



















































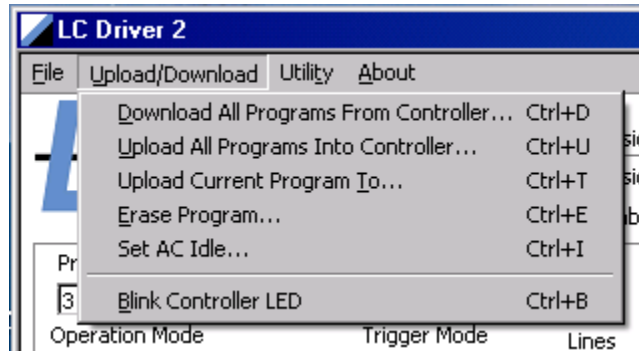






### c. Upload/Download Menu

The options available from the Upload/Download menu permit transfer of LC programs to/from *LCDriver2*'s program memory and the LCC-230's program memory. The LCC-230 controller has an onboard EEPROM that retains LC program contents for operation in controller standalone mode.

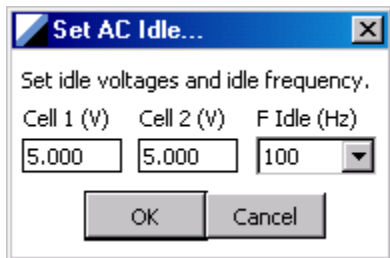


**Download All Programs From Controller...** will refresh all slots of *LCDriver2*'s program memory with the contents of the currently-active controller's EEPROM. If program changes have been made in *LCDriver2* and not been saved to text files, a prompt warning will appear before the controller's EEPROM contents are read. This menu option can be used to "resync" *LCDriver2*'s program memory with the LCC-230's EEPROM.

**Upload All Program Into Controller...** will transfer all programs slots in *LCDriver2* program memory into the corresponding slots of the LCC-230's EEPROM. This menu option will make the controller's onboard EEPROM programs identical to what is currently being held in *LCDriver2*.

**Upload Current Program To...** will transfer the currently-active program in *LCDriver2* into a designated controller EEPROM slot. Most users will find this to be a frequently-used option of the Upload/Download menu. A prompt will appear allowing the user to select a LCC-230 program slot; note this need not be the same slot as selected by the *LCDriver2* "Program" drop-down control. Once the update is complete, *LCDriver2* will adjust its program memory to agree with the contents of controller EEPROM.

**Erase Program...** will prompt for a controller EEPROM slot to make blank, and then blank out this program slot both on the controller and in *LCDriver2*. By definition, a blank program is a one-line, two-cell AC Internal Trigger program, with carrier frequency and cell voltages set to the currently-set AC idle frequency and amplitudes

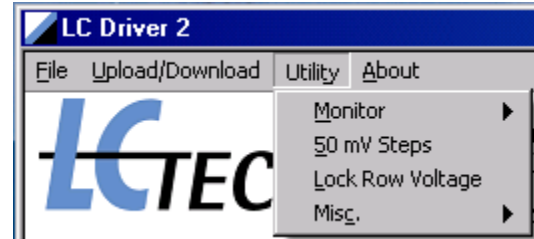


**Set AC Idle...** sets the AC carrier frequency and cell amplitudes of the AC "idle" condition. The controller will output this AC idle frequency and amplitudes when a blank program is created in *LCDriver2*, a blank program is selected in standalone mode by pushbutton switch, or when the controller is in OLD\_HOST mode.

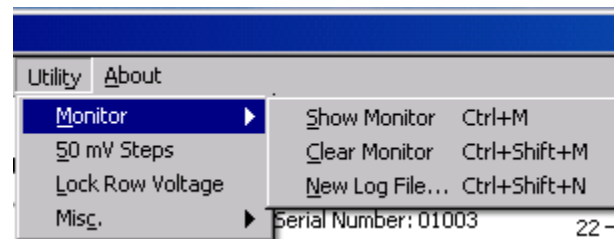
**Blink Controller LED** will briefly strobe the Status LED of the currently-active controller. It is useful when there are multiple controller on USB to help identify the currently-active controller selected by the “Device” control in *LCDriver2*. It can also be used as a confirmation of host computer/controller USB connectivity.

#### d. Utility Menu

The options available from the Utility menu are not as frequently used. Some of this functionality is more advanced and is discussed in Sec. 7.e below.



