LISTEN.
THINK.
SOLVE.SM

Micro*Logix* *1100*

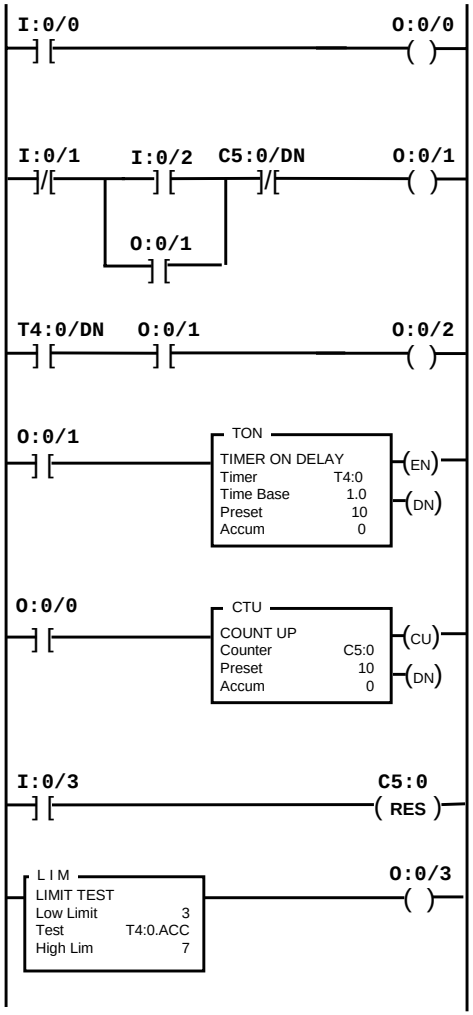
RSLogix 500 LAB#2

Timing, Counting & Comparing

ALLEN-BRADLEY • ROCKWELL SOFTWARE

Rockwell Automation

What we are going to do:



- We are going to take your program from Lab #1, modify two rungs, and create some new program logic.
- We are also going to program a Timer, and Counter. We will then use these in our program to see how they can be used to provide unique control capabilities.
- The last thing we will do is program a Limit command. The limit command is one of several powerful comparison instructions available in the MicroLogix controller.

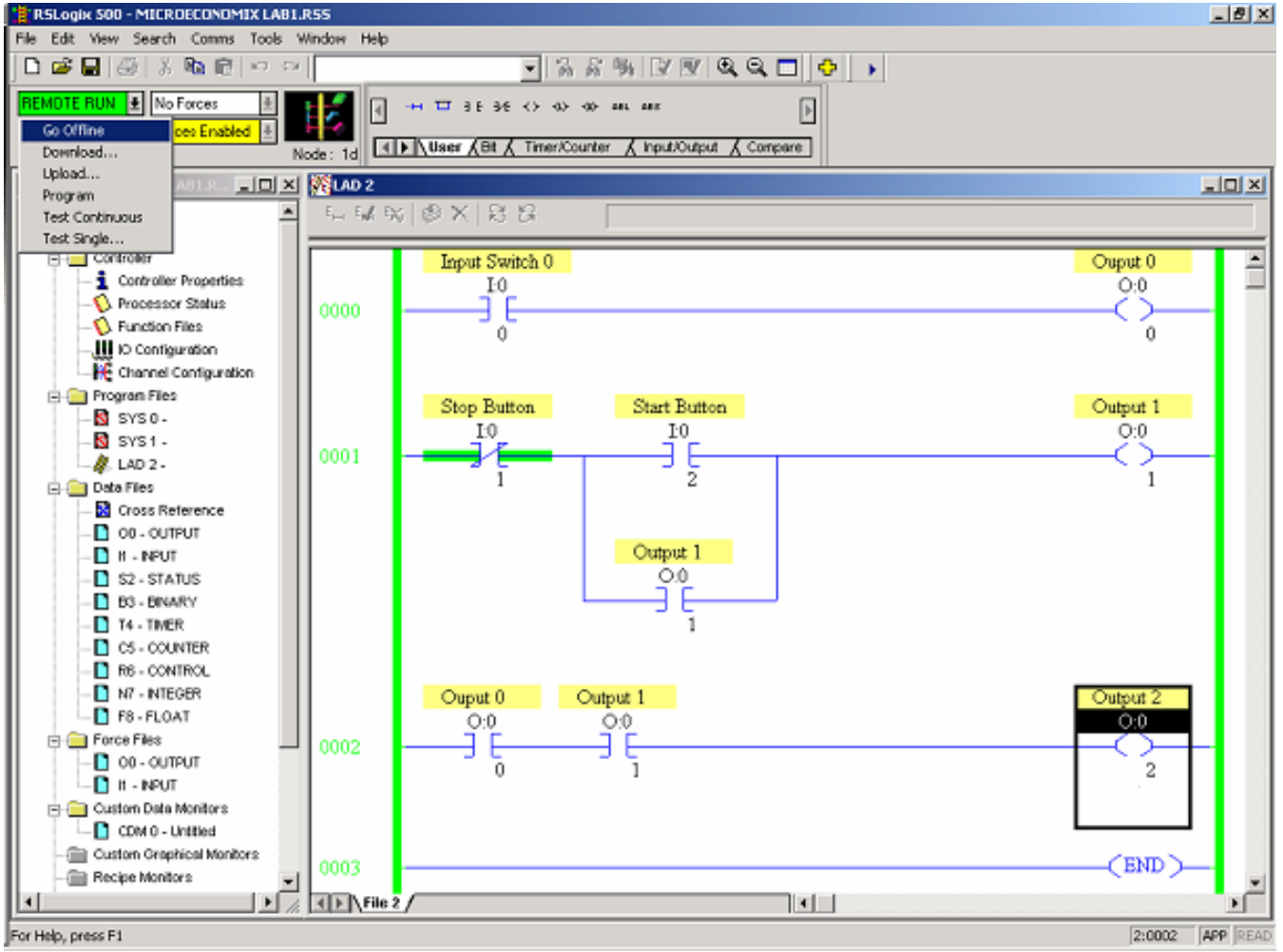
Steps for Today's Assignments

1. Save a Copy of your first lab under a different name
2. Modify your existing program
3. Add a timer, counter and limit instruction to your program
4. Transfer your program to the MicroLogix 1100
5. Monitor and test your program

Go Offline with the Controller

If you are ONLINE with the MicroLogix you must go OFFLINE to complete this process

- **Click the down arrow by the green box that says REMOTE RUN**
- **Select “Go Offline”**



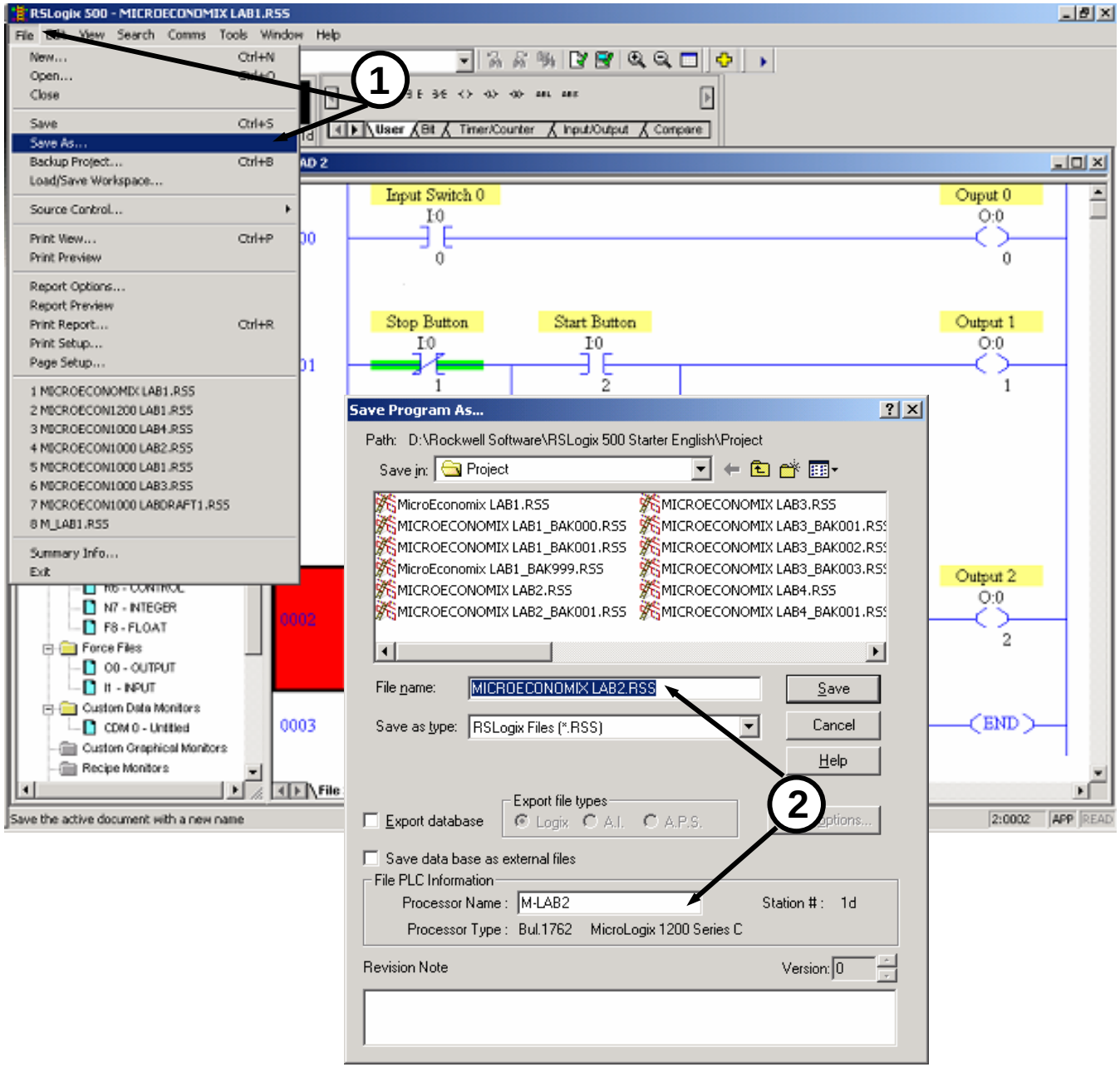
Copy and Rename Your 1st Program

1. Click “File” Menu

- Select “Save As” to create a copy

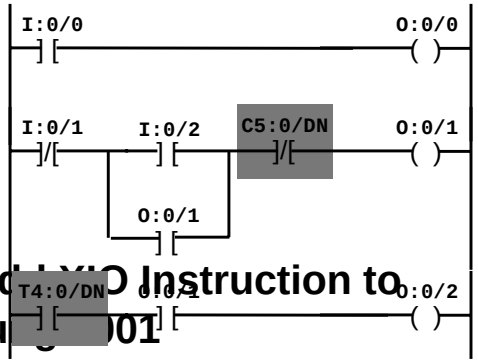
2. Type the new name

- Type MICROECONOMIX LAB 2 in the “File name” box
- Type M_LAB2 in the “Processor Name” box
- Click “Save”



