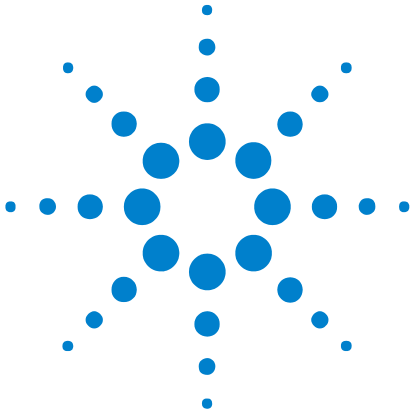

# Agilent 5000 Series Oscilloscopes

## Programmer's Quick Start Guide

Agilent Technologies

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# Programming the Oscilloscope—At a Glance

You can automate 5000 Series oscilloscope setup and data capture by running programs on a controller PC. Just install the Agilent IO Libraries Suite software, connect the oscilloscope (using USB, LAN, or GPIB interfaces), and begin writing programs.

The Agilent IO Libraries Suite provides SICL, VISA, and VISA COM libraries for programming instruments. You can use these libraries from C/C++ or Visual Basic programs. Examples in different programming languages are provided.

You can perform the following basic operations when programming the oscilloscope:

- Set up the instrument.
- Make measurements.
- Acquire data (waveform, measurements, etc.) from the oscilloscope.
- Save/restore information (such as pixel images, configurations, etc.) from/to the oscilloscope.

Other tasks are accomplished by combining these basic functions.

# In This Book

This *Programmer's Quick Start Guide* is your introduction to programming the oscilloscope using an instrument controller PC. This book and the *Programmer's Reference*, which is supplied as a Microsoft Windows help file on CD, describes the 5000 Series oscilloscope's programming interface.

This book contains the following information:

- Chapter 1, "Setting Up", describes the steps you must take before you can program the oscilloscope. It also describes how to access the *Programmer's Reference* online help file.
- Chapter 2, "Getting Started", gives a general overview of oscilloscope program structure and shows how to program the oscilloscope using a few simple examples.

**See Also**

- For in-depth information on oscilloscope commands, see the online *Programmer's Reference* help file.
- For more information on using the SICL, VISA, and VISA COM libraries in general, see the documentation that comes with the Agilent IO Libraries Suite.
- For information on controller PC interface configuration, see the documentation for the interface card used (for example, the Agilent 82350A GPIB interface).
- For information on oscilloscope operation, see the *User's Guide*.
- For detailed connectivity information, refer to the *Agilent Technologies USB/LAN/GPIB Connectivity Guide*. For a printable electronic copy of the *Connectivity Guide*, direct your Web browser to "www.agilent.com" and search for "Connectivity Guide".

# Contents

## Index

# 1 Setting Up



This chapter explains how to install the Agilent IO Libraries Suite software, connect the oscilloscope to the controller PC, set up the oscilloscope, verify the oscilloscope connection, and access the online *Programmer's Reference*.

## Step 1. Install Agilent IO Libraries Suite software

Insert the Automation-Ready CD that was shipped with your oscilloscope into the controller PC's CD-ROM drive, and follow its installation instructions.

You can also download the Agilent IO Libraries Suite software from the web at:

- "http://www.agilent.com/find/iolib"

## Step 2. Connect and set up the oscilloscope

The 5000 Series oscilloscope has three different interfaces you can use for programming: USB (device), LAN, or GPIB.

All three interfaces are "live" by default, but you can turn them off if desired. To access these settings press the **Utility** key on the front panel, then press the **I/O** softkey, then press the **Control** softkey.

