
```
:ZOOM:ALLOCATION:CHANNEL1 ON
:ZOOM:ALLOCATION:CHANNEL1? ->
:ZOOM:ALLOCATION:CHANNEL1 1
```

:ZOOM:FITMeasure

Function Changes the range of the automated measurement of waveform parameters to the ends of the zoom box.

Syntax
```
:ZOOM:FITMeasure {Z1|Z2}
:ZOOM:FITMeasure?
```

Example
```
:ZOOM:FITMEAURE Z1
:ZOOM:FITMEAURE? -> :ZOOM:
FITMEAURE Z1
```

:ZOOM:FORMat

Function Sets/queries the zoom display format.

Syntax
```
:ZOOM:FORMat {MAIN|SINGle|DUAL|
TRIad|QUAD|HEXa}
:ZOOM:FORMat?
```

Example
```
:ZOOM:FORMAT SINGLE
:ZOOM:FORMAT? -> :ZOOM:
FORMAT SINGLE
```

:ZOOM:MLINkage (Mag Linkage)

Function Enables/disables/queries zoom ratio linkage.

Syntax
```
:ZOOM:MLINKage {<Boolean>}
:ZOOM:MLINKage?
```

Example
```
:ZOOM:MLINKAGE ON
:ZOOM:MLINKAGE? -> :ZOOM:MLINKAGE 1
```

:ZOOM:MAG<x>

Function Sets/queries the zoom ratio.

Syntax
```
:ZOOM:MAG<x> {<NRf>}
:ZOOM:MAG<x>?
<x>=1, 2
<NRf>=magnification up to 40
points.  See the IM701710-01E
User's Manual.
```

Example
```
:ZOOM:MAG1 2.5
:ZOOM:MAG1? -> :ZOOM:MAG1 2.5
```

:ZOOM:MODE

Function Sets/queries the zoom display mode.

Syntax
```
:ZOOM:MODE {MAIN|MAIN_Z1|MAIN_Z2|
MAIN_Z1_Z2|Z1_Z2|Z1|Z2}
:ZOOM:MODE?
```

Example
```
:ZOOM:MODE MAIN_Z1_Z2
:ZOOM:MODE? -> :ZOOM:
MODE MAIN_Z1_Z2
```

:ZOOM:PLINkage (Position Linkage)

Function Turns the link ON/OFF when moving the zoom box or queries the current setting.

Syntax
```
:ZOOM:PLINkage {<Boolean>}
:ZOOM:PLINkage?
```

Example
```
:ZOOM:PLINKAGE ON
:ZOOM:PLINKAGE? -> :ZOOM:PLINKAGE 1
```

:ZOOM:POSition<x>

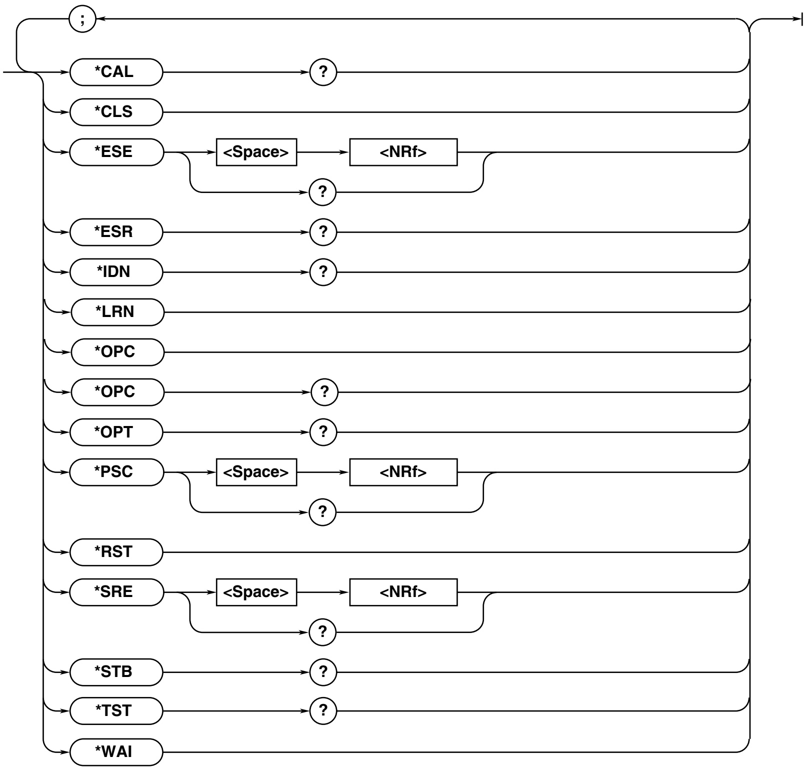
Function Sets/queries the zoom box position.

Syntax
```
:ZOOM:POSition<x> {<NRf>}
:ZOOM:POSition<x>?
<x>=1, 2
<NRf>=-5 to 5 div(in steps of 10
div/display-record-length)
```

Example
```
:ZOOM:POSITION1 2
:ZOOM:POSITION1? -> :ZOOM:
POSITION1 2.00E+00
```

6.34 Common Command Group

The commands in the common command group are independent of the instrument’s functions, and are specified in IEEE 488.2-1987. There is no front panel key that corresponds to this group.



*CAL? (CALibrate)

Function Performs calibration and queries about the result.

Syntax `*CAL?`

Example `*CAL? -> 0`

Description "0" will be returned if calibration is completed properly, and "1" will be returned if an abnormality has been detected during calibration.

*CLS (CLear Status)

Function Clears the standard event register, extended event register and error queue.

Syntax `*CLS`

Example `*CLS`

Description
- The output queue will also be cleared if a `*CLS` command is appended after the program message terminator.
- For details of the registers and queue, refer to Chapter 7.

*ESE (standard Event Status Enable register)

Function Sets the value for the standard event enable register/queries about the current setting.

Syntax `*ESE {<NRf>}`
`*ESE?`
`<NRf>=0 to 255`

Example `*ESE 251`
`*ESE? -> 251`

Description
- <NRf> is the sum of the bits expressed as a decimal number.
- For example, if "*ESE 251" is set, the standard event enable register will be set to "11111011." This means that bit 2 of the standard event register is disabled so that bit 5 (ESB) of the status byte register will not be set to "1," even if an query error occurs.
- Default is "*ESE 0," i.e. all bits are disabled.
- The standard event enable register will not be cleared, even if an query is made using "*ESE?."
- For details of the standard event enable register, refer to page 7-3.

*ESR? (standard Event Status Register)

Function Queries about the value of the standard event register and clears it at the same time.

Syntax `*ESR?`

Example `*ESR? -> 32`

Description
- The sum of the bits is returned as a decimal value.
- It is possible to ascertain the type of event which has occurred, while SRQ is occurring.
- For example, if "32" is returned, this means that the standard event register is "00100000," i.e. the SRQ has occurred due to a command syntax error.
- If an query is made using "*ESR?," the standard event register will be cleared.
- For details of the standard event register, refer to page 7-3.

*IDN? (IDeNtify)

Function Queries about the instrument model.

Syntax `*IDN?`

Example `*IDN? -> YOKOGAWA,701710,0,F1.01`

Description A reply consists of the following sequence: <Manufacturer>, <Model>, <Serial No.> and <Firmware version>. "0" is always returned as the <Serial No.>.
701710 is returned if the model is the DL1740, and 701705 if it is the DL1720.

*LRN? (LeaRN)

Function Queries about all the current settings for the following command groups.
ACQuire, CHANnel<x>, TIMebase, TRIGger

Syntax `*LRN?`

Example

```
*LRN? -> :ACQUIRE:RLENGTH 10000;
MODE NORMAL;AVERAGE:COUNT INFINITY;
EWEIGHT 16;:ACQUIRE:COUNT INFINITY;
INTERLEAVE 0;REPETITIVE 0;
CLOCK INTERNAL;:CHANNEL1:DISPLAY 1;
VDIV 50.000E+00;POSITION 0.00;
COUPLING DC;PROBE 10;
OFFSET 0.0E+00;BWIDTH FULL;
VARIABLE 50.000E+00;LSCALE:MODE 0;
AVALUE 1.00000E+00;
BVALUE 0.00000E+00;UNIT "";:
CHANNEL1:LABEL "CH1";:CHANNEL2:
DISPLAY 1;VDIV 50.000E+00;
POSITION 0.00;COUPLING DC;PROBE 10;
OFFSET 0.0E+00;BWIDTH FULL;
VARIABLE 50.000E+00;LSCALE:MODE 0;
AVALUE 1.00000E+00;
BVALUE 0.00000E+00;UNIT "";:
CHANNEL2:LABEL "CH2";:CHANNEL3:
DISPLAY 1;VDIV 50.000E+00;
POSITION 0.00;COUPLING DC;PROBE 10;
OFFSET 0.0E+00;BWIDTH FULL;
VARIABLE50.000E+00;LSCALE:MODE 0;
AVALUE 1.00000E+00;
BVALUE 0.00000E+00;UNIT "";:
CHANNEL3:LABEL "CH3";:CHANNEL4:
DISPLAY 1;VDIV 50.000E+00;
POSITION 0.00;COUPLING DC;PROBE 10;
OFFSET 0.0E+00;BWIDTH FULL;
VARIABLE 50.000E+00;LSCALE:MODE 0;
AVALUE 1.00000E+00;
BVALUE 0.00000E+00;UNIT "";:
CHANNEL4:LABEL "CH4";:TIMEBASE:
SOURCE INTERNAL;TDIV 1.0E-03;:
TRIGGER:ACTION:BUZZER 0;SAVE 0;
HCOPY 0;ACQCOUNT INFINITE;:TRIGGER:
SIMPLE:SOURCE 1;LEVEL 0.0E+00;
SLOPE RISE;COUPLING DC;
HFREJECTION OFF;HYSTERESIS LOW;
PROBE 1;:TRIGGER:SOURCE:CHANNEL1:
LEVEL 0.0E+00;COUPLING DC;
HFREJECTION OFF;HYSTERESIS LOW;
WIDTH 50.000E+00;:TRIGGER:
SOURCE:CHANNEL2:LEVEL 0.0E+00;
COUPLING DC;HFREJECTION OFF;
HYSTERESIS LOW;WIDTH 50.000E+00;:
TRIGGER:SOURCE:CHANNEL3:
LEVEL 0.0E+00;COUPLING DC;
HFREJECTION OFF;HYSTERESIS LOW;
WIDTH 50.000E+00;:TRIGGER:SOURCE:
CHANNEL4:LEVEL 0.0E+00;COUPLING DC;
HFREJECTION OFF;HYSTERESIS LOW;
WIDTH 50.000E+00;:TRIGGER:ABN:
COUNT 1;:TRIGGER:HOLDOFF:
TIME 80.000E-09;:TRIGGER:ADB:
DELAY 1.000E-09;:TRIGGER:
DELAY 0.0E+00;PATTERN:CLOCK:
SOURCE 1;SLOPE RISE;:TRIGGER:
PATTERN:CHANNEL1 HIGH;
CHANNEL2 DONTCARE;
CHANNEL3 DONTCARE;
CHANNEL4 DONTCARE;CONDITION TRUE;:
TRIGGER:POSITION 50.000;MODE AUTO;
WIDTH:TYPE IN;CHANNEL1 HIGH;
CHANNEL2 HIGH;CHANNEL3 HIGH;
CHANNEL4 HIGH;CONDITION TRUE;
TIME1 1.000E-09;TIME2 1.000E-09;
WINDOW 0;:TRIGGER:OR:WINDOW 0;
CHANNEL1 RISE;CHANNEL2 OFF;
CHANNEL3 OFF;CHANNEL4 OFF;:TRIGGER:
SCOUNT 2;TV:TYPE NTSC;
POLARITY NEGATIVE;LEVEL 5000000.0;
FIELD 1;LINE 5;FRAME 1;:TRIGGER:
TYPE SIMPLE;ATRIGGER:CHANNEL1 HIGH;
CHANNEL2 DONTCARE;
CHANNEL3 DONTCARE;
CHANNEL4 DONTCARE;CONDITION ENTER;:
TRIGGER:BTRIGGER:CHANNEL1 DONTCARE;
CHANNEL2 HIGH;CHANNEL3 DONTCARE;
CHANNEL4 DONTCARE;CONDITION
```