**Monitor** is a submenu that controls the behavior of a sub-window that displays the actual *LCDriver2/LCC-230* controller protocol message stream. The Monitor is primarily used for diagnostics and troubleshooting. Selecting **Show Monitor** will open the Monitor



sub-window just below the main application window. The *LCDriver2* commands and queries sent to the LCC-230 are shown one per line, with the *LCDriver2* message on the left, and the corresponding response from the controller on the right. Re-selecting Show Monitor will close the Monitor window. Note that *LCDriver2* will always start up with the Show Monitor option turned off (unchecked).

**Clear Monitor** will clear the monitor display of all previous messages. This can be useful for capturing a stream of messages of particular interest. This menu items performs the same action as the “Clear Monitor” button in the Monitor sub-window.

**New Log File...** permits an alternate log file to be started. The Monitor sub-window contains four checkboxes. The two “Monitor” checkboxes control what is displayed in the Monitor sub-window. The two “Log” checkboxes control what is written to the current log file. These checkbox settings are retained by *LCDriver2* when the application is closed.



Clear Monitor

Checking the “Log Command/Response Traffic” box permits the *LCDriver2/LCC-230* controller protocol message stream to be captured to a log file for later inspection. If either of these boxes are checked, *LCDriver2* will create a log file.

The default capture log file will be stored as

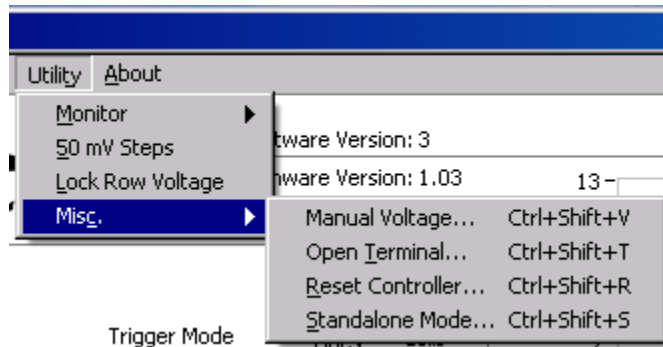
Log File

C:\Documents and Settings\erica\  
My Documents\LCDriver2\_Data\  
logs\USB\_COM.LOG

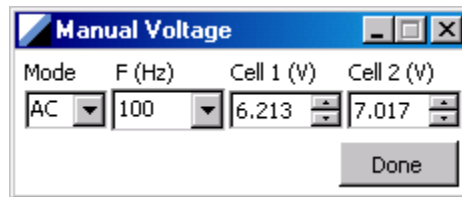
C:\Documents and Settings\\My Documents\  
LCDriver2\_Data\logs\USB\_COM.LOG. The log file will be overwritten every  
time *LCDriver2* is run. An alternate log file may be selected by the New Log File...  
option. This option is intended for test setups where records of each run are desired to be  
kept in separate files.

The **50 mV Steps** and **Lock Row Voltage** options are discussed below in Sec. 7.e.

The **Misc** submenu allows access  
to special controller features. The  
only item in this menu normally  
accessed by most users is the  
Manual Voltage... option.



**Manual Voltage...** opens up a separate dialog box that permits simple static amplitude  
control of the LC channels in AC mode.



In this mode, there is no concept of dynamic host state or LC programs. The LCC-230 is  
forced into AC operating mode in the OLD\_HOST state. The edit boxes act as “knobs”  
that just set a fixed carrier amplitude for each cell.

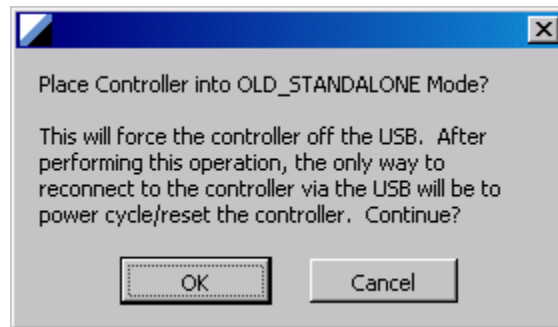
For nematic LC cell applications, AC mode should be used. However, DC mode can be  
set as well; when selected, warning message boxes will appear cautioning about possible  
device damage. If “Continue” is chosen and DC mode selected, the controller will output  
DC voltages of the selected polarity on each channel.