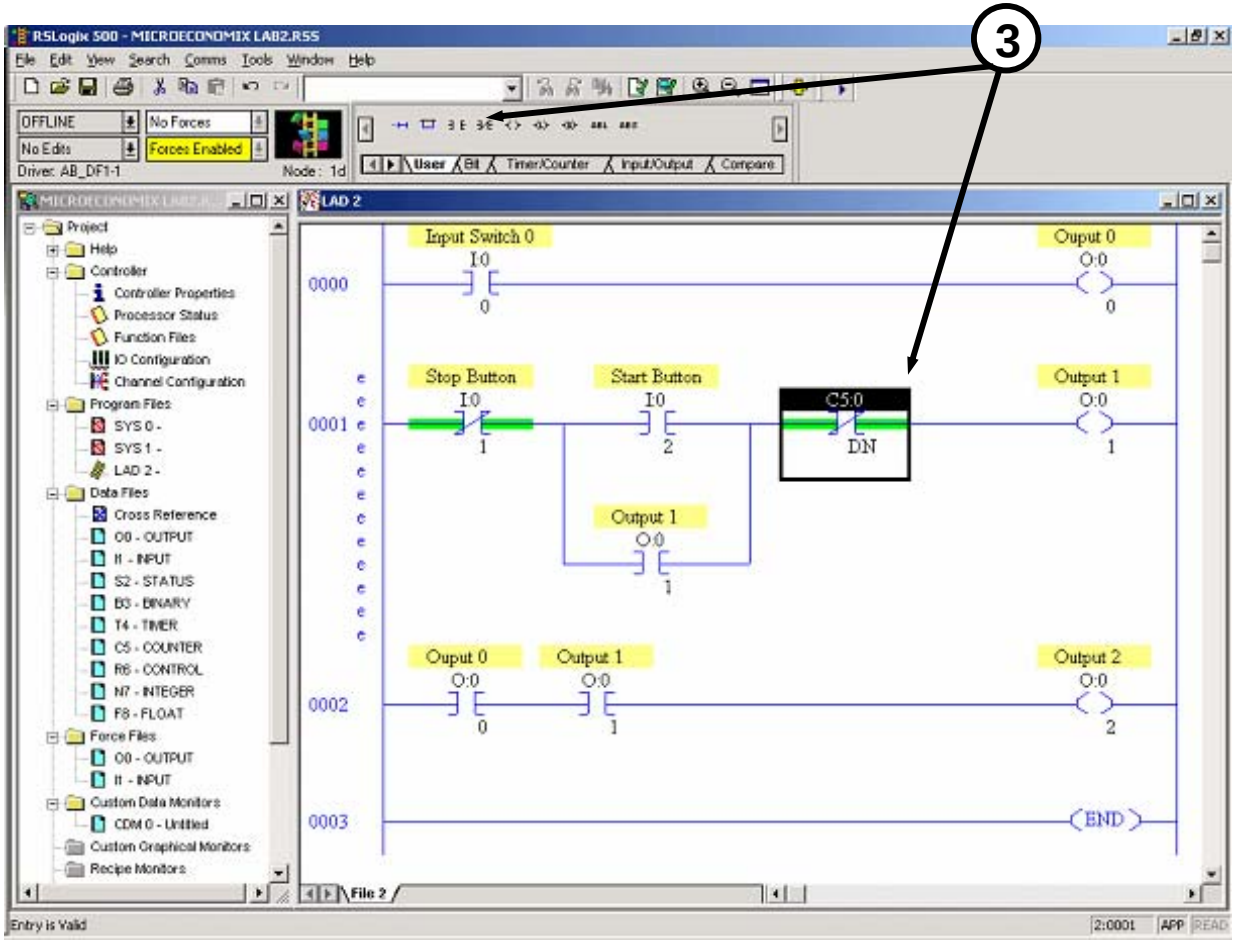
Modify Existing Logic

Modify the 2 rungs:



3. Add XIO Instruction to rung 001

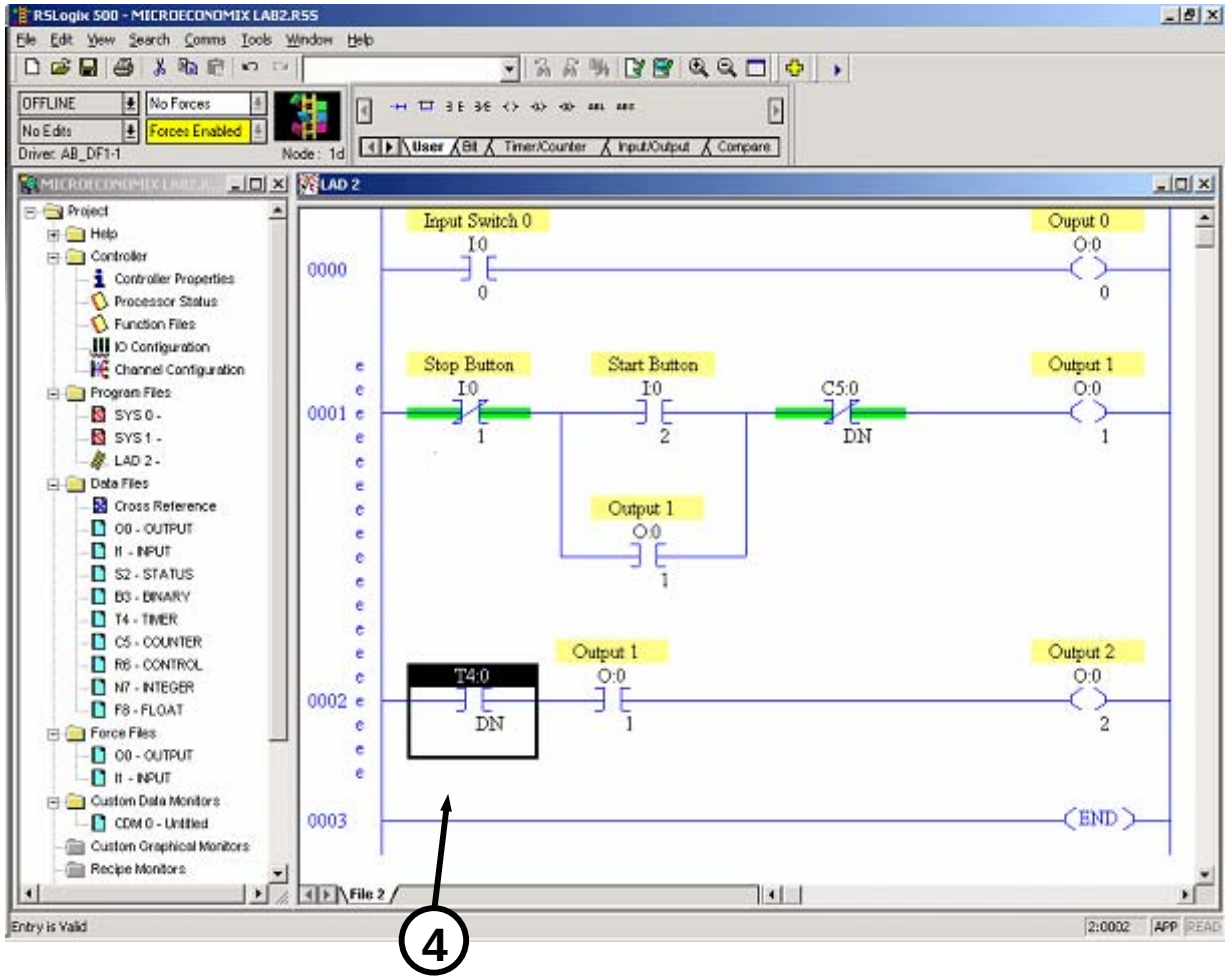
- **Make sure the Program Window is active (the right window title bar is colored or highlighted)**
- **Click on the "User" tab**
- **Click, hold the left mouse button and Drag the XIO button in between the branch and the OTE. When you see a green box, release the mouse button.**
- **With the instruction highlighted Type C5:0/DN [Enter]. This is the address of the XIO(examine if open) instruction**



Modify Existing Logic

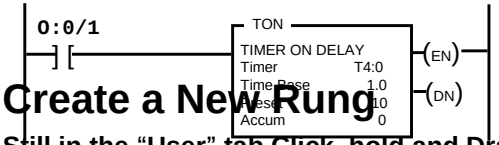
4. Modify the 1st XIC in rung 0002

- **Double click on the first XIC instruction, this will open the text edit box for the instruction.**
- **Type T4:0/DN [Enter]. This will overwrite the existing address.**



Add a Timer to Your Program

Program this rung:

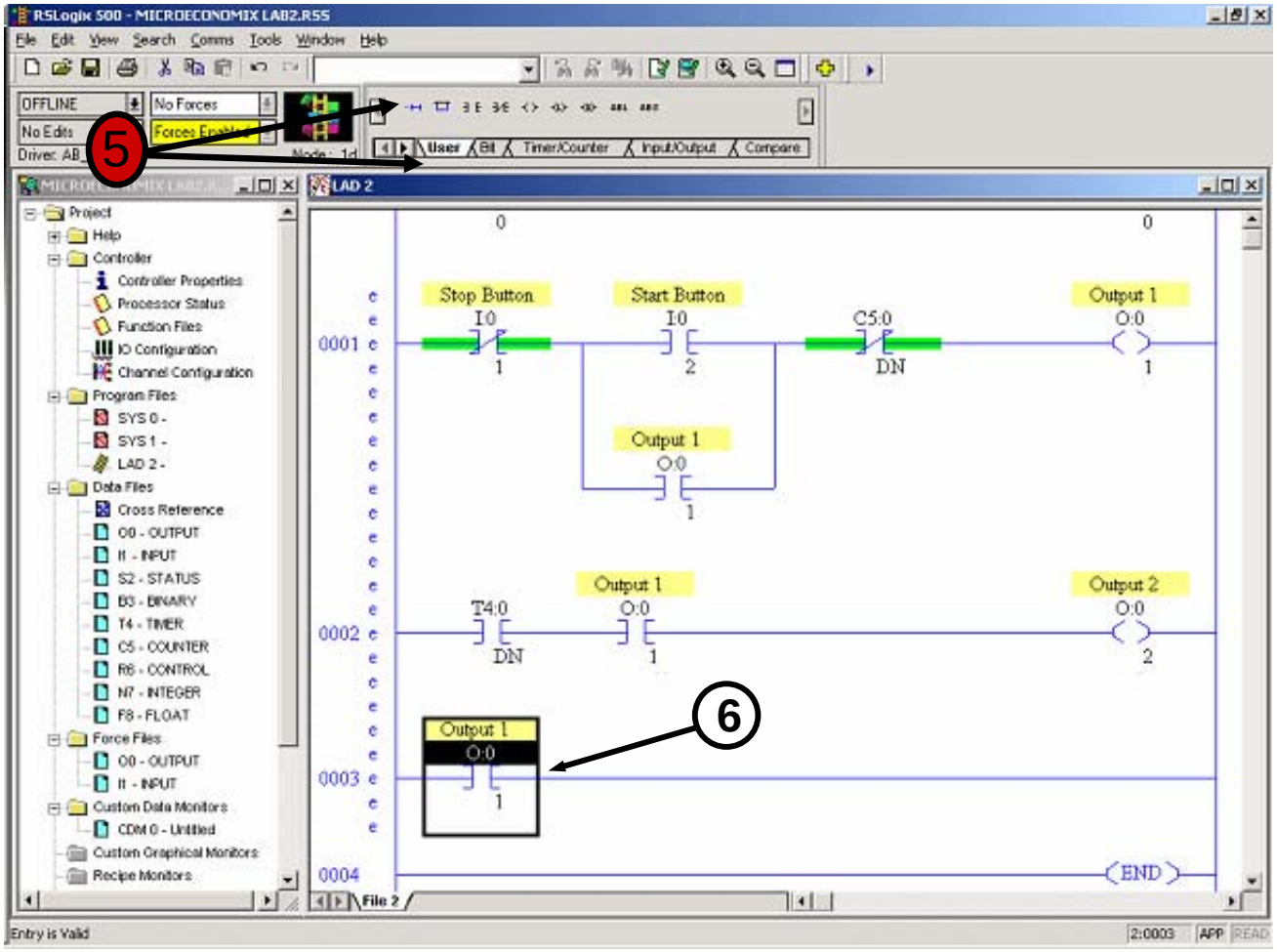


5. Create a New Rung

- **Still in the "User" tab Click, hold and Drag the "New Rung" button over "0003". When you see a green box, release the mouse button.**

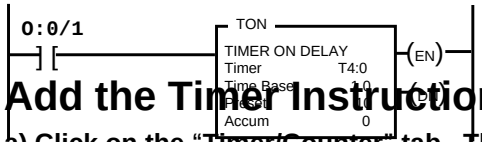
6. Add an Input Instruction

- **Click, hold and Drag the XIC button onto the left side of the rung you just created. When you see a green box, release the mouse button.**
- **With the instruction highlighted Type O:0/1 [Enter].**
- **Notice this instruction has the same address as the Output on rung 0001.**



