5.0 Editing Programs Online

Editing a program online lets you modify ladder logic and the initial values of variables as well as set, force, and unforce variables. You can be connected to a Processor via a serial connection or a PC Link interface connection. If you are connected via the PC Link module, you can have multiple online programs from different networked racks opened simultaneously.

While a program is running, you can view the power flow of executing logic, variable state information, and any instruction runtime error codes generated.

An Overview of Editing and Downloading the Changes

Step 1. Open the program by using the Monitor PC Program command from the Editor, Task Manager, or System Configurator.

Step 2. Make your changes to the online program.

Step 3. Accept the changes.

Step 4. Download the program modifications to the Processor.

About the Changes You Can Make

While editing an online program, you can add new variables with some limitations and restrictions, but you cannot add or edit variable or rung descriptions. See "About the Limitations for Inserting and Modifying Rungs in Online Programs" in Appendix D for more information. When you add global variables, make sure the variables are non-volatile and do not have retained initialization data. You must define global variables in the Variable Configurator database. If you enter a global variable in an online ladder program and that variable is not in the Variable Configurator database, you get a verify error when you commit the online changes.

IMPORTANT

Add global variables to the Variable Configurator database before making the online changes.

You can also view rung and variable descriptions. When opening an online program, you can choose whether or not you want to display rung and variable descriptions. When you open an online program, the logic is uploaded from the Processor to your computer. If you choose to display the variable and rung descriptions, these are extracted from the program's source file, which must be accessible by located on the computer you are using to edit the online version of the program. For more information, see "Choosing To Display Descriptions While Editing/Viewing an Online Ladder Program" in the AutoMax Ladder Editor and Enhanced Ladder Language online help.

About Accepting and Downloading Your Changes

When you set, force, unforce, or change a variable's initial value, the change takes effect immediately in the online program. Other changes such as adding, deleting, or modifying a rung must be accepted before the change takes effect. You can accept one or all rungs that have been added, deleted, or changed. Accept changes that you want to download to the Processor. Once any changes are accepted, you can temporarily load them into the Processor (place the program in test mode) or permanently download them to the Processor (commit the changes).

Before any changes are downloaded to the Processor, either permanently or temporarily, the changes are verified using the same rules used for verifying offline programs. If the program does not pass the verification process, you must correct the errors and accept them again. An edited online program is downloaded to a Processor only when all the accepted changes to the program have been successfully verified. The verified changes are downloaded to the Processor as a group, not as individual rungs. See "About How Changes Made to Online Programs are Verified" in section 5.9 for more information.

About Accessing the Online Task Manager

You can access the Online Task Manager from the Editor, Task Manager, or the System Configurator. The Online Task Manager and the Editor cannot share the same communication channel. If you need to use the Online Task Manager while editing an online ladder program, you must place the Editor in a paused state. By pausing the Editor, you free up the communication channel so the Online Task Manager can use it. See section 5.3 for more information.

5.1 About the States of Online Programs

An online program is in one of the following states at any time:

State:	Description:	How the state is indicated:
Run	The program is actively executing in a Processor and power flow is displayed.	The word "RUN" appears the Editor's status bar, and the left power rail is highlighted in the power flow color. In the Online Task Manager, the word "Run" appears in the status column.
Stopped	The program is **not** actively executing.	The word "STOP" appears the Editor's status bar. In the Online Task Manager, the word "Stopped" appears in the status column.

State:	Description:	How the state is indicated:
Test mode	The program is actively executing rungs, but the changes made to an online program are not permanently installed in the Processor. You can test the changes you made to an online program.	The text “Test Mode” appears after the file name in the window’s title bar. See “Testing Programs (Test Mode),” section 5.8, for more information.
Paused	When the Editor is paused, the programs continue to run in the Processor, but their display in the program window is not updated. The Processor connection is freed so you can access the Online Task Manager. Because the Online Task Manager and the Editor cannot share the same communication channel to the Processor, the Pause command allows you to place the Editor into a paused state. The online program windows that are paused after you select the Pause command from the Online menu are: • windows containing your online programs • Original Program window The Set/Force/Unforce dialog box is also closed.	The status bar for windows that are in the paused state is blank and the text “Paused” appears before the file name in the window’s title bar. See “Pausing the Editor,” section 5.3, for more information.

