

Remote Control Shortcuts

Using Queries to Define Correct Remote Commands

LeCroy oscilloscopes can be remotely controlled using GPIB, RS232, and on some models, Ethernet. Many users routinely exploit the remote control capabilities of LeCroy scopes to perform sophisticated automatic signal measurements and export data. This LeCroy application note is directed to the novice programmer; providing some insights and shortcuts to scope remote control.

Remote messages are made up of one or more "commands" and "queries". Commands "direct" the oscilloscope to change its state (e.g. time base, vertical sensitivity). Queries "read" the oscilloscope settings and measurements. Very often the same mnemonic can be used for a command or query. The query differs from the command mnemonic by the question mark (?) following the last character. The remote control commands and queries are described in the LeCroy Remote Control Manual. Many of these manuals are available on-line, with the latest additions to the command set, at www.lecroy.com.

The examples in this LAB brief were accomplished using Scope Explorer (also available free from the LeCroy web site)

Using Scope Explorer in the Terminal Mode allows the user to control/query the scope without having to write low level commands. Establishing communications between the computer and scope via Scope Explorer is easily accomplished

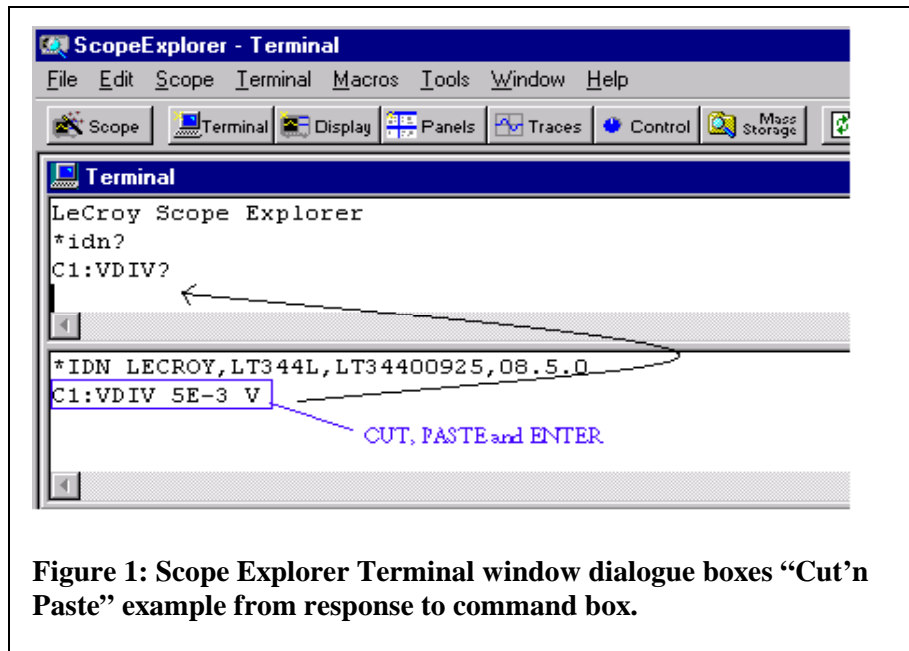


Figure 1: Scope Explorer Terminal window dialogue boxes "Cut'n Paste" example from response to command box.

using the "Find" icon, which will automatically locate the scope.

Once this is accomplished, click on the "Terminal Mode" icon. This terminal mode dialogue window consists of two parts--the upper portion is command/query and the lower portion is where the response is displayed. (See figure 1)

To verify communications are established in the command/query screen (upper portion of Terminal mode window) type the characters ***idn?** (Identify) which is the query requesting the scope to report the model number, software version and serial number. The query response will appear in the response screen (bottom portion) of the Terminal window. Once communications are established, consider the following exercise.

- Manually set Channel 1 of scope to 5mV/div.
- Query for Channel 1 with volts per division mnemonic, "**C1:VDIV?**" observe the scope returns "**C1:VDIV 5E-3 V**".
- Manually change the scope channel 1 to a different volts per division setting.
- "Cut and Paste" the previous query response as a command. Depress return and observe scope channel 1 is now at the new setting.

Note: Some commands can be sent in two ways: numerically or mnemonically. V/div can be 5E-3 V or 5mV.