When the Manual Voltage dialog box is closed with the “Done” button, the controller is  
reset and placed back in dynamic mode (NEW\_HOST), and will resume executing the  
currently-active program. The Manual Voltage settings do not affect the currently-active  
program in any way.

**Open Terminal...** is for field diagnostics and troubleshooting. This option allows *LCDriver2*/LCC-230 controller protocol messages to be sent directly to the LCC-230 and is intended only for field support in consultation with LC-Tec.

**Reset Controller...** can be used to reset the LCC-230's onboard microcontroller without a power off/on sequence. Selecting it will open an explanatory message box. If "Continue" is selected, a \*RST: message will be sent to the LCC-230, and then the controller placed back in dynamic mode (NEW\_HOST).

**Standalone Mode...** is the only way to access the special OLD\_STANDALONE state discussed in Sec. 6.b above. Selecting it will display the explanatory message box shown below cautioning that once this state is entered, the only way to exit it is a power off/on sequence, by deliberate design. If "Yes" is chosen, the LCC-230 is placed in the OLD\_STANDALONE state, and *LCDriver2*'s USB annunciator will change to read "No Connection".



As explained in Sec. 6.b, OLD\_STANDALONE should only be entered in circumstances where the controller must continue to operate a standalone program, even if inadvertently reattached back to USB.

## e. Advanced topics

If only one standalone LC program is of interest or needed in a situation, a short-cut can be taken by leaving the controller's front-panel pushbutton switch set to "0". As explained above, all *LCDriver2* program edits are implicitly performed on Program 0. If the front-panel switch is left in the "0" position, the controller will automatically execute the currently-active program that has been automatically stored in the Program 0 slot when placed in standalone mode.

Note that one-line AC and DC programs are allowed in *LCDriver2*, and are useful in practice. One-line Program Trigger programs are treated like Internal Trigger programs—any trigger edges present are ignored. Program triggers will resume when additional lines are added to the program. DC one-line programs can be used to create carriers of arbitrary frequency by modifying the time duration of the first line.

*LCDriver2* handles USB attach and detach of controllers while the application is running. *LCDriver2* also handles multiple instances of LCC-230 controllers on USB. Although the "Device" control at window bottom is continuously updated with the number of controllers currently on USB, to avoid confusion it is recommended that all controllers be attached to USB prior to *LCDriver2* being run. The "Device" control selector will determine which controller *LCDriver2* is currently addressing. The **Upload/Download: Blink Controller LED** option may be used to facilitate controller identification. When a controller is first selected on USB, *LCDriver2* will issue a \*RST: and read all pre-loaded programs, just as if the controller was attached to USB while *LCDriver2* is running. When a controller is deselected, it will remain in the NEW\_HOST state executing the currently-active program.

In a multi-controller setup, it is frequently desirable to replicate all of the programs from one "master" controller onto other "copy" controllers. This may be accomplished in the following way:

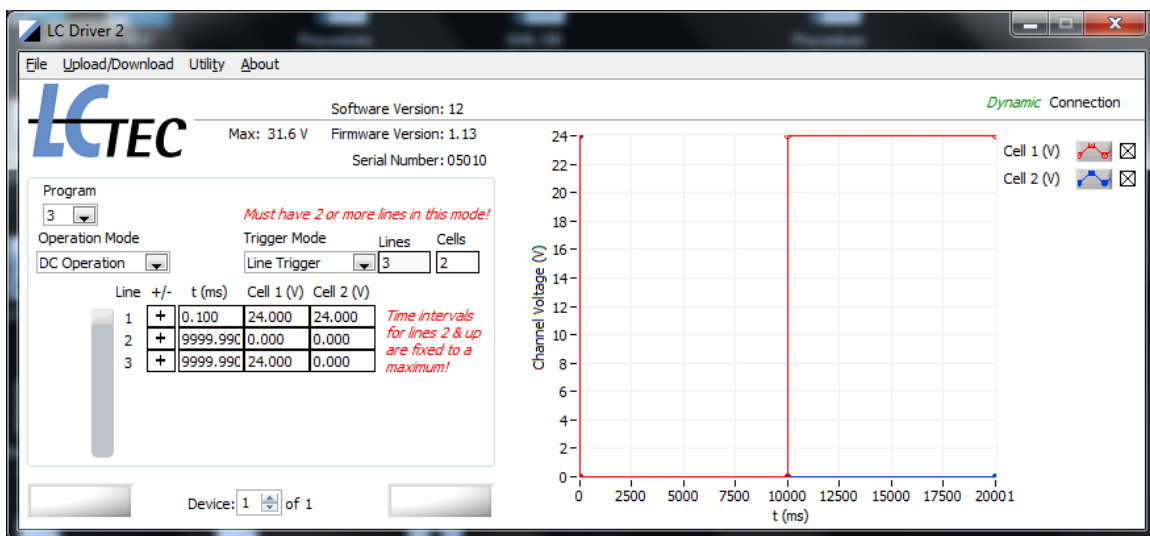
1. Connect the "master" controller to *LCDriver2*, and save all programs read from its EEPROM with the File/Save All Programs To Files... option.
2. Disconnect the "master" controller from USB, leaving *LCDriver2* open.
3. Power up and connect one of the "copy" controllers to USB. *LCDriver2* will then read all programs stored on this controller's EEPROM into its program memory.
4. Overwrite these *LCDriver2* programs with the "master" programs by selecting the File/Load All Programs From Files... option and selecting one file from the "master" sequence just saved.
5. Select Upload/Download: Upload All Programs Into Controller... to write the "master" LC programs now held by *LCDriver2* into the "copy" controller's onboard EEPROM.
6. Disconnect the "copy" controller with *LCDriver2* still open. Repeat steps 3 through 5 for any additional "copy" controllers in the setup.

