GE Proficy
Programming Software

GE Fanuc RX3i
Programming

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This document is a supplement to the "Lab 1.doc" lab exercise that introduces one to the basics of ladder logic programming. The following equipment is assumed:

GE IC695CHS012 12 slot backplane
GE IC695PSA140 power supply
GE IC695CPU310 RX3i processor
GE IC695ETM001 Ethernet module
GE IC694MDL660 32 chan. 24v disc. input
GE IC694MDL754 32 chan. 12/24v disc. out

This document is primarily for Proficy Machine Edition version 6.0. A serial port and an Ethernet connection from the PC to the processor is also assumed.

In order to become familiar with basic ladder logic programming and addressing techniques on the GE Fanuc RX3i equipment, the steps to accomplish the first part of the first lab exercise are outlined in sections A, and B. The remainder of the sections outlines the steps to document your ladder, to print the ladder logic program, and to save your ladder logic diagram. The last sections explain the differences when programming offline and accessing the programming software outside of the laboratory.

In an industrial setting, the initial PLC programming is done offline and then later downloaded to the PLC when ready for the final test and debug. In addition, there is usually only one project (program) for each PLC on the network. For these labs, the ladder programming will be done online so that changes can be immediately tested.

Proficy Machine Edition version 6.0 is used to program the RX3i PLC's. An icon for this program should already be on the desktop.

The PLC and the PC used to program it are connected directly to the PLC either through a serial port or through the Ethernet connection. The serial port must be used to load the initial hardware configuration (to set up the Ethernet module) and after that, the Ethernet connection may be used.

For the casual user, the Proficy software is best operated using the point-and-click approach. Towards the top of the screen, buttons for frequently-used commands are displayed in toolbars. One may click on the button, or access the function by selecting commands from the menu at the top of the screen.

A. STARTING A PROJECT WITH THE RX3i

Start the Proficy programming software by clicking on the PROFICY icon on the desktop, or by selecting

Start | All Programs | GE Fanuc | Proficy Machine Edition | Proficy Machine Edition

A popup window should appear with a list of selections. If starting a new project:

Select "Empty Project."
Click *OK*.
On the next window, type in a name for your project in the Project Name field.
Click *OK*
The software will start up in the offline mode and a blank project is displayed.

If your project is already in the PLC, select your project from the list of projects, and then click on *OK*. Connect to the processor (click on the "lightning bolt" icon). Double-click on _MAIN in the Inspector window to show the ladder in the Editor window. Skip to the online programming functions.

