LISTEN.
THINK.
SOLVE.SM

MicroLogix 1100

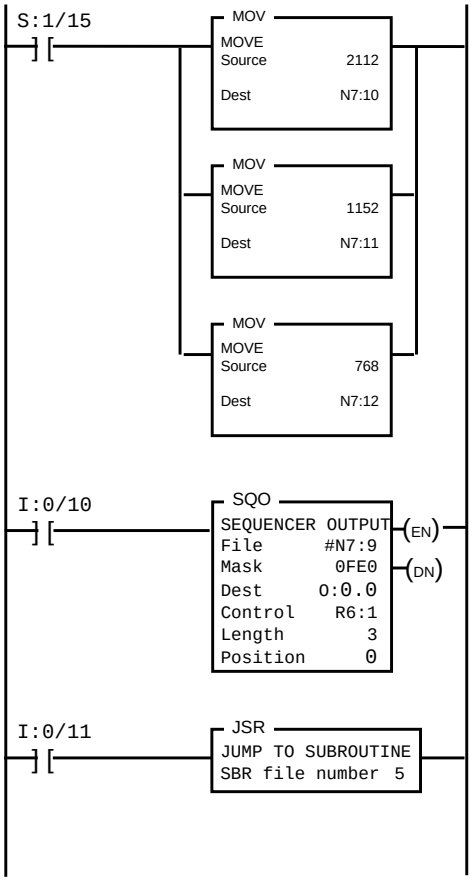
RSLogix 500 LAB#3

Sequencing and Subroutines

ALLEN-BRADLEY • ROCKWELL SOFTWARE

Rockwell Automation

What we are going to do:



- Here we will program and run a Sequencer. Sequencers are powerful instructions that are primarily used in applications that require sequential activation of outputs. Strapping machines, Traffic light sequencing, Filter cleaning processes etc.
- We will also program a simple subroutine. This will illustrate how subroutines work, and how easy they are to use.

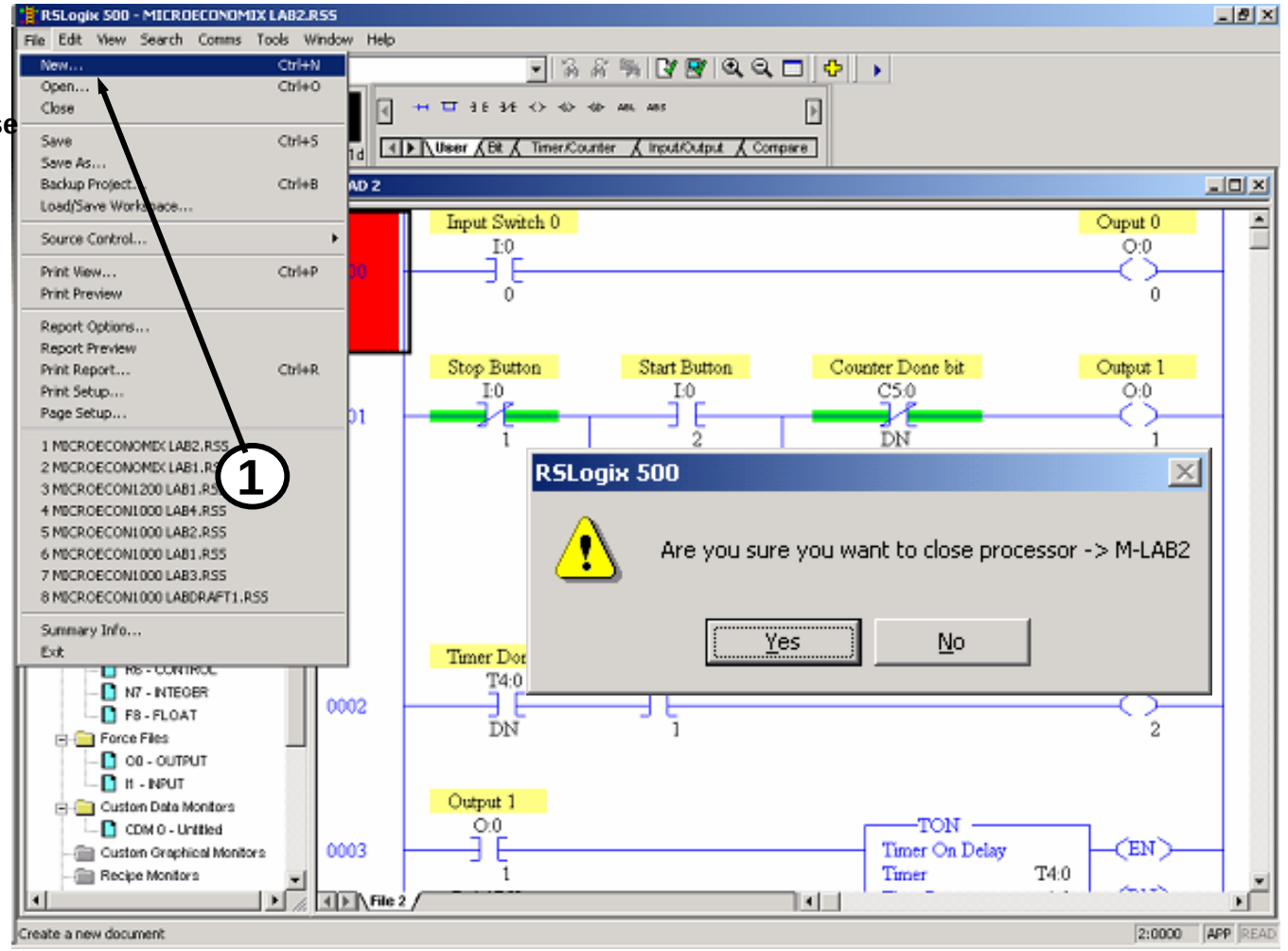
Steps for Today's Assignments

1. Create a new file.
2. Create new program rungs including a sequencer.
3. Create a subroutine
4. Save your work.
5. Go ONLINE and transfer your program to the MicroLogix 1100 controller.
6. Put the MicroLogix 1100 into RUN mode and test your program.

Creating a “PROJECT”

1. Click “File” Menu

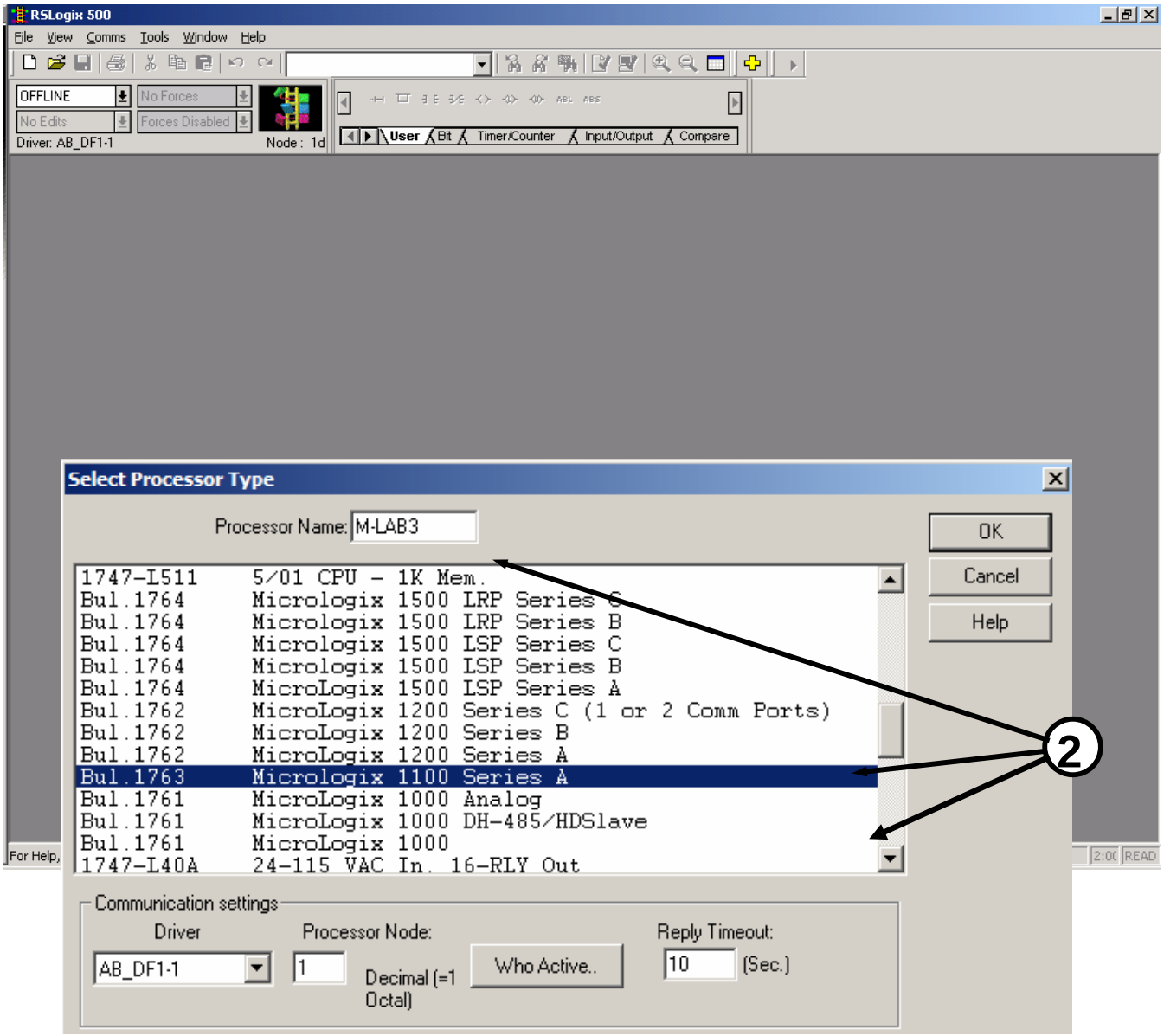
- **Select “NEW” To Create a File**
- **Select “Yes” are you sure you want to close processor->M_LAB2**



Creating a “PROJECT”

2. Select Controller

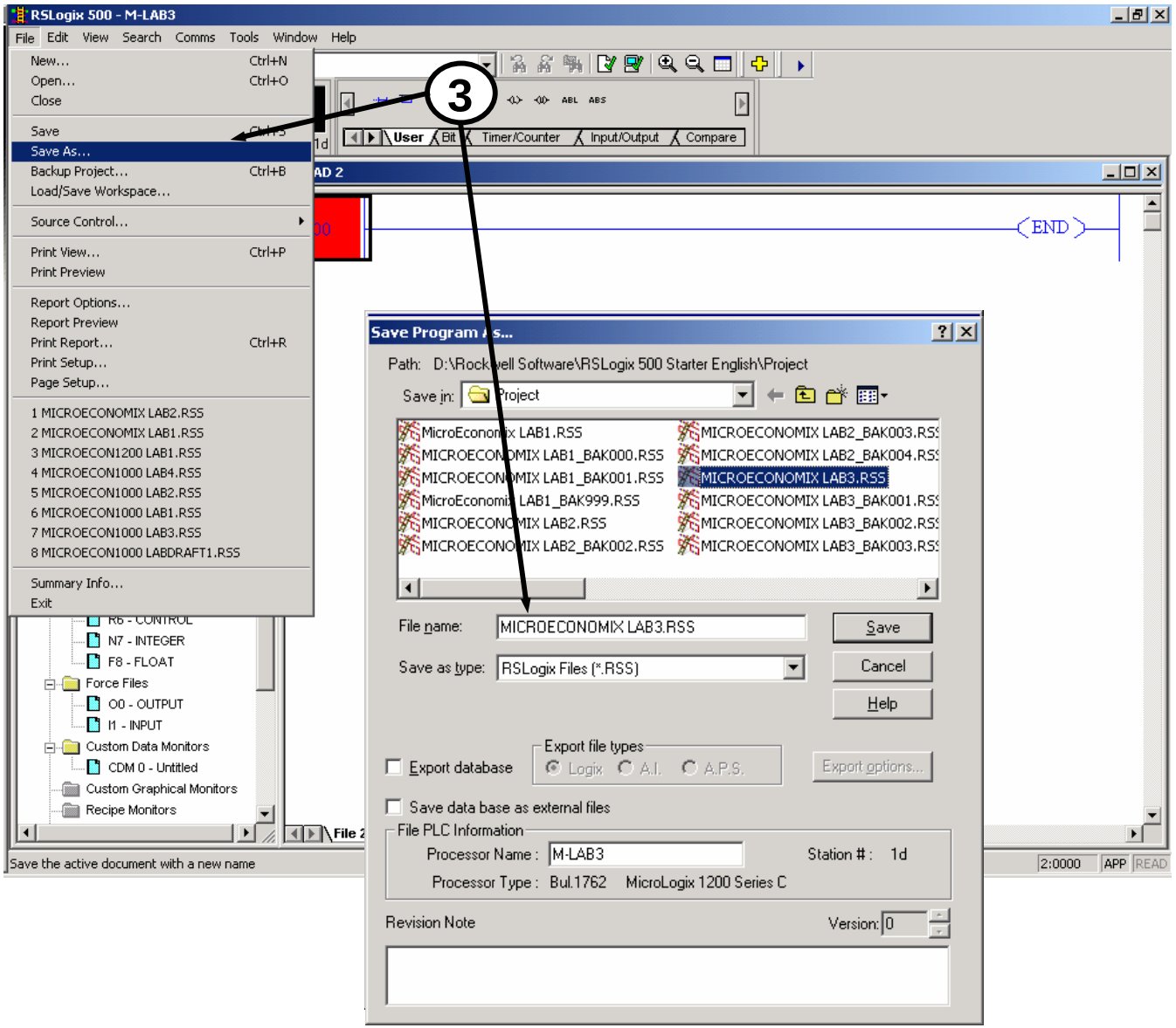
- Enter Processor Name “M-LAB3”
- Using the down arrow, move to the center of the list
- “Click” Bul.1763 MicroLogix 1100 Series A or ask the instructor
- (Either double click, or select and then click OK)



Save Project

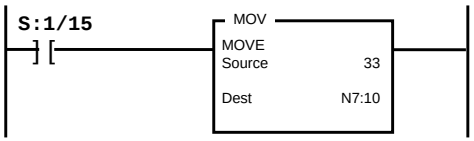
3. Click “File” Menu

- Select “Save As”
- Type “MicroEconomix LAB3” in the “File name” box
- Click “Save”



