070-8513-01
Digital Oscilloscope
TDS 820
Tektronix
Programmer Manual
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Table 3-7: System Error Messages
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Table 2-4: Acquisition Commands
Table 2-3: Composition of Header Off and On Response
Table 2-2: Command Message Elements
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Programmable Examples

Messages
Synchronization Methods
Event Handling Sequences
Queues
Registers
Status and Events
Figure 1-1: Common Message Elements

Command Syntax Subsection

Figure 1-1 shows a syntax diagram and command parts as described in the content of the messages. Your program sends to the digitizing oscilloscope. The Syntax and Commands section (Section 2) describes the structure and command parts.

This Manual

Getting Started
Driven Programs

Figure 1.3: Service Requests (SRO's) Provide for Event (Interrupt)

Figure 1.2: Functional Groupings and an Alphabetical List of Commands

Commands Grouped in 17 Functional Areas

Example: Group: Command: Syntax:

Acquire: Mode

Application Menu Commands

Acquire: Numacq? (Query Only)

Acquire: Stopped

Acquire: Name

Acquire: Number

Acquire: Mode
Programming Examples

The Programming Examples section (Section 4) starting on page 4.1 describes some example digitizing oscilloscope programs and how to compile them. The disks that come with this manual (Figure 1-4) have an executable version of each program.
If needed, you can stack GPIB connectors as shown in Figure 1-5.

Figure 1-5: GPIB Connector Location

Attach an IEEE Std 488.1-1987 GPIB cable (available from Tektronix as part number 012-0991-00) to this connector.

IEEE Std 488.1-1987 defines a D-type shell and contacts to show in Figure 1-5. This connector has a D-type shell and contacts as shown in Figure 1-5. This connector on the rear panel as GPIB connector on the controller.

Even the best instrument control program will not do much if the instrument is not connected to the controller.
Shown in Figure 1-7, do not use loop or parallel configurations. Connect the devices on the network in a star or linear configuration as network.

Turn on at least two-thirds of the devices on the network while using the bus.

Do not use more than 20 meters (65 feet) of cable to connect devices to the network.

Connect one device for every 2 meters (6 feet) of cable used.

Do not connect more than 15 devices to any one bus.

Each device can share the same device address. Assign a unique device address to each device on the bus. No two devices can share the same device address.

Observe these rules when you use your digitizing oscilloscope with a GPIB.
Figure 1-8: Selecting the I/O System in the Main Menu

Step 2: Press the System button in the main menu until the highlighted
Utility menu.

Step 1: Press the UTIL button to display the
Utility menu.

You need to set the GPIB parameters of the digitizing oscilloscope to match
the configuration of the digitizing oscilloscope.

Appendix C: Interface Specifications gives more information on the GPIB
network configurations.
If you wish to enter a special mode of operation to communicate directly with the controller, you must do so by enabling the digitialization oscilloscope function on the bus.

The digitalizing oscilloscope is set up for direct communication with your controller. If you wish to isolate the digitalizing oscilloscope from the bus, you may do so at any time during the process.

Figure 1-9: Selecting the GPIB Address in the GPIB Configuration Menu

Step 5: Press the Talk/Listen Address side menu button, and set the GPIB address using either the general purpose knob or the keypad.

Step 4: Press the Configure button in the main menu to display the GPIB selection in the pop-up menu (see Figure 1-9).

Step 3: Press the Port button in the main menu until the highlighting is in the correct port.

Step 2: Press the Configure button on the side menu to display the GPIB configuration.

Step 1: Press the Talk/Listen Address side menu button to display the GPIB address selection.
Some commands have set only and some have query only.

Acquire: Mode?
Not all commands have both a set and a query form.
Example: The set command Acquire: Mode has a query form.
The command differs from the set form by its question mark on its end. For
most commands, there is both a set form and a query form. The query form of
a command consists of set commands and query commands (usually simply
called commands and queries). Commands modify instrument settings or
calibrate commands and queries.
Commands consist of set commands and query commands (usually simply
called commands and queries).

<table>
<thead>
<tr>
<th>Command</th>
<th>( )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous element(s) may be repeated</td>
<td>. .</td>
</tr>
<tr>
<td>Optional can be omitted</td>
<td>[ ]</td>
</tr>
<tr>
<td>Group; one element is required</td>
<td>{ }</td>
</tr>
<tr>
<td>Exclusive OR</td>
<td></td>
</tr>
<tr>
<td>Is defined as</td>
<td>= :</td>
</tr>
<tr>
<td>Defined element</td>
<td>&lt; &gt;</td>
</tr>
</tbody>
</table>

**Table 2-1: BNF Symbols and Meanings**

This manual uses the following BNF symbols:

BNF (Backus-Naur Form) describes commands and queries using Backus-Naur Form
BNF (Backus-Naur Form) describes commands and queries using Backus-Naur Form

```
set encoding Appendix A on page 4-1 contains a chart of the ASCII character
American Standard Code for Information Interchange (ASCII) character
You transmit commands to the digitizing oscilloscope using the enhanced
You can control the digitizing oscilloscope through the GPIB and RS-232-C

Syntax

Query Structure

Command and

Symbole
Figure 2.1: Command Message Elements

- A white space character represents characters that are not part of the command.
- A single space separates arguments from each other.
- A space character before and after the command.
- A quote mark ("), a colon (:) character, or a question mark (?) character.
- The command is terminated with a colon (:) character.
- The header may begin with a colon (:) character.
- The basic command name, if any, is followed by any additional text.

Table 2.2: Command Message Elements

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
</table>

- Command messages may contain any elements defined in Table 2.2, with the exception of any character that needs to be escaped by any other symbol.
Table 2-3: Comparison of Header Off and on Responses

<table>
<thead>
<tr>
<th>Status of Settings</th>
<th>Queues have the Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Queues cause the digitizing oscilloscope to return information about its level.</td>
</tr>
</tbody>
</table>

**Headers in Query Responses**

- Measurement parameters for the specified measurement
- Environmental parameters, and MEASUREMENT:MEAS:RECALL returns all the measurement parameters for the current session, or the last measurement, while MEASUREMENT:RECALL:DEFERRED returns the measurement parameters for the measurement before the specified branch of a deferred mode, for example, MEASUREMENT:RECALL:DEFERRED:DEFERRED.
- You can specify a query command at any level within the command tree:

```
[...[header][command][parameter]]
```

- Queues cause the digitizing oscilloscope to return information about its level.

**Queues**

- The reading level, the reading column (:), always returns you to the base of the command.
- Commands at a higher level in the tree may affect those at a lower one. Commands at a higher level in the tree may affect those at a lower one.
- Each subsequent mnemonic is a level of branching of the previous tree and each subsequent mnemonic is a level of branching of the previous tree. The first mnemonic is the base of the tree.

**Commands**

- A command header consists of one or more mnemonic strings, structured in a

```
[...[command][parameter]]
```

- Queues cause the digitizing oscilloscope to perform a specific function.
Clearing the Digiziting Oscilloscope

**Command Entry**
- You can enter commands in upper or lower case.
- You can precede any command with a white space character. White-space characters include any combination of the ASCII control characters (0 through 9 and 11 through 32 decimal).
- The digiziting oscilloscope ignores commands consisting of any combination of white space characters and line feeds.

**Abbreviating Commands**
You can abbreviate many digiziting oscilloscope commands. Each command's listing in the Commands section shows the abbreviations in capital.
For example, you can enter the command `ACQUIRE: NORM: AVG` simply as `ACQ: N: A`.

**Concatenating Commands**
You can concatenate any combination of set commands and queries using a semicolon (;). The digiziting oscilloscope executes concatenated commands in the order received.

When concatenating commands and queries, you must follow these rules:
1. Separate completely different headers by a semicolon and by the beginning colon on all commands but the first. For example, the commands `TRIGGER: MODE: NORM; ACQUIRE: NORM: AVG` would be concatenated into a single command:
   
   `TRIG: MODE: NORM; ACQ: N: A`
Message Terminators

(End of message) to represent a message termina-

Here are some invalid concatenations:

5. Serial commands and queries may be concatenated in the same mes-

4. Lines for requirement to 10.

3. Never precede a start (.) command with a colon.

2. Concatenate any text is 80% and for the waveform is 90%, the

1. When you concatenate queries, the response to all the queries are

0. A query that ends with an asterisk (e.g., MODE: NOVAMAP:TRG)


5. Set commands and queries may be concatenated in the same mes-

4. Lines for requirement to 10.

3. Never precede a start (.) command with a colon.

2. Concatenate any text is 80% and for the waveform is 90%, the

1. When you concatenate queries, the response to all the queries are

0. A query that ends with an asterisk (e.g., MODE: NOVAMAP:TRG)


Command Syntax

This manual uses <<BOX> (End of message) to represent a message termina-

Here are some invalid concatenations:

5. Serial commands and queries may be concatenated in the same mes-

4. Lines for requirement to 10.

3. Never precede a start (.) command with a colon.

2. Concatenate any text is 80% and for the waveform is 90%, the

1. When you concatenate queries, the response to all the queries are

0. A query that ends with an asterisk (e.g., MODE: NOVAMAP:TRG)


Command Syntax
Way:
Each displayed waveform. The displayed measurements are specified in this
in the header. Up to four analog measurements may be displayed with
Commands can specify which measurement to set or query as a numeric

**Measurement Specific Mnemonics**

<table>
<thead>
<tr>
<th>Cursor Selection</th>
<th>Meaning</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>✳</td>
<td>Panel to use.</td>
<td></td>
</tr>
</tbody>
</table>

When cursors are displayed, commands may specify which cursor of the

**Cursor Position Mnemonics**

<table>
<thead>
<tr>
<th>Cursor</th>
<th>Meaning</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEFT</td>
<td>Menu button to use.</td>
<td></td>
</tr>
<tr>
<td>BOTTOM</td>
<td>Menu is displayed.</td>
<td></td>
</tr>
</tbody>
</table>

When the application menu is displayed, commands may specify which

**Application Menu Mnemonics**

<table>
<thead>
<tr>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

Some header mnemonics specify one of a range of mnemonics. For exam-

**Constructed Mnemonics**

<table>
<thead>
<tr>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

Examples: A allows CR LF messages with LF and CR, or CR LF. The digitizing oscilloscope always leaves
The end of-message terminator may be the END message (Z01) or (Z02). You use these mnemonics in

**Message Terminator** | Meaning |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>✳</td>
<td></td>
</tr>
</tbody>
</table>
### Waveform Mnemonics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAN BE</td>
<td>CH -&gt; X</td>
<td>Waveform</td>
</tr>
<tr>
<td></td>
<td>X -&gt; H, R, OR RER -&gt; X</td>
<td></td>
</tr>
</tbody>
</table>

Such a waveform as follows:

- A channel waveform, a main waveform, or a reference waveform. Specify in some commands you can specify a waveform regardless of whether it is the header. Commands can specify the reference waveform to use as a mnemonic in

### Reference Waveform Mnemonics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH -&gt; X</td>
<td>A main waveform specifier. X is either 1, 2, or 3.</td>
<td></td>
</tr>
</tbody>
</table>

### Math Waveform Mnemonics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH -&gt; X</td>
<td>A channel specifier. X is either 1, 2, or 2.</td>
<td></td>
</tr>
</tbody>
</table>

### Channel Mnemonics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>3, 4, OR 4 (polarity)</td>
<td>A measurement specifier X is either I [top], 3.</td>
<td></td>
</tr>
</tbody>
</table>
There is a "mark" the quote for example.

4. You can include a quote character within a string simply by repeating
the original quote.

Example: "this is an acceptable string"

3. You can mix question marks within a string as long as you follow the
rule of a valid string.

Example: "this is a valid string"

2. Use the same type of quote character to open and close the string
within a group of ASCII characters enclosed by a single quote or
between the quotes.

Example: 'A quoted string can include any character defined in the 7-bit ASCII
set. When you use quoted strings:

<table>
<thead>
<tr>
<th>Quoted String of ASCII Text</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;something&quot;</td>
<td>&quot;this is a quoted string&quot;</td>
</tr>
</tbody>
</table>

Some commands require or return data in the form of a quoted string, which
must be enclosed in either single quotes or double quotes.

Quoted String Arguments:

Some numeric arguments will be automatically forced to a valid setting, either
by rounding or functioning when an invalid number is input unless otherwise
noted in the command description.

<table>
<thead>
<tr>
<th>Floating Point Value with an Exponent</th>
<th>&lt;F3&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floating Point Value without an Exponent</td>
<td>&lt;F2&gt;</td>
</tr>
<tr>
<td>Signed Integer Value</td>
<td>&lt;F1&gt;</td>
</tr>
</tbody>
</table>

Numeric Arguments:

command:

This command may be in one of several forms. The individual
descriptions of each command tell which argument types to use with that
command.
### Block Arguments

Termination character is embedded in the string

```
"<EOF>" "<EOI>
```

Characters are not of the same type

```
"Invalid string argument"
```

Here are some invalid strings:

- The maximum length of a quoted string returned from a query is 1000 characters.
- The maximum length of a quoted string included in the string.
- A character or string is treated as just another character in the string.
- A character or string is treated as just another character in the string.
- A character or string is treated as just another character in the string.
- A character or string is treated as just another character in the string.
- A character or string is treated as just another character in the string.
- A character or string is treated as just another character in the string.

5. Strings can have upper or lower case characters.
**Figure 2.3**: Typical Syntax Diagrams

- Loops show elements that you can repeat.
- Paths around a group of elements show that these elements are optional.
- Parallel paths show that you must take one and only one of the paths. A
  choice among these paths is shown by arrows that show the allowed paths through.

Example elements are connected by arrows that show the allowed paths through.

- Boxes contain the defined elements described earlier in this section.
- Case position of the mnemonic:
  - Lower case elements are not case sensitive. You can omit the lower case.
  - These elements are not case sensitive. You can omit the lower case.
  - Abbreviated spelling.
  - The command mnemonics are shown in both upper and lower case.

The syntax diagram in this manual use the following symbols and notation:
Table 2-5: Alias Commands

Ing oscilloscope to take a measurement.

Mands each time you perform a certain task, such as setting up the digitizer.

Single acquisition.

Table of acquisition system.

Number of acquisitions for envelope.

Number of acquisitions for envelope.

query

Number of acquisitions processed.

Acquisition mode.

Return acquisition parameters.

Table 2-4: Acquisition Commands

2.99

(Ion, (Resistive) controls are in the Display commands section on page

Acquisition commands affect the acquisition of waveforms. These com-

The TDS 800 GPIB interface commands to Tektronix standard codes and

Provides more detail on each command and starts on page 2-31.

This section lists digitizing oscilloscope commands in two ways: first
Sequence and then examining the results.

Diagnostic Test Procedure includes selecting the Next Test Sequence, executing the
Diagnostic routines that are built into the digitizing oscilloscope. The digit-
izing oscilloscope consists of the self-calibration and
diagnostic and Calibration and Diagnostic commands. Let you initiate the self-calibration and

---

### Commands

<table>
<thead>
<tr>
<th>Menu</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a title for the application</td>
<td>TITLE</td>
</tr>
<tr>
<td>Label for a side menu button</td>
<td>LEFT:RIGHT</td>
</tr>
<tr>
<td>Label for a bottom menu button</td>
<td>BOTTOM:RIGHT</td>
</tr>
<tr>
<td>Remove or remove all application</td>
<td></td>
</tr>
<tr>
<td>Display the application menu</td>
<td></td>
</tr>
</tbody>
</table>

### Description

Table 2-6: Application Menu Commands

* Generalized when a menu button is pressed.
  * The event reporting system can also be set up so that a Service Request is
  * an event is generalized that tells the controller which button was pressed. The
  * when the application menu is displayed and a front-panel button is pressed,
  * an Activate command.

* Either pressing the front-panel APPLICATION button or sending the APPLiE-
  * menu as well as a side menu title, you can display an application menu by
  * digitizing oscilloscope, you can define the ideas for both the main and side
  * diagnostics commands. Let you define special-purpose menus for the

---

### Commands

<table>
<thead>
<tr>
<th>Menu</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn the alias state on and off</td>
<td>ALIAS:STATE</td>
</tr>
<tr>
<td>Remove a named alias</td>
<td>ALIAS:DELETE:NAME</td>
</tr>
<tr>
<td>Remove all aliases</td>
<td>ALIAS:DELETE:ALL</td>
</tr>
<tr>
<td>Remove an alias</td>
<td>ALIAS:DELETE</td>
</tr>
<tr>
<td>Create a new alias</td>
<td>ALIAS:DEFINE</td>
</tr>
</tbody>
</table>

### Description

Table 2-5: Aliases Commands (Cont.)
### Cursor Commands

Cursor commands provide control over cursor (calliper) display and readout.

<table>
<thead>
<tr>
<th>Description</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control of diagnostic tests</td>
<td>DIAG:STARK</td>
</tr>
<tr>
<td>Front panel diagnostic test set</td>
<td>DIAG:SELECT:FRONT</td>
</tr>
<tr>
<td>Display system diagnostic test set</td>
<td>DIAG:SELECT:DISPLAY</td>
</tr>
<tr>
<td>Processor diagnostic test sequence</td>
<td>DIAG:SELECT:CPU</td>
</tr>
<tr>
<td>Diagnostics test sequence for auditor</td>
<td>DIAG:SELECT:ATT</td>
</tr>
<tr>
<td>Acquisition system diagnostic test</td>
<td>DIAG:SELECT:ACQUISITION</td>
</tr>
<tr>
<td>Results of last diagnostic test set</td>
<td>DIAG:RESULT:LAST</td>
</tr>
<tr>
<td>Status of diagnostic tests</td>
<td>DIAG:RESULT:DISPLAY</td>
</tr>
<tr>
<td>Results of the self-calibration</td>
<td>CALIBRATION:ALL:STATUS:CAL</td>
</tr>
<tr>
<td>Return the result of a manual self-calibration or perform an internal self-calibration and return the result</td>
<td>CALIBRATION:ALL</td>
</tr>
</tbody>
</table>
### Display Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISPLAY:GARLAND</td>
<td>Style</td>
</tr>
<tr>
<td>DISPLAY:FORMATE</td>
<td>XY display</td>
</tr>
<tr>
<td>DISPLAY:MIRROR</td>
<td>Displayed data interpolation</td>
</tr>
<tr>
<td>DISPLAY:REWIND</td>
<td>Stamp</td>
</tr>
<tr>
<td>DISPLAY:ROTATE</td>
<td>Controls the display of the date/time</td>
</tr>
<tr>
<td>DISPSETUP</td>
<td>Home display settings</td>
</tr>
<tr>
<td>CLEAR</td>
<td>Clear menu from display</td>
</tr>
</tbody>
</table>

### Table 2-8: Cursor Commands (Cont.)

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURSOR:VERT:UNITS</td>
<td>Frequency</td>
</tr>
<tr>
<td>CURSOR:VERT:SELECT</td>
<td>Set vertical cursors to position or</td>
</tr>
<tr>
<td>CURSOR:VERT:POSITION</td>
<td>Set which cursor has the knob controls</td>
</tr>
<tr>
<td>CURSOR:VERT:DELTA</td>
<td>Position a vertical cursor</td>
</tr>
<tr>
<td>CURSOR:VERT</td>
<td>Horizontal distance between cursors</td>
</tr>
<tr>
<td>CURSOR:VERT:PAIR</td>
<td>Position vertical bar cursors</td>
</tr>
<tr>
<td>CURSOR:PAIR</td>
<td>PAIR:VERT</td>
</tr>
<tr>
<td>CURSOR:PAIR</td>
<td>PAIR:SELECT</td>
</tr>
<tr>
<td>CURSOR:PAIR</td>
<td>PAIR:POSITION2</td>
</tr>
<tr>
<td>CURSOR:PAIR</td>
<td>PAIR:POSITION1</td>
</tr>
<tr>
<td>CURSOR:PAIR:ORIGINAL</td>
<td>Retrieve horizontal position of second</td>
</tr>
<tr>
<td>CURSOR:PAIR:ORIGINAL</td>
<td>Retrieve horizontal position of first</td>
</tr>
<tr>
<td>CURSOR:PAIR:DELTA</td>
<td>Retrieve horizontal distance between horizontal</td>
</tr>
</tbody>
</table>

The update rate is much lower when waveform display is OFF. From display waveforms are acquired and transmitted but not displayed. In menus, display messages, and clear the menu. When you turn off wave-
<table>
<thead>
<tr>
<th>Description</th>
<th>Graphics Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draw a line from the current position</td>
<td>Graphics:Draw</td>
</tr>
<tr>
<td>Move to a new position</td>
<td>Graphics:Move</td>
</tr>
<tr>
<td>Revert graphics display status and collection of move and draw points</td>
<td>Graphics:Reset</td>
</tr>
<tr>
<td>Collection of move and draw points</td>
<td>Graphics:Display</td>
</tr>
<tr>
<td>Set size and location of message window</td>
<td>Message:Box</td>
</tr>
<tr>
<td>Remove text from the message win.</td>
<td>Message:Del</td>
</tr>
<tr>
<td>Display text on screen</td>
<td>Display:Draw</td>
</tr>
<tr>
<td>Contols the display of the targer</td>
<td>Display:Target</td>
</tr>
<tr>
<td>Included for compatibility only</td>
<td></td>
</tr>
<tr>
<td>Waveform display, line, infinite or vertical variable persistence</td>
<td>Display:Persist</td>
</tr>
<tr>
<td>Waveform brightness</td>
<td>Display:Intensity:Waveform</td>
</tr>
<tr>
<td>Text brightness</td>
<td>Display:Intensity:Text</td>
</tr>
<tr>
<td>Main brightness</td>
<td>Display:Intensity:Overall</td>
</tr>
<tr>
<td>Waveform intensity zone bright.</td>
<td>Display:Intensity:Contrast</td>
</tr>
<tr>
<td>Relays intensity settings</td>
<td>Display:Intensity:Relay</td>
</tr>
</tbody>
</table>

Table 2-9: Display Commands (Cont)
Table 2-12: Horizontal Commands

<table>
<thead>
<tr>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Helium main time base settings</td>
<td></td>
</tr>
<tr>
<td>Main time base line per division</td>
<td></td>
</tr>
<tr>
<td>Sets deskey for selected channel</td>
<td></td>
</tr>
<tr>
<td>Time from the trigger to the first point in the record in delay mode</td>
<td></td>
</tr>
<tr>
<td>Same as Helium:Delay:Scale</td>
<td></td>
</tr>
<tr>
<td>Delay time base line per division</td>
<td></td>
</tr>
<tr>
<td>Helium delay time base settings</td>
<td></td>
</tr>
<tr>
<td>Helium horizontal settings</td>
<td></td>
</tr>
</tbody>
</table>

Horizontal commands provide programm compatibility with earlier models of Tektronix digitalizing oscilloscopes. Scale may be substituted for Delay in the horizontal commands (this

delay time base. You can also set the record length.

you can set the time per division (or time per point) of both the main and

Horizontal commands control the time base of the digitalizing oscilloscope.

Table 2-11: Hard Copy Commands

<table>
<thead>
<tr>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard copy port I or output</td>
<td></td>
</tr>
<tr>
<td>Hard copy orientation</td>
<td></td>
</tr>
<tr>
<td>Hard copy output format</td>
<td></td>
</tr>
<tr>
<td>Start or terminate hard copy</td>
<td></td>
</tr>
</tbody>
</table>

The hard copy commands let you control the format of hard copy output.

Table 2-10: Graphics Commands (cont.)

<table>
<thead>
<tr>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Move and draw points</td>
<td></td>
</tr>
<tr>
<td>Set or return the entire collection of graphic points</td>
<td></td>
</tr>
</tbody>
</table>

Command groups
### Limit Test Commands

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Use as the reference waveform.</td>
</tr>
<tr>
<td>Source</td>
<td>Specify the source of the waveform.</td>
</tr>
<tr>
<td>Destination</td>
<td>Specify the destination in which to use as a refer.</td>
</tr>
<tr>
<td>On/Off</td>
<td>Turn Limit Test on or off.</td>
</tr>
<tr>
<td>Limits</td>
<td>Limits on the reference waveform.</td>
</tr>
<tr>
<td>Hardware</td>
<td>Hardware settings.</td>
</tr>
<tr>
<td>Compare</td>
<td>Compare waveform to ac.</td>
</tr>
<tr>
<td>Exceed</td>
<td>Sound an audio signal if a signal exceeds the limits of the reference waveform.</td>
</tr>
</tbody>
</table>

**Table 2-13: Limit Test Commands**

- **Set the main time base position**
- **Same as Horizontal: MAIN:SCALE**
- **Horizontal: Scale**
- **Number of points in waveform**
- **Position of waveform to display**
- **Select main or delayed time base**
- **Point in the record in main mode**
- **Time from the trigger to the first point in the record in main mode**

**Command Groups**
<table>
<thead>
<tr>
<th>Table 2.13: Limit Test Commands (Cont.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Header</strong></td>
</tr>
<tr>
<td>LIMIT:TEMPLATE: tolerance: VERTICAL</td>
</tr>
<tr>
<td>Description</td>
</tr>
<tr>
<td>Vertical tolerance when making template from other waveform</td>
</tr>
</tbody>
</table>

Measurement commands control the automated measurement system. Up to four automated measurements can be displayed on the screen of the digital oscilloscope. The commands are named **MEAS<i>:>>**, where <i> can be 1, 2, 3, or 4.

In addition, the four displayed measurement commands are named **MEAS<i>:>>**, where <i> can be 1, 2, 3, or 4.

Several measurement commands set and query measurement parameters. Some parameters, such as waveform sources, can be assigned differently for each measurement command. Other parameters, such as reference levels, have only one value, which applies to all measurements.

Table 2.14: Measurement Commands

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returns all measurement parameters.</td>
</tr>
<tr>
<td>Takes down measurement snapshot.</td>
</tr>
<tr>
<td>Returns immediate measurement gating.</td>
</tr>
<tr>
<td>Returns information on immediate parameters.</td>
</tr>
<tr>
<td>Search direction to use for delay measurements.</td>
</tr>
<tr>
<td>Which waveform edge to use for delay measurements.</td>
</tr>
<tr>
<td>Channel to take measurement from.</td>
</tr>
<tr>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Absolute volts</td>
</tr>
<tr>
<td>Mid level for delay measurements</td>
</tr>
<tr>
<td>Mid level for measurements</td>
</tr>
<tr>
<td>The low level for nistime (10% level)</td>
</tr>
<tr>
<td>The top level for nistime (90% level)</td>
</tr>
<tr>
<td>Helium reference levels</td>
</tr>
</tbody>
</table>

- Method for calculating reference
- Measurement: MEAS.<X>:VALUE?
- Units to use for measurement
- The measurement to be taken
- Turn measurement display on or off
- Second channel to take measurement
- Channel to take measurement from
- Initial edge to use for delay measurements
- Which waveform edge to use for delay measurements
- Direction to use for delay measurements
- Return delay measurement parameter

---

Table 2-14: Measurement Commands (cont.)

Command Groups
<table>
<thead>
<tr>
<th>Description</th>
<th>Header</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 2-15: Miscellaneous Commands</td>
<td></td>
</tr>
</tbody>
</table>

1988, and begin with a asterisk (*) character
defined by IEC 61000-4-39 and IEC Standard Codes and Formats
common to all devices on the GPIB bus. These commands are used with the
other category.

Miscellaneous commands are a group of commands that do not fit into any

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement: Snapshot</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent: MID</td>
</tr>
<tr>
<td></td>
<td>Percent: MID2</td>
</tr>
<tr>
<td></td>
<td>Percent: MD</td>
</tr>
<tr>
<td></td>
<td>Percent: RELEVEL</td>
</tr>
<tr>
<td></td>
<td>Percent: RELEVEL2</td>
</tr>
<tr>
<td></td>
<td>Percent: LOW</td>
</tr>
<tr>
<td></td>
<td>Percent: HIGH</td>
</tr>
<tr>
<td></td>
<td>Percent: MEASUREMENT</td>
</tr>
<tr>
<td></td>
<td>Percent: REFLEVEL</td>
</tr>
<tr>
<td></td>
<td>Percent: REFLEVEL2</td>
</tr>
<tr>
<td></td>
<td>Percent: LOW</td>
</tr>
<tr>
<td></td>
<td>Percent: HIGH</td>
</tr>
<tr>
<td></td>
<td>Percent: MEASUREMENT</td>
</tr>
<tr>
<td></td>
<td>Percent: REFLEVEL</td>
</tr>
<tr>
<td></td>
<td>Percent: REFLEVEL2</td>
</tr>
<tr>
<td></td>
<td>Percent: LOW</td>
</tr>
<tr>
<td></td>
<td>Percent: HIGH</td>
</tr>
<tr>
<td></td>
<td>Percent: MEASUREMENT</td>
</tr>
<tr>
<td></td>
<td>Percent: REFLEVEL</td>
</tr>
<tr>
<td></td>
<td>Percent: REFLEVEL2</td>
</tr>
<tr>
<td>Command Groups</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Number of unallocated data points</td>
<td>ALLOCATE: WAVEPARM: FREE2</td>
</tr>
<tr>
<td>Number of allocated data points</td>
<td>ALLOCATE: WAVEPARM2</td>
</tr>
<tr>
<td>Number of allocated data points</td>
<td>ALLOCATE2</td>
</tr>
<tr>
<td></td>
<td>Header</td>
</tr>
</tbody>
</table>

### Table 2-16: Save and Recall Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAVE</td>
<td>Store the current settings</td>
</tr>
<tr>
<td>UNLOAD</td>
<td>Unload a saved settings</td>
</tr>
<tr>
<td>SET</td>
<td>Set the settings</td>
</tr>
<tr>
<td>GET</td>
<td>Get the settings</td>
</tr>
<tr>
<td>TIME</td>
<td>Set the current time</td>
</tr>
<tr>
<td>TSS</td>
<td>Set the sampling rate</td>
</tr>
<tr>
<td>R222</td>
<td>Set RS-222 port</td>
</tr>
<tr>
<td>R222P</td>
<td>Set RS-222 port</td>
</tr>
<tr>
<td>R222F</td>
<td>Set RS-222 port</td>
</tr>
<tr>
<td>R222B</td>
<td>Set RS-222 baud rate</td>
</tr>
<tr>
<td>RS222</td>
<td>Set RS-222 parameters</td>
</tr>
<tr>
<td>REM</td>
<td>Remove a saved settings</td>
</tr>
</tbody>
</table>

*Note: The settings that are recalled to the scope by the RECALL command are the settings that were saved when the SAVE command was issued. The recalled settings will be displayed on the scope's front panel.*
### Syntax and Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER-ON</td>
<td>Status Clear</td>
</tr>
<tr>
<td>OPM</td>
<td>Operation Complete</td>
</tr>
<tr>
<td>INIT</td>
<td>Initialization</td>
</tr>
<tr>
<td>NOE</td>
<td>Number of Events Generated</td>
</tr>
<tr>
<td>EME</td>
<td>Event Message Queue</td>
</tr>
<tr>
<td>EvNT</td>
<td>Event Queue</td>
</tr>
<tr>
<td>SEER</td>
<td>Standard Event Status Register</td>
</tr>
<tr>
<td>SESE</td>
<td>Standard Event Status Enable</td>
</tr>
<tr>
<td>DSE</td>
<td>Device Event Status Enable</td>
</tr>
<tr>
<td>ClS</td>
<td>Clear Status</td>
</tr>
<tr>
<td>BUSY</td>
<td>Scope Busy Queue</td>
</tr>
<tr>
<td>ATTE</td>
<td>Return all events</td>
</tr>
</tbody>
</table>

**Header**

### Status and Error Commands

Commands and queries. They begin with an asterisk (*) character. Commands are supported. These commands let you determine the status of the digitizing oscilloscope.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAVE:WAVEFORM</td>
<td>Save waveform</td>
</tr>
<tr>
<td>SAVE:SETUP</td>
<td>Save instrument setting</td>
</tr>
<tr>
<td>SAY</td>
<td>Save setting</td>
</tr>
<tr>
<td>RECALL:SETUP</td>
<td>Recall instrument setting</td>
</tr>
<tr>
<td>RCL</td>
<td>Recall setting</td>
</tr>
<tr>
<td>DELETE:WAVEFORM</td>
<td>Delete stored waveform</td>
</tr>
<tr>
<td>DELETE:SETUP</td>
<td>Delete stored setup</td>
</tr>
<tr>
<td>ALLOCATE:WAVEFORM:REF+X</td>
<td>Allocate waveform: Reference + X</td>
</tr>
</tbody>
</table>

**Header**

### Table 2-17: Save and Recall Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAVE:WAVEFORM</td>
<td>Save waveform</td>
</tr>
<tr>
<td>SAVE:SETUP</td>
<td>Save instrument setting</td>
</tr>
<tr>
<td>SAY</td>
<td>Save setting</td>
</tr>
<tr>
<td>RECALL:SETUP</td>
<td>Recall instrument setting</td>
</tr>
<tr>
<td>RCL</td>
<td>Recall setting</td>
</tr>
<tr>
<td>DELETE:WAVEFORM</td>
<td>Delete stored waveform</td>
</tr>
<tr>
<td>DELETE:SETUP</td>
<td>Delete stored setup</td>
</tr>
<tr>
<td>ALLOCATE:WAVEFORM:REF+X</td>
<td>Allocate waveform: Reference + X</td>
</tr>
</tbody>
</table>

**Header**

### Table 2-18: Status and Error Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER-ON</td>
<td>Status Clear</td>
</tr>
<tr>
<td>OPM</td>
<td>Operation Complete</td>
</tr>
<tr>
<td>INIT</td>
<td>Initialization</td>
</tr>
<tr>
<td>NOE</td>
<td>Number of Events Generated</td>
</tr>
<tr>
<td>EME</td>
<td>Event Message Queue</td>
</tr>
<tr>
<td>EvNT</td>
<td>Event Queue</td>
</tr>
<tr>
<td>SEER</td>
<td>Standard Event Status Register</td>
</tr>
<tr>
<td>SESE</td>
<td>Standard Event Status Enable</td>
</tr>
<tr>
<td>DSE</td>
<td>Device Event Status Enable</td>
</tr>
<tr>
<td>ClS</td>
<td>Clear Status</td>
</tr>
<tr>
<td>BUSY</td>
<td>Scope Busy Queue</td>
</tr>
<tr>
<td>ATTE</td>
<td>Return all events</td>
</tr>
</tbody>
</table>

**Header**

### Command Groups

- **Status and Commands**
- **Save and Recall Commands**
- **Status and Error Commands**

---

### Trigger Commands

Triggering lets you display a waveform just after the point where the signal passes through a voltage level of your choosing. Trigger commands control all aspects of digitizing oscilloscopes triggering. Use them to trigger acquisition of data at specific points of interest, such as voltage levels or derivatives.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRIGGER LEVEL</td>
<td>Set the trigger level to midrange</td>
</tr>
<tr>
<td>TRIGGER: HOLDoff: VALUE</td>
<td>Query the actual trigger holdoff</td>
</tr>
<tr>
<td>TRIGGER: INTRate</td>
<td>Requested clock rate for internal clock trigger source</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRIGGER MAIN: EDGE: SLICE</td>
<td>Same as TRIGGER: LEVEL</td>
</tr>
<tr>
<td>TRIGGER MAIN: HOLDoff: ACTUAL</td>
<td>Same as TRIGGER: HOLDoff: VALUE</td>
</tr>
<tr>
<td>TRIGGER MAIN: MAXSampleRate</td>
<td>Same as TRIGGER: MAXSampleRate</td>
</tr>
</tbody>
</table>

### Table 2-18: Trigger Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRIGGER</td>
<td>Set the trigger level to midrange</td>
</tr>
<tr>
<td>TRIGGER: HOLDoff: ACTUAL</td>
<td>Query the actual trigger holdoff</td>
</tr>
<tr>
<td>TRIGGER: INTRate</td>
<td>Requested clock rate for internal clock trigger source</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRIGGER MAIN: EDGE: SLICE</td>
<td>Same as TRIGGER: LEVEL</td>
</tr>
<tr>
<td>TRIGGER MAIN: HOLDoff: ACTUAL</td>
<td>Same as TRIGGER: HOLDoff: VALUE</td>
</tr>
<tr>
<td>TRIGGER MAIN: MAXSampleRate</td>
<td>Same as TRIGGER: MAXSampleRate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRIGGER MAIN: MODE</td>
<td>Same as TRIGGER: MODE</td>
</tr>
<tr>
<td>TRIGGER MAXSampleRate</td>
<td>Same as TRIGGER: MAXSampleRate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRIGGER MODE</td>
<td>Same as TRIGGER: MODE</td>
</tr>
<tr>
<td>TRIGGER MAXSampleRate</td>
<td>Same as TRIGGER: MAXSampleRate</td>
</tr>
</tbody>
</table>

**Note:**
- *PUD*: Query or set User Protected Data
- *RST*: Reset
- *SRE*: Service request enable
- *STB*?: Wait to continue
### Commands

- **Waveform Commands**
  - `SELECT: WFM <channel>`: Select waveform data points for a collection of values that define a waveform. One data value usually represents one data point in the display window.
  - `DISPLAY: SCALAR`: Waveform data points are displayed as a collection of values that define the waveform.

### Vertical Commands

- **Table 2-13: Vertical Commands**
  - `CH<channel>.POSITION`: Vertical position
  - `CH<channel>.OFFSET`: Vertical offset
  - `CH<channel>.PROBE`: Vertical probe attenuation

- **TRIGGER Commands**
  - `TRIGGER:STATE`: Trigger status
  - `TRIGGER:SOURCE`: Trigger source
  - `TRIGGER:SLOPE`: Trigger slope

### Table 2-15: Trigger Commands (Cont.)
Waveform Data/Record Lengths

The waveform data is transferred in blocks consisting of 1, 2, 4, or 8 data points, depending on the address specified in the data command. The first data point in each block is transferred first, followed by subsequent data points in ascending order. The maximum number of data points that can be transferred in one block is 8.

Binary data can be represented by signed integer or positive integer values. The range of the values depends on the binary width specified. When the binary width is 16, the range is -32768 to 32767.

An example ASCII waveform data string may look like this:

```

```

Waveform Data Formats

Data points that are located below the waveform will be ignored when the DATA STOP command is issued. Data points that are located above the waveform will be stored in the DATA START command. If the DATA STOP command is issued, data points will be stored starting with the first data point located above the waveform record. For example, when transferring data into the digitizing oscilloscope, you must specify the data points of the waveform record.

The DATA START and DATA STOP commands let you specify the first and last data points of the waveform you can transfer a portion of the waveform or you can transfer the entire record. You can transfer up to 10 000 data points of each waveform record. You can transfer each waveform record.
Syntax and Commands

Command:

Step 2: Specify the waveform data format using the DATA:FORM command.

Source:

Step 1: Select the waveform source(s) using the DATA:SOURCE command. You can transfer waveforms from the digitizing oscilloscope to an external controller using the following sequence:

- Transfer waveform data.

- Scaling waveform data.

- Waveform preamble.

- Allocate waveform memory.

- Waveform data locations and memory allocation.

Transfering waveform data from the digitizing oscilloscope:

Using information from the waveform preamble, waveform data points can be converted into voltage values for analysis. Once the waveform data has been transferred to the controller, the waveform preamble:

- Provides information about the waveform data.

- Contains information about the horizontal scale, the vertical scale, and other settings.

- Allows conversion of waveform data points into voltage values.

Scaling waveform data:

Each waveform that is transferred has an associated waveform preamble.

Waveform preamble:

For each reference location, the command lets you specify the memory size.

ALLOCATE:WAVEFORM:REF <x> command.

The specified location must be defined before the data can be stored. The specific location can be specified by the DATA:DEST command.

The memory size for the reference memory location can be specified by the DATA:DEST command.

Only one waveform can be transferred to the digitizing oscilloscope at a time. Waveforms sent to the digitizing oscilloscope are always stored in one location. Only one waveform can be transferred at one time.

Storing waveforms from the digitizing oscilloscope:

Multiple waveforms can be transferred at one time.

The DATA:SOURCE command specifies the location of the data when transferred.
### Table 2-26: Waveform Commands

<table>
<thead>
<tr>
<th>Description</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 7: Transient the waveform data to the digitizing oscilloscope using the CURVE? query.</td>
<td></td>
</tr>
<tr>
<td>Step 6: Transfer the waveform preamble information using the WFMPRE? query.</td>
<td></td>
</tr>
<tr>
<td>Step 5: Transfer the waveform data to the digitizing oscilloscope using the WFMPRE? command.</td>
<td></td>
</tr>
<tr>
<td>Step 4: Specify the number of bytes per data point using the DAT:STOP command.</td>
<td></td>
</tr>
<tr>
<td>Step 3: Specify the reference memory location for the waveform data using the DAT:START command.</td>
<td></td>
</tr>
<tr>
<td>Step 2: Specify the memory size for the reference location specified in the previous steps using the ALLOCATE:WAVFORM command.</td>
<td></td>
</tr>
<tr>
<td>Step 1: Specify the reference memory location for the waveform using the DATA:DESTINATION command.</td>
<td></td>
</tr>
<tr>
<td>You can transfer waveform data to one of the four reference memory locations using the CURVE? query.</td>
<td></td>
</tr>
</tbody>
</table>

**Command Groups**
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z-axis offset</td>
<td>MUNIT: ZOFF</td>
</tr>
<tr>
<td>Z-axis scale factor</td>
<td>MUNIT: ZMULT</td>
</tr>
<tr>
<td>Offset voltage</td>
<td>MUNIT: ZVREF</td>
</tr>
<tr>
<td>Vertical units</td>
<td>MUNIT: VTILT</td>
</tr>
<tr>
<td>Vertical offset</td>
<td>MUNIT: VOFF</td>
</tr>
<tr>
<td>Vertical scale factor</td>
<td>MUNIT: VMULT</td>
</tr>
<tr>
<td>Horizontal origin offset</td>
<td>MUNIT: XZER0</td>
</tr>
<tr>
<td>Horizontal units</td>
<td>MUNIT: XUNIT</td>
</tr>
<tr>
<td>Horizontal offset</td>
<td>MUNIT: XOFF</td>
</tr>
<tr>
<td>Horizontal scale factor</td>
<td>MUNIT: XMUL</td>
</tr>
<tr>
<td>Horizontal sampling interval</td>
<td>MUNIT: XINC</td>
</tr>
<tr>
<td>Curve identifier</td>
<td>MUNIT: XID</td>
</tr>
<tr>
<td>Trigger position</td>
<td>MUNIT: P-REL</td>
</tr>
<tr>
<td>Format of curve points</td>
<td>MUNIT: P-PTX</td>
</tr>
<tr>
<td>Number of points in the curve</td>
<td>MUNIT: N-PTX</td>
</tr>
<tr>
<td>Preamble encoding method</td>
<td>MUNIT: ENCODE</td>
</tr>
<tr>
<td>Preamble checksum of waveform</td>
<td>MUNIT: CROCKX</td>
</tr>
<tr>
<td>Preamble byte order of waveform</td>
<td>MUNIT: BTT-ORX</td>
</tr>
<tr>
<td>Preamble byte width of waveform</td>
<td>MUNIT: BYT- NIX</td>
</tr>
<tr>
<td>Preamble binary encoding type</td>
<td>MUNIT: BIN- FMT</td>
</tr>
<tr>
<td>Preamble bit width of waveform</td>
<td>MUNIT: BIT- NIX</td>
</tr>
<tr>
<td>Returns waveform format data</td>
<td>( \text{varchar})</td>
</tr>
<tr>
<td>Returns the waveform preamble and curve data</td>
<td>( \text{varchar})</td>
</tr>
<tr>
<td>Returns the waveform points</td>
<td>( \text{varchar})</td>
</tr>
<tr>
<td>Byte width of waveform points</td>
<td>DATA: WIDTH</td>
</tr>
<tr>
<td>Same as DATA: DESTINATION</td>
<td>DATA: TARGET</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DATA: STOP</th>
<th>CURVE?</th>
<th>Ending point in waveform record for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Header</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Header</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>Vertical zoom scale</td>
<td>Vertical zoom position</td>
<td></td>
</tr>
<tr>
<td>Zoom: SCALE</td>
<td>Zoom: POSITION</td>
<td></td>
</tr>
<tr>
<td>Zoom: SCALE</td>
<td>Zoom: POSITION</td>
<td></td>
</tr>
<tr>
<td>Zoom: SCALE</td>
<td>Zoom: POSITION</td>
<td></td>
</tr>
<tr>
<td>Zoom: SCALE</td>
<td>Zoom: POSITION</td>
<td></td>
</tr>
<tr>
<td>Horizontal zoom scale</td>
<td>Horizontal zoom position</td>
<td></td>
</tr>
<tr>
<td>Zoom: SCALE</td>
<td>Zoom: POSITION</td>
<td></td>
</tr>
<tr>
<td>Zoom: SCALE</td>
<td>Zoom: POSITION</td>
<td></td>
</tr>
<tr>
<td>Zoom: SCALE</td>
<td>Zoom: POSITION</td>
<td></td>
</tr>
<tr>
<td>Horizontal zoom lock</td>
<td>Horizontal zoom scale factor</td>
<td></td>
</tr>
<tr>
<td>Vertical offset</td>
<td>Vertical units</td>
<td></td>
</tr>
<tr>
<td>Vertical offset</td>
<td>Vertical units</td>
<td></td>
</tr>
<tr>
<td>Vertical offset</td>
<td>Vertical units</td>
<td></td>
</tr>
<tr>
<td>Vertical offset</td>
<td>Vertical units</td>
<td></td>
</tr>
<tr>
<td>Horizontal units</td>
<td>Horizontal units</td>
<td></td>
</tr>
<tr>
<td>Horizontal units</td>
<td>Horizontal units</td>
<td></td>
</tr>
<tr>
<td>Horizontal units</td>
<td>Horizontal units</td>
<td></td>
</tr>
<tr>
<td>Horizontal units</td>
<td>Horizontal units</td>
<td></td>
</tr>
<tr>
<td>Cue identifier</td>
<td>Higher position</td>
<td></td>
</tr>
<tr>
<td>HP-Off</td>
<td>Format of cue points</td>
<td></td>
</tr>
<tr>
<td>Number of points in the curve</td>
<td>Z-axis origin offset</td>
<td></td>
</tr>
<tr>
<td>Z-axis units</td>
<td>Z-axis units</td>
<td></td>
</tr>
<tr>
<td>Z-axis units</td>
<td>Z-axis units</td>
<td></td>
</tr>
</tbody>
</table>

Table 2-2: Zoom Commands (Cont.)

Table 2-3: Waveform Commands (Cont.)
ACQquire? (Query Only)

Group: Acquisition

Syntax: ACQUIRE?

Examples:
- ACQUIRE?
ymight return the string: ACQUIRE; STOPAFER; RUNSTOP; STATE
- 1; MODE; NORMAL; NUMBER 10, NUMBER 16; for the current acquisition parameters.

This manual spells out headers, mnemonics, and arguments with the minimal spelling shown in upper case. For example, to use the abbreviated form of the ACQUIRE:MODe command just type ACQ:MOD.
mode: 

Examples: 

Envelop: mode

Many individual waveform records are summed to display a waveform that is an envelope of 

Examples: 

Average: mode

The envelop waveform is set of numerically using the Acquire: NumWay command.

The number of waveform records that go into making up the envelope waveform is set on 

Examples: 

Normal: mode

The resulting waveform shows an average of data points from several separate waveform records. The number 

Examples: 


Acquisition: commands

Group

The Acquisition mode, which you set using this Acquire:Mode command, 

determines how the final value of the waveform is generated from the many 

horizontal scale (time per division).

The acquisition interval represents a time duration that is determined by the 

Waveforms are the data point values taken from acquisition intervals. Each 

acquisition menu.

This command is equivalent to setting mode in 

Scope of queries the acquisition mode of the digitalizing oscilloscope. This
ACQuire: NUMAcq? (Query Only)

Indicates the number of acquisitions that have taken place since starting acquisition. This value is reset to zero when any Acquisition, Horizontal or vertical arguments that affect the waveform are modified. The maximum number of acquisitions that can be counted is 2,048 - 1. Counting stops when this number is reached. This is the same value that is displayed in the upper left corner of the screen when RUN/STOP is pressed.

Group: Acquisition

ACQuire: STATE

Syntax: ACQuire: NUMAcq?

Returns: <NRI>

Examples: ACQuire: NUMAcq?

might return 350, indicating that 350 acquisitions took place since an ACQUIRE: STATE RUN command was executed.
Command Descriptions

ACQUIRE:NUMAVg

Sets the number of waveform acquisitions that make up an averaged waveform. This is equivalent to setting the Average count in the Acquire Mode side menu.

Group: Acquisition

Syntax: ACQUIRE:NUMAVg

Arguments:

<NR1> is the number of waveform acquisitions, from 2 to 10,000. Most changes in instrument settings will cause the average to restart (for example, changes in horizontal or vertical settings).

Examples:

ACQUIRE:NUMAVg 10

specifies that an averaged waveform will show the result of combining 10 separately acquired waveforms. ACQUIRE:NUMAVg? might return 15, indicating that there are 75 acquisitions specified for averaging.
ACQUIRE: NUMERO

To separate acquired waveforms. Specify that an envelope waveform will show the result of combining enveloped waveforms. May return 0, indicating that acquisitions are acquired initially.

ACQUIRE: NUMERO?

Examples:

If you set the acquisition system to single sequence, envelope oscilloscope will envelope a maximum of 2001 acquisitions. Set mode and set the number of envelopes to initiate the digitizing. Changes in instrument settings will cause the envelope to restart.

NOTE

INITIOTE <NRT> = 0 specifies continuous enveloping. If NRT # 0 is the number of waveform acquisitions, from 1 to 2000. Most arguments:

< NRT >

Syntax:

ACQUIRE: MODE

Related commands:

Group: Acquisition

Side menu:

ACQUIRE: NUMERO?

Command Descriptions
ACQUIRE

ACQUIRE: STATE

Syntax:

ACQUIRE: STATE | OFF | ON | STOP | RUN | < NET >

Related commands:

ACQUIRE: NUMACQ?

Group:

Acquisition

Running:

Returns either 0 or 1, depending on whether the acquisition system is

acquired (NUMACQ) to zero.

Starts acquisition of waveform data and resets the number of acquisition.

Examples:

Arguments:

Off or stop or < net > = 0 stops acquisition.

Exemptions:

Averaging or monitoring. Run resets the sequence, discarding any data
accumulated before the stop. It also resets the number of acquisitions.
NOTE

Single sequence mode.

Stop button will also stop acquisition when the digitizing oscilloscope is in
stop mode. However, if the acquisition mode is set to acquire 100 waveforms,
the digitizing oscilloscope will stop if it is unable to acquire a single
waveform. If the digitizing oscilloscope is unable to acquire enough waveforms
to satisfy the command, the oscilloscope will repeat the acquisition.

Syntax:

ACQUIRE:STOPPATTERN <sequence>

Arguments:

RUNSTOP:STOPPATTERN

Related Command:

ACQUIRE:MODE

Group:

Acquisition

Command Description:

Equivalent to setting Stop After in the Acquire menu. This is the
digitizing oscilloscope when to stop taking acquisitions. This is.
There are 3 aliases named SETUP1, TESTMENU, and DEFAULT.

**Examples:**

```
ALIAS: CATALOG

['QSCRTING', 'QSCRTING']
```

**Returns:**

**Syntax:**

ALIAS: CATALOG

**Group:**

ALIAS

No aliases are defined. The query returns the string "".

**Returns:**

A list of the currently defined aliases labels, separated by commas. If

```
ALIAS: CATALOG (query only)
```

**Returns:**

When the aliases are on.

```
ALIAS?
```

**Syntax:**

```
ALIAS?
```

**Arguments:**

```
ON <NR> | OFF | NO
```

The specified command sequence is substituted for the aliases and executed.

When a defined alias is received, alias "" will be generated.

When alias is OFF, an execution error 102, ""Syntax error: illegal use of

```
OFF <NR> | <NR> = 0 | 0
```

```
```

**Aliases:**

```
ON <NR> | OFF | NO
```

The specified command sequence is substituted for the aliases and executed.

When a defined alias is received, alias "" will be generated.

When alias is OFF, an execution error 102, ""Syntax error: illegal use of

```
OFF <NR> | <NR> = 0 | 0
```

```
```

**Syntax:**

ALIAS?

**Group:**

ALIAS

```
ALIAS: STATE command.
```

This command is identical to the

```
ALIAS
```

Command Descriptions
Example:

```
ALIAS:DEFINE "STI", .RECALL;STEPUP 5;ALUS;SELECT:CH.
```

First delete the existing alias.

To give a new alias the name of an existing alias, you must attempt to give two aliases the same name causes an execution error.

**NOTE**

mands (see page 2-4). The sequence must be >= 80 characters.

The second effecting <ideal> or <block> is a complete sequence of program characters.

and underscores other characters are not allowed. The label must be >= 12
name labels must start with a letter and can contain only letters, numbers.

The first effecting is the alias label. This label cannot be a command.

```
<STRING> <STRING> \{ <block> | <STRING> <STRING> \}
```

**Syntax:** Aliases

**Group:** Aliases

Is, aliases can include other aliases with up to 10 levels of recursion. 
Up to 10 aliases can be defined at one time. Aliases can be recursive. That

Aliases::DEFINE queries return the definition of a selected alias.

Aliases::DEFINE may provide ALIAS::STATE has been linked on the
mand of query provided ALIAS::STATE was entered. It is recursive as a com-
sage is then subjected for the alias whether it is referenced by a com-

```
ALIAS:DEFINE
```

Command Descriptions
**Example:**

```
DELETE: ALL
```

**Syntax**

```
DELETE: ALL
```

**Group**

**Aliases**

```
DELETE: ALL
```

**Delete all aliases.**

**Examples:**

```
DELETE: ALL
```

**Note:**

- The `DELETE` command is used to remove aliases.
- Use `DELETE: ALL` to remove all defined aliases.

**Arguments:**

- `<string>`

**Example:**

```
DELETE: ALL
```

**Syntax**

```
DELETE: ALL
```

**Group**

**Alias:**

**Delete all existing aliases.**

**Example:**

```
DELETE: ALL
```

**Note:**

- Use `DELETE: ALL` to remove all defined aliases.
- This command is identical to `DELETE: NAME`.
Returns 0 when alias mode is off.

**Examples:**

```
ALIAS: STATE
```

**Arguments:**

- OFF or STATE

The specified command sequence is substituted for the alias and executed.

**OFF:** A command error (102) will be generated.

**STATE:** The command is OFF a command error (102) will be generated.

**Syntax:**

```
{ OFF | STATE }
```

**Group:**

Alias

Turns aliases on or off. This command is identical to the Alias command.

```
ALIAS: STATE
```

**Examples:**

```
ALIAS: DELETE "NAME" "STATE"
```

**Arguments:**

- STRING

This command removes a specified alias. This command is identical to Alias:DELETE.