*OPC (OPeration Complete)

Function Sets bit 0 (OPC bit) of the standard event register to "1" when execution of an overlap command is completed.

Syntax `*OPC`

Example `*OPC`

Description
- For a description of the synchronization method using "*OPC," refer to page 5-8.
- Designation of an overlap command is performed using "COMMunicate:OPSE."
- Operation is not guaranteed if "*OPC" is not appended to the end of the message.

*OPC? (OPeration Complete)

Function After "*OPC?" is sent, "1" (ASCII) will be returned if execution of the designated overlap command has been completed.

Syntax `*OPC?`

Example `*OPC? -> 1`

Description
- For a description of the synchronization method using "*OPC?," refer to page 5-8.
- Designation of an overlap command is performed using "COMMunicate:OPSE."
- Operation is not guaranteed if "*OPC" is not appended to the end of the message.

*OPT? (OPTion)

Function Queries the installed options.

Syntax `*OPT?`

Example `*OPT? -> CH1MW,PRINTER,LOGIC`

Description
- Returns the existence of the <memory model>, <printer>, <serial interface>, <SCSI>, <floppy disk or Zip disk>, and <ethernet>.
- The "*OPT?" command must be the last query in a program message. Otherwise, an error results.

*PSC (Power-on Status Clear)

Function Selects/queries whether following registers are cleared when power is turned ON. However, they cannot be cleared if the parameter is "0" when rounded.
- Standard event enable register
- Extended event enable register
- Transit filter

Syntax
```
*PSC {<NRf>}
*PSC?
<NRf>=0(does not clear the
registers), a value other than 0
(clears the registers)
```

Example
```
*PSC 1
*PSC? -> 1
```

Description For details of each register, refer to Chapter 7.

*RST (ReSeT)

Function Resets the current settings of the following groups at once.
ACCumulate, ACQuire, CHANnel<x>, TIMebase, TRIGger

Syntax `*RST`

Example `*RST`

Description Previously sent *OPC and *OPC? commands are also cleared.

*SRE (Service Request Enable register)

Function Sets the value of the service request enable register/inquires about the current setting.

Syntax
```
*SRE <NRf>
*SRE?
<NRf>=0 to 255
```

Example
```
*SRE 239
*SRE? -> 239
```

Description
- <NRf> is the sum of the bits expressed as a decimal number. For example, if "*ESE 239" is set, the service request enable register will be set to "11101111." This means that bit 4 of the service request enable register is disabled, so that bit 5 (ESB) of the status byte register will not be set to "1," even if the output queue is not empty. However, bit 6 (MSS) of the status byte register is the MSS bit, so it will be ignored.
- Default is "*SRE 0," i.e. all bits are disabled.
- The service request enable register will not be cleared, even if a query is made using "*SRE?."
- For details of the service request enable register, refer to page 7-1.

*STB? (STatus Byte)

Function Queries about the value of the status byte register.

Syntax `*STB?`

Example `*STB? -> 4`

Description
- The sum of the bits expressed as a decimal value is returned.
- Bit 6 is MSS not RQS, since the register is read without serial polling. For example, if "4" is returned, the status byte register is set to "00000100," i.e. the error queue is not empty (an error has occurred).
- The status byte register will be cleared, even if a query is made using "*STB?."
- For details of the status byte register, refer to page 7-2.

*TST?

Function Executes self test and queries the result. The self test involves internal memory tests.

Syntax `*TST?`

Example `*TST? -> 0`

Description `"0"` is returned if the self test is successful, `"1"` if it is not.

*WAI (WAIt)

Function Waits for the command following "*WAI" until execution of the designated overlap command is completed.

Syntax *WAI

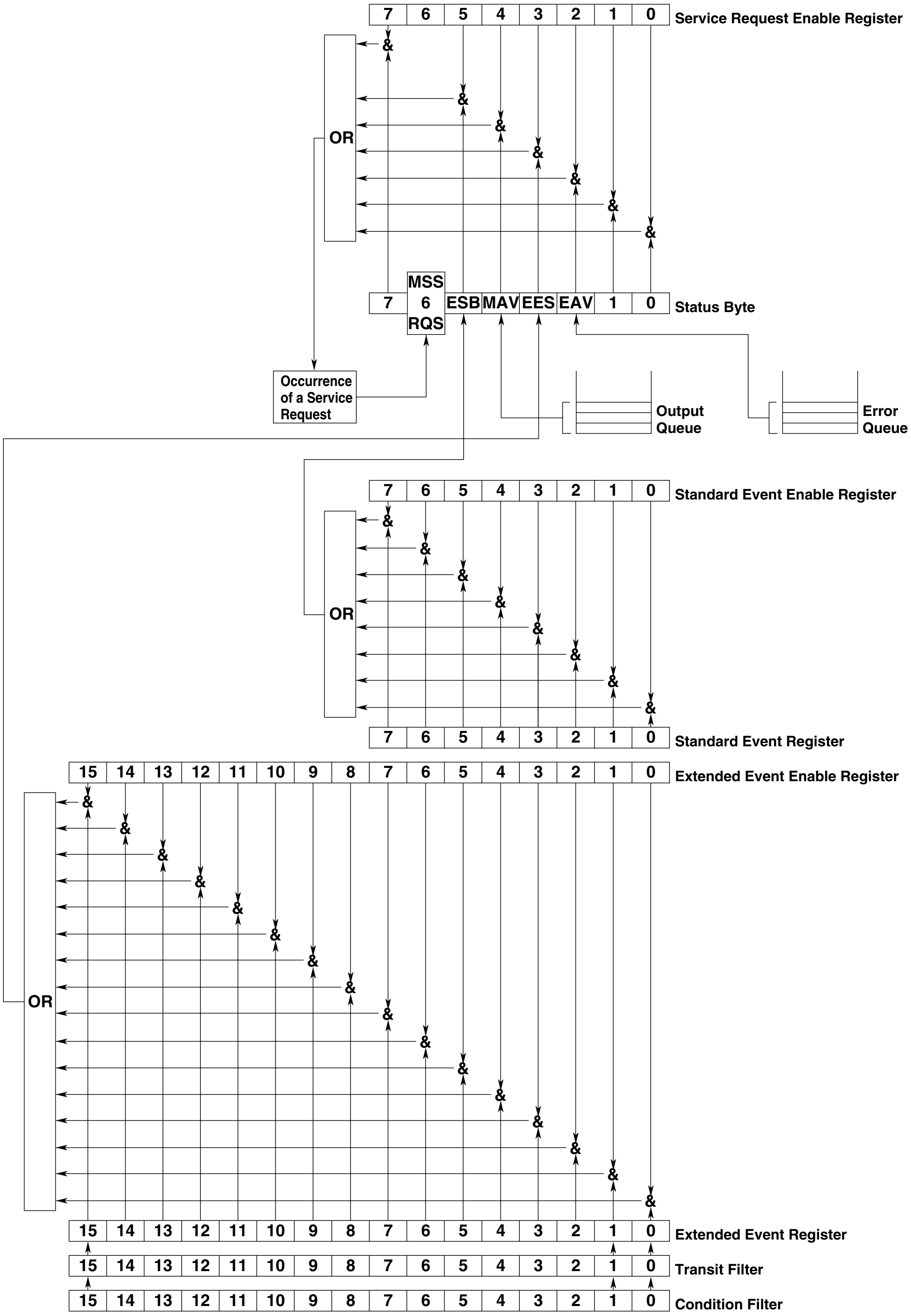
Example *WAI

Description
- For a description of the synchronization method using `"*WAI,"` refer to page 5-8.
- Designation of overlap commands can be performed using `"COMMunicate:OPSE."`

Chapter 7 Status Report

7.1 Overview of the Status Report

The figure below shows the status report which is read by a serial poll. This is an extended version of the one specified in IEEE 488.2-1992.



Overview of Registers and Queues

Name	Function	Writing	Reading
Status byte		—	Serial poll (RQS), `*STB?`(MSS)
Service request enable register	Masks status byte.	`*SRE`	`*SRE?`
Standard event register	Change in device status	—	`*ESR?`
Standard event enable register	Masks standard event register	`*ESE`	`*ESE?`
Extended event register	Change in device status	—	`STATus:EESR?`
Extended event enable register	Masks standard event register	`STATus:EESE`	`STATus:EESE?`
Condition register	Current instrument status	—	`STATus:CONDition?`
Transit filter	Extended event occurrence conditions	`STATus:FILTer<x>`	`STATus:FILTer<x>?`
Output queue	Stores response message to a query.	All executable queues	
Error queue	Stores error Nos. and messages.	—	`STATus:ERRor?`

Registers and Queues which Affect the Status Byte

Registers which affect each bit of the status byte are shown below.

Standard event register	: Sets bit 5 (ESB) of status byte to "1" or "0."
Output queue	: Sets bit 4 (MAV) of status byte to "1" or "0."
Extended event register	: Sets bit 3 (EES) of status byte to "1" or "0."
Error queue	: Sets bit 2 (EAV) of status byte to "1" or "0."