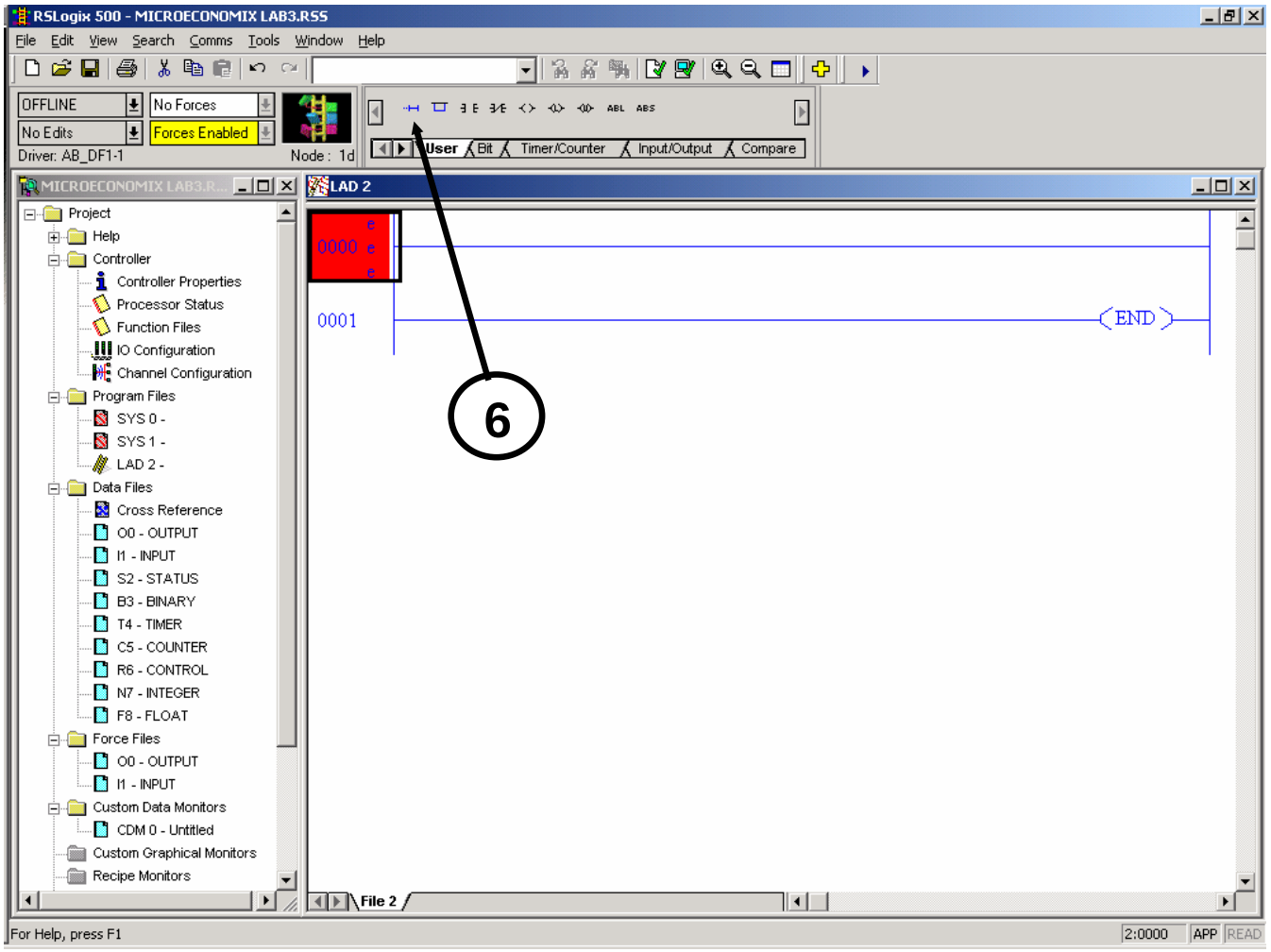
Create the 1st Rung of Ladder Logic

Program this rung:



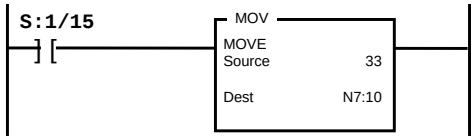
6. Create a New Rung

- **Activate Program Window (the right window title bar is colored or highlighted)**
- **Click on the "User" tab.**
- **Click, hold and Drag the "New Rung" button over "0000". When you see a green box, release the mouse button.**



Create the 1st Rung of Ladder Logic

Program this rung:

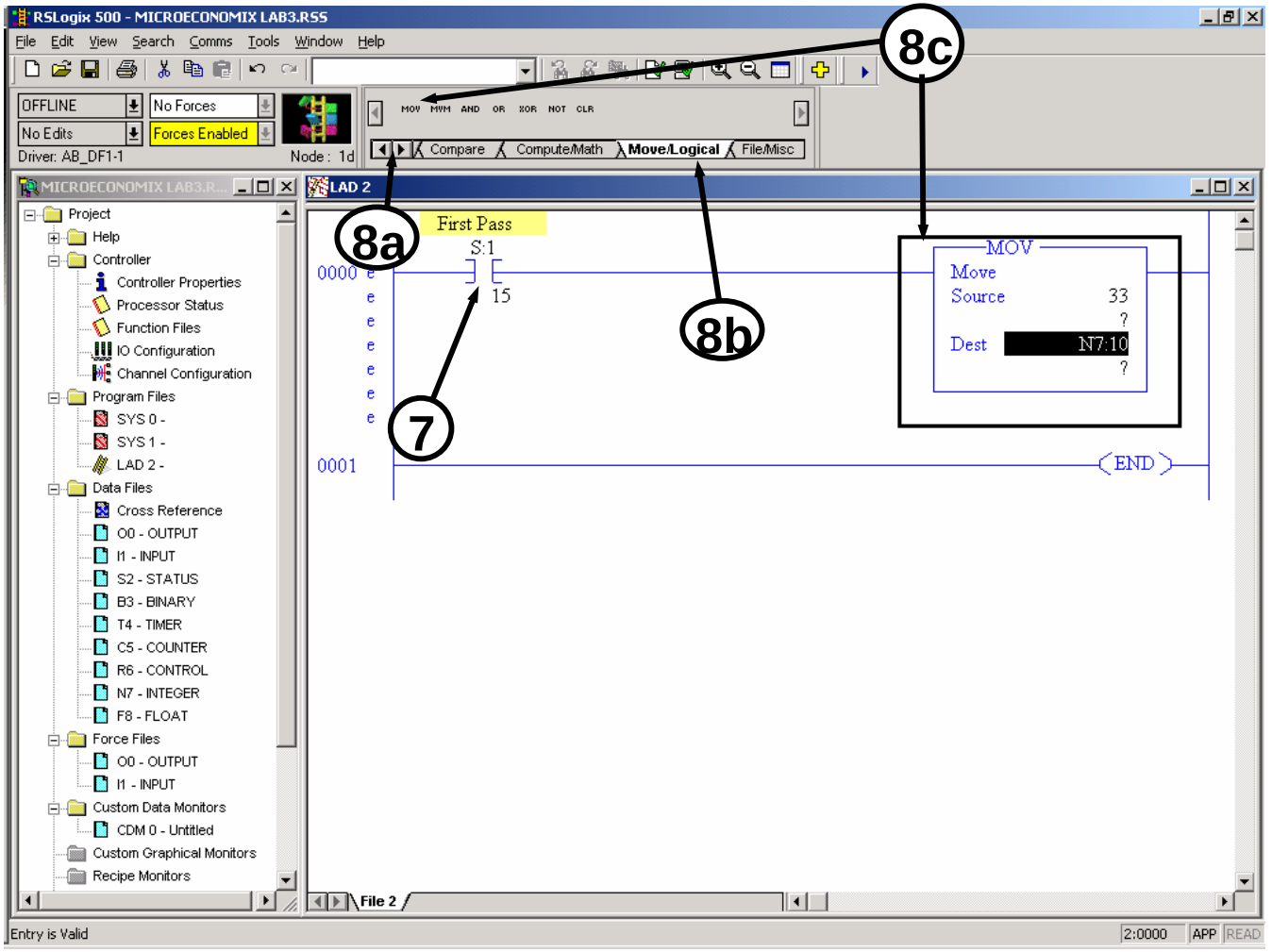


7. Add an Input Instruction

- **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 S:1/15 [Enter]. Notice this address location is already documented. This instruction will be true only for the first program scan.**

8. Add a Move Instruction

- **a) Click on the tab right arrow 3 or 4 times until you see the "Move/Logical" tab**
- **b) Click on the "Move/Logical" Tab.**
- **c) Click, hold and drag the MOV button on the right side of the rung. When you see a green box, release the mouse button.**
- **Type 33 [Enter] for the source and N7:10 [Enter] for the "Dest" .**



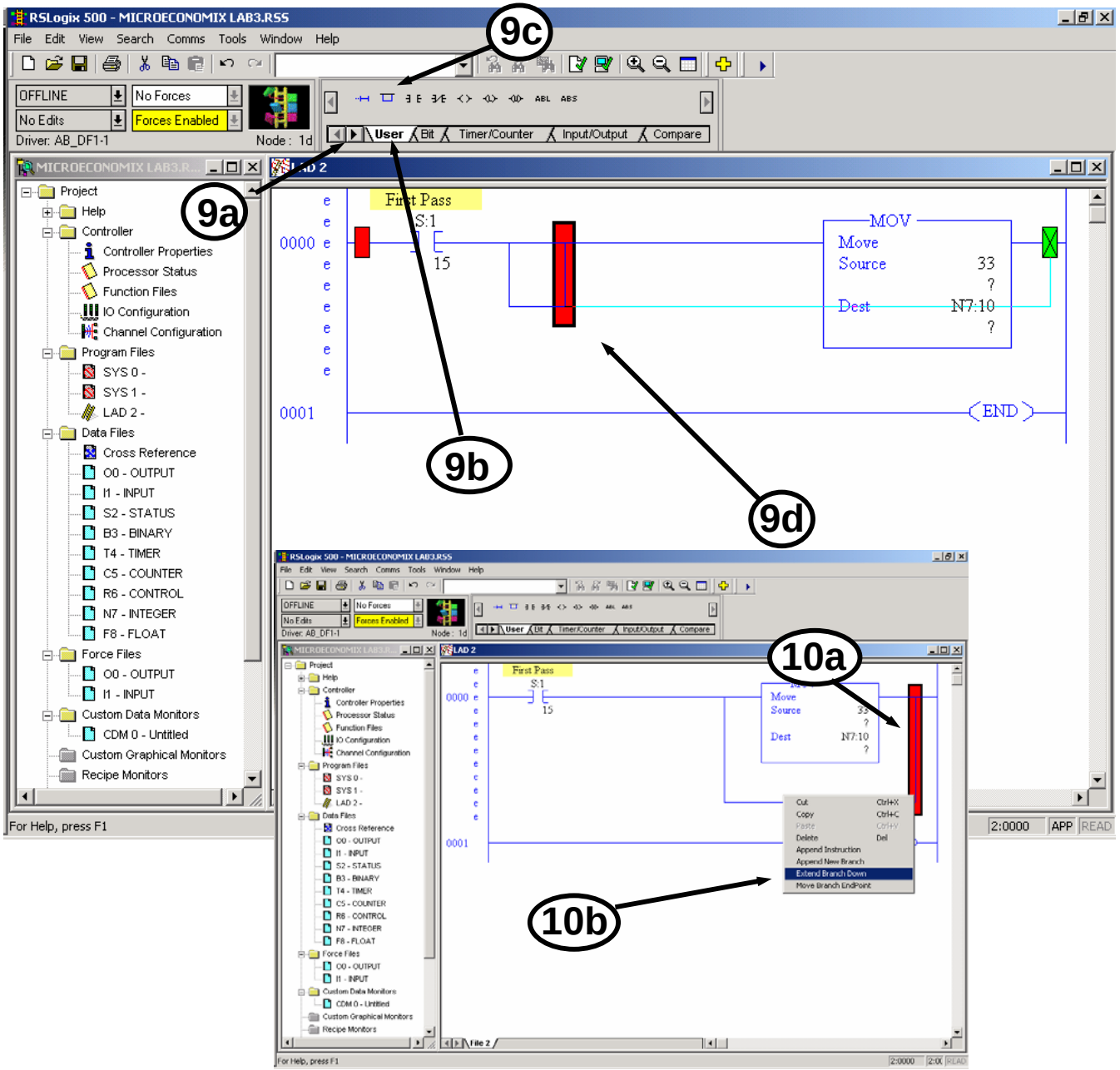
Create and Extend a Branch

9. Add an empty branch

- a) Click on the tab left arrow 3 or 4 times until you see the “User” tab.
- b) Click on the “User” tab.
- c) Click, hold and Drag the RUNG BRANCH button in-between the XIC and the MOV instructions. When you see a green box, release the mouse button.
- d) Click, hold and Drag the highlighted branch leg to the right of the MOV instruction. When you see a green box, release the mouse button.

