

OMEGA APPLICATION NOTE - AN001

“Introduction to OM-LMPLC programming Simple output cycling”

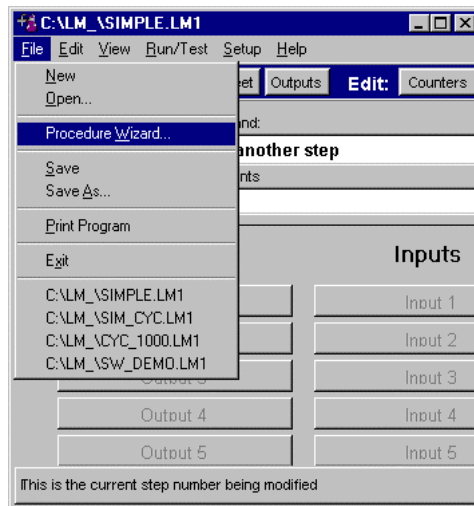
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This application note describes a simple but useful application of the OM-LMPLC. This application note is ideal for getting familiar with how to use the OM-LMPLC. Following this example step by step will expose you to important features in building a procedure. For additional information, please see the OM-LMPLC’s User Documentation or other available application notes.

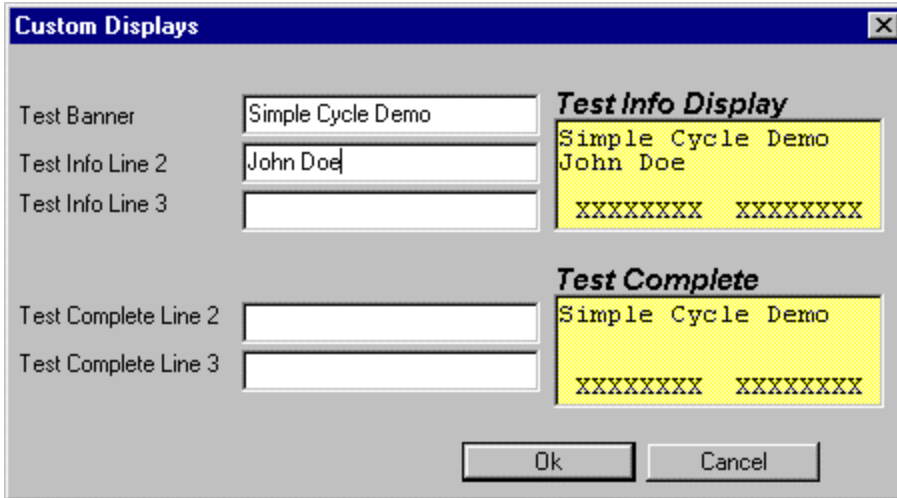
The object of the test procedure we are going to build is to cycle an actuator on and off. The actuator is exercising a test part. We wish to determine its durability, so we will keep a count of the cycles the part was exposed to. We can build this procedure in only four steps using the OM-LMPLC.

To build this procedure we need to use the “Procedure Writer” software that comes with the OM-LMPLC. Start the procedure writer by double clicking on its icon in Windows 3.x or selecting it from the start menu in Windows 95.

Now that the Procedure Writer is started, we will start with a new procedure. This can be done in two ways from the file pull down menu: the first is to select “New” and the second is to select “Procedure Wizard...”. We will select the “Procedure Wizard” to start building our first program. The “Procedure Wizard” will guide us through some steps in creating our new procedure.