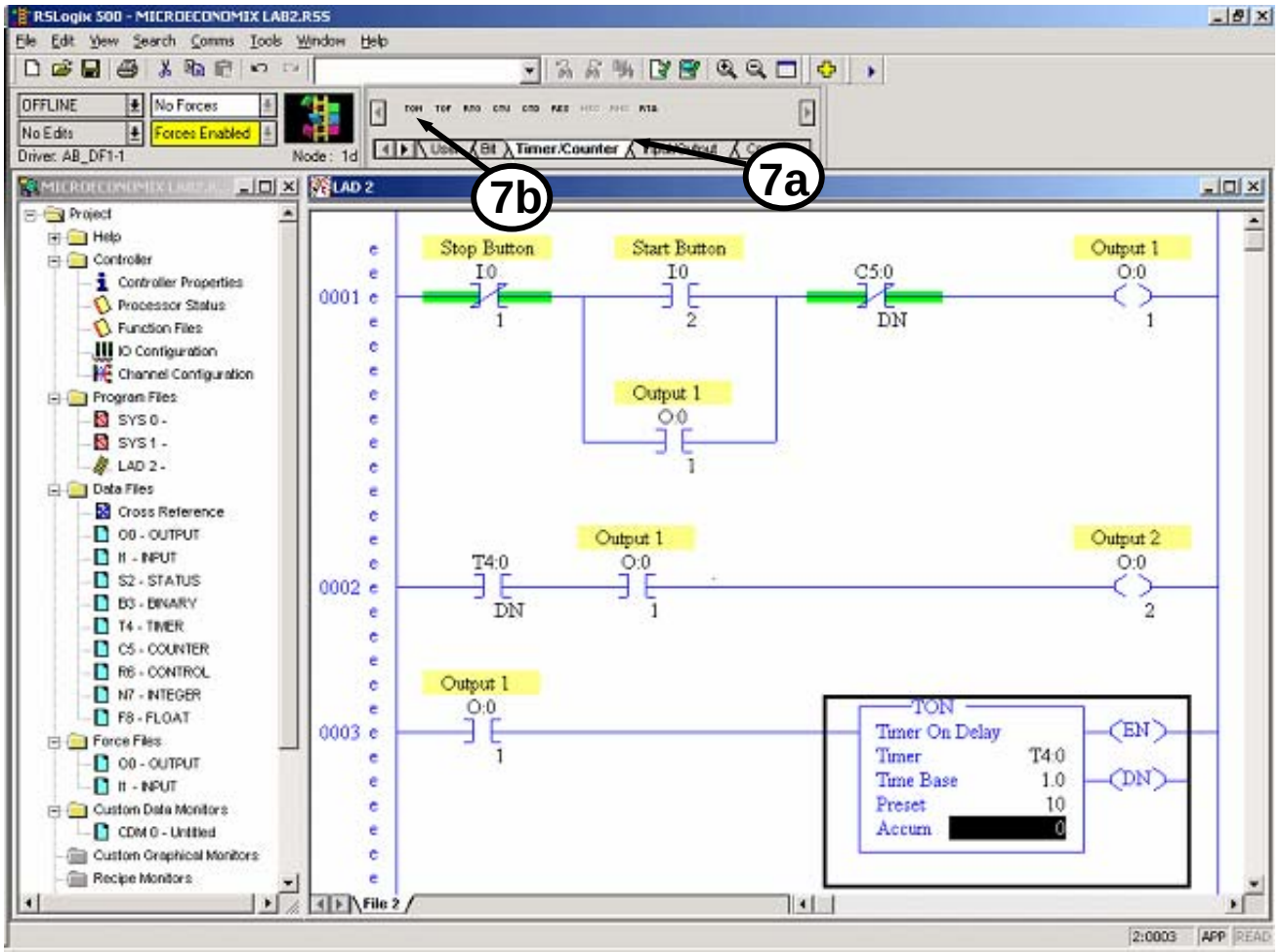
Add a Timer to Your Program

Program this rung:



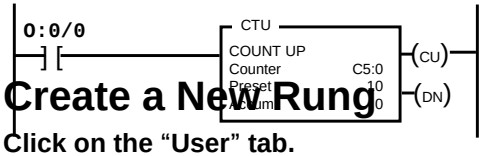
7. Add the Timer Instruction

- a) Click on the "Timer/Counter" tab. This changes the instruction buttons to timers and counters
- b) Click, hold and Drag the TON (timer on delay) button onto the right side of the rung you just created. When you see a green box, release the mouse button.
- c) Enter these parameters:
  - Timer: T4:0 [Enter]
  - Time Base: 1.0 [Enter]
  - Preset: 10 [Enter]
  - Accum: 0 [Enter]



Add a Counter to Your Program

Program this rung:

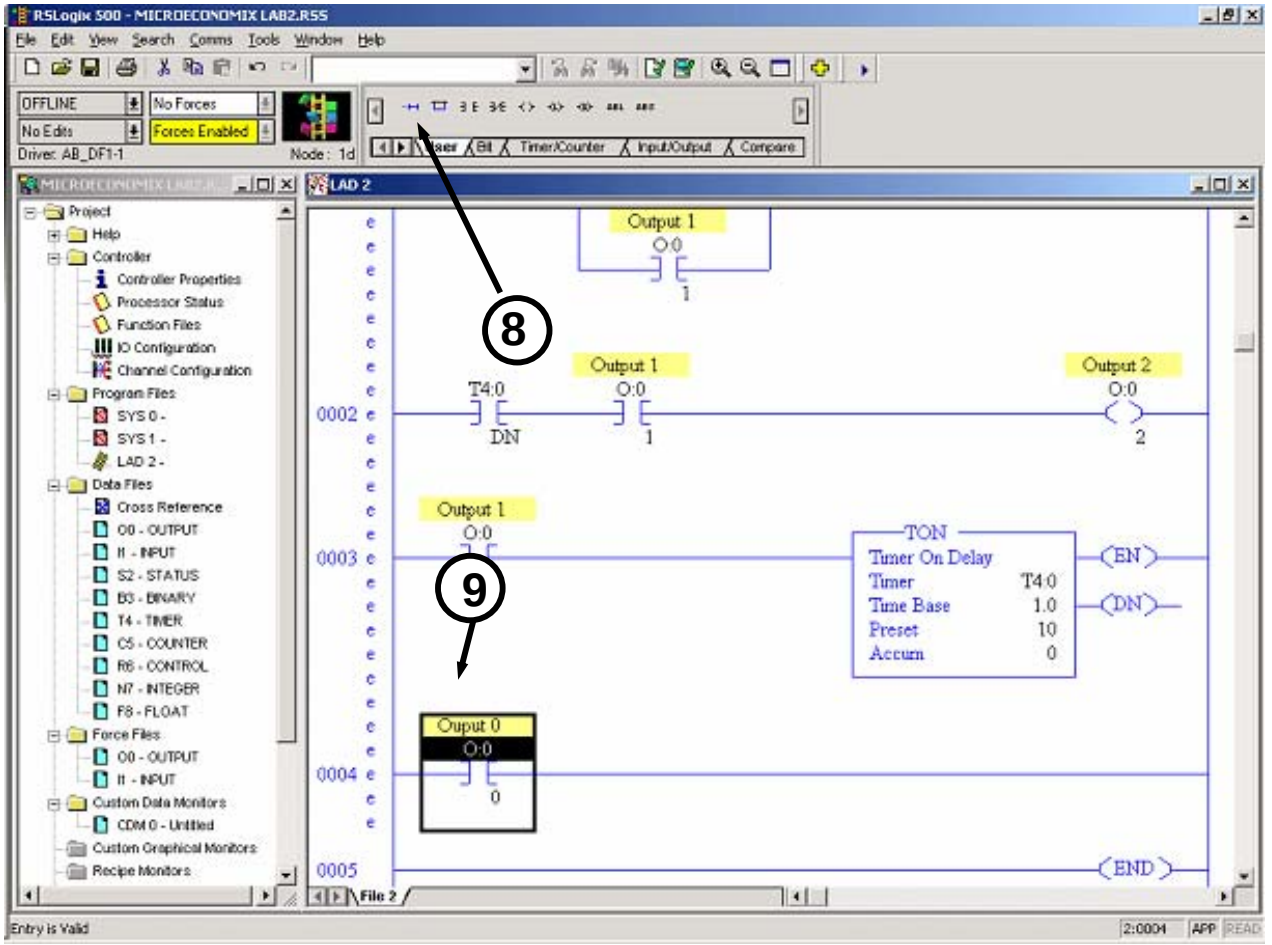


8. Create a New Rung

- Click on the “User” tab.
- Click, hold and Drag the “New Rung” button over “0004”. When you see a green box, release the mouse button.

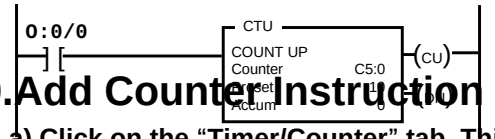
9. Add an Input Instruction

- Click, hold and Drag the XIC button onto the left side of the rung you just created. When you see a green box, release the mouse button.
- With the instruction highlighted Type O:0/0 [Enter].



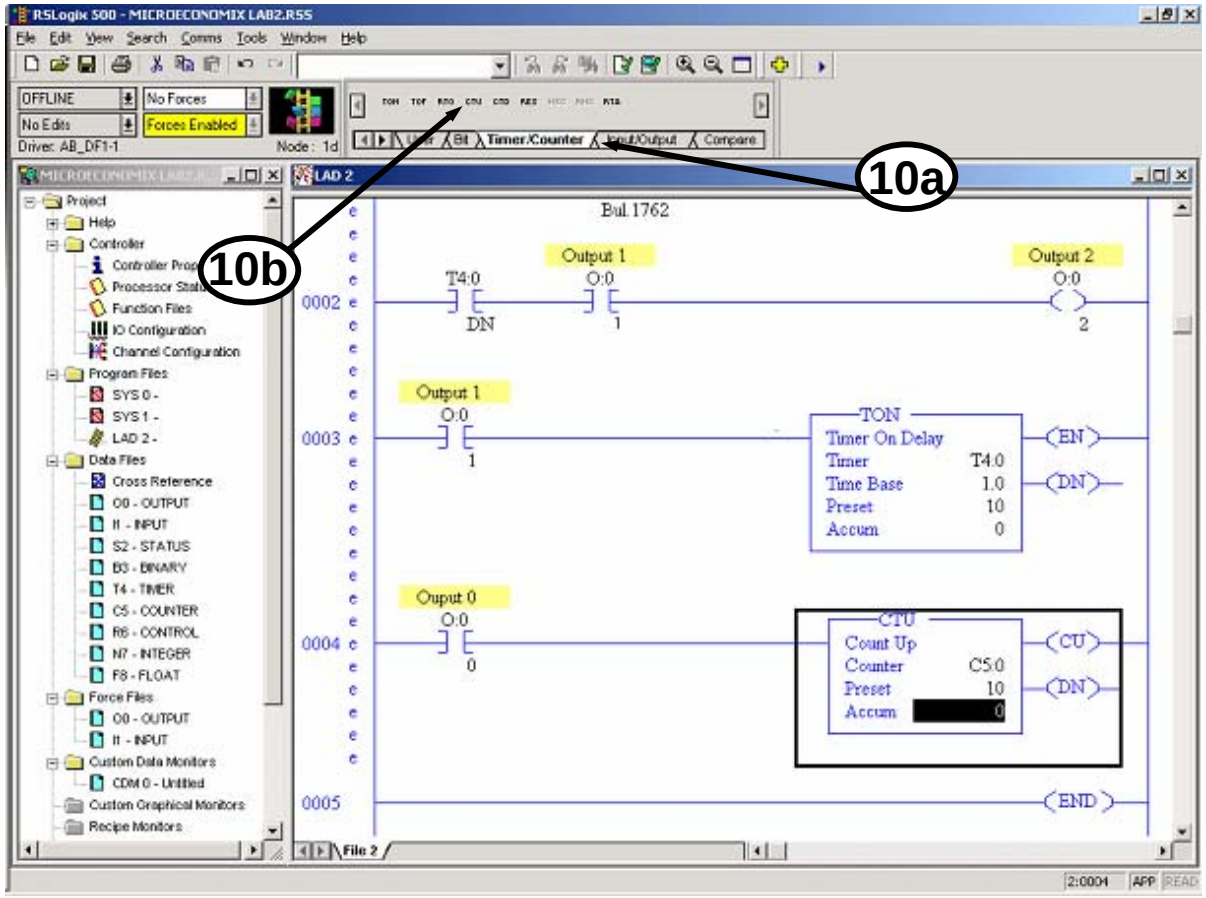
Add a Counter to Your Program

Program this rung:



10. Add Counter Instruction

- a) Click on the "Timer/Counter" tab. This changes the instruction buttons to timers and counters.
- b) Click, hold and Drag the CTU (count up) button onto the right side of the rung you just created. When you see a green box, release the mouse button.
- c) Enter these parameters:
  - Counter: C5:0 [Enter]
  - Preset: 10 [Enter]
  - Accum: 0 [Enter]