10.Extend the branch down

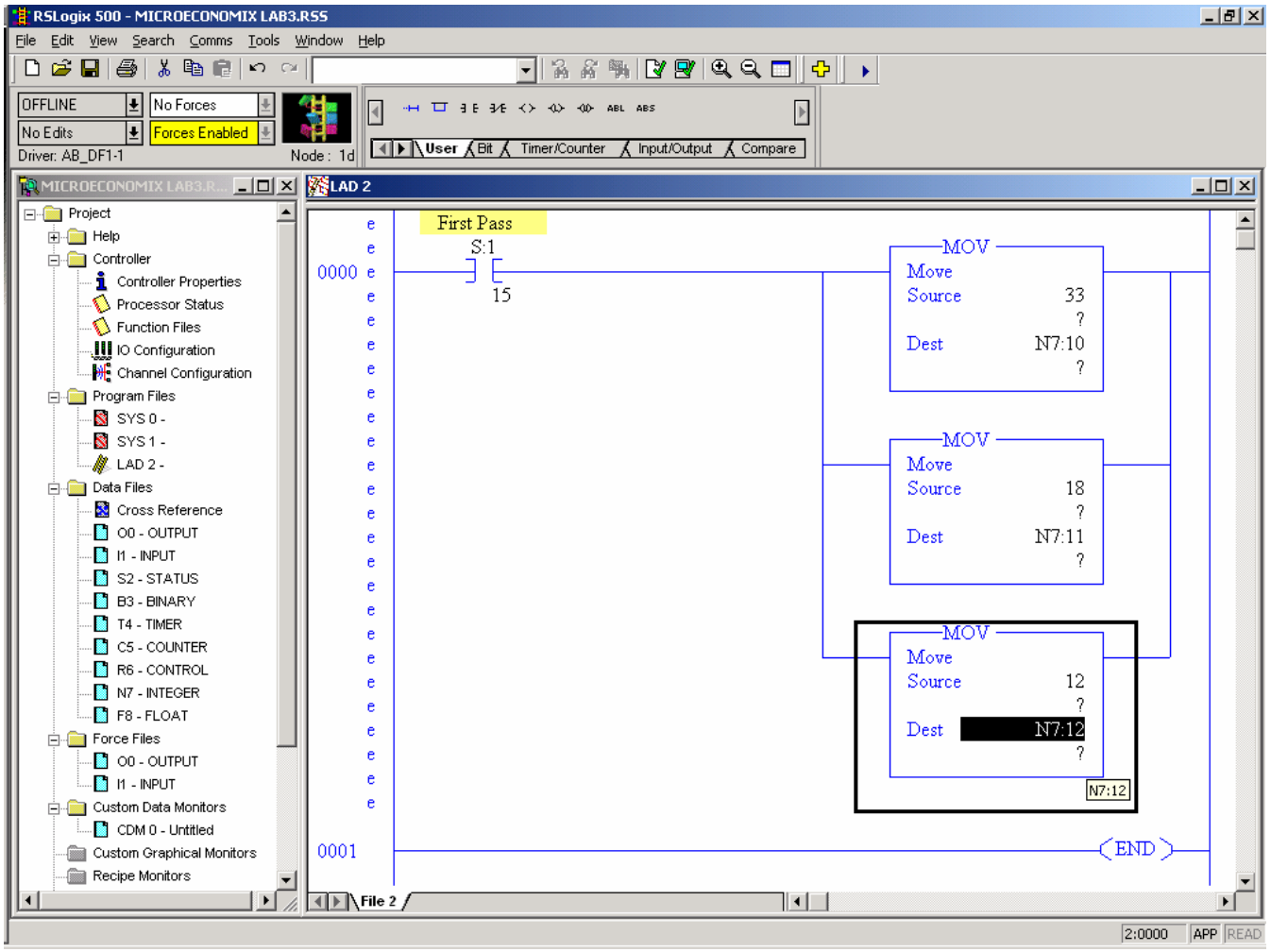
- a) Right click on the highlighted leg of the branch.
- b) Click on “Extend Branch Down”



Create and Extend a Branch

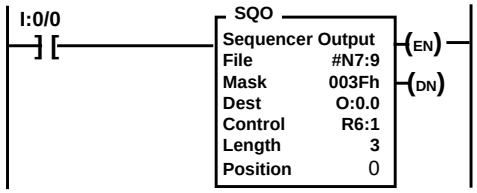
11. Add Instructions to the branch

- Click on the tab right arrow 3 or 4 times until you see the “Move/Logical” tab.
- Click on the “Move/Logical” Tab
- Click, hold and Drag the MOV button onto the middle level of the branch you just created. When you see a green box, release the mouse button.
- Type 18 [Enter] for the “Source” and N7:11 [Enter] for the “Dest”.
- Click, hold and Drag the MOV button onto the bottom level of the branch you just created. When you see a green box, release the mouse button.
- Type 12 [Enter] for the “Source” and N7:12 [Enter] for the “Dest”



Creating the 2nd Rung of Logic

Program this rung:

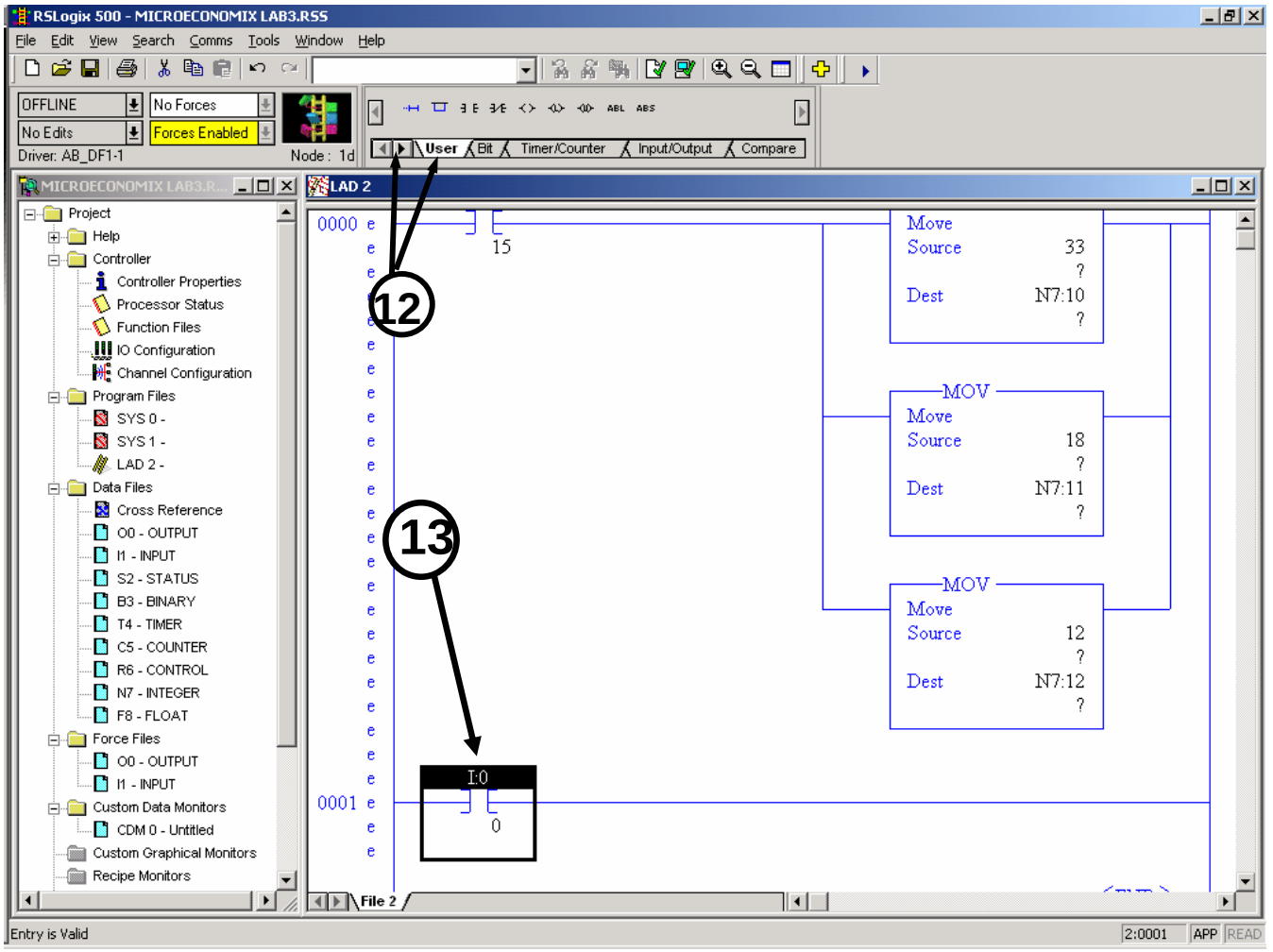


12.Create a New Rung

- Click on the tab left arrow 3 or 4 times until you see the “User” tab.
- b) Click on the “User” tab.
- Click, hold and Drag the “New Rung” button over “0001” until you see a green box. When you see a green box, release the mouse button.

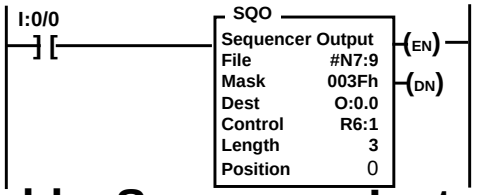
13.Add an Input Instruction

- 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:0.0/0 [Enter].



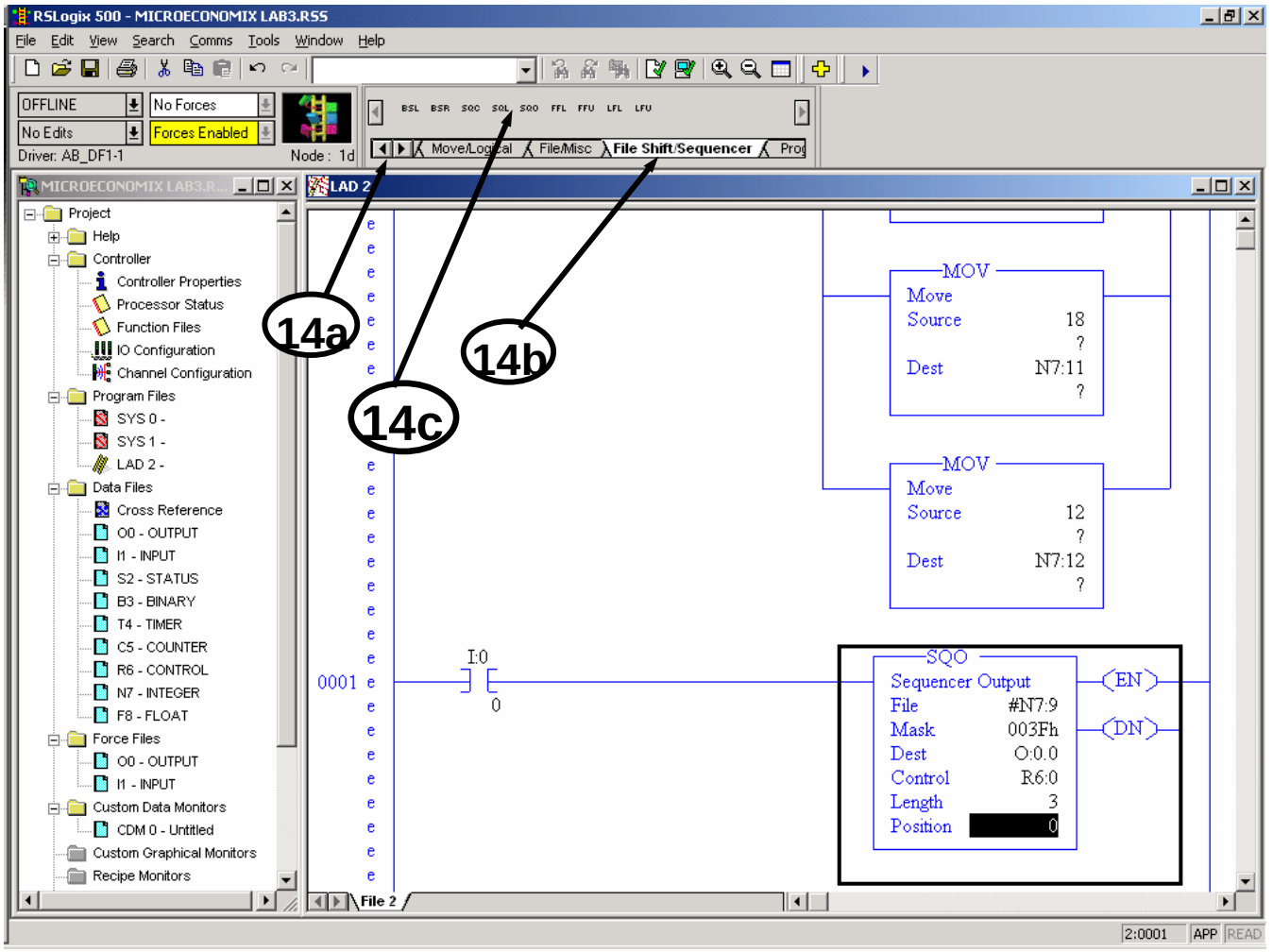
Creating the 2nd Rung of Logic

Program this rung:



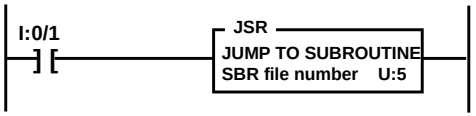
14.Add a Sequencer Instruction

- a)Click on the tab right arrow 4 or 5 times until you see the “File Shift/Sequencer” tab.
- b)Click on the “File Shift/Sequencer” tab
- b) Click, hold and Drag the SQO button to the right of the XIC you just created. When you see a green box, release the mouse button.
- Enter these parameters:
  - File: #N7:9 [Enter]
  - Mask: 003Fh [Enter] (zero,zero,3,F,H)
  - Dest: O:0.0 [Enter]
  - Control: R6:0 [Enter]
  - Length: 3 [Enter]
  - Position: 0 [Enter]



Creating the 3rd Rung of Logic

Program this rung:

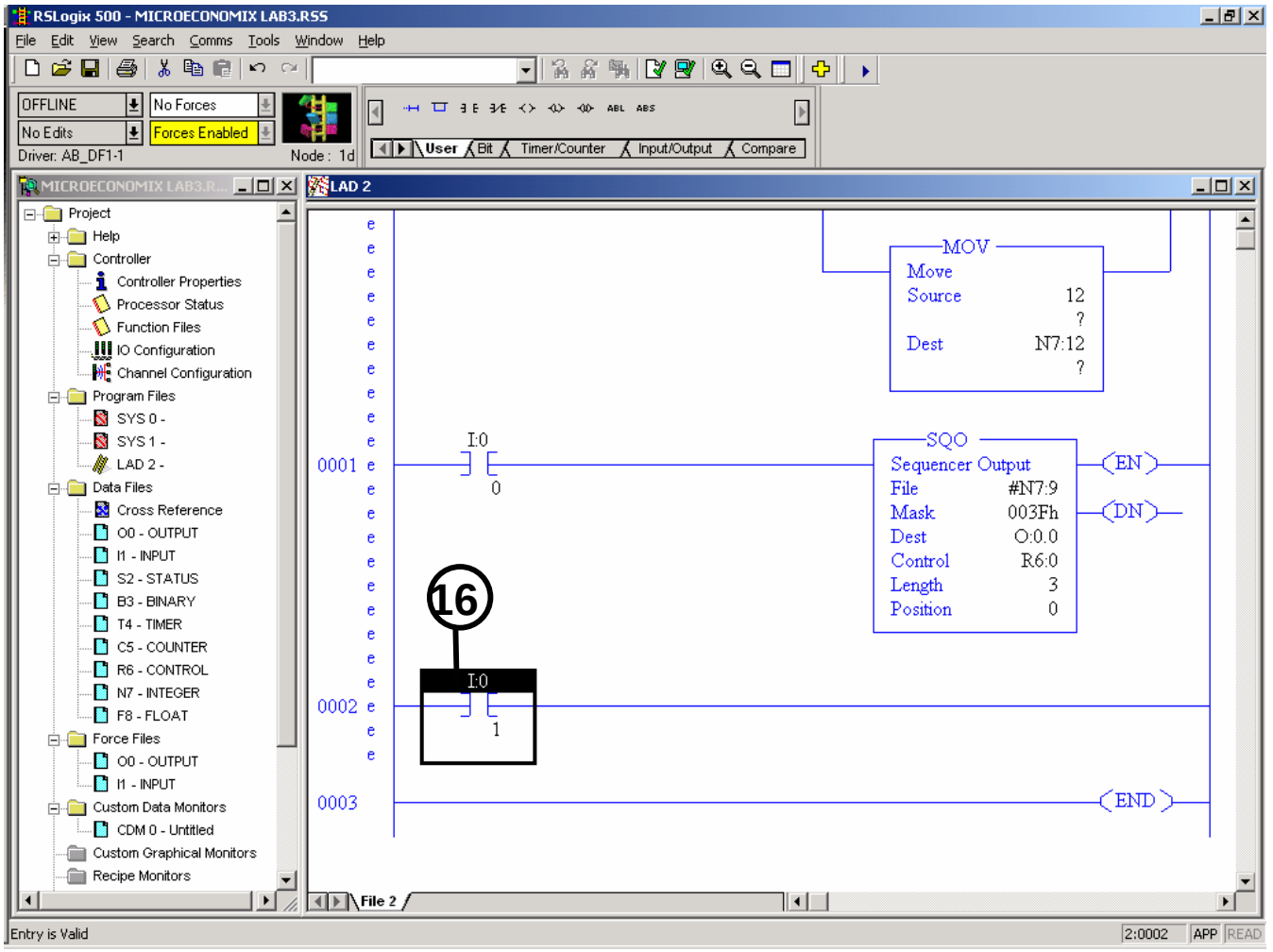


15.Create a New Rung

- Click on the tab left arrow 4 or 5 times until you see the “User” tab.
- Click, hold and Drag the “New Rung” button over “0002” until you see a green box. When you see a green box, release the mouse button.

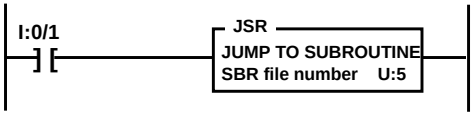
16.Add an Input Instruction

- 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:0.0/1 [Enter].



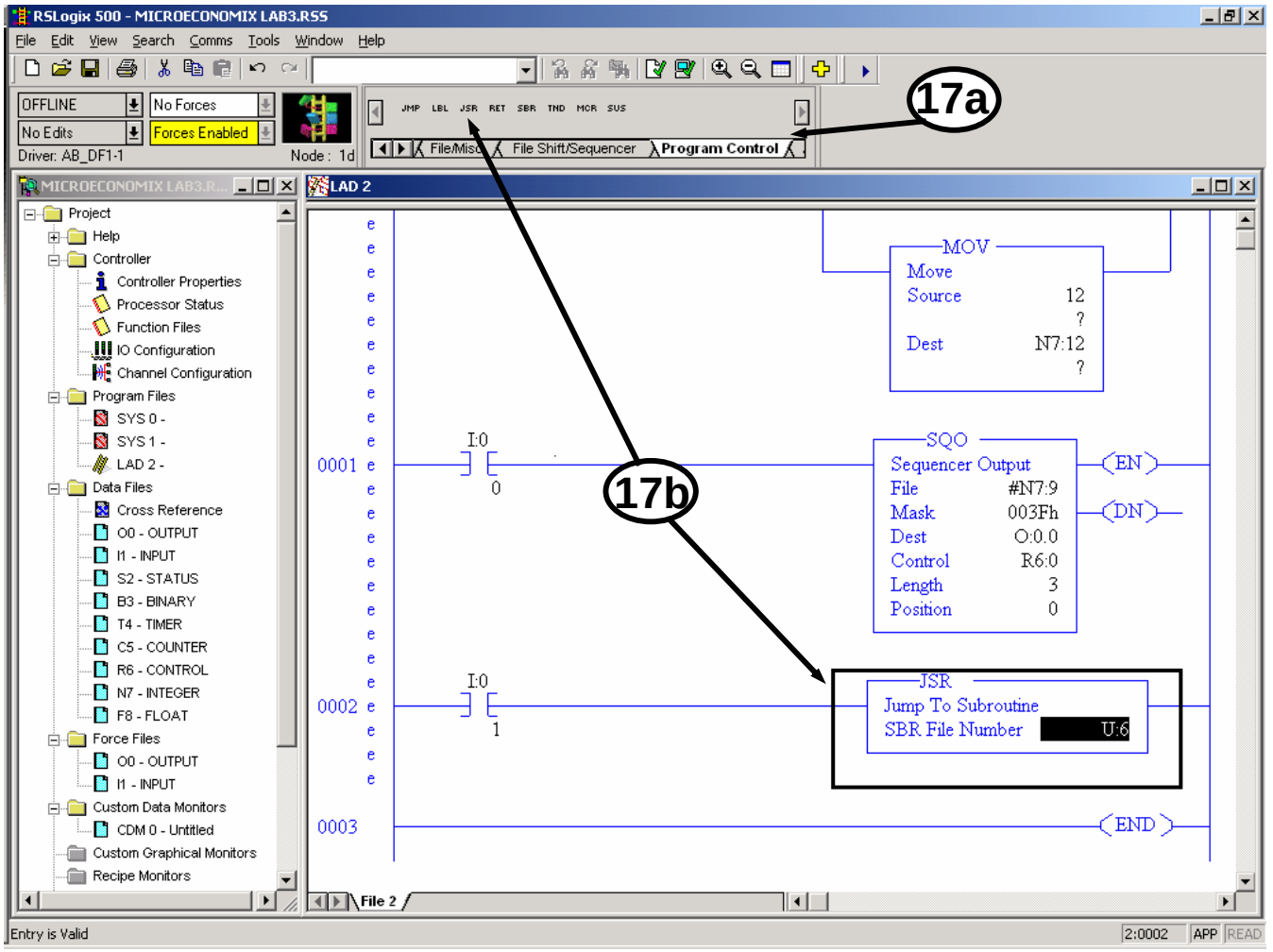
Creating the 3rd Rung of Logic

Program this rung:



17. Add a JSR, Jump to Subroutine Instruction.

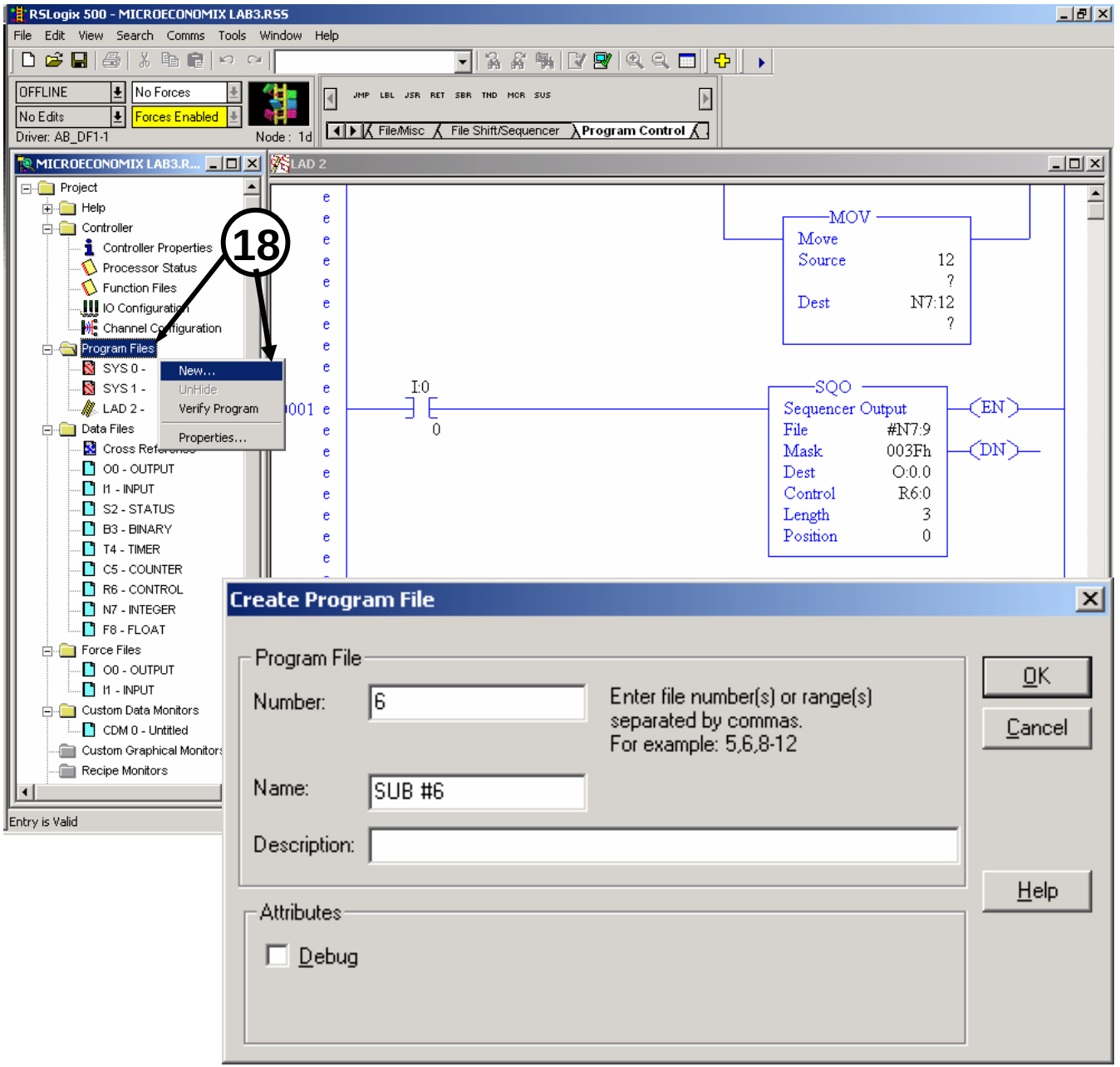
- Click on the tab right arrow 6 or 7 times until you see the “Program control” tab.
- a)Click on the “Program Control” tab
- b) Click, hold and Drag the JSR button to the right of the XIC you just created. When you see a green box, release the mouse button.
- Type 6 [Enter] for the “SBR File Number”



Create the Subroutine

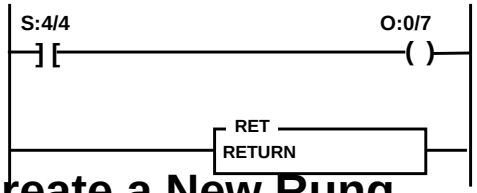
18.Create Subroutine 6

- **Right mouse click on “Program Files”**
- **Select “New”**
- **Type 6 for Number**
- **Type SUB #6 for name**
- **Select “OK”.**



Create the Subroutine

Program these rungs:

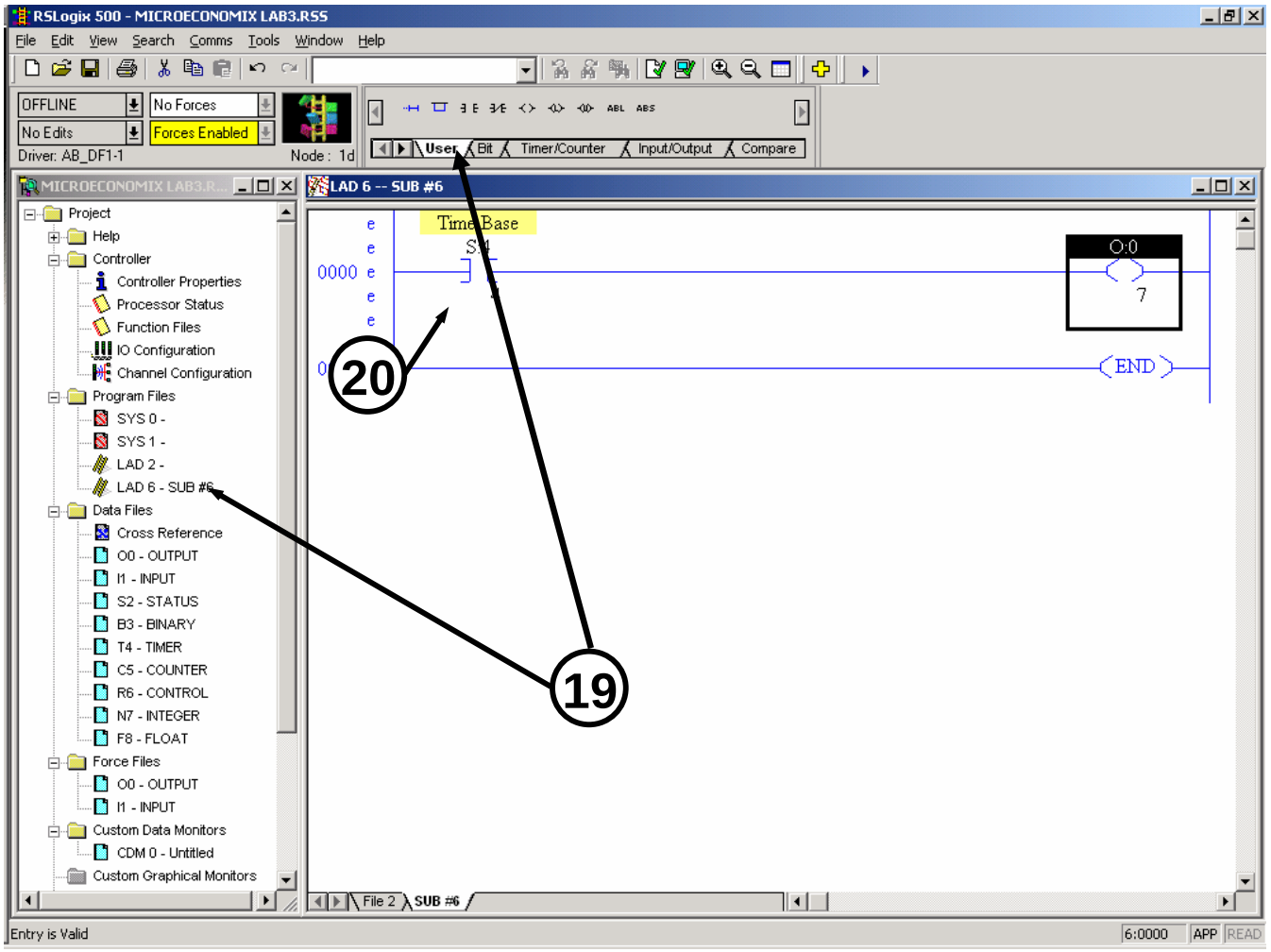


19.Create a New Rung

- Double click on “LAD6”
- Click on the tab left arrow 4 or 5 times until you see the “User” tab
- Click on the “User” tab
- Click, hold and Drag the “New Rung” button over “0000”. When you see a green box, release the mouse button.