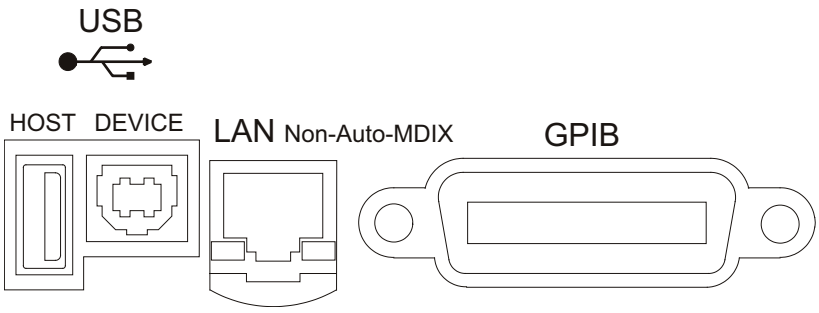



**Figure 1** Control Connectors on Rear Panel

### Using the USB (Device) Interface

1. Connect a USB cable from the controller PC's USB port to the "USB DEVICE" port on the back of the oscilloscope.

   This is a USB 2.0 high-speed port.

2. On the oscilloscope, verify that the controller interface is enabled:
   a. Press the **Utility** button.
   b. Using the softkeys, press **I/O** and **Control**.
   c. Ensure the box next to **USB** is selected ( ). If not ( ), use the Entry knob to select **USB**; then, press the **Control** softkey again.

### Using the LAN Interface

1. If the controller PC isn't already connected to the local area network (LAN), do that first.
2. Get the oscilloscope's network parameters (hostname, domain, IP address, subnet mask, gateway IP, DNS IP, etc.) from your network administrator.
3. Connect the oscilloscope to the local area network (LAN) by inserting LAN cable into the "LAN" port on the back of the oscilloscope.

4 On the oscilloscope, verify that the controller interface is enabled:
   a Press the **Utility** button.
   b Using the softkeys, press **I/O** and **Control**.
   c Ensure the box next to **LAN** is selected (  ). If not (), use the Entry knob to select **LAN**; then, press the **Control** softkey again.
5 Configure the oscilloscope's LAN interface:
   a Press the **Configure** softkey until "LAN" is selected.
   b Press the **LAN Settings** softkey.
   c Press the **Addresses** softkey. Use the **IP Options** softkey and the Entry knob to select DHCP, AutoIP, or netBIOS. Use the **Modify** softkey (and the other softkeys and the Entry knob) to enter the IP Address, Subnet Mask, Gateway IP, and DNS IP values. When you are done, press the return (up arrow) softkey.
   d Press the **Domain** softkey. Use the **Modify** softkey (and the other softkeys and the Entry knob) to enter the Host name and the Domain name. When you are done, press the return (up arrow) softkey.

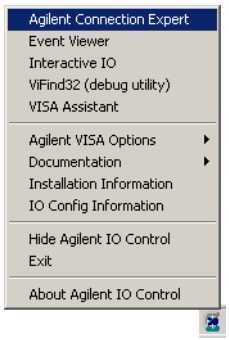
## Using the GPIB Interface

1 Connect a GPIB cable from the controller PC's GPIB interface to the "GPIB" port on the back of the oscilloscope.
2 On the oscilloscope, verify that the controller interface is enabled:
   a Press the **Utility** button.
   b Using the softkeys, press **I/O** and **Control**.
   c Use the Entry knob to select "GPIB"; then, press the **Control** softkey again.