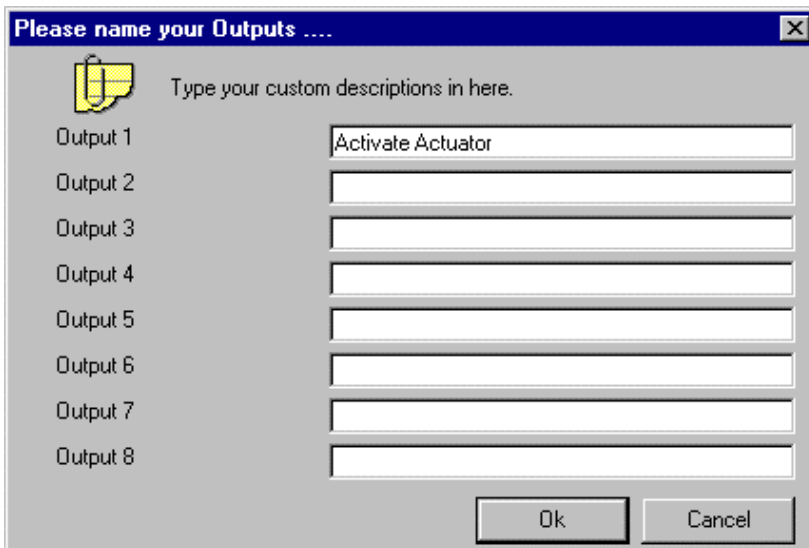


After selecting the Procedure Wizard, a dialog box appears asking you to fill in your custom screens. This box lets you customize the displays of the OM-LMPLC. Fill in the first box with the text “Simple Cycle Demo”. The first box will appear on the first line of the OM-LMPLC’s LCD display. In the second box enter your name. After completing this step, press okay to proceed to the next step.

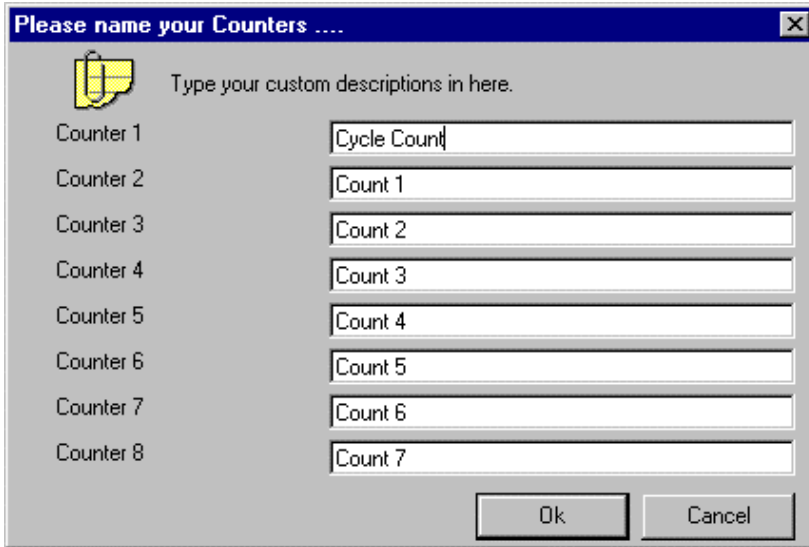


The Procedure Writer will then ask you to name your inputs. Since we do not require inputs in this example, simply press OK.

Now the Procedure writer asks us to Name our outputs. In the first box labeled output 1, type in “Activate Actuator”. This is the output we will connect the actuator to. After this, click the OK button or enter to continue.



Finally the Procedure Writer asks you to name your counters. Since we want to keep track of the cycles we deliver to our test specimen, we are interested in filling the information for counter 1. Delete “Count 1” from the text box and add “Cycle Count”. The custom description “Cycle Count” will appear on the OM-LMPLC’s LCD display. Press okay or enter to continue.

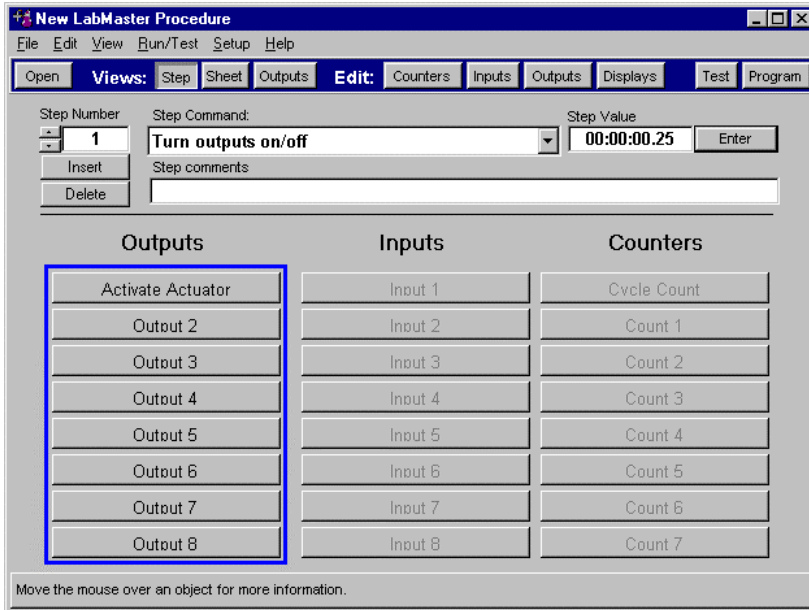


Each of the previous screens is available from the “Edit” pull down menu and the Procedure Writer toolbar. The Procedure Wizard simply stepped through them for us.