Enable Registers

Registers which mask a bit so that the bit does not affect the status byte, even if the bit is set to "1," are shown below.

Status byte	: Masks bits using the service request enable register.
Standard event register	: Masks bits using the standard event enable register.
Extended event register	: Masks bits using the extended event enable register.

Writing/Reading from Registers

The `*ESE` command is used to set bits in the standard event enable register to "1" or "0," and the `*ESE` query is used to check whether bits in that register are set to "1" or "0." For details of these commands, refer to Chapter 5.

7.2 Status Byte

Overview of Status Byte

7	RQS 6 MSS	ESB	MAV	EES	EAV	1	0

Bits 0, 1 and 7

Not used (always "0")

Bit 2 EAV (Error Available)

Set to "1" when the error queue is not empty, i.e. when an error occurs. For details, refer to page 7-5.

Bit 3 EES (Extended Event Summary Bit)

Sets to "1" when the logical "AND" of an Extended Event Register bit and the corresponding Enable Register bit is equal to "1."—that is, when an event takes place in the instrument. Refer to page 7-4.

Bit 4 MAV (Message Available)

Set to "1" when the output queue is not empty, i.e. when there is data which is to be output when an query is made. Refer to page 7-5.

Bit 5 ESB (Event Summary Bit)

Set to "1" when the logical AND of the standard event register and the corresponding enable register is "1," i.e. when an event takes place in the instrument. Refer to page 7-3.

Bit 6 RQS (Request Status)/MSS (Master Summary Status)

Sets to "1" when the logical "AND" of any one of the Status Byte bits (other than bit 6) and the corresponding Service Request Enable Register bit becomes "1"—that is, when the instrument is requesting service from the controller.

RQS is set to "1" when MSS changes from "0" to "1," and is cleared when a serial poll is performed or when MSS changes to "0."

Bit Masking

To mask a bit in the status byte so that it does not cause an SRQ, set the corresponding bit of the service request enable register to "0."

For example, to mask bit 2 (EAV) so that no service will be requested, even if an error occurs, set bit 2 of the service request enable register to "0." This can be done using the `*SRE` command. To query whether each bit of the service request enable register is "1" or "0," use `*SRE?`. For details of the `*SRE` command, refer to Chapter 6.

Operation of the Status Byte

A service request is issued when bit 6 of the status byte becomes "1." Bit 6 becomes "1" when any of the other bits becomes "1" (or when the corresponding bit in the service request enable register becomes "1").

For example, if an event takes place and the logical OR of each bit of the standard event register and the corresponding bit in the enable register is "1," bit 5 (ESB) will be set to "1." In this case, if bit 5 of the service request enable register is "1," bit 6 (MSS) will be set to "1," thus requesting service from the controller.

It is also possible to check what type of event has occurred by reading the contents of the status byte.

Reading from the Status Byte

The following two methods are provided for reading the status byte.

- **Inquiry Using the *STB? Query**
  Making an query using the *STB? query sets bit 6 to MSS. This causes the MSS to be read. After completion of the read-out, none of the bits in the status byte will be cleared.
- **Serial Poll**
  Execution of a serial poll changes bit 6 to RQS. This causes RQS to be read. After completion of the read-out, only RQS is cleared. Using a serial poll, it is not possible to read MSS.

Clearing the Status Byte

No method is provided for forcibly clearing all the bits in the status byte. Bits which are cleared are shown below.

- **When an Query is Made Using the *STB? Query**
  No bit is cleared.
- **When a Serial Poll is Performed**
  Only the RQS bit is cleared.
- **When the *CLS Command is Received**
  When the *CLS command is received, the status byte itself is not cleared, but the contents of the standard event register (which affects the bits in the status byte) are cleared. As a result, the corresponding bits in the status byte are cleared, except bit 4 (MAV), since the output queue cannot be emptied by the *CLS command. However, the output queue will also be cleared if the *CLS command is received just after a program message terminator.

7.3 Standard Event Register

Overview of the Standard Event Register

7	6	5	4	3	2	1	0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Bit 7 PON (Power ON)

Bit 7 PON (Power ON) Set to "1" when power is turned ON

Bit 6 URQ (User Request)

Not used (always "0")

Bit 5 CME (Command Error)

Set to "1" when the command syntax is incorrect.

Examples: Incorrectly spelled command name; "9" used in octal data.

Bit 4 EXE (Execution Error)

Set to "1" when the command syntax is correct but the command cannot be executed in the current state.

Examples: Parameters are outside the setting range: an attempt is made to make a hard copy during acquisition.

Bit 3 DDE (Device Dependent Error)

Set to "1" when execution of the command is not possible due to an internal problem in the instrument that is not a command error or an execution error.

Example: The circuit breaker is reset.

Bit 2 QYE (Query Error)

Set to "1" if the output queue is empty or if the data is missing even after a query has been sent.

Examples: No response data; data is lost due to an overflow in the output queue.

Bit 1 RQC (Request Control)

Not used (always "0")

Bit 0 OPC (Operation Complete)

Set to "1" when the operation designated by the *OPC command has been completed. Refer to Chapter 6.

Bit Masking

To mask a bit in the standard event register so that it does not cause bit 5 (ESB) of the status byte to change, set the corresponding bit in the standard event enable register to "0."

For example, to mask bit 2 (QYE) so that ESB will not be set to "1," even if a query error occurs, set bit 2 of the standard event enable register to "0." This can be done using the *ESE command. To inquire whether each bit of the standard event enable register is "1" or "0," use the *ESE?. For details of the *ESE command, refer to Chapter 6.

Operation of the Standard Event Register

The standard event register is provided for eight different kinds of event which can occur inside the instrument. Bit 5 (ESB) of the status byte is set to "1" when any of the bits in this register becomes "1" (or when the corresponding bit of the standard event enable register becomes "1").

Examples

1. A query error occurs.
2. Bit 2 (QYE) is set to "1."
3. Bit 5 (ESB) of the status byte is set to "1" if bit 2 of the standard event enable register is "1."

It is also possible to check what type of event has occurred inside the instrument by reading the contents of the standard event register.

Reading from the Standard Event Register

The contents of the standard event register can be read by the `*ESR` command. After completion of the read-out, the register will be cleared.

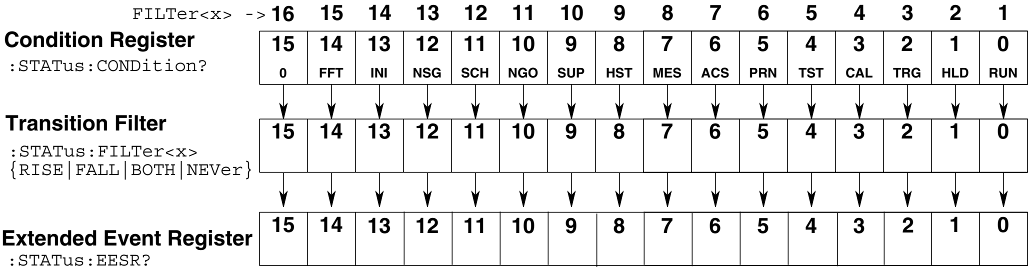
Clearing the Standard Event Register

The standard event register is cleared in the following three cases.

- When the contents of the standard event register are read using `*ESR?`
- When the `*CLS` command is received
- When power is turned ON again

7.4 Extended Event Register

Reading the extended event register tells you whether changes in the condition register (reflecting internal conditions) have occurred. A filter can be applied which allows you to decide which events are reported to the extended event register.



The meaning of each bit of the condition register is as follows.

Bit 0 RUN (Running)	Set to "1" during acquisition.
Bit 1 HLD (Hold)	Set to "1" for waveforms loaded from a storage medium.
Bit 2 TRG (Awaiting Trigger)	Set to "1" when waiting for a trigger.
Bit 3 CAL (Calibrating)	Set to "1" during calibration.
Bit 4 TST (Testing)	Set to "1" during self-test.
Bit 5 PRN (Printing)	Set to "1" while the built-in printer is in operation.
Bit 6 ACS (Accessing)	Sets to "1" while floppy disk drive/Zip drive, or external SCSI device is being accessed.
Bit 7 MES (Measuring)	Set to "1" when automated measurement of waveform parameters or cursor measurement is in progress.
Bit 8 HST (History Search)	Set to "1" while executing history search.
Bit 9 SUP (Set-up)	Set to "1" during auto set-up.
Bit 10 NGO (Go/No-Go)	Set to "1" while performing GO/NO-GO determination.
Bit 11 SCH (Search)	Set to "1" while executing edge/pattern search.
Bit 12 NSG (N-Single)	Set to "1" during continuous acquisition when the trigger mode is set to single (N).
Bit 13 INI (Initializing)	Sets to "1" during initialization.
Bit 14 FFT	Set to "1" while performing the FFT.

The filter is applied to each bit of the condition register seperately, and can be selected from the following. Note that the numbering of the bits used in the filter setting differs from the actual bit number (1 to 16 vs. 0 to 15).

Rise	The bit of the extended event register becomes "1" when the bit of the condition register changes from "0" to "1."
Fall	The bit of the extended event register becomes "1" when the bit of the condition register changes from "1" to "0."
Both	The bit of the extended event register becomes "1" when the bit of the condition register changes from "0" to "1," or from "1" to "0."
Never	The bit of the extended event register is disabled and always "0."

7.5 Output Queue and Error Queue

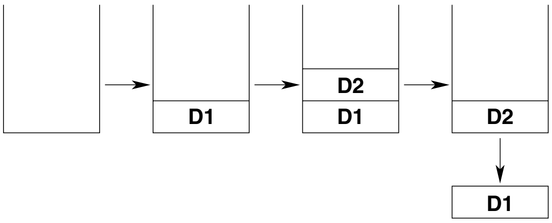
Overview of the Output Queue

The output queue is provided to store response messages to queries. For example, when the WAVeform:SEND? query is sent to request output of the acquired waveform, the response data will be stored in the output queue until it is read out.

The example below shows that data is stored record by record in the output queue, and is read out oldest item first, newest item last. The output queue is emptied in the following cases (in addition to when read-out is performed).

- When a new message is received from the controller
- When dead lock occurs (page 5-2)
- When a device clear command (DCL or SDC) is received
- When power is turned ON again

The output queue cannot be emptied using the *CLS command. To see whether the output queue is empty or not, check bit 4 (MAV) of the status byte.



Overview of the Error Queue

The error queue stores the error No. and message when an error occurs. For example, if the controller sends an incorrect program message, the number, “113, “Undefined header”,” and the error message are stored in the error queue, when the error is displayed.