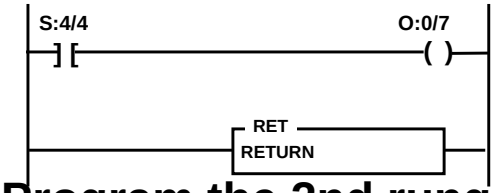
20.Program the 1st rung

- 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 S:4/4 [Enter].
- Click, hold and Drag the OTE button onto the right side of the rung you just created. When you see a green box, release the mouse button.
- Type O:0.0/7 [Enter].



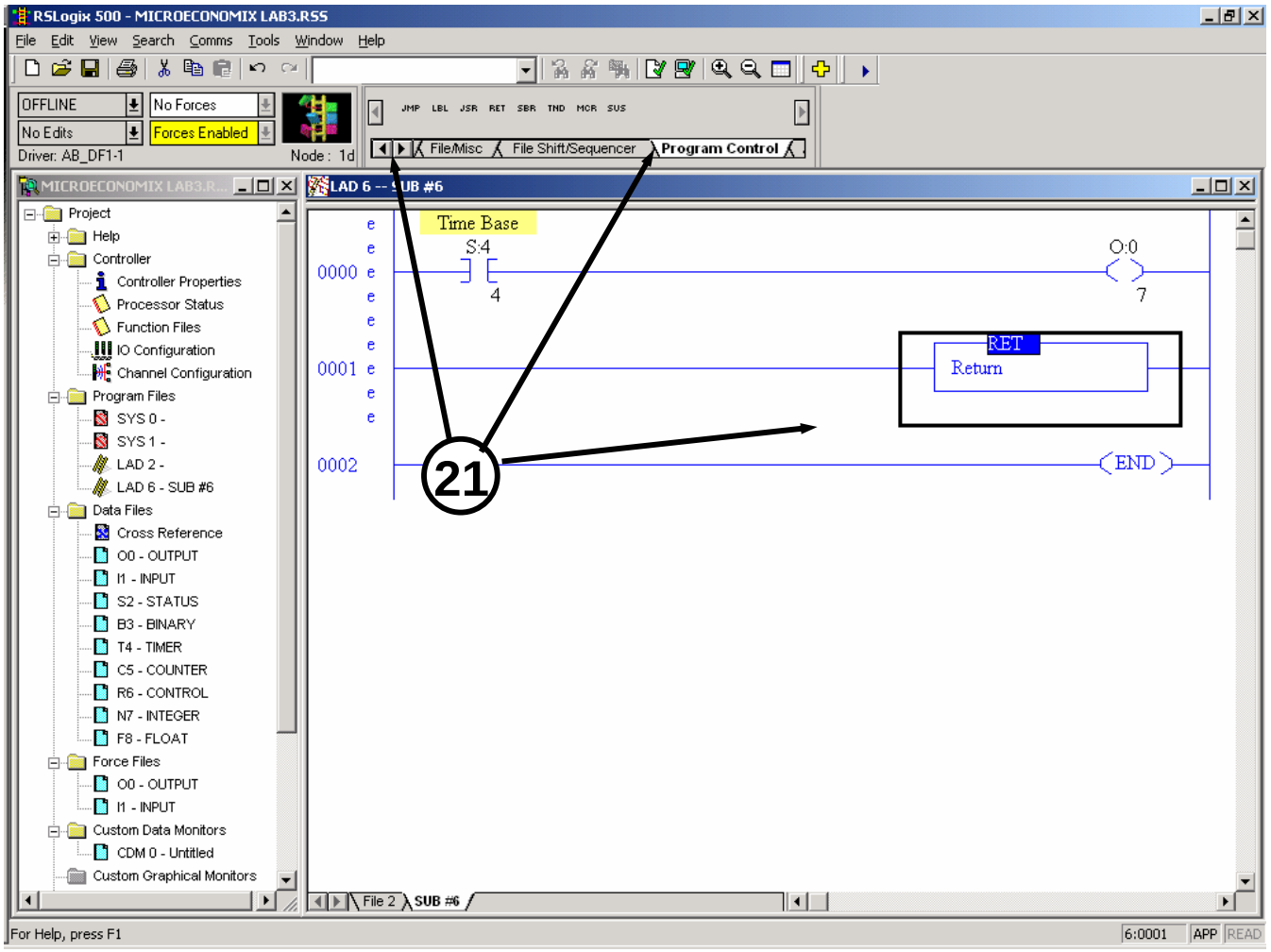
Create the Subroutine

Program these rungs:



21.Program the 2nd rung

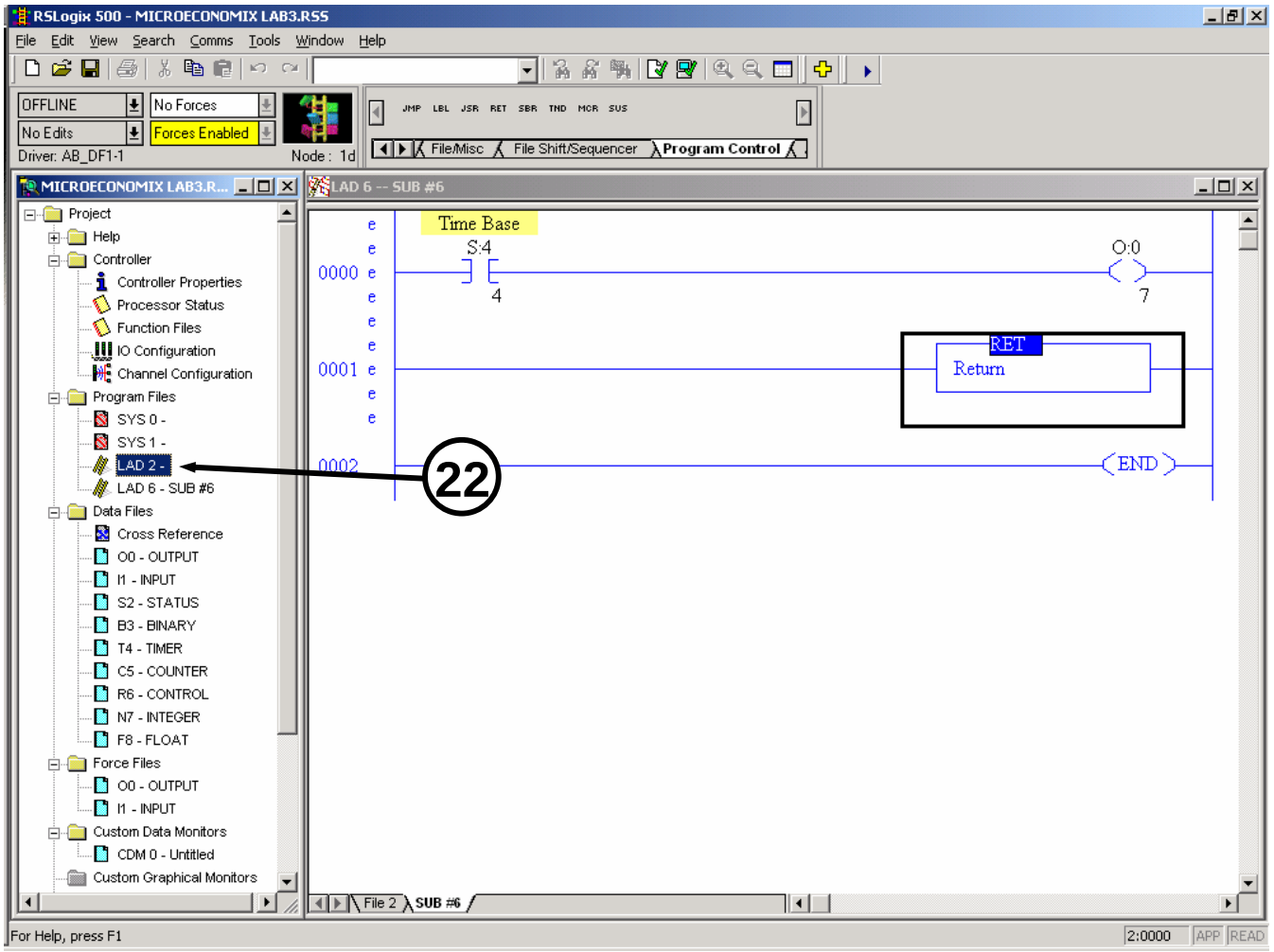
- **Click, hold and Drag the “New Rung” button over “0001”. When you see a green box, release the mouse button.**
- **Click on the tab left arrow 6 or 7 times until you see the “Program Control” tab.**
- **Click on the “Program Control” tab.**
- **“Click, hold and Drag the RET button to the right side of the new rung. When you see a green box, release the mouse button.**



Return to Main Program

22.Return to Main Program

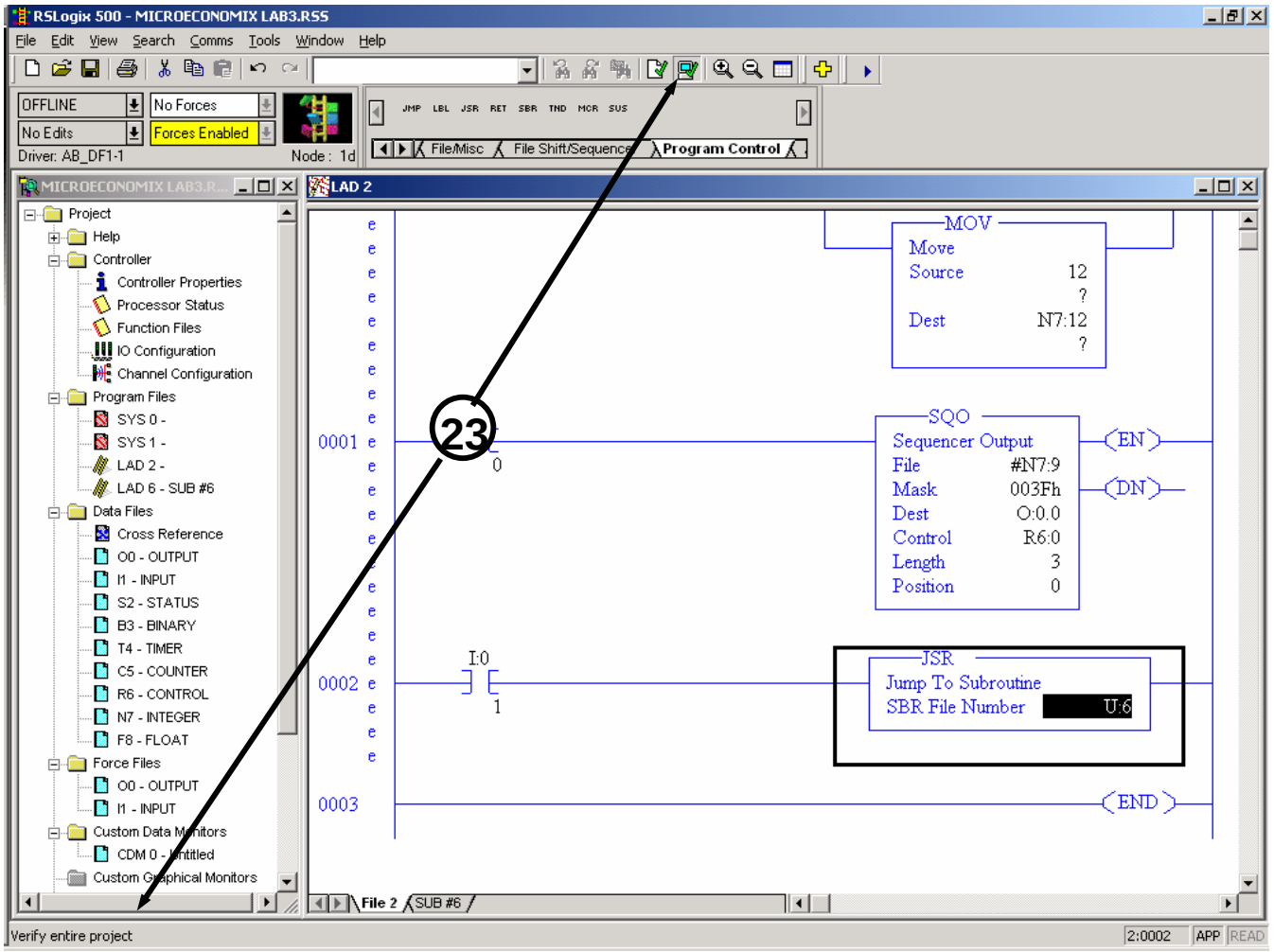
- **Double Click on LAD 2. This will take you out of LAD 6 subroutine and open the main program.**