When starting a project for the first time, it must initially be set up offline, and then go online. The initial setup consists of specifying the processor and configuring the discrete I/O modules.
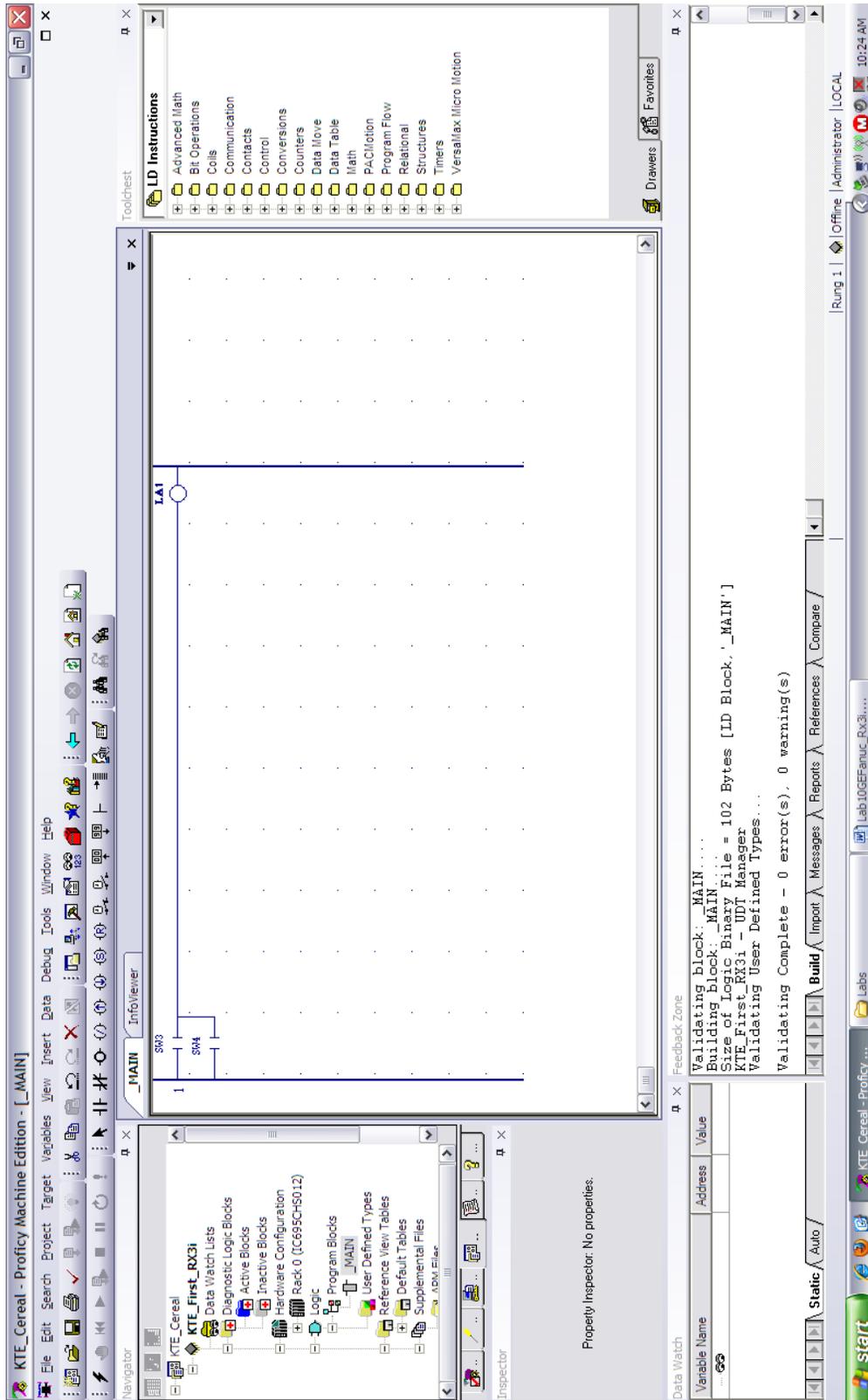
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Fig. 1. Proficy Machine Edition screen.

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The PC display (Fig. 1) consists of six windows. On the left one-third of the screen, the two panes are the Navigator (top) and Inspector (middle) windows. The Navigator window contains the project-related information, such as the PLC configuration and the variable names. The two tabs that you will use most are the "Project" (4th) tab (PLC configuration, program files) and "Variables" (5th) tab (variable definitions). The Inspector window displays the properties of whatever is highlighted in the Navigator window. The Editor window is the large pane in the middle top of the screen. This is where the ladder is displayed. When the "InfoViewer" tab is selected, help information is displayed here. The window at the top right of the screen is the Toolchest. The LD blocks are selected from the Toolchest, but variable data types can also be displayed. The lower left contains the Data Watch window, which displays the values of selected variables. The Feedback Zone window is at the lower right and logs the results of compiling the program, attempted connection to the PLC, program download, etc.

When starting Proficy for the first time, the windows will not appear as shown in Fig. 1. To set up the windows as shown in Fig. 1,

Close Companion window (at bottom)

Add Data Watch – From main menu, select *Tools | Data Watch*. It will appear at the bottom. Size it to cover the.

Add Feedback Zone – From main menu, select *Tools | Feedback Zone*. It will appear at the bottom. Size the Data Watch Window to cover about 1/3 of the screen on the left side.

Add Toolchest – From main menu, select *Tools | Toolchest*. It will appear in the right side. You will want to make it narrower (so middle window larger).

1. Configuring the Processor

When starting a project for the first time, check and make sure the Offline/Online window in the lower right corner displays "Offline Administrator". Select the "Project" tab of the Navigator window (if not already selected). The name of your project should be displayed. To configure your processor, do the following:

Right-mouse your project name in the "Project" tab of the Navigator window.

Select *Add Target | GE Fanuc Controller | PACSystems RX3i*

Items will be added to the project. The process will end with PROFICY expecting you to edit the "Target1" line below your project name. You should change "Target1" to your project name (but, you can also leave it alone).