Add a Counter Reset Rung

Program this rung:

I:0/3 C5:0 (RES)

11. Create a New Rung

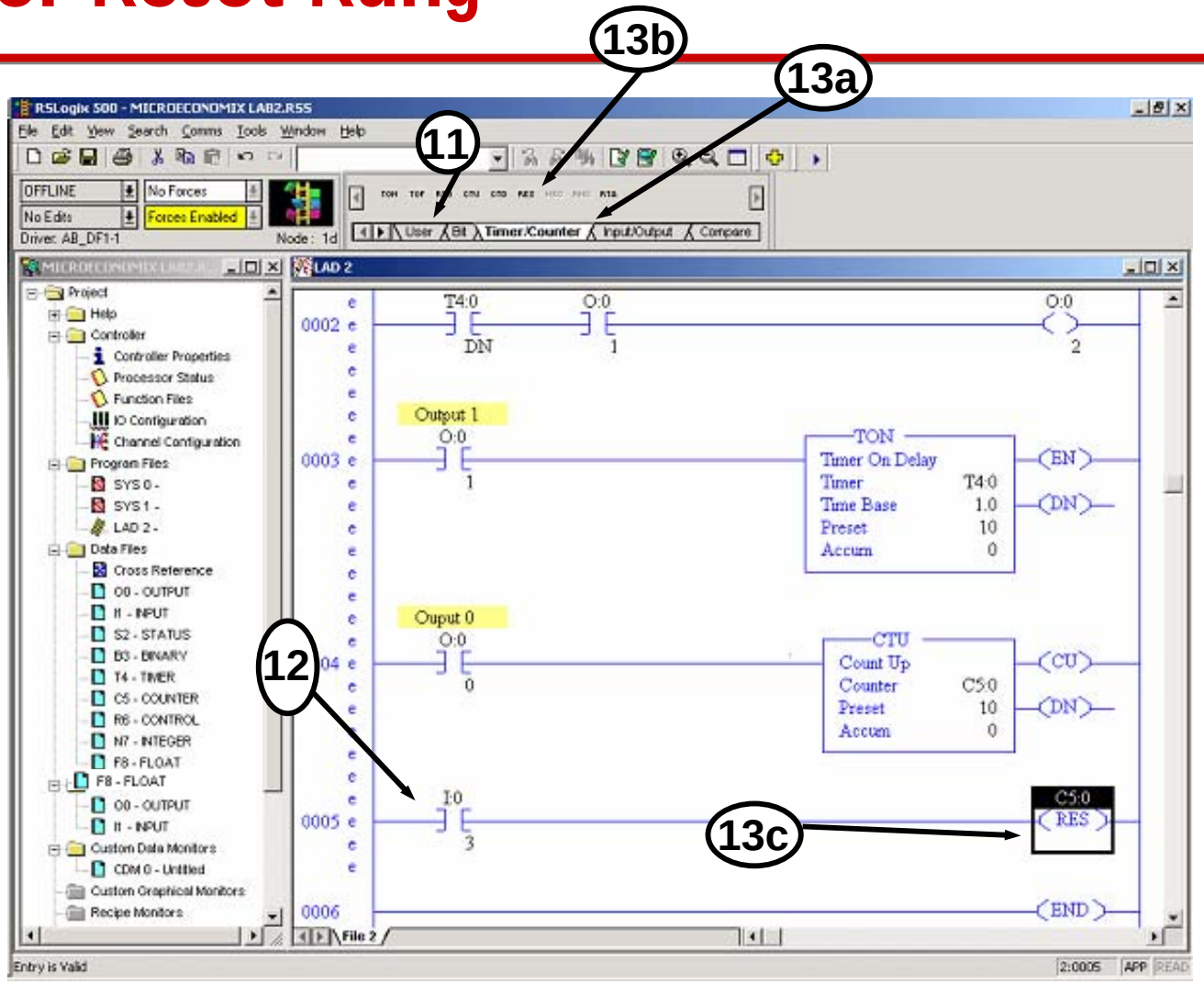
- Click on the “User” tab.
- Click, hold and Drag the “New Rung” button over “0005”. When you see a green box, release the mouse button.

12. Add an Input Instruction

- Click, hold and Drag the XIC button onto the left side of the rung you just created. When you see a green box, release the mouse button.
- Type I:0/3 [Enter].

13. Add Reset Instruction

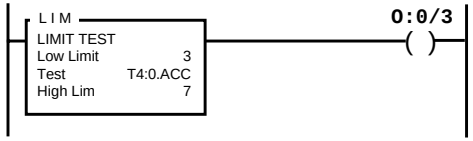
- a) Click on the “Timer/Counter” tab. This changes the instruction buttons to timers and counters
- b) Click and Drag the RES button onto the right side of the rung you just created. When you see a green box, release the mouse button.
- c) Type C5:0 [Enter]



NOTE: The function of the RESet instruction is to zero out the accumulator of the counter.

Add a Limit Instruction

Program this rung:

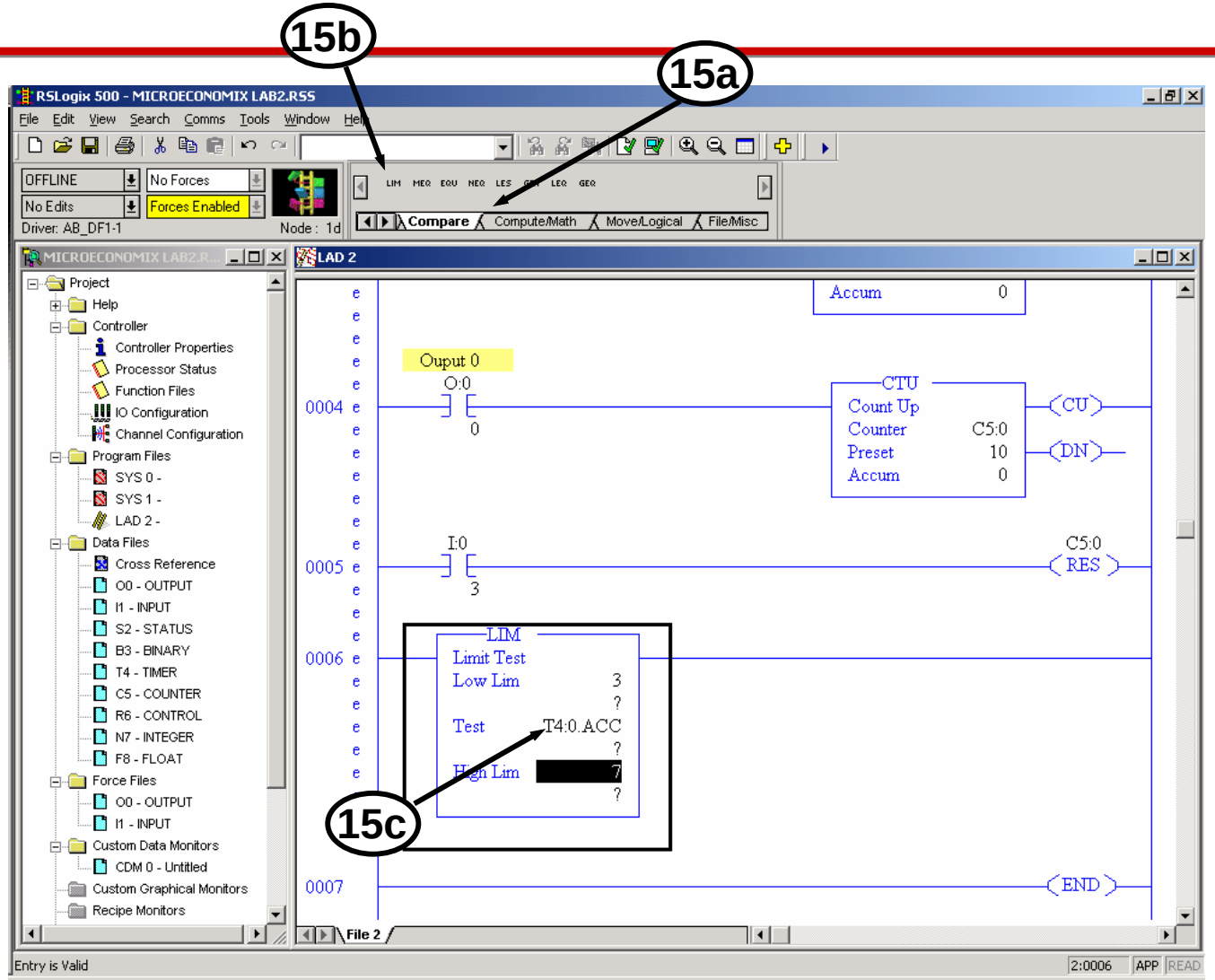


14.Create a New Rung

- Click on the “User” tab.
- Click and Drag the “New Rung” button over “0006”. When you see a green box, release the mouse button.

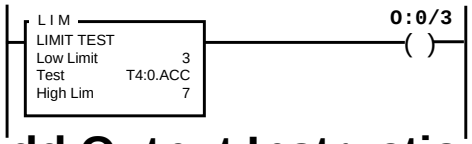
15.Add the Limit Instruction

- a) Click on the “Compare” tab.
- b) Click and Drag the LIM button onto the left side of the rung you just created.
- c) Enter these parameters:
  - Low Lim: 3
  - Test: T4:0.ACC
  - High Lim: 7
- NOTE: The LIMit instruction is true when the timer is between 3 and 7 seconds. The question marks will disappear when you save the program



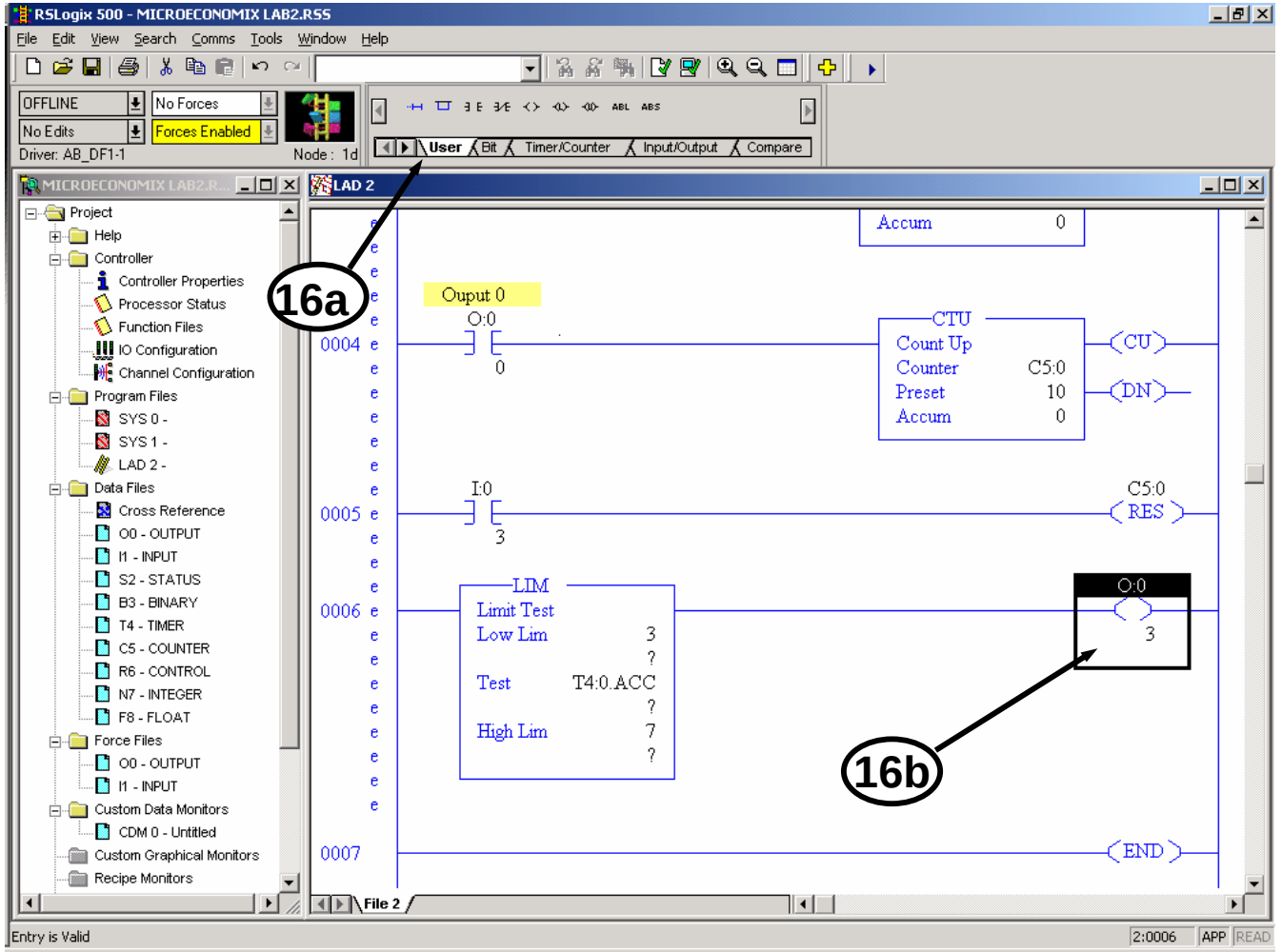
Add a Limit Instruction

Program this rung:



16.Add Output Instruction

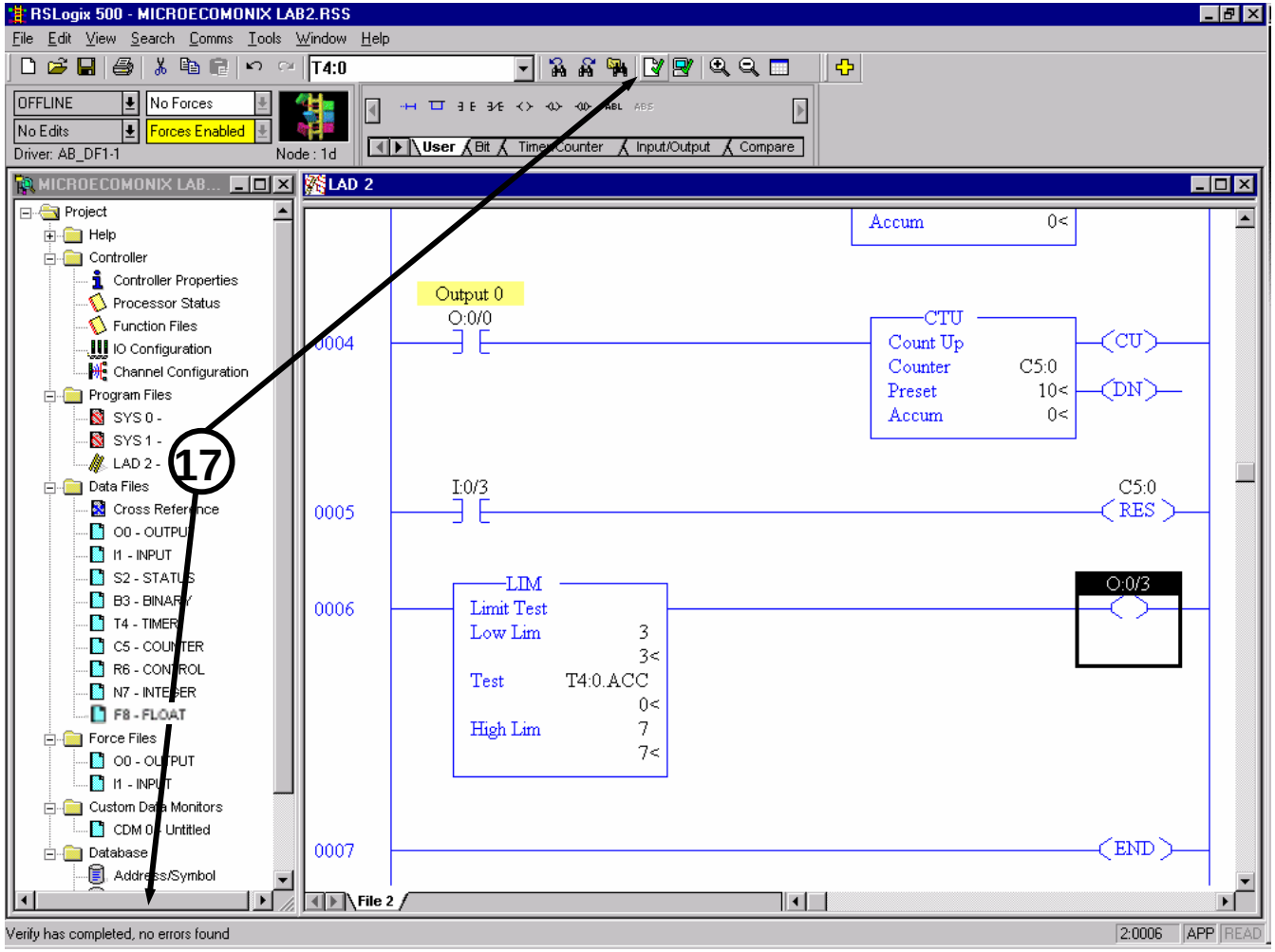
- **a) Click on the “Bit” tab to change the buttons.**
- **b) Click and Drag the OTE button onto the right side of the rung you just created.**
- **Type O:0/3 [Enter].**



Verify your work

17.To verify your work

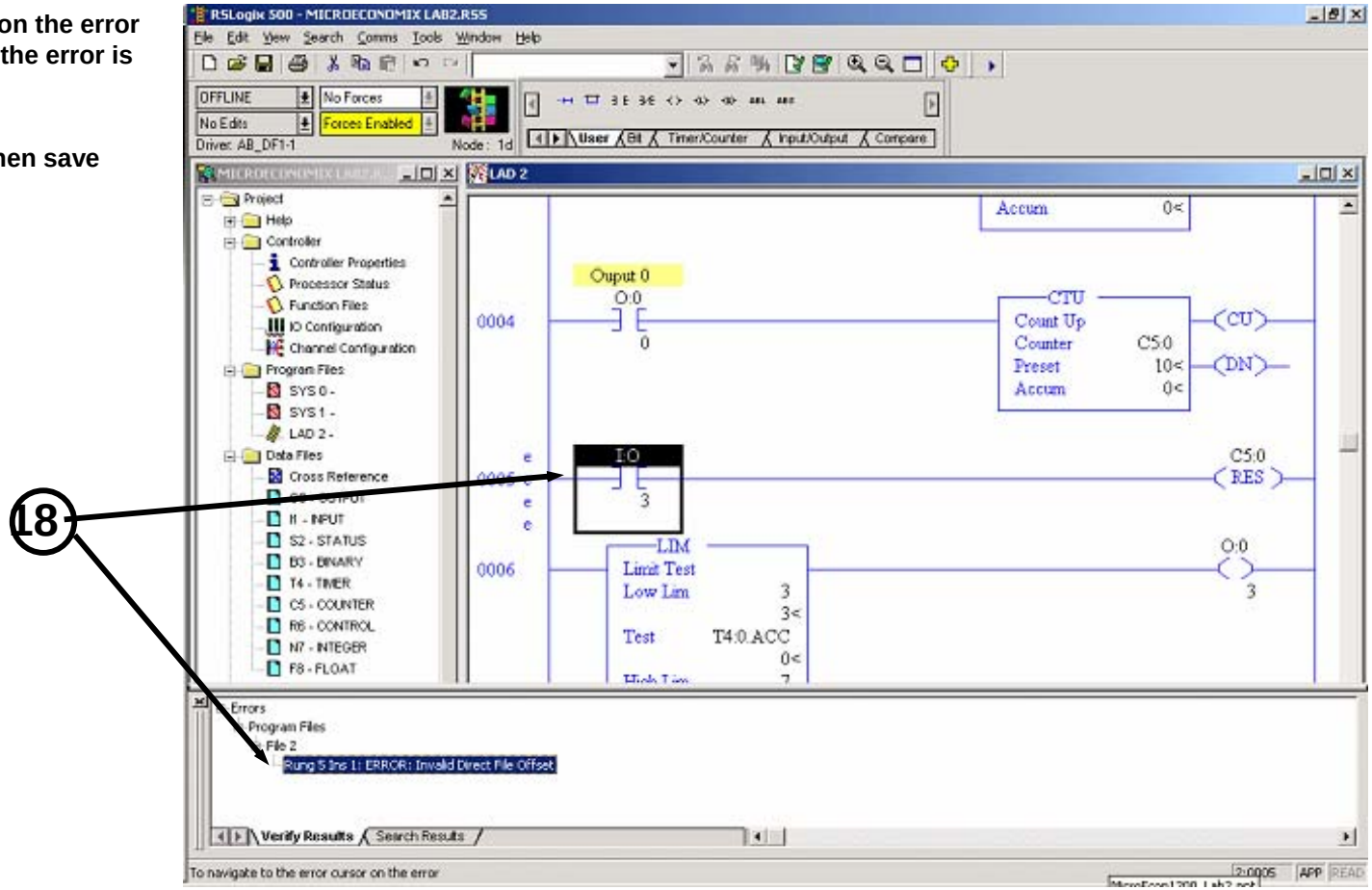
- There are two types of verify. The first one verifies the file you are in and only that file. The second verifies all the files created or the total project created. Because this program only resides in one file we will use the first one.
- Click on the “Verify file” button
- When the verify is completed and no errors are found all program edit markers will disappear and no errors found is displayed at the bottom.
- Go to next step if errors are found



Verify your work

18.Program has errors

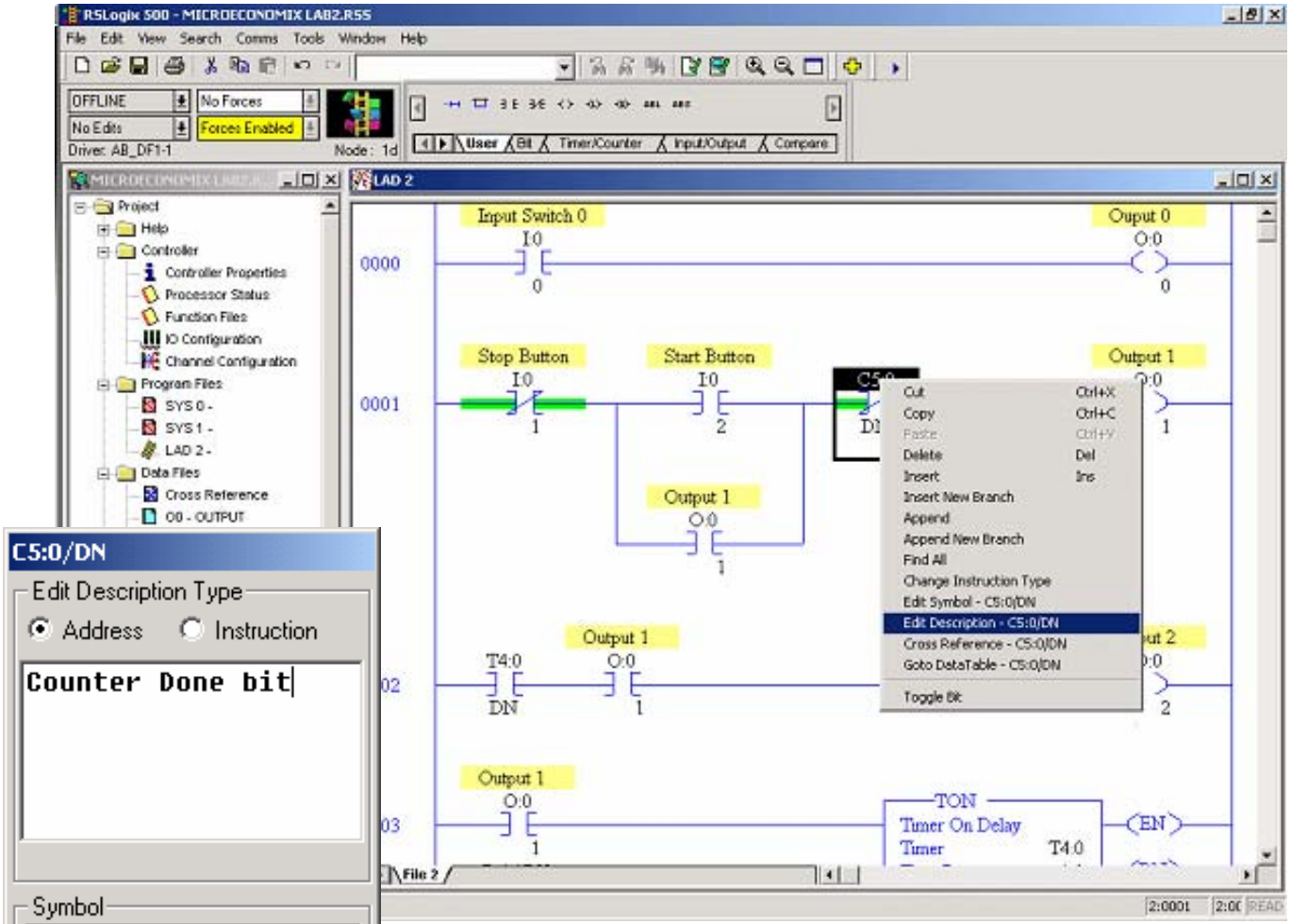
- To find the errors in the program click on the error message in the “Verify results window the error is then highlighted in the ladder window
- Fix the error and run “Verify file” again
- When all the errors are fixed you can then save and download the program