Verify your work

23.To verify your work

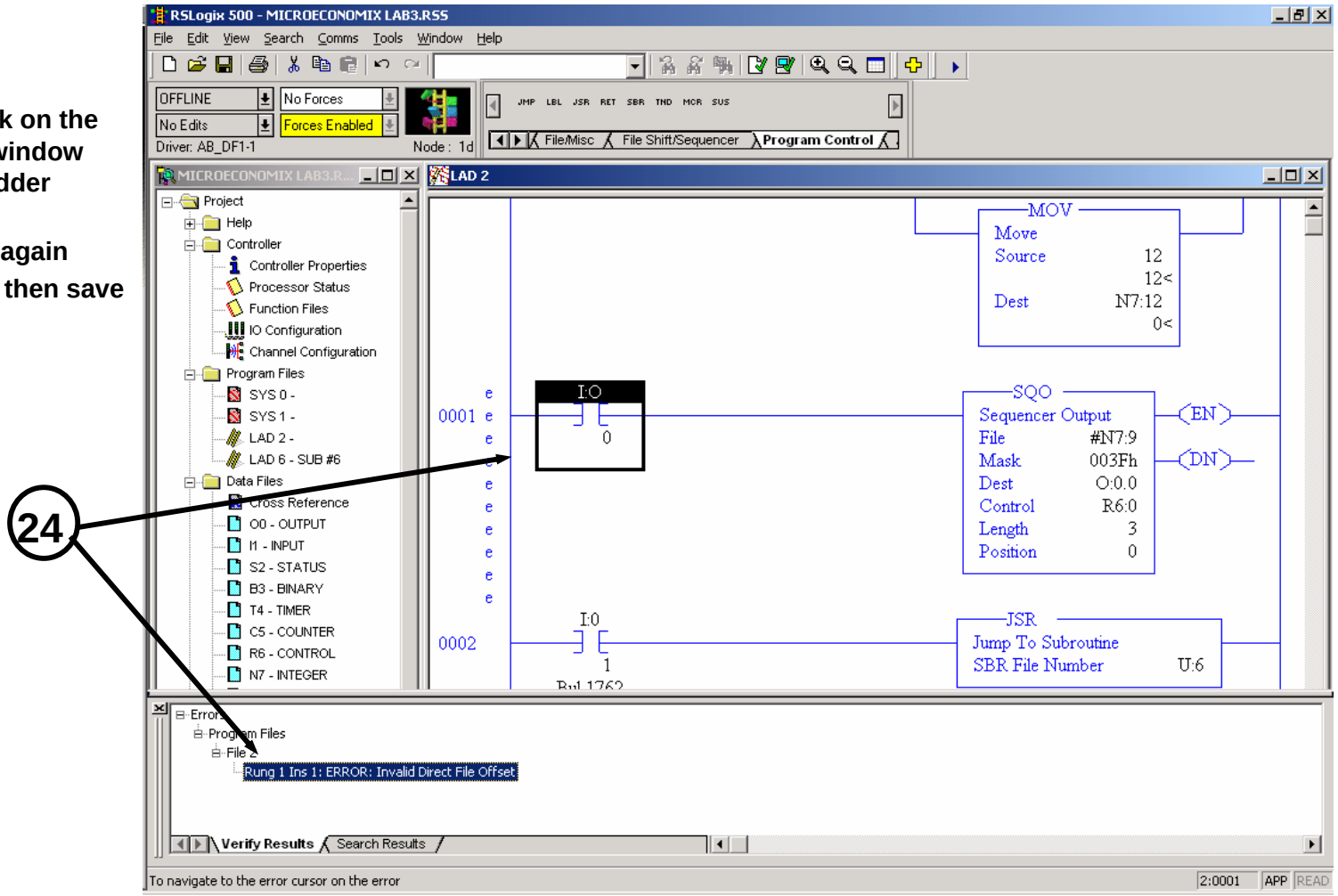
- There are two types of verify. The first one verifies the file you are in and only that file. The second verifies all the files created or the total project created. Because this program resides in more than one file we will use the second one.
- Click on the “Verify Project” button
- When the verify 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

24.Program has errors

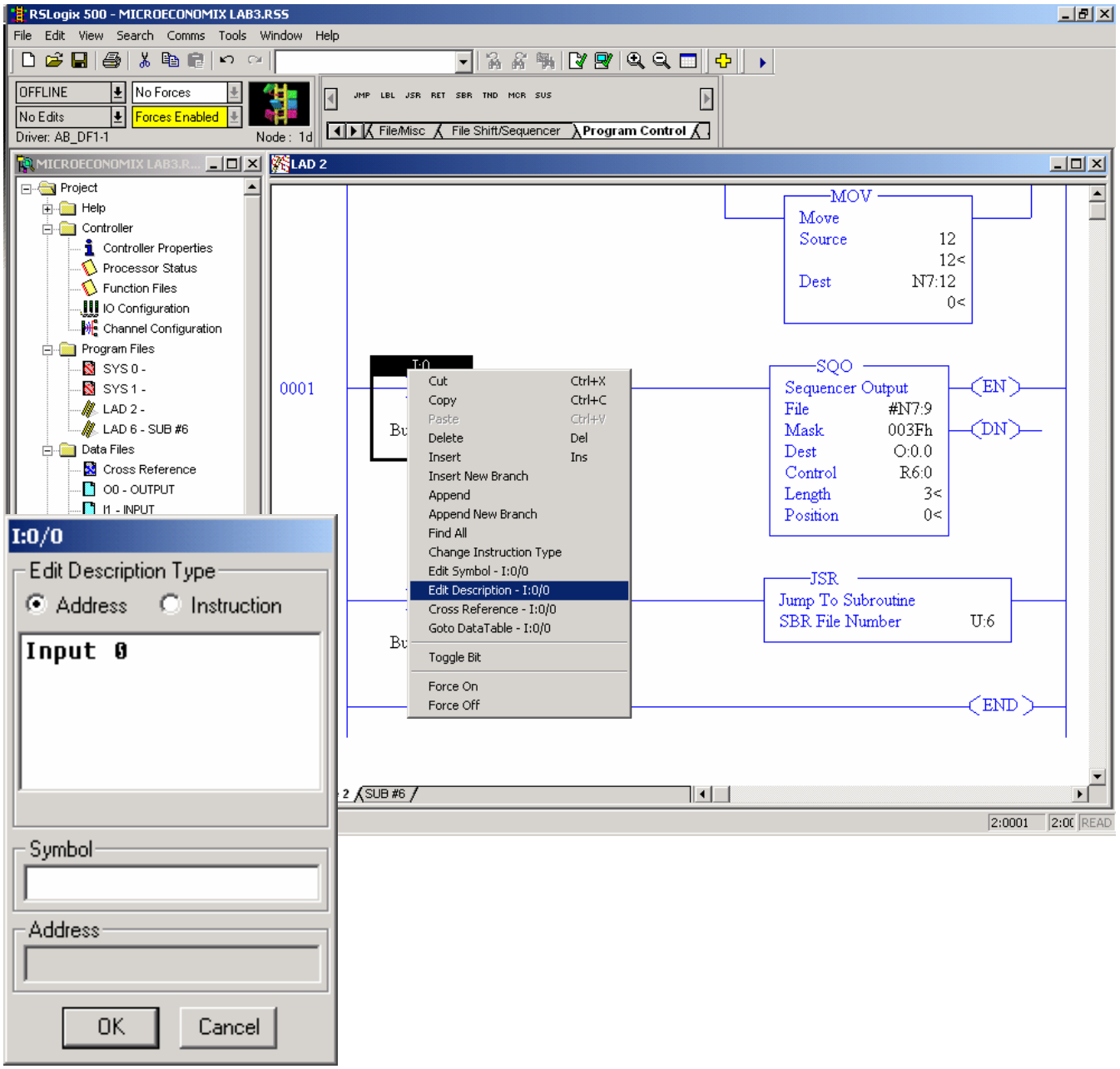
- To find the errors in the program click on the error message in the “Verify results window the error is then highlighted in the ladder window
- Fix the error and run “Verify Project” again
- When all the errors are fixed you can then save and download the program



Documenting your Program

25.Documenting your work

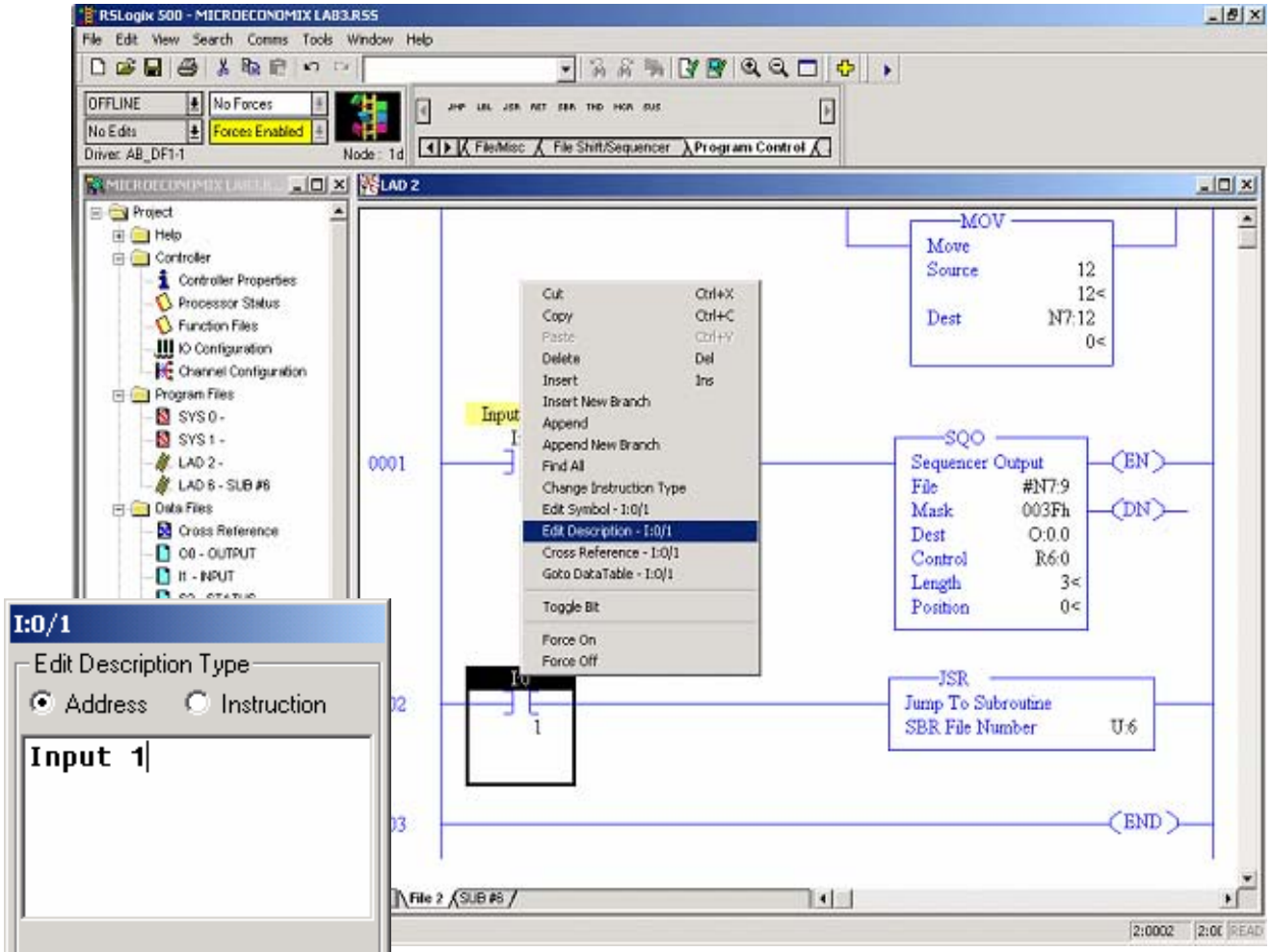
- Click on the Input I:0/0 to highlight
- Right mouse on I:0/0 and select “Edit Description- I:0/0”
- Select “Address”
- Type “Input 0” in the Edit window
- Select “OK”



Documenting your Program

26.Documenting your work

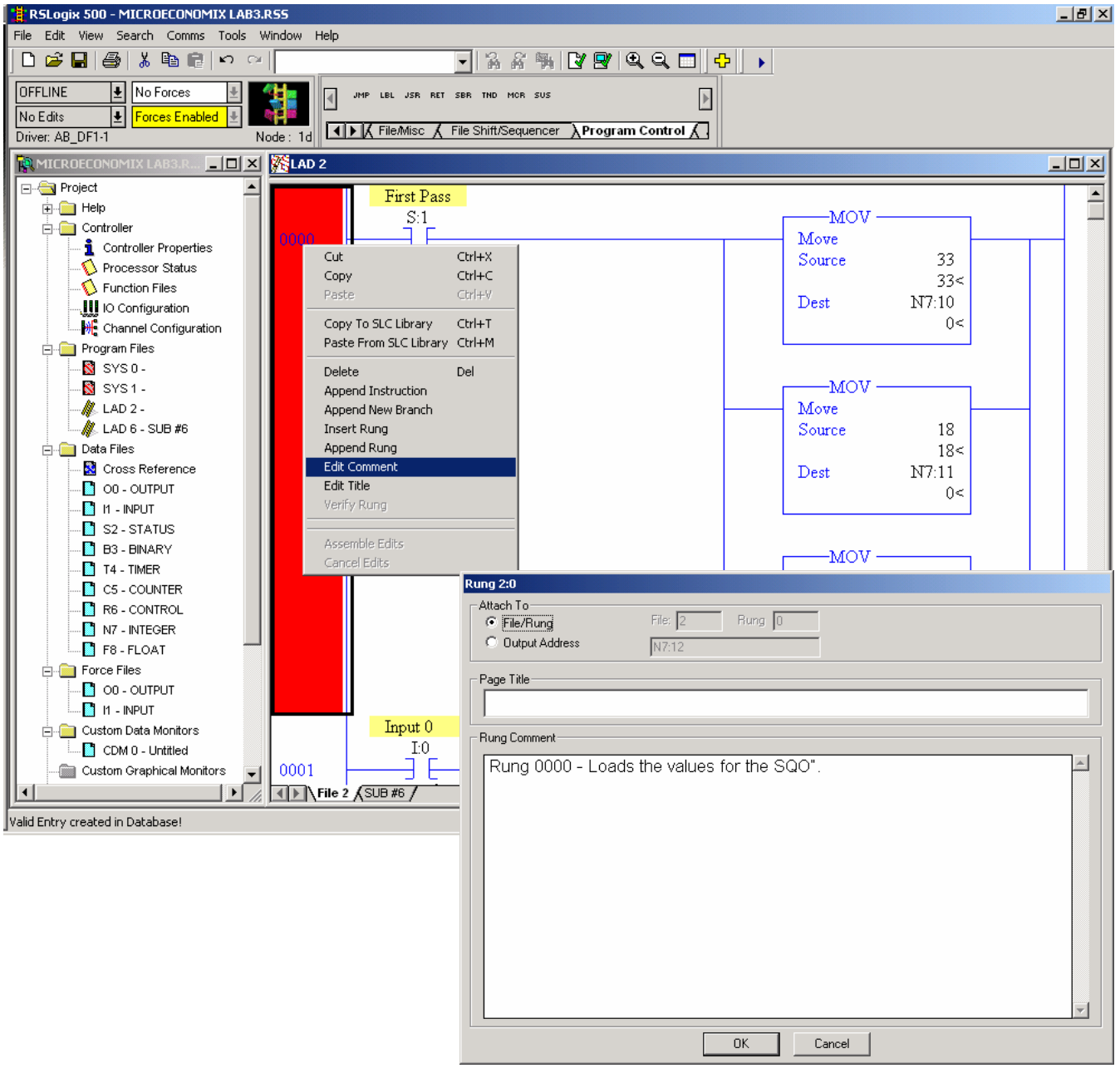
- Click on the Input I:0/1 to highlight
- Right mouse on I:0/1 and select “Edit Description- I:0/1”
- Select “Address”
- Type “Input 1” in the Edit window
- Select “OK”