Expand the Hardware Configuration (Click on the +)

Expand Rack 0

Right-mouse the "Slot 0" module and select *Replace Module…*. Select the appropriate power supply (IC695PSA140) and click on *OK*.

A configuration window with the module number on the tab will appear in the Editor window. To remove this tab, right-click "x" in the upper right of the window displaying the power supply properties.

Right-mouse the "Slot 2" module and select *Configure* Click on the "Settings" Tab. Change the Passwords field to "Disabled".

Right-mouse "Slot 4" module and select ***Replace Module….*** Select the appropriate Ethernet module by clicking on the "Communications" tab and select IC695ETM001 and click on ***OK***.

Three tabs will appear in the Editor window. Click on the "Settings" tab (if not selected already).

Set up the Ethernet configuration. Click the "IC200CPUE05" tab at the bottom of the Editor. Select the "Ethernet" tab at the top of the Editor window. Fill in the following information:

Use BOOTP:	No
IP Address:	whatever IT assigns
Subnet Mask:	whatever IT assigns
Gateway IP Address:	whatever IT assigns
Name Server IP:	whatever IT assigns
Status Address:	%I00201

To remove the Ethernet window, click on the "x" in the upper right of the window.

The processor is now configured.

Set up project communications. Select the processor name in the Inspector window (next to the gray diamond) and then right click on the processor name and select Properties.
If communicating via the Ethernet port:

In the Inspector window, scroll down until you see the Physical Port line.
It should be "ETHERNET".
Enter the following for the IP Address: whatever you used above

If communicating with the serial port:

In the Inspector window, scroll down until you see the Physical Port line.
It should be "COM1".

If the PC you are using also contains Rockwell Automation software, before downloading through the serial port, make sure RSLinx does not control the serial port. To do this, start RSLinx and click on the blue 'S' (configure drivers icon). Then select ABDF1 under "Name and Description". If the description for ABDF1 indicates "Running", then click the ***Stop*** button. The description will then indicate "Stopped."

You are now ready to configure the I/O channels.

2. I/O Configuration

Using the Proficy software, configuration of the inputs and outputs involves two steps:

1. specifying modules in the rack
2. assigning symbols to the I/O channels

The second step is not absolutely necessary, but it is easier to specify symbols now than when programming the ladder logic. The Proficy programming software aids the programming of a PLC because one does not need to memorize the I/O addresses and file addresses, but can refer to them symbolically, as a variable.

The PLC will be set up so that the module configuration is as follows:

Slot	Module	Description	Start Addr.
0	IC695PSA140	Power Supply	
2	IC695CPU310	CPU	
4	IC695ETM001	Ethernet module	%I201 (ENet status)
5	IC694MDL660	32 channel 24 volt disc. input	%I1
6	IC694MDL754	32 channel 12/24 volt disc. output	%Q1

Select the "Project" tab of the Navigator window (if not already selected). The name of your project should be displayed. To configure the I/O modules, do the following:

Expand the Hardware Configuration (Click on the +)

Expand Rack 0

Right-mouse "Slot 5" and select *Add Module…*. Select the "Discrete Input" tab. Select the appropriate module (IC694MDL660) and click on *OK*.

A configuration window with the module number on the tab will appear in the Editor window. Note that the starting address for this modules address is %I1. There is no configuration information that needs changing, so remove this module tab by clicking on the "x" in the upper corner.

Right-mouse "Slot 6" and select *Add Module…*. Select the "Discrete Output" tab. Select the appropriate module (IC694MDL754) and click on *OK*.

A configuration window with the module number on the tab will appear in the Editor window. Note that the starting address for this modules address is %Q1. There is no configuration information that needs changing, so remove this module tab by clicking on the "x" in the upper corner.

Now assign variables to the input/output channels. Click on the "Variables" tab in the Navigator window. An empty variable list will appear. To define variables and assign to the discrete input/output channels,

Right-click on the "Variable List" line.

Select *New Variable* and then the data type (BOOL). A variable list entry is created with "BOOL" as the name of the new variable. The "BOOL" variable will be highlighted and you are expected to change the variable name. Change "BOOL" to your symbol name, in this case "Start_PB" and press <Enter>. **Note:** if the BOOL variable is not contained in an edit box, right-mouse the variable name and select *Rename*.

