Introducing the LSA1000 Software…

The LSA1000 software tools, provided separately with the instrument, allow you to develop your own application-specific programs, quickly and easily. These tools are: *Remote LSA*, *ActiveDSO*, *ScopeExplorer*, and NET_CON. The files for all software described here are to be found on the CD-ROM.

Remote LSA

The LSA1000 offers a scope-like graphical user interface on the host PC for the Windows 95 or NT environment. This program, *Remote LSA*, provides a live waveform display and the ability to control the basic functions of the LSA1000 remotely from the computer *without programming*. *Remote LSA*'s user interface broadly simulates a LeCroy oscilloscope's front panel. The program is intended as a initial performance verification, and a visual diagnostic tool for use in program development with the LSA1000. *See pages 5–6 and 5–11.*

ActiveDSO

Based on Microsoft's ActiveX control technology, *ActiveDSO* gives leverage to widely-available Microsoft software tools and makes programming within the Microsoft environment easier. *ActiveDSO* simplifies the computer's interface with the LSA1000 and programming within Visual C++, Visual Basic or any other ActiveX-compatible applications. For example, Microsoft Excel can even be used to control and retrieve data directly from the LSA1000. This tool becomes part of the target application and provides seamless access to the full power of the LSA1000. *See page 5–13.*

ScopeExplorer

This PC-based connectivity tool integrates LeCroy instruments with Windows 95 or NT PCs. Connected to the PC by the Ethernet port, the LSA1000 using *ScopeExplorer* allows data and images to be transferred from the instrument and stored in the computer. And because it is designed specifically for use with LeCroy instruments, *ScopeExplorer* allows these tasks to be completed with only a few keystrokes or mouse clicks. *See page 5–19*.

NET_CON

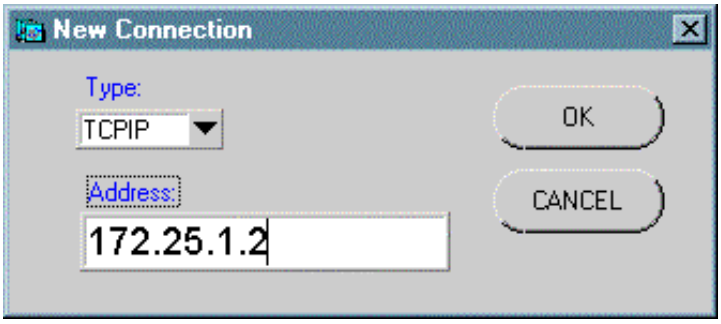
When complied on a target system, this C program demonstrates the implementation of a BSD socket under Microsoft Developer Studio 5.0. The TCP/IP protocol is accessed using this “socket”, which is platform-independent. For non-Windows systems such as the UNIX-based workstation, the “NET_CON” sockets software can be used as the baseline implementation of the LSA1000 network protocol. *The NET_CON source code is provided in Appendix B of this manual. See also page 5–21.*

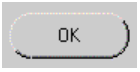
Installing and Launching the Software

Included with the LSA1000 software tools on the CD-ROM are the source codes for all the programs. Provided as reference materials for software development, depending on the application they can be directly copied into your program.

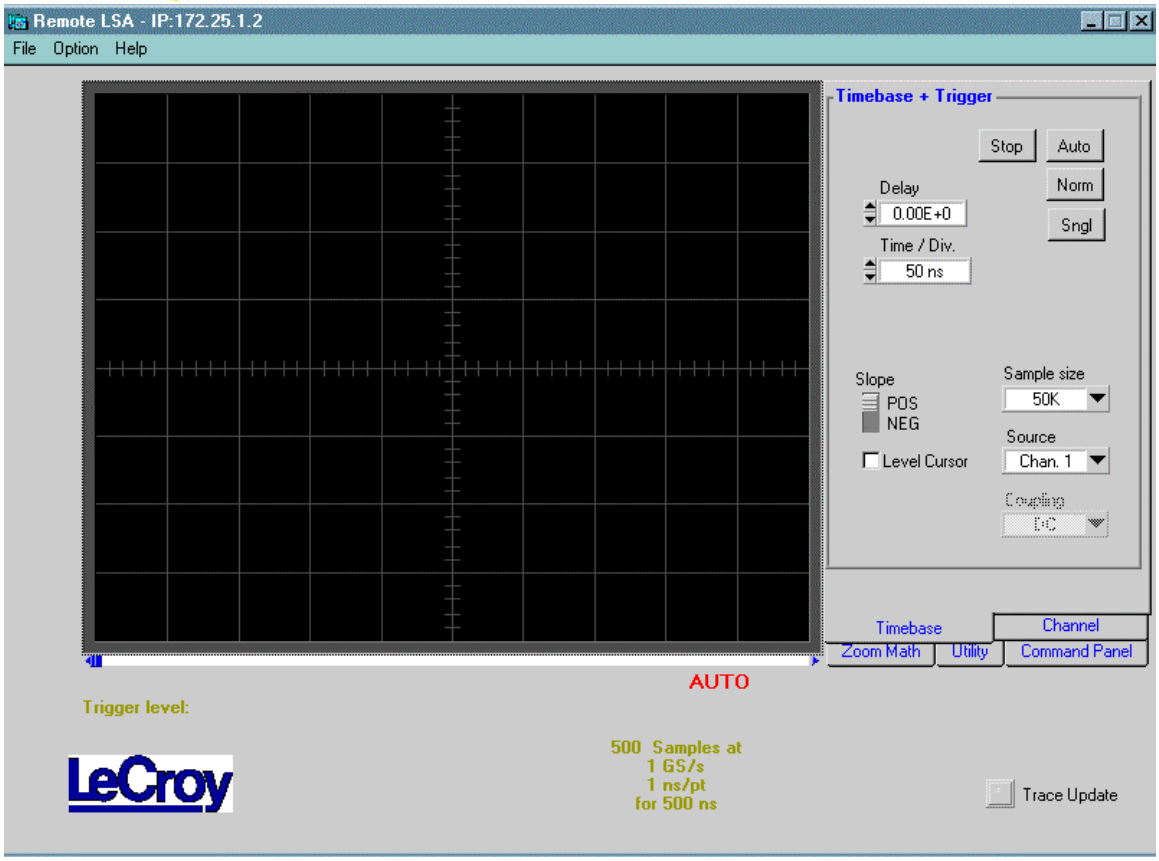
Note: *Because of the similarities between Windows™ 95 and Windows™ NT, the software tools provided should work in both system with minimal configuration effort. For PCs with Windows™ 3.1, NET_CON should be used as the base line communication protocol implementation on 16-bit compilers.*