The contents of the error queue can be read using the STATus:ERRor? query. As with the output queue, messages are read oldest first, newest last (refer to the previous page).

If the error queue becomes full, the final message will be replaced by message “350, “Queue overflow”.”

The error queue is emptied in the following cases (in addition to when read-out is performed).

- When the *CLS command is received
- When power is turned ON again

To see whether the error queue is empty or not, check bit 2 (EAV) of the status byte.

Chapter 8 Sample Program

8.1 Before Programming

Environment

Model	: MS-DOS/V Computer
Language	: Visual BASIC Ver5.0 Professional Edition or more
GP-IB board	: AT-GPIB/TNT IEEE-488.2 board from National Instruments.

Setting up the Visual Basic

Compornent	: MSComm
Standardmodule	: Niglobal.bas Vbib-32.bas

Setting up the DL1720/DL1740

GP-IB

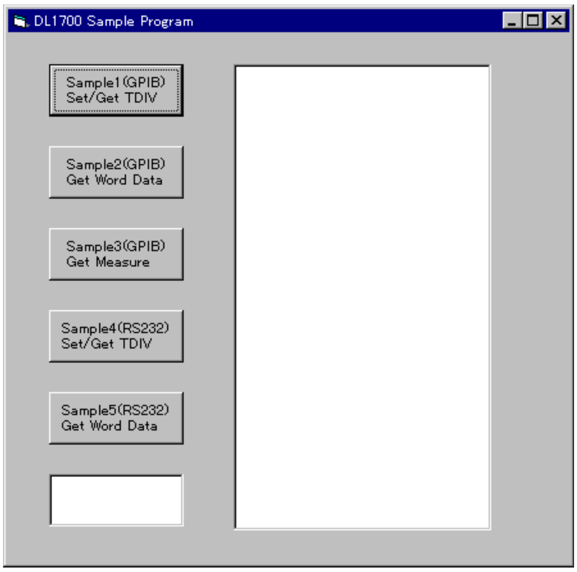
All the sample programs given in this chapter use address 1 for the DL1720/DL1740, so be sure to assign the instrument to address 1 as described on page 1-6.

Serial (RS-232)

All the sample programs in this chapter assume the below settings, so be sure to set parameters as described on page 2-8.

Baud Rate	: 19200
Handshake	: CTS-RTS
Parity Check	: NO
Stop Bit	: 1
Character Length	: 8
Terminator	: LF

8.2 Image of Sample Program


DL1700 Sample Program
Sample1(GPIB) Set/Get TDIV
Sample2(GPIB) Get Word Data
Sample3(GPIB) Get Measure
Sample4(RS232) Set/Get TDIV
Sample5(RS232) Get Word Data

8.3 Initialize/Error/Execute

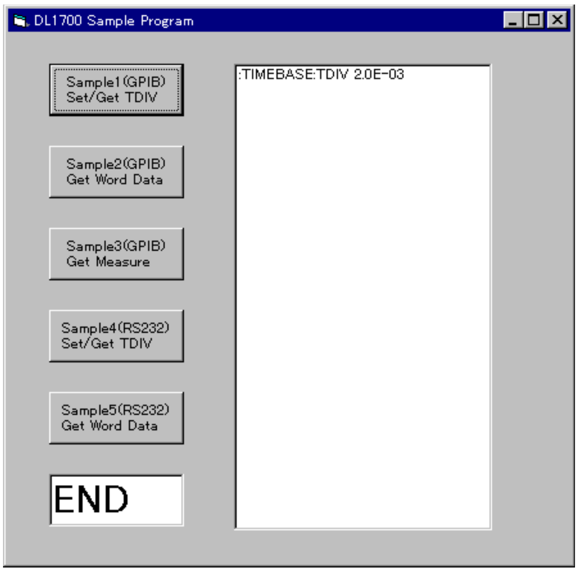
```
----------------------------------------------------------------------------------------
Option Explicit
Dim StartFlag As Integer                           'Start Flag
Dim TimerCount As Integer                          'Timeout(RS232)
Dim Addr As Integer                                'GPIB Address
Dim Timeout As Integer                             'Timeout
Dim Dev As Integer                                 'Device ID(GPIB)
Dm CtsFlag As Integer                             'CTS Flag
Dim Term As String                                 'Terminator
Dim Query(3) As String                             'Query String
Dim WaveBuffer(20070) As Integer                   'WaveData Buffer(GPIB)
Dim Dummy As Integer
----------------------------------------------------------------------------------------
Private Function InitGpib() As Integer
    Dim eos As Integer                             'EOS
    Dim eot As Integer                             'EOI
    Dim brd As Integer                             'GPIB Board ID
    Dim sts As Integer

    eos = &HC0A                                    'Terminator = LF
    eot = 1                                        'EOI = Enable
    Term = Chr(10)
    Timeout = T10s                                 'Timeout = 10s

    brd = ilfind("GPIB0")
    If (brd < 0) Then
        Call DisplayGPIBError(brd, "ilfind")
        InitGpib = 1
        Exit Function
    End If
    Dev = ildev(0, Addr, 0, Timeout, eot, eos)
    If (Dev < 0) Then
        Call DisplayGPIBError(Dev, "ildev")
        InitGpib = 1
        Exit Function
    End If
    sts = ilsic(brd)                               'Set IFC
    If (sts < 0) Then
        Call DisplayGPIBError(sts, "ilsic")
        InitGpib = 1
        Exit Function
    End If
    InitGpib = 0
End Function
----------------------------------------------------------------------------------------
Private Function InitSerial() As Integer
    Dim rat As String

    MSComm1.CommPort = 1                           'Port = COM1

    rat = "19200,N,8,1"                            'Rate = 19200, NoParity, 8Bit,
1Stopbit

    MSComm1.Settings = rat

    MSComm1.Handshaking = comRTS                   'Handshake = CTS-RTS
    MSComm1.RTSEnable = True                       'RTS = TRUE
    CtsFlag = 1
    Term = Chr(10)                                 'Terminator = LF
    Timeout = 10                                   'Timeout = 10s
    InitSerial = 0
End Function
----------------------------------------------------------------------------------------
Private Sub DisplayGPIBError(ByVal sts As Integer, ByVal msg As String)
    Dim wrn As String
    Dim ers As String
    Dim ern As Integer

    If (sts And TIMO) Then
        wrn = "Time out" + Chr(13)
    Else
        wrn = ""
    End If
    If (sts And EERR) Then
        ern = iberr
        If (ern = EDVR) Then
            ers = "EDVR:System error"
        ElseIf (ern = ECIC) Then
            ers = "ECIC:Function requires GPIB board to be CIC"
        ElseIf (ern = ENOL) Then
            ers = "ENOL:No Listeners on the GPIB"
        ElseIf (ern = EADR) Then
            ers = "EADR:GPIB board not addressed correctly"
        ElseIf (ern = EARG) Then
            ers = "EARG:Invalid argument to function call"
        ElseIf (ern = ESAC) Then
            ers = "ESAC:GPIB board not System Controller as required"
        ElseIf (ern = EABO) Then
            ers = "EABO:I/O operation aborted(timeout)"
        ElseIf (ern = ENEB) Then
            ers = "ENEB:Nonexistent GPIB board"
        ElseIf (ern = EDMA) Then
            ers = "EDMA:DMA error"
        ElseIf (ern = EOIP) Then
            ers = "EOIP:I/O operation started before previous operation completed"
        ElseIf (ern = ECAP) Then
            ers = "ECAP:No capability for intended operation"
        ElseIf (ern = EFSO) Then
            ers = "EFSO:File system operation error"
        ElseIf (ern = EBUS) Then
            ers = "EBUS:GPIB bus error"
        ElseIf (ern = ESTB) Then
            ers = "ESTB:Serial poll status byte queue overflow"
        ElseIf (ern = ESRQ) Then
            ers = "ESRQ:SRQ remains asserted"
        ElseIf (ern = ETAB) Then
            ers = "ETAB:The return buffer is full"
        ElseIf (ern = ELCK) Then
            ers = "ELCK:Address or board is locked"
        Else
            ers = ""
        End If
    Else
        ers = ""
    End If

    MsgBox ("Status No. " + Str(sts) + Chr(13) + wrn + "Error No. " + Str(ern) + Chr(13)
+ ers + Chr(13) + msg), vbExclamation, "Error!"
    Call ibonl(Dev, 0)
    Dev = -1
End Sub
-----------------------------------------------------------------------------------------
Private Sub DIsplayRS232Error(ByVal erm As String, Optional ByVal msg As String = "")
    MsgBox (erm + Chr(13) + msg), vbExclamation, "Error!"
End Sub
-----------------------------------------------------------------------------------------
Private Sub Command1_Click()
    Dim sts As Integer

    If (StartFlag = 1) Then
        Exit Sub
    End If
    StartFlag = 1
    Text1.Text = "START"
    List1.Clear
    Dummy = DoEvents()
    sts = GpibTdiv                                      'Run Sample1(GPIB) Set/Get TDIV
    If (sts = 0) Then
        List1.AddItem Query(0)
    End If
    Text1.Text = "END"
    StartFlag = 0
End Sub
-----------------------------------------------------------------------------------------
Private Sub Command2_Click()
    Dim sts As Integer

    If (StartFlag = 1) Then
        Exit Sub
    End If
    StartFlag = 1
    Text1.Text = "START"
    List1.Clear
    Dummy = DoEvents()
    sts = GpibGetWord                                   'Run Sample2(GPIB) Get Word Data
    If (sts = 0) Then
        List1.AddItem "END"
    End If
    Text1.Text = "END"
    StartFlag = 0
End Sub
-----------------------------------------------------------------------------------------
Private Sub Command3_Click()
    Dim sts As Integer

    If (StartFlag = 1) Then
        Exit Sub
    End If
    StartFlag = 1
    Text1.Text = "START"
    List1.Clear
    Dummy = DoEvents()
    sts = GpibGetMeasure                                'Run Sample3(GPIB) Get Measure
    If (sts = 0) Then
        List1.AddItem Query(0)
        List1.AddItem Query(1)
        List1.AddItem Query(2)
    End If
    Text1.Text = "END"
    StartFlag = 0
```

```
End Sub
---------------------------------------------------------------------------------------
Private Sub Command4_Click()
    Dim sts As Integer

    If (StartFlag = 1) Then
        Exit Sub
    End If
    StartFlag = 1
    Text1.Text = "START"
    List1.Clear
    sts = RS232Tdiv                              'Run Sample4(RS232) Set/Get TDIV
    If (sts = 0) Then
        List1.AddItem Query(0)
    End If
    Text1.Text = "END"
    StartFlag = 0
End Sub
---------------------------------------------------------------------------------------
Private Sub Command5_Click()
    Dim sts As Integer

    If (StartFlag = 1) Then
        Exit Sub
    End If
    StartFlag = 1
    Text1.Text = "START"
    List1.Clear
    sts = RS232GetWord                           'Run Sample5(RS232) Get Word Data
    If (sts = 0) Then
        List1.AddItem "END"
    End If
    Text1.Text = "END"
    StartFlag = 0
End Sub
---------------------------------------------------------------------------------------
Private Sub Form_Load()

    StartFlag = 0                                'Clear Start Flag
    Dev = -1                                     'Clear device id
    Addr = 1                                     'GPIB Address = 1
    Timer1.Interval = 0
    Command1.Caption = "Sample1(GPIB)" + Chr(13) + "Set/Get TDIV"
    Command2.Caption = "Sample2(GPIB)" + Chr(13) + "Get Word Data"
    Command3.Caption = "Sample3(GPIB)" + Chr(13) + "Get Measure"
    Command4.Caption = "Sample4(RS232)" + Chr(13) + "Set/Get TDIV"
    Command5.Caption = "Sample5(RS232)" + Chr(13) + "Get Word Data"
    Text1.Text = ""

End Sub
---------------------------------------------------------------------------------------
Private Sub MSComm1_OnComm()
    Dim evt As Integer

    evt = MSComm1.CommEvent
    Select Case evt
    'Error
        Case comBreak
            Call DIsplayRS232Error("comBreak:Break received")
        Case comCDTO
            Call DIsplayRS232Error("comCDTO CD(RLSD) timeout")
        Case comCTSTO
            Call DIsplayRS232Error("comCTSTO:CTS timeout")
        Case comDSRTO
            Call DIsplayRS232Error("commDSRTO:DSR timeout")
        Case comFrame
            Call DIsplayRS232Error("comFrame:Frame error")
        Case comOverrun
            Call DIsplayRS232Error("comOverrun:Overrun")
        Case comRxOver
            Call DIsplayRS232Error("comRxOver:Receive buffer overflow")
        Case comRxParity
            Call DIsplayRS232Error("commRxParity:Parity error")
        Case comTxFull
            Call DIsplayRS232Error("comTxFull:Send buffer overflow")
    'Event
        Case comEvReceive
        Case comEvCD
        Case comEvCTS
       Case comEvDSR
        Case comEvRing
        Case comEvSend
    End Select

End Sub
---------------------------------------------------------------------------------------
Private Sub Timer1_Timer()
    TimerCount = TimerCount + 1
End Sub
---------------------------------------------------------------------------------------
```