If the "Ref Address" column is not shown, click on the icon in the upper left corner of the Navigator window (the Property Columns View icon).

Click in the "Ref. Address" column for this variable and change it to %I1 and then press <Tab> <Tab>..

If the cursor is not in the Description column, use the mouse or cursor keys to move the box to the Description column. Type in a description, for example, "Start push

button switch" and then press <Enter>. Note: you may want to move the left side of the Navigator window to see the Description column.

Repeat the above 5 steps to specify the variables and descriptions for the other input and output channels.

3. Specifying Other Variables

It is good practice to enter all of the variables before you start programming. However, Proficy will automatically create the undefined variables when compiling the program.

You should probably save your project now.

To check that the processor is properly configured, the blank program should be downloaded to the processor.

4. Processor Download

Before downloading the program, it should be verified by selecting from the program menu *Target | Validate "<name>"*. The errors and warnings are displayed in the Feedback Zone window. The Feedback Zone window should indicate 0 errors and 0 warnings. If you defined TON variables, you will see some warnings about setting the retentive properties on some of the fields. That is okay and you should not see the warnings for these timers again because Proficy fixed the problem automatically.

Before downloading through the serial port, make sure RSLinx does not control the serial port. To do this, start RSLinx and click on the blue 'S' (configure drivers icon). Then select ABDF1 under "Name and Description". If the description for ABDF1 indicates "Running", then click the *Stop* button. The description will then indicate "Stopped."

To connect to the processor, select from the program menu *Target | Go Online with "<name>"* or click on the "lightening bolt" icon. The progress is displayed in the Feedback Zone. If successful, "Connected to the device" is displayed.

Now go online with the processor by clicking on the green hand icon toward the upper left side of the screen. You should see a green diamond on the bottom right of the screen with a red "X" on top of it.

To download the program, select from the program menu *Target | Download "<name>" to PLC* or click on the icon that has a green arrow beneath a paper sheet. A window will be displayed asking which parts of the project to download. The "Hardware Configuration" should be checked only if downloading for the first time you are downloading the program. Subsequent times, it should be unchecked in order to save time. The download progress is displayed in the Feedback Zone. If successful, "Connected to device" is displayed.

You are now on-line, indicated by the green diamond at the bottom of the screen. Skip to the online editing functions.

For your information, to download **and start** the program, select from the program menu *Target | Download and Start "<name>" to PLC* or click on the icon that has a green arrow beneath a paper sheet and a triangle pointing right.

B. LADDER LOGIC PROGRAMMING

The box at the bottom of the screen should show "Stop" after the green diamond. The steps necessary to program the first part of the exercise, the series rung, will be explained in detail. For the other parts of the exercise, only the different steps required to do these parts are explained.

To show the ladder program in the Editor window, expand *Logic* in the Navigator window, expand *Program Blocks*, and double-click on *_MAIN*. The ladder logic window is marked off in rectangles, whose corners are indicated by the dots. Contact and coil instructions occupy one rectangle. Timer instructions occupy two or three (vertically stacked) rectangles. Counter instructions occupy three rectangles. Math instructions occupy at least three rectangles, depending on the number of inputs. The position of the cursor is indicated by the gray rectangle.

1. Two Contacts in Series (Logical AND)

The first ladder program to be implemented will be a simple series control rung. Two switches, SW3 and SW4, will be placed in series and will be used to control a single light, LA1.

To put in the contacts and coil, do the following:

- A normally open (NO) relay contact is needed at the input, so click on the NO contact in the toolbar above the ladder window. Now move the cursor to the upper left ladder logic position and click. A "Logic Change Options" window will appear. Click on the "Lose logic equality" option and then click on *OK*. A pink contact appears, connected to the left power rail. (Pink indicates that you are editing the program on-line and that you have not downloaded the program changes to the PLC.)
- An alternate way to select the NO contact is to select it from the Toolchest by expanding the *Contacts* folder. Select the appropriate contact symbol (-| |- NOCON) and holding down the left-mouse button, drag the gray rectangle to the upper left ladder logic position and release the mouse button.
- Add another NO contact to the next position right of the other contact.
- Add the output coil by clicking on the coil icon above the ladder window and then click on the position directly right of the two contacts. It will be actually placed in the tenth column. Alternatively, a coil can be selected from the toolchest *Coils* folder as -( )- COIL.
- Click on the Pointer icon (arrow to left of NO contact) to exit the component placement mode.