1. Insert the CD into a Windows 95 or NT computer. Executable files (.exe) are available for *Remote LSA*, *ActiveDSO* and *ScopeExplorer,* and each of their program folders contains either a "setupex.exe" or "setup.exe" file.
2. Run the desired program's "setupex.exe" file.
3. Follow the on-screen instructions to complete the installation.
4. Ensure that the Ethernet connection between the PC and LSA1000 is established (*see Chapter 4*).
5. Start *Remote LSA*.
6. After starting the program, you will be asked for the IP address of the LSA1000, as shown in the following dialog box. Select TCPIP under Type and enter the IP address of the your LSA1000 unit.



7. Click 

Remote LSA will be launched and the panel shown on the next page opened.

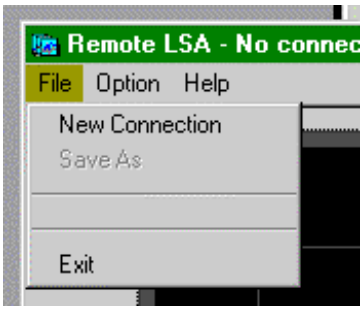


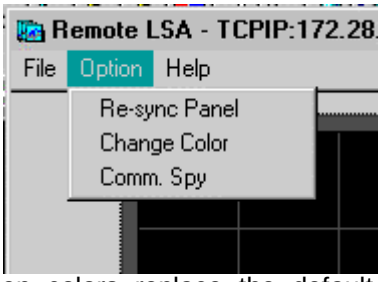
Remote LSA Panel. The Timebase + Trigger control panel is displayed here (see following sections).

Remote LSA Menu

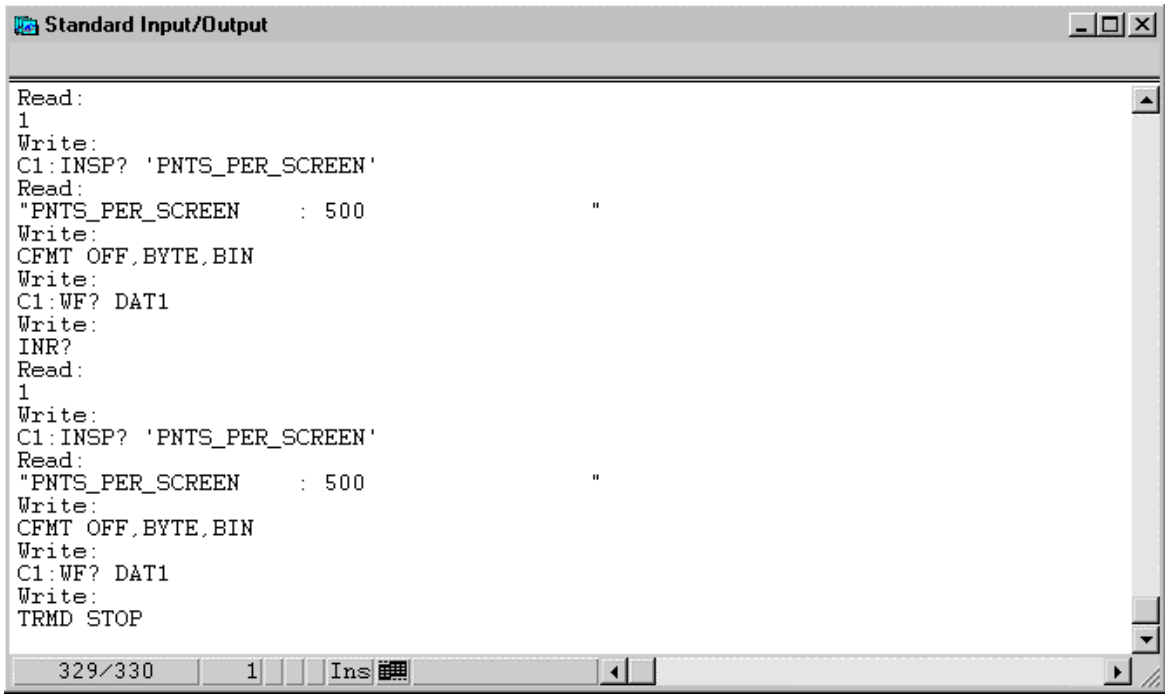
The standard menus are described here:

- **File New Connection** creates a new connection.
- **File Exit** returns to the operating system.





- **Option Re-sync Panel** loads all the current values from the instrument.
- **Option Change Color** opens a window that allows the user to change the color of waveform traces, the grid, and the screen. Chosen colors replace the default colors.
- **Option Comm. Spy** opens a window that shows the ASCII transfer that takes place between the LSA1000 and the host computer. An example of the Comm. Spy window is shown in the figure below. Data from the Comm. Spy can be cut and pasted into other applications to make script files.