Documenting your Program

19.Documenting your work

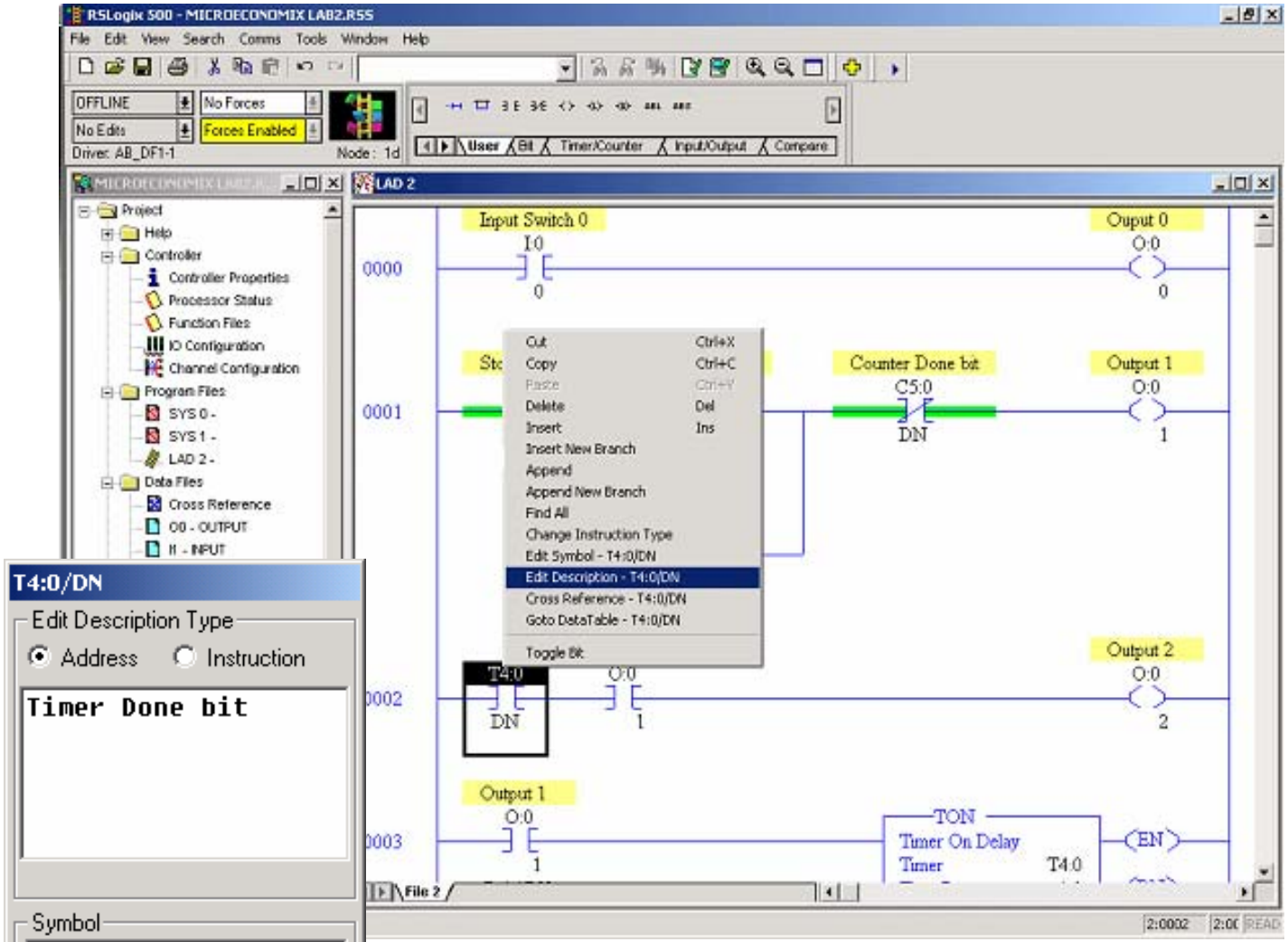
- **Click on the Input C5:0/DN to highlight**
- **Right mouse on C5:0/DN and select “Edit Description- C5:0/DN”**
- **Select “Address”**
- **Type “Counter done bit” in the Edit window**
- **Select “OK”**



Documenting your Program

20.Documenting your work

- Click on the Output T4:0/DN to highlight
- Right mouse on T4:0/DN and select “Edit Description- T4:0/DN”
- Select “Address”
- Type “Timer done bit” in the Edit window
- Select “OK”



Documenting your Program

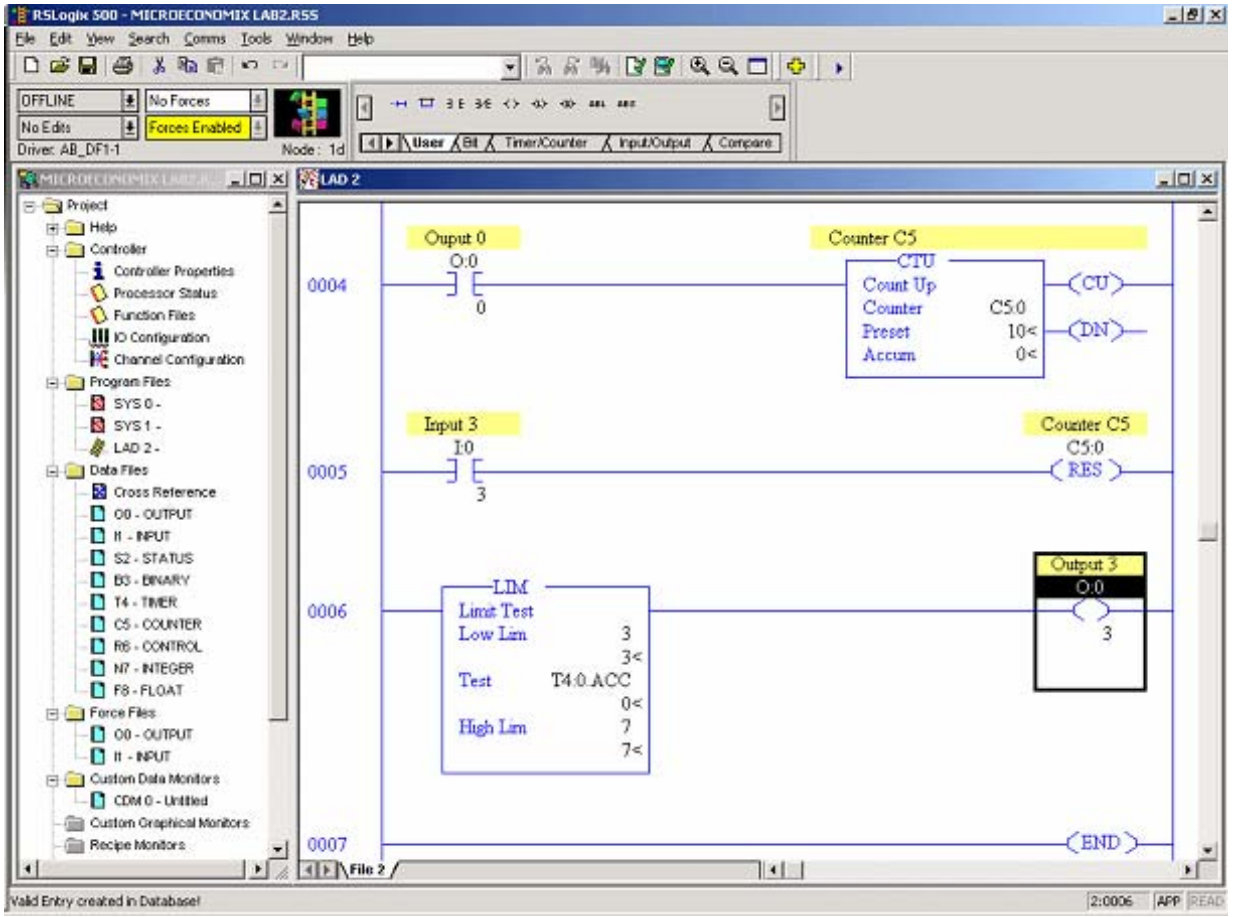
21.Documenting your work

- Click on the Input I:0/3 to highlight
- Right mouse on I:0/3 and select “Edit Description- I:0/3”
- Select “Address”
- Type “Input 3” in the Edit window
- Select “OK”
- Complete the rest of the instruction descriptions

  Counter C5 = C5:0

  Output 3 =O:0/3

Notice that some of the instructions have the same descriptions. This because the descriptions are link to the address of each instruction

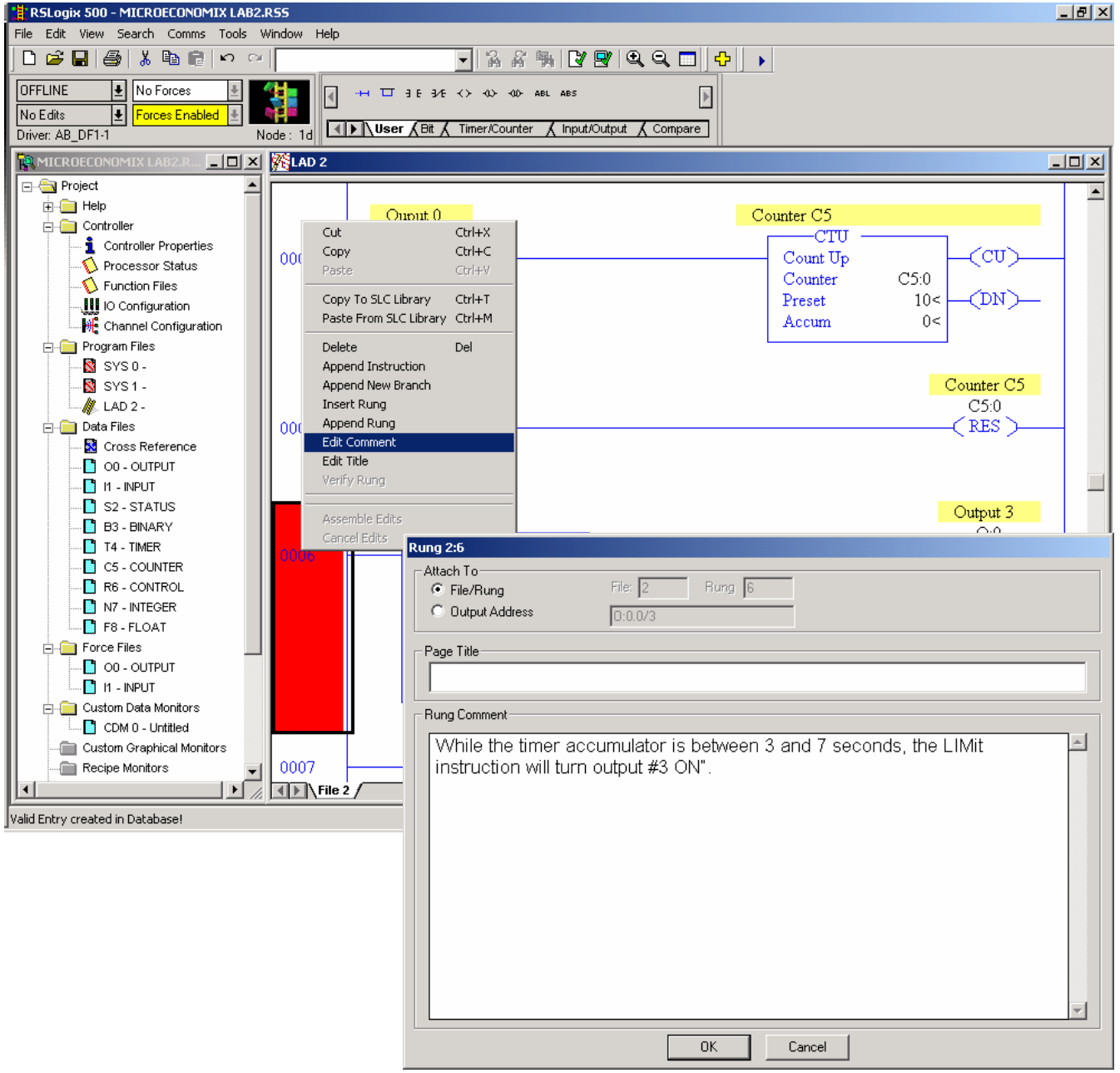


Documenting your Program

22.Documenting your work

- Click on rung 0006 to highlight
- Right mouse on rung 0006 and select “Edit Comment”
- Select “File/Rung”
- Type “While the timer accumulator is between 3 and 7 seconds, the LIMit instruction will turn output #3 ON”.
- Select “OK”