Double-click on the first contact and a window will popup, asking for the address or variable of the contact.

Switch SW3 will be used first, so type the variable or address for that switch ("SW3" or "%I3") and press <Enter>. The variable that controls the contact will appear above the contact symbol on the ladder diagram. Alternatively, if you have forgotten the variable name, select the variable from the displayed list.

Double-click on the other NO contact. Type the symbol or address for that switch ("SW4" or "%I4") and press <Enter>.

Double-click on the output coil and type the symbol or address for light LA1 ("LA1" or "%Q1").

The green diamond at the bottom of the window should have a red "X" on top of it and "Logic NE" should show in the window to the right of the green diamond. In order to run this program, the changes must be downloaded into the PLC. The changes you just made were not actually entered into the PLC memory. Click on the Download icon (green arrow beneath a paper sheet) and then the Run icon (right-pointing triangle). If a "Start Controller" window pops up, select "Outputs Enabled" and then *OK*. The right box along the bottom of the window should show a green diamond and "Logic EQ".

Try the input switches in various combinations and observe the output. Also observe the changing status of ladder components on the screen. Energized or true conditions cause the elements to be highlighted (green) on the ladder diagram. Note that if SW3 is off, and SW4 is on, the second contact does not highlight, but the "SW4" changes to green to indicate that the switch is on, even though power is not flowing through the contact, due to SW3 being open.

2. Entering Branches (Logical OR)

Stop the controller to change the processor back to program mode:

Click on the Stop icon (black square), select "Outputs Disabled" and then click on *OK.*

The SW4 contact is deleted and then added to the row below the contact for SW3. To place the SW4 contact in parallel with the SW3 contact,

Delete the SW4 contact by selecting it (gray rectangle around it) and pressing the <Del> key. A "Logic Change Options" window will appear. Click on the "Lose logic equality" option and then click on *OK*.

Now, click on the Horiz/Vert Wire icon ("T" rotated CCW 90 degrees). Move the cursor into the ladder. Notice that as you move the cursor, it indicates a vertical or horizontal line. Move it to the blank spot. It should change to a horizontal line. Click the mouse to the "fill in" the place where the contact was deleted.

Move the cursor below and to the right of the SW3 contact. It should change to a vertical line. Click the mouse and a vertical branch is added below SW3.

Add a NO contact to the ladder position beneath the SW3 contact. Select the Pointer icon. Double-click the new contact and type "SW4" to add the variable to it.

Download the program and start the processor. The controller is now set to respond to input conditions and perform appropriate output commands.

Note: to make on-line changes and download the processor, it is not necessary to stop the processor. If you download the processor while it is running, you will be asked if you really want to do the download, but you will not be forced to stop the processor.

3. Timers

A timer occupies two or three (vertically stacked) rectangles on the screen. To place a timer block in a network:

> Expand the *Timers* folder in the Toolchest to show the available timer function blocks. The timer resolution is indicated by the block name suffix. Note that _SEC is not supported by the RX3i processors. (The timer icon located just after the -(R)- coil icon is a **retentive** on-delay timer.)
>
> Drag-and-drop the appropriate timer (TMR_...) to the ladder window. Note that they cannot be placed in the first column. The cursor will change to a circle with a diagonal if you are trying to place a block in an illegal location.
>
> Double-click on the "????" field in the timer block. Type the timer variable name in the popup window. If the timer variable does not exist, it will be created for you.
>
> Place the logic for the timer input (top input connection).
>
> To specify the preset (PV) input, double-click on the blank space just to the left of the PV input. Either type in the preset value as an integer, or specify an integer variable that contains the preset value.

When downloading the changed program, if you created a new timer variable, a pop-up will appear. The "Cleared" option should be selected and then click on *OK*.