Now we are ready to begin writing the procedure. If you are familiar with procedures or recipes you are at an advantage. This is because the way the OM-LMPLC procedures work are very similar. The process of writing the procedure is simply telling and describing what the OM-LMPLC should do on each step. The Lab PLC starts at step 1, performs it. Then, it goes to step 2. On each step it performs an action. Sometimes you may repeat a series of steps. These simple ideas are used to build an OM-LMPLC procedure.

The first thing we wish the OM-LMPLC to do is to turn on our actuator. The screen which is called “Step” view is shown below. The box labeled “Step Number” shows the current step we are viewing. From this screen we will fill in the “Action” information for the procedure.

Make sure the step number box reads “1”. Click on the down arrow on box labeled “Step Commands”. This will display a list of actions that the OM-LMPLC can perform. Select “Turn Outputs On/Off”.

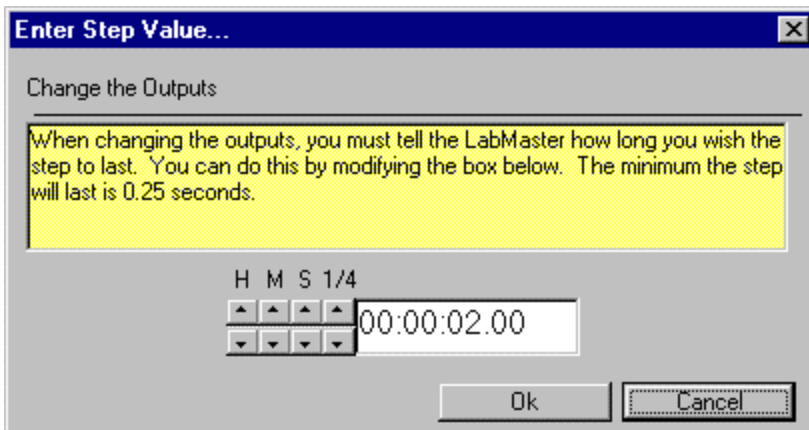


Your screen should now look the screen above.

Now that you have selected which action you wish to perform on step 1, you must describe how that action is to be performed. The procedure writer helps you know what information should be entered. Notice the flashing blue bar around the buttons with output names. Also the enter button went from disabled gray to enabled black.

For an output step we must tell the OM-LMPLC which output to turn on. So click on the button “Activate Actuator”. When the button is pressed, it means it is selected. If it is raised it is not selected. For the “Turn Output On/Off” command the selected outputs are turned “On” and the un-selected Outputs are turned “off”.

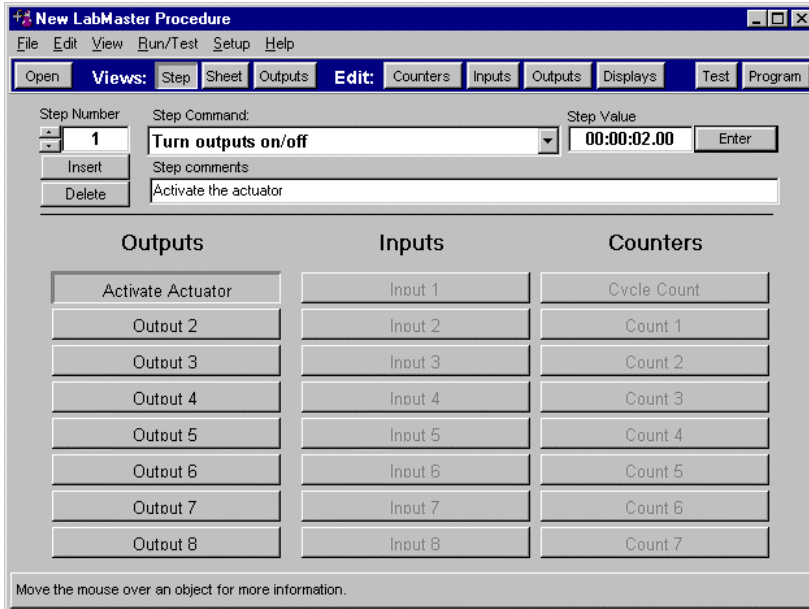
The “Turn Output On/Off” also requires a value. This value is the length of time this step lasts before going to the next step. Since the actuator requires a few seconds to fully extend, we need to modify the steps time. Do this by clicking the enter button.