Documenting your Program

27.Documenting your work

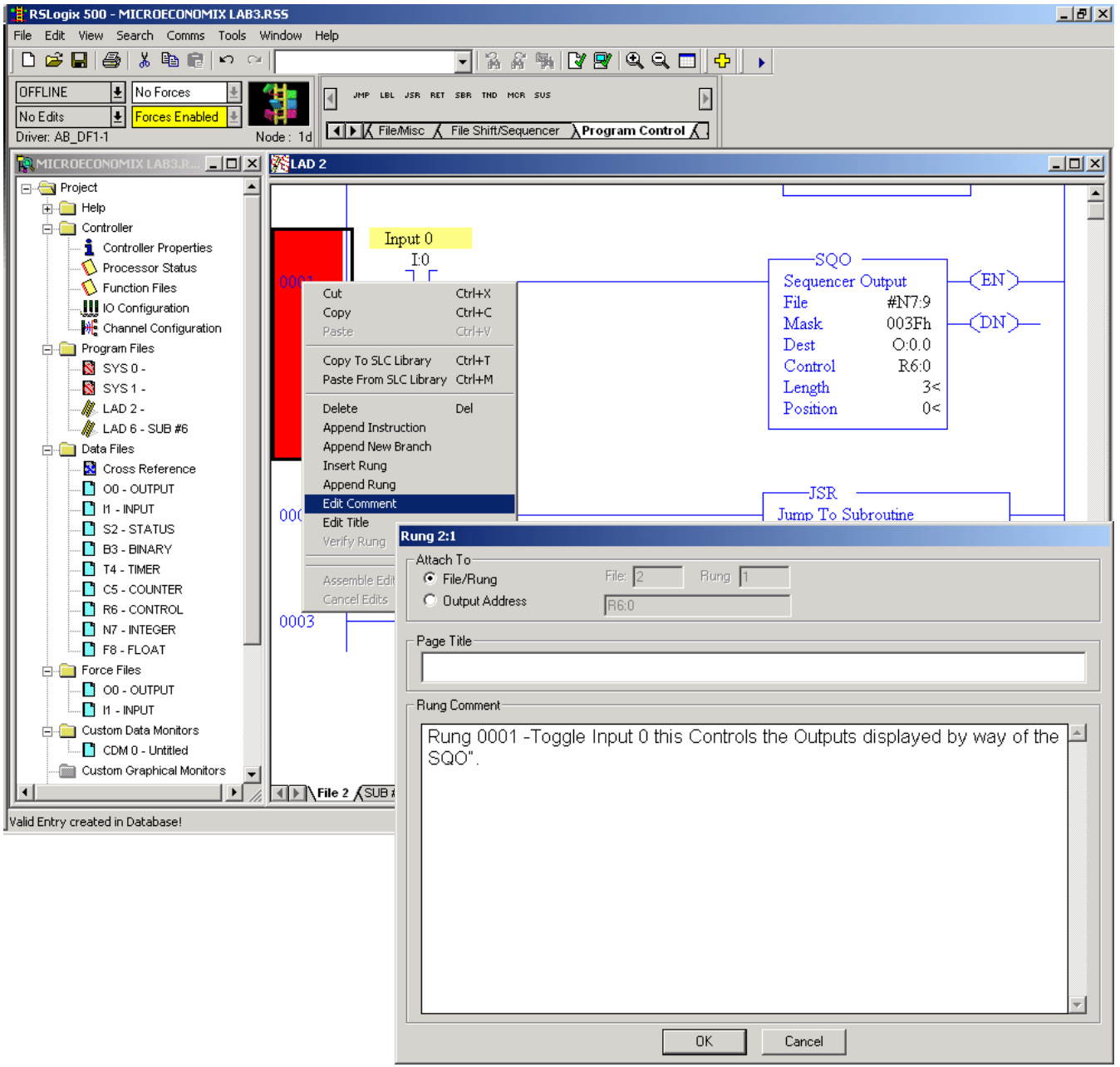
- Click on rung 0000 to highlight
- Right mouse on rung 0000 and select “Edit Comment”
- Select “File/Rung”
- Type “Rung 0000 - Loads the values for the SQO”.
- Select “OK”



Documenting your Program

28.Documenting your work

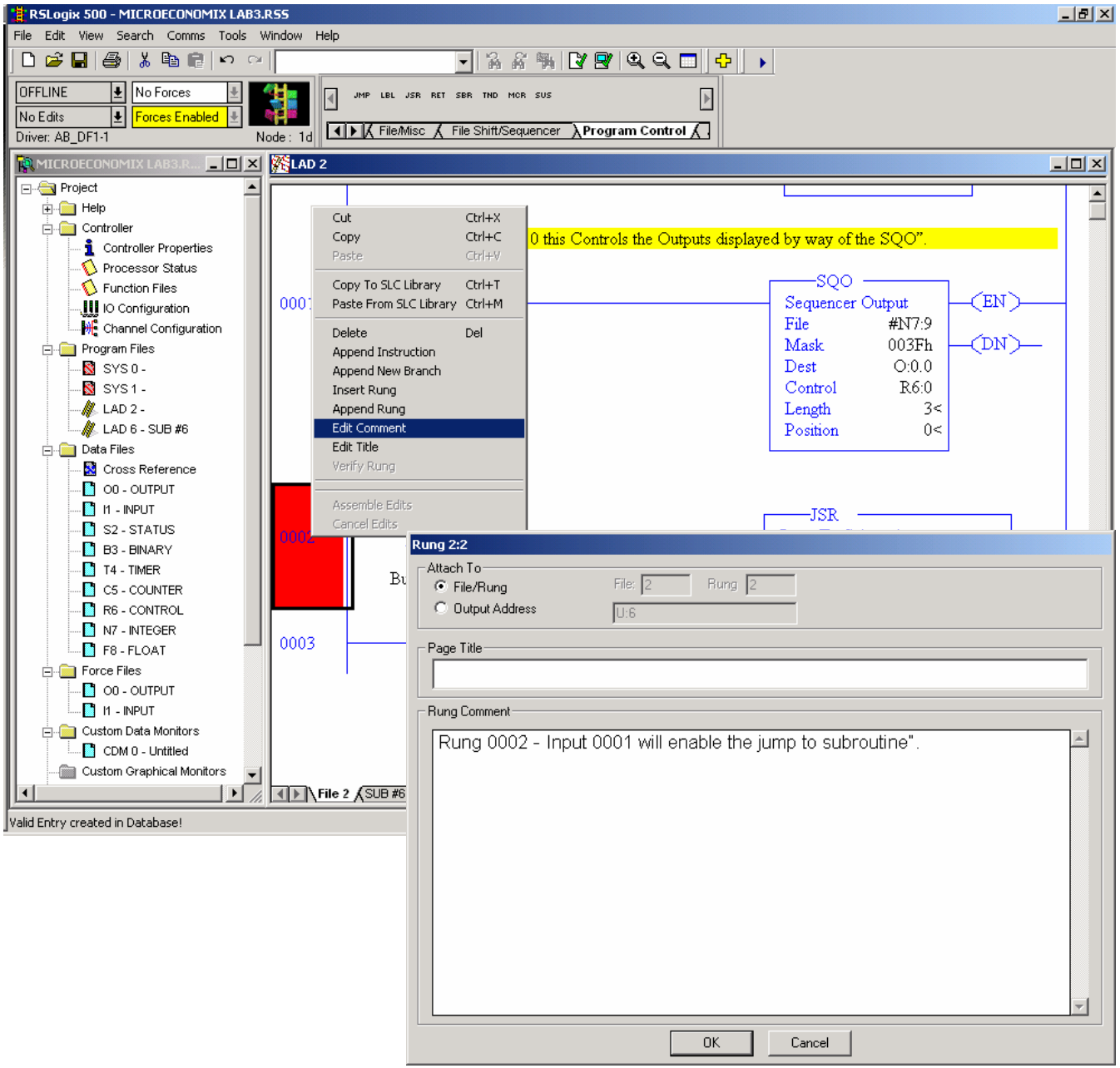
- Click on rung 0001 to highlight
- Right mouse on rung 0001 and select “Edit Comment”
- Select “File/Rung”
- Type “Rung 0001 -Toggle Input 0 this Controls the Outputs displayed by way of the SQO”.
- Select “OK”



Documenting your Program

29.Documenting your work

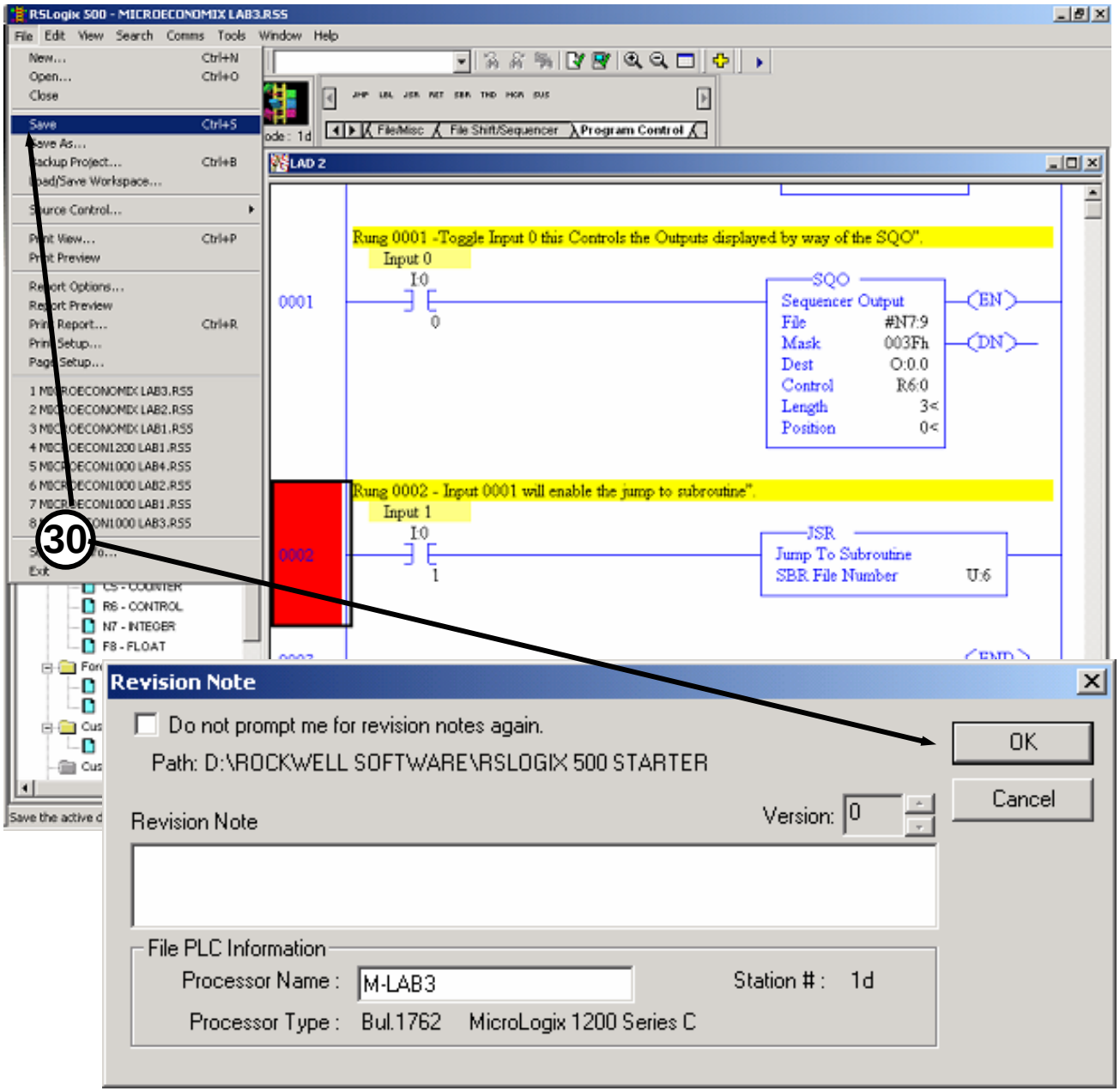
- Click on rung 0002 to highlight
- Right mouse on rung 0002 and select “Edit Comment”
- Select “File/Rung”
- Type “Rung 0002 - Input 0001 will enable the jump to subroutine”.
- Select “OK”