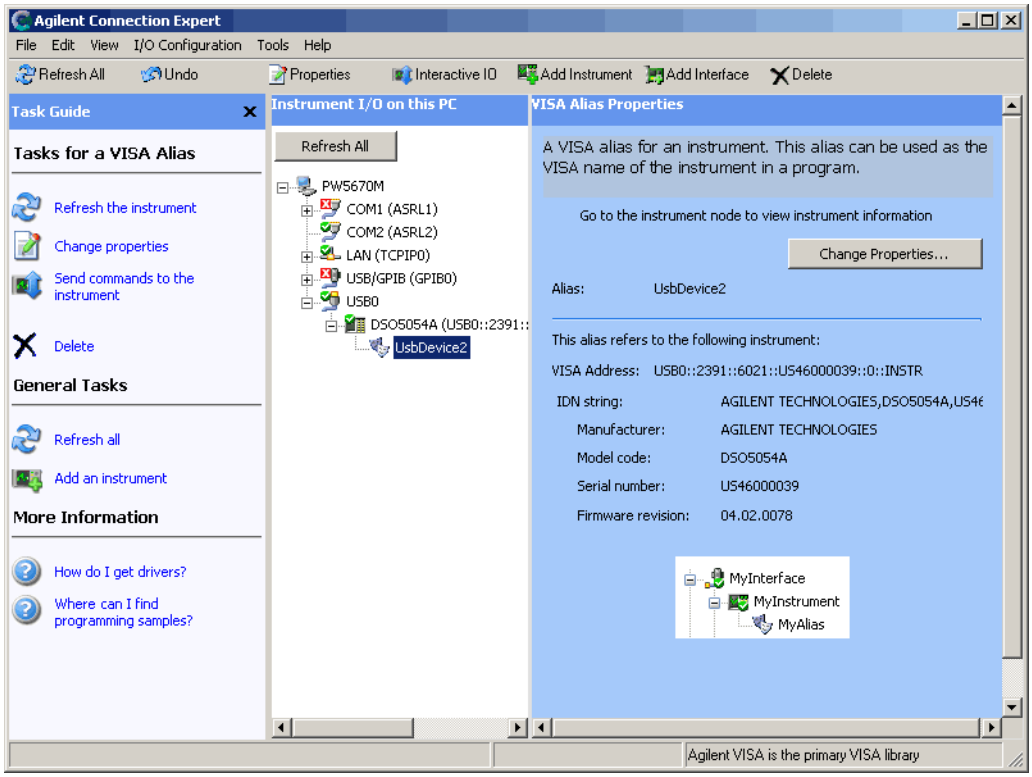
   Ensure the box next to **GPIB** is selected (  ). If not (), use the Entry knob to select **GPIB**; then, press the **Control** softkey again.
3 Configure the oscilloscope's GPIB interface:
   a Press the **Configure** softkey until "GPIB" is selected.
   b Use the Entry knob to select the **Address** value.

## Step 3. Verify the oscilloscope connection

1 On the controller PC, click on the Agilent IO Control icon in the taskbar and choose **Agilent Connection Expert** from the popup menu.




2 In the Agilent Connection Expert application, instruments connected to the controller's USB and GPIB interfaces should automatically appear. (You can click Refresh All to update the list of instruments on these interfaces.)



You must manually add instruments on LAN interfaces:

a Right-click on the LAN interface, choose **Add Instrument** from the popup menu, and click OK in the resulting dialog (because the desired interface is already selected).

b In the next LAN Instrument dialog, select either **Hostname** or **IP address**, and enter the oscilloscope's hostname or IP address.

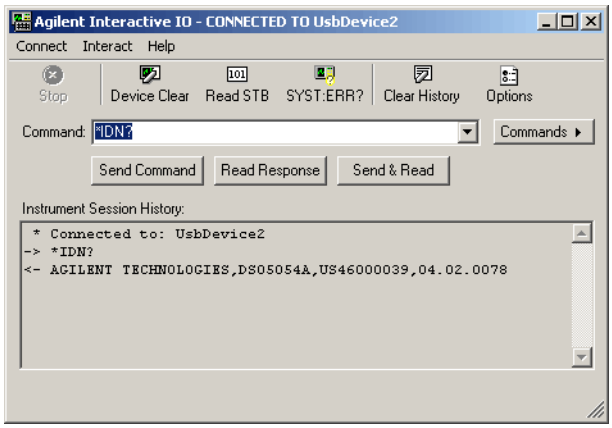
c Click **Test Connection**.

d If the instrument is successfully opened, click **OK** to close the dialog. If the instrument is not opened successfully, go back and verify the LAN connections and the oscilloscope setup.

3 Test some commands on the instrument:

a Right-click on the instrument and choose **Send Commands To This Instrument** from the popup menu.

b In the Agilent Interactive IO application, enter commands in the **Command** field and press **Send Command**, **Read Response**, or **Send&Read**.




c Choose **Connect>Exit** from the menu to exit the Agilent Interactive IO application.

4 In the Agilent Connection Expert application, choose **File>Exit** from the menu to exit the application.

## Step 4. Install the Programmer's Reference

The *Programmer's Reference* is supplied on CD as a help file readable with the Microsoft Windows help viewer. The *Programmer's Reference* help file describes oscilloscope command syntax and status reporting data structures. It also contains sample programs that you can cut-and-paste from.