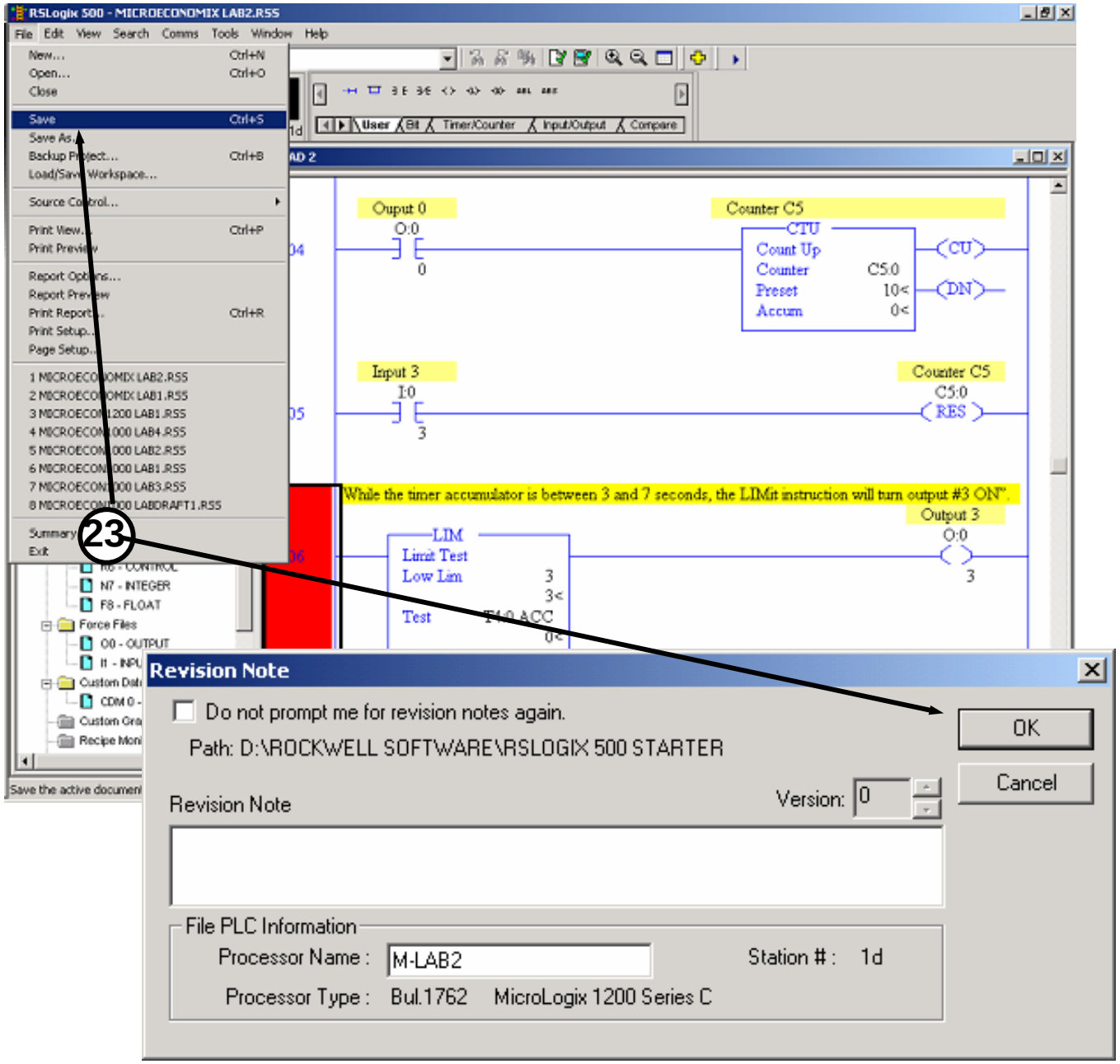
Notice that some of the instructions have the same descriptions. This because the descriptions are link to the address of each instruction



Save your work

23.Save your work

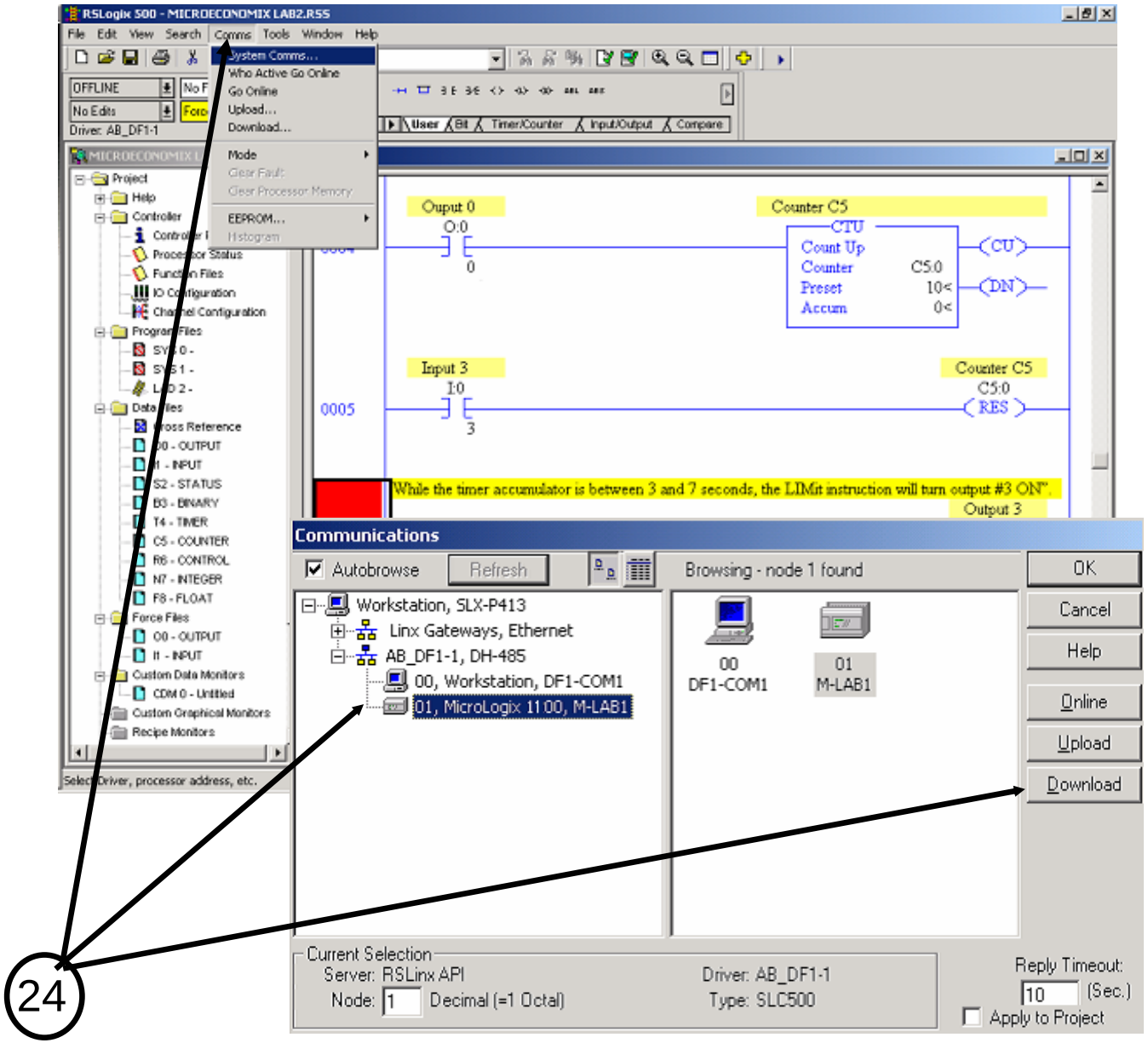
- **Click on the “Save” button**
- **Click “Ok” for Revision note box. The revision note box is used to keep track of changes made to the existing program. You can create many revisions of the same program. This feature can be disabled if desired.**



Transfer the Program to the Micro

24.Download the Program

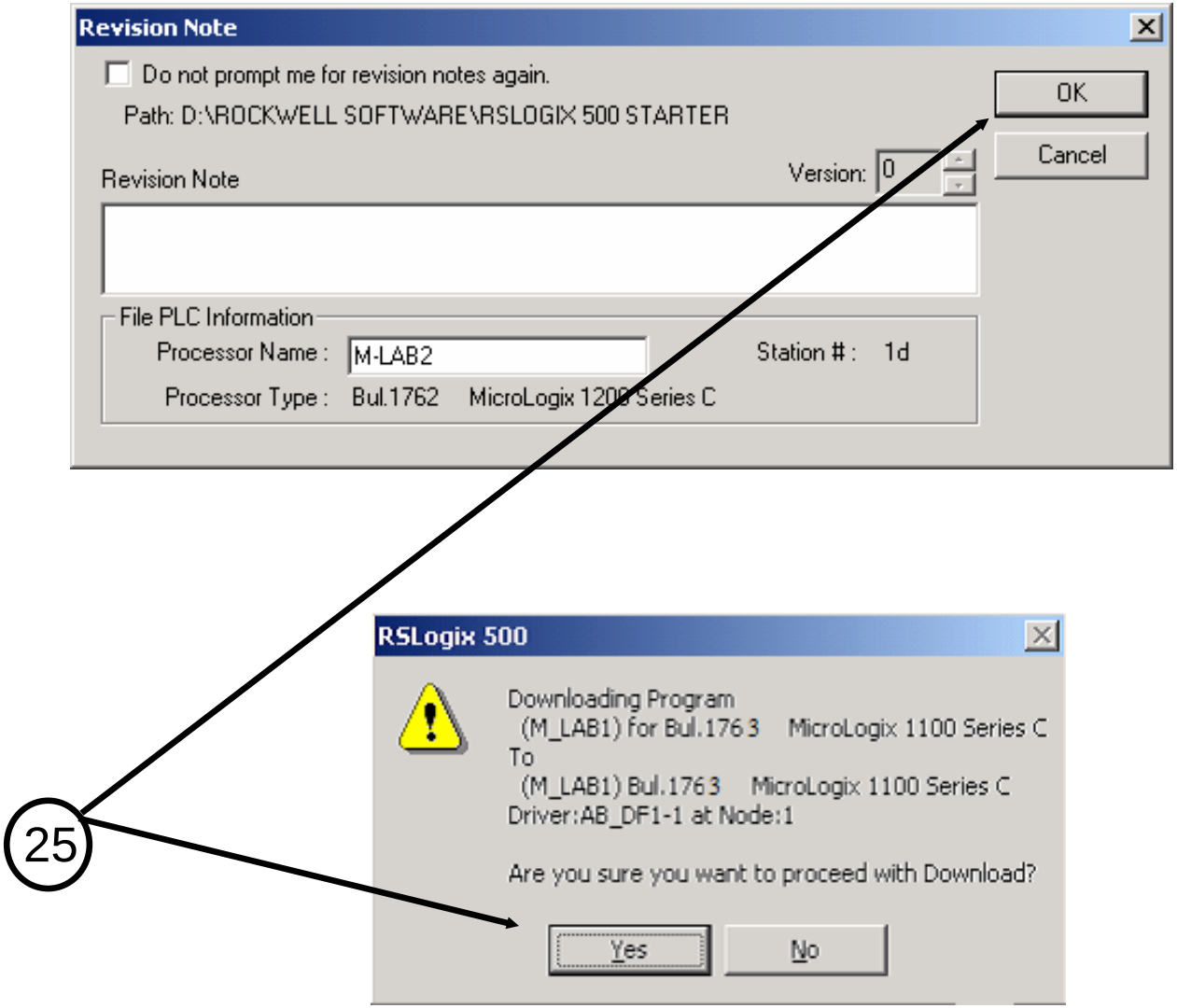
- **Select the menu item “Comms>System Comms”**
- **Three primary selections**
  - “Online” Establish the “path”
  - “Upload” Receive from the controller
  - “Download” Send to the controller
- **Highlight the device at Node 01.**
- **Select “Download”**