From this screen, enter the length of time you wish the step to last. In our case, enter 2.00 seconds. When you are done entering, press ok.

Now let's add a comment to this step which describes what it does. Comments are useful for debugging and documenting when the test is complete. Add the text to the box labeled "Step comments", "Activate the actuator".

Your screen should now look like below.

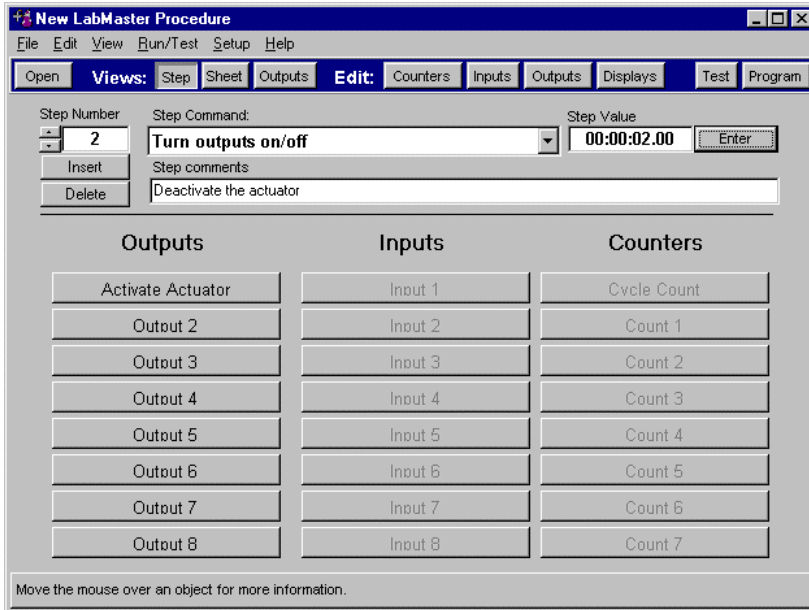


Now we will move to step 2. Now, since the actuator is fully extended, we wish to retract it back to the original position. We will do this by turning off our "Activate Actuator" output.

Move to the second step of the procedure. This is done by clicking on the up arrow button next to the step label. You can use these arrow buttons to navigate through all 96 of the OM-LMPLC's steps.

Now that we are at step 2, select the "Turn output On/Off" command again. This time we will deselect the "Activate Actuator" output. Click on the "Activate Actuator" button so it is deselected. It now should be raised. Enter a 2.00 second time and add the comments "Deactivate the actuator".

The step view for step 2 should be as follows

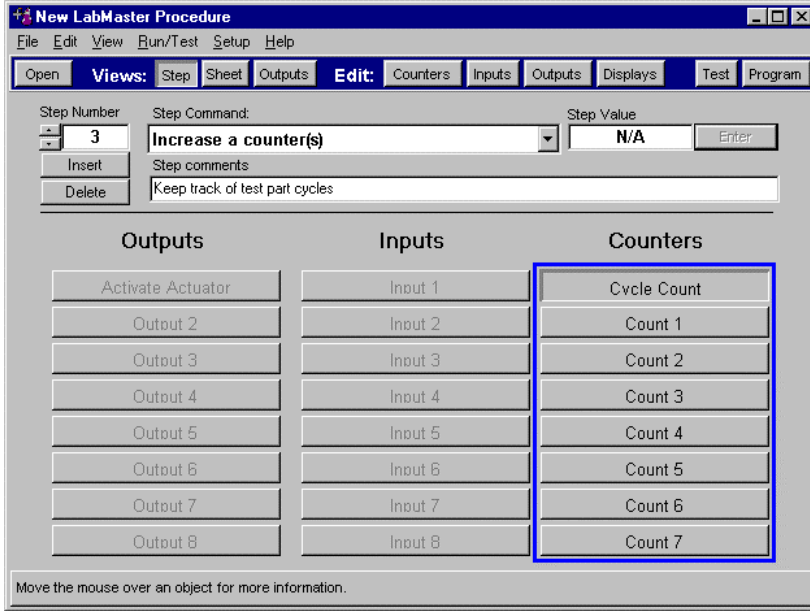


Now we have cycled our test specimen. We want to increase a counter to reflect how many cycles our specimen was exposed to. That will be our action in step 3.