### To access the Programmer's Reference help file

The *Programmer's Reference* help file requires Microsoft Windows 95/98/NT/2000/XP.

1. Insert the "Programmer's Documentation" CD into your PC's CD-ROM drive.
2. If a web browser window doesn't auto-run, open the *Readme.htm* file on the CD.
3. In the web browser window, click the **Programmer's Reference** link.

### To get the latest versions via the web

The latest versions of the *Programmer's Reference* help file and other manuals are available on the world-wide web at:

- "http://www.agilent.com/find/dso5000"

# 1 Setting Up

# 2 Getting Started



This chapter gives you an overview of programming the 5000 Series oscilloscopes. It describes basic oscilloscope program structure and shows how to program the oscilloscope using a few simple examples.

The getting started examples show how to send oscilloscope setup, data capture, and query commands, and they show how to read query results.

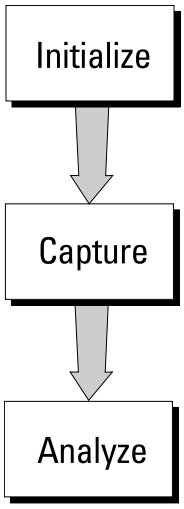
NOTE

**Language for Program Examples**

The programming examples in this quick start guide are written in Visual Basic using the Agilent VISA COM library.

# Basic Oscilloscope Program Structure

The following figure shows the basic structure of every program you will write for the oscilloscope.




## Initializing

To ensure consistent, repeatable performance, you need to start the program, controller, and oscilloscope in a known state. Without correct initialization, your program may run correctly in one instance and not in another. This might be due to changes made in configuration by previous program runs or from the front panel of the oscilloscope.

- Program initialization defines and initializes variables, allocates memory, or tests system configuration.
- Controller initialization ensures that the interface to the oscilloscope (GPIB, LAN, or USB) is properly set up and ready for data transfer.
- Oscilloscope initialization sets the channel configuration, channel labels, threshold voltages, trigger specification, trigger mode, timebase, and acquisition type.

## Capturing Data

Once you initialize the oscilloscope, you can begin capturing data for analysis. Remember that while the oscilloscope is responding to commands from the controller, it is not performing acquisitions. Also, when you change the oscilloscope configuration, any data already captured will most likely be rendered.

To collect data, you use the :DIGitize command. This command clears the waveform buffers and starts the acquisition process. Acquisition continues until acquisition memory is full, then stops. The acquired data is displayed by the oscilloscope, and the captured data can be measured, stored in trace memory in the oscilloscope, or transferred to the controller for further analysis. Any additional commands sent while :DIGitize is working are buffered until :DIGitize is complete.

You could also put the oscilloscope into run mode, then use a wait loop in your program to ensure that the oscilloscope has completed at least one acquisition before you make a measurement. Agilent does not recommend this because the needed length of the wait loop may vary, causing your program to fail. :DIGitize, on the other hand, ensures that data capture is complete. Also, :DIGitize, when complete, stops the acquisition process so that all measurements are on displayed data, not on a constantly changing data set.

## Analyzing Captured Data

After the oscilloscope has completed an acquisition, you can find out more about the data, either by using the oscilloscope measurements or by transferring the data to the controller for manipulation by your program. Built-in measurements include: frequency, duty cycle, period, positive pulse width, and negative pulse width.

Using the :WAVeform commands, you can transfer the data to your controller. You may want to display the data, compare it to a known good measurement, or simply check logic patterns at various time intervals in the acquisition.

# Programming the Oscilloscope

## Referencing the IO Library

No matter which instrument programming library you use (SICL, VISA, or VISA COM), you must reference the library from your program.

In C/C++, you must tell the compiler where to find the include and library files (see the Agilent IO Libraries Suite documentation for more information).

