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Introduction

The 10BaseT Ethernet option allows you to control the LeCroy Waverunner over a network, or through a direct connection between the oscilloscope and a computer. The connection is made through the Ethernet port located at the rear of the oscilloscope.

This chapter introduces the basic capabilities for control of the Waverunner oscilloscope over the Ethernet interface.

The Waverunner Remote Control Manual gives a complete description of the GPIB commands. These commands apply to control of the oscilloscope via Ethernet, as well as through the GPIB interface.

Implementation Standard

To the greatest extent possible, these remote commands conform to the IEEE 488.2[*] standard, which may be considered as an extension of the IEEE 488.1 standard, dealing mainly with electrical and mechanical issues.

Connections

The oscilloscope can be connected to the PC via Ethernet using a TCP/IP network protocol. This connection can be made through a network, or directly between the oscilloscope's Ethernet interface and a computer using a crossover network cable.

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[*] ANSI/IEEE Std. 488.2–1987, *IEEE Standard Codes, Formats, Protocols, and Common Commands*. The Institute of Electrical and Electronics Engineers Inc., 345 East 47th Street, New York, NY 10017, USA.

ScopeExplorer

ScopeExplorer is a free PC-based connectivity tool that interfaces a LeCroy Digital Oscilloscope to the Windows 95/98 or Windows NT/2000 desktop. It is available on CD-ROM as well as from the internet at www.lecroy.com.

Scope Explorer provides the following connectivity features:

Remote control terminal

This provides a teletype-like terminal that allows standard remote control commands to be sent to the scope, and the scope's response to be displayed. Features are provided to allow sequences of commands to be piped to the scope from a file, and the scope's responses to be piped into another file.

Image capture and storage

This feature allows a pixel-for-pixel copy of the scope's display to be transferred to the PC, and displayed and/or printed. A single key press (or button push) will transfer this image to the Windows Clipboard ready for pasting into any Windows application. It also supports automatic refresh of the captured image at periodic intervals.

Panel file (scope setup) capture, storage, and playback

The entire front panel setup of the scope can be captured with this feature and stored on the PC with a long descriptive filename. The captured panel can then be transferred back to the scope at a later date to reproduce the setup.

Trace capture, storage, playback, and conversion to ASCII

Waveforms acquired by the Waverunner can be transferred to the PC and stored in either the compact LeCroy Binary format, or an ASCII version that allows compatibility with PC-based analysis products, such as Microsoft's Excel or Mathsoft's MathCad. Pre-captured LeCroy Binary waveforms can be converted into ASCII files individually or in batches.

Virtual Front Panel

The Waverunner can be controlled remotely using the virtual front panel feature. A virtual panel with front panel knobs and buttons is presented on the Windows display, and may be used to control the scope. (**Note:** The virtual front panel may not reflect exactly the front panel of the Waverunner, but is still useful for control.)

ActiveDSO

This **ActiveX**™ control enables LeCroy oscilloscopes to be **controlled by**, and to **exchange data with**, a variety of Windows applications that support the ActiveX standard. MS Office programs, Internet Explorer, Visual Basic, Visual C++, Visual Java, and Matlab (v5.3) are a few of the many applications that support ActiveX controls. ActiveDSO is available on CD-ROM or on the internet at www.lecroy.com

With **ActiveDSO** you can develop your test program using standard GPIB commands. For easy integration of your scope data with your Windows Application (through GPIB, RS-232, or Ethernet 10BaseT) ActiveDSO, helps you:

➢ Generate a report by importing scope data right into Excel or Word.

➢ Archive measurement results on the fly in a Microsoft Access Database.

➢ Automate tests using Visual Basic, Java, C++, Excel (VBA).

The ActiveDSO control hides the intricacies of programming and provides a simple and consistent interface to the controlling application. With less than 10 lines of VBA (Visual Basic for Applications) code in an Excel macro the spreadsheet can recover pre-scaled waveform data from a remote instrument.

The ActiveDSO control can also be embedded visually in any OLE automation compatible client, and can be used manually without any need for programming. It will run on any PC running Windows 95, Windows 98, or Windows NT.

There are two fundamental ways to use the control:

➢ As a visible object embedded in an OLE Automation compatible Client (PowerPoint for example) showing a captured display image. See Embedded Control Example for more details.

➢ As an invisible object accessed via a scripting language (Visual Basic for Applications, for example) to remotely control an instrument. See Accessing from VBA for more details.

VBA (Visual Basic for Applications) is the programming language built into many of the more recent Windows applications. It is a

subset of Visual Basic that makes it very simple to utilize the services of OLE Automation Servers and ActiveX Controls.

The following VBA subroutine demonstrates how easy it is to connect to a Waverunner Oscilloscope and send remote commands to it.

```
Sub LeCroyDSOTest()
    Dim o As Object
        Set o = CreateObject("LeCroy.ActiveDSOCtrl.1")
    Call o.AboutBox            ' Present the control's About box
    Call o.MakeConnection("IP: 172.28.11.26)  'Connect to device on LAN
    Call o.WriteString("BUZZ BEEP", True) ' Make the DSO beep
End Sub
```

Example Syntax:

Boolean controlName.WriteString

The WriteString method has the following arguments.

Argument	Description
controlname	The name of the ActiveDSO control object.
textString	String, Text string to send to the device.
EOI	Boolean, TRUE = terminate with EOI

Returns: True on success, False on failure.

Remarks: This method sends a string command to the instrument.

If EOI is set to TRUE then the device will start to interpret the command immediately. This is normally the desired behavior.

If EOI is set to FALSE then a command may be sent in several parts with the device starting to interpret the command only when it receives the final part which should have EOI set TRUE.

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