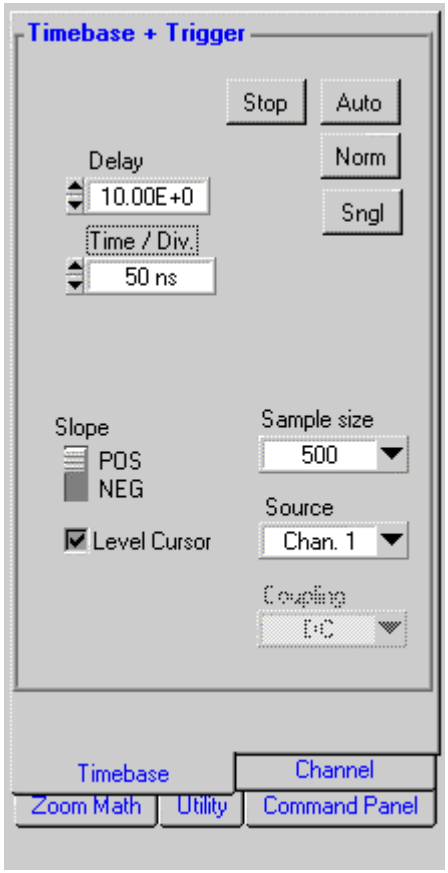
"Comm. Spy" Window.

Operating the LSA1000 Using *Remote LSA*

Remote LSA offers control panels for operating all the major LSA1000 functions, simulating front-panel oscilloscope controls. Five control panels provide this scope-like graphical user interface: "Timebase", "Channel", "Zoom Math", "Utility", and "Command Panel". The desired panel is selected by clicking on its tab.

Timebase + Trigger

This control panel is accessed by clicking on Timebase



Stop halts acquisitions.

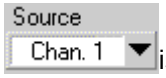
Auto starts an acquisition that continuously updates the screen, taking into account possible trigger occurrence or, after a short time interval, if no trigger has been detected.

Norm (normal) continuously updates the screen as long as a valid trigger is present.

Sngl (single) arms the LSA1000 and acquires one trigger.

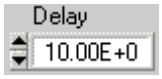
Slope POS NEG selects the signal transition direction required to qualify the trigger.

Sample size 500 is a fly-out menu providing valid record-size options. .

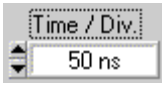


is a fly-out menu for selection of the trigger source.

...



is a spin button used to adjust pre- or post-trigger delay.

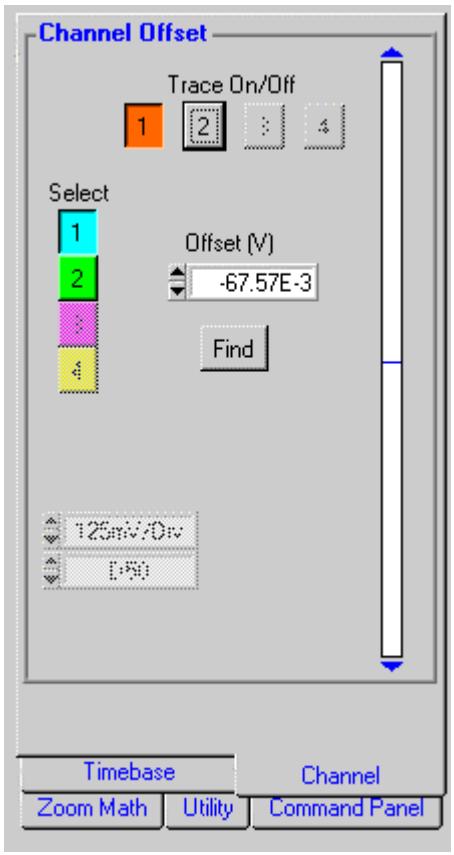


is a fly-out menu giving the valid sweep rates.

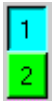
Channel Offset

This control panel is accessed by clicking on 

.

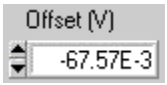


are toggle buttons that change the display status of the corresponding channel.



toggle buttons provide a mechanism for changing the “active” channel without modifying the display status.

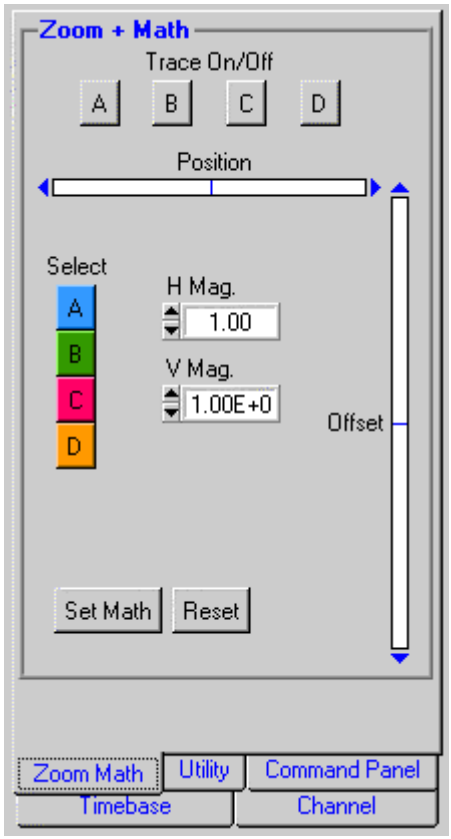
.. .

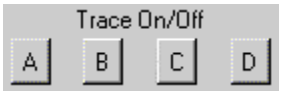


sets the vertical position of the active channel. It is calibrated in volts, ±0.5 V. And the offset scroll bar to its right offers offset control using mouse.

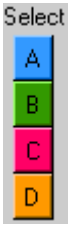
automatically adjusts the offset to display the active channel.

Zoom + Math This control panel is accessed by clicking on Zoom Math.





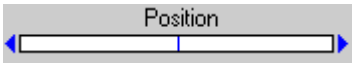
enables or disables the display status of the corresponding memory.



toggle buttons to choose the active memory trace.

spin buttons allow the active memory trace to be expanded horizontally.

spin buttons allow the active memory trace to be expanded vertically.



scroll bar allows the active memory trace to be positioned horizontally on the screen.
.