8.4 Sets/Queries the T/Div

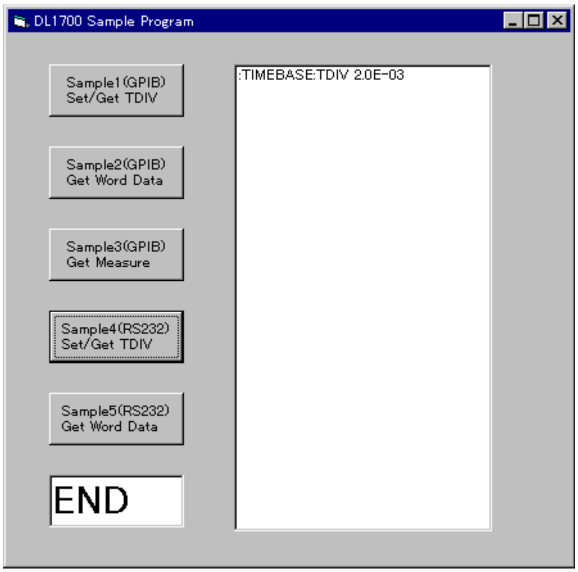
```
Sample1(GPIB) Set/Get TDIV
--------------------------------------------------------------------------------------
Private Function GpibTdiv() As Integer
    Dim msg As String                             'Command buffer
    Dim qry As String                             'Query biffer
    Dim sts As Integer

    msg = Space$(100)
    qry = Space$(100)

    sts = InitGpib                                'Initialize GPIB
    If (sts <> 0) Then
        GpibTdiv = 1
        Exit Function
    End If

    msg = "TIMEBASE:TDIV 2ms" + Term              'Set T/div = 2ms
    sts = ilwrt(Dev, msg, Len(msg))               'Send Command
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibTdiv = 1
        Exit Function
    End If
    msg = "TIMEBASE:TDIV?" + Term                 'Get T/div value
    sts = ilwrt(Dev, msg, Len(msg))               'Send Command
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibTdiv = 1
        Exit Function
    End If
    sts = ilrd(Dev, qry, Len(qry))                'Receive Query
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibTdiv = 1
        Exit Function
    End If
    Query(0) = Left(qry, ibcntl - 1)
    Call ibonl(Dev, 0)
    GpibTdiv = 0
End Function
--------------------------------------------------------------------------------------

Sample4(RS232) Set/Get TDIV
--------------------------------------------------------------------------------------
Private Function RS232Tdiv() As Integer
    Dim msg As String                             'Command buffer
    Dim qry As String                             'Query biffer
    Dim sts As Integer

    msg = Space$(100)
    qry = CStr(Empty)

    sts = InitSerial                              'Initialize RS232
    If (sts <> 0) Then
        Exit Function
    End If

    MSComm1.InputLen = 0                          'Receive All Data
    MSComm1.InputMode = comInputModeText          'Text Mode
    MSComm1.PortOpen = True                       'Port Open
    MSComm1.OutBufferCount = 0                    'Out Buffer Clear
    MSComm1.InBufferCount = 0                     'In Buffer Clear
    Timer1.Interval = 1000

    If CtsFlag = 1 Then                           'If CTS = FALSE
        TimerCount = 1                            'Wait until CTS = TRUE
        Do
            Dummy = DoEvents()
            If (TimerCount >= Timeout) Then
                Call DIsplayRS232Error("CTS Timeout")
                RS232Tdiv = 1
                GoTo finish
            End If
        Loop Until MSComm1.CTSHolding = True
    End If

    msg = "TIMEBASE:TDIV 2ms" + Term              'Set T/div = 2ms
    MSComm1.Output = msg                          'Send Command

    TimerCount = 1
    Do                                            'Wait until OutBufferCount = 0
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Send Timeout", msg)
            RS232Tdiv = 1
            GoTo finish
        End If
    Loop Until MSComm1.OutBufferCount = 0
    msg = "TIMEBASE:TDIV?" + Term                  'Get T/div value
    MSComm1.Output = msg                           'Send Command

    TimerCount = 1
    Do                                             'Wait until OutBufferCount = 0
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Send Timeout", msg)
            RS232Tdiv = 1
            GoTo finish
        End If
    Loop Until MSComm1.OutBufferCount = 0

    TimerCount = 1
    Do                                             'Receive Query
        qry = qry + MSComm1.Input                  'Wait until End Data = Terminator
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Receive Timeout", msg)
            RS232Tdiv = 1
            GoTo finish
        End If
    Loop Until Right$(qry, 1) = Term

    Query(0) = Left$(qry, Len(qry) - 1)
    RS232Tdiv = 0
finish:
    MSComm1.PortOpen = False                       'Port Close
    Timer1.Interval = 0

End Function
----------------------------------------------------------------------------------------
```

GP-IB


DL1700 Sample Program
Sample1(GPIB) Set/Get TDIV
Sample2(GPIB) Get Word Data
Sample3(GPIB) Get Measure
Sample4(RS232) Set/Get TDIV
Sample5(RS232) Get Word Data
END

:TIMEBASE:TDIV 2.0E-03

RS-232


DL1700 Sample Program
Sample1(GPIB) Set/Get TDIV
Sample2(GPIB) Get Word Data
Sample3(GPIB) Get Measure
Sample4(RS232) Set/Get TDIV
Sample5(RS232) Get Word Data
END

