Getting Started with the “lcwave” and “LeCroy Wave Series” LabVIEW™ Drivers

Lab Brief WM832

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Summary

This application note provides all the information required to get your LeCroy oscilloscope up and running with LabVIEW.

The “lcwave” and “LeCroy_Wave_Series” LabVIEW drivers are available for LabVIEW users who wish to control their LeCroy Windows-based “X-Stream” oscilloscope from a LabVIEW program. This application note provides all the information required be up and running with LabVIEW, including instructions for downloading and installing the drivers and required components, and instructions on running example Virtual Instruments. These instructions are tailored for Windows installations.

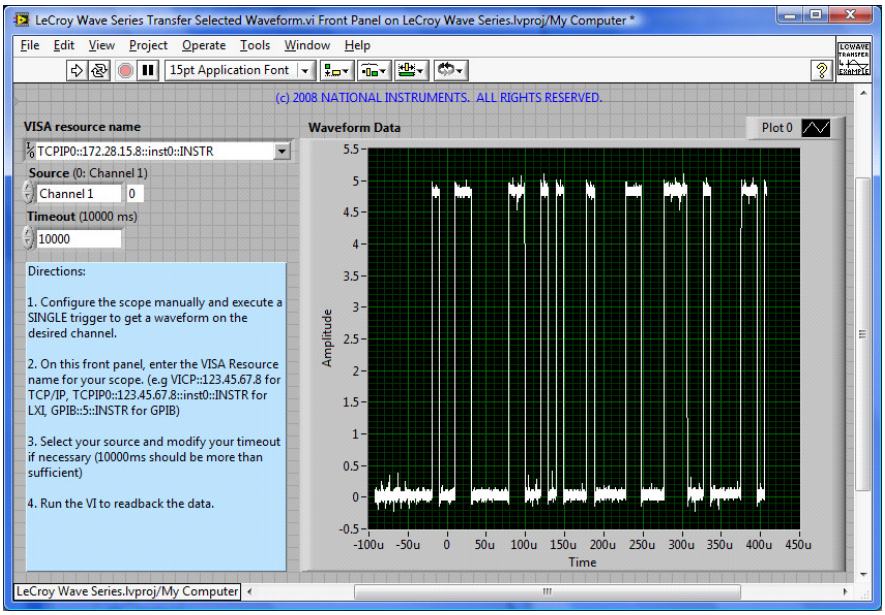

Figure 1: LeCroy_Wave_Series front panel.

Selecting a Driver: lcwave vs. LeCroy_Wave_Series

The lcwave and LeCroy_Wave_Series Drivers are two flavors of the same driver, and have the exact same code. The only difference is that the LeCroy_Wave_Series driver is created using LabVIEW’s “project architecture” which first appeared in LabVIEW 8.0.

- ➔ lcwave is provided in order to support customers using LabVIEW 7.x, and can also be used in LabVIEW 8.x and higher. It is "packaged" in the file lcwave.zip
- ➔ LeCroy_Wave_Series is compatible with LabVIEW 8.x and higher, and is packaged in the file LeCroy_Wave_Series.zip
- ➔ Users of LabVIEW 8.x and higher can use either driver, but we recommend using LeCroy_Wave_Series in order to have the ability to use the project view.
- ➔ The zip file downloaded can be used with any of the interface types supported by your DSO. (There are not separate zip files for GPIB, TCPIP, LXI, etc.)

How to Download and Install the Required Components

1. Install **LabVIEW**
2. Install **NI-VISA**, either the full version or the run-time version for your OS. The installer can be downloaded from National Instruments' website. Go to www.ni.com/visa as a starting point. As of the writing of this document, this page included a link to "downloads".
3. Install **VICPPassport**, which is required only if using the TCPIP (VICP) control type in conjunction with a driver that uses NI-VISA calls (which includes the drivers covered by this Application Note.) The VICPPassport can be downloaded from the Software Utilities section of the LeCroy website www.lecroy.com. No additional components are required for LXI or GPIB connection types.
4. Download the LeCroy oscilloscope driver from NI. (**See "Selecting a Driver" above)**
    a. Both drivers can be downloaded from www.ni.com/idnet, or you can enter "LeCroy_Wave_Series" or "lcwave" from the search box on National Instrument's homepage to get to the download page for the driver. Web registration on NI's website is required.
5. Install the driver as per the instructions in the readme file that is in the zip file downloaded above. The driver will be installed under the instr.lib folder of your LabVIEW installation.

Setup the Oscilloscope's Remote Control Interface

1. Go to Utilities > Utilities Setup…
2. Go to the Remote tab.
3. Select the appropriate button in the Control from section of the dialog. In the figure below, LXI has been selected. See the section below **Selecting an Interface Type: TCPIP vs LXI vs GPIB**
4. Note the IP address and hostname for the scope. If the scope is attached to a network, then it will acquire an IP address automatically like any other PC.
5. Acquire a waveform on channel 1. (For "Getting Started" purposes, keep it reasonably small, 50KPoints, for example.)

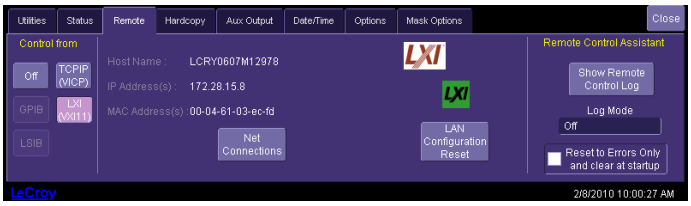

Figure 2: Setting up the oscilloscope remote control interface.