While the 

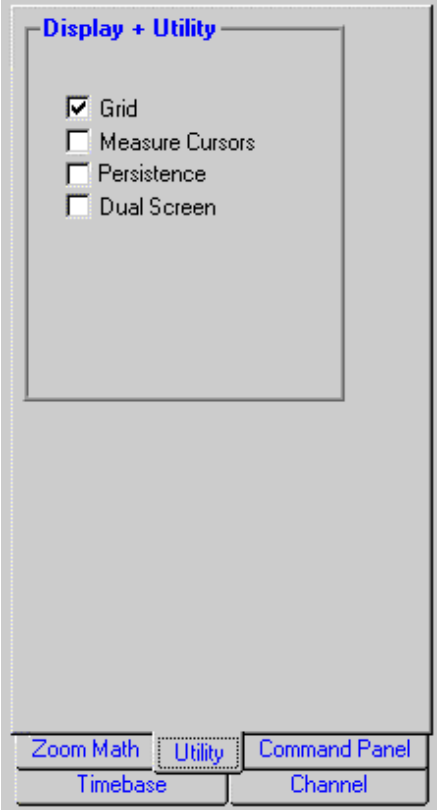
scroll bar allows the active memory trace to be positioned vertically on the screen.

invokes a menu for loading of selected math functions.

restores all traces to the normal ZOOM function.

Display + Utility

This control panel is accessed by clicking on Utility



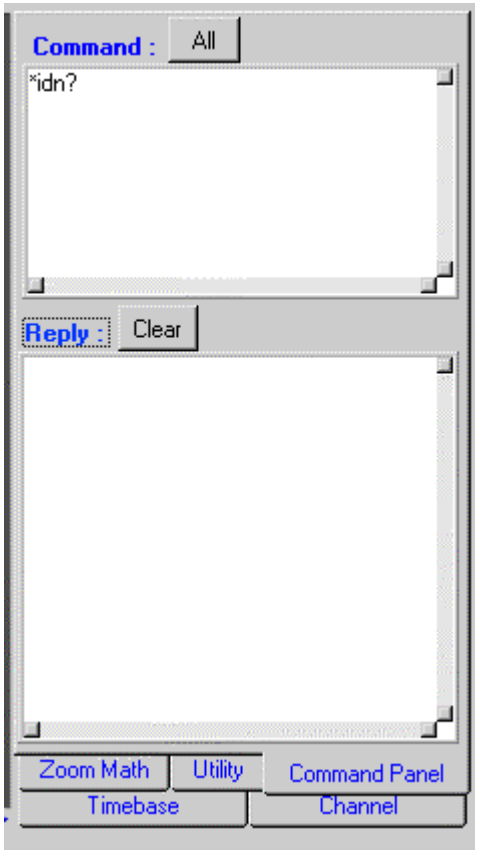
Grid turns the 8 x 10 division display grid on or Grid off.

Measure Cursors enables or Measure Cursors disables a pair of cursors on each active trace. The time and amplitude difference between the cursors on the active trace is displayed at the bottom of the screen.

Persistence enables or Persistence disables Persistence Display Mode.

Dual Screen enables or Dual Screen disables dual display.

Command/Reply This control panel is accessed by clicking on Command Panel



Command : is the window for remote command input to the LSA1000. *Refer to the Remote Control Manual.*

All executes all the commands listed in the window.

Reply : displays the text messages returned by the LSA1000.

Clear erases the reply window.

Performance Verification with *Remote LSA*

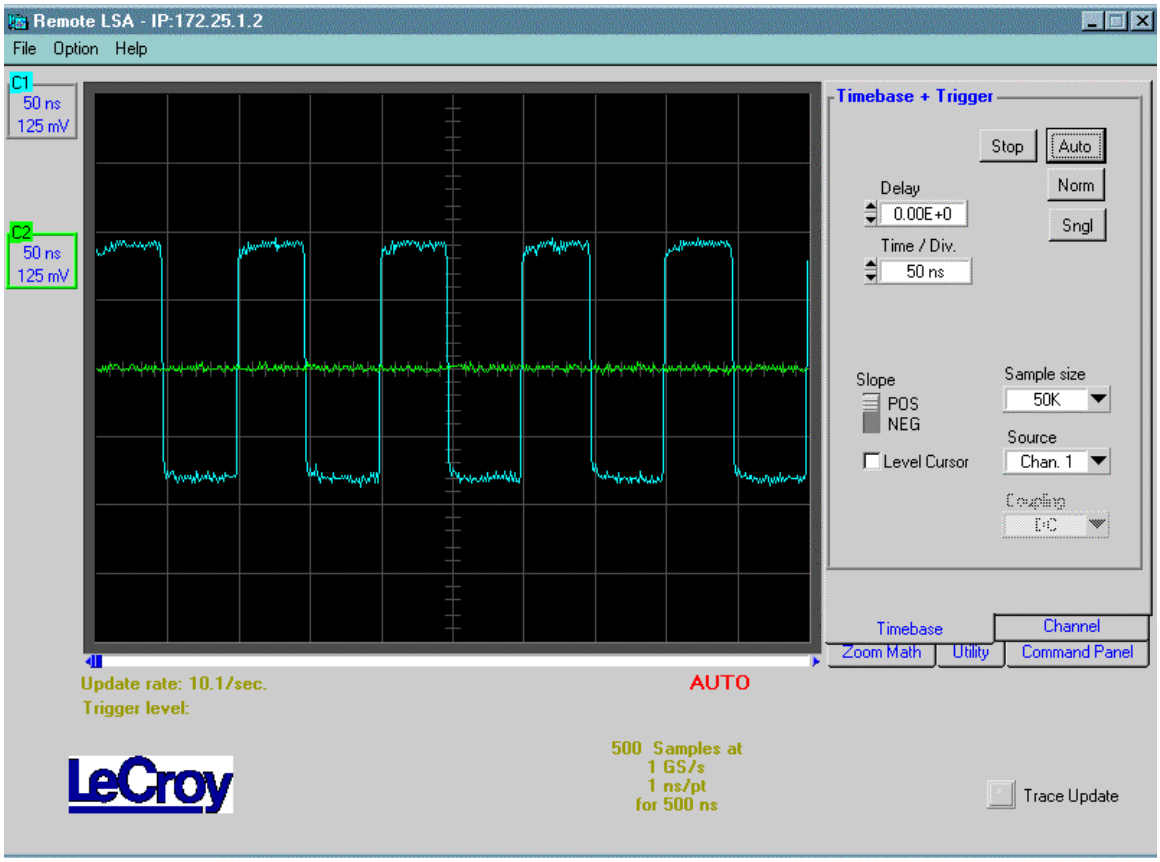
***Remote LSA* is the simplest way to run the LSA1000's basic operations — without the need for remote control commands. Thus we recommend that *Remote LSA* be used for the initial performance verification of the LSA1000.**