Save your work

30.Save your work

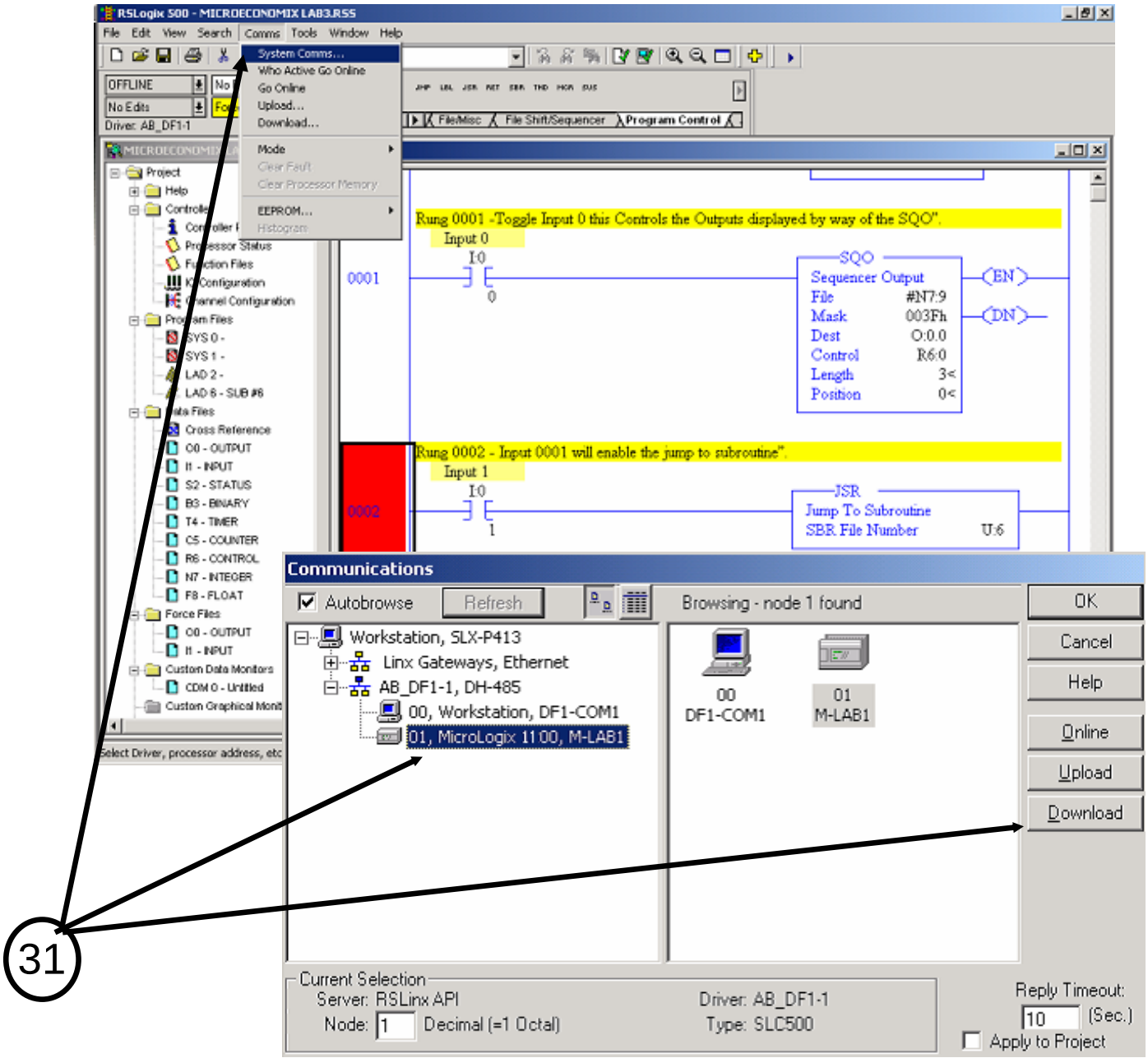
- **Click on the “Save” button**
- **Click “Ok” for Revision note box. The revision note box is used to keep track of changes made to the existing program. You can create many revisions of the same program. This feature can be disabled if desired.**



Transfer the Program to the Micro

31.Download the Program

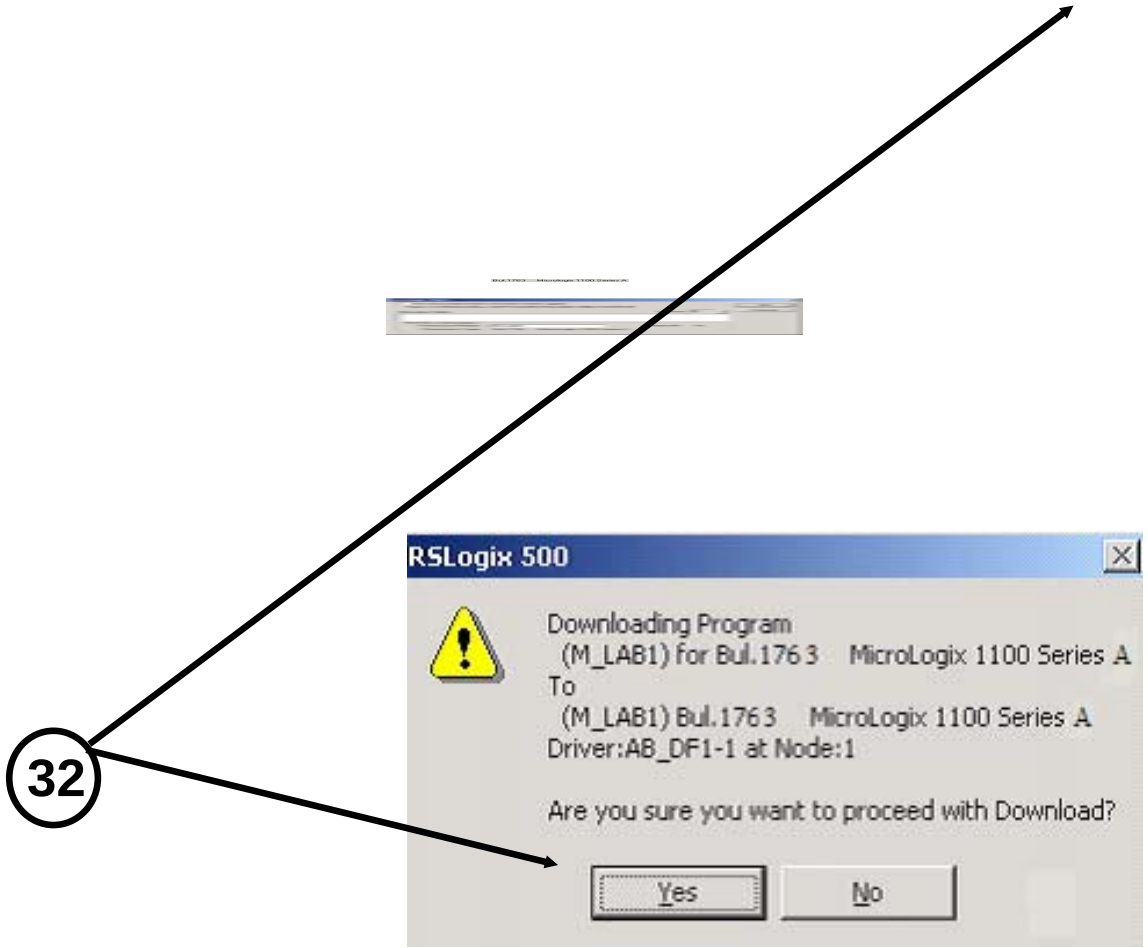
- **Select the menu item “Comms>System Comms”**
- **Three primary selections**
  - “Online” Establish the “path”
  - “Upload” Receive from the controller
  - “Download” Send to the controller
- **Highlight the device at Node 01.**
- **Select “Download”**



Transfer the Program to the Micro

32.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.**

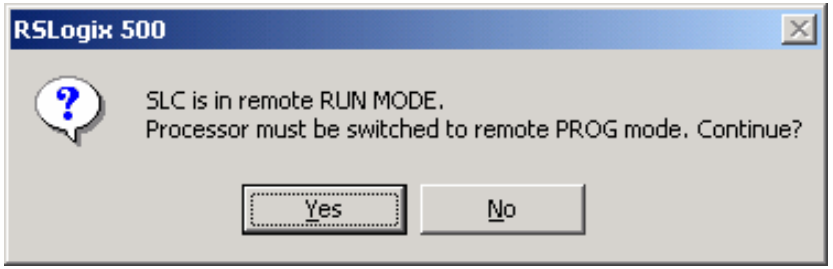


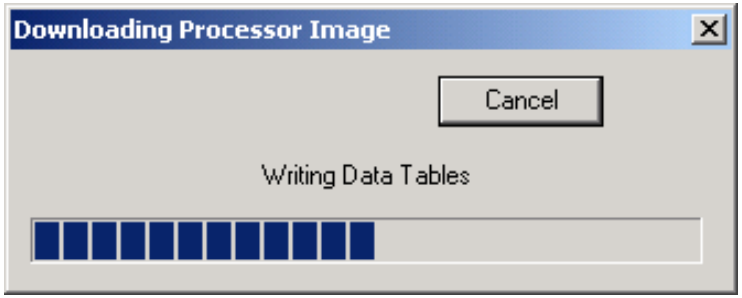
Transfer the Program to the Micro

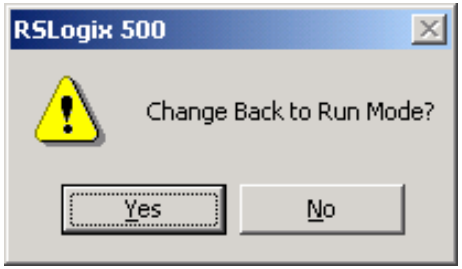
33.Download the Program

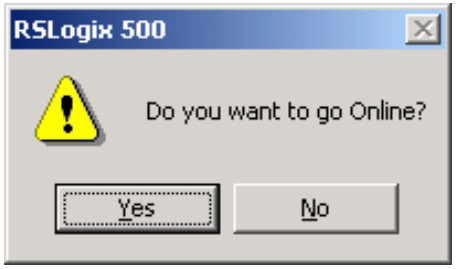
- Select “Yes” to put he processor in Program. The processor must be in program mode to download the program
- The download window will appear when the download occurs.
- Select “Yes” to change back to run mode
- Select “Yes” to go online. This will allow you to monitor the program that now resides in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

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









Monitoring Your Program

PROGRAM OPERATION

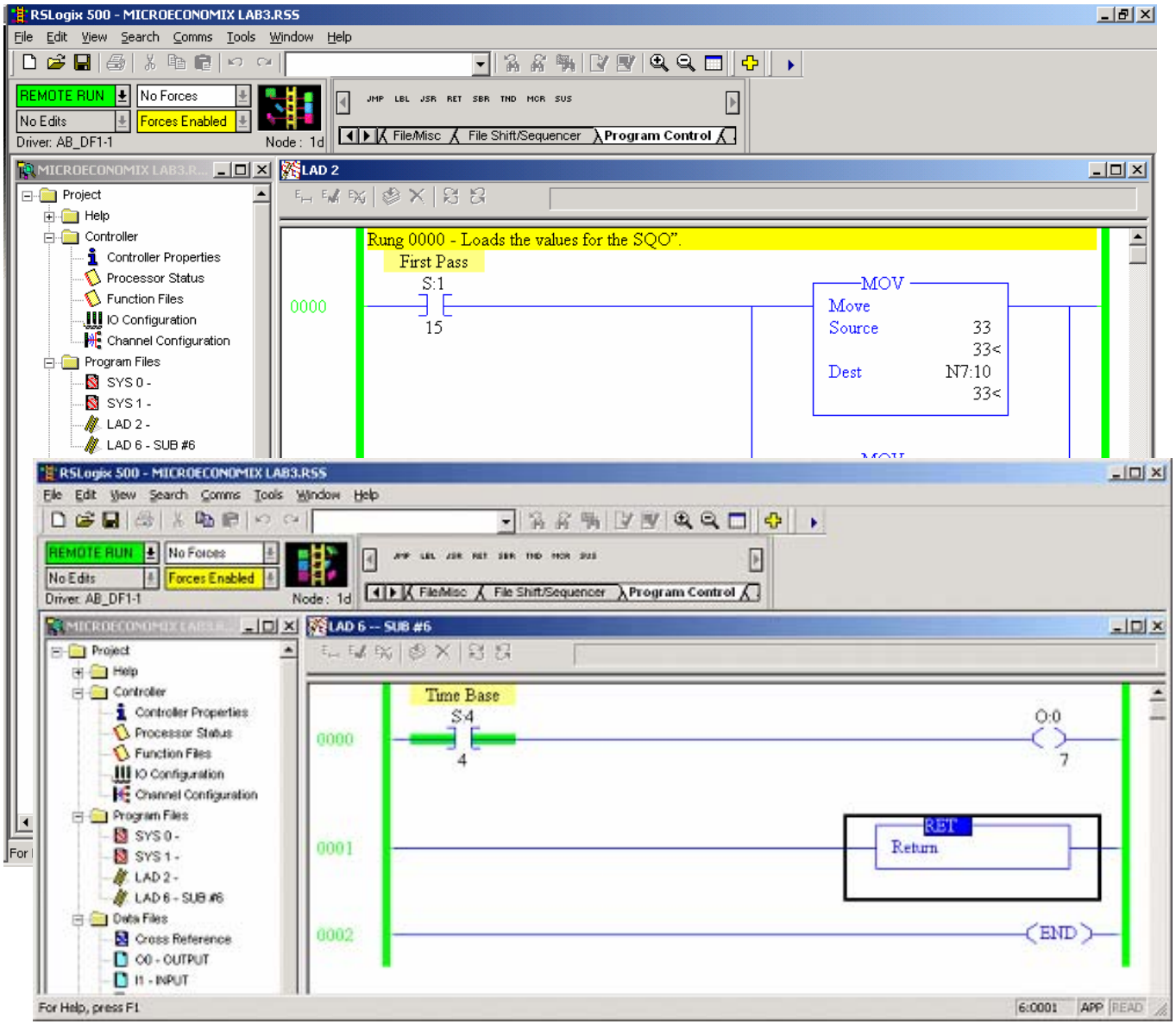
Rung 0- During the first scan of the program, data is written to locations N7:10, N7:11, and N7:12 with the Move instructions. This will only happen once.

Rung 1- Each time you Push button #0 ON, the sequencer sends data to outputs 6 thru10. This sequencer has 3 steps:

- turn ON outputs 0 & 5
- turn ON outputs 1 & 4
- turn ON outputs 2 & 3

- When the sequencer is finished with step 3 it wraps back around to step 1 again.

Rung 2- When you push ON button #1 the MicroLogix scans subroutine file 5 and executes it's logic. If button #1 is OFF, the MicroLogix skips the logic in subroutine file 6.



Subroutine File 6

Rung 0- Address S:4/4 pulses ON and OFF based on an internal clock. This turns output 4 ON and OFF.

Rung 1- RET instruction tells the program scan to return to the main program file.

ALLEN-BRADLEY • ROCKWELL SOFTWARE

Rockwell Automation