The **Utility/Lock Row Voltage** option may be used to set all cell voltages in a row of a program at once by editing a single cell's edit box. The Lock Row Voltage is a toggle setting; when set, a checkmark appears by the option. Re-selecting the option will turn it off. When turned on, changes to any cell voltage value in a row will replicate the new value to all other cells in that row.

Normally, the host computer's up/down arrow edit keys will increment/decrement the digit immediately to the left of the cursor when the cursor is in a time or voltage edit box in the program matrix. The **Utility/50 mV Steps** option changes this default behavior of the up/down arrow edit keys when editing a cell voltage. This option is a toggle setting; when set, a checkmark appears by the option. Re-selecting the option will turn it off. When turned on and the cursor placed in a voltage edit box in the program matrix, the up/down arrow edit keys will increment/decrement the voltage by 0.050 V, regardless of where the cursor is positioned in the edit box. This option is intended to facilitate adjustments in applications where the least-discernable optical difference corresponds to about a 50 mV adjustment. With this option, the cursor arrow can be positioned in a cell and adjustments made by the up/down arrow keys while the user's eyes continuously monitor the optical setup

The Lock Row Voltage option may be used in conjunction with the 50 mV step option to change all voltages in a row in 50 mV increments by up/down arrow key adjustments of one cell in the row. These options are commonly used together to optimize settings for LC-panel-based stereoscopic installations. Note that the Utility/Lock Row Voltage and Utility/50 mV step settings are *not* retained by *LCDriver2* if the application is closed.

*LCDriver2* V. 12 and up running on LCC-230's with device-side software version 1.13 and up support DC Line Trigger mode. The main application window of *LCDriver2* with this mode selected is shown below. In this mode, red annunciator text appears adjacent to the program matrix regarding the special program constraints.



DC Line Trigger programs must always have two or more lines, and the line durations for all lines except line 1 are always set to 9999.990 ms. *LCDriver2* will validate and enforce these constraints. Durations for line 1 may be set from a minimum 0.10 ms value to a maximum 9999.990 ms value. Note in particular that the maximum settable DC line duration for DC Internal and Program Trigger modes is 2000.000 ms; the 9999.990 ms maximum is for DC Line Trigger mode only.

DC Line Trigger is useful for situations in which the optical state of a FOS, X-FOS, or PolarSpeed™ device must be toggled by an external trigger. This mode allows ‘syncing’ to an arbitrary frequency to set a 50% open/closed shutter duty cycle. Each of the external triggers will advance the program line; the line durations are set long (maximum value) with the understanding that they will be terminated by a trigger edge. In DC Line Trigger, the trigger edges are effectively controlling line duration for lines 2 and up. In the absence of any triggers, the line durations will default to their onscreen values (line 1 as set by user; lines 2 and up 9999.990 ms) and the device drive will still remain DC balanced.

For PolarSpeed™ waveforms, line 1 should be set short (~0.10 ms). This first line will ‘time out’ and advance without a trigger edge. Lines 2 and 3 will be advanced by external trigger edges, which will then toggle the optical state of the device.