1. **Ensure that your PC has the Ethernet connection established with the LSA1000 (*see Chapter 4*).**
2. **Connect the LSA1000's "REF OUT" to "CH 1".**
3. **Start *Remote LSA*.**
4. **In the "Timbase + Trigger" panel click on** 

to set the trigger to automatic.
5. **Select channel** 

from the "Channel" panel.
6. **The program should display a 10MHz square waveform of approximately 400mV amplitude, *as shown on the next page*.**

This process using *Remote LSA* is a simple means of verifiing that the LSA1000 is working properly when first received. *Remote LSA* is also recommended as a visual diagnostic tool during LSA1000 program development.



Remote LSA display of LSA1000's External Reference Out Waveform.

Using *ActiveDSO*

***ActiveDSO* is highly suitable for fast program development in the Microsoft environment. This LSA1000 program is a control of ActiveX, the software technology developed by Microsoft as a subset of its COM model.**

ActiveDSO facilitates the programming with the LSA1000 by providing a ready interface between the instrument and the host computer. Programs such as Visual C++, Visual Basic or Visual Basic for Applications (VBA) can be used under remote control without concern for interfacing complications. *ActiveDSO* acts as the key design structure allowing effective integration of software from the different manufacturers supporting ActiveX containment.

Control Instantiation

This ActiveX component can be instantiated more than once by using the Visual Basic function CreateObject. Once the object is created, it can be initialized by invoking the connection method. ActiveDSO enables control of the LSA1000 from a variety of PC desktop applications. And the complexities of programming using Ethernet are fully encapsulated in this control. For example, with less than 10 lines of VBA code in an Excel macro the spreadsheet can recover pre-scaled waveform data from the LSA1000 (*see the on-line Excel example in ActiveDSO*).

ActiveDSO control can be used in two fundamental ways:

1. As a visible object embedded in an OLE Automation-compatible Client — PowerPoint, for example — showing a captured LSA1000 display image. *See the Embedded Control example below for more details.*
2. As an invisible object accessed via a scripting language — VBA, for example — to remotely control the LSA1000. *See VBA example below for more details.*

***Note:** this example assumes that PowerPoint 97 is being used. Earlier versions may or may not behave in the same manner.*

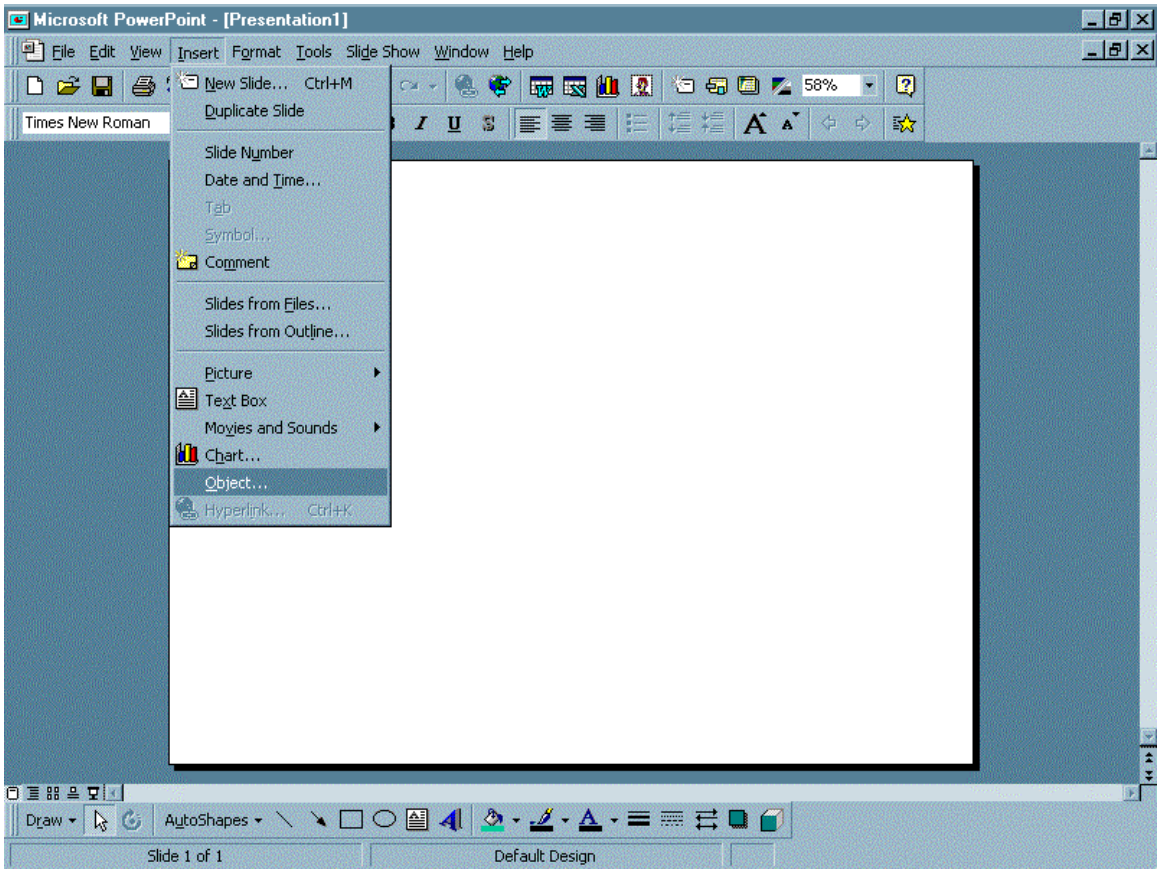
The *ActiveDSO* control may be embedded in any ActiveX containment-capable client and used manually without the need for any programming or scripting.