Selecting an Interface Type: TCPIP vs LXI vs GPIB

The LXI control type has been available on LeCroy DSOs since ~2009; the TCPIP selection, which uses the VICP protocol handled by the VICPPassport plug-in for NI-VISA, has been used on LeCroy

scopes since ~1997. An advantage of the LXI interface is that it includes a higher level of integration with NI MAX; see the application note "Introducing the LXI Interface", available in the Technical Library on LeCroy's website, www.lecroy.com. As of the writing of this Application Note, the TCPIP (VICP) control type is much faster than LXI. The GPIB interface type is optional, and is the slowest of the three choices. GPIB is typically used by customers who are controlling a rack of GPIB equipment, or who are using existing software that only supports interfacing to the scope via GPIB.

➔ The remote control command language is exactly the same for all interface types

Use LabVIEW to Retrieve a Waveform

The following steps utilize LabVIEW's function palette to get to the example that retrieves a waveform. See below for navigating via the Project Window (LeCroy_Wave_Series users).

1. Close any connections to the scope that you may have made with ScopeExplorer, WaveStudio, VIC or other utility (see **Debugging** section below)
2. Launch LabVIEW
3. Open a new VI, and go to the block diagram
4. Open up the Function Palette by selecting View > Function Palette
5. Navigate to Instrument I/O > Instrument Drivers, and then into the subpalette for the LeCroy driver.
   - ➔ **If you do not see an icon for the driver, then it wasn't installed properly.**
6. Open the Examples subpalette *(Note: in certain LabVIEW 8.x versions; the Examples subpalette doesn't show in the Function Palette due to a LabVIEW bug.)*
7. Right-click on the **Transfer Selected Waveform** example and select Open VI
8. In the VISA resource name control, enter the VISA address:
   - ➔ VICP::<ip address> for TCPIP (VICP) (ex: VICP::172.29.9.22)
   - ➔ TCPIP0::<ip address>:: inst0::INSTR for LXI (ex: TCPIP0::172.28.9.22::inst0::INSTR)
   - ➔ GPIB::<address> for GPIB. (ex: GPIB::13)
9. Select the Channel 1 in the Source control
10. Run the example to transfer the waveform to the PC.
11. The next example to run is **Transfer Single Waveform**. In order to run this example, the scope must be setup to trigger when the Single button on the front panel is pressed.

Using the LeCroy_Wave_Series Project Window

Beginning with LabVIEW 8.0, LabVIEW includes a "Project" architecture. LeCroy_Wave_Series is built as a LabVIEW project, and the project can be opened by selecting the LeCroy_Wave_Series.lvproj file, which can be found in the instr.lib/ LeCroy_Wave_Series folder under your LabVIEW installation.

As shown in figure 3, the Project window can be used to open examples and select driver VIs for use in your application.

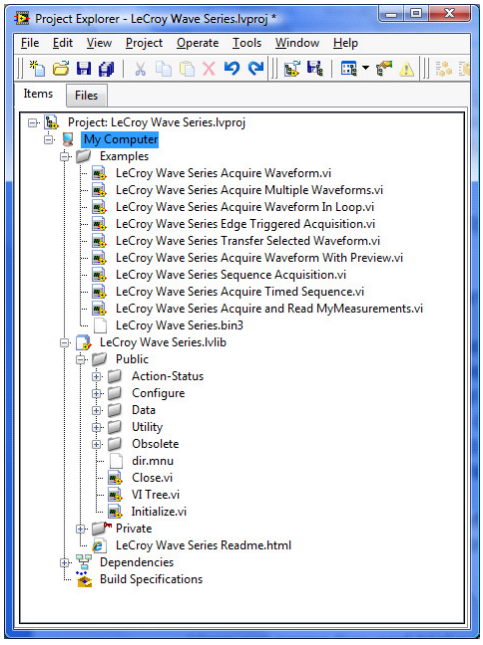

Figure 3: The project window in LabVIEW 8+

Using Your Driver's Function Palette

Open the driver's function palette as described in the section above **Use LabVIEW to recall the waveform.** The palette includes all "public" VIs for the driver, including examples. One handy VI is **Tree.vi.** This vi serves as a graphical table of contents for the driver. Open the Tree, and type Control-h to open up context help. Roll over a VI to see its description. You can also use LabVIEW's Search capabilities from the Tree VI to hunt for any VI of interest to you. (For example, search on "Screenshot" to easily find the driver's VI to grab a screenshot from the scope.)

Keep in mind that only a subset of the scope's complete functionality is included in the driver. Reference the Remote Control Manual for your scope for a complete list of commands.

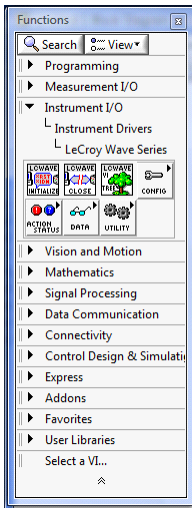

Figure 4: The Drive Function Palette.

Debugging

Here are some tips and tricks for debugging. If you suspect that you are not able to establish a connection:

1. Confirm that you have installed the required components
2. Confirm that the oscilloscope is setup correctly for remote control
3. Confirm that you are using the correct syntax for the VISA resource name
4. Confirm that there are no open connections to the oscilloscope from other applications
5. Use LeCroy's ScopeExplorer or WaveStudio utility to confirm that you can connect to the scope.
6. Use the National Instrument's Visa Interactive Control ("VIC") to confirm that you can connect to the scope. VIC can launched from with NI's Measurement and Automation Explorer (MAX), which is typically installed when installing NI-VISA.

If you are having difficulties, it is wise to simplify operations as much as possible. Keep in mind that the lcwave and LeCroy_Wave_Series drivers have are well-tested and well-supported. Many initial problems are simply a result of a missing required component or syntax error. If you continue having troubles, email LeCroy Tech Support at technical.support@lecroy.com