Move to step 3 and choose the “Increment Counters” command. The Procedure writer indicates you must select counters for this command by the flashing blue box around the Counter buttons. As with the outputs, a selected counter is pressed in and a non-selected counter is raised. The OM-LMPLC will increment all the counters which are selected. Click the “Cycle Count” button to indicate we wish to increment this counter.

Notice the Enter button is now gray and disabled. This is because the Procedure Writer knows that there is no step value associated with the “Increase a Counter” command.

To finish step 3, add the comment “Keep track of test part cycles”. Your completed screen should look as below.

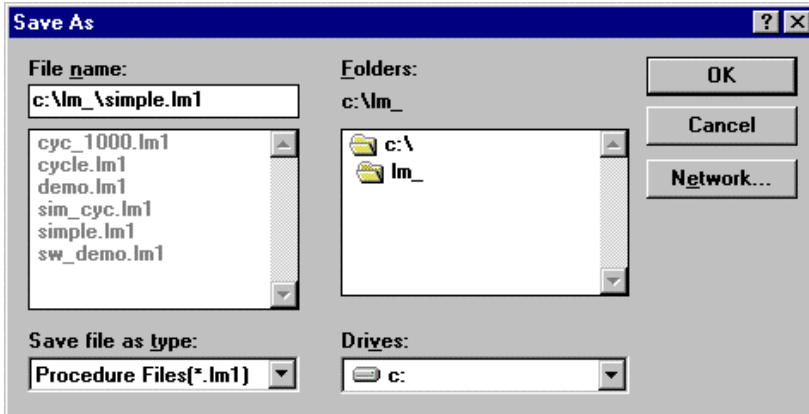


Now in order to cycle the part many times, we want to repeat the last three steps many times. This is what we will accomplish in step 4.

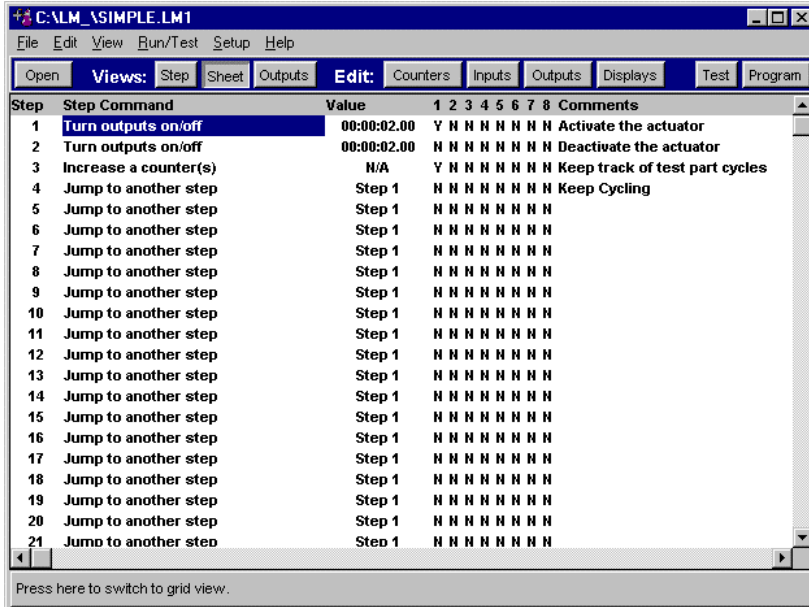
Move to step 4. Select the jump command. Note: this command is probably already selected since it is the default step command. Notice that no flashing blue boxes appear. This is because the Jump command does not require any actions based on any inputs, outputs, or counters. It only has a value which is the step you wish to jump to. Press the enter button and enter step 1. We enter 1 because that is the number of the step where our cycling starts. After entering the step number, add the comment “Keep Cycling”. Your screen should look as follows:



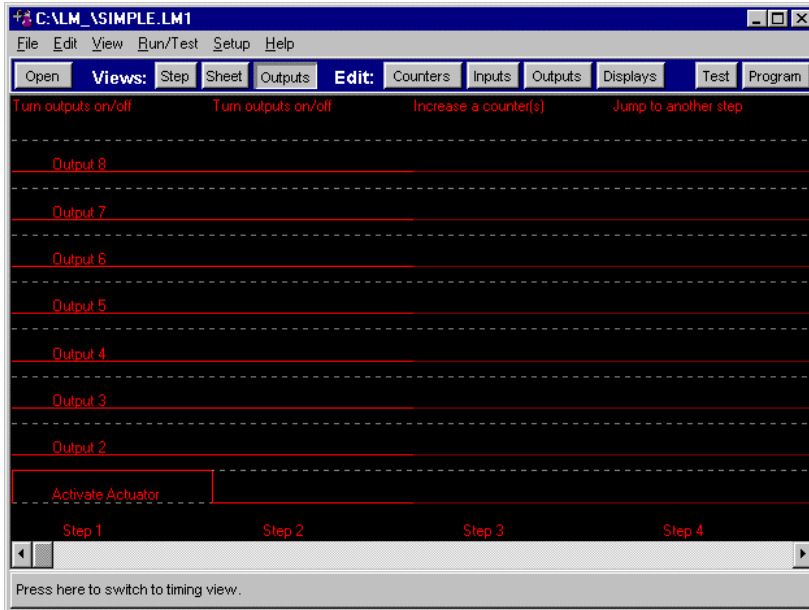
Now our procedure is complete. Now, let’s save it to disk. From the file menu select “Save”. This will bring up the Save As dialog. Enter a name for your procedure. You can open this file later on from the file pull down menu.



After saving, let's examine the different views that the Procedure Writer gives you for your program. From the View pull down menu, choose "Sheet". This gives you a spreadsheet view of your procedure. You can modify your procedure from this screen by double clicking on various cells of the sheet. This view is especially useful when entering jump step values.

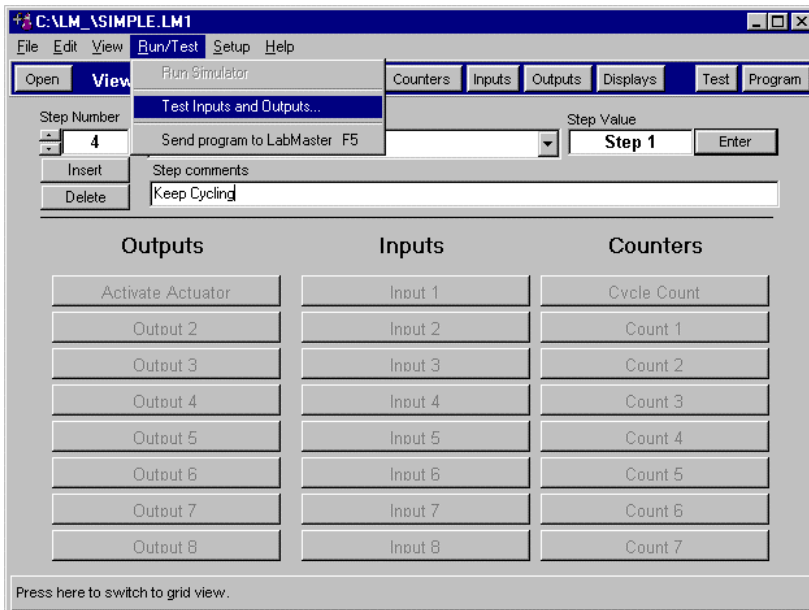


The remaining view is the output view. This view shows you how your outputs vary with each step. The following is output view.



The next step is to print the test. This will print the program and the wire list. We can use the wire list to wire up the outputs in the OM-LMPLC. You can print the test by choosing “Print..” from the File menu.