Example: PowerPoint

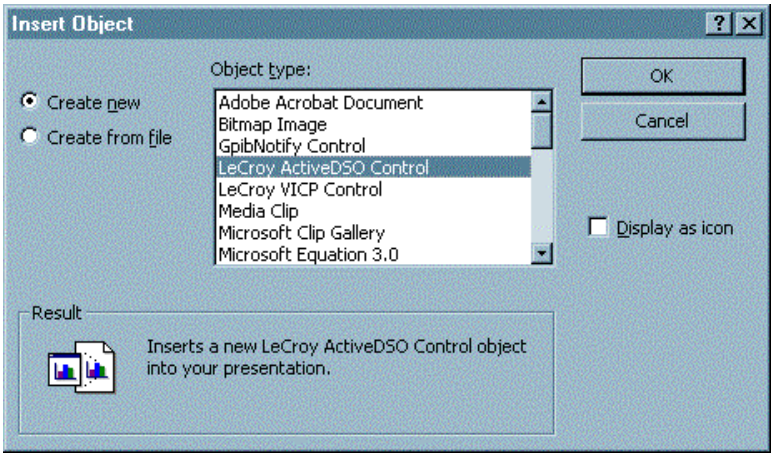
This example shows the control being embedded into a Microsoft PowerPoint slide. The waveform captured by the

LSA1000 can be simply imported into PowerPoint with just a few mouse clicks:

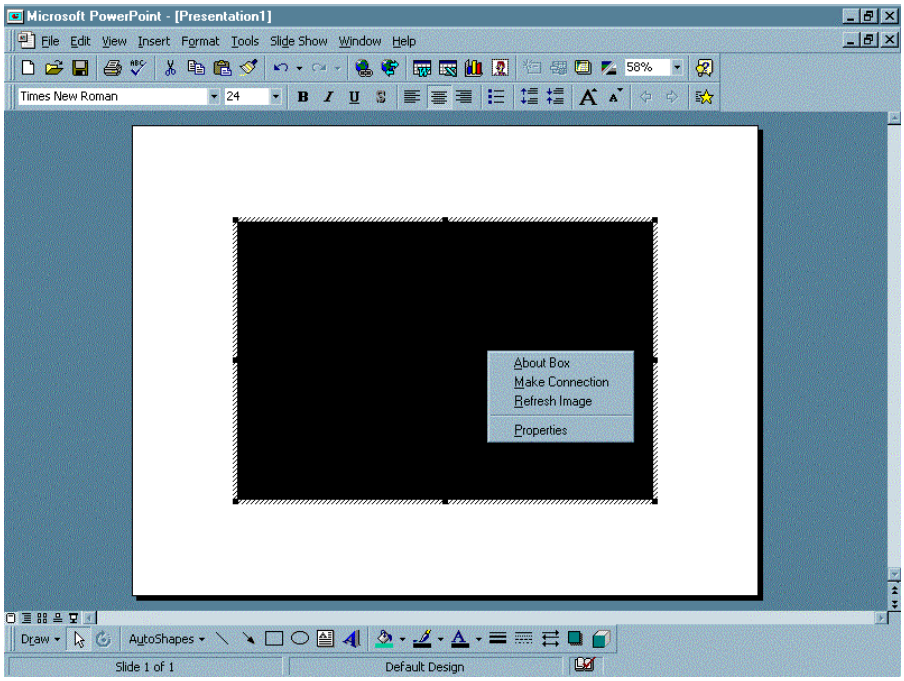
1. **Ensure that the *ActiveDSO* files from the CD-ROM are installed on the PC.**
2. **Check that the PC and LSA1000 are properly connection via the Ethernet.**
3. **Open PowerPoint with a new blank presentation.**
4. **Select "Insert" and then "Object", *as shown here:***



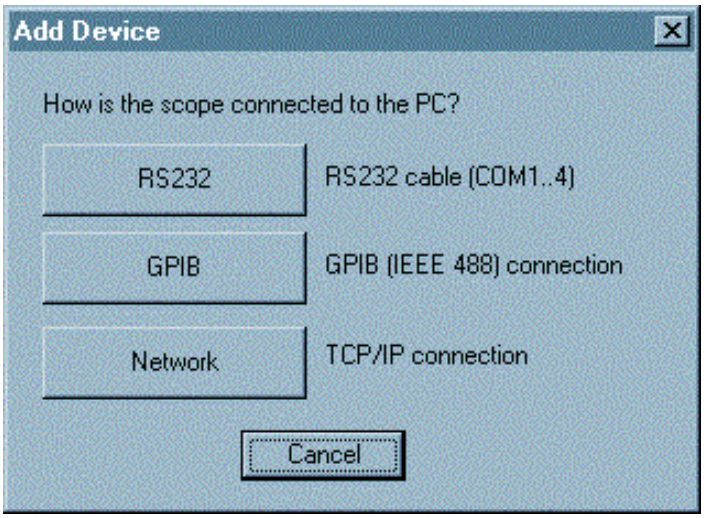
5. **From the pop-up window, select LeCroy ActiveDSO object *as shown here:***