To reference the Agilent VISA COM library in Visual Basic for Applications (VBA, which comes with Microsoft Office products like Excel):

1 Choose **Tools>References...** from the main menu.

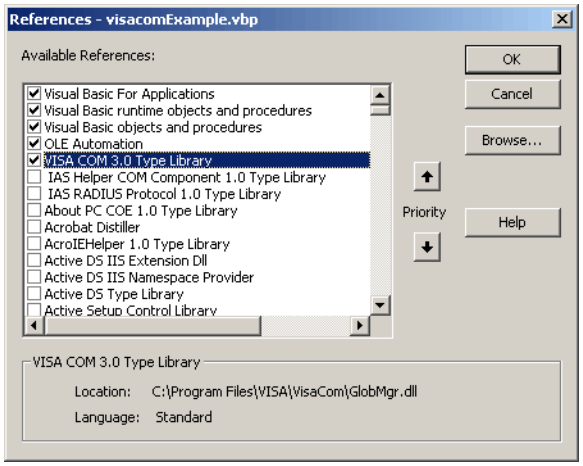
2 In the References dialog, check the "VISA COM 3.0 Type Library".

3 Click **OK**.

To reference the Agilent VISA COM library in Microsoft Visual Basic 6.0:

1 Choose **Project>References...** from the main menu.

2 In the References dialog, check the "VISA COM 3.0 Type Library".




3 Click **OK**.

## Opening the Oscilloscope Connection via the IO Library

PC controllers communicate with the oscilloscope by sending and receiving messages over a remote interface. Once you have opened a connection to the oscilloscope over the remote interface, programming instructions normally appear as ASCII character strings embedded inside write statements of the programing language. Read statements are used to read query responses from the oscilloscope.

For example, when using the Agilent VISA COM library in Visual Basic (after opening the connection to the instrument using the ResourceManager object's Open method), the FormattedIO488 object's WriteString, WriteNumber, WriteList, or WriteIEEEBlock methods are used for sending commands and queries. After a query is sent, the response is read using the ReadString, ReadNumber, ReadList, or ReadIEEEBlock methods.

The following Visual Basic statements open the connection and send a command that turns on the oscilloscope's label display.

```
Dim myMgr As VisaComLib.ResourceManager
Dim myScope As VisaComLib.FormattedIO488

Set myMgr = New VisaComLib.ResourceManager
Set myScope = New VisaComLib.FormattedIO488

' Open the connection to the oscilloscope. Get the VISA Address from the
' Agilent Connection Expert (installed with Agilent IO Libraries Suite).
Set myScope.IO = myMgr.Open("<VISA Address>")

' Send a command.
myScope.WriteString ":DISPLAY:LABEL ON"
```

The ":DISPLAY:LABEL ON" in the above example is called a *program message*. Program messages are explained in more detail in the online *Programmer's Reference*.

## Initializing the Interface and the Oscilloscope

To make sure the bus and all appropriate interfaces are in a known state, begin every program with an initialization statement. When using the Agilent VISA COM library, you can use the resource session object's Clear method to clears the interface buffer:

```
Dim myMgr As VisaComLib.ResourceManager
Dim myScope As VisaComLib.FormattedIO488

Set myMgr = New VisaComLib.ResourceManager
Set myScope = New VisaComLib.FormattedIO488

' Open the connection to the oscilloscope. Get the VISA Address from the
' Agilent Connection Expert (installed with Agilent IO Libraries Suite).
Set myScope.IO = myMgr.Open("<VISA Address>")

' Clear the interface buffer.
myScope.IO.Clear
```

When you are using GPIB, CLEAR also resets the oscilloscope's parser. The parser is the program which reads in the instructions which you send it.

After clearing the interface, initialize the instrument to a preset state:

```
myScope.WriteString "*RST"
```

NOTE

**Information for Initializing the Instrument**

The actual commands and syntax for initializing the instrument are discussed in the common commands section of the online *Programmer's Reference*.

Refer to the Agilent IO Libraries Suite documentation for information on initializing the interface.

## Using :AUToscale to Automate Oscilloscope Setup

The :AUToscale command performs a very useful function for unknown waveforms by setting up the vertical channel, time base, and trigger level of the instrument.