After we have wired our actuator, we can verify that the wiring is correct using the “Procedure Writer”. From the “Run/Test” pull down menu, select “Test Inputs and Outputs”. Note that you must have the OM-LMPLC connected to your PC, the comm port properly configured to perform this operation, and the OM-LMPLC in program mode. Program mode is selected by turning the OM-LMPLC’s key switch to the “Prog” position. For configuration information, see the OM-LMPLC User’s Documentation.



This brings up the test inputs and outputs screen. From this screen you can manually activate your outputs. You can also see the current state of your inputs. Exercise your actuator by pressing the “Activate Actuator” button.

After we have verified the circuit wiring we can now send the program to the OM-LMPLC. Select the “Send procedure to OM-LMPLC” from the Run/Test pull down.

This will then bring up a screen which shows you the progress of transferring the program to OM-LMPLC. The OM-LMPLC will beep once at the start of a procedure transfer and twice when it is complete.

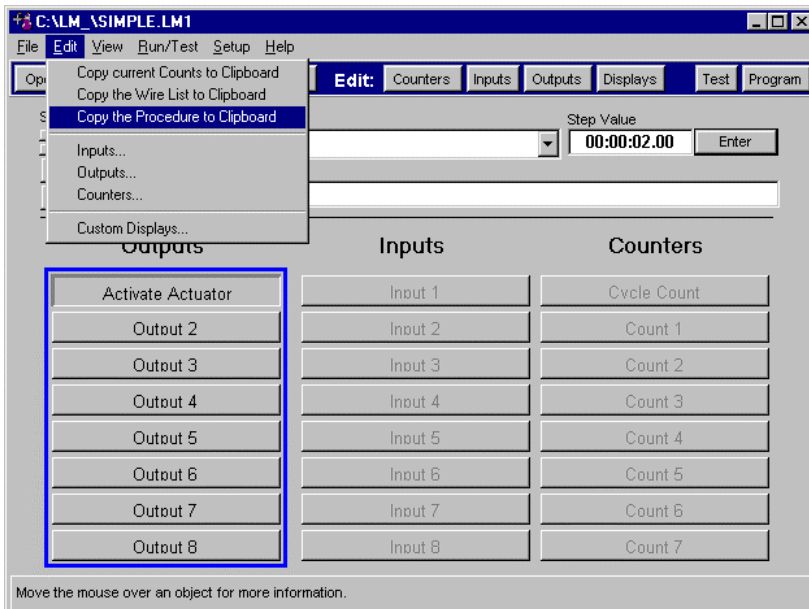
Now we are ready to run the program. Turn the OM-LMPLC’s key switch from the “Prog” to “Run” position. Press the Mode button to begin the cycling.

Notice the last line of the LCD display. The first box labeled “output 1” should be flashing on and off every two seconds.

Cycle through the displays by pressing the “Mode” button. Notice the Test Information display. This display shows your name and the text we entered in the first box of the Custom Display screen. Also notice the Counter labeled “Cycle counts”. This shows the current number of cycles the OM-LMPLC has performed.

A very important display is the program information display. This is the display which shows what step the OM-LMPLC is currently performing and information about it. For example, the display should now show on the first line that it is cycling the outputs. The current step switches from step 2 to step 3. The steps also show their timing in a count down fashion. Also, on the third line are the current loop counts. These are important if your program uses looping. This display is valuable for both debugging and finding out exactly where the OM-LMPLC is in the procedure.

After the test is finished, the Procedure writer can help you prepare your test report. From the edit menu choose “Copy the procedure to the clip board”. This copies the current procedure to the clipboard in a tab separated format. This can be pasted in MS Word or Excel via the Windows clip board and made into a table. This can also be done with Wire List and the OM-LMPLC current counts. Note the OM-LMPLC must be connected to read its current counts.



This concludes our simple example. To learn more, experiment with Procedure Writer and with the different step commands. The OM-LMPLC command set is very flexible and can be used to build powerful control programs. Please consult the user’s documentation for information about the other step commands.

FINAL PROCEDURE

Step no	Step Command	Value	1 2345678	Comments
1	Turn outputs on/off	00:00:02.00	Y NNNNN	Activate the actuator
2	Turn outputs on/off	00:00:02.00	N NNNNN	Deactivate the actuator
3	Increase a counter(s)	N/A	Y NNNNN	Keep track of test part cycles
4	Jump to another step	Step 1	N NNNNN	Keep Cycling