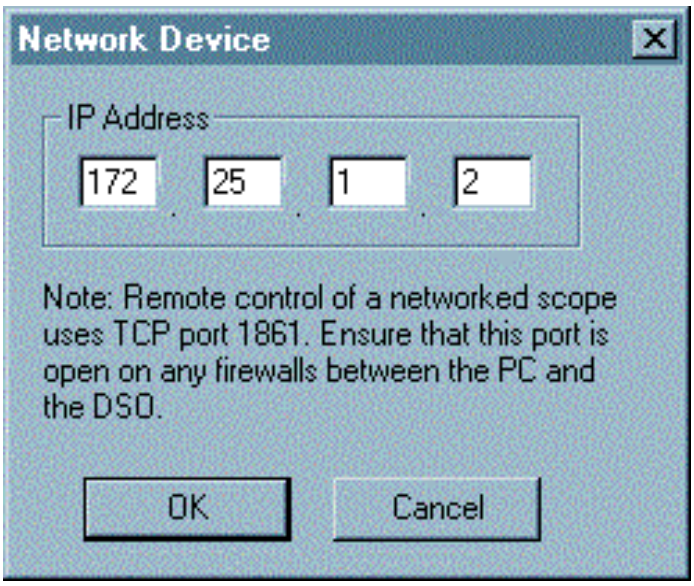
6. **Right-click on the object and select "Make Connection".**



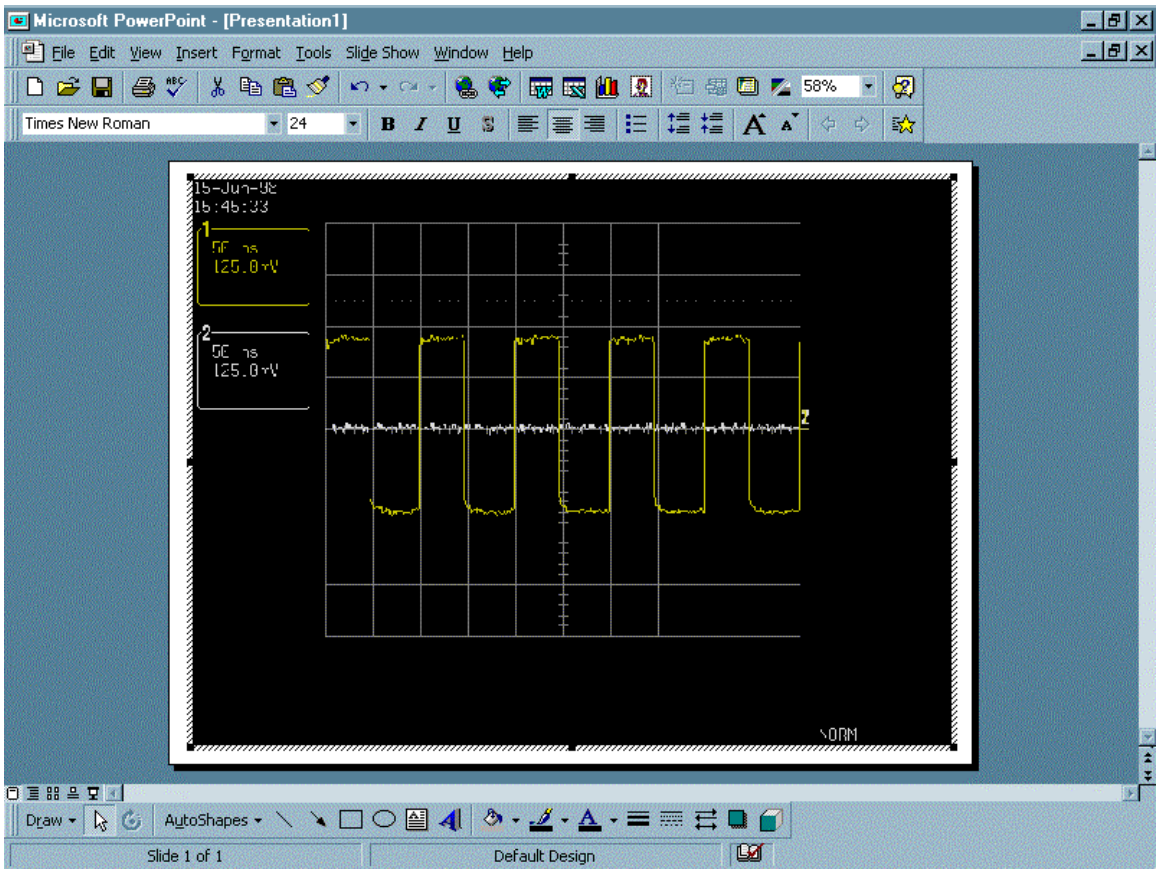
7. **Select "Network" "TCP/IP connection" *as shown here* (for "scope" read LSA1000):**



8. **Enter the LSA1000's IP address and click "OK".**



9. **Right-click on the object again and select the "Refresh Image" menu item. A captured waveform will be displayed *similar the one shown here*:**



LSA1000's captured waveform imported into PowerPoint.

Once the *ActiveDSO*™ object has been properly set within the application, macro script can be created utilizing an object method such as SendString() to send `DISP ON, C1:TRA ON, TRMD AUTO` (*see the Remote Control Manual*). Then RefreshImage() method can be used to update the screen.