5.2 Monitoring an Online Ladder Program

Before you can edit an online program, you must open it using the Monitor PC Program command from the Online menu. You access this command from the Editor, Task Manager, or System Configurator.

To monitor an online ladder program

Step 1. Close the Online Task Manager application if it is running.

The Online Task Manager uses the same online connection as an opened online program. Both applications cannot be accessed at the same time.

Step 2. Do one of the following:

- From the Online menu of the Editor, Task Manager, or Software Configurator, choose Monitor PC Program.

or

- Click on 

The Monitor PC Program dialog box is displayed.

Step 3. Using the Look In area of the dialog box, navigate to the location containing the ladder program you want to open. You can look in these folders:

- Direct – for programs available in the Processor to which you are connected
- Network – for programs located on Processors connected to the network

Step 4. Once you have located the program you want to monitor, select the program's icon displayed in the Files area of the dialog box. To select more than one program to open, do one of the following:

- Draw a selection box around the programs you want to open.
- To select individual programs, press [CTRL] while selecting the program icons with the mouse.
- To select all programs, select the first program, and press [SHIFT] while selecting the last program.

Notice that the program's name appears in the File name field.

Step 5. If you want to view the rung and variable descriptions while monitoring the online program, see "Choosing To Display Descriptions While Editing/Viewing an Online Program" in online help.

Step 6. Click OK to open the program.

The program you selected is opened.

Tip

You can have multiple online programs opened at once.

5.3 Pausing the Editor

Because the Online Task Manager and online programs in the Editor use the same communication channel, you must place the Editor in the Paused state before you can use the Online Task Manager. The programs continue to run in the Processor, but their display in a program window is not updated.

IMPORTANT

Before pausing the Editor's online program windows, you might want to commit any pending changes. All pending changes are lost once an online program is paused and then removed from the paused state.

Any trigger information is also lost when you remove online program windows from the pause state.

To pause or un-pause the Editor

- From the Online menu, choose Pause.

  or

- Click on 

While online programs are paused, the status bar is blank and the word "Paused" appears in the programs' title bar.

Remove the programs from the paused state when the communication port is again available. The Editor re-establishes communication to all available ports and notifies you when a connection is not available. If a connection is not available, the online programs stay paused.

For more information about the paused state, see section 5.1.

5.4 About Power Flow

Power flow indicates the rungs and instructions that are executing in an online program. It is shown as a bar of color that highlights wires that are connected together. You can define the color of power flow using the Colors Option tab of program properties.

The state of a variable is shown as a solid block of color in the contact. For positive transition contacts (PTI), the block of color is shown when the contact is true, but power flow from the contact is shown only during the scan where the transition is true. The same concept applies to the negative transition contacts (NTI). The block of color in an NTI is shown when the contact is false, but the power flow from the contact is shown only during the scan in which the transition is true.

Hatch marks in the rung status area identify rungs that are not executing. For non-executing rungs, the power flow and last state information you see are those from the last time the rung executed since you started monitoring the online program. Factors causing rungs not to execute are:

- They could be skipped via a Jump instruction.
- The program is executed based on an event.
- The program is stopped.
- The scan time of the program is very long.

5.5 Monitoring Data in an Online Program

While a program is running online, the data is displayed as follows:

- Forced variables are highlighted in the Forced Variable color, defined via the Color Option tab of the Program Properties.
- Numeric values are displayed under the variable name. You can define the data display format using the Variable Properties tab for the variable but only in an offline program.
- A timer's elapsed value is displayed under the timer variable name.
- A counter's current value is displayed under the counter variable name.
- If the preset of a timer or counter variable is changed via logic, the new preset value is displayed under the original preset value.
- For variables using element or bit-indexing, the display format is that of the base variable. For example, if you specified variable *array* to be displayed as decimal and the variable *element* to be displayed in hexadecimal, the value of the variable *array[element]* would be displayed in decimal.
- For element-indexed array variables (array[element]), the value displayed is that of the element.

5.6 Accepting Changes Made to Online Programs

After editing an online program, you must approve the changes before the Editor can download them to the Processor by using the Online menu's Accept command. You can accept modified, added, or deleted rungs either individually or as a group. You can also reject any change. Rejected changes are not recoverable.

You do not have to accept changes to an online program that are made through the Set/Force/Unforce dialog box or that caused the initial value of a variable to be changed because these changes take effect immediately.