```
ALIAS: DELETE:NAME (NO QUERY FORM)
```

Command Descriptions
command string is right justified.

command_string = <message> command <message>

the character limit of the message command strings combined. The
command string is returned as possible with no exceeding the 60
when a command error is detected by the digitizing oscilloscope as much
when a command error is caused the error and may be returned.

Message: <command>!

Example: 

```
GETTING = MESSAGE

```

Returns: The event code and message in the following form:

```
GETTING <command>
```

Syntax:

```
ALTER?
```

Related Commands:

- CLS, DES, *ESE?, *EVEN?, *EWM?, *EVT?, *RFE, *STB?

Status and error

to the instrument

to the instrument
page 31. This command is similar to repeatedly sending EVMSG? queries
resulting for a complete discussion of the use of these registers. see
separated by commas. Use the *ESE? query to enable the events to be
and removes the residual events from the Event Queue. The messages are
Causes the digitizing oscilloscope to return all events and their messages.
allocate:waveform? (query only)

Example: ALLOCATE?

Syntax: allocate:waveform?

Group: Save and Recall

Description: Returns the number of data points allocated for all four reference memories.
poses. Available for allocation. The extra 20 are used for administration purposes.

malloc return 520 indicating there are approximately 500 data points available.

Examples:
ALLOCATE: WAVEFORM: FREE?

Returns: NAL > is the approximate number of data points available.

ALLOCATE: WAVEFORM: FREE?

Syntax: Save and Recall

Group: select

Returns: the approximate number of data points that have not been allocated:

ALLOCATE: WAVEFORM: FREE? (query only)
might return 500

allocate waveform:ref?

Reserves 15,000 data points for REF.

allocate waveform:ref 15000

Cannot exceed 50000 data points.

The reference memory size of the four reference locations combined
cannot exceed 50000 data points, and those higher than 50000 will be
stored in the next highest valid value. All invalid values less than 50000 will be
returned.

Arguments:

nrt = 0 is returned when the reference location is empty.

Syntax:

allocate waveform:ref<x>

Allocate waveform:ref<x>?

Save and Recall:

Allocated memory is not allocated. An execution error is generated and the
memory is not allocated.

Once allocation, if an attempt is made to allocate memory when it is not
available, the number of waveform data points for the specified referen-

Command Descriptions
ApplMenu ACTIVATE

Displays the application menu.

**Examples**

ApplMenu ACTIVATE

Page 3-7 for a complete discussion of the use of these registers.

See page 3-7 for event codes.

Menu button presses will also generate Service Request when the UNO bit

Once the application menu is activated, whenever a front-panel menu

button is pressed an event is generated that tells which button was pressed.

**Arguments**

ApplMenu ACTIVATE

To deactivate the Application menu, use the CLEAR MENU command.

Related Commands:

CLEAREVEN

Group:

Application Menu

Current Application Menu labels and title. This is equivalent to pressing the

front-panel APPLICATION button.

Displays the user-definable Application menu and the query returns the

ApplMenu Command Descriptions
space 1 characters 1 to position the label within a line.

The string to position the label on multiple lines. You can use white
horizontally, or a single label. A line label can be embedded in
The label is displayed on a single line and is centered both vertically and
specify the main menu button.

If more than 1000 characters, the label is displayed in the area above the
shown in the TDG character chain or appended. The maximum length of
string is the menu button label and can include any of the characters

**Arguments**

```c
<STRING> <NUMBER>
```

**Syntax**

Application Menu

**Group**

*AppMenu: Label* :: <x>

**Command Descriptions**

- `AppMenu: Label::CLEAR` clears the user-defined menu labels from the display.

**Examples**

From panel, bezel button presses will continue to generate events.

- `CLEAR` removes the main and side menu button labels from the display.

**Arguments**

- 

**Group**

*AppMenu: Label*
A tab can be sent by sending a tab character (decimal 9) followed by two numeric characters that specify the pixel column relative to the left margin of the label area. The ESC @ character turns reverse video on and off, and can be embedded in the label string. The first ESC @ character displays all text following the ESC @ in reverse video until another ESC @ character is found in the string.

**NOTE**

The use of undocumented codes may produce unpredictable results.

The label area is 45 pixels high and 90 pixels wide. The length of the label that fits in the label area depends on the contents of the label, because the width of characters varies. The label area is about 10 characters wide and 3 lines high. For a complete list of character widths in pixels, see Table A-1 on page A-1.

If the label exceeds the limits of the label area, either horizontally or vertically, the portion of the label that exceeds the limits will not be displayed. Note that the label itself is not altered. The entire label can be returned as a query response regardless of what is displayed.

**Examples:**

```
APPEND: LABEL: BOTTOM3 "SETUP1"
```

assigns the label "SETUP1" to the third main menu button.
displays the label "TEST ON" next to the top side menu button.

**Examples:**

```
APPMENU::LABEL::RIGHT::"TEST ON"
```

**Arguments:**

- `&string` is the menu button label and can include any of the characters shown in the page character chart.

**Syntax:**

```
APPMENU::LABEL::RIGHT::&string
```

**Group:** Application Menu

**Description:**
From 1 to 5 strings with the top-most button. Menu buttons are located on the right side of the display and are numbered. Defines a label for the side menu button that is specified by &string.
might return "Test Setup" for the current application menu title.

```
APPMENU:TITLE
```

dispplays the title "Custom Menu" on the screen.

```
APPMENU:TITLE "Custom Menu"
```

**Examples:**


- For a complete list of character widths in pixels, see Table A1 on lines 10-1. For a complete list of character widths in pixels, see Table A1 on width of characters varies. The label area is about 12 characters wide and 2 width of characters varies. The label area is about 12 characters wide and 2 that ties in the label area depends on the context of the label, because the label area is 40 pixels high and 112 pixels wide. The length of the label area is 40 pixels high and 112 pixels wide.

**Arguments:**

- `<string>` is the side menu title and can include any of the characters shown in the PDES Character Chart in Appendix C. The maximum length of the menu title is 100 characters. All menu labels also apply to the title is not more than 100 characters. All menu labels also apply to the title is not more than 100 characters.

**Syntax:**

```
APPMENU:TITLE <string>
```

**Related commands:**

- `APPLICATION MENU`:
- `APPLICATION LABEL`:
- `APPMENU, APPMENU LABEL`:

- above the side menu.

Set or queries the user-defined application menu title. The title is displayed.
BELL

Examples:

BELL

Syntax:

BELL

Miscellaneous

Group:

BELL (NO QUERY FORM)

Arguments:

EXECEute

NOTE

The AUTOSET command does not return control to the instrument until the AUTOSET operation is complete.

Syntax:

AUTOSET EXECEute

Miscellaneous

Group:

AUTOSET (NO QUERY FORM)
### BUSY? (Query Only)

**Group:**

*OPC, *WAI

**Syntax:**

BUSY?

**Returns:**

BUSY?

### Command Descriptions

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUSY?</td>
<td>Returns the status of the digitizing oscilloscope. This command allows you to synchronize the operation of the digitizing oscilloscope with your application program. Synchronization methods are described on page 3-7.</td>
</tr>
</tbody>
</table>

### Table 2-22: Commands That Affect BUSY? Response

<table>
<thead>
<tr>
<th>Operation</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single sequence acquisition</td>
<td>ACQ:ACQUIRE:STATE ON or ACQ:ACQUIRE:STATE RUN (when ACQ:ACQUIRE:STOP is set to SEQUENCE)</td>
</tr>
<tr>
<td>Limit test comparison</td>
<td>LIMIT</td>
</tr>
<tr>
<td>Hardcopy output</td>
<td>HARDCOPY:START</td>
</tr>
</tbody>
</table>

### Examples

BUSY? might return 1, indicating that the instrument is busy.
The calibration was successful.
Perform an internal self-calibration and might return 0 to indicate that

Example:

<table>
<thead>
<tr>
<th>Code</th>
<th>No Error</th>
<th>The calibration has failed</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No Error</td>
<td>The calibration has failed</td>
</tr>
</tbody>
</table>

Table 2.23: Calibration Error Codes

Complied with errors. See Table 2.23 for error code meanings.
NRT = 0 indicates that the calibration did not complete successfully or
detected.
NRT ≠ 0 indicates that the calibration completed without any errors

Returns:

Syntax:

Related Commands:
CALBRATE
Calibration and Diagnostic

Note:

Active channels can cause calibration errors.
All channels should be inactive before you issue this command.

Other commands will be executed until calibration is complete.
The self-calibration can take 15 seconds or more to respond. No

Command Descriptions

*CAL? (Query Only)
performs the internal self-calibration.

**Examples**

```
CALIBRATE:ALL START
```

**Arguments**

START starts the internal self-calibration.

---

**NOTE**

- All channels should be inactive before you issue this command.
- All channels will be executed until calibration is complete.

- The calibration can take 15 seconds or more to respond. No other commands will be executed until calibration is complete.
- All channels will be executed before you calibrate the instrument. This is equivalent to executing CALIBRATE:ALL before you calibrate the instrument. This is not necessary to execute CALIBRATE:ALL.
- CALIBRATE:ALL calibrates all channels and the horizontal and vertical base voltages for all channels.
- The CALIBRATE:ALL command is used for debugging the digitizing oscilloscope.
might return PASS, indicating that the instrument is calibrated properly.

**Examples:**

```
calibrate:all:status?
```

- **Default:** and must be calibrated before it is used.
- **INIT** means that the digitizing oscilloscope has been restored to its initial
  menu item on the SYSTEM I/O item in the Utility menu.
- **FAIL** means that the digitizing oscilloscope is not properly calibrated. Look
  at the error log to determine the specific error. Use the Diagnosis pop-up
  menu for help with troubleshooting.
- **PASS** means that the digitizing oscilloscope is properly calibrated.

**Returns:**

```
FAIL
```

**Syntax:**

```
calibrate:all:status?
```

**Related Commands:**

- `CAL?`, `calibrate:all`

**Group:**

Calibration and Diagnostics

---

**NOTE**

Activate channels can cause calibration errors.
All channels should be inactive before you issue this command.

The self-calibration.

```
calibrate:all:status? (query only)
```

Command Descriptions
CH<x>? (Query Only)

Command Descriptions

Returns the vertical parameters. Because CH<x>: SCALE and CH<x>: VOLts are identical, only CH<x>: SCALE is returned.

Group: Vertical
Syntax: CH<x>?

Examples:
CH1?
might return the string: CH1: SCALE 10.05E-3
OFFSET 0.0E+0, for channel 1.
that come with your probe for these values. If you are using a probe with probe tip offset capability, your probe's offset is 

Arguments:
NP3 < CHX:OFFSET

Related commands:
CHX:POSITION

Group: Vertical

menu.

G.5 volts.

might return 500.05-3. indicating that the current channel 1 offset is

Examples:
CHX:OFFSET 0.5E+00

lower the channel 1 displayed waveform by 0.5 volts.

When using probes with an attenuation factor greater than 1x, multiply 
these numbers by the probe attenuation factor to get the offset for exam-

Argument:
NP3 < is the desired offset in volts. The range depends on whether delay 

<CHX:OFFSET

Syntax:
<CHX:OFFSET<br>

<CHX:POSITION

Vertical
Sets or queries the vertical position of the specified channel. The position value is applied to the signal before digitization. This is equivalent to setting Position in the vertical menu or adjusting the front-panel Vertical Position knob.

**CH<x>::POSITION**

**Group:** Vertical

**Related Commands:** CH<x>::OFFSet

**Syntax:** `CH<x>::POSITION <NR3>`

**Arguments:**
- `<NR3>` is the desired position, in divisions from the center graticule. The range is ±5 divisions.

**Examples:**
- CH1::POSITION 1.3E+00 positions the channel 1 input signal 1.3 divisions above the center of the display.
- CH1::POSITON might return 1.3E-00, indicating that the current position of channel 1 is at -1.3 divisions.

**CH<x>::PRObe? (Query Only)**

**Group:** Vertical

**Syntax:** `CH<x>::PRObe?`

**Returns:** The attenuation factor of the probe that is attached to the specified channel.

**Examples:**
- CH1::PROBE? might return 100.0E-3 for a 10x probe.
Sets or queries the channel external attenuation factor.

The probe attenuation of an active probe attached to a channel and the external attenuation for that channel are multiplied. The external attenuation factor is displayed in the VERTICAL MENU → Probe Functions (main) → External Attenuation (side) menu.

Arguments:

CH:<x> PROBE:EXTAtt <N1> sets the external attenuation factor, from 1E+6 to 1E-6.

Examples:

CH:PROBE:EXTAtt? returns 1000X, indicating 1X external attenuation.
Syntax: CH<x>: PROBEFUNCTION: EXTDATEN <NR3>

Example:

CH2: PROBEFUNCTION: EXTDATEN 30

Arguments:

> NR3 <

120 dB.

NR3 is the external attenuation factor in decibels. From -120 dB to 120 dB.

Vertical

Sets or queries the channel external attenuation factor in dB units.

CH<x>: PROBEFUNCTION: EXTDATEN
CH>:=VOLTS?

Syntax

CH>:=VOLTSenames

Related Commands:
CH:=SCALE
Group: Vertical

Purpose: Only CH>:=SCALE is returned in response to a CH>:=query.

Internal to the CH>:=SCALE command and is included for compatibility.
Sets or queries the vertical gain of the specified channel. This command is

CH>:=VOLTS

channel 2 is 500 m/Div.

might return 500.0 0-3 indicating the current V/Div setting of

CH>:=SCALE?

sets the channel 2 gain to 100 m/Div.

Examples:

CH>:=SCALE 100-0.3

when using a 1x probe.

Arguments:

NR3 < is the gain, in volts per division, the range is 10 V/Div to 1 MV/Div

CH>:=VOLTS

CH>:=SCALE?

Syntax

CH>:=SCALEenames

Related Commands:
CH>:=VOLTS
Group: Vertical

Call SCALE knob.

To setting fine SCALE in the Vertical menu on adjusting the front-panel Vertical
Sets or queries the vertical gain of the specified channel. This is equivalent

CH>:=SCALE

Command Descriptions
The CLS command clears the display.

**Examples:**
- `CLEARMENU`
- `CLEARMENU`
Example

```
CURSOR? A=THE CURSOR SETTINGS.
CURSOR? A=CURSOR: POSITION 3,20+0; POSITION 3,20+0;
CURSOR? A=CURSOR: POSITION 3,20+0; POSITION 3,20+0;
CURSOR? A=CURSOR: POSITION 3,20+0; POSITION 3,20+0;
CURSOR? A=CURSOR: POSITION 3,20+0; POSITION 3,20+0;
```

Syntax

```
CURSOR?
```

Group: Cursor

Returns all current cursor settings.
CURSOR:FUNCTION  VARARS

Examples:
PARLED  specifies paired cursors that show both line and vertical.
VARS  specifies vertical bar cursors that measure time.
OFF  removes the cursors from the display.
HARS  specifies horizontal bar cursors that measure volts.

Arguments:

CURSOR:FUNCTION

Syntax:

Related Commands:
SELECT:FUNCTION

Group:
CURSOR

Menu:

CURSOR:FUNCTION

Command Descriptions:

Selects vertical bar type cursors.

Example:

PARLED  specifies paired cursors that show both line and vertical.
VARS  specifies vertical bar cursors that measure time.
OFF  removes the cursors from the display.
HARS  specifies horizontal bar cursors that measure volts.

Arguments:

CURSOR:FUNCTION

Syntax:

Related Commands:
SELECT:FUNCTION

Group:
CURSOR

Menu:

CURSOR:FUNCTION

Command Descriptions:

Selects vertical bar type cursors.

Example:

PARLED  specifies paired cursors that show both line and vertical.
VARS  specifies vertical bar cursors that measure time.
OFF  removes the cursors from the display.
HARS  specifies horizontal bar cursors that measure volts.

Arguments:
CURSOR: HBAR3:DELETE (query only)

**Description:**
You have since changed the values per division. The function of the results of a query will be the last difference in effect, even if the vertical position is indicated on the vertical axis of the screen. The range depends on the vertical axis of the cursor menu. You may return to the default settings in effect, even if the vertical position is also indicated in a readout at the top right of the vertical cursor. The range used for the current settings for the horizontal bar cursor. If you return to the default settings, the cursor in display.

**Syntax:**
CURSOR: HBAR3:DELETE

**Example:**
CURSOR: HBAR3:DELETE

**Group:** Cursor
Arguments:

NR3 specifies the cursor position relative to ground in volts.

Examples:

Position one of the horizontal cursors at 25.0 mV.

You have since changed the volts per division.

The position reported is related to the position of the cursors in display.

The cursor menu:

At the top right of the screen after executing the HBARs side menu item or positioning a horizontal bar cursor, the position is also indicated in a readout.

CURSOR: HBARs: POSITION

Command Descriptions
Cursors are selected to provide a solid or dashed horizontal line. The selected cursor is active for front-panel control. The command "Select" displays the active cursor. The command "Cursor" displays the cursor menu. The command "Cursors: Headers: Select" selects the first horizontal bar cursor as the active cursor. The command "Cursors: Headers: Select: Cursor Select cursor: Select cursor: Select" selects the second horizontal bar cursor.
might return : TRACK showing the two cursors move in unison.

Syntax:
CURSOR: MODE?

Specifies that the cursors move in unison.

CURSOR: MODE TRACK

Example:

Independent frees the two cursors to move separately of each other.

Most horizontal cursors.

This argument is valid only for "cursors" (ethmost vertical cursors and tops).

TRACK frees the two cursors together as you move the general purpose knob.

Arguments:

CURSOR, MODE?

{ Independent | TRACK }

Independent

CURSOR MODE TRACK

Related commands:
CURSOR_FUNCTION

Group:
Cursor

Each other

Selects whether the two cursors move together in unison or separately from

CURSOR: MODE

Command descriptions
CURSOR: Paired

Syntax: CURSOR: Paired SNAP

Related Commands: DATA: START, DATA: STOP, MEASUREMENT, CURSOR

Group: Cursor

Current paired cursor settings for position and cursor selection. Positions the paired cursors and the CURSOR: Paired query returns the

command descriptions.
Curson: Pairred: HPost1 (query only)

Syntax: Curson: Pairred: HPost1

Related Commands: Curson: Function

Group: Curson

Queries the horizontal bar (voltagan) position of the first paired cursor.

Examples:

\[ \text{Curson: Pairred: HPost1 (query only)} \]

Curson: Pairred: HDeltra (query only)

Syntax: Curson: Pairred: HDeltra

Related Commands: Curson: Function

Group: Curson

Queries the difference (voltagan) between the two cursors.

Examples:

\[ \text{Curson: Pairred: HDeltra (query only)} \]
CURSOR: PAIRED: POSITION

Set or query the vertical bar position of the first paired cursor.

Syntax:
CURSOR: PAIRED: POSITION NRP

Related Commands:
Cursor

Examples:
CURSOR: PAIRED: POSITION 1

Command Descriptions
CURSOR:PAIRED:POSITION

Examples:

Arguments:

Syntax:

Related Commands:

Group:

Description:
Sets or queries the vertical bar position of the second paired cursor.
CURSOR:PAIRED:VDELTA (Query Only)

Returns CURSOR when the first paired cursor is the active cursor.

Examples:
CURSOR:PAIRED:SELECT

Sets the second paired cursor as the active cursor.

Examples:
CURSOR:PAIRED:DELETE

Arguments:
CURSOR: PAIRED: SELECT

CURSOR: PAIRED: SELECT ( CURSOR )

Syntax:
CURSOR: PAIRED: SELECT

Group:
Cursor

The Cursor menu is displayed.

Command Descriptions
Position the vertical bar cursors and the CURSor:VBar.s? query returns the current vertical bar cursor settings for horizontal position, delta, cursor selection, and unit. The units used are seconds or Hertz, as indicated by the CURSor:UNIt.s command. The settings are also indicated in a readout at the top right of the screen after executing the VBar.s menu item of the Cursor menu.

The settings are related to the position of the cursors in display pixels, not to seconds per division settings. If you turn the vertical cursor function off, the results of a query will be the last settings in effect, even if you have since changed the seconds per division.

Related Commands: DATa:START, DATa:STOP

Syntax:
CURSor:VBar.s SNAP
CURSor:VBar.s?

Arguments:
SNAP positions the vertical bar cursors at DATa:START and DATa:STOP.

Examples:
CURSor:VBar.s SNAP specifies that the cursors' positions are the same as the current DATa:START and DATa:STOP values.

CURSor:VBar.s?
CURSor:VBar.s?

might return: CURSor:VBar.s:UNIt.s SECONDS, POSITION1 1.00E-6, POSITION2 9.00E-6; SELECT CURSor.s.
CURSOR:VBAR:UNITs

Returns the time of frequency between the two vertical bar cursors. The units, seconds or Hertz, are specified by the CURSOR:VBAR:UNITs command. The difference is also indicated in a readout at the top right of the screen after executing the VBARs side menu item of the Cursor menu. The difference reported is related to the position of the cursors in display pixels, not to the seconds per division settings. If you turn the vertical cursor function off, the results of a query will be the last difference reported, even if you have since changed the seconds per division.

Group: Cursor

Related Commands: CURSOR:VBARs

Syntax: CURSOR:VBAR:UNITs

Returns: <NR3>

Examples: CURSOR:VBAR:UNITs? DELTA? might return 1.064E+00, indicating that the time between the vertical bar cursors is 1.064 seconds.
CURSOR: VBARS: POSITION

Positions a vertical bar cursor. The units are specified by the CURSOR: VBAR: UNITS command. The position is also indicated in a readout at the top right of the screen after executing the VBARS side menu item of the Cursor menu.

The position reported is related to the position of the cursors in display pixels, not to the seconds per division settings. If you turn the vertical cursor function off, the results of a query will be the last position in effect, even if you have since changed the seconds per division.

Group: Cursor

Syntax: CURSOR: VBAR: POSITION [NR3]?

Arguments: CURSOR: VBAR: POSITION <NR3> specifies the cursor position in the units specified by the CURSOR: VBAR: UNITS command. The position is relative to the trigger position.

Examples: CURSOR: VBAR: POSITION 9.9E-6 positions one of the vertical bar cursors at 9.9 µs.

CURSOR: VBAR: POSITION? might return 1.0E-6, indicating that one of the vertical bar cursors is at 1 µs.
RETURN CURSOR: When the first vertical bar cursor is the active cursor.
CURSOR::VBar::SELECT

SELECT: The second vertical bar cursor as the active cursor.
CURSOR::VBar::SELECT CURSOR2

CURSOR2: Specifies the second vertical bar cursor.
CURSOR: Specifies the first vertical bar cursor.
Arguments:

CURSOR::VBar::SELECT (CURSOR | CURSOR2)

Syntax: CURSOR::VBar::SELECT

GROUP: Cursor

Toogle: Button on the front panel when the cursor menu is displayed. Placed as a dashed vertical line. This command is equivalent to pressing the knob when the cursor menu is active. The unselected cursor will be deselected with vertical bar cursor is active. The active cursor will be deselected.
Returns Hz/Sec when the vertical bar cursor units are Hertz.

Syntax: CURSOR:VARS:UNITS?

Sets the units for the vertical bar cursor to seconds.

Examples: CURSOR:VARS:UNITS SECONDS

CURSOR:VARS:UNITS?

{ Hz/Sec | Hertz | Seconds } SECONDS

Related Commands: CURSOR:VARS:DELTA, CURSOR:VARS:POSITION

Group: Cursor

Sets or queries the units for the vertical bar cursor. This is equivalent to

CURSOR:VARS:UNITS

Command Descriptions
A description of the waveform transfer process is displayed.

Related commands:
- DATA: START...
- DATA: END...
- CURVE
- DATA: WIDTH
- DATA: SOURCE...
DATA

Syntax: DATA

Arguments:

Examples:

Diagram:

Related Command: CURVE, WAVE

Group: WAVEFORM

Data

{ SNAP | INIT }

Related Command: CURVE, WAVE

Group: WAVEFORM

Examples:
selected.

DATA: DESTINATION?

stores incoming waveform data in reference memory.

Example:

Arguments:

<x> is the reference memory location where the waveform will be stored.

Syntax:

Group:

Waveform

This command is identical to the DATA: TARGET command.

<space> Data or queues the reference memory location for storing waveform data.

DATA: DESTINATION
Syntax:

```
DATA : ENCD9
```

Arguments:

ASCII  speaks the ASCII representation of signed integer (repeatedly).

Syntax:

```
DATA : ENCD9
```

Related commands:

WFMPE: ENCD9, WFMPE: ENCD9, WFMPE: ENCD9, WFMPE: ENCD9, WFMPE: ENCD9, WFMPE: ENCD9

Group:

Waveform

Description:

The DATA: ENCD9 command sets or queries the format of the waveform data. This command is equivalent to setting the WFMPE: ENCD9, WFMPE: ENCD9, WFMPE: ENCD9, WFMPE: ENCD9, WFMPE: ENCD9, WFMPE: ENCD9, WFMPE: ENCD9, WFMPE: ENCD9. The corresponding waveform values to be updated and vice versa.

Syntax:

```
DATA : ENCD9
```

Arguments:

ASCII  speaks the ASCII representation of signed integer (repeatedly).

**Note:**

When transmitting data to the device, the least significant byte is transmitted first. This is the same as the `ASCII` format, except that the byte order is swapped, meaning that the least significant byte is transmitted first. This is referred to as `ASCII` format.
Might return SP/REPI binary for the format of the waveform data.

DATA: ENC, ENC2

Significant byte is transferred first.
Sets the data encoding format to be positive integer where the most
significant byte is transferred first.

Examples:
DATA: ENC, ENC2

<table>
<thead>
<tr>
<th></th>
<th>ENC</th>
<th>ENC2</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSB</td>
<td>RP</td>
<td>RP</td>
</tr>
<tr>
<td>MSB</td>
<td>RP</td>
<td>RP</td>
</tr>
<tr>
<td>RB</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>ASCII</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 2.24: DATA and WFMPE Parameter Settings

Formal is useful when transferring data to IBM compatible PCs.
Sweeped, meaning that the least significant byte is transferred first. This
is the same as REPI, except that the byte order is

Command Descriptions
Transferred using CURVE? query.

Syntax: `DATA: SOURCE {<wm> COMMA <wm>} GROUP {<wm> COMMA <wm>}`

Example:

```plaintext
DATA: SOURCE REF2, CH2, MATH1, REF1.
```

Arguments:

- `<wm>` is the location of the waveform data that will be transferred from the digitizing oscilloscope to the controller.

Diagram:

![Diagram of data source and transfer process]

Retained through REF4.

Syntax: `DATA: SOURCE {<wm> COMMA <wm>} GROUP {<wm> COMMA <wm>}`

Example:

```plaintext
DATA: SOURCE REF2, CH2, MATH1, REF1.
```

Sets or queries the location of the waveform data that is transferred from the instrument by the CURVE? query. The source data is always transferred in a predefined order regardless of the order they are specified using this command.
DA:START

Sets or queries the starting data point for waveform transfer. This command allows for the transfer of partial waveforms to and from the digitizing oscilloscope.

Group: Waveform
Related Commands: CURVe?, DA:SNAP, DA:STOP
Syntax: DA:START?

Arguments:
<NR1> ranges from 1 to the record length, and is the first data point that will be transferred. Data will be transferred from <NR1> to DA:STOP of the record length, whichever is less. If <NR1> is greater than the record length, then no data will be transferred. When DA:START is less than DA:STOP, the values will be swapped internally for the CURVe? query.

Examples:
- DA:START 1.0 specifies that the waveform transfer will begin with data point 1.
- DA:START 1.1 might return 2.14 as the first waveform data point that will be transferred.

TDS 820 Programmer Manual
might return 14900 as the last data point that will be transferred.

```
DATA: STOP?
```

specifies that the waveform transfer will stop at data point 15000.

```
DATA: STOP 15000
```

Examples:

and DATA: STOP to the maximum record length.

If you always want to transfer complete waveforms, just set DATA:START to 1.

```
CURVE? query
```

is less than DATA:START, the values will be swapped internally for the greater than the record length, an execution error occurs. When DATA:STOP and DATA:START are transferred up to the record length, if both DATA:START and DATA:STOP are transferred, if <NR1> is greater than the record length then data will be transferred. If <NR1> ranges from 1 to the record length, and is the last data point that will be transferred.

```
<NR1> ranges from 1 to the record length, and is the last data point that will
```

Arguments:

```
<NR1> RANGE
```

Syntax:

```
DATA: STOP?
```

Related Commands:

```
CURVE?, DATA SNAP
```

Group:

```
Waveform
```

Those circumstances:

- when the command has been received. This command is therefore ignored under those circumstances.
- when the specified recording has no more data to read or when the specified recording is done. When using the CURVE command, the digitizing oscilloscope will stop.
- when using the CURVE query. This allows the transfer of partial waveforms to the controller.

Syntax:

```
DATA: STOP
```

Command Descriptions:

```
``
DATA: TARGET

Syntax: DATA: TARGET REP: x

Related Commands: CURVE, WAVEFORM

Group: Target

Command Description:

The DATA: TARGET command is included here for compatibility with older Tektronix instruments. The DATA: DESTINATION command and is equivalent to the instrument using the CURVE command. This command is equivalent to the SETS or GUESPS, the location for storing waveform data transferred to the target.
Sets the data width to 1 byte per data point for CURVE data.

**Syntax:**
```
DATA: WIDTH 1
```

**Description:**
Beyond the limits of the waveform the number of bytes will be less.

**Arguments:**
- `<NRt>` = 2 specifies that there are 2 bytes (16 bits) per point. This format reports the maximum amount of precision. This is the default.
- `<NRt>` = 1 specifies that there is 1 byte (8 bits) per point. The low order byte is not transmitted. Any data over 8 bits is truncated.

**Example:**
```
DATA: WIDTH 2, NR2
```

---

**Related Commands:**
- CURVE, WMPE, BFT.N, WMPE.BF.T.N
- WMFM

**Group:** Waveform

**Diagram:**
```
<NRt> <WIDTH> [SPACE] <DATA>
```

**Command Descriptions:**
- **DATA:**
  -`WIDTH` sets the number of bytes per data point for the waveform transferred using the CURVE command.
Examples:

```
DATE "1993-01-24"
```

Arguments:

- `dd`: refers to a two-digit day number in the month.
- `mm`: refers to a two-digit month number from 01 to 12.
- `yyyy`: refers to a four-digit year number.
- `yyyy-mm-dd`: a date in the form "yyyy-mm-dd".

Syntax:

```
DATE <string>
```

Related Commands:

- Display: CLOCK, TIME
- Miscellaneous:

Notes:

Sets or queries the date that the digitizing oscilloscope can display.

Command Descriptions:

DATE
Each time a TRG command is sent, the acquisition system will be started and the bell rings.

**Examples:**

```
*DDT #ACQUIRE:STATE RUN; BELL=EF01
```

Always returned as a query response.

**Arguments:**

- `block` or `GETTRG` is a complete sequence of program messages.

---

**DDT**

```
{<GETTRG> | <block>} DDT
```

**Syntax:**

- ALIAS: DEFINE +TRG, GET TRG interface message
- Related commands: Miscellaneous

**Miscellaneous:**

- Allows the user to specify a command or a list of commands that are executed when the instrument receives a TRG command or the GET TRG interface message. This is just a special elite Intel TRU uses.
DETELE:SETUP (NO QUERY FORM)

Command Descriptions

Examples:

DELETE:SETUP ALL

Arguments:

ARGUMENTS:

NR1 < value in the range 1 to 10, and specifies a setup storage location.

Syntax:

( ) DELETE:SETUP ( ALL | NR1 < )

Related Commands:

*RCI, RECALL, SETUP, RST, SAY, SAVE, SETUP

Group:

Save and Recall

NOTE

The setup information cannot be recovered once it has been deleted.

Default default setup.

Removes stored setups from memory and initializes the location with the
Remove all the waveforms stored in reference memory.

**Delete:WAVEFORM ALL**

**Examples:**

```
x = 1 to 4, and specifies one of the reference memory locations.
```

**Arguments:**

```
{x} = 1 to 4, and specifies one of the reference memory locations.
```

**Synopsis:**

```
{ [DELETE:WAVEFORM | REE:x] } = ALL, WAVEFORM, SAVE:WAVEFORM
```

**Related Commands:**

Save and Recall

**Group:**

**Note:**

The waveform data is not actually cleared from the reference loca-

DELETE:WAVEFORM (NO QUERY FORM)
the binary value 10111010. Might return the string 'DESE 186', showing that the DESER contains 186 bytes.

The binary to be entered into the Event Queue and summarized. Setting the DESER to the same value allows only

NOTE

DESER maintains its value through a power cycle. The power-on default for DESER is all bits set to 1. If PSC is 1, the

set to 1, the next most significant bit to 1, the next bit to 0, etc.)

are set according to this value. For example, DESER 29 sets the DESER to

> MRT < is a value in the range from 0 to 255. The binary bits of the DESER

Arguments:

Syntax:

Related Commands:

Status and Error

Command Descriptions:

Queue, for a complete discussion of the use of these registers, see page

1. The DESER is the mask that determines whether events are reported to

the Standard Event Status Register (SESR), and entered into the Event

Queue. For a complete discussion of the use of these registers, see page

DESE

DESE?
Returns either PASS or FAIL.

Examples:

FAIL:Indicating that at least one of the selected diagnostic tests have failed.

PASS:Indicating that all the selected diagnostic tests have passed.

Syntax:

```
DIAG:RESULT:FAIL?
```

Related Commands:

```
DIAG:RESULT:LOG?
```

Group:

Calibration and Diagnostic

Notes:

SUI:LOG? query can be used to determine which test(s) has failed.

Returns the pass/fail status from the last diagnostic test. The DIAG:RE-

```
DIAG:RESULT:FLAG? (Query Only)
```

Command Descriptions
Argument:
ALL selects functional, memory and register tests.

Syntax: Diag:Select:Acquisition ALL

Diag: Select: Acquisition

Groups: Calibration and Diagnostic

Setting Acquisition in the utility menu when System is set to Diag/En.
Diag: State Execute command is sent. This command is equivalent to selecting the acquisition session that will be run when the Diag:State Execute command is sent.

**Diag:Select:Acquisition (No Query Form)**

```
<Pass -- Front Panel>
Pass -- Acquisition
Pass -- Acq/Proc Interface
Pass -- Proc Interface
FAIL + Call Initialization (see Error Log)
Diag:RESULT:LOG: Pass -- Processor
Diag:RESULT:LOG: Marshal return
```

Examples:

```
[status, module name>[, status, module name>...
```

Returns:

Diag:RESULT:LOG?

**Diag:RESULT:LOG? (Query Only)**

Command Descriptions:

**Diag:RESULT:LOG?**

Diag:RESULT:LOG?

Related Commands:

Diag:RESULT:FLAG?

Groups: Calibration and Diagnostic

Status of each all modules and module interfaces that were tested along with the pass/fail.

Replies the internal results log from the last diagnostic test. The last 250 lines.
STATE was in just before the test. If the PON event was enabled before the command. When complete, the diagnostic test sequence will return to the state of the specified SELECT.

**Arguments:**

- DIAG:STATE EXCECUTE

**Syntax:**

```plaintext
STATE: EXCECUTE
```

**Group:**

Calibration and Diagnostic

**Complete:**

Return control to the instrument controller until diagnostics are ready to respond. This command performs a warm boot and does not take 30 seconds or more. The DIAG:STATE EXCECUTE command can take 30 seconds or more.

**NOTE:**

When the test sequence has completed and all of the modules of module.

Diagnosis by selecting **EXCECUTE** in the Utility menu when **SYSTEM** is set to **SPLIT**:LOG? Set. This command is equivalent to running EXCECUTE.

SYS:LOG? Query and the internal log will be returned by the DIAG:RE.

**Arguments:**

- ALL: Selects set diagnostic tests.

**Syntax:**

```plaintext
ALL: SELECT:FILENAME
```

**Group:**

Calibration and Diagnostic

**Panel in the Utility menu when SYSTEM is set to DIAG/EN:**

EXCECUTE command is sent. This command is equivalent to setting FRONT.

**Specifications:**

The front-panel test sequence that will be run when the DIAG:STATE

**Panel:**

EXCECUTE command is sent. This command is equivalent.
**Examples:**

- `PSC 0`  
- `SR 32`  
- `ES 128`  
- `DES 128`

**Query (Only)**

Command: `diag: state execute`

By executing the `diag: state execute` query, the following is returned:

- The diagnostic clear the following:
  - The Service Request has been received, the pass/fail status of the tests can be returned running the tests, a Service Request will be generated. When the Service Request

**Syntax:**  
**Group:** Display

`Display` returns the current display settings.

**Examples:**

- `diag: state execute`

To enable a power-on event to generate a Service Request, send the following:

- The Status Register (ESR and SBR)
- The Input Queue
- The Event Queue
- The Diag: State Execute command clears the following:
display:Clock?

sets the display to show time and date.

Examples:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>on or &lt;nrt&gt;</td>
<td>displays the clock on the display.</td>
</tr>
<tr>
<td>off or &lt;nrt&gt;</td>
<td>removes the clock from the display.</td>
</tr>
</tbody>
</table>

Syntax: display:Clock

Group: Display

Command Descriptions:

display:Clock returns on "on" or on "off". This is equivalent to setting the display date/time in the Readout Options side menu. The query form controls the display of the date and time.
DISPLAY:FILTER?

Returns either LINEAR or SINC, indicating the type of interpolation filter.

Examples:
DISPLAY:FILTER LINEAR

Sets the interpolation filter type to linear.

SINC specifies sinc(x)/x interpolation where acquired points are fit to a curve.

LINEAR specifies linear interpolation where acquired points are connected with straight lines.

Arguments:

SINC
LINEAR

DISPLAY:FILTER

{ SINC | LINEAR } SINC

Related Commands:
DISPLAY:STYLE

Display

Group:

Display menu.

DISPLAY:FILTER

Sets or queries the type of interpolation to use for the display when the
Command Descriptions
might return XY for the display format.

```
DISPLAY.FORMAT
```

selects a voltage versus time format for the display.

```
DISPLAY.FORMAT YX
```

<table>
<thead>
<tr>
<th>Y1</th>
<th>RET 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y2</td>
<td>RET 3</td>
</tr>
<tr>
<td>CH 2</td>
<td>RET 1</td>
</tr>
<tr>
<td>CH 1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Y-AXIS Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-AXIS Source</td>
</tr>
</tbody>
</table>

Table 2-25: XY Format Pairs

Arguments:

displayed.

Table 2-25: Displaying one source causes its corresponding source to be
sources that make up an XY waveform are predefined and are listed in
source display with a voltage against the voltage of another The

```
DISPLAY.FORMAT

{ DISPLAY:FORMAT } XX | XY
```

Syntax:

Display

Group:

```
Format in the Display menu.
```

Sets or queries the display format. This command is equivalent to setting

```
DISPLAY:FORMAT
```

Command Descriptions
The current intensity settings for different parts of the display:

**Display: Intensity? (query only)**

- Returns **Display::Calculate?**
- Sets the grid type to display a frame and a grid.
- **Grid** specifies a frame and a grid.
- **Full** specifies a frame, a grid, and cross hairs.
- **Frame** specifies just a frame.
- **Crosshair** specifies a frame and cross hairs.

**Arguments:**

- **GRID**
- **FULL**
- **FRAME**
- **CROSSHAIR**

**Example:**

```
Display::Calculate()
```

**Syntax:**

```
{ GRID | FULL | FRAME | CROSSHAIR }
```

**Display::Calculate?**

- Returns **Display::Calculate?**

**Example:**

```
Display::Calculate()
```

**Syntax:**

```
{ GRID | FULL | FRAME | CROSSHAIR }
```
Display: INTENSITY:OVERALL

Sets the intensity of the display to the middle of the range.

**Syntax**

```plaintext
<NR1> INTENSITY:OVERALL
```

**Arguments**

- NR1: Ranges from 50 to 100 percent.

**Examples**

```plaintext
DISPLAY:INTENSITY:OVERALL 50
```

Display

**Group**

OVERALL in the Display intensity side menu.

See the intensity of the entire display. This command is equivalent to setting

**DISPLAY:INTENSITY:OVERALL**

Sets the intensity of the intensified portion of a waveform.

**Syntax**

```plaintext
<NR1> INTENSITY:OVERALL
```

**Arguments**

- NR1: Ranges from 100 to 250 percent.

**Examples**

```plaintext
DISPLAY:INTENSITY:OVERALL 140
```

Display

**Group**

OVERALL in the Display intensity side menu.

See the intensity of the intensified zone on a waveform. This command is equivalent to setting

**DISPLAY:INTENSITY:CONTRAST**

Command Descriptions
**Syntax**

Display:Intensity:Waveform

**Arguments**

NRT1 < ranges from 20 to 100 percent.

Example:

Display:Intensity:Waveform

Set the intensity of the waveforms. This command is equivalent to setting the Intensity in the Display Intensity side menu.

**Display:Intensity:Waveform**

Sets the intensity of the text to the brightest level.

Example:

Display:intensity:TEXT 100

Argument:

NRT1 < ranges from 20 to 100 percent.

**Display:Intensity:TEXT**

The Display Intensity side menu...
3 seconds before they fade. Specifies that the waveform points are displayed on the screen for

```
DISPLAY: PERSISTENCE
```

Examples:

Arguments:

```
NR3 <n> specifie the length, in seconds, that the waveform points are dis-
```
Syntax:

```
DISPLAY:STYLE
```

Arguments:

- **VECTOR**: Connects adjacent data points. Old points are immediately re-plotted by new ones.
- **INTERPERSISTED**: Displays non-interpolated data points. Brighter than other data points. Play is reset when the style or acquisition is reset.
- **DOTE**: Displays individual data points. Does not display individual data points.

Example:

```
DISPLAY:STYLE:VECTOR
```

Related Commands:

- **DISPLAY**
- **INTERPERSISTED**
- **DOTE**

Group:

**DISPLAY**

**Style** in the Display menu.

Selects how the data is displayed. This command is equivalent to selecting **DISPLAY:STYLE**.
**Display: Trigger**

{ <NR1> | ON | OFF } Display: Trigger

This command has no effect and is included for compatibility.

**Examples**

**Display: Trigger Long**

LONG displays a horizontal line in the center of the graticule.

SHORT displays a short arrow at the right side of the graticule.

OFF removes the trigger bar indicator from the display.

**Arguments**

Display

**Group: Trigger**

The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also displayed. The bar will not appear if the instrument is using an external trigger. The digitizing oscilloscope will only display the trigger bar if the trigger source is also di
**Syntax and Comments**

The ESE* command is used to set the DESER. A complete discussion of event handling is beyond the scope of this document. Setting the DESER and the ESE* in the same value allows only one event to be entered into the event queue and summarized.

**NOTE**

The power-on default for ESE* is 0. If ESE* is set to 1, the ESE* and DESER are set according to this value. The binary value of the ESE* and DESER are 0 through 255. The binary value of the ESE* and DESER are 0 through 255.

**Arguments**

- **NR1**: A value in the range from 0 through 255.

**Syntax**

**Related Commands**: CLS, DESER*, ESR?, EVMSG*, SRF*, STBP

**Group**: Status and Error

---

For a complete discussion of the use of these registers, see page 3-1.
Error in a command header.

Examples:

```
EVENT?
```

Syntax:

```
EVENT?
```

Related Commands:

```
ALLEV?, CLS, DESE, ESE, ESR?, ETN?, EWM8?, SRE, STB?
```

Status and Error

Page 3-1.

The Event Queue is an internal queue that allows the Event Read command to return the result of the last ESR? Read. EVENT? also returns the returned information from the Event Queue an event code that provides information.

**EVENT** (Query Only)

```
11010101
```

Might return the value 213, showing that the ESR contains binary.

Examples:

```
*ESR?
```

Syntax:

```
*ESR?
```

Related Commands:

```
ALLEV?, CLS, DESE, ESE, ESR?, ETN?, EWM8?, SRE, STB?
```

Status and Error

Page 3-1.

Discussion of the use of these registers. See page 3-1. Also clears the ESR (since reading the ESR clears it). For a complete

Returns the content of the Standard Event Status Register (ESR). *ESR?

**ESR?** (Query Only)

Command Descriptions

---
Error: ...

**Message:** EVMSG 110, Command header

**Example:** EVMSG?

Command string is right justified.

If the message limit of the message and command string combined is exceeded, as much of the command string will be returned as possible, without exceeding the return buffer. When a command error is detected by the digitizing oscilloscope, the error message will be the command string followed by the following format:

```
[command] [message]: = :: <message>
```

Event Code: Command<get_tag><get_tag><get_tag>

**Return:**

The event code and message in the following format:

```
<event code><message>
```

**Syntax:**

```
EVMSG?
```

**Related Commands:** ALTE?, OLS, DES, ESE, EVENT?, SVEN?, STBP?

**Status and Error Group:**

Page 3-1

**Description:** EVMSG is a complete discussion of event handling on the SCPI. The errors of the output or ESE? read and returns the event code along with an error event code, with the single event code associated with the event.
might return 3 as the number of event codes in the Event Queue.

**Examples:**

`EVQRY?`  
`<RQT`  
`>RQT`  

**Returns:**

Syntax:

`EVQRY?`  

Related Commands:  
`ALLEV?`, `EVENTQ`  

Group:  
Status and Error

many events will be returned.

useful when using the ALLEV query since it lets you know exactly how

Returns the number of event codes that are in the Event Queue. This is

**EVQRY? (Query Only)**

Command Descriptions
FACTORY (No Query Form)

Command Descriptions


Syntax

FACTORY

Miscellaneous

Call menu

- mand is equivalent to selecting Recall Factory Setup in the Setup / Factory menu.
- Re-set the digitizing oscilloscope to factory default settings.]
Example:
```
Graphics: Delete All
```

Syntax:
```
Graphics: Delete All
```

Related Commands:
```
Graphs, Graph: Display, Graphics: Move, Graphics: Draw
```

Group:
```
Graphics
```

Menu:
```
Delete All Points
```

Description:
```
Deletes the entire collection of points added with the Graphics: Move and
```
```
Graphics: Draw commands. This command is equivalent to executing
```
```
```
Delete the entire collection of points added with the Graphics: Move and
```
```
```

Example:
```
Graphics:
```

Example:
```
Graphics:
```

Group:
```
Graphics
```

Related Commands:
```
Graphs, Graph: Display, Graphics: Move, Graphics: Draw
```

Example:
```
Graphics:
```

Group:
```
Graphics
```

Example:
```
Graphics:
```

Group:
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Graphics
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Example:
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Group:
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Graphics
```

Example:
```
Graphics:
```
GRAPHICS:DISPLAY?

displays the lines drawn using the GRAPHICS:DRAW command.

Example:

GRAPHICS:DISPLAY ON

Command

to clear the lines from the instrument's memory, use the GRAPHICS:DELETE command.

Arguments:

ON or OFF

allows the display of lines drawn with the graphics command.

<PRINT>

ON

OFF

{ GRAPHICS:DISPLAY |

GROUP:

GRAPHICS:DISPLAY

Related commands:

GROUP:

NUMPOINTS, GRAPHICS:POLYLINE, GRAPHICS:DELETE, GRAPHICS:MOVE, GRAPHICS:DRAW, GRAPHICS:

pop-up menu of the Utility System I/O side menu.

equivalent to setting LINE DISPLAY ON or LINE DISPLAY OFF in the Graphics

Turns the graphics display on or off, or changes its status. This command is

GRAPHICS:DISPLAY

Command descriptions
and y coordinates 210. draw a line from the current position to the point at x coordinates 200.

```
Examples:
```

Graphics: Draw 200, 210

The upper left corner of the rectangle is 34, 43. the lower right corner of the rectangle is 34, 43. the range for x coordinates is 34-254. the range for y coordinates is 34-93. to draw a line, points must be contained within the rectangle. the points which to draw a line, points are not contained is the point to be specially.

```
Arguments:
```

 Antworten: \( \text{NRt1, NRt2} \), \( \text{xrt1, xrt2} \). are the x and y coordinates.

```
Syntax:
```

```
Related Commands:
```

```
Group:
```

```

When a setting is saved, they are saved with the setting.

The instrument can hold up to 100 points if points have been specified.

Graphics pop-up menu of the Utility System / I/O side menu.

Draw a line to the specified coordinate from the current position. This is the first specified coordinate then becomes the current position. This is the first draw of more coordinates. it is executed as a move command and no line is drawn a line to the specified coordinate from the current position. The

```
Graphics: Draw (No query form):
```

Command Descriptions
Syntax:

MOVE

Examples:

move 420.

Explanation:

The current position is moved to the point at x-coordinate 420 and y-coordinate 0.

Arguments:

x, y are the x and y coordinates, respectively, of the point to which the move is made.

Syntax:

MOVE x, y

Related Commands:

DRAW, DISPLAY, ERASE, GRAPHICS:DISPLAY, GRAPHICS:ERASE, GRAPHICS:DRAW, GRAPHICS:NUMPOINTS

Group:

Graphics

When a setting is saved, they are saved with the setting.

The instrument can hold up to 100 points. If points have been specified
Graphics pop-up menu of the Utility System I/O side menu.

Move the current position to the specified coordinate without drawing a

FIGURE: GRAPHICS:MOVE (NO QUERY FORM)

Command Descriptions
Currently in the collection of move and draw points.

Example:  

```
GRAPHICS:NUMPOINTS
```

Syntax:  

```
GRAPHICS:MOVE, GRAPHICS:POINTS
```

Related Commands:  

```
GRAPHICS:MIRROR, GRAPHICS:DISPLAY, GRAPHICS:DRAW
```

Group: Graphics

Returns the number of points currently in the collection added with the

```
GRAPHICS:NUMPOINTS? (Query Only)
```

Command Descriptions
STARE initializes a screen copy that is sent to the port where it can be stored.

CLEARSPool clears the printer output spool.

NOTE

HARDcopy ABort ensures that the first HARDcopy is complete before starting another HARDcopy.

Use the SMH command between HARDcopy START commands to clear DCL using DCL.

HARDcopy ABort command. The output queue can then be emptied. The only way to abort the HARDcopy process is to send the process. The only way to abort the process once a HARDcopy is in progress.

NOTE

Arguments: ABort terminates the HARDcopy output in process.

HARDcopy

{ HARDcopy | ABort | CLEARSPool | STARE } HARDcopy

This command is NOT IEEE STD 488-1987 compatible.

NOTE

The HARDcopy query returns format, layout, and port information twice. This command is equivalent to pressing the front-panel HARDcopy button. Aborting this command is equivalent to pressing the front-panel HARDcopy button. Aborting this command twice.
HARDCOPY: FORMAT

Selects the output data format for hard copies. This is equivalent to setting Format in the HARDCOPY menu.

**Group:**
HARDCOPY

**Syntax:**
HARDCOPY: FORMAT { BMP | DESKjet | EPSCOLOR | EPSSImage | EPSmono | EPSON | HPGL | INTERleaf | LASERjet | PCX | TIFF | TIF }

HARDCOPY: FORMAT?

**Examples:**
HARDCOPY: FORMAT HPGL
sets the hardcopy output format to HPGL.

HARDCOPY: FORMAT?
might return INTERleaf as the final hardcopy output format.
HARDCOPY: PORT

Syntax:
HARDCOPY: PORT ( PORT )

Related Commands:
Hardcopy

Group:
Hardcopy menu.

Selects the output port for the printer. This is equivalent to setting PORT in the

HARDCOPY: PORT

Example:

Output:
may return PORTNAME as the page layout format of the hardcopy

Arguments:

Examples:
HDR

\{(<NRT> | OFF | ON)\}  HDR: Syntax

Miscellaneous: Group

This command is identical to the HEADER query and is included for compatibility with older Tektronix instruments.

Command Descriptions
This is a page from a document discussing the `HEADER` command. The text describes the state of the `HEADER` command, which might return the value 1, showing that the Response Header Enable is on. It also explains the use of the `spare` parameter and provides examples of how to use the command.

### Arguments

- `on` or `off`: Sets the Response Header Enable state to true or false, respectively.

### Syntax

```
HEADER { <NR4> | ON | OFF }
```

### Related Commands

- `VERBOSE`

### Miscellaneous

- This command cannot affect IEEE Std 488.2-1992 Common Commands (those involving oscilloscope to trigger or query headers or query responses). It sets and queries the Response Header Enable state that causes the digitizer.

---

**Command Descriptions**
**HORIZONTAL:DELAY:SCALE**

**Syntax:**
```
HORIZONTAL:DELAY:SCALE <NR3>
```

**Arguments:**
- `<NR3>` is the time per division. The range is 500 ms to 200 ps per division.

**Description:**
This command is identical to the HORIZONTAL:DELAY:SCALE command. It is used to adjust the delay scale in the horizontal direction.

**Examples:**
- `HORIZONTAL:DELAY:SCALE 2.0E-6`
  - Set the delay scale to 2 ps per division.
- `HORIZONTAL:DELAY:SCALE 1.0E-9`
  - Set the delay scale to 10 ps.

Values are rounded to the nearest 10 ps.

**Related Commands:**
- `HORIZONTAL:DELAY:SCALE`
- `HORIZONTAL:DELAY:SCALF`
- `HORIZONTAL:DELAY:SCALF`

**Group:**
- Horizental
HORIZONTAL:DELAY:TBPosition

Sets or queries the delayed time base position. The time base position is the time from the trigger to the first sample of the record. The delay time base position is equivalent to setting Delayed Position in the Time Base Position side menu of the Horizontal menu.

Syntax: HORIZONTAL:DELAY:TBPosition <TBD>

Arguments:
- For instruments with delay lines, the valid range for <TBD> is -1.5 ns to 50.0 ns in increments of 1.0 ns. For instruments without delay lines (Option 16), the valid range for <TBD> is 16.0 ns to 500.0 ns in increments of 1.0 ns.

Examples:
- `HORIZONTAL:DELAY:TBPosition 15.000E-9` indicating a delay of 15 ns.
- `HORIZONTAL:DELAY:TBPosition?` returning the current delay position for <TBD>.

Group: Horizontal

Command Descriptions
**Examples: HORIZONITAL:MAIN?**

**Syntax:**

HORIZONITAL:SCALE, HORIZONITAL:SCALE, HORIZONITAL:SCALE

**Related commands:** HORIZONITAL:SCALE

**Group:** HORIZONITAL

**HORIZONITAL:MAIN? (Query Only)**

Sees the delay for channel 1 to 1, 4 ns.

**Examples:**

HORIZONITAL:DESKW:CH<x> 1,4-9

**Arguments:**

The valid range for NR<x> is 0 to 10 ns in increments of 1 ps.

**Syntax:**

HORIZONITAL:DESKW:CH<x> 1,4-9

**Group:** HORIZONITAL

Sets a selected channel in the HORIZONITAL menu.

The command is equivalent to setting Manual DESKW for different channels. This command may be combined with commands to set the signals from both channels precisely with each other, it allows you to set the gain of each channel for the specified channel DESKw allows you to set the gain of each channel for the specified channel...
Syntax: Horizontaal:Main:Position

Set the time base position for the main time base. This command is identical to the Horizontaal:Position command and is included for compatibility.

Syntax: Horizontaal:Main:Scale

Set the time per division for the main time base. This command is identical to the Horizontaal:Scale command and is included for compatibility.

Syntax: Horizontaal:Main:ScalEv

Set the time per division for the main time base. This command is identical to the Horizontaal:Scale command and is included for compatibility.

Command Descriptions
Using both the main and delayed time base scale.
When using INTENSITY: INTENSIFIED, indicating that the waveform is displayed
at the delayed horizontal scale to display the waveform.

**Examples**

*Main*

Main means that the waveform is horizontally scaled relative to the main

*Delay Command*

Delay command.

Mode is adjustable. The intensity level is set by the Display INTENSITY: CON.

INTERSECT: Use the both both main and delay scales to display the

*Delay Command*

The delay command.

**Arguments**

INTERSECT: means that the selected waveform is horizontally scaled relative to

**Syntax**

**Related Commands**

Display

**Group**

Horizontal

**Menu**

Command Descriptions
**Command Descriptions**

**Horizontal: RECORDLengTh**

- **Examples:**
- **Arguments:**

**Explanation:** Setting **RECORDLengTh** in the Horizontal menu.

Sets the number of data points that are acquired for each record. This is equivalent to setting the length of the waveform in the side menu.

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**
- **Horizontal: POSITION**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```

**Group:**

- **Syntax:**
- **Horizontal:**

**Examples:**

- **Arguments:**

**Explanation:**

```
<NR3> is from 0 to 100, and is the percentage of the waveform that is displayed.
```
HORIZONTAL: SCALE

Sets the horizontal scale for the main time base. This command is identical to the HORIZONTAL: SCALE command. It is provided to maintain program compatibility with some older models of Tektronix digitizing oscilloscopes.

Syntax:

HORIZONTAL: SCALE <N3>

N3 <N3>

Related Command:

HORIZONTAL: SCALE

Examples:

HORIZONTAL: SCALE 20.6 - 6

Arguments:

NR3 is the time per division. The range is 500 ms to 20 ps per division.

Related Command:

HORIZONTAL: SCALE
Syntax: \texttt{HORZONTALE:TPosition \{NR\}</nr>]<spacenms [In]crements of 1 ps.
the valid range for \texttt{<NR} is 16 ms to 50 ms in increments of 1 ps.
50 ms in increments of 1 ps, for instruments with out delay lines (option 1D).
For instruments with delay lines, the valid range for \texttt{<NR} is -1.5 to
10 ms.

Parameters:
Example: \texttt{HORZONTALE:TPosition 1.7, 0.005, 9 Increments of 1 ps.}

The Horizontal menu:
Equivalent to setting \texttt{Main Position} in the Time Base Position side menu of
the Horizontal menu. This command is the time from the trigger to the first sample of the record. This command is the
Sels of operator the mean time base position. The time base position is the
**IDN?**

**Examples:**

```
IDN?
```

**Syntax:**

```
IDN?
```

**Related Commands:**

ID

**Group:** Miscellaneous

**Description:**

Equivalent to executing the `System` side menu item in the Status menu.

Returns the identifying information about the instrument and its firmware. This is equivalent to executing the `System` side menu item in the Status menu.

**Examples:**

```
IDN?
```

**Syntax:**

```
ID?
```

**Related Commands:**

*IDN?

**Group:** Status and Error

**Description:**

Equivalent to executing the `System` side menu item in the Status menu.

Returns the identifying information about the instrument and its firmware. This is equivalent to executing the `System` side menu item in the Status menu.

**Examples:**

```
ID?
```

**Syntax:**

```
ID?
```

**Related Commands:**

*IDN?

**Group:** Commands
**Example:**

```
ON OR OFF
```

**Arguments:**

- OFF or OFF = 0, turns off ringing when any waveform data exceeds the limits set by the limit test.
- ON or ON = 0, turns on ringing when any waveform data exceeds the limits specified in the limit test.
- `<ON> - <OFF>` (returns either 0 or 1, indicating whether the bell is to ring when any waveform data exceeds the limits specified in the limit test).

**Related Commands:**

- `LIMIT:COMPAR:x=x,LIMIT:STATE`

**Group:**

- `LIMIT:BELT`
**Command Descriptions**

**Limit: Compare: CH</x>**

*In RD4:*

Acquired using CHZ will be compared to the template waveform stored with return LIMIT: COMPARE: CHZ REF4, indicating if waveforms acquired using CHZ: Compare REF1 as the template waveform against which to compare.

**Examples:**

LIMIT: COMPARE: CH1.

**Arguments:**

- REF4 is a reference waveform.

**Syntax:**

LIMIT: COMPARE: CH</x> { <ref> | NONE }

Related Commands:

CURVE, LIMIT: TEMPLATE, LIMIT: Template: Destination, LIMIT: Template: Source, WIMP

Group:

Limit Test
in the limit test.

for the waveform when any waveform data exceeds the limits specified.

relends either 0, indicating whether the hardcopy operation occurs.

**Examples:**

```
LIMIT: HARDCOPY
```

**Arguments:**

```
ON or OFF
```

**Syntax:**

```
{ ( "LIMIT: HARDCOPY" | "OFF" ) | "ON" }<caret>
```

**Related Command:**

- LIMIT：STATE，HARDCOPY

**Group:**

Limit Test.

The HARDCOPY command executes a hard copy operation on the waveform when any waveform data exceeds the pre-defined limit that has been specified. It can be turned on or off.

**Command Descriptions:**

- **LIMIT：HARDCOPY**
LIMIT: STATE

Effect:
Enables either 0 or 1, indicating whether limit testing of waveforms is in effect.

Syntax:
LIMIT: STATE

Examples:
ON or OFF

Arguments:
ON or OFF

Related commands:
CURVE, LIMIT: COMPOP:CH<x>, LIMIT: HARD:POP:CH<x>, LIMIT: HARD:POP

Group:
Limit Test

Limits limit testing on or off, depending on whether limit testing is in effect.

Command Descriptions
TESTING command:

Example:

STORE LIMIT::TEMPLATE STORE

Arguments:

STORE creates a template with the specified source waveform and tolerance.

Syntax:

LIMIT::TEMPLATE STORE

Related Commands:

LIMIT::TEMPLATE:SOURCE, LIMIT::TEMPLATE:TOL.

Group:

LIMIT

Command Descriptions

LIMIT::TEMPLATE (NO QUERY FORM)
STORE command is stored as the REFS waveform.

specifies that the template waveform referred to with the LIMIT:TEMPLATE.REFS
waveform is to be stored.

Arguments:
REFX specifies the reference waveform destination in which the template

Syntax:
LIMIT:TEMPLATE:DESTINATION

Related Commands:
LIMIT:COMPARE:CH>, LIMIT:TEMPLATE, LIMIT:TEMPLATE:SOURCE

Group:
Limit Test

Command Descriptions
LIMIT: TEMPLATE: SOURCE

Examples:

LIMIT: TEMPLATE: SOURCE

LIMIT: TEMPLATE: SOURCE

Arguments:

Syntax:

LIMIT: TEMPLATE: SOURCE

Related Commands:

Group:

STORX command must be executed for this to take effect.

Sets or queries the channel math waveform of reference waveform to use.
Example: 

```
LIMIT: TEMPlATE: TOLERANCE: HoriZONtaL?
```

Arguments:

- `<R3>` is the amount in horizontal divisions by which the current window is deemed to be close enough to the template window. 

Diagram:

```
<END> <GENERIC> 
<END>:HORIZONtaL?
```

Syntax:
```
LIMIT: TEMPlATE: TOLERANCE: HORiZONtaL?
LIMIT: TEMPlATE: TOLERANCE: HORIZONtaL R3
```

Related Command:
```
LIMIT: COMpare: CONdition
```

Limit Test:

The LIMIT: TEMPLATE: TOLERANCE: HORIZONtaL? command must be executed for this to take effect. 

The LIMIT: TEMPLATE STORE command must place the window for limit test. The LIMIT: TEMPLATE STORE command must place the amount by which the template window is deemed to be close enough to the template. The amount of horizontal divisions, when computing the current window, can vary in units of 0.1.
close enough to the template waveform if it is within \( \pm 1.0 \) vertical div-
might return 1.0 specifying that the current waveform is deemed to be
"LIMIT:TEMPLATE:TOLEANCE:VERTICAL"

"TEMPFRAME:TOLEANCE:VERTICAL"

specifies that the current waveform is deemed to be close enough to the

Examples:

have exceeded the limits set in the limit test.

allowed to deviate from the template waveform without being deemed to

Arguments:

NR3 is the amount in vertical divisions by which the current waveform is

Syntex:

NR3 LIMIT:TEMPLATE:TOLEANCE:VERTICAL

Related commands:

Limit Test

Group:

Command Descriptions

LIMIT:TEMPLATE:TOLEANCE:VERTICAL
Command: Lock

Examples: Lock All

Description:
Command Lock enables/disables all front panel controls. This is equivalent to the Unlock ALL command. See the ANSI/IEEE Std. 488.1-1993 Standard Digital Interface (VMEbus) for more info.

NOTE

Lock

{ Lock, Unlock, Remote Enable Group, Local Lockout Group }

Syntax:
Unlock, Remote Enable Group, Local Lockout Group

Related Commands:
Miscellaneous

Panel Equivalent:
Enables and disables all front panel buttons and knobs. There is no front panel equivalent.
Examples:

```
*LNR?
```

A partial response might look like this:

```
*LNR?
```

NOTE

Headers should be abbreviated. Headers should be used normally to specify whether the returned command string is a command string, The Verbose command because the returned string is intended to be sent back to the user. Regardless of the setting of the header command, this is the default. Always return a string including command.

Syntax:

```
*LNR?
```

Related Commands:

```
HEADER, SET?, VERBOS
```

Miscellaneous:

```
GROUP
```

*LNR? query.

Returns a string listing the digitizing oscilloscope's settings, except for configuration information for the calibration values. You can use this string to return the digitizing oscilloscope to the state it was in when you made the command.
DIFFERENTIATE: takes the derivative of the selected waveform.

INV (for invert): inverts the defined waveform.

Function: = INV | DIF | PNL | INT

Where:

<SRC> OPERATOR SRC>

The format for a dual waveform expression is:

<Function>(SRC)

The format for a single waveform expression is:

den.

waveform expressions. SRC and function elements are case insensitive.
lude any amount of white space. Expressions can be either single or dual.
expression can contain the mathematical expression. The expression can

Arguments:

MATH X: DEFINE

Syntax:

MATH X: DEFINE GROUP

Vertical:

MATH X side menu.

This is equivalent to selecting Change Math waveform definition in the

Allows the user to define new waveforms using mathematical expressions.

MATH X: DEFINE

Syntax:

MATH X?

Vertical:

Returns the definition for the math waveform specified by X

MATH X? (Query only)
MATH: DEFINE Ch1 + Ch2 = result

Example:

\[
\begin{align*}
\text{INTTEGRATE:} & \text{ takes the integral of the selected waveform.} \\
\text{PHASE SUPPRESSION:} & \text{ is of the range: } -100 \text{ db to } 100 \text{ db.}
\end{align*}
\]
Examples:

MEASUREMENT: CLEARSNAPSHOT

Syntax:

MEASUREMENT: CLEARSNAPSHOT

Group:

Measurement

Takes down the measurement snapshot display.

Example:

MEASUREMENT: CLEARSNAPSHOT

90.0+E+0; LOW 10.0+E+0; MID 50.0+E+0; MIDS 50.0+E+0; HIGH 0.0+E+0; 0.0+E+0; 0.0+E+0;

Example:

MEASUREMENT: CLEARSNAPSHOT

Syntax:

MEASUREMENT: CLEARSNAPSHOT

Group:

Measurement

Clears all measurement parameters.

Example:

MEASUREMENT (query only)
Gating is on.

Example:

ON or OFF = 0 lums off measurement gating.

Arguments:

ON or OFF ≠ 0 lums on measurement gating.

Syntax:

Measurement: GATING

Group:

Measurement

calling in the Measure menu.

Set or query measurement gating. This command is equivalent to setting

MEASUREMENT:GATING

Command Descriptions
RISE; DIRECTION: FORWARDS
might return: MEASUREMENT: IMMED; DELAY, RISE; EDGE

Examples:

Measurement: IMMED; DELAY

Syntax: Measurement

Group: Measurement

Remarks: Information about the immediate delay measurement

MEASUREMENT: IMMED; DELAY (Query Only)

RISE; DIRECTION: FORWARDS
might return: MEASUREMENT: IMMED; DELAY, RISE; EDGE

Examples:

Measurement: IMMED; DELAY

Syntax: Measurement

Group: Measurement

Remarks: Returns all immediate measurement setup parameters.

MEASUREMENT: IMMED? (Query Only)

Command Descriptions
SIGNALS: IMMEDIATE: DELAY: DIRECTION

Examples:

Widths:

MEASUREMENT: IMMED: DELAY: DIRECTION

Description:

MEASUREMENT: IMMED: DELAY: DIRECTION

Arguments:

Example:

edge is specified by MEASUREMENT: IMMED: DELAY: DIRECTION.

Edge is specified by MEASUREMENT: IMMED: DELAY: DIRECTION.

Edge is specified by MEASUREMENT: IMMED: DELAY: DIRECTION.

Edge is specified by MEASUREMENT: IMMED: DELAY: DIRECTION.

Syntax:

Command Description:

SOURCE IMMEDIATE: IMMEDIATE: DELAY: DIRECTION

Sets or obtains the starting point and direction that determines the delay.
MEASUREMENT: IMMED:DELAY:EDGE?

- **Usage**:
  - Returns either RISE or FALL.
  - The measurement is taken for the immediate delayed waveform.
  - The waveform data points are the edge transition times.

- **Syntax**:
  - MEASUREMENT: IMMED:DELAY:EDGE?

- **Arguments**:
  - RISE specifies the rising edge.
  - FALL specifies the falling edge.

- **Examples**:

- **Related Commands**:
  - MEASUREMENT: IMMED:SOURCE1

- **Group**:
  - MEASUREMENT

---

Command Descriptions
is used for the immediate delay measurement.

Example:

```
MEASUREMENT: IMMED:DELAY:EDGE?
```

Arguments:

- **Rise**: specifies the rising edge.
- **Fall**: specifies the falling edge.

```
Example:

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Example:

Measurement: IMMEDIATE: SOURCE MAT1

REF<x> is a reference waveform.
MAT1<x> is a math waveform.
CH<x> is an input channel.

Arguments:

Measurement: IMMEDIATE: SOURCE [1]

< <x> | REF<x> | MAT1<x> | CH<x> | IMMEDIATE/>

Syntax:

Group: Measurement

Measurement: IMMEDIATE: SOURCE [1]

Command Descriptions
**Syntax:**

MEASUREMENT: IMME:DTYPE

**Group:**

Measurement

**Source:**

The MEASUREMENT: IMME:DTYPE command specifies the immediate measurement type.

**Examples:**

MEASUREMENT: IMME:DTYPE SOURCepad

MEASUREMENT: IMME:DTYPE REFPad

**Arguments:**

- `Ref` is a reference waveform.
- `Math` is a math waveform.
- `Ch` is an input channel.

**Description:**

The MEASUREMENT: IMME:DTYPE command allows you to specify the type of measurement that should be taken immediately. This can be a reference waveform, a math waveform, or a specific input channel. The syntax is `MEASUREMENT: IMME:DTYPE SOURCE pad` or `MEASUREMENT: IMME:DTYPE Ref pad` or `MEASUREMENT: IMME:DTYPE Math pad` or `MEASUREMENT: IMME:DTYPE Ch pad`. The command can be used to set up immediate measurements for specific needs, ensuring that the desired data is captured right away.
RMS is the true root mean square voltage.

PERIOD is the time it takes for the leading edge of a pulse to rise from a point of a positive pulse.

PEDIT is the distance (time) between Midcrest (usually 50% amplitude) points of a negative pulse.

\[ \text{Power} = (\frac{\text{Amplitude}}{\text{Maximum} - \text{High}}) \times 100 \]  

\[ \text{Power} = (\frac{\text{Amplitude}}{\text{Minimum} - \text{Low}}) \times 100 \]

**Definitions**

Amplitude is the absolute difference between the maximum and minimum waveform.

Phase is the phase difference from the selected waveform to the displayed waveform.

Period is the time, in seconds, it takes for one complete signal cycle to happen.

Percentage is the ratio of the positive pulse width to the signal period expressed as a percentage.

Instrument has no delay lines (Option 1D).

The midcrest is a positive slope. This rise can be less than zero if the waveform is the time from the trigger to the point in the waveform that crosses points of a negative pulse.

Midcrest is the distance (time) between Midcrest (usually 50% amplitude) points of a waveform.

\[ \text{Midcrest} = \frac{\text{Amplitude}}{\text{Maximum} - \text{High}} \times 100 \]

\[ \text{Midcrest} = \frac{\text{Amplitude}}{\text{Minimum} - \text{Low}} \times 100 \]

**Definitions**

Amplitude is the absolute difference between the maximum and minimum waveform.

Phase is the phase difference from the selected waveform to the displayed waveform.

Period is the time, in seconds, it takes for one complete signal cycle to happen.

Percentage is the ratio of the positive pulse width to the signal period expressed as a percentage.

Instrument has no delay lines (Option 1D).

The midcrest is a positive slope. This rise can be less than zero if the waveform is the time from the trigger to the point in the waveform that crosses points of a negative pulse.

Midcrest is the distance (time) between Midcrest (usually 50% amplitude) points of a waveform.

\[ \text{Midcrest} = \frac{\text{Amplitude}}{\text{Maximum} - \text{High}} \times 100 \]

\[ \text{Midcrest} = \frac{\text{Amplitude}}{\text{Minimum} - \text{Low}} \times 100 \]

**Definitions**

Amplitude is the absolute difference between the maximum and minimum waveform.

Phase is the phase difference from the selected waveform to the displayed waveform.

Period is the time, in seconds, it takes for one complete signal cycle to happen.

Percentage is the ratio of the positive pulse width to the signal period expressed as a percentage.

Instrument has no delay lines (Option 1D).

The midcrest is a positive slope. This rise can be less than zero if the waveform is the time from the trigger to the point in the waveform that crosses points of a negative pulse.

Midcrest is the distance (time) between Midcrest (usually 50% amplitude) points of a waveform.

\[ \text{Midcrest} = \frac{\text{Amplitude}}{\text{Maximum} - \text{High}} \times 100 \]

\[ \text{Midcrest} = \frac{\text{Amplitude}}{\text{Minimum} - \text{Low}} \times 100 \]

**Definitions**

Amplitude is the absolute difference between the maximum and minimum waveform.

Phase is the phase difference from the selected waveform to the displayed waveform.

Period is the time, in seconds, it takes for one complete signal cycle to happen.

Percentage is the ratio of the positive pulse width to the signal period expressed as a percentage.

Instrument has no delay lines (Option 1D).

The midcrest is a positive slope. This rise can be less than zero if the waveform is the time from the trigger to the point in the waveform that crosses points of a negative pulse.

Midcrest is the distance (time) between Midcrest (usually 50% amplitude) points of a waveform.
MEASUrement:IMMed:UNITS? (Query Only)

Returns the units for the immediate measurement.

Examples:
- MEASUREMENT: IMMEDIATE:UNIT:SYMBOL "DEG"

Group: Measurement
Related Commands: MEASUREMENT: IMMEDIATE:UNIT
Syntax: MEASUREMENT: IMMEDIATE:UNIT?


MEASUrement:IMMed:VALUe? (Query Only)

Immediately executes the immediate measurement specified by the MEASUREMENT: IMMEDIATE command. The measurement is taken on the source(s) specified by the SELECT:CH<x> command.

Examples:
- MEASUREMENT: IMMEDIATE:VALUE "CH1" + "CH2"

Group: Measurement
Syntax: MEASUREMENT: IMMEDIATE:VALUE?

Returns:
- "CH1 + CH2"
MEASUREMENT:MEAS \textbf{\textbackslash{<}x\textbackslash{>}:\texttt{DELAY}(\texttt{QUERY\ only})}\)
MEASUREMENT:MEASx:DELAY:DIRECT|FORWARD|REVERSE

The command is equivalent to setting the direction in the Delay Edges Direction menu.

MEASUREMENT:MEASx:SOUR|DIRECT

Sets the direction of the delay measurement.

MEASUREMENT:MEASx:DEL|DIRECT

Edges is specified by MEASUREMENT:MEASx:DELx:EDGES.
Notes for the first rising or falling edge in the waveform. The search for the
EDGES means that the search starts at the beginning of the waveform.

MEASUREMENT:MEASx:DELx:EDGES

Edges is specified by MEASUREMENT:MEASx:DELx:EDGES.
Notes for the last rising or falling edge in the waveform. The search for the
EDGES means that the search starts at the end of the waveform.

Examples:

Arguments:

FORWARD

FORWARD.

REVERSE

REVERSE.

Command Descriptions:
Returns either RISE or FALL for measurement 1.

Example:

RISE
FALL

Arguments:

RISE specifies the rising edge.
FALL specifies the falling edge.

Syntax:

MESREMET: MEAS=x,<x>: DELEY:EDGEX

Group:

Measurement

Selecting the edges in the Delay Edges & Direction side menu.

MEASUREMENT: MEAS=x,<x>: DELEY:EDGEX

Command Descriptions
MEASUREMENT: MEAS<X>:DELAY<DELAY2?

**Syntax:**
MEASUREMENT: MEAS<X>:DELAY<DELAY2?

**Arguments:**
- `Rise`
- `Fall`

**Examples:**
- MEASUREMENT: MEAS<X>:DELAY<DELAY2?
- MEASUREMENT: MEAS<X>:EDGE

**Description:**
The `MEASUREMENT: MEAS<X>:DELAY<DELAY2?` command selects the edges in the delay edges & direction side menu. This command is equivalent to `MEASUREMENT: MEAS<X>:SOURCE<DELAY2`. The waveform is specified by the `MEASUREMENT: MEAS<X>:SOURCE<DELAY2` command when taking a delay measurement. The waveform is specified by the `MEASUREMENT: MEAS<X>:EDGE` command when taking an edge measurement.
Specified MATH as the measurement source.

Example: MEASUREMENT: MEAS=x; SOURCE: MATH

Argumemts:
REF x is a reference waveform.
MATH x is a math waveform.
CH x is an input channel.

Syntax: MEASUREMENT: MEAS=x; SOURCE: [T1]?

Group: Measurement

This is the source to measure "from" when taking a delay measurement.
Set or query the source for all single channel measurements and special...
m math return math.
measurement: meas:x<source2>

meets.
sets channel 1 to the delay to source when making delay measure.
measurement: meas:x<source4> ch=x

examples:
ref>x is a reference waveform.
math)x is a math waveform.

arguments:
ch=x is an input channel.

measurement: meas:x<source2>

{ ref|x | math|x | ch=x } measurement: meas:x<source2> ch=x

syntax:

measurement:
group:
with side menu.
met. This is equivalent to setting the source to the Delay from selected
series of channels to the source to measure to when taking a delay measure.

measurement: meas:x<source2>
Measurement: MEAS<X>:TYPE

Syntax:

Crosshair: MEAS<X>:TYPE

Examples:

ON or OFF

Arguments:

ON or OFF

Display:

The source can be selected using the SELECT:CH command.

Control the measurement system. The source specified by MEASURE:

MEASUREMENT:MEAS<X>:STATE:

Syntax:

Group:

Measurement:

Displays the measurement in the selected measurement slide menu.

Type is equivalent to the MEASURE:MEAS<X>:TYPE command. If only one measurement is selected, MEAS<X>:STATE will display the state of that measurement.

Returns either 0 or 1, indicating the state of MEAS<X>:STATE.

Displays measurement defined as MEAS<X>:STATE.

ON or OFF

Displays the source.

ON or OFF

Options:

ON or OFF

Display the state or OFF.
Delay is the time between the middle crossings of two different waveforms.

CRMS is the root mean square voltage over one cycle.

CMEAN is the arithmetic mean over one cycle.

Cycle's area (cycle area) is the area between the curve and ground over one cycle.

BUSR is the time from the first middle crossing to the last middle crossing.

AREA is the area between the curve and ground over the entire waveform.

Amplitude is the high value minus the low value of HIGH - LOW.

Arguments:
**Symax and Command**

RMS is the True Root Mean Square Voltage.
Low Reference Value to a high Reference Value of its final Value.
Rise is the Time that it takes for the leading edge of a pulse to rise from a
Point of a Positive Pulse.

\[ \text{Power} \times \left( \frac{\text{Amplitude (High)}}{\text{Maximum} - \text{Minimum}} \right) \times 100 = \text{Power} \text{Shoal} \]

PowerShoal is the positive overshoot, expressed as:

Amplitude

\[ \frac{\text{PowerShoal}}{\text{Amplitude}} \]

ZX26 is the absolute difference between the maximum and minimum
Waveform.

Phase is the phase difference from the selected waveform to the designated
Happen.

PRZED is the time, in seconds, it takes for one complete signal cycle to
happen.

A Percentage.

Powy is the ratio of the positive pulse width to the signal period, expressed
as a Percentage.

Instrument has no delay these (Option 12).
This time can be less than zero if the
Middle level with a negative slope. This time can be less than zero if the
Power is the time from the higher to the point in the waveform that crosses
points of a negative pulse.

\[ \text{NOVershoot} \times \left( \frac{\text{Amplitude (Low)}}{\text{Minimum} - \text{Minimum}} \right) \times 100 = \text{NOVershoot} \text{ Shoal} \]

NOVershoot is the negative overshoot, expressed as:

A Percentage

NDGTY is the ratio of the negative pulse width to the signal period, expressed
as a Percentage.

Instrument has no delay these (Option 12).
This time can be less than zero if the
Middle level with a negative slope. This time can be less than zero if the
NDGTY is the time from the higher to the point in the waveform that crosses
MINIMUM is the lowest amplitude (Voltage).

\[ \text{MINIMUM} \times \text{NDGTY} = \text{MINIMUM} \text{ Shoal} \]

MEAN is the arithmetic mean over the entire waveform.

MAXIMUM is the highest amplitude (Voltage).

LOW is the 0% Reference level.

HIgh is the 100% Reference level.

FREQUENCY is the reciprocal of the period measured in Hertz.

Highest value to a lower Referential value of its final value.
ANO is the time that it takes for the falling edge of a pulse to fall from a
Point of a Positive Pulse.

\[ \text{RMS} \times \left( \frac{\text{Amplitude (High)}}{\text{Maximum} - \text{Minimum}} \right) \times 100 = \text{RMS} \text{ Shoal} \]

PowerShoal is the positive overshoot, expressed as:

Amplitude

\[ \frac{\text{PowerShoal}}{\text{Amplitude}} \]
Returns: MEASUREMENT TYPE: VALUE

**Syntax:**

```
MEASUREMENT: MEASUREMENT <X>: VALUE
```

**Group:** Measurement

**Second:**

This value is a display value and will be updated every 1/3 of a second.

**Note:**

By <X>:

Assigns the value that has been calculated for the measurement specified.

**Examples:**

```
MEASUREMENT: MEASUREMENT <X>: UNITS?
```

**Returns:** MEASUREMENT: MEASUREMENT <X>: UNITS?

**Syntax:**

```
MEASUREMENT: MEASUREMENT <X>: TYPE?
```

**Group:** Measurement

**Example:**

```
MEASUREMENT: MEASUREMENT <X>: TYPE?
```

**Returns:** MEASUREMENT: MEASUREMENT <X>: TYPE?

Command Descriptions
**Syntax:**

```
MEASUREMENT: RELEVEL
```

**Description:**

Returns MINMAX when the high and low levels are set to MIN and MAX.

**Examples:**

```
!histogram
!histogram METHOD HISTOGRAM

MINMAX sets the high and low waveform levels to MAX and MIN, respectively.
```

**Arguments:**

```
METHOD
```

**Syntax:**

```
MEASUREMENT: METHOD
```

**Description:**

Equivalent to setting the HIGH-LOW SET command in the Measure menu.

Sets or queries the method used to calculate the 0% and 100% levels. This is

**Syntax:**

```
MEASUREMENT: METHOD
```

**Description:**

Sets or queries the method used to calculate the 0% and 100% levels. This is
might return 0.0 ±0.0 as the low reference level.

**Examples:**

**Arguments:**

NEVR3 Is the low reference level, in volts. The default is 0.0 V.

**Syntax:**

MEASUREMENT:REFERENCE:ABSOLUTE:LOW

**Group:** Measurement

Equivalent to setting the Reference Levels in the Measure menu.

Sets or queries the low reference level, and is the 10% reference level when

**MEASUREMENT:REFERENCE:ABSOLUTE:LOW**

sets the high reference level to 1.71 V.

**Examples:**

**Arguments:**

NEVR3 Is the high reference level, in volts. The default is 0.0 V.

**Syntax:**

MEASUREMENT:REFERENCE:ABSOLUTE:HIGH

**Group:** Measurement

Equivalent to setting the Reference Levels in the Measure menu.

Sets or queries the high reference level, and is the 90% reference level when

**MEASUREMENT:REFERENCE:ABSOLUTE:HIGH**

Command Descriptions
MEASUREMENT: REFLEVEL: ABSOLUTE: MID?

* Example:

NR3 is the mid reference level. In volts, the default is 0.0 V.

* Arguments:

NR3 <nr> is the mid reference level. In volts, the default is 0.0 V.

** Syntax:**

MEASUREMENT: REFLEVEL: ABSOLUTE: MID

** Group:** Measurement

in the "from waveform when taking a delay measurement."

The mid reference level is used in the REFERENCE LEVELS in the Measure menu.

Equivalent to setting the REFERENCE LEVELS in the Measure menu.

MEASUREMENT: REFLEVEL: METHOD is set to ABSOLUTE. This command is

Sends or queries the mid reference level, and is the 50% reference level when
$\text{MEASUREMENT:REFLEVEL:ABSOLUTE:NR1:MACRO:MD2}$

**Examples:**

- $\text{MEASUREMENT:REFLEVEL:ABSOLUTE:NR1:MACRO:MD2}$

**Arguments:**

- $\text{NR1}$ is the mid reference level in volts. The default is 0.0 V.

**Syntax:**

- $\text{MEASUREMENT:REFLEVEL:ABSOLUTE:NR1:MACRO:MD2}$

**Group:** Measurement

The command sets the mid reference level in the measurement menu.

**Description:**

- Sets or queries the mid reference level for the "0" waveform. When taking a delayed measurement, this command is equivalent to setting the phase of delay measurement and is the 50% reference level when using the internal reference level for the "0" waveform.
Syntax and Commands

Example:

```
MEASUREMENT: REFERENCE: METHOD

levels.
```

Specifications that explicitly define levels are used for the reference
levels.

Arguments:

```
METHOD

```
MEASUREMENT::LEVEL:PERCENT:HIGH

Specifies that the high reference level is set to 95% of HIGH.

Syntax:

MEASUREMENT::LEVEL:PERCENT:HIGH <NRP3>

Examples:

Arguments:

default is 90%.

Range from 0 to 100 percent, and is the high reference level. The

Command Description:

This command is equivalent to setting the Reference Levels in the
high reference level when MEASUREMENT::LEVEL:PERCENT:HIGH is set to PER
Sels or queries the percent relative to HIGH, that is used to calculate the

HITs: 320 Programmer Manual
**MEASUREMENT: REFERENCE: PERCENT: LOW**

This command is equivalent to setting the `REFERENCE` level in the Measure menu, or querying the percent relative to the level that is used to calculate the low.

### Command Descriptions

**Syntax:**

```
MEASUREMENT: REFERENCE: PERCENT: LOW
```

**Group:**

```
>NR3
```

**Arguments:**

- (NULL) ranges from 0 to 100 percent and is the low reference level.

**Example:**

Default is 10%.
CMD: MEASUREMENT: REFLEVEL: PERCENT: MID

Description:
This command is equivalent to setting the Reference Levels in the MDIR. When the measurement level is set to PERCENT, the display is set to percent. The MID specifies whether the percent relative to HIGH, or to the MID is used to calculate the reference levels.

Arguments:
- PERCENT (range from 0 to 100 percent and is the measurement level)
- MID

Examples:
- MEASUREMENT: REFLEVEL: PERCENT: MID 60

Syntax:
MEASUREMENT: REFLEVEL: PERCENT: MID

Group:
Measurement
Examples:

**MEASUREMENT: SNAPSHOT**

Syntax:

```
MEASUREMENT: SNAPSHOT
```

Related Commands:

```
MEASUREMENT: CLEARSNAPSHOT
```

Group: Measurement

Display the measurement snapshot

**MEASUREMENT: SNAPSHOT**

Examples:

```
MEASUREMENT: REFLEVEL: PERCENT: MID2 0
```

Arguments:

```
NR2 <NR> Range <0 to 100 percent> and is the mid reference level. The default is 50%.
```

Reference Levels in the Measure Menu:

delay of phase measurement. This command is equivalent to setting the mid reference level for the second waveform specified when taking a spell of queries. The percentage, relative to HIGH, that is used to calculate
CLEAR removes the message from the message window. This is equivalent to sending MESSAGE SHOW.

Syntax: MESSAGE CLEAR

Group: Display

Message parameters:
Clears the message window and the MESSAGE group returns the current MESSAGE.
The coordinate system relative to the screen is shown in Figure 2-1.

The origin of the coordinate system is the upper left corner of the screen.

Character widths in pixels, see Table A-1 on page 4-1.

Window is smaller, the characters will be clipped. For a complete list of
must be at least 15 pixels before any characters can be fully displayed. If the
The reserved height of all characters is 15 pixels so the height of the window
DEFINES the top of the window, XZ2 defines the bottom of the window,
and = 0 to 480, and are pixel positions along the vertical axis.

Arguments:

<ZX>, <ZY> defines the right side of the
<ZX> defines the left side of the window.
<ZT>, <TD> defines the position.
<DT> defines the position.

Syntax: MESSAGEx:BOX <ZT>, <ZX>, <ZY>, <DT>

Display: not display the window unless MESSAGE:STATE is ON.

Defines the size and position of the message window. This command does

MESSAGE:BOX

Command Description
space and tab characters to position the message within a line.
the string to position the message on multiple lines. You can also use white
the topmost line in the window a line feed character can be embedded in
The message is left-justified, and is displayed on a single line starting with
The message is 1000 characters.
the message is 1000 characters. The maximum length of the mes-
the characters char in Appendix C. The maximum length of the mes-
Arguments:

<Message: SHOW>
Syntax: <Message: SHOW> \texttt{\texttt{TEXT}}

Display:
Group:

Message: SHOW

in the window.
Clears the contents of the message window and displays the new message

Figure 2-4: Message Window Coordinates

Command Descriptions
depending on your controller and your GPL I/O drivers. The ESC character may appear differently on your
workstation. The message "HELLO" is displayed in inverse video. In the example, the space for
"HELLO" is displayed in the upper left corner of the box. The
message "HELLO" is displayed in the upper left corner of the box. You can define
"HELLO" in the upper left corner of the box. (You can define
"HELLO" in the upper left corner of the box.

Examples:

```
MESSAGE: SHOW "HELLO WORLD"
```

The box size with the MESSAGE: BOX command.

The window can be returned as a query response regardless of what is displayed in the
query. Notice the message string itself is not altered. The entire message
contains the portion of the message that exceeds the limits will not be dis-
played. The length of the label, because the width of character replaces the
command. The length of the label that is in the label area depends on the
command.

The label area is the height and width you have set using the MESSAGE: BOX
command.

The use of any undocumented codes may produce unpredictable

NOTE

String

until another ESC character followed by the ® character is found in the
followed by the ® character displays all the text that follows in inverse video
character. The first ESC character
characters that occupy the pixel column relative to the left margin of
A tab can be sent by sending a tab character (decimal 9) followed by two
create a new password for accessing the user-provided data.

*Examples:* NEWPASS "myPassword"

*Arguments:*
- `<string>` is the new password. The password can include up to 10 characters.

*Syntax:
- NEWPASS `<string>`

**Related Commands:**
- PASSWORD

**Group:** Miscellaneous

Command or an execution error will be generated.

The PASSWORD command must be successfully executed before using this command to ensure that the password that enables access to password-protected data has been correctly set.

**NEWPASS (No Query Form)***

*Arguments:
- `on` or `off`<n> = 0 displays the message window and its contents on the screen.
- `off` or `on`<n> = 0 removes the message window from the screen.

*Syntax:
- MESSAGE STATE {on|off}

**Group:** Display

Controls the display of the message window.
Table 2-25: Commands that Generate an Operation Complete Message

The *OPC* command allows you to synchronize the operation of the digitizers and the output queue. See page 3-7.

Syntax:

*OPC*  

Related Commands:

BUSY, WA1

States and Errors:

Group:

Related Descriptions:

OPC
Factory default password is "XYZZY" and is always valid.

Arguments:

Password is the password and can include up to 10 characters. The

Syntax:

_PASSWORD<space>Password

Related Commands:

NEWPASS, PWD

Miscellaneous:

When you learn for the first time you must use the PASSWord command to prove
when you turn it on again you must use the PASSWord command to prove
while the digitizing oscilloscope remembers the password even if you turn it off
The digitizing oscilloscope remembers the password even if you turn it off
PASSWord command with no arguments, or the *RO command is issued.

Any arguments disable these commands. Once the password is

Ends the PWD and NEWPass commands. Sending PASSWord without

Password (No Query Form)
Set to True.

This is the value 1, showing that the power-on status clear flag is

+PSC

set to true.  

Sets the power-on status clear flag to false.

0

+PSC

Examples:

Example 1:

Power-on, using an out-of-range value causes an execution warning.

The 0 status clears the power-on status clear and prevents any SHG assertion after

NT/ = 0 sets the power-on status clear flag true. Sending *PSC I there-

After power-on,

Power-on clear and allows the digitizing oscilloscope to possibly assert SHG

NT/ = 0 sets the power-on status clear flag to false, and disables the

Arguments:

Related commands:

DESR, ESR, FACTORY, RST, SHG

Syntax:

NT/ *PSC

Group:

Status and Error

The use of these registers, see page 3-1.

Power is still off and are restored at power-on. For a complete discussion of

SHER, and ESR registers are presented in non-volatile memory when

When *PSC is false, the current values in the DESER,

The DESER register is set to 255 and the SHER and ESR registers are set

on handing of the DESER, SHER, and ESR registers. When *PSC is true,

Sets and queries the power-on status clear flag that controls the automatic power-

PSC

Command descriptions
memory location 3:
restores the digitizing oscilloscope from a copy of the settings stored in

\textbf{Examples:}

\texttt{RCL 3}

\textbf{Arguments:}

\texttt{RCL, RLT, NEW, FACTORY, LRN?, REGAI:SETUP, RST, RST, SAY, SAVE, SETUP}

\textbf{Syntax:}

\texttt{DELETE:SETUP, FACTORY, LRN?, REGAI:SETUP, RST, RST, SAY, SAVE, SETUP}

\textbf{Related Commands:}

\texttt{Save and Recall}

\textbf{Group:}

Save and Recall

\textbf{Description:}

as the \texttt{Recall} item in the front-panel Save/Recall menu. command is equivalent to \texttt{RECAI:SETUP} and performs the same function. This command is stored in memory. The settings are stored using the \texttt{SAY} command. This stores the state of the digitizing oscilloscope from a copy of its settings

\underline{\textbf{RCL (NO Query Form)}}

\texttt{might return #22PROPERTY of Company, X.}

\texttt{?}

\textbf{Examples:}

\texttt{PUD #22PROPERTY OF COMPANY, X.}

\textbf{Arguments:}

\texttt{BLOCK < 100 characters.}

\texttt{?}

\texttt{PUD ?}

\textbf{Syntax:}

\texttt{PUD ?}

\textbf{Related Commands:}

\texttt{PASSWORD}

\textbf{Group:}

Miscellaneous

\textbf{Description:}

Password. The password is not necessary to query the data.
Examples:

Arguments:

Syntax:

Miscellaneous:

Specifies a comment. This line is ignored by the instrument.

(RECALL: SETUP (NO QUERY FORM))

Recalls the front panel setup to its factory defaults.

Examples:

Arguments:

Syntax:

(RECALL: SETUP)

Retrieves the front panel setup to its factory defaults.

Related commands:

Save and Recall

Factory Setup in the Save/Recall Setup menu.

This command is equivalent to selecting Recall Saved Setup or Recall from a stored Recall Front Panel setup of the digitizing oscilloscope.

(RECALL: SETUP (NO QUERY FORM))

Command Descriptions
The *PDU* response:
- Hardcopy settings.
- Stored settings.
- Alias definitions.
- The Power-on Status Clear flag setting.
- The Standard Event Status Enable Register setting.
- The Service Request Enable Register setting.
- The Output Queue.
- Calibration data that affect device specifications.
- The selected IEEE Std 488.1-1987 address of the digitizing oscilloscope.
- The state of the RS-232-C or IEEE 488.1 interface.
- The RST command does not alter the following:
  - Returns the instrument settings to the factory defaults (see Appendix D).
  - RST does the following:

  Syntax:
  ```
  RST
  ```

  Related commands: FACTORY, P5C, *PCL, RECALL, SETUP, SAY, SAVE, SETUP

  Group: Status and Error

  Status, but does not purge any aliases or stored settings.

  *RST (no query form)*

  Command Descriptions
PARTY: NONE, STOPBITS: 1
RS232: Baud: 9600, SOFTPARAGING: OFF, HARDPARAGING: ON.

If minor revision:

Arguments: None

Syntax: RS232?

Gives RS232 STOPBITS.


Group: Miscellaneous

Queries the RS232 settings.

RS232? (query only)

Command Descriptions
 sets the transmission rate to 9600 baud.

 Examples:

 RS232: BAUD 9600

 Arguments:

 NRT, where NRT can be 300, 600, 1200, 2400, 4800, 9600 or 19200.

 Syntax:

 RS232: BAUD

 Related Commands:


 Group:

 Miscellaneous

 Self or query RS-232-C interface transmission speed.

 Command Description:
Example:

```
RS232: HREADY[flag] ON
```

Arguments:

```
OFF or 0 = turn off hardtagging.
ON or 1 = turn on hardtagging.
```

Related Commands:

```
```

Miscellaneous:

```
is asserted again to restart transmission.
```

Group:

```
RS232: HARD[flag]ing
```

Command Descriptions:

```
Sets or queries the input and output hard tagging over the RS-232 port. It
```
**PARTY**

Sets the parity to be even.

**Examples:**
- Rs232: parity even
- None
- Odd
- Even

**Arguments:**

**Syntax:**

R232党: PARTY { none | odd | even }

**Related Commands:**
- Rs232: baud, Rs232: hardflaging, Rs232: softflaging, Rs232: stop

**Miscellaneous:**

Uses no output parity. The data flaging oscilloscope performs no input parity error checks and generates output and checks all input signals. When parity is even, odd or even, the data flaging oscilloscope generates the selected parity on party of parity. The parity used for all Rs-232-C data transfers.
Syntax and Commands

Commands and Descriptions

Example:

```
RS232:SOFTFLAGGING
```

Arguments:

```
ON or OFF < NRT > 0 0
```

Syntax:

```
RS232:SOFTFLAGGING
```

Related Commands:

```
```

Group:

```
Miscellaneous
```

Description:

Byes.

An XON (DC1) character is sent when the input buffer is 100 bytes full. The flow control character begins transmitting data again when a byte of data is received

Sends an XOFF character when its buffer is full. Byes.

Sends an XOFF character when its buffer is empty. Byes.

Sends transmitting data any time it receives an XOFF (DC3) character. Byes.

Sends or receives the input and output port flagging over the RS-232 port. Byes.
Example: 

```
SAV <\nRT> <\nGLOBAL> SAV
```

**Arguments**

- `<\nRT>`: a value in the range from 1 to 10 and specifies a location, using an argument.

**Syntax**

```
<\nRT> * SAV
```

**Related Commands:**

- `DELETE.SEITU`, `FACTORY`, `RCL`, `RECALL:SETUP`, `SAVE:SETUP`

**Group:**

- `Save and Recall`

---

**RZ322:STOPBIT**

```
<\nRT> STOPBITES 1, SEL the number of stop bits to 1.
```

**Examples:**

```
> STOPBITES 1
```

**Arguments**

- `STOPBITES`: sets the number of stop bits to 1.

**Syntax**

```
<\nRT> STOPBITES <\nRT>
```

**Related Commands:**

- `RZ322:BAUD`, `RZ322:DIFFGND`, `RZ322:PARITY`, `RZ322:SOFTGND`

**Group:**

- `Miscellaneous`

**Ter to identify the end of data for that character:**

Sells or queues the number of transmission stop bits sent with each character.

---

**RZ322:STOPBITS**

**Command Descriptions**
**SAVE: WAVEFORM (NO QUERY FORM)**

Saves the current front-panel setup in memory location 5.

**Example:**

```
SAVE: SETUP 5
```

**Arguments:**

- `<NRT>` is a value in the range from 1 to 60 and specifies a location. Using an out-of-range value causes an execution error. Any settings that have been stored previously at this location will be overwritten.

**Related Commands:**

- DELETE: SETUP
- RECALL: SETUP
- RCL.
- SAY

**Group:**

Save and Recall menu.

This command is equivalent to selecting the Save Current Setup in the Save/Recall Setup menu.

**SAVE: WAVEFORM (NO QUERY FORM)**

Saves the current waveform in memory location 2.

**Example:**

```
SAVE: WAVEFORM MATH2, REF2
```

**Arguments:**

- `<REF>` is the location where the waveform will be stored.
- `<MATH>` is CH<>{X} or MATH<>{X} and is the waveform that will be stored.

**Related Commands:**

- DELETE: WAVEFORM
- RECALL: WAVEFORM

**Group:**

Save and Recall menu.

This command is equivalent to selecting the Save WavEform item in the Save/Recall menu.

**SAVE: WAVEFORM (NO QUERY FORM)**

Saves the current waveform in memory location 5.

**Example:**

```
SAVE: WAVEFORM MATH2, REF2
```

**Arguments:**

- `<REF>` is the location where the waveform will be stored.
- `<MATH>` is CH<>{X} or MATH<>{X} and is the waveform that will be stored.

**Related Commands:**

- DELETE: WAVEFORM
- RECALL: WAVEFORM

**Group:**

Save and Recall menu.

This command is equivalent to selecting the Save WavEform item in the Save/Recall menu.

**SAVE: WAVEFORM (NO QUERY FORM)**

Saves the current waveform in memory location 5.
Command Descriptions

**Select: REF1**

Returns either 0 or 1, indicating whether the REF1 waveform is selected.

**Examples**

Examples of selecting REF1.

**Select: CH2 ON**

Turns the channel 2 display on and selects channel 2.

**Examples**

Example of turning CH2 on and selecting channel 2.

**Select: CH2 OFF**

Turns the channel 2 display off and取消s channel 2.

**Examples**

Example of turning CH2 off and取消s channel 2.

**Select: <wfm>**

Selects waveform <wfm>.

**Syntax**

`Select: <wfm>`

**Group**

Vertical

**MORE button**

When pressed, this command is equivalent to pressing a front-panel CH or MATH button. The selected waveform is the waveform that was most recently displayed or selected at one time. This command allows display of only one waveform at a time.

**Examples**

Example of selecting a waveform.

**Select: >wfm**

Controls the display and selection of waveforms. There can be up to eleven waveforms displayed and selected at one time.

**Syntax**

`Select: >wfm`

**Group**

Vertical

**Examples**

Example of selecting multiple waveforms.

**Select? (Query Only)**

Returns the selected waveform and the display status of all waveforms.
**Syntax and Commands**

**Select: Control**?

**Arguments:**

- WITH <CH>, X, MATH X, or REF X, and is the selected waveform.

**Syntax:**

```
SELECT: CONTROL?
```

**Group:** Vertical

**Vertical Commands:**

Select clears the waveform that is currently selected by the cursor and returns CH as the selected waveform.

**Examples:**

```
SELECT: CONTROL?
```

---

**Command Descriptions**
Example:

```
SET
```

should be abbreviated or full length

```
SET
```

```
```

Related Commands:
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```
Syntax and Commands

Syntax

Example:

Arguments:

Syntax:

Related Commands:

Group:

Status and Error

Registers, see page 3-1.

Enable Register (SREP). For a complete discussion of the use of these
Service Request (Enable) sets and clears the bits in the Service Request
(SREP)
Syntax: TEREcure

Miscellaneous Group

TERecure displays a pass or a fail notice on completion. If then verifies that the waveform and setup memory are in the desired state. TERecure writes 0's in all waveform reference memories regardless of selected record. By default data initializes both waveform and setup memories. This overwrites any previous.

Value of 010000 might return the value 06, showing that the SBR contains the binary

Examples:

STEP +

Returns:

<NR1>

Syntax: STEP

Commands:

Related Commands: CPLS, DESCE, ESE, ESR?, ESR?, EVENS?, EVENSH, FACTORY, SFRE

Status and Error Group

discussion of the use of these registers, see page 2-1. The * STB? (Read Status Byte) query returns the contents of the Status Byte

* STB? (Query Only)

Command Descriptions
Syntax and Command Descriptions

**Example:**

```
TIME "01:24:00"
```

There must be a colon after the hour and after the min.

- `<NUMBER>` refers to the seconds number in the minute from 0 to 59.
- `<NUMBER>` refers to the minute number in the hour from 0 to 59.
- `<NUMBER>` refers to the hour number from 1 to 24.
- `<NUMBER>` is a date in the form "<DDMMYY>".

**Arguments:**

```
TIME <string>
```

Related Commands:
- Display: `CLOCKS`
- Miscellaneous: `TIME`

Sets or queries the time that the digizing oscilloscope can display.
Trigger holdoff: actual (query only)

Example:

```
TRIGGER: HOLDOFF: ACTUAL
```

Syntax:

```
TRIGGER: HOLDOFF: ACTUAL
```

Group:

Trigger

Settings:

May need to be longer than the requested holdoff to accommodate those delayed time bases. If the delayed time base is longer, the actual trigger holdoff is the record length is long. The time base position is large (for max. or min.) time bases, etc., if the time per division is large (for max. or min.), the minimum possible trigger holdoff is 15 ms, but it is also affected by certain settings the actual trigger holdoff — the minimum time between triggers. The

Trigger holdoff: actual (query only)

Example:

```
TRIGGER: HOLDOFF: ACTUAL
```

Syntax:

```
TRIGGER: HOLDOFF: ACTUAL
```

Group:

Trigger

Sets the trigger level midway between MAX and MIN.

Example:

```
TRIGGER: SETLEVEL
```

Syntax:

```
TRIGGER: SETLEVEL
```

Arguments:

Front-panel SET LEVEL TO 50% button.

Sets the main trigger level midway between the MIN and MAX amplitudes of the trigger source input. This is equivalent to pressing the SET LEVEL button on the front panel.

Command Descriptions
TRIGGER: HOLDOFF: VALUE?

sets the requested holdoff value to 40 ms.

TRIGGER: HOLDOFF: VALUE 40e-6

Examples:

Arguments:

NR3 < New requested trigger holdoff in fractions of seconds (the minimum is 0.5 ms, the maximum is 1s, the trigger holdoff is also affected by certain time base settings). If the time per division is large, the minimum possible trigger holdoff is 15 ms, the maximum is 1s. The trigger holdoff is 0 ms when no holdoff is selected.

Syntax:

GROUP: Trigger

Menu:

This is equivalent to setting HOLDOFF in the Mode & Holdoff side menu. This is equivalent to setting some signals that would otherwise cause the instrument to hold off to ignore some signals that would otherwise cause the instrument to hold off. The minimum possible trigger holdoff is 15 ms. You can use trigger holdoff selections or control the trigger holdoff—the minimum time between

TRIGGER: HOLDOFF: VALUE
Trigger: LEVEL

Syntax:

Example:

Arguments:

Trigger: INTRATE

Syntax:

Example:

Arguments:

Command Descriptions
**TRIGGER:MAIN:HOLDOFF? (query only)**

Syntax:

TRIGGER:MAIN:EDGE:SOURCE?

TRIGGER:MAIN:EDGE:SOURCE { INTCLOCK | EXTERNAL | CHX< }?

**TRIGGER:MAIN:EDGE:SOURCE**

Syntax:

TRIGGER:MAIN:EDGE:SLOPE { RISE | FALL }?

**TRIGGER:MAIN:EDGE:SLOPE**

Syntax:

TRIGGER:MAIN:EDGE? (query only)

**TRIGGER:MAIN**

Syntax:

TRIGGER:MAIN:SLAVE?

TRIGGER:MAIN? (query only)

Command Descriptions
75 KHz

Example:

TRIGGER: MAXSAMPLERATE?

Syntax:

TRIGGER:

Group:

Holdoff, whichever is slower:

The rate is either the internal clock rate or the inverse of the actual trigger
holdoff. If the trigger source is the internal clock, the maximum sam-
ple rate is the inverse of the actual sample rate. If the trigger source is external
sampled and placed in the waveform record. If the trigger source is external
samples and placed in the waveform record. If the least rate at which points can be
queried the maximum sample rate—The least rate at which points can be
TRIGGER: MAXSAMPLERATE (Query only)

TRIGGER: MAIN:MODE?

{ NORMAL | AUTO }

TRIGGER: MAIN:MODE

Syntax

See TRIGGER: MAIN:MODE and is included for compatibility.

TRIGGER: MAIN:LEVEL?

{ <3> } TRIGGER: MAIN:LEVEL

Syntax

See TRIGGER: MAIN:LEVEL and is included for compatibility.

TRIGGER: MAIN:VALUE?

TRIGGER: MAIN:HOLDOFF:VALUE

See TRIGGER: HOLDOFF:VALUE and is included for compatibility.

Command Descriptions
TRIGGER: SLOPE

Specifies that a waveform record is automatically acquired.

Examples:

TRIGGER: MODE AUTO

Arguments:

NORMAL waits for valid trigger events.

AUTO forces acquisition of a record if a trigger is not detected within 50 ms.

TRIGGER: MODE?

{ NORMAL | AUTO }

TRIGGER: MODE

Mode in the Trigger menu.

Sets or queries the trigger mode. This command is equivalent to selecting

TRIGGER: MODE
The trigger source might return 'CHX' indicating that the signal was acquired using channel X. The trigger source could be the internal clock or an external source.

**Examples**

- **TRIGGER:SOURCE INTCLK**

**Arguments**

- **Example:**
  
**TRIGGER:SOURCE INTCLK**

**Arguments**

- **Example:**
  
**TRIGGER:SOURCE (CHX2 EXTERNAL)**

**Syntax**

**Group:** Trigger

**Note**

Doing so causes a parameter error. Cannot set the trigger source to be either of the two channels. If you have an instrument without delay lines (Option 1D), you may split the source in the trigger menu. Source or queries the source for the trigger. This is equivalent to setting **TRIGGER:SOURCE**.
**TRIgger:STATE? (Query Only)**

Returns the current state of the triggering system. This is equivalent to viewing which LEDs are lit on the front panel.

**Group:** Trigger

**Syntax:** TRIGGER:STATE?

**Returns:**
- **READY:** indicates that the instrument is ready to accept a trigger.
- **TRIgger:** indicates that the instrument is seeing triggers and is acquiring the waveform record.
- **FAIl:** indicates that the instrument is not ready to accept a trigger.
- **SAVe:** indicates that the instrument is in save mode and is not acquiring data.
- **AUTO:** indicates that the instrument is in auto mode and acquires data even in the absence of a trigger.
- Might return READY, indicating that the instrument is ready to accept a trigger.

**Examples:**
- TRIGGER:STATE?

**Related Commands:**
- Miscellaneous
- Alias commands
- *DDT

**Related Commands:**
- Immediate executes all commands that have been defined by *DDT.

---

**TRIgger (No Query Form)**

(Trigger) Executes commands that are defined by *DDT.

**Group:** Miscellaneous

**Syntax:** *TRIG

**Examples:**
- *TRIG
Argumets:
ALL specifies all front-panel buttons and knobs.

Syntax:
UNLOCK ALL

Related Commands:
LOCK

Miscellaneous:
Group:

Programmable Instrumentation, Section 2.8.3 on P. 419. See ANSI IEE 36.1-1987 Standard Digital Interface for RMLs, the UNLOCK command has no effect. For more information, refer to Chapter 11: The Displaying Oscilloscope is in the Remote With Lockout State.

NOTE
Unlock the front panel. This command is equivalent to LOCK NONE.

UNLOCK (NO Query Form)

Returns:
NRJ and is always 0.

Syntax:
TSTR (Query Only)

Group:
Miscellaneous

Command Descriptions
**Syntax**

*WAII*

**Related Commands:**

BUSY?, OPC, Error

**Group:**

Synchronization

**Description:**

Synchronize the operation of the digitizing oscilloscope with your application.

Prevents the digitizing oscilloscope from executing further commands (waits) until all pending operations finish. This command allows you to synchronize your application with the digitizing oscilloscope. Synchronization of commands is described on page 37.

**Examples:**

1. Set the Verbosity State to true:
   
   ```
   VERBOSITY ON
   ```

2. Length keywords for applicable setting queues:
   
   ```
   OFF or ON <NRs> = 0 sets the Verbosity State true, which relays minimum.
   ```

   ```
   KEYWORDS for applicable setting queues.
   ```

   ```
   KEYWORDS for applicable setting queues.
   ```

**Arguments:**

- OFF or ON <NRs> = 0 sets the Verbosity State true, which relays minimum.
- KEYWORDS for applicable setting queues.

**Syntax:**

*VERBOSITY?

**Related Commands:**

HEADER, L خدمات

**Miscellaneous:**

Sends the Verbosity State, which controls the length of keywords on the output.

**Description:**

Sends a single character on the basis of the Verbosity State.

**Examples:**

1. Send the character 'a':
   
   ```
   SEND "a"
   ```

2. Send the character 'b':
   
   ```
   SEND "b"
   ```

**Arguments:**

- SEND <DATA> sends the character to the output.
- SEND <DATA> sends the character to the output.
WMPRE: BIT-NR?

Examples:

WMPRE: BIT-NR?

Arguments:

WMPRE: BIT-NR ≥ NRT

Related Commands:

DATA: WIDTH, WMPRE: BIT-NR

Group:

Waveform

WMPRE: BIT-NR

Command Descriptions:

WMPRE: BIT-NR returns the number of bits per binary waveform point for the waveform.
Workflow Description

---

Command Description:

**WFMPRT:BN_FMT**

Returns either R or RP as the current waveform data format.

**Syntax**

WFMPRT:BN_FMT

**Examples**

RP specifies positive integer data-point representation.

RI specifies signed integer data-point representation.

**Group**

Waveform

**Related Commands:**

DATA:ENCODG, WFM:BYT-ON, WFM:ENCODG
specifics that there are 2 bytes per waveform data point.

**Examples:**

```
WEMPRE:BYTE:NR 2
```

**Arguments:**

```
NR1 <NR2
```

*NR1* is the number of bytes per point and can be 1 or 2.

**Syntax:**

```
WEMPRE:BYTE:NR?
```

**Related Commands:**

```
DATE:WIDTH, WEMPRE:BYTE:NR
```

**Group:**

Waveform

Sends or queries the binary field data width for the waveform specified by the

```
WEMPRE:BYTE:NR
```

**Command Descriptions:**
First

Returns either MSB or LSB depending on which data byte is transmitted first.

MSS selects the most significant byte to be transmitted first.
LSB selects the least significant byte to be transmitted first.

**Examples:**

- MSS: BT="0x ME" BW=16
- LSB: BT="0x ME" BW=16

**Arguments:**

BW (bit width) - The width of the data bus.
MSS (Most Significant Byte) - Selects the most significant byte to be transmitted first.
LSB (Least Significant Byte) - Selects the least significant byte to be transmitted first.

**Syntax:**

```
WMPRE:BT=0x ME (MSS | LSB)
```

**Related Commands:**

DATA:ENC, WMPRE:EN, WMPRE:ENDCD, WAVE:ENC

**Group:**

Waveform

Selects which byte of binary waveform data is transmitted first during a waveform data transfer when DATA:ENC (or WMPRE:BT=0x ME) is set to 2.
WFMPRE: ENCODING

Examples:
WFMPRE: ENCODING ASCII BIN

Arguments:
- BIN specifies binary curve data.
- ASCII specifies ASCII curve data.

Syntex:
WFMPRE: ENCODING ( BIN | ASCII )

Related Commands: WFMPT: BFT, WFMPT: BN, WFMPT: FMT 

Group: Waveform Curve Command

Sends or queries the type of encoding for waveform data transferred with the
WFM:PRE:WAVE (NO QUERY FORM)

Sets the waveform data point format to enveloped.

\[ \text{WFM:PRE:PT} \quad \text{ENVELOPED} \]

Examples:

\[ \text{WFM:PRE:PT \{ ENVELOPED \}} \]

Arguments:

\( N3 \) is the sampling interval, in seconds, per point.

Syntax:

\[ \text{WFM:PRE:WAVE} \quad \text{N3} \]

Group:

WAVeform

The DATA: SOURCE command specifies the point format of the waveform data for the waveform specified by WFM:PRE:WAVE.

WFM:PRE:PT -fmt (NO QUERY FORM)

Command Descriptions
WFPRF: YDFT (NO Query Form)  

Arguments:  
 \[ \text{NR3} \] is the vertical offset in digitizing levels.

Syntax:  
WFPRF: YDFT

Group:  
Waveform

WFPRF: YDFT is specified by the DATA:DESTINATION command.  
Specifying the vertical offset of the vertical component for the reference waveform.

WFPRF: YMUT (NO Query Form)  

Arguments:  
\[ \text{NR3} \] is the vertical scale factor in YUNITS (usually volts) per division.

Syntax:  
WFPRF: YMUT

Group:  
Waveform

WFPRF: YMUT is specified by the DATA:DESTINATION command.  
Specifying the vertical scale factor for the reference waveform specified by the

WFPRF: XZER0 (NO Query Form)  

Arguments:  
\[ \text{NR3} \] specifies the time base position in seconds.

Syntax:  
WFPRF: XZER0

Group:  
Waveform

WFPRF: XZER0 is specified by the DATA:DESTINATION command.  
Sets the time base position of the waveform data for the reference waveform.
NOTE

These commands do not support a query form and all information is ignored.

Table 2.27: Additional WFPR6 Commands

Argument: NRM3 is of the offset in UNITS (usually Votes).

WFPR6:YZERO (NO Query Form)
When returning WMFPre:<wfm> information from the oscilloscope, the waveform source (CH<x> or REF<y>) must be set to "<wfm>" using the MATH<<wfm>> or REF<<wfm>> command. When sending WMFPre:<wfm> information to the oscilloscope, the "<wfm>" specification is ignored and the reference location specified by DATA:SOURCE is used instead.

Returns the waveform formatting data for the waveform specified by the DATA:SOURCE command. Channel and math waveforms must be displayed before they can be queried. Querying an invalid reference waveform generates an execution error.

**Group:** Waveform

**Syntax:** WMFPre:<wfm>?

**Returns:**

```
<wfm> WFMID <Qstring> PRESS <NR1> XUNIT <Qstring>;
XMIN <NR3> PT. <NR5> XOFFSET <NR7> XZERO <NR9>;
YMIN <NR3> PT. <NR5> YOFFSET <NR7> YZERO <NR9>;
```

**NOTE**
Transferred from channel 1.

Example:

```plaintext
> NR = 0 means that the waveform record is of an unspecified length.
```

Arguments:

- NR is the number of data points. If DATA:WIDTH is 2 then there are twice

Guides:

- `<NR>`

Syntax:

```plaintext
> NR = NR0
```

Related Commands:

- DATA:DESTINATION

Command Descriptions:

- WFM:PR:NR:PT
**Syntex and Commands**

**Syntax:**

```
WMPRE: WM> ENV
```

**Related Commands:**

- **DATA DESTINATION**
- **Waveform**

**Group:**

Related by DATA DESTINATION regardless of what is sent.

Command: Om input <wm> always defines to the reference location specif.
**Syntax:**

```
WFMPE: <wfm> <wfid>
```

**Group:** Wavform

**Arguments:**
- `<wfm>`: Waveform Name
- `<wfid>`: Waveform ID

**Example:** WFMPE: CH1: PT- OFF

**Description:**

Returns 0. This command is ignored on input and is included for compatibility.

**Example:**

```
WFMPE: <wfm>: <wfid>: <arg1> <arg2>
```
seconds.

might return "e" indicating that the horizontal units for channel 1 are

Examples:

WFMPRE:CHT:XUNIT?

Arguments:

string is "s" for seconds or "Hz" for Hertz and specifies the units.

Group:

Wavetron

The WFMPRE:Wm:XUNIT command is ignored on input.

Creation, for the waveform specified by the DATA:SOURCE command.

Returns the horizontal (X-axis) units of the waveform data at the time of

WFMPRE:Wm:XUNIT

Arguments:

NR3 is the sampling interval.

Group:

Wavetron

Reference location specified by DATA:SOURCE command. On input, "Wm" always defaults to the

Sets or queries the horizontal sampling interval for the waveform specified

WFMPRE:Wm:XINC

Command Descriptions
**Arguments:**

NR3 is the scale factor in YNUIT (usually volts) per digitizing level.

**WFM:**<wfm>:YNUIT?

**Syntax:**

**Group:**

Waveform

**Notes:**

Defines channel regardless of what is sent.

WFM always flags to the reference location specified by DATA:SRC.

Value for the waveform specified by the DATA:SRC command. On input
Sends or queries the vertical scale factor in YNUIT per unscaled data point.

**WFM:**<wfm>:YNUIT

**Examples:**

**NR3** specifies the time base position in seconds.

**WFM:**<wfm>:XZERO?

**Syntax:**

**Group:**

Waveform

**Notes:**

From specified by the DATA:SRC command.
Sends or queries the time base position of the waveform data for the waveform.
The Channel 2 waveform data are volts.

Example:

WMPRE: CH2: YUNIT?

Arguments:

Specifies the units.

getunit is "V" for volts, "A" for current, "DB" for decibels, and

WMPRE: CH2: YUNIT

Syntax:

WMPRE: YUNIT: GETUNIT

Group:

Wavform

The WMPRE: YUNIT command is ignored on input.

When the waveform specified by the DATA: SOURCE command is set to the reference location specified by the DATA: DESTINATION regardless of what set of units the vertical position of the waveform for the waveform

W MPRE: YUNIT

Arguments:

N3< is the position in digitizing levels.

WMPRE: YUNIT: YOFF

Syntax:

WMPRE: YOFF

Group:

Wavform

is set

to the reference location specified by DATA: DESTINATION regardless of what set of units the vertical position of the waveform for the waveform

WMPRE: YOFF

Command Descriptions
Examples:
and vertical scale to one.

Arguments:

**Reset**

Resets the horizontal and vertical positions to zero, and the horizontal
and vertical scale to one.

**Syntax**

`ZOOM Reset`

**Group**

Zoom

Equivalent to selecting **Reset** zoom factors in the ZOOM menu.
and horizontal positioning and scaling of the display. This command is
their default settings. The ZOOM query requires the current vertical
and horizontal settings, the ZOOM query requires the current vertical.
Reverts the display to its normal state, and reverts all zoom parameters to

**Arguments**

`NR3 < is the offset in VLTUes (usually volts).`

**Syntax**

`VPRT: <`, `VRX: <`, `VRM: <`, `VR3: <`

**Group**

Wavform

Reference location specified by DATA:DESTINATION regardless of what is sent
by the DATA:SOUR command. On input, `wv <` always refers to the
sees or clears the vertical (Y-axis) offset voltage for the wavform specified

**WPMRT: <`, `VRM: <`, `VR3: <`

Command Descriptions
Syntax and Commands

**Returns either** LOCK OR NONE.

**Examples:**

1. **ZOOM: HORIZONTAL: LOCK**

   - Returns either LOCK or NONE.
   - Example: ZOOM: HORIZONTAL: LOCK

2. **ZOOM: HORIZONTAL: LOCK LIVE**

   - LIVE specifies that all live waveforms are positioned and scaled together.
   - Example: ZOOM: HORIZONTAL: LOCK LIVE

3. **ZOOM: HORIZONTAL: LOCK HORIZ**

   - Live specifies that only the selected waveform is positioned and scaled together.
   - Example: ZOOM: HORIZONTAL: LOCK HORIZ

4. **ZOOM: HORIZONTAL: LOCK ATL**

   - ATL specifies that all live (CH<x>) waveforms will be horizontally positioned and scaled together.
   - Example: ZOOM: HORIZONTAL: LOCK ATL

5. **ZOOM: HORIZONTAL: LOCK NONE**

   - NONE specifies that none of the waveforms will be horizontally positioned and scaled.
   - Example: ZOOM: HORIZONTAL: LOCK NONE

**Syntax:**

```
{  |  LIVE  |  NONE  |  ALL  }

ZOOM: HORIZONTAL: LOCK
```

**Group:**

**ZOOM: HORIZONTAL: LOCK**

Equivalent to setting **HORIZONTAL: LOCK** in the ZOOM dialog.

- LIVE specifies the waveforms that the horizontal zoom parameters affect.
- This is the default.
- NONE specifies no waveforms affected.
- ALL specifies all waveforms affected.

**Command Descriptions:**

- **LIVE**
- **NONE**
- **ALL**
**zoom**: 

Horizontal scale factor.

**Examples:**

- `zoom: horizontal: scale <N3>`

**Arguments:**

- `<N3>`: is the amount of expansion in the horizontal direction.

**Syntax:**

`<zoom: horizontal: scale > N3`  

**Group:**

To use the front-panel **Horizontal Scale** knob when zoom is on.

---

**zoom: horizontal: scale**

Centers the waveform on the display.

**Examples:**

- `zoom: horizontal: position 50`

**Arguments:**

- `<N3>`: is from 0 to 100, and is the percentage of the waveform that is to the left of screen center.

**Syntax:**

`<zoom: horizontal: position > N3`  

**Group:**

Selected waveform is affected.

---

**zoom: horizontal: position**

Command Descriptions
Returns either 0 or 1 depending on the state of Zoom mode.

Syntax: ZOOM:STATE?

Example: ZOOM:STATE

Arguments:

ON or OFF < NRT

OFF or ON < NRT = 0 turns Zoom mode off.

ZOOM:STATE

{ < NRT> | ON | OFF } Zoom:STATE OFF

Syntax: ZOOM:STATE

Group: Zoom

Zoom side menu.

This command is not equivalent to zooming in or out on the waveform. This is the only way to position and scale the waveform display and not the vertical position and scale commands affect the waveform display and not the zoom mode.

ZOOM:STATE

Command Descriptions
Arguments:

Example:

ZOOM:VERTICAL:SCALE

NR3 < is the amount of vertical expansion or compression.

Syntax:

ZOOM:VERTICAL:SCALE < NR3

Related Commands:

ACQUIRE:MODE

Group:

Zoom

Sets or queries the vertical expansion and compression factor.

ZOOM:VERTICAL:SCALE

Arguments:

Example:

ZOOM:VERTICAL:POSITION

NR3 < is the vertical position, in divisions.

Syntax:

ZOOM:VERTICAL:POSITION < NR3

Group:

Zoom

Sets or queries the vertical position of waveforms.

ZOOM:VERTICAL:POSITION

Command Descriptions
Figure 3-1: The Standard Event Status Register (SESR)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROR</td>
<td>Event ID</td>
</tr>
<tr>
<td>OPE</td>
<td>Event Status</td>
</tr>
<tr>
<td>ESE</td>
<td>Event Status Enable</td>
</tr>
<tr>
<td>DEE</td>
<td>Device Event Control</td>
</tr>
<tr>
<td>CME</td>
<td>Command Enable</td>
</tr>
<tr>
<td>ESE</td>
<td>Event Status Clear</td>
</tr>
<tr>
<td>STS</td>
<td>Status Register</td>
</tr>
<tr>
<td>OSE</td>
<td>Oscilloscope Enable</td>
</tr>
<tr>
<td>SESR</td>
<td>SESR Register</td>
</tr>
</tbody>
</table>

The Standard Event Status Register (SESR) records eight types of events that can occur within the digitizing oscilloscope. This register can accommodate up to 8-bit information about new events.

Registers tell you what types of events have occurred:
- The SESR records the status section on page 3-2.
- Each bit in a Status Register records a particular type of event, and if a particular event is pending, it is set.
- Each bit in the SESR indicates whether selected types of events are pending. If a bit is set, the event has occurred.

Status Registers:
- The SESR (SESR) and the SESR (SESR) enable the device to receive enable register (SESR). The SESR (SESR) enables the status register (SESR) and the standard event status register (SESR).
- Enable registers determine whether selected types of events are pending.

Oscilloscope register control information about the status of the digitizing oscilloscope. The registers in the event handling system fall into two functional groups:
- The digitizing oscilloscope provides a status and event reporting system for the digitizing oscilloscope, which can occur within the digitizing oscilloscope. The digitizing oscilloscope provides a status and event reporting system for the digitizing oscilloscope.
Figure 3-2: The Status Byte Register (SBR)

Table 3-1: SBR Bit Functions

<table>
<thead>
<tr>
<th>Bit</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>PON (Power On)</td>
</tr>
<tr>
<td>6</td>
<td>UPO (Upper Request)</td>
</tr>
<tr>
<td>5</td>
<td>COM (Command Error)</td>
</tr>
<tr>
<td>4</td>
<td>EXE (Execution Error)</td>
</tr>
<tr>
<td>3</td>
<td>DDE (Device Error)</td>
</tr>
<tr>
<td>2</td>
<td>QCE (Query Error)</td>
</tr>
<tr>
<td>1</td>
<td>ROC (Request Complete)</td>
</tr>
<tr>
<td>0</td>
<td>OPC (Operation Complete)</td>
</tr>
</tbody>
</table>

Note: Clear the bits.

STEP 1: Query to obtain the SBR, bit 6 is the QCE bit. When you use the
use a serial poll to obtain the SBR. Bit 6 is the ROC bit. When you use the
Event Status Enable Register (ESER). The Event Queue is handled and checked depending on the contents of the SBR.

When a serial poll of the **SBR** query to read the contents of the SBR. The
requests service and whether the SBR has recorded any events.
The DEVICE query to read the DESER.

Use the DESER command to enable and disable the bits in the DESER. Use the CSeR, a device control.

The bits in the DEVICE correspond to those in the SEER and the Event Queue. The bits in the DEVICE correspond to those in the Register controls, which types of events are reported to the

Figure 3-2. This Register controls which types of events are reported to the

Figure 3-2: The Device Event Status Enable Register (DESER)

---

The DEVICE query to read the DESER.

Various commands set the bits in the Enable Register. The Enable Register set to zero the enable is not read.

The Enable Register is set to zero the Enable Register must be set to one. If the bit in the corresponding bit in the Enable Register is set to one, the Enable Register is set to one. If the bit in the Enable Register is set to zero, the Enable Register is set to zero.

Each bit in the Enable Register corresponds to a bit in the Status Register. Each bit in the Status Register corresponds to a bit in the Enable Register. Each bit in the Enable Register corresponds to a bit in the Status Register. Each bit in the Enable Register corresponds to a bit in the Status Register.

Enable Registers

<table>
<thead>
<tr>
<th>Bit</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not used</td>
</tr>
<tr>
<td>1</td>
<td>Not used</td>
</tr>
<tr>
<td>2</td>
<td>Not used</td>
</tr>
<tr>
<td>3</td>
<td>Not used</td>
</tr>
<tr>
<td>4</td>
<td>MAY (Message Available) Shows that output is available in the Output Queue</td>
</tr>
<tr>
<td>5</td>
<td>ESB (Event Status Bit) Shows that status is enabled and present in the SEER</td>
</tr>
<tr>
<td>6</td>
<td>MSS (Master Status Summary) Obtained from the SEER Status Register or the Event Queue</td>
</tr>
<tr>
<td>7</td>
<td>Not used</td>
</tr>
</tbody>
</table>

Table 3-2: SBR Bit Functions
The Service Request Enable Register (SER)

Figure 3-5: The Service Request Enable Register (SER)

<table>
<thead>
<tr>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>---</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

The Event Status Enable Register (ESER)

Figure 3-4: The Event Status Enable Register (ESER)

<table>
<thead>
<tr>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

The Event Status Register (ESR)

The Event Status Register (ESR) contains the status of the system and can be read through the ESER. The ESER is used to set the ESR for different events.

**NOTE**

The memory through a power cycle.

Sending a PSC 0 sets the Enable Registers to maintain their values in non-volatile.

SER 0 (Equivalent to an SERVICE 0 command)

ESER 0 (Equivalent to an EVENT 0 command)

DESER 255 (Equivalent to a DESE 255 command)

Sending a PSC 1 sets the Enable Registers at power on as follows:

The PSC command controls the Enable Registers at power-on.
used again.

if *ESR* is read after pull in the Event Queue, but are not available, until *ESR* is

Read the *ESR* each time it becomes available. *ESR* reads both read from the Event Queue. Events that follow an

Read the *ESR* each time an event is summarized by previous

Event Queue, and emplases the *ESR*.

Events summarized by the *ESR* read available in the Event Queue, and

Events summarized by the earlier Event Summary at the Event Queue. This makes the

Before reading an event from the Event Queue, you must use the *ESR*.

Remove 1 from the Event Queue.

Remove all events other than *ESR* from the Event Queue, and

Event Queue stores detailed information on up to 20 events. If more

The Event Queue

Clears the Error message or sends a DCL Device

Sending any command (or query) will lose responses to earlier queries.

Controller should always read the responses immediately after

Reading any response as well. To avoid this situation, the

The output queue normally clears the last responses and queries

When a controller issues a query on *<COM>*, and a second query.

For example:

If the next command (or query) on *<COM>*, any response before it sends

The controller must read a query before a new command or query message

The digitizing oscilloscope stores queries, responses, and event reporting system contains two

Queues

Queues: The Output Queue and the Event Queue.
When output is sent to the output queue, the MAY bit in the SBR is set to 1.

(9) When the ESB bit in the SBR is set to one (4), the corresponding bit in the ESBR is also enabled. The appropriate bit in the DESER (that is, if the bit for that event type is set to 1) is then set to one.

When an event occurs, a signal is sent to the DESER (1) if that type of event occurs.
The acquisition of the waveform requires extended processing time. If new measurement data is taken before the digitizing oscilloscope takes in amplitude measurement, the waveform measurement enters processing time. If new data is taken before the digitizing oscilloscope takes in amplitude measurement, the waveform measurement enters processing time.

```
MEASUREMENT: IMEM: VALUE?
// ** Take amplitude measurement on acquired data **
MEASUREMENT: IMEM: SOURCE CAT
MEASUREMENT: IMEM: TYPE AMPLITUDE
// ** Set up the measurement parameters **
ACQUIRE: STATe ON
// ** Acquire waveform data **
ACQUIRE: STOPPPer SEQUENCE
ACQUIRE: MODE: NORMal
HORIZontAL: ASCRCondENTRY 500
SELECT: CH1 ON
// ** Set up single-sequence acquisition **
```

Use the following command sequence to do this:

For example, a typical application might involve acquiring a single-sequence waveform then taking a measurement on the acquired waveform. You could use the following command sequence to do this:

1. The digitizing oscilloscope’s status and event reporting system provides ways to do this.
2. Assess the digitizing oscilloscope’s status and event reporting system. A first operation must complete before the next one gets started.
3. Sometimes the result of an operation depends on the result of an earlier operation.

Synchronization

Methods

Although most GPIB commands are completed almost immediately after

General (7)

Embedded (6), the MSS bit in the SFR is set to one and a service request is

When a bit in the SFR is set to one and the corresponding bit in the SFR is
The same command sequence using the *WAI* command for synchronization:

```
REQUIREMENT: IMME: TOME: MOD: APTAMPT
/* Set up the measurement parameters */
ACQUIRE:STATE ON
/* Acquire waveform data */
ACQUIRE:MODE NORMAL
ACQUIRE:SOURCE SEQUENCE
ACQUIRE:CH1:RECORDERLENGTH 500
SELECT:CH1 ON
/* Set up single-sequence acquisition */
```

This looks like this:

The same command sequence completed of the previous commands before processing new one.

You can force commands to execute sequentially by using the *WAI* command.

**Using the *WAI* Command**

You can use your commands to synchronize the operation of the digitizing oscilloscope with your application program: *WAI*, *BUSY*, *OPE*, and *OPE?*. You can use your commands to synchronize the operation of the digitizing oscilloscope.

---

**Figure 3.8: Processsing Sequence With Synchronization**

![Diagram](image)

To ensure the digitizing oscilloscope completes waveform acquisition before program, Figure 3.8 shows the desired processing sequence.

**Figure 3.7: Command Processing Without Using Synchronization**

![Diagram](image)
though, and the repeated BUSY? query will result in more busy
commands. The BUSY? query helps you avoid timeout errors caused by writing
the sequence lets you create your own while loop rather than using the "while

MEASUREMENT: IMEAD:VALUE?
/* Take amplitude measurement on acquired data */

while BUSY? keep looping
/*
MEASUREMENT: IMEAD:SOURCE CH1
MEASUREMENT: IMEAD:TYPE AMPLITUDE
/* Set up the measurement parameters */
ACQUIRE:STATE ON
/* Acquire waveform data */
ACQUIRE:STOPAFTER SEQUENCE
ACQUIRE:MODE NORMAL
RECORDS:RECORDING 100
SELECTION:CH1 ON
/* Set up single-sequence acquisition */

looks like this:
The same command sequence using the BUSY? query for synchronization
as a single-sequence acquisition.

Using the BUSY? query
the buffer. This can cause a time-out.
the buffer becomes full, the controller will be unable to write more commands to
the oscilloscope until all operations in progress are complete. If the in full-
scope's input buffer, the controller will not be processed by the digitizing
scope. The controller can continue to write commands to the digitizing oscillo-
scope.
doing other tasks.

MEASUREMENT: IMEAD:VALUE?
/* Take amplitude measurement on acquired data */

while

/*
MEASUREMENT: IMEAD:SOURCE CH1
MEASUREMENT: IMEAD:TYPE AMPLITUDE
/* Set up the measurement parameters */
ACQUIRE:STATE ON
/* Acquire waveform data */
ACQUIRE:STOPAFTER SEQUENCE
ACQUIRE:MODE NORMAL
RECORDS:RECORDING 100
SELECTION:CH1 ON
/* Set up single-sequence acquisition */

looks like this:
The same command sequence using the BUSY? query for synchronization
as a single-sequence acquisition.

Using the BUSY? query
the buffer. This can cause a time-out.
the buffer becomes full, the controller will be unable to write more commands to
the oscilloscope until all operations in progress are complete. If the in full-
scope's input buffer, the controller will not be processed by the digitizing
scope. The controller can continue to write commands to the digitizing oscillo-
scope.
doing other tasks.

MEASUREMENT: IMEAD:VALUE?
/* Take amplitude measurement on acquired data */

while

/*
MEASUREMENT: IMEAD:SOURCE CH1
MEASUREMENT: IMEAD:TYPE AMPLITUDE
/* Set up the measurement parameters */
ACQUIRE:STATE ON
/* Acquire waveform data */
ACQUIRE:STOPAFTER SEQUENCE
ACQUIRE:MODE NORMAL
RECORDS:RECORDING 100
SELECTION:CH1 ON
/* Set up single-sequence acquisition */

looks like this:
The same command sequence using the BUSY? query for synchronization
as a single-sequence acquisition.
This technique requires less bus traffic than did looping on BUSY?

```c
MEASUREMENT: IMMEDIATE;
/* Take amplitude measurement on acquired data */
while serial poll = 0, keep looping
  opc
/*
Wait until the acquisition is complete before taking the measurement.
MEASUREMENT: IMMEDIATE; CH1
MEASUREMENT: IMMEDIATE; AMPERAGE; CH1
Set up the measurement parameters */

ACQUIRE: STATE ON
/* Acquire waveform data */
  0
  else
  else
/* Enable the status registers */
ACQUIRE: STOPPER SEQUENCE
ACQUIRE: MODE NORMAL
HORIZON: RESOLUTION 500
SELECT: CH1 ON
/* Set up single-sequence acquisition */

ion with serial polling looks like this:
The same command sequence using the *OPC* command for synchronization.

the Event Status Bit (ESB) in the Status Byte Register will be updated. OCP bit in the Standard Event Status Register (SESR) will be enabled and using the DESER and ESE commands. When the operation is complete, the Enable Register (ESER) and the Event Status Enable Register (ESER)

enable Register Method—Enable the OCP bit in the Device Event Status

Serial Poll Method—Enable the OCP command

Using the *OPC* Command
This technique is more efficient but requires more sophisticated program.

```
MEASUREMENT: IME:
   /* Take amplitude measurement on acquired data */
   /* Since tasks and routines control to this task, choose tasks, the SRQ, when it comes, interrupts program can now do different tasks such as talk to OPC. */

   /* Wait until the acquisition is complete before taking the measurement */
   MEASUREMENT: IME:
   MEASUREMENT: IME:
   MEASUREMENT: IME:
   SET up the measurement parameters
   ACQUIRE:
   ACQUIRE:
   ACQUIRE:
   ACQUIRE:
   SET up waveform data

   /* Enable the status registers */
   ACQUIRE: STARTER
   ACQUIRE: STARTER
   ACQUIRE: STARTER
   ACQUIRE: STARTER
   SELECT: CH1 ON

   /* Set up single-sequence acquisition */

   Then looks like this:
```

The same command sequence using the OPC command for synchronization will be generated. The `SRQ` command, when the operation is complete, a Service Request will be generated by setting the ESB bit in the Service Request Enable Register (SER) using the `DSE` and `FSE` commands. You can also enable Service Request Enable Register (SER) and the Event Status Enable Register (ESER) using the `DESE` and `FSE` commands.
This is the simplest approach. It requires no status handling or loops. How-

operation

even you must set the controller time-out for longer than the acquisition

MEASUREMENT: IMMED; VALUE?
" Take amplitude measurement on acquired data
 wait for read from output queue.
 OPC?
 /*
 WAIT until the acquisition is complete before taking the measurement

MEASUREMENT: IMMED; SOURCE CH1
MEASUREMENT: IMMED; TYPE AMPLITUDE
 " Set up the measurement parameters.

ACQUIRE:STATE ON
 /* Acquire waveform data
 ACQUIRE:STOPPER SEQUENCE
 ACQUIRE:MODE NORMAL
 HORIZONTAL:RECORDLENGTH 500
 SELECT:CH1 ON
 /* Set up single-sequence acquisition

looks like this:

The same command sequence using the *OPC? query for synchronization

there is any data in it.
complete. A timeout could occur if you try to read the output queue before

The *OPC? query places a 1 in the output queue once an operation is

Using the *OPC? query
command. In these error messages, you should read "macro" as "else."

Table 3-5 lists the execution errors that are detected during execution of a

<table>
<thead>
<tr>
<th>Code Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>113  Undefined header</td>
</tr>
<tr>
<td>112  Program mnemonic too long</td>
</tr>
<tr>
<td>111  Header separator error</td>
</tr>
<tr>
<td>110  Command header error</td>
</tr>
<tr>
<td>108  Parameter not allowed</td>
</tr>
<tr>
<td>105  GET not allowed</td>
</tr>
<tr>
<td>104  Data type error</td>
</tr>
<tr>
<td>103  Invalid separator</td>
</tr>
<tr>
<td>102  Syntax error</td>
</tr>
<tr>
<td>100  Command error</td>
</tr>
</tbody>
</table>

Table 3-4: Command Error Messages—CME Bit 5

Rules in the command syntax chapter starting on page 2-1, in the syntax check that the command is properly formed and that it follows the syntax. Check that the command is properly generated by improper command

<table>
<thead>
<tr>
<th>Code Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>1   No events to report – new events pending *ERR?</td>
</tr>
<tr>
<td>0   No events to report – channel empty</td>
</tr>
</tbody>
</table>

Table 3-3: No Event Messages

Report. These have no associated SERS bit.

Table 3-3 shows the messages when the system has no events or status to

Notes re the error message text:

- that follows the associated SERS bit is specified in the table title, with except-
- that follow, the associated SERS bit is specified in the messaage title, with the message.

For most messages, a secondary message from the digitizing oscilloscope

digitizing oscilloscope message, is part of the message string, and is separated from the

Table 3-2 through 3-9 list all the programming interface messages the
<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>2211</td>
<td>Measurement Error, No backwards Mid Ref. crossing</td>
</tr>
<tr>
<td>2210</td>
<td>Measurement Error, No Mid Ref. crossing, Second Waveform</td>
</tr>
<tr>
<td>2209</td>
<td>Measurement Error, No second Mid Ref. crossing</td>
</tr>
<tr>
<td>2208</td>
<td>Measurement Error, Waveform does not cross Mid Ref</td>
</tr>
<tr>
<td>2207</td>
<td>Measurement Error, Measurement Overflow</td>
</tr>
<tr>
<td>2206</td>
<td>Measurement Error, Invalid gate</td>
</tr>
<tr>
<td>2205</td>
<td>Measurement Error, Low amplitude, Second Waveform</td>
</tr>
<tr>
<td>2204</td>
<td>Measurement Error, Low signal amplitude</td>
</tr>
<tr>
<td>2203</td>
<td>Measurement Error, No period, Second waveform</td>
</tr>
<tr>
<td>2202</td>
<td>Measurement Error, No period found</td>
</tr>
<tr>
<td>2201</td>
<td>Measurement Error, Zero period</td>
</tr>
<tr>
<td>2200</td>
<td>Measurement Error, Measurement System error</td>
</tr>
<tr>
<td>2261</td>
<td>Math error in expression</td>
</tr>
<tr>
<td>2260</td>
<td>Expression error</td>
</tr>
<tr>
<td>243</td>
<td>Hardware I/O Device error</td>
</tr>
<tr>
<td>242</td>
<td>Hardware Configuration error</td>
</tr>
<tr>
<td>241</td>
<td>Hardware missing</td>
</tr>
<tr>
<td>240</td>
<td>Hardware error</td>
</tr>
<tr>
<td>230</td>
<td>Data corrupt or stale</td>
</tr>
<tr>
<td>224</td>
<td>Illegal parameter value</td>
</tr>
<tr>
<td>223</td>
<td>Too much data</td>
</tr>
<tr>
<td>222</td>
<td>Data out of range</td>
</tr>
<tr>
<td>221</td>
<td>Settings conflict</td>
</tr>
<tr>
<td>220</td>
<td>Parameter error</td>
</tr>
<tr>
<td>212</td>
<td>Am ignored</td>
</tr>
<tr>
<td>211</td>
<td>Integer ignored</td>
</tr>
<tr>
<td>210</td>
<td>Integer error</td>
</tr>
<tr>
<td>201</td>
<td>invalid while in local</td>
</tr>
<tr>
<td>200</td>
<td>Execution error</td>
</tr>
</tbody>
</table>

Table 3-5: Execution Error Messages—EXE Bit 4
<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>2240</td>
<td>Invalid password</td>
</tr>
<tr>
<td>2237</td>
<td>Math error: Out of acquisition memory</td>
</tr>
<tr>
<td>2236</td>
<td>Math error: Reference waveform is invalid</td>
</tr>
<tr>
<td>2235</td>
<td>Math error: Invalid math description</td>
</tr>
<tr>
<td>2230</td>
<td>Measurement error: High Rel &gt; Low Rel</td>
</tr>
<tr>
<td>2229</td>
<td>Measurement error: Negative Clipping</td>
</tr>
<tr>
<td>2228</td>
<td>Measurement error: Positive Clipping</td>
</tr>
<tr>
<td>2227</td>
<td>Positive and negative clipping</td>
</tr>
<tr>
<td>2226</td>
<td>Null waveform</td>
</tr>
<tr>
<td>2225</td>
<td>Measurement error: No waveform to measure</td>
</tr>
<tr>
<td>2224</td>
<td>Measurement error: WAIT calculating</td>
</tr>
<tr>
<td>2223</td>
<td>Measurement error: waveform mismatch</td>
</tr>
<tr>
<td>2222</td>
<td>Measurement error: No valid edge – No second cross</td>
</tr>
<tr>
<td>2221</td>
<td>Measurement error: No valid edge – No higher cross</td>
</tr>
<tr>
<td>2220</td>
<td>Measurement error: No valid edge – No arm cross</td>
</tr>
<tr>
<td>2219</td>
<td>Measurement error: No valid edge – No arm sample</td>
</tr>
<tr>
<td>2218</td>
<td>Measurement error: Unlensed</td>
</tr>
<tr>
<td>2217</td>
<td>Measurement error: Constant waveform</td>
</tr>
<tr>
<td>2216</td>
<td>Measurement error: No crossing, integer waveform</td>
</tr>
<tr>
<td>2215</td>
<td>Measurement error: No crossing, second waveform</td>
</tr>
<tr>
<td>2214</td>
<td>Measurement error: No crossing</td>
</tr>
<tr>
<td>2213</td>
<td>Measurement error: No positive crossing</td>
</tr>
<tr>
<td>2212</td>
<td>Measurement error: No negative crossing</td>
</tr>
</tbody>
</table>

Table 3-5: Execution Error Message—EXE EDIT (Cont.)
<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>2277</td>
<td>Alias redefinition not allowed</td>
</tr>
<tr>
<td>2276</td>
<td>Alias expansion error</td>
</tr>
<tr>
<td>2275</td>
<td>Alias definition too long</td>
</tr>
<tr>
<td>2274</td>
<td>Alias parameter error</td>
</tr>
<tr>
<td>2273</td>
<td>Illegal alias label</td>
</tr>
<tr>
<td>2272</td>
<td>Alias execution error</td>
</tr>
<tr>
<td>2271</td>
<td>Alias syntax error</td>
</tr>
<tr>
<td>2270</td>
<td>Alias error</td>
</tr>
<tr>
<td>2269</td>
<td>Calibration error; VCO wrap delay out of bounds</td>
</tr>
<tr>
<td>2268</td>
<td>Calibration error; Diagnostic A/D timed out</td>
</tr>
<tr>
<td>2267</td>
<td>Calibration error; VCO frequency measurement failed</td>
</tr>
<tr>
<td>2266</td>
<td>Calibration error; VCO logan DAC out of bounds</td>
</tr>
<tr>
<td>2265</td>
<td>Calibration error; VCO fine DAC did not converge</td>
</tr>
<tr>
<td>2264</td>
<td>Calibration error; VCO fine DAC nonfunctional</td>
</tr>
<tr>
<td>2263</td>
<td>Calibration error; VCO coarse DAC did not converge</td>
</tr>
<tr>
<td>2262</td>
<td>Calibration error; VCO coarse DAC nonfunctional</td>
</tr>
<tr>
<td>2261</td>
<td>Calibration error; VCO coarse DAC out of bounds</td>
</tr>
<tr>
<td>2260</td>
<td>Calibration error</td>
</tr>
<tr>
<td>2259</td>
<td>Calibration error; VLU T overrun cannot be calculated</td>
</tr>
<tr>
<td>2258</td>
<td>Calibration error; VLU T underrun cannot be calculated</td>
</tr>
<tr>
<td>2257</td>
<td>Calibration error; Incorrect forward gain at sampler</td>
</tr>
<tr>
<td>2256</td>
<td>Calibration error; Excessive offset on DC measurement</td>
</tr>
<tr>
<td>2255</td>
<td>Calibration error; Excessive amplitude on DC measurement</td>
</tr>
<tr>
<td>2254</td>
<td>Calibration error; HLLT corrections not working</td>
</tr>
<tr>
<td>2253</td>
<td>Calibration error; HLLT empty out of bounds</td>
</tr>
<tr>
<td>2252</td>
<td>Calibration error; Slope decay failed</td>
</tr>
<tr>
<td>2251</td>
<td>Reference definition error; WAV file in use for math</td>
</tr>
<tr>
<td>2250</td>
<td>Several error; Source reference data invalid</td>
</tr>
<tr>
<td>2249</td>
<td>Several error; Out of reference memory</td>
</tr>
</tbody>
</table>

Table 3.5: Execution Error Messages—EXE BIT 4 (cont.)
Table 3-7: System Event Messages

Whenever certain system conditions occur:
Table 3-7 lists the system event messages. These messages are generated:

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>Query event</td>
</tr>
<tr>
<td>401</td>
<td>Power on (PON bit set)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>350</td>
<td>Queue overflow (does not set DE Bit)</td>
</tr>
<tr>
<td>315</td>
<td>Configuration memory lost</td>
</tr>
<tr>
<td>314</td>
<td>Sever/reseed memory lost</td>
</tr>
<tr>
<td>313</td>
<td>Calibration memory loss</td>
</tr>
<tr>
<td>312</td>
<td>PFD memory lost</td>
</tr>
<tr>
<td>311</td>
<td>Memory error</td>
</tr>
<tr>
<td>310</td>
<td>System error</td>
</tr>
<tr>
<td>300</td>
<td>Device specific error</td>
</tr>
</tbody>
</table>

Table 3-8: Device Error Messages—DEE Bit 3

These errors may indicate that the oscilloscope needs repair:
Table 3-8 lists the device errors that can occur during digitizing oscilloscope operation. These errors may indicate that the oscilloscope needs repair:

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>2301</td>
<td>Cursor error off-screen</td>
</tr>
<tr>
<td>2299</td>
<td>Limit error: selected channel is tuned off</td>
</tr>
<tr>
<td>2292</td>
<td>Limit error: out of reference memory</td>
</tr>
<tr>
<td>2291</td>
<td>Limit error: reference data invalid</td>
</tr>
<tr>
<td>2290</td>
<td>Limit error: reference in use</td>
</tr>
<tr>
<td>2286</td>
<td>Testpoint FAIL</td>
</tr>
<tr>
<td>2285</td>
<td>Testpoint PASS</td>
</tr>
<tr>
<td>2280</td>
<td>Alias table full</td>
</tr>
<tr>
<td>2279</td>
<td>Alias label too long</td>
</tr>
<tr>
<td>2278</td>
<td>Alias header not found</td>
</tr>
</tbody>
</table>
### Table 3-8: Execution Warning Messages—EXE Bit 4

These messages notify you that you may get unexpected results. Do not interrupt the flow of command.

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>466</td>
<td>Bottom menu button #7 pushed (URG bit 5 set)</td>
</tr>
<tr>
<td>465</td>
<td>Bottom menu button #6 pushed (URG bit 5 set)</td>
</tr>
<tr>
<td>464</td>
<td>Bottom menu button #5 pushed (URG bit 5 set)</td>
</tr>
<tr>
<td>463</td>
<td>Bottom menu button #4 pushed (URG bit 5 set)</td>
</tr>
<tr>
<td>462</td>
<td>Bottom menu button #3 pushed (URG bit 5 set)</td>
</tr>
<tr>
<td>461</td>
<td>Bottom menu button #2 pushed (URG bit 5 set)</td>
</tr>
<tr>
<td>460</td>
<td>Bottom menu button #1 pushed (URG bit 5 set)</td>
</tr>
<tr>
<td>454</td>
<td>Right menu button #5 pushed (URG bit 6 set)</td>
</tr>
<tr>
<td>453</td>
<td>Right menu button #4 pushed (URG bit 6 set)</td>
</tr>
<tr>
<td>452</td>
<td>Right menu button #3 pushed (URG bit 6 set)</td>
</tr>
<tr>
<td>451</td>
<td>Right menu button #2 pushed (URG bit 6 set)</td>
</tr>
<tr>
<td>450</td>
<td>Right menu button #1 pushed (URG bit 6 set)</td>
</tr>
<tr>
<td>440</td>
<td>Query UNTRANSMITTED after indefinite response (OYE bit 2 set)</td>
</tr>
<tr>
<td>430</td>
<td>Query DEADLOCK (OYE bit 2 set)</td>
</tr>
<tr>
<td>420</td>
<td>Query UNTRANSMITTED (OYE bit 2 set)</td>
</tr>
<tr>
<td>410</td>
<td>Query INTERRUPTED (OYE bit 2 set)</td>
</tr>
<tr>
<td>409</td>
<td>Request control</td>
</tr>
<tr>
<td>408</td>
<td>Power fail (DDE bit 3 set)</td>
</tr>
<tr>
<td>407</td>
<td>User request (URG bit 6 set)</td>
</tr>
<tr>
<td>406</td>
<td>Operation completed (OFC bit 0 set)</td>
</tr>
</tbody>
</table>

### Table 3-7: System Event Messages (cont.)
<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>630</td>
<td>Internal Warning: 50% Overload</td>
</tr>
<tr>
<td>620</td>
<td>Internal Warning: Bad Thermistor</td>
</tr>
<tr>
<td>600</td>
<td>Internal Warning</td>
</tr>
</tbody>
</table>

**Table 3-9: Internal Warning Messages**

Table 3-9 shows internal errors that indicate an internal fault in the digitizing oscilloscope.

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>549</td>
<td>Measurement Warning: Clipping Negative</td>
</tr>
<tr>
<td>548</td>
<td>Measurement Warning: Clipping Positive</td>
</tr>
<tr>
<td>547</td>
<td>Measurement Warning: Clipping Positive/Negative</td>
</tr>
<tr>
<td>546</td>
<td>Measurement Warning: Need 3 Edges</td>
</tr>
<tr>
<td>545</td>
<td>Measurement Warning: Invalid MIN/MAX</td>
</tr>
<tr>
<td>544</td>
<td>Measurement Warning: Unknown Edge</td>
</tr>
<tr>
<td>543</td>
<td>Measurement Warning: Low Resolution</td>
</tr>
<tr>
<td>542</td>
<td>Measurement Warning: Unstable Histogram</td>
</tr>
<tr>
<td>541</td>
<td>Measurement Warning: Low Signal Amplitude</td>
</tr>
<tr>
<td>540</td>
<td>Measurement Warning</td>
</tr>
<tr>
<td>532</td>
<td>Curve data too long, curve truncated</td>
</tr>
<tr>
<td>531</td>
<td>Data stop &lt; record length, curve truncated</td>
</tr>
<tr>
<td>530</td>
<td>Data stop &lt; stop, values swapped internally</td>
</tr>
<tr>
<td>528</td>
<td>Parameter out of range</td>
</tr>
<tr>
<td>527</td>
<td>Parameter Rounded</td>
</tr>
</tbody>
</table>

**Table 3-8: Execution Warning Messages**

Table 3-8 shows execution errors that indicate that the application is in an illegal state or that an illegal function is being used.
Figure 4-1: Equipment Needed to Run the Example Programs

- PC Compatible
- and
- GPIB Board
- National Instruments Tektronix 3SG510 or equivalent
- GPIB Interface
- TDS 500 Programmer Manual

The example software includes:

- a program to configure the GPIB system to recognize the
- TDS 500 programmer as the controller of the GPIB interface.
- ID: 0x04, Vendor ID: 0x15C5, Product ID: 0x0002.
- The programs run on a PC compatible system equipped with a Tektronix GPIB interface.

The example programs illustrate how to control the digitizing oscilloscope using the GPIB interface.

4.5 and Microsoft QuickBASIC manual contain listings for these programs written in Microsoft QuickBASIC.

The example programs illustrate how to control the digitizing oscilloscope using the GPIB interface. The digitizer is controlled via the GPIB interface, allowing for the manipulation of the digitizing oscilloscope and the acquisition of data.
Compliling Examples

Compliling and Linking Your Example Quick-C Programs

To make an executable for any example, perform the following:

Step 1: Install QuickC. Select the small memory model. Be sure to set up your path so DOS can access the QuickC directory.

Step 2: Install the National Instruments GPIB-PCLI-IIA library.

Step 3: Copy the files from the example directory to your hard disk. You and the examples directory is in drive B, you might type:
cd examples
cd examples

and the example directory is in drive C, you want to move the examples in drive C

current drive is not disk C. You want to move the examples in drive C

Step 4: For this installation, you will also want to copy dec.l, h and

make examples

GPIB drivers directory, you would type:
copy \GaP\GaP-DEC\GaP-DEC.l

copy \GaP\GaP-DEC\GaP-DEC.h

GPIB drivers are in the GPIB-PC directory and you are in the example pro-

Step 4: A GPIB drivers directory in this directory. For example, all the GPIB

RCP driver is from your Tektronix 3FEG10 (National Instruments GPIB-

RCP). Once you have installed QuickC, you can use the IDE. EXE program to do this.

Step 2: Install the Tektronix 3FEG10 (National Instruments GPIB-PCLI-IIA) GPIB

system. If you have the latest version of QuickC, you will need to use files that come with the

executeable files. These have the suffix .EXE

Example Quick-C comes with sample MAKE files and sample

The source files are:
The source files provided:

QuickBASIC 4.5 and Microsoft QuickBASIC 2.5.

Example Programs
Compliling and Linking Your Example QuickBASIC Programs

To run C:\> type: c:\quickas.exe
To run Cursor, type: cursor
To run Getwarm, type: getwarm
To run Comm, type: comm
To run Meas, type: meas

Step 6: Run the program by simply typing the program name.

To compile and link C:\> type: make c:\mak
To compile and link Cursor, type: make cursor\mak
To compile and link Getwarm, type: make getwarm\mak
To compile and link Comm, type: make comm\mak
To compile and link Meas, type: make meas\mak

You wish to compile and link specifically:
where <file name> refers to the name of the example program

Step 5: To compile and link your TDS sample C programs, simply type:

make <file name>.mak
Step 5: Perform the following two steps for each program:

1) Compile the program by using the following command:
   
   bc /<file>.bas;
   To compile TMW.BAS, type: bc /o meas.bas;
   To compile CURSOR.BAS, type: bc /o comm.bas;
   To compile TL.BAS, type: bc /o tl.obj;

2) Link the compiled program with the qdb.obj module to create the executable program (file .EXE) by using the following command:

   link <file>.obj +qdb.obj;
   To link TMW.BAS, type: link meas.obj +qdb.obj;
   To link CURSOR.BAS, type: link comm.obj +qdb.obj;
   To link TL.BAS, type: link tl.obj +qdb.obj;

GPBIO.BAS is a collection of input/output routines used by the other programs and is included for proper file compilation.

Step 6: Run the program by simply typing the program name.

To run meas, type: meas
To run comm, type: comm
To run getwfm, type: getwfm
To run cursor, type: cursor
To run tl, type: tl

NOTE
The example programs disable frontend operation while they are running, and re-enable it when they terminate. If your program terminates prematurely, front panel operation may remain disabled. To re-enable front panel operation, do one of the following: cycle power on the digital oscilloscope or send the GEB command and UNLOCK ALL command with the TL program included in your sample programs disk.
The lower left corner are character widths in pixels. These characters are available for the digitizing oscilloscope. Numbers in spaces.

### Table A.1: The TDS Character Set

<table>
<thead>
<tr>
<th>Character</th>
<th>Width (pixels)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7</td>
<td>Null</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>Space</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>&quot;</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>!</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>@</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>$</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>%</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>^</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td>&amp;</td>
</tr>
<tr>
<td>9</td>
<td>11</td>
<td>*</td>
</tr>
<tr>
<td>A</td>
<td>10</td>
<td>(</td>
</tr>
<tr>
<td>B</td>
<td>10</td>
<td>)</td>
</tr>
<tr>
<td>C</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>D</td>
<td>10</td>
<td>+</td>
</tr>
<tr>
<td>E</td>
<td>10</td>
<td>,</td>
</tr>
<tr>
<td>F</td>
<td>10</td>
<td>;</td>
</tr>
<tr>
<td>G</td>
<td>10</td>
<td>&lt;</td>
</tr>
<tr>
<td>H</td>
<td>10</td>
<td>&gt;</td>
</tr>
<tr>
<td>I</td>
<td>10</td>
<td>?</td>
</tr>
<tr>
<td>J</td>
<td>10</td>
<td>\</td>
</tr>
<tr>
<td>K</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>10</td>
<td>_</td>
</tr>
<tr>
<td>M</td>
<td>10</td>
<td>`</td>
</tr>
<tr>
<td>N</td>
<td>10</td>
<td>\</td>
</tr>
<tr>
<td>O</td>
<td>10</td>
<td>.</td>
</tr>
<tr>
<td>P</td>
<td>10</td>
<td>;</td>
</tr>
<tr>
<td>Q</td>
<td>10</td>
<td>,</td>
</tr>
<tr>
<td>R</td>
<td>10</td>
<td>:</td>
</tr>
<tr>
<td>S</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The character set includes a range of symbols and characters commonly used in digital oscilloscopes for various data and control purposes.
<table>
<thead>
<tr>
<th>DECIMAL</th>
<th>NAK</th>
<th>DEC 21</th>
<th>ASCII CHARACTER</th>
<th>GBIP CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>:</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td>\</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td>=</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td>/</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td>\</td>
<td></td>
</tr>
</tbody>
</table>

Table A-2: The ASCII & GBIP Code Chart

The digizig oscilloscope uses these interface buffers to provide:

- Optimal high-speed data transfer.
- Co (controller), The digizig oscilloscope can control other devices.
- Scope responds to the GET (Get) request when the Digizig oscilloscope is a listener, the Digizig oscilloscope responds to the GLT (Get) request when the Digizig oscilloscope is a listener.
- FAQ (Device Clear), When the Digizig oscilloscope clears a listener, the Digizig oscilloscope clears its interface messages.
- DCT (Device Clear), The digizig oscilloscope responds to the DCL request.

A message is sent when the ATN (Attention) and EO (End of Display) signals are simultaneously high. This message is sent when the Digizig oscilloscope does not respond to the PPD (Parallel port) or PTL (Parallel port) requests.

- PTL (Parallel port), The digizig oscilloscope has no parallel port capability.
- PPL (Parallel port), The digizig oscilloscope responds to the PPL request.
- ER (Error), The Digizig oscilloscope assumes a listener when the Digizig oscilloscope becomes a listener.
- BT (Break), The digizig oscilloscope becomes a listener, the Digizig oscilloscope becomes a listener, and the Digizig oscilloscope assumes a listener, the Digizig oscilloscope becomes a listener, and the Digizig oscilloscope assumes a listener.

The Digizig oscilloscope supports many GPIB function supports, as indicated below.

GPIB Function Supports

- LS (Source Handshake), The digizig oscilloscope can transmit multiple messages across the GPIB.
- LH (Receive Handshake), The digizig oscilloscope can receive multiple messages across the GPIB.
- ATN (Acceptor Handshake), The digizig oscilloscope can receive multiple messages across the GPIB.
- SHT (Source Handshake), The digizig oscilloscope can transmit.
Table C-1: Digitizing Oscilloscope Standard Interface Messages

<table>
<thead>
<tr>
<th>Message</th>
<th>DCL</th>
<th>GET</th>
<th>GTL</th>
<th>LLO</th>
<th>PPC</th>
<th>PPD</th>
<th>PPE</th>
<th>PPU</th>
<th>SDC</th>
<th>SPD</th>
<th>SPE</th>
<th>TCT</th>
<th>UNL</th>
<th>UNT</th>
<th>Listen Addresses</th>
<th>Talk Addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPB</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
The factory initialization settings provide a known state for the digitizing oscilloscope.

Factory initialization sets values as shown in Table D-1.

<table>
<thead>
<tr>
<th>Control</th>
<th>Changed by Factory Init to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquire mode</td>
<td>Normal</td>
</tr>
<tr>
<td>Acquire stop after</td>
<td>RUN/STOP button only</td>
</tr>
<tr>
<td>Acquire # of averages</td>
<td>16</td>
</tr>
<tr>
<td>Acquire # of envelopes</td>
<td>10</td>
</tr>
<tr>
<td>Channel selection</td>
<td>Channel 1 on, all others off</td>
</tr>
<tr>
<td>Cursor H Bar 1 position</td>
<td>10% of graticule height (-3.2 divs from the center)</td>
</tr>
<tr>
<td>Cursor H Bar 2 position</td>
<td>90% of the graticule height (+3.2 divs from the center)</td>
</tr>
<tr>
<td>Cursor V Bar 1 position</td>
<td>10% of the record length</td>
</tr>
<tr>
<td>Cursor V Bar 2 position</td>
<td>90% of the record length</td>
</tr>
<tr>
<td>Cursor function</td>
<td>Off</td>
</tr>
<tr>
<td>Cursor mode</td>
<td>Independent</td>
</tr>
<tr>
<td>Cursor time units</td>
<td>Seconds</td>
</tr>
<tr>
<td>Delayed time base position</td>
<td></td>
</tr>
<tr>
<td>without delay lines</td>
<td>16 ns</td>
</tr>
<tr>
<td>Delayed time base position</td>
<td></td>
</tr>
<tr>
<td>with delay lines</td>
<td>-1.5 ns</td>
</tr>
<tr>
<td>Delayed time per division</td>
<td>100 ps</td>
</tr>
<tr>
<td>Display format</td>
<td>YT</td>
</tr>
<tr>
<td>Display graticule type</td>
<td>Full</td>
</tr>
<tr>
<td>Display intensity — contrast</td>
<td>150%</td>
</tr>
<tr>
<td>Control</td>
<td>Changed by Factory Init to</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------</td>
</tr>
</tbody>
</table>

Table D-1: Factory Initialization Details (Cont.)
<table>
<thead>
<tr>
<th>Control</th>
<th>Changed by Factory Init to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trigger Source</td>
<td>External</td>
</tr>
<tr>
<td>Trigger slope</td>
<td>Rising</td>
</tr>
<tr>
<td>Trigger mode</td>
<td>Auto</td>
</tr>
<tr>
<td>Trigger level</td>
<td>0.0</td>
</tr>
<tr>
<td>Trigger holdoff</td>
<td>15</td>
</tr>
<tr>
<td>Trigger internal clock rate</td>
<td>100 KHz</td>
</tr>
<tr>
<td>Short</td>
<td>No change</td>
</tr>
<tr>
<td>Saved waveforms</td>
<td></td>
</tr>
</tbody>
</table>

Table D-1: Factory Initialization Defaults (Cont.)
BEGINNER'S ALL-PURPOSE SYMBOLIC INSTRUCTION CODE

A computer language (distributed by Microsolv) that is based on the

QUICKBASIC

ACCOUNT FOR THE INSTRUMENT FOR ELECTRICAL AND ELECTRONIC ENGINEERS.

IEEE

COMMUNICATIONS INTERFACE SYSTEM defined in IEEE Std 488.

GPIB

ACCOUNT FOR GENERAL PURPOSE INTERFACE BUS. The common name for the

ET

equivalent time sampling mode in which the oscilloscope acquires signals over many

EOM

writing the samples from multiple acquisitions.

EOT

The input waveform. The oscilloscope constructs a waveform record for

EOI

next sample. So, the next acquisition sample represents voltage at the

Controller

sample at time after the trigger event specified by the time base position. Each

BNF

counting 16

time after the trigger event specified by the time base position. Each

GPIB

counting 16

sequence begins with the trigger event. The TDS 220 DIGITIZING OSCILOSCOPE uses a type

A standard notation for command syntax diagrams. The syntax

ASCI1 Character Encoding.

ASCI1 Character Encoding. The digitizing oscilloscope uses

Address

to recognize and transmit commands to it. The digitizing oscilloscope must have a unique address for the controller.


memories. This overwrites any previously stored data.

A Tektronix custom command that initializes both waveform and setup

TEXSCN

A computer language (distributed by Microsoft) that is based on C.

Quickc
<table>
<thead>
<tr>
<th>Abbreviating command, 2-4</th>
<th>Backus-Naur Form, Definition of, Glossary-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALIAS, 2-38</td>
<td>BNF (Backus-Naur Form), 2-1</td>
</tr>
<tr>
<td>ALIAS, CATALOG, 2-36</td>
<td>BNF, Glossary-1</td>
</tr>
<tr>
<td>ALIAS, DEFINE, 2-39</td>
<td>Break, 2-4</td>
</tr>
<tr>
<td>ALIAS, DELETE ALL, 2-40</td>
<td>BUSY?, 2-52</td>
</tr>
<tr>
<td>ALIAS, STATE, 2-41</td>
<td>CALIBRATE, 2-54, 2-55</td>
</tr>
<tr>
<td>ALIAS, WAVEFORM, 2-43</td>
<td>CALL, 2-43</td>
</tr>
<tr>
<td>ALLOCATE, 2-43</td>
<td>CALL, WAVEFORM, FREE, 2-44</td>
</tr>
<tr>
<td>ALLOCATE WAVEFORM, 2-43</td>
<td>CALL, WAVEFORM REF &lt;&lt;, 2-25</td>
</tr>
<tr>
<td>ALLOCATE WAVEFORM, FREE, 2-44</td>
<td></td>
</tr>
</tbody>
</table>

**Index**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbreviating command, 2-4</td>
<td>Abbreviating command, 2-4</td>
<td>Abbreviating command, 2-4</td>
</tr>
<tr>
<td>ALIAS, 2-38</td>
<td>ALIAS, CATALOG, 2-36</td>
<td>ALIAS, DEFINE, 2-39</td>
</tr>
<tr>
<td>ALIAS, DEFINE, 2-39</td>
<td>ALIAS, DELETE ALL, 2-40</td>
<td>ALIAS, DELETE ALL, 2-40</td>
</tr>
<tr>
<td>ALIAS, STATE, 2-41</td>
<td>ALIAS, WAVEFORM, 2-43</td>
<td>ALIAS, WAVEFORM, 2-43</td>
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