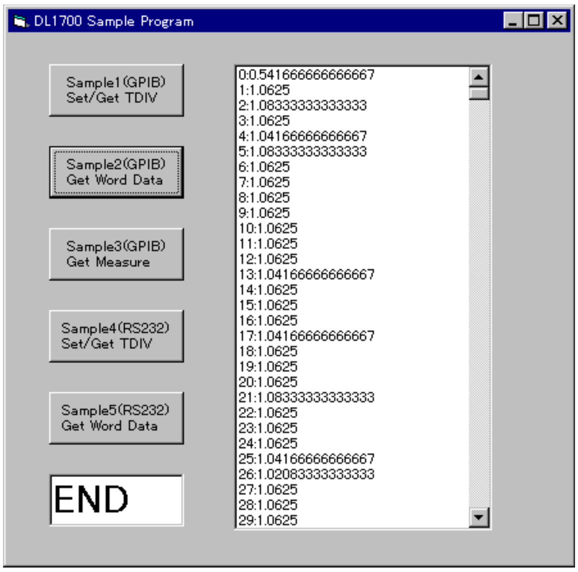
:TIMEBASE:TDIV 2.0E-03

8.5 Data Output in Word Format (2 bytes)

```
Sample2(GPIB) Get Word Data
----------------------------------------------------------------------------------------
Private Function GpibGetWord() As Integer
    Dim msg As String                              'Command buffer
    Dim qry As String                              'Query biffer
    Dim sts As Integer
    Dim vdv As Variant                             'Vdiv value
    Dim ofs As Variant                             'Offset value
    Dim eos As Integer                             'EOS
    Dim hlg As Integer                             'Block Header Length
    Dim dlg As Integer                             'Block Data Length
    Dim dat As Variant                             'Data
    Dim i   As Integer

    msg = Space$(100)
    qry = Space$(100)

    sts = InitGpib                                 'Initialize GPIB
    If (sts <> 0) Then
        GpibGetWord = 1
        Exit Function
    End If

    msg = "STOP" + Term                            'Stop Acquisition
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If
    msg = "COMMUNICATE:HEADER OFF" + Term          'Query Header Off(for Get V/div)
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If
    msg = "WAVEFORM:TRACE 1" + Term                'Trace = 1
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If
    msg = "WAVEFORM:RECORD 0" + Term               'Record number = 0
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If
    msg = "WAVEFORM:FORMAT WORD" + Term            'Data Format = WORD
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If
    msg = "WAVEFORM:BYTEORDER LSBFIRST" + Term     'Data Byte order = LSB First(for
Little Endian)
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If
    msg = "WAVEFORM:START 0;END 1001" + Term       'START 0,END 1001(Length = 1002)
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If
    msg = "WAVEFORM:RANGE?" + Term                 'Get V/div value
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If
    sts = ilrd(Dev, qry, Len(qry))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If
    vdv = Val(qry)
    msg = "WAVEFORM:OFFSET?" + Term                 'Get Offset value
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If
    sts = ilrd(Dev, qry, Len(qry))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If
    ofs = Val(qry)

    eos = 0
    sts = ileos(Dev, eos)                          'Terminator = None(for Binary Data)
    If (sts < 0) Then
        Call DisplayGPIBError(sts, "ileos")
        GpibGetWord = 1
        Exit Function
    End If
    msg = "WAVEFORM:SEND?" + Term                  'Receive Waveform Data
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If
    sts = ilrd(Dev, qry, 2)                        'Receive "#X"
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If
    hlg = Val(Mid$(qry, 2, 1))
    sts = ilrd(Dev, qry, hlg)                      'Receive Block Header
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If
    dlg = Val(Left$(qry, hlg))                     'dlg = Data Byte Length

    sts = ilrdi(Dev, WaveBuffer(), dlg + 1)        'Receive Waveform Data + LF
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If

    For i = 0 To (dlg / 2 - 1) Step 1
        dat = WaveBuffer(i) * vdv / 3072 + ofs
        List1.AddItem CStr(i) + ":" + CStr(dat)
    Next i

    eos = &HC0A
    sts = ileos(Dev, eos)                          'Terminator = LF
    If (sts < 0) Then
        Call DisplayGPIBError(sts, "ileos")
        GpibGetWord = 1
        Exit Function
    End If
    msg = "COMMUNICATE:HEADER ON" + Term           'Query Header On
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetWord = 1
        Exit Function
    End If
    Call ibonl(Dev, 0)
    GpibGetWord = 0
End Function
---------------------------------------------------------------------------------------

Sample5(RS232) Get Word Data
---------------------------------------------------------------------------------------
Private Function RS232GetWord() As Integer
    Dim msg As String                              'Command buffer
    Dim qry As String                              'Query biffer
    Dim sts As Integer
    Dim vdv As Variant                             'V/div value
    Dim ofs As Variant                             'Offset value
    Dim hlg As Integer                             'Block Header Length
    Dim dlg As Integer                             'Blocl Data Length
    Dim buf As Variant                             'temporary buffer
    Dim dat As Variant                             'data buffer
    Dim i   As Integer

    msg = Space$(100)
    qry = CStr(Empty)
    sts = InitSerial                              'Initialize RS232
    If (sts <> 0) Then
        Exit Function
    End If

    MSComm1.InputLen = 0                          'Receive All Data
    MSComm1.InputMode = comInputModeText          'Text Mode
    MSComm1.PortOpen = True                       'Port Open
    MSComm1.OutBufferCount = 0                    'Out Buffer Clear
    MSComm1.InBufferCount = 0                     'In Buffer Clear
    Timer1.Interval = 1000

    If CtsFlag = 1 Then                           'If CTS = FALSE
        TimerCount = 1                            'Wait unitl CTS = TRUE
        Do
            Dummy = DoEvents()
            If (TimerCount >= Timeout) Then
                Call DIsplayRS232Error("CTS Timeout")
                RS232GetWord = 1
                GoTo finish
            End If
        Loop Until MSComm1.CTSHolding = True
    End If

        msg = "STOP" + Term                           'Stop Acquisition
    MSComm1.Output = msg
    TimerCount = 1
    Do
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Send Timeout", msg)
            RS232GetWord = 1
            GoTo finish
        End If
    Loop Until MSComm1.OutBufferCount = 0

    msg = "COMMUNICATE:HEADER OFF" + Term         'Query Header Off(for Get V/div)
    MSComm1.Output = msg
    TimerCount = 1
    Do
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Send Timeout", msg)
            RS232GetWord = 1
            GoTo finish
        End If
    Loop Until MSComm1.OutBufferCount = 0

    msg = "WAVEFORM:TRACE 1" + Term               'Trace = 1
    MSComm1.Output = msg
    TimerCount = 1
    Do
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Send Timeout", msg)
            RS232GetWord = 1
            GoTo finish
        End If
    Loop Until MSComm1.OutBufferCount = 0

    msg = "WAVEFORM:RECORD 0" + Term              'Record number = 0
    MSComm1.Output = msg
    TimerCount = 1
    Do
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Send Timeout", msg)
            RS232GetWord = 1
            GoTo finish
        End If
    Loop Until MSComm1.OutBufferCount = 0

    msg = "WAVEFORM:FORMAT WORD" + Term           'Data Format = WORD
    MSComm1.Output = msg
    TimerCount = 1
    Do
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Send Timeout", msg)
            RS232GetWord = 1
            GoTo finish
        End If
    Loop Until MSComm1.OutBufferCount = 0

    msg = "WAVEFORM:BYTEORDER LSBFIRST" + Term    'Data Byte order = LSB First(for
Little Endian)
    MSComm1.Output = msg
    TimerCount = 1
    Do
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Send Timeout", msg)
            RS232GetWord = 1
            GoTo finish
        End If
    Loop Until MSComm1.OutBufferCount = 0

    msg = "WAVEFORM:START 0;END 1001" + Term       'START 0,END 1001(Length = 1002)
    MSComm1.Output = msg
    TimerCount = 1
    Do
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Send Timeout", msg)
            RS232GetWord = 1
            GoTo finish
        End If
    Loop Until MSComm1.OutBufferCount = 0

    qry = CStr(Empty)
    msg = "WAVEFORM:RANGE?" + Term                  'Get V/div value
    MSComm1.Output = msg
    TimerCount = 1
    Do
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Send Timeout", msg)
            RS232GetWord = 1
            GoTo finish
        End If
    Loop Until MSComm1.OutBufferCount = 0
    TimerCount = 1
    Do
        qry = qry + MSComm1.Input
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Receive Timeout", msg)
                 RS232GetWord = 1
            GoTo finish
        End If
    Loop Until Right$(qry, 1) = Term
    vdv = Val(qry)

    qry = CStr(Empty)
    msg = "WAVEFORM:OFFSET?" + Term                  'Get Offset value
    MSComm1.Output = msg
    TimerCount = 1
    Do
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Send Timeout", msg)
            RS232GetWord = 1
            GoTo finish
        End If
    Loop Until MSComm1.OutBufferCount = 0
    TimerCount = 1
    Do
        qry = qry + MSComm1.Input
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Receive Timeout", msg)
            RS232GetWord = 1
            GoTo finish
        End If
    Loop Until Right$(qry, 1) = Term
    ofs = Val(qry)

    msg = "WAVEFORM:SEND?" + Term                  'Receive Waveform Data
    MSComm1.Output = msg

    TimerCount = 1
    Do
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Send Timeout", msg)
            RS232GetWord = 1
            GoTo finish
        End If
    Loop Until MSComm1.OutBufferCount = 0

    MSComm1.InputLen = 2                           'Receive "#X"
    TimerCount = 1
    Do Until MSComm1.InBufferCount >= 1
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Receive Timeout", msg)
            RS232GetWord = 1
            GoTo finish
        End If
    Loop
    qry = MSComm1.Input
    hlg = Val(Mid$(qry, 2, 1))
```

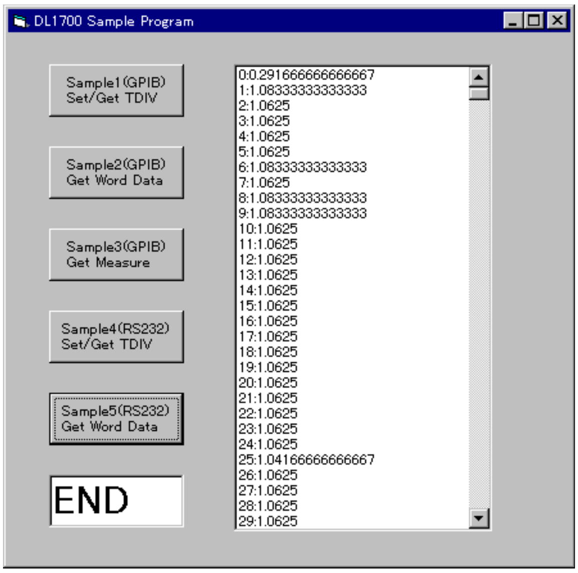
```
    MSComm1.InputLen = hlg                         'Receive Block Header
    TimerCount = 1
    Do Until MSComm1.InBufferCount >= hlg
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Receive Timeout", msg)
                RS232GetWord = 1
            GoTo finish
        End If
    Loop
    qry = MSComm1.Input
    dlg = Val(Left$(qry, hlg))                     'leng% = Data Byte Length

    MSComm1.InputMode = comInputModeBinary
    MSComm1.InputLen = 2                           'Receive Waveform Data(2 Byte)

    For i = 0 To (dlg / 2 - 1) Step 1              'Loop(dlg)
        TimerCount = 1
        Do Until MSComm1.InBufferCount >= 2
            Dummy = DoEvents()
            If (TimerCount >= Timeout) Then
                      Call DIsplayRS232Error("Receive Timeout", msg)
                RS232GetWord = 1
                GoTo finish
            End If
        Loop
        buf = MSComm1.Input                        'Receive 1 Data(2 Byte)
        dat = buf(1) * 256 + buf(0)
        If (dat > 32767) Then
            dat = dat - 65536
        End If
        dat = dat * vdv / 3072 + ofs
        List1.AddItem CStr(i) + ":" + CStr(dat)
    Next i

    msg = "COMMUNICATE:HEADER ON" + Term           'Query Header On
    MSComm1.Output = msg
    TimerCount = 1
    Do
        Dummy = DoEvents()
        If (TimerCount >= Timeout) Then
            Call DIsplayRS232Error("Send Timeout", msg)
            RS232GetWord = 1
            GoTo finish
        End If
    Loop Until MSComm1.OutBufferCount = 0

    RS232GetWord = 0
finish:
    MSComm1.PortOpen = False                       'Port Close
    Timer1.Interval = 0

End Function
----------------------------------------------------------------------------------------
```

GP-IB


DL1700 Sample Program
Sample1(GPIB) Set/Get TDIV
Sample2(GPIB) Get Word Data
Sample3(GPIB) Get Measure
Sample4(RS232) Set/Get TDIV
Sample5(RS232) Get Word Data
END

```
0:0.541666666666667
1:1.0625
2:1.08333333333333
3:1.0625
4:1.04166666666667
5:1.08333333333333
6:1.0625
7:1.0625
8:1.0625
9:1.0625
10:1.0625
11:1.0625
12:1.0625
13:1.04166666666667
14:1.0625
15:1.0625
16:1.0625
17:1.04166666666667
18:1.0625
19:1.0625
20:1.0625
21:1.08333333333333
22:1.0625
23:1.0625
24:1.0625
25:1.04166666666667
26:1.02083333333333
27:1.0625
28:1.0625
29:1.0625
```