***Example:* VBA**

VBA is the programming language built in to many of the more recent Windows applications. It is a subset of Visual Basic that makes using OLE Automation Servers and ActiveX Controls very simple. The following VBA subroutine demonstrates how easy it is to connect to an LSA1000 and send remote commands to it.

```
Sub LeCroyDSOTest()
      Dim o As Object

      Set o = CreateObject("LeCroy.ActiveDSO.1")

      Call o.AboutBox         Present        the
control's About box
      Call o.MakeConnection("IP:172.25.1.2")
      Connect to the unit
      Call o.WriteString("DISP ON", 1)
      Enable the internal display routine
      Call o.WriteString("TRMD AUTO", 1)  Set
the trigger mode to AUTO
End Sub
```

To enter the VBA editor in members of the Microsoft Office suite:

1. **Select Tools > Macro >Visual Basic Editor menu item.**
2. **When the VBA window appears, select the "Insert > Module" menu item**
3. **Copy the above example into the editor window that appears.**

And to execute:

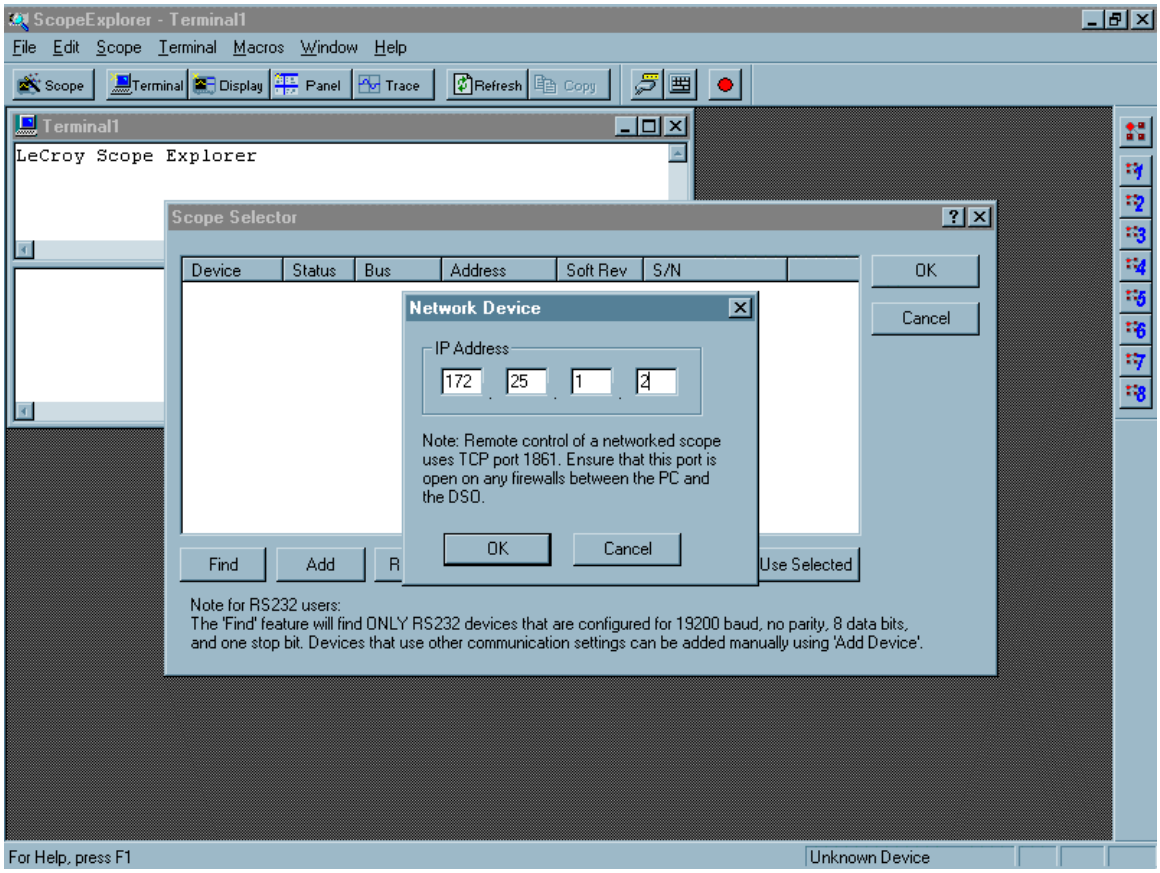
4. **Position the text cursor within the subroutine**
5. **Either select the Run > Run Sub/UserForm or press function key F5.**

***Note:* For more information, see the ActiveDSO on-line Help. On-line Help contains VisualC++ example, explanations of ActiveDSO Methods and Properties.**

Using *ScopeExplorer*

1. **Start *ScopeExplorer*.**
2. **Click on "Scope > Scope Finder".**
3. **In the "Scope Selector" window, click "OK", *as below*.**
4. **When the ADD DEVICE window opens, select "Network".**

   (If you don't see "Network" button, press "ALT + N" simultaneously.)
5. **A "Network Device" window will appear, *as here*:**



6. **Enter the IP address of LSA1000 in the "NETWORK DEVICE" window.**

ScopeExplorer offers:

- ***Terminal: Remote control commands can be sent and data can be retrieved using Terminal.***
- ***Image capture: Internal scope-like "screen" representation of the acquired waveform can be viewed with Display button. Use the Refresh button to refresh the "screen" dump image.***
- ***IP address change: ScopeExplorer can be used to change the IP address of the LSA1000. See Chapter 4 for details.***

ScopeExplorer is supported for all LeCroy instruments and additional information can found on the LeCroy web site: www.lecroy.com

About NET_CON

A C program demonstrating the construction of a TCP/IP socket, NET_CON is an example that can be used as a reference for program development in either a Windows or non-Windows environment. The program is written using the Microsoft Developer Studio version. 5.0. All source code for the Windows environment can be found on the CD and in Appendix B this manual. When the program is run, the LSA1000 will return the ID string "LECROY, LSA1000, LSA1000000000, 01.0.0".

For Unix based workstation, the NET_CON sample program provides the baseline implementation of a stable TCP/IP communication between the LSA1000 and the computer system.

This API (Applications Programming Interface) sits above the TCP/IP protocol stack in all UNIX systems and is also available in Windows 95 and Windows NT. It is for the most part platform-independent, and should allow the same source code to compile and run on each of the supported systems.

The more commonly known WinSock API is derived from the original BSD sockets API and may be used to communicate with BSD sockets based systems. WinSock is the API used by Netscape, Internet Explorer, Telnet, FTP, among others, for PC communication with the Internet.