Transfer the Program to the Micro

25.Download the Program

- **Select “OK” in the Revision note window. The revision note box is used to keep track of changes made to the existing program. You can create many revisions of the same program. This feature can be disabled if desired.**
- **Select “Yes” to download your program over the existing program that resides in the processor. This window will appear when ever a program is being downloaded to the processor.**

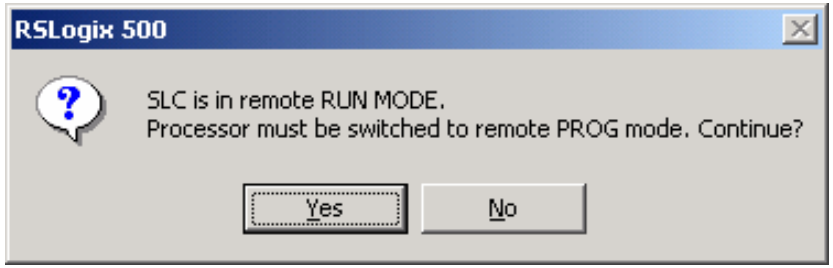


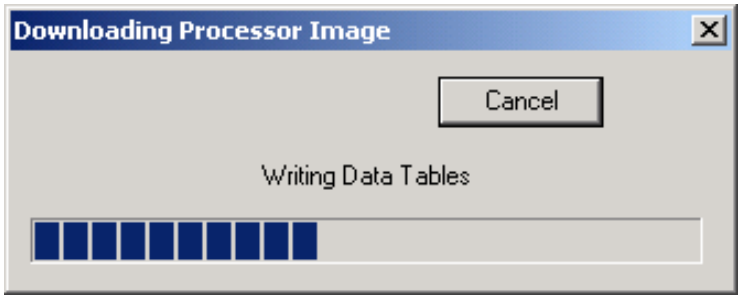
Transfer the Program to the Micro

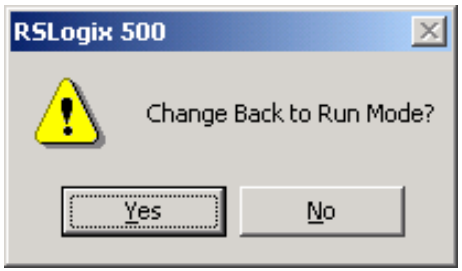
26.Download the Program

- Select “Yes” to put he processor in Program. The processor must be in program mode to download the program
- The download window will appear when the download occurs.
- Select “Yes” to change back to run mode
- Select “Yes” to go online. This will allow you to monitor the program that now resides in the processor.

27.Test your program using the switches and lights. Does it work the way you expect it to?







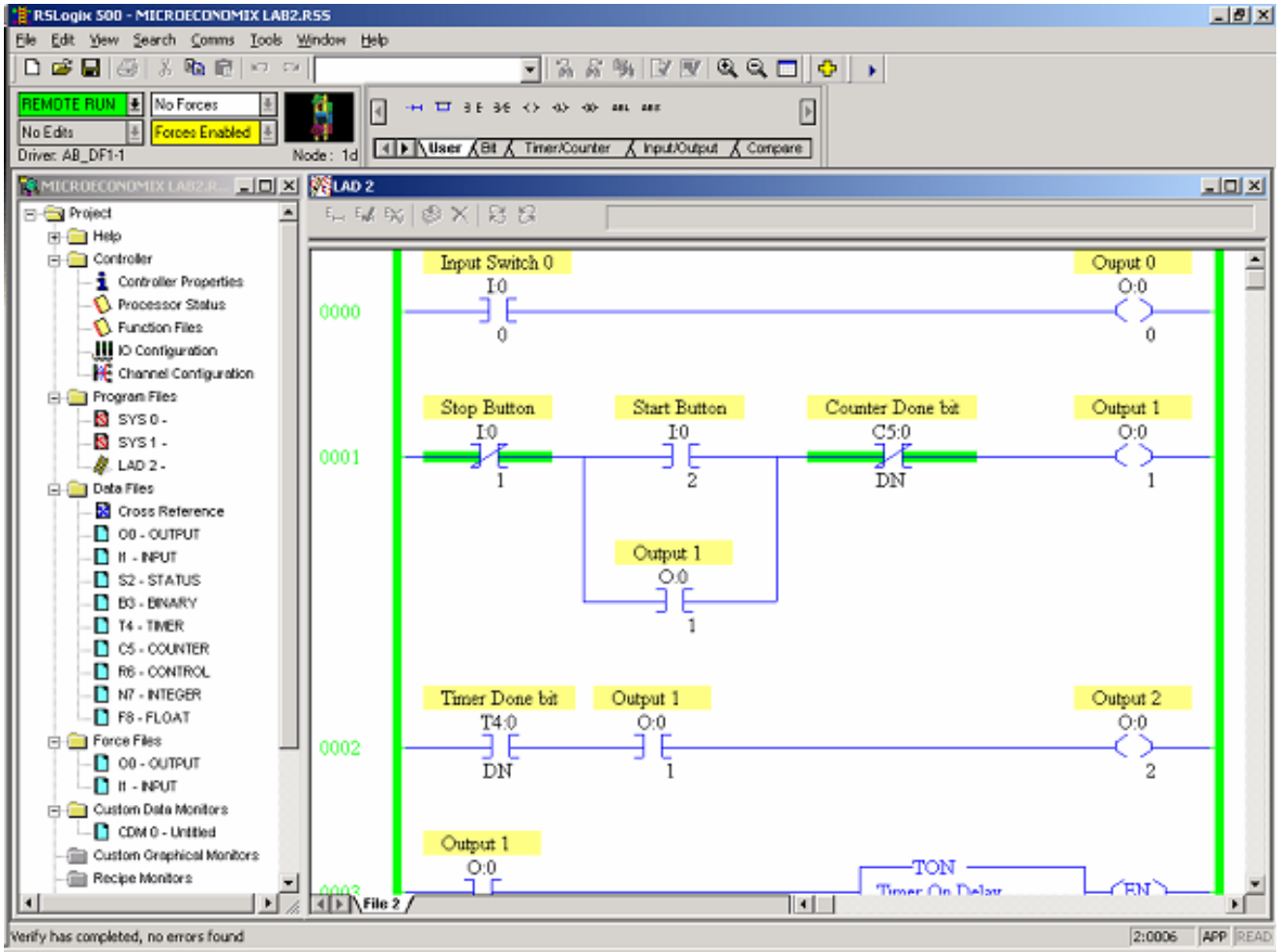
Monitor the Controller

With the controller in “Remote Run”, you can monitor or edit data within the controller. This allows:

- Program debugging
- Change data variables while in run

When “Green” bars are shown on either side of logic elements, this indicates “Logical Continuity”, this helps to determine how the application is operating.

This design is to help in debugging an applications logic.



Monitor the Program

PROGRAM OPERATION

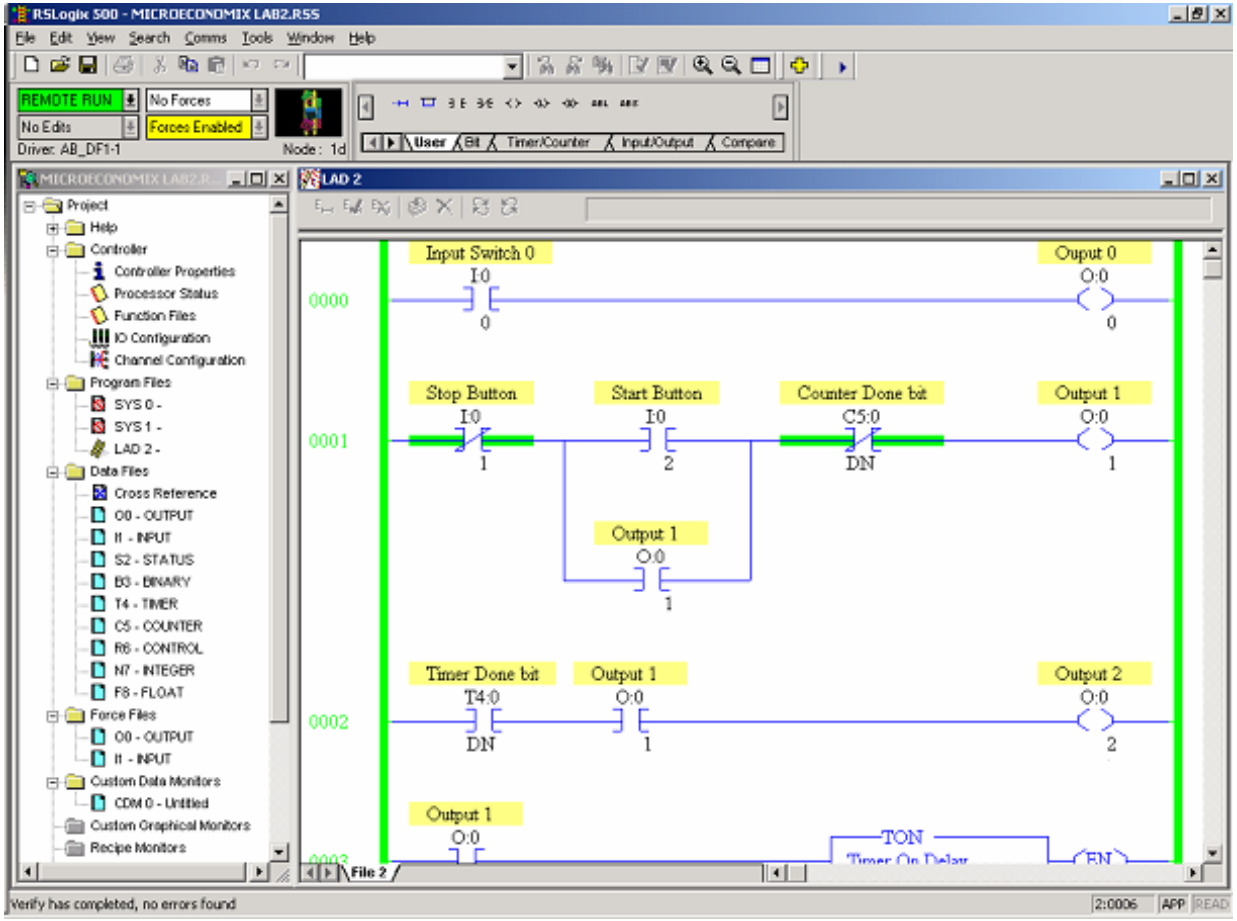
Rung 0- Push button #0, output #0 will turn ON and the counter will count up by 1. Push button #0 10 times, watch the counters accumulator. When the preset and the accumulator are equal the counter will enable the done bit and will disable output #1 as well as the timer. Reset the counter with input #3.

Rung 1- Push button #2 (start button), output #1 will latch ON and the timer will start timing. Push button #1 (stop button) will turn OFF output #1 and will stop & reset the timer.

RUNG 2- The two inputs on rung 2 are conditions of rungs 1 and 4. The output (output #2) is a condition of these two inputs. So each outputs of rungs 1 and 4 must be true to turn on output #2. When the timer reaches 10 seconds, output #2 will turn ON.

Rung 3- The TON input is a condition of rung 1.

Rung 4- The CTU input is a condition of rung 0.



Rung 5- Push button #3 will reset the counter back to 0 and re-enable output #1 and the timer.

Rung 6- While the timer accumulator is between 3 and 7 seconds, the LIMit instruction will turn output #3 ON.