To accept or reject changes made to an online program

Step 1. When you are finished editing an online program, do one of the following:

- Choose Accept from the Online menu

  or

- Click on 

The first edited rung is highlighted and displayed along with the Accept Online Changes Dialog box.

Step 2. From the Accept Online Changes dialog box, perform one of the following actions:

To:	Choose this button:	Result:
Approve the displayed rung.	Accept	The next edited rung is displayed for you to accept.
Approve all the rungs that you added, deleted, or modified.	Accept All	The Commit Online Changes dialog box is displayed. You can immediately download the changes to the Processor or temporarily download the changes to the Processor by placing the program in Test Mode. See “Downloading Changes Made to an Online Program (Commit Online Chnges),” section 5.7.
Discard the changes made to the rung.	Reject	The Editor returns the rung to its original construction.
Cancel the Accept process and return to editing the online program.	Cancel	The Accept Online Changes dialog box disappears. You can resume editing the online program. Your current modifications are unaffected.

If you have accepted at least one rung, you can commit the change or place the program in Test Mode. If not, you can resume editing the program.

5.7 Downloading Changes Made to an Online Program (Commit Online Changes)

After accepting added, deleted, or modified rungs, you must commit the changes before the Editor can download them to the Processor. You use the Commit Online Changes dialog box to do this. The Editor automatically displays this dialog box after you have finished accepting the changes made to an online program. You must have accepted at least one online change for the Editor to display the dialog box.

From the Commit Online Changes dialog box, you must choose how to download the online changes to the Processor. You can download the changes to the Processor by sending the changes to the Processor and either:

- immediately install the changes in the program by selecting Commit
- temporarily install the changes in the program by selecting Test Mode

The changes are downloaded to the Processor as a group.

To download changes made to an online program (commit)

Step 1. Accept the changes to an online program. See "Accepting Changes Made to Online Programs," section 5.6.

The Editor displays the Commit Online Changes dialog box.

Step 2. From the Commit Online Changes dialog box, choose one of the following:

To:	Choose this button:	Result:
Send the accepted online changes to the Processor and install them.	Commit	The online changes are verified. See "About How Changes Made to Online Programs are Verified," section 5.9, for more information. Once the changes are successfully verified, they are downloaded to the Processor.
Send the accepted online changes to the Processor and temporarily install them.	Test Mode	The online changes are verified. See "About How Changes Made to Online Programs are Verified," section 5.9, for more information. Once the changes are successfully verified, they are temporarily downloaded to the Processor. The program is placed into Test Mode so that you can see how your changes perform before they are permanently installed in the Processor. See "Testing Programs (Test Mode)," section 5.8, for more information.
Cancel the Commit process and return to editing the online program.	Cancel	The Commit Online Changes dialog box disappears. You can resume editing the online program. Your current modifications are unaffected. When you are finished editing, you must begin the Accept process again.

5.8 Testing Programs (Test Mode)

Selecting Test Mode from the Commit Online Changes dialog box places the program in the Test Mode state, which provides you with an opportunity to make sure that the changes you made work properly before you permanently install them in the Processor. Once a program is in Test Mode, you can:

- commit the online changes, which permanently installs the program in the Processor (see section 5.8.1 for more information)
- take the program out of Test Mode, which allows you to resume editing the program with your current modifications unaffected (see section 5.8.2 for more information)
- cancel all changes

While a program is in Test Mode, you cannot make any changes to it or download a configuration to a rack.

To place an online program in Test Mode

Step 1. After editing an online program, choose Accept from the Online menu.

Step 2. Accept the online changes.

Step 3. From the Commit Online Changes dialog box, choose the Test Mode button.

The online changes are verified. See "About How Changes Made to Online Programs are Verified," section 5.9, for more information. If the changes are successfully verified, they are installed in the Processor. To make the changes permanent you must commit them.

5.8.1 Committing an Online Program in Test Mode (Commit Changes in Test Mode)

Once a program is in Test Mode and you are satisfied with the changes you made, you must commit these changes before they can be installed permanently in the Processor. Use the Commit Test Mode changes command from Online menu.

To commit save an online program in Test Mode

Step 1. Make sure the program is in an active program window.

Step 2. From the Online menu, choose Commit Test Mode Changes. The Editor prompts you to confirm your decision.