RS-232


DL1700 Sample Program
Sample1(GPIB) Set/Get TDIV
Sample2(GPIB) Get Word Data
Sample3(GPIB) Get Measure
Sample4(RS232) Set/Get TDIV
Sample5(RS232) Get Word Data
END

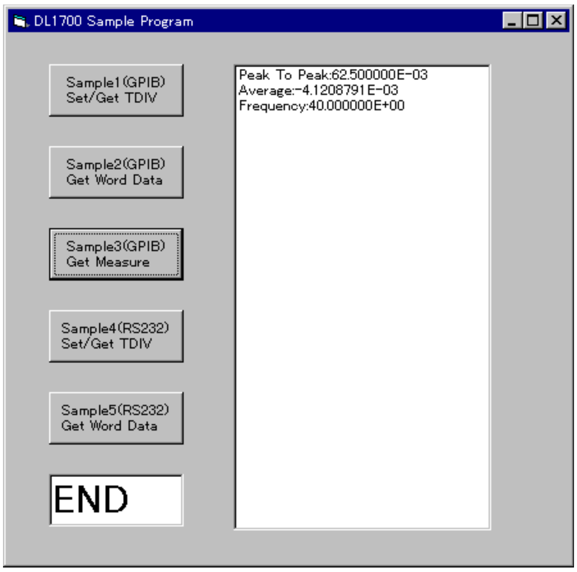
```
0:0.291666666666667
1:1.08333333333333
2:1.0625
3:1.0625
4:1.0625
5:1.0625
6:1.08333333333333
7:1.0625
8:1.08333333333333
9:1.08333333333333
10:1.0625
11:1.0625
12:1.0625
13:1.0625
14:1.0625
15:1.0625
16:1.0625
17:1.0625
18:1.0625
19:1.0625
20:1.0625
21:1.0625
22:1.0625
23:1.0625
24:1.0625
25:1.04166666666667
26:1.0625
27:1.0625
28:1.0625
29:1.0625
```

8.6 Sets/Queries Measure Value

```
Sample3(GPIB) Get Measure value
---------------------------------------------------------------------------------------
Private Function GpibGetMeasure() As Integer
    Dim msg As String                              'Command buffer
    Dim qry As String                              'Query biffer
        Dim sts As Integer
    Dim stp As Integer

    msg = Space$(100)
    qry = Space$(100)

    sts = InitGpib                                 'Initialize GPIB
    If (sts <> 0) Then
        GpibGetMeasure = 1
        Exit Function
    End If

    msg = "STOP" + term                            'Acquisition = Stop
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetMeasure = 1
        Exit Function
    End If
    msg = "COMMUNICATE:HEADER OFF" + term          'Query Header Off(for Get V/div)
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetMeasure = 1
        Exit Function
    End If
    msg = "MEASURE:MODE OFF" + term                'Measure Off
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetMeasure = 1
        Exit Function
    End If
    msg = "CHANNEL:DISPLAY ON" + term              'CH1 On
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetMeasure = 1
        Exit Function
    End If
    msg = "CHANNEL:PROBE 10" + term                'CH1 Probe = 10:1
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetMeasure = 1
        Exit Function
    End If
    msg = "CHANNEL:VDIV 500mV" + term              'CH1 V/div = 500mV
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetMeasure = 1
        Exit Function
    End If
    msg = "ACQUIRE:MODE NORMAL;RLENGTH 1000" + term
                                                   'Acquisition mode = NORMAL, length =
1000
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetMeasure = 1
        Exit Function
    End If
    msg = "TIMEBASE:TDIV 100ms" + term             'T/div = 100ms
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetMeasure = 1
        Exit Function
    End If
    msg = "TRIGGER:SIMPLE:LEVEL 500mV" + term      'Trigger level = 500mV
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetMeasure = 1
        Exit Function
    End If
    msg = "MEASURE:CHANNEL1:PTOPEAK:STATE ON" + term
                                                   'Measure P-P On
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetMeasure = 1
        Exit Function
```

```
End If
msg = "MEASURE:CHANNEL1:AVERAGE:STATE ON" + term
                                              'Measure Average On
sts = ilwrt(Dev, msg, Len(msg))
If (sts < 0) Then
    Call DisplayGPIBError(sts, msg)
    GpibGetMeasure = 1
    Exit Function
End If
msg = "MEASURE:CHANNEL1:FREQUENCY:STATE ON" + term
                                              'Measure Frequency On
sts = ilwrt(Dev, msg, Len(msg))
If (sts < 0) Then
    Call DisplayGPIBError(sts, msg)
    GpibGetMeasure = 1
    Exit Function
End If
msg = "MEASURE:TRANGE -5,5" + term            'Measure Time Range -5,5
sts = ilwrt(Dev, msg, Len(msg))
If (sts < 0) Then
    Call DisplayGPIBError(sts, msg)
    GpibGetMeasure = 1
    Exit Function
End If

msg = "SSTART? 500" + term                    'Start Single Trigger
sts = ilwrt(Dev, msg, Len(msg))                'Wait until stop Acquisition
If (sts < 0) Then
    Call DisplayGPIBError(sts, msg)
    GpibGetMeasure = 1
    Exit Function
End If
sts = ilrd(Dev, qry, Len(qry))
If (sts < 0) Then
    Call DisplayGPIBError(sts, msg)
    GpibGetMeasure = 1
    Exit Function
End If
stp = Val(qry)
If (stp = 1) Then
    GpibGetMeasure = 2
    Exit Function
End If

msg = "MEASURE:MODE ON" + term                'Start Measure
sts = ilwrt(Dev, msg, Len(msg))
If (sts < 0) Then
    Call DisplayGPIBError(sts, msg)
    GpibGetMeasure = 1
    Exit Function
End If
msg = "MEASURE:WAIT? 100" + term              'Wait until stop Measure
sts = ilwrt(Dev, msg, Len(msg))
If (sts < 0) Then
    Call DisplayGPIBError(sts, msg)
    GpibGetMeasure = 1
    Exit Function
End If
sts = ilrd(Dev, qry, Len(qry))
If (sts < 0) Then
    Call DisplayGPIBError(sts, msg)
    GpibGetMeasure = 1
    Exit Function
End If

msg = "MEASURE:CHANNEL1:PTOPEAK:VALUE?" + term 'Get P-P value
sts = ilwrt(Dev, msg, Len(msg))
If (sts < 0) Then
    Call DisplayGPIBError(sts, msg)
    GpibGetMeasure = 1
    Exit Function
End If
sts = ilrd(Dev, qry, Len(qry))
If (sts < 0) Then
    Call DisplayGPIBError(sts, msg)
    GpibGetMeasure = 1
    Exit Function
End If
Query(0) = "Peak To Peak:" + Left$(qry, ibcntl - 1)

msg = "MEASURE:CHANNEL1:AVERAGE:VALUE?" + term 'Get Average value
sts = ilwrt(Dev, msg, Len(msg))
If (sts < 0) Then
    Call DisplayGPIBError(sts, msg)
    GpibGetMeasure = 1
    Exit Function
End If
sts = ilrd(Dev, qry, Len(qry))
If (sts < 0) Then
    Call DisplayGPIBError(sts, msg)
    GpibGetMeasure = 1
```

```
        Exit Function
    End If
    Query(1) = "Average:" + Left$(qry, ibcntl - 1)

    msg = "MEASURE:CHANNEL1:FREQUENCY:VALUE?" + term 'Get Freq value
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetMeasure = 1
        Exit Function
    End If
    sts = ilrd(Dev, qry, Len(qry))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetMeasure = 1
        Exit Function
    End If
    Query(2) = "Frequency:" + Left$(qry, ibcntl - 1)

    msg = "COMMUNICATE:HEADER ON" + term           'Query Header On
    sts = ilwrt(Dev, msg, Len(msg))
    If (sts < 0) Then
        Call DisplayGPIBError(sts, msg)
        GpibGetMeasure = 1
        Exit Function
    End If
    Call ibonl(Dev, 0)
    GpibGetMeasure = 0
End Function
----------------------------------------------------------------------------------------
```



```
Peak To Peak:62.500000E-03
Average:-4.1208791E-03
Frequency:40.000000E+00
```

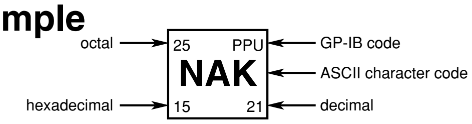
Appendix

Appendix 1 ASCII Character Code

ASCII character codes are given below.