The syntax for the autoscale command is:

```
myScope.WriteString ":AUTOSCALE"
```

## Using Other Oscilloscope Setup Commands

A typical oscilloscope setup would set the vertical range and offset voltage, the horizontal range, delay time, delay reference, trigger mode, trigger level, and slope. An example of the commands that might be sent to the oscilloscope are:

```
myScope.WriteString ":CHANNEL1:PROBE 10"
myScope.WriteString ":CHANNEL1:RANGE 16"
myScope.WriteString ":CHANNEL1:OFFSET 1.00"
myScope.WriteString ":TIMEBASE:MODE NORMAL"
myScope.WriteString ":TIMEBASE:RANGE 1E-3"
myScope.WriteString ":TIMEBASE:DELAY 100E-6"
```

Vertical is set to 16 V full-scale (2 V/div) with center of screen at 1 V and probe attenuation set to 10. This example sets the time base at 1 ms full-scale (100 ms/div) with a delay of 100 µs.

### Example Oscilloscope Setup Code

This program demonstrates the basic command structure used to program the oscilloscope.

```
' Initialize the instrument interface to a known state.
myScope.IO.Clear

' Initialize the instrument to a preset state.
myScope.WriteString "*RST"

' Set the time base mode to normal with the horizontal time at
' 50 ms/div with 0 s of delay referenced at the center of the
' graticule.
myScope.WriteString ":TIMEBASE:RANGE 5E-4"    ' Time base to 50 us/div.
myScope.WriteString ":TIMEBASE:DELAY 0"       ' Delay to zero.
myScope.WriteString ":TIMEBASE:REFERENCE CENTER"    ' Display ref. at
```

```
                                                        ' center.

' Set the vertical range to 1.6 volts full scale with center screen
' at -0.4 volts with 10:1 probe attenuation and DC coupling.
myScope.WriteString ":CHANNEL1:PROBE 10"     ' Probe attenuation
                                              ' to 10:1.
myScope.WriteString ":CHANNEL1:RANGE 1.6"     ' Vertical range
                                              ' 1.6 V full scale.
myScope.WriteString ":CHANNEL1:OFFSET -.4"    ' Offset to -0.4.
myScope.WriteString ":CHANNEL1:COUPLING DC"   ' Coupling to DC.

' Configure the instrument to trigger at -0.4 volts with normal
' triggering.
myScope.WriteString ":TRIGGER:SWEEP NORMAL"   ' Normal triggering.
myScope.WriteString ":TRIGGER:LEVEL -.4"      ' Trigger level to -0.4.
myScope.WriteString ":TRIGGER:SLOPE POSITIVE" ' Trigger on pos. slope.

' Configure the instrument for normal acquisition.
myScope.WriteString ":ACQUIRE:TYPE NORMAL"    ' Normal acquisition.
```

## Capturing Data with the :DIGitize Command

The :DIGitize command captures data that meets the specifications set up by the :ACQuire subsystem. When the digitize process is complete, the acquisition is stopped. The captured data can then be measured by the instrument or transferred to the controller for further analysis. The captured data consists of two parts: the waveform data record, and the preamble.

**NOTE**

### Ensure New Data is Collected

When you change the oscilloscope configuration, the waveform buffers are cleared. Before doing a measurement, send the :DIGitize command to the oscilloscope to ensure new data has been collected.

When you send the :DIGitize command to the oscilloscope, the specified channel signal is digitized with the current :ACQuire parameters. To obtain waveform data, you must specify the :WAVeform parameters for the SOURce channel, the FORMat type, and the number of POINts prior to sending the :WAVeform:DATA? query.

**NOTE**

### Set :TIMebase:MODE to NORMal when using :DIGitize

:TIMebase:MODE must be set to NORMal to perform a :DIGitize command or to perform any :WAVeform subsystem query. A "Settings conflict" error message will be returned if these commands are executed when MODE is set to ROLL, XY, or DELayed. Sending the *RST (reset) command will also set the time base mode to normal.

The number of data points comprising a waveform varies according to the number requested in the :ACQuire subsystem. The :ACQuire subsystem determines the number of data points, type of acquisition, and number of averages used by the :DIGitize command. This allows you to specify exactly what the digitized information contains.