Step 3. To commit the changes, click Yes. Clicking No removes the question dialog box, leaving the program unchanged.

Once the rungs are successfully committed, the Editor removes the program from Test Mode and displays the rungs in the non-modified rung color.

5.8.2 Removing an Online Program from Test Mode

If you want to continue making changes to an online program that is in Test Mode, you must first take it out of Test Mode. You can do this by using the Quit Test Mode command from the Online menu. Taking a program out of Test Mode removes the changes from the Processor. The modified rungs are no longer running on the Processor; the original rungs are now executing.

IMPORTANT

If you delete a counter data structure as part of the online changes, the counter has retained its value while the changes were in Test Mode. When you remove the program from Test Mode, the counter is storing a current value since the change that deleted the counter was not accepted.

If you delete a timer data structure as you edit an online program, the timer is reset when you remove the program from Test Mode without accepting the online changes.

To remove an online program from Test Mode while retaining pending changes

Step 1. Make sure the program is in an active program window.

Step 2. Do one of the following:

- From the Online menu, choose Quit Test Mode

  or

- Click on 

  The Editor prompts you to confirm your decision.

Step 3. To remove the program from Test Mode, click Yes. Clicking No removes the question box, leaving your program in Test Mode.

The online program continues to display the modified rungs. You can continue to make changes or cancel all the online changes. You must accept added, deleted, or modified rungs before they can be installed in the Processor again.

5.8.3 Canceling All Changes Made to an Online Program

You can cancel any pending changes made to an online program or remove the program from Test Mode by using the Cancel All Changes command. Pending changes are those that have not yet been committed to the Processor. You cannot cancel changes to a variable that resulted in setting, forcing, or unforcing it or changing its initial value, since these changes take effect immediately.

To cancel all changes made to an online program

Step 1. Make sure the program is in an active program window. The program can be in Test Mode.

Step 2. From the Online menu, choose Cancel All Changes. The Editor prompts you to confirm your decision.

Step 3. To cancel the changes, click Yes. Clicking No removes the question dialog box and leaves the online program unchanged.

All pending changes are removed from the program. If the program was in Test Mode, it is removed from this mode.

5.9 About How Changes Made to Online Programs Are Verified

Once you commit any online changes after accepting the rungs, the Editor verifies the changes before they are downloaded to the Processor. The changes are verified using the same rules that are used for offline programs. All accepted online changes must be successfully verified before they are installed into a Processor.

When online program changes are verified, the Editor ignores warnings and does not check against the Variable Configurator database.

The Editor generates a log file only if you have selected the Generate Log File verify option. For more information, see "Creating a Verify Error Log File," section 4.1.

If the program is not successfully verified, you must correct the errors, re-accept the rungs, and commit the changes or enter test mode. The Editor also notifies you when either of the following events occur:

If this event occurs:	Do the following:
a global variable has been defined in the program that is not in the online configuration	Step 1. Reject the changes containing the global variable(s). Step 2. Commit any other changes. Step 3. Go offline and add the new global variable(s) to the Variable Configurator database. Step 4. Load the configuration. Step 5. Monitor the ladder program again and add the logic with the global variables. Step 6. Accept and commit the changes.
the amount of memory for the accepted online changes exceeds the amount of memory reserved for online modifications	Increase the amount of memory allotted for online modifications. See "Specifying the Amount of Memory Reserved for Editing a Program Online" in Appendix D.
the online changes exceed the allowed number of variables, timers, counters, or labels	Edit the program to correct the limitation errors and re-accept the program. See "Specifying the Amount of Memory Reserved for Editing a Program Online" in Appendix D.

Tip

You can use the Verify command to check your online changes before you accept them.

5.10 Viewing an Online Program as It Looked Before It Was Edited

While you are editing an online program and before you commit any online changes, you can view the same program as it appeared before you began making modifications. The Editor displays the original program in a separate window. The text "(Original Program)" printed before the file name in the window's title bar helps you identify the original program from the edited version. Use the Show Original Program command to display an original version of the program you are currently editing online.

To view an online program as it looked before it was edited online

Step 1. Make sure the online-edited program for which you want to view the original version is in the active online program window.