	0	1	2	3	4	5	6	7
0	0 **NUL** 0 0	20 **DEL** 10 16	40 0 **SP** 20 32	60 16 **0** 30 48	100 0 **@** 40 64	120 16 **P** 50 80	140 0 **‘** 60 96	160 16 **p** 70 112
1	1 GTL **SOH** 1 1	21 LLO **DC1** 11 17	41 1 **!** 21 33	61 17 **1** 31 49	101 1 **A** 41 65	121 17 **Q** 51 81	141 1 **a** 61 97	161 17 **q** 71 113
2	2 **STX** 2 2	22 **DC2** 12 18	42 2 **”** 22 34	62 18 **2** 32 50	102 2 **B** 42 66	122 18 **R** 52 82	142 2 **b** 62 98	162 18 **r** 72 114
3	3 **ETX** 3 3	23 **DC3** 13 19	43 3 **#** 23 35	63 19 **3** 33 51	103 3 **C** 43 67	123 19 **S** 53 83	143 3 **c** 63 99	163 19 **s** 73 115
4	4 SDC **EOT** 4 4	24 DCL **DC4** 14 20	44 4 **$** 24 36	64 20 **4** 34 52	104 4 **D** 44 68	124 20 **T** 54 84	144 4 **d** 64 100	164 20 **t** 74 116
5	5 PPC **ENQ** 5 5	25 PPU **NAK** 15 21	45 5 **%** 25 37	65 21 **5** 35 53	105 5 **E** 45 69	125 21 **U** 55 85	145 5 **e** 65 101	165 21 **u** 75 117
6	6 **ACK** 6 6	26 **SYN** 16 22	46 6 **&** 26 38	66 22 **6** 36 54	106 6 **F** 46 70	126 22 **V** 56 86	146 6 **f** 66 102	166 22 **v** 76 118
7	7 **BEL** 7 7	27 **ETB** 17 23	47 7 **’** 27 39	67 23 **7** 37 55	107 7 **G** 47 71	127 23 **W** 57 87	147 7 **g** 67 103	167 23 **w** 77 119
8	10 GET **BS** 8 8	30 SPE **CAN** 18 24	50 8 **(** 28 40	70 24 **8** 38 56	110 8 **H** 48 72	130 24 **X** 58 88	150 8 **h** 68 104	170 24 **x** 78 120
9	11 TCT **HT** 9 9	31 SPD **EM** 19 25	51 9 **)** 29 41	71 25 **9** 39 57	111 9 **I** 49 73	131 25 **Y** 59 89	151 9 **i** 69 105	171 25 **y** 79 121
A	12 **LF** A 10	32 **SUB** 1A 26	52 10 ***** 2A 42	72 26 **:** 3A 58	112 10 **J** 4A 74	132 26 **Z** 5A 90	152 10 **j** 6A 106	172 26 **z** 7A 122
B	13 **VT** B 11	33 **ESC** 1B 27	53 11 **+** 2B 43	73 27 **;** 3B 59	113 11 **K** 4B 75	133 27 **[** 5B 91	153 11 **k** 6B 107	173 27 **{** 7B 123
C	14 **FF** C 12	34 **FS** 1C 28	54 12 **,** 2C 44	74 28 **<** 3C 60	114 12 **L** 4C 76	134 28 \ 5C 92	154 12 **l** 6C 108	174 28 **|** 7C 124
D	15 **CR** D 13	35 **GS** 1D 29	55 13 **-** 2D 45	75 29 **=** 3D 61	115 13 **M** 4D 77	135 29 **]** 5D 93	155 13 **m** 6D 109	175 29 **}** 7D 125
E	16 **SO** E 14	36 **RS** 1E 30	56 14 **.** 2E 46	76 30 **>** 3E 62	116 14 **N** 4E 78	136 30 **^** 5E 94	156 14 **n** 6E 110	176 30 **~** 7E 126
F	17 **SI** F 15	37 **US** 1F 31	57 15 **/** 2F 47	77 UNL **?** 3F 63	117 15 **O** 4F 79	137 UNT **_** 5F 95	157 15 **o** 6F 111	177 **DEL (RUBOUT)** 7F 127
	Address Command	Universal Command	Listener Address		Talker Address		Secondary Command	

Example



Appendix 2 Error Messages

Error messages related to communications are given below.

- The instrument allows error messages to be displayed in either Japanese or English, however, they are shown only in English when they are displayed on a personal computer.
- When servicing is required, contact your nearest YOKOGAWA representative, given on the back cover of this manual.
- Only error messages relating to communications are given. For other error messages, refer to the User's Manual IM 701710-01E.

Errors in Communication Command (100 to 199)

Code	Message	Action	Reference Page
102	Syntax error.	Incorrect syntax.	Chapter 5, 6
103	Invalid separator.	Insert a comma between data items to separate them.	5-1
104	Data type error.	Refer to pages 5-5 to 5-6 and enter using the correct data format.	5-5 to 5-6
105	GET not allowed.	GET is not supported as response to an interface message.	1-9
108	Parameter not allowed.	Check the number of parameters.	5-5, Chapter 6
109	Missing parameter.	Enter required parameters.	5-5, Chapter 6
111	Header separator error.	Insert a space between header and data to separate them.	5-1
112	Program mnemonic too long.	Check the mnemonic (a character string consisting of letters and numbers).	Chapter 6
113	Undefined header.	Check the header.	Chapter 6
114	Header suffix out of range.	Check the header.	Chapter 6
120	Numeric data error.	Numeric value must be entered for <NRf> format.	5-5
123	Exponent too large.	Use a smaller exponent for <NR3> format.	5-5, Chapter 6
124	Too many digits.	Limit the number of digits to 255 or less.	5-5, Chapter 6
128	Numeric data not allowed.	Enter in a format other than <NRf> format.	5-5, Chapter 6
131	Invalid suffix.	Check the unit for <Voltage>, <Time> and <Frequency>.	5-5
134	Suffix too long.	Check the units for <Voltage>, <Time> and <Frequency>.	5-5
138	Suffix not allowed.	No units are allowed other than <Voltage>, <Time> and <Frequency>.	5-5
141	Invalid character data.	Enter one of the character strings in {...|...|...}.	Chapter 6
144	Character data too long.	Check the character strings in {...|...|...}.	Chapter 6
148	Character data not allowed.	Enter in a format other than in {...|...|...}.	Chapter 6
150	String data error.	<Character string> must be enclosed by double quotation marks or single quotation marks.	5-6
151	Invalid string data.	<Character string> is too long or contains characters which cannot be used.	Chapter 6
158	String data not allowed.	Enter in a data format other than <Character string>.	Chapter 6
161	Invalid block data.	<Block data> is not allowed.	5-6, Chapter 6
168	Block data not allowed.	<Block data> is not allowed.	5-6, Chapter 6
171	Invalid expression.	Equation is not allowed.	Chapter 6
178	Expression data not allowed.	Equation is not allowed.	Chapter 6
181	Invalid outside macro definition.	Does not conform to the macro function specified in IEEE488.2.	—

Error in Communication Execution (200 to 299)

Code	Message	Action	Reference Page
221	Setting conflict.	Check the relevant setting.	Chapter 6
222	Data out of range.	Check the setting range.	Chapter 6
223	Too much data.	Check the data byte length.	Chapter 6
224	Illegal parameter value.	Check the setting range.	Chapter 6
241	Hardware missing.	Check availability of options.	—
260	Expression error.	Equation is not allowed.	—
270	Macro error.	Does not conform to the macro function specified in IEEE488.2.	—
272	Macro execution error.	Does not conform to the macro function specified in IEEE488.2.	—
273	Illegal macro label.	Does not conform to the macro function specified in IEEE488.2.	—
275	Macro definition too long.	Does not conform to the macro function specified in IEEE488.2.	—
276	Macro recursion error.	Does not conform to the macro function specified in IEEE488.2.	—
277	Macro redefinition not allowed.	Does not conform to the macro function specified in IEEE488.2.	—
278	Macro header not found.	Does not conform to the macro function specified in IEEE488.2.	—

Error in Communications Query (400 to 499)

Code	Message	Action	Reference Page
410	Query INTERRUPTED.	Check transmission/reception order.	5-2
420	Query UNTERMINATED.	Check transmission/reception order.	5-2
430	Query DEADLOCKED.	Limit the length of the program message including <PMT> to 1024 bytes or less.	5-2
440	Query UNTERMINATED after indefinite response.	Do not enter any query after `*IDN?` and `*OPT?`. indefinite response	—

Error in System Operation (912)

Code	Message	Action	Reference Page
912	Fatal error in the communication driver.	Servicing is required.	—

Warning (5)

Code	Message	Action	Reference Page
5	`*OPC/?` exists in message.	Place the `*OPC` or `*OPC?` at the end of the program message.	—

Other Errors (350 and 390)

Code	Message	Action	Reference Page
350	Queue overflow.	Read the error queue. Code 350 occurs when the error queue is full up. This message is output only for the `STATus:ERRor?` query and is not displayed on the screen.	7-5
390	Overrun error. (only RS-232)	Execute with a lower baud rate.	—

Note

Code 350 indicates overflow of error queue. This code is returned as a response to the `"STATus:ERRor?"` query; it does not appear on the screen.

Appendix 3 Overview of IEEE 488.2-1992

The GP-IB interface provided with DL1720/DL1740 conforms to IEEE 488.2-1992. This standard requires the following 23 points be stated in this document. This Appendix describes these points.

1 Subsets Supported by IEEE 488.1 Interface Functions
Refer to Section 1.4 “GP-IB Interface Specifications”.

2 Operation of Device when the Device is Assigned to an Address Other than Addresses 0 to 30.
The DL1720/DL1740 does not allow assignment to an address other than 0 to 30.

3 Reaction when the User Changes the Address
The current address is changed when a new address is set using **MISC**. The newly set address is valid until another new address is set.

4 Device Set-up at Power ON.Commands which can be Used at Power ON
Basically, the previous settings (i.e. the settings which were valid when power was turned OFF) are valid. All commands are available at power ON.

5 Message Transmission Options

a Input Buffer Size
4096 bytes

b Queries which Return Multiple Response Messages
Refer to Chapter 6, “Command List”.

c Queries which Generate Response Data during Analysis of the Syntax
Every query generates a response data when analysis of the syntax is completed.

d Queries which Generate Response Data during Reception
No query generates response data when the query is received by the controller.

e Commands Consisting of Parameters which Restrict One Other
Some commands, like the `CHANnel<x>:VOLTage:PROBe` and `VDIV`, have parameters which restrict unilaterally, but no commands have parameters which restrict bilaterally.

6 Options Included in Command Function Elements and Composite Header Elements
Refer to Chapters 5 and 6.

7 Buffer Size which Affects Transmission of Block Data
During transmission of block data, the output queue is extended according to the size of the data blocks.

8 List of Program Data Elements which can be Used in Equations, and Nesting Limit
No equations can be used.

9 Syntax of Response to Queries
Refer to the description of the commands given in Chapter 6.

10 Communications between Devices which do not Follow the Response Syntax
Not supported.

11 Size of Data Block of Response Data
1 to 2004000 bytes

12 List of Supported Common Commands

Refer to Section 6.34 “Common Command Group”.

13 Condition of Device when Calibration is Successfully Completed

Same as the one under which measurements are performed

14 Maximum Length of Block Data which can be Used for Definition of `*DDT` Trigger Macro

Not supported

15 Maximum Length of Macro Label Used in Definition of Macro, Maximum Length of Block Data which can be Used for Definition of Macro, Processing when Recursion is Used in Definition of Macro

Macro functions are not supported.

16 Response to `*IDN?`

Refer to Section 6.34 “Common Command Group”.

17 Size of Storage Area for Protected User Data for `PUD` and `*PUD?`

`*PUD` and `*PUD?` are not supported.

18 Length of `*RDT` and `*RDT?` Resource Name

`*RDT` and `*RDT?` are not supported.

19 Change in Status Due to `*RST`, `*LRN?`, `*RCL` and `*SAV`

`*RST`, `*LRN?`

Refer to Section 6.34 “Common Command Group”.

`*RCL`, `*SAV`

These commands are not supported.

20 Execution Range of Self-Test Using the `*TST?`

All the memory tests (for each internal memory) given in the Self Test menu displayed using **MISC** can be executed.

21 Structure of Extended Return Status

Refer to Chapter 7.

22 To Find out whether Each Command is Performed in Parallel or Sequentially

Refer to Section 5.5 “Synchronization with the Controller” and to Chapter 6.

23 Description of Execution of Each Command

Refer to Chapter 6 of this manual and to the User’s Manual IM 701710-01E.

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