As the program is executing, the timer accumulator value is shown as a number just above the timer variable in the timer block. The timer values can also be viewed in the Data Watch window as follows:

> <name>[0]   Accumulator
> <name>[1]   Preset
> <name>[2]   Control word

4. Counters

A counter occupies three (vertically stacked) rectangles on the screen. To place a counter block in a network:

> Expand the "Counters" folder in the Toolchest to show the available counter function blocks. Alternatively, the up and down counter icons are located just left of the horiz/vertical wire icon.
>
> Drag-and-drop the appropriate counter to the ladder window. Note that they cannot be placed in the first column. The cursor will change to a circle with a diagonal if you are trying to place a block in an illegal location.

Double-click on the "????" field in the counter block. Type the counter variable name in the popup window.

Place the logic for the counter input (top input connection) and the reset (R) input.

To specify the preset (PV) input, double-click on the blank space just to the left of the PV input. Either type in the preset value as an integer, or specify an integer variable that contains the preset value.

As the program is executing, the counter accumulator value is shown as a number just above the counter variable in the counter block. The counter values can also be viewed in the Data Watch window as follows:

<name>[0]   Accumulator
<name>[1]   Preset
<name>[2]   Control word

5. Online Editing With PLC in Run Mode

The ladder logic program may be edited while the PLC is in the Run mode. Proficy actually has two modes of on-line editing. If an edit to the program is started while on-line, the user is presented with a pop-up window with two choices:

Enter Test Edit Mode
Lose Logic Equality

If one selects, "Lose Logic Equality", the editing is essentially done off-line and then downloaded to the processor. If one selects "Enter Test Edit Mode", then the editing is done on-line.

In Test Edit Mode, a few more steps are required, since edited rungs are not immediately executed. The process of Test Edit Mode editing is illustrated by Figure 2. After rungs are edited, they must be tested and then "assembled" before the process is complete. If the edits are discovered to be unacceptable while in the Test Edit mode, the test may be cancelled and then modify the edits of the edits may be cancelled.

While in the Test Edit Mode, purple lightening bolts appear in the margins. The type of editing on a particular rung is indicated in the left margin:

(Del) – being deleted
(Ins) – new rung
(Mod) – modifying an existing rung

While editing, the new rungs are not being executed, shown as a white background. While testing edits, the new/modified rungs are shown with a light blue background. The old or deleted rungs are shown with a darker gray background, indicated they are being skipped.

To test the new rungs, right click on the ladder and select *Debug | Test Edits*. While testing edits, the new/modified rungs are shown with a light blue background. The old or deleted rungs are shown with a darker gray background, indicated they are being skipped.

If the program operation with the new rungs is acceptable, then right click on the ladder and select *Debug | Accept Edits*. When the rungs are assembled, the old rungs are deleted from the PLC memory and the edit zone markers are removed.

If the new rungs are unacceptable, either while editing or during testing, right click on the ladder and select ***Debug | Cancel Edit***. One is presented with a popup with three options:

Restore original logic in editor – complete cancel the edits
Keep modified logic in editor – keeps modified rungs, going back to essentially off-line editing.
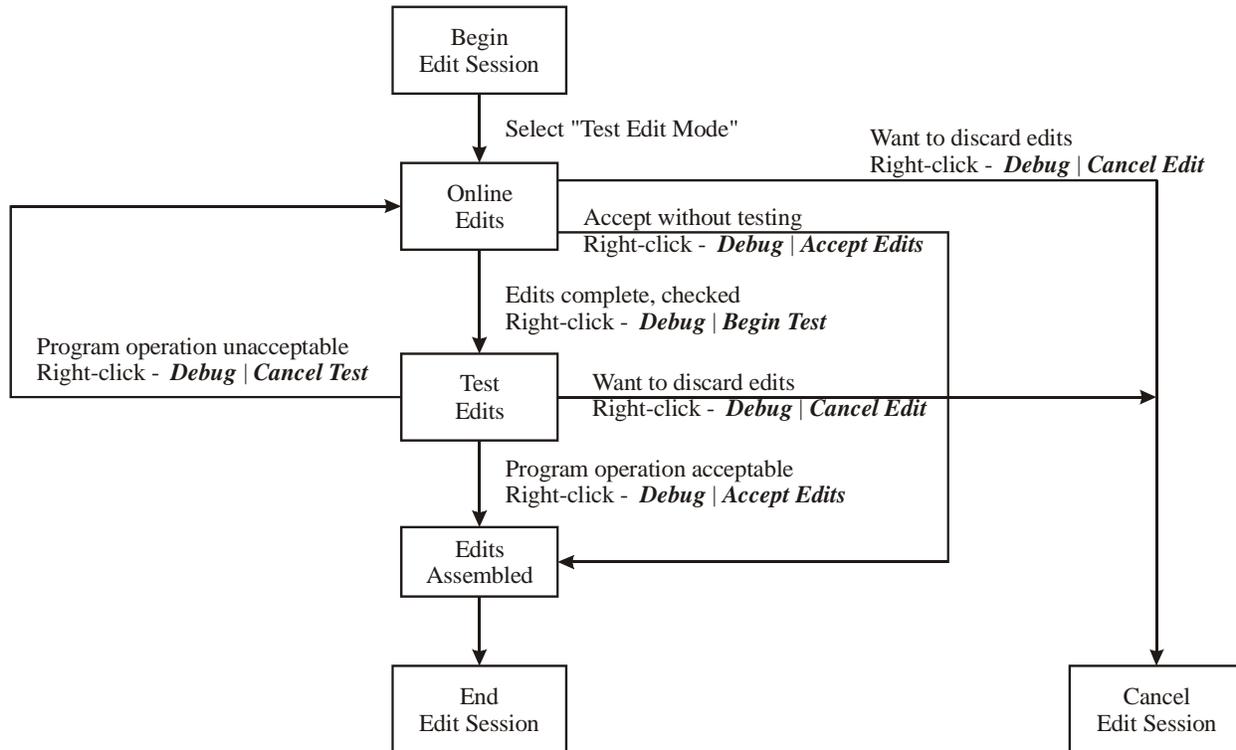Stay in Test Edit mode – returns to Test Edit mode

Fig. 2. Test Edit Mode steps.

C. ADDING COMMENTS TO LADDER PROGRAM

To insert a comment, put the cursor anywhere along the top row of a rung. From the main menu, select ***Insert | Comment***. A row is inserted and blank comment box appears in this new row. Click inside the comment box and type your comment. When finished, click outside the comment box.

D. DEFINING VARIABLES AND/OR ASSIGNING TO ADDRESSES

For a large project, it is much easier to enter the symbols into an external file in the format of comma separated variables and import them into the database. However, for the purposes of this lab, it is probably easier to manipulate the database directly. There are times

when one will want to assign a specific address to a variable, or to correct an incorrectly entered variable.

To define or change variables, click on the "Variables" tab in the Navigator window. The variable list will appear. To define a new variable,

Right-click on the "Variable List" line.

Select *New Variable* and then the appropriate data type. A variable list entry is created with the data type as the name of the new variable. The data type name will be highlighted and you are expected to change the variable name. Change to your variable name.

If the variable should be attached to a physical I/O channel, the address should be placed in the "Ref Address" column. If the "Ref Address" column is not shown, click on the icon in the upper left corner of the Navigator window (the Property Columns View icon). Click in the "Ref. Address" column for the variable and change it to the appropriate address.

Enter an appropriate description in the Description column. Note: you may want to move the left side of the Navigator window to see the Description column.

To modify the variable name and/or description for an address, use the mouse or cursor keys to highlight the appropriate box and type in the correct information. To move to another field, use the mouse to select another field.

To delete a symbol from the database, use the mouse or cursor keys to highlight the variable name in the record. Press the <Del> key. A confirmation popup appears. Click on **OK**.

E. DISPLAYING VARIABLE VALUES

Variables are displayed in the Data Watch window. Double-click on a blank entry in the "Variable Name" column and type in the name of the variable.

To change the value of an internal variable in the data watch table, double-click in the "Value" column. Now change the value. For Boolean variables, one can also right-click in the "Value" column and select "Turn On" or 'Turn Off'.

F. INPUT/OUTPUT FORCING

For inputs, the force function allows one to override the actual status of external inputs by forcing individual discrete inputs to be ON or OFF. Input forces are written to the input image table and have no effect on the actual input. The value in the force table overrides the actual input. For example, if %I83 is forced to 1 (ON), it will appear in the input image and ladder logic as 1, regardless of the actual status of the device.