Step 2. Do one of the following:

- From the Online menu, choose Show Original program.

  or

- Click on 

In the Original Program window, power flow and rung numbers are displayed as they appear in the online edited version. If a rung was deleted, the corresponding rung in the Original Program window is marked with a "D" revision mark and displayed using the color defined for modified rungs.

The Editor updates the original program window with any changes you make to the online program. For example, if you insert a rung in the online program, the rung numbers in the original program are updated. However, you cannot make any changes to the original program; it is a read-only file.

When you cancel all changes made to an online program, this program then matches the original version. When you commit changes made to an online program, the Editor updates the version displayed in the original program window to match the one in the online program window.

5.11 Capturing the State of Logic in an Online Program

While monitoring a program, you can freeze or capture the power flow of a given rung using the Capture Trigger command from the Online menu. When the trigger is activated (becomes true), the state of the rung is captured and displayed. The rung's power flow information is not updated on the computer; however, it continues to run on the Processor. The Editor obtains trigger information from the Processor. You can capture a rung's status based on one of the following conditions:

- a coil turns on
- a coil turns off
- an error occurs with an instruction in a rung

If more than one coil exists, the coil used for the trigger is a rung's upper-right-most coil. Once a trigger is set, it is active on the next program scan. Triggers are edge-sensitive. (For example, a coil-on trigger is activated the next time that the coil goes true.)

Only one trigger can be set for a rung, but you can set multiple triggers in an online program. The only limitation is the amount of available Processor memory.

Triggers are local to the computer that set the trigger. Other online connections cannot view these triggers until they are activated.

A trigger remains set as long as the rung is displayed in the online program window. Once the triggered rung scrolls off the screen, the trigger is cleared. Also, closing an online program window clears all the triggers set in the program.

Rungs that have triggers set are indicated by a letter displayed in the rung status area representing the trigger type, either an "o", "f", or "e". When a trigger is activated, this indicator is replaced by a "T." If a rung is marked by a revision mark, the trigger indicator replaces the revision mark until the trigger is cleared.

This table summarizes some points to keep in mind if you set triggers on rungs that already contain a trigger.

If a rung already has a trigger set and you:	**Then the Editor:**
• modify the rung, or • scroll the rung off the screen, or • close the program window	clears the trigger
select the same trigger type for a new trigger	resets the trigger
select a different trigger type for a new trigger	clears the current trigger and assigns the new trigger to the rung

The Editor notifies you when another online connection has set a trigger for the same rung.

5.11.1 Capturing the State of Logic Based on a Coil Becoming True

You can freeze the power flow of a rung based on its upper-right-most coil turning on (becoming true). You use the Coil On command from the Capture Trigger menu. When a rung has a Coil On trigger set, the rung is marked with a letter “o” in the rung status area.

To set a Coil On trigger

Step 1. Select the rung or at least one instruction in the rung for which you want to set a trigger. See “Selecting Rungs,” section 2.2, or “Selecting Instructions,” section 2.7, for more information.

Step 2. From the Online menu, select Capture Trigger. Move the mouse to the right to display the Capture Trigger menu.

Step 3. From the Capture Trigger menu, choose Coil On.

When the coil goes true, “T” is displayed in the status area and power flow stops updating. The state of the rung when the coil went true is displayed until the trigger is reset or cleared.

5.11.2 Capturing the State of Logic Based on a Coil Becoming False

You can freeze the power flow of a rung based on its upper-right-most coil turning off (becoming false). You use the Coil Off command from the Capture Trigger menu. When a rung has a Coil Off trigger set, the rung is marked with a letter “f” in the rung status area.

To set a Coil Off trigger

Step 1. Select the rung or at least one instruction in the rung for which you want to set a trigger. See “Selecting Rungs,” section 2.2, or “Selecting Instructions,” section 2.7, for more information.

Step 2. From the Online menu, select Capture Trigger. Move the mouse to the right to display the Capture Trigger menu.

Step 3. From the Capture Trigger menu, choose Coil Off.

When the coil goes false, “T” is displayed in the status area and power flow stops updating. The state of the rung when the coil went false is displayed until the trigger is reset or cleared.

5.11.3 Capturing the State of Logic Based on a Rung Error

You can freeze the power flow of a rung based on a run-time error occurring within the rung. Run-time errors may be those caused by an instruction. You use the Rung Error command from the Capture Trigger menu. When a rung has a Rung Error trigger set, the rung is marked with a letter “e” in the rung status area.

To set a Rung Error trigger

Step 1. Select the rung or at least one instruction in the rung for which you want to set a trigger. See “Selecting Rungs,” section 2.2, or “Selecting Instructions,” section 2.7, for more information.

Step 2. From the Online menu, select Capture Trigger. Move the mouse to the right to display the Capture Trigger menu.

Step 3. From the Capture Trigger menu, choose Rung Error.

When a run-time error occurs for an instruction in a rung, “T” is displayed in the status area and power flow stops updating. The state of the rung when the error occurs is displayed until the trigger is reset or cleared.

5.11.4 Waiting for Triggers While Continuing To Edit

You can wait for triggers while continuing to work with the Editor. After setting any triggers, you can minimize the program’s window or open a new window for the program.

You can also display triggers in a program using two computers. Use one computer to set and display the triggers for an online program while using another computer to monitor the program, including scrolling through the same online program.

5.11.5 Re-Activating a Trigger

You can reset an activated trigger on a selected rung. This re-initializes a rung’s frozen trigger.

To re-activate a trigger

Step 1. Select the rung or at least one instruction in the rung containing the trigger you want to reset. See “Selecting Rungs,” section 2.2, or “Selecting Instructions,” section 2.7, for more information.

Step 2. From the Online menu, select Capture Trigger. Move the mouse to the right to display the Capture Trigger menu.

Step 3. From the Capture Trigger menu, choose Reset Trigger.

5.11.6 Clearing a Trigger

You can remove a set trigger for a selected rung. Once the trigger is removed, the rung's status area returns to the state it was in prior to the trigger being set.

To clear a trigger

Step 1. Select the rung or at least one instruction in the rung containing the trigger you want to remove. See "Selecting Rungs," section 2.2, or "Selecting Instructions," section 2.7, for more information.

Step 2. From the Online menu, select Capture Trigger. Move the mouse to the right to display the Capture Trigger menu.

Step 3. From the Capture Trigger menu, choose Clear Trigger.

The Editor also clears triggers when the selected rung is scrolled out of view on the screen or when an online program is closed.

5.12 Setting and Forcing Variables in Ladder Programs

You can set and force variables in ladder programs to put them temporarily in a known state for debugging purposes. To set, force, and unforce variables, you must have an online program window open. You can set or force any global variable in the configuration or any local variable present in a task that is loaded into the rack.

IMPORTANT

You can force only simple variables. You cannot force element-indexed or bit-indexed variables. For example, you cannot force variables like: vat.13, array_var[11], array_var[index_name], array_var[11].12, or array_var[index_name].bit_name.

WARNING

THE SET AND FORCE FUNCTIONS BYPASS CONTROL OF THE APPLICATION PROCESS BY THE APPLICATION PROGRAMS. IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE POTENTIAL HAZARDS INVOLVED. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.

WARNING

VARIABLES AND OUTPUTS THAT ARE FORCED BEFORE AC POWER IS LOST WILL REMAIN FORCED WHEN AC POWER IS RESTORED. SHOULD AC POWER BE LOST WHILE VARIABLES ARE FORCED, THE USER MUST ENSURE THAT UNEXPECTED MACHINE MOVEMENT DOES NOT OCCUR WHEN AC POWER IS RESTORED. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.

About Setting a Variable

To set a variable is to write a value to it that can be over-written by an instruction in the same program, another program referencing the same variable, or an external device if the variable is mapped to an input. It is possible for a variable that is set to be over-written on the next scan of the program. Forced values cannot be set.

The Editor stores and displays up to 64 set variables for the current editing session. The Editor does not store the list of set variables after the current editing session has been completed. When you set a variable, it is added to the bottom of the list. Once the 65th variable is added to the set list, the variable present at the top of the set list is removed from the list. Duplicate entries are removed from the list.

When setting variables that use variable initialization, keep these points in mind:

- Setting a variable using Retained Value initialization modifies the variable's retained value, and this value becomes its new initial value.
- Setting a variable using User Specified Value initialization changes the variable's current value but not its initial value.

About Forcing a Variable

To force a variable is to write a value to it that cannot be over-written by an instruction or another program referencing the same variable. Only unforcing the variable permits its value to be changed. Up to 64 variables can be forced. Forced variables are stored on force pages, a maximum of four, each containing 16 