The following program example shows a typical setup:

```
myScope.WriteString ":ACQUIRE:TYPE AVERAGE"
myScope.WriteString ":ACQUIRE:COMPLETE 100"
myScope.WriteString ":ACQUIRE:COUNT 8"
myScope.WriteString ":DIGITIZE CHANNEL1"
myScope.WriteString ":WAVEFORM:SOURCE CHANNEL1"
myScope.WriteString ":WAVEFORM:FORMAT BYTE"
myScope.WriteString ":WAVEFORM:POINTS 500"
myScope.WriteString ":WAVEFORM:DATA?"
```

This setup places the instrument into the averaged mode with eight averages. This means that when the :DIGitize command is received, the command will execute until the signal has been averaged at least eight times.

After receiving the :WAVeform:DATA? query, the instrument will start passing the waveform information.

Digitized waveforms are passed from the instrument to the controller by sending a numerical representation of each digitized point. The format of the numerical representation is controlled with the :WAVeform:FORMat command and may be selected as BYTE, WORD, or ASCii.

The easiest method of transferring a digitized waveform depends on data structures, formatting available and I/O capabilities. You must scale the integers to determine the voltage value of each point. These integers are passed starting with the left most point on the instrument's display.

For more information, see the waveform subsystem commands and corresponding program code examples in the online *Programmer's Reference*.

NOTE

**Aborting a Digitize Operation Over GPIB**

When using GPIB, you can abort a digitize operation by sending a Device Clear over the bus (for example, myScope.IO.Clear).

## Reading Query Responses from the Oscilloscope

After receiving a query (command header followed by a question mark), the instrument interrogates the requested function and places the answer in its output queue. The answer remains in the output queue until it is read or another command is issued. When read, the answer is transmitted across the interface to the designated listener (typically a controller).

The statement for reading a query response message from an instrument's output queue typically has a format specification for handling the response message.

When using the VISA COM library in Visual Basic, you use different read methods (ReadString, ReadNumber, ReadList, or ReadIEEEBlock) for the various query response formats. For example, to read the result of the query command :CHANnel1:COUPling? you would execute the statements:

```
myScope.WriteString ":CHANNEL1:COUPLING?"
Dim strQueryResult As String
strQueryResult = myScope.ReadString
```

This reads the current setting for the channel one coupling into the string variable strQueryResult.

All results for queries (sent in one program message) must be read before another program message is sent.

Sending another command before reading the result of the query clears the output buffer and the current response. This also causes an error to be placed in the error queue.

Executing a read statement before sending a query causes the controller to wait indefinitely.

The format specification for handling response messages depends on the programming language.

## Reading Query Results into String Variables

The output of the instrument may be numeric or character data depending on what is queried. Refer to the specific command descriptions in the online *Programmer's Reference* for the formats and types of data returned from queries.

NOTE

**Express String Variables Using Exact Syntax**

In Visual Basic, string variables are case sensitive and must be expressed exactly the same each time they are used.

The following example shows numeric data being returned to a string variable:

```
myScope.WriteString ":CHANNEL1:RANGE?"
Dim strQueryResult As String
strQueryResult = myScope.ReadString
MsgBox "Range (string):" + strQueryResult
```

After running this program, the controller displays:

**Range (string): +40.0E+00**

## Reading Query Results into Numeric Variables

The following example shows numeric data being returned to a numeric variable:

```
myScope.WriteString ":CHANNEL1:RANGE?"
Dim varQueryResult As Variant
strQueryResult = myScope.ReadNumber
MsgBox "Range (variant):" + CStr(varQueryResult)
```

After running this program, the controller displays:

**Range (variant): 40**

## Reading Definite-Length Block Query Response Data

Definite-length block query response data allows any type of device-dependent data to be transmitted over the system interface as a series of 8-bit binary data bytes. This is particularly useful for sending large quantities of data or 8-bit extended ASCII codes. The syntax is a pound sign (#) followed by a non-zero digit representing the number of digits in the decimal integer. After the non-zero digit is the decimal integer that states the number of 8-bit data bytes being sent. This is followed by the actual data.