For outputs, the force function allows one to override the processor logic and force individual discrete outputs to be ON or OFF. Output forces are written directly to the output

device and do not appear in the output image table. The value in the force table overrides the value in the output image. For example, if %Q2 is forced to 1 (ON), the actual output will be ON, regardless of how it appears in the ladder and output image table.

Note: Enabling or disabling forces can result in sudden machine movement, possibly injuring personnel. Applying of removing forces while forces are enabled takes place immediately, with no prompt for confirmation. **USE EXTREME CAUTION WHEN USING FORCES!**

When the cursor is on a contact controlled by a physical discrete input, forcing functions are accessed by right-clicking the mouse. The forcing functions are:

Force ON	Forces the physical input **on**.
Force OFF	Forces the physical input **off**.
Remove Force	Removes the forcing.

A forced input is indicated by the underlined red symbol/address.

G. IMPORTING/EXPORTING

1. Importing Database from CSV File

One must be offline to import variables.
To import an address/tag/description database from a .CSV (comma-separated variable) file:
    Right-click on the top line in the "Variables" tab in the Navigator window).
    Select Import.
    A pop up will ask to specify certain import options. The defaults should work in most situations. The options are as follows:
        Identify variable conflict
            By variable name – when name of variable in import file matches the name of a variable already in the data base.
            By variable address and data type– when name of variable and data type in import file matches the name and data type of a variable already in the data base.
        If there is a conflict
            Keep existing variable properties – new variable(s) will not be imported.
            Overwrite existing variable properties – new variable(s) will replace existing in project.
            Rename imported variable – new variable(s) name will be suffixed with a two-digit number and then added to the project data base.
    Click on *Next>*
    An window will open to allow one to select which variable to import. To import all, click on *All >>*
    Click on *Next>*

On the next screen review the selection and the click on *Finish*.
The variables are imported.

2. Exporting Database to CSV File

To export a variable database to a .CSV (comma-separated variable) file:
Right-click on the top line in the "Variables" tab in the Navigator window).
Select Export.
An export window will open. Select folder for file to be placed. Name destination file.
Click on *Save*.

Note that individual variables may be exported, also.

H. SAVING LADDER LOGIC PROGRAMS

Ladder logic programs (projects) are automatically saved to the default program directory on the hard disk. One then saves the program to a flash drive for backup/transport to another computer.

The default directory where programs are saved is

C:\Program Files\CIMPLICITY Machine Edition\SecurWORX\Local\FrameworX

To change the default directory where programs are saved,

Close the open project
In the Navigator window, click on the "Options" tab and select *Machine Edition | Preferences*.
In the Inspector window, scroll down to the "Project Files Location".
Change the directory.

To best way to save a project that will be moved to another computer is to backup the project,

Close the open project
In the Navigator window, click on the "Manager" tab.
Right-click on your project, and select *Back Up...*
A backup window will open. Select folder for file to be placed. Name destination file.
Click on *Save*.

I. RESTORING LADDER LOGIC PROGRAMS

Restore a previously backed-up project file with the following steps:
    Close any open projects.
    In the Navigator window, click on the "Manager" tab.
    Right-click on the "My Computer" line, and select ***Restore...***
    A restore window will open. Select folder and file of the project archive (.zip) file.
    Click on ***Open***.
    If the project by this name already exists on the computer, a pop-up will appear.
        Select either "Rename" or "Overwrite" as appropriate.
    The project is now loaded into the PC

J. PRINTING A LADDER LOGIC PROGRAM

You may print your program only while disconnected from the PLC (off-line).

Set ladder view options to "full comment"
    Select first tab in Navigator window
    Select ***Editors*** | ***Ladder*** | ***View***
    In inspector window, set comment mode to "Full"

To print program,
    Right-mouse ***Program Blocks***
    Select ***Print LD Blocks***
    Select appropriate blocks
    Select "Print rung comments" and "Full- entire comment"
    Do not select "Show variable cross reference between rungs"
    Do not select "Shrink to fit"

To print variable list,
    From main menu, select ***Variables*** | ***Report***
    Select "All variables by name"
    Click on "Print"
    Print-out appears in an InfoViewer window.
    Select ***File*** | ***Print***
    Prints on default printer.