Controlling math functions remotely requires attention to detail for both command syntax and equation arguments. When invoking some of the advanced math functions, with a large number of variable arguments and syntax, this can

appear to be a daunting task. However, LeCroy remote operation can be summarized as: "if you can do it manually, you can do it remotely..." A useful tool for writing programs to control scope math functions is the **DEFINE** or "**DEF**" command/query.

An easy way to configure a math trace for remote control is:

- Configure the scope manually for the desired math setup.
- Remotely query the scope for Trace definition (configuration).
- Use the response from step b above as the command.

This three-step procedure has two distinct advantages:

- When manually controlling the scope, the set up dialogue boxes will prompt you for set up information
- The responses are syntactically correct for "cut and paste" use

In this exercise we will set up a simple average function.

- Manually configure Trace A for an average on channel 2 of 1000 sweeps and 1000 points per sweep in Math.

Using the Scope Explorer terminal mode command.

b) Query window, enter **TA:DEF?** This will command the scope to return the settings for math trace A return a command string back to Scope Explorer.

c) The query command syntax for **DEFINE**, or **TA:DEF** ?

For summed average, is as follows:

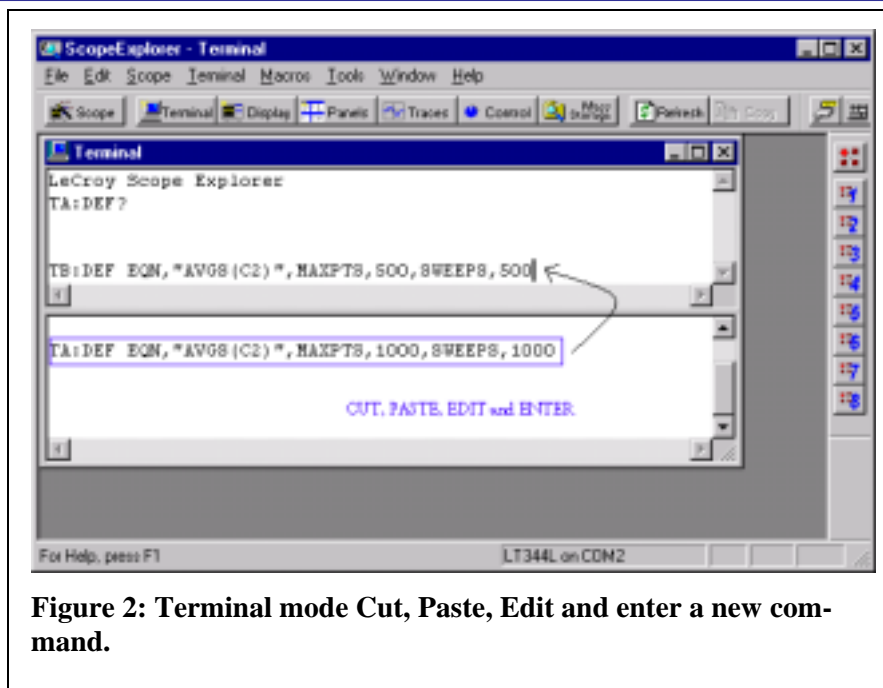


Figure 2: Terminal mode Cut, Paste, Edit and enter a new command.

**TA:DEF EQN, "AVG(C2)"
MAXPTS 1000, SWEEPS,1000**

In plain text, this is the math equation for average of channel 2 using a maximum of 1000 points and 1000 sweeps. This response displayed in the response portion of the Terminal Mode dialog screen is syntactically correct when used as a command for math function setup.

You can "cut and paste" the command back to the upper terminal window. In this next example, after pasting the returned command try editing some of the pasted command. Change the Math Trace to B, C, or D. Change the **MAXPTS** to 500 and **SWEEPS** to 500. Next place the cursor after the text to be changed. Then use the Backspace key to remove characters and type in new text. Try not to change the basic structure of the command. (watch the spaces and commas).

Now re-send this command string by placing the cursor at the end of

the command line and pressing the Enter key. The scope will now be set to this new configuration. without having to consult the remote manual.

The above procedure can be used for any Math function you require. Once the math trace is configured, remotely query the appropriate Math Trace (A through D) and the scope will return the correct equation to setup that Math Trace. These query returns can easily be cut, edited, and pasted, into other programs without worrying about syntax errors. Once the basic structure of a command is seen, it becomes easier to modify it for other Math functions as well.