For example, for transmitting 1000 bytes of data, the syntax would be:

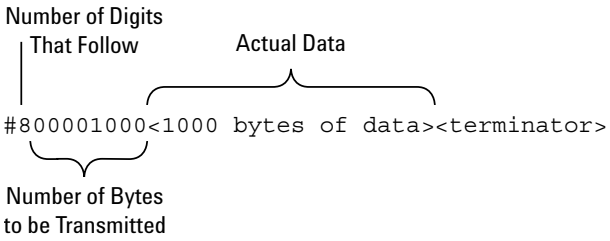



**Figure 2** Definite-length block response data

The "8" states the number of digits that follow, and "00001000" states the number of bytes to be transmitted.

The VISA COM library's ReadIEEEBlock and WriteIEEEBlock methods understand the definite-length block syntax, so you can simply use variables that contain the data:

```
' Read oscilloscope setup using ":SYSTEM:SETUP?" query.
myScope.WriteString ":SYSTEM:SETUP?"
Dim varQueryResult As Variant
varQueryResult = myScope.ReadIEEEBlock(BinaryType_UI1)

' Write learn string back to oscilloscope using ":SYSTEM:SETUP" command:
myScope.WriteIEEEBlock ":SYSTEM:SETUP ", varQueryResult
```

## Sending Multiple Queries and Reading Results

You can send multiple queries to the instrument within a single command string, but you must also read them back as a single query result. This can be accomplished by reading them back into a single string variable, multiple string variables, or multiple numeric variables.

For example, to read the :TIMebase:RANGe?;DELay? query result into a single string variable, you could use the commands:

```
myScope.WriteString ":TIMEBASE:RANGE?;DELAY?"
Dim strQueryResult As String
strQueryResult = myScope.ReadString
MsgBox "Timebase range; delay:" + strQueryResult
```

When you read the result of multiple queries into a single string variable, each response is separated by a semicolon. For example, the output of the previous example would be:

```
Timebase range; delay: <range_value>;<delay_value>
```

To read the :TIMebase:RANGe?;DELay? query result into multiple string variables, you could use the ReadList method to read the query results into a string array variable using the commands:

```
myScope.WriteString ":TIMEBASE:RANGE?;DELAY?"
Dim strResults() As String
strResults() = myScope.ReadList(ASCIIType_BSTR)
MsgBox "Timebase range: " + strResults(0) + ", delay: " + strResults(1)
```

To read the :TIMebase:RANGe?;DELay? query result into multiple numeric variables, you could use the ReadList method to read the query results into a variant array variable using the commands:

```
myScope.WriteString ":TIMEBASE:RANGE?;DELAY?"
Dim varResults() As Variant
varResults() = myScope.ReadList
MsgBox "Timebase range: " + FormatNumber(varResults(0) * 1000, 4) + _
       " ms, delay: " + FormatNumber(varResults(1) * 1000000, 4) + " us"
```

## Checking Instrument Status

Status registers track the current status of the instrument. By checking the instrument status, you can find out whether an operation has been completed, whether the instrument is receiving triggers, and more.

For more information, see the "Status Reporting" topic in the online *Programmer's Reference* which explains how to check the status of the instrument.

# Other Ways of Sending Commands

Standard Commands for Programmable Instrumentation (SCPI) can be sent via a Telnet socket or through the Browser Web Control.

## Telnet Sockets

The following information is provided for programmers who wish to control the oscilloscope with SCPI commands in a Telnet session.

To connect to the oscilloscope via a telnet socket, issue the following command:

```
telnet <hostname> 5024
```

where <hostname> is the hostname of the oscilloscope. This will give you a command line with prompt.

For a command line without a prompt, use port 5025. For example:

```
telnet <hostname> 5025
```

## Sending SCPI Commands Using Browser Web Control

To send SCPI commands using the Browser Web Control feature, establish a connection to the oscilloscope via LAN as described in the *5000 Series Oscilloscopes User's Guide*. When you make the connection to the oscilloscope via LAN and the instrument's welcome page is displayed, select the **Browser Web Control** tab, then select the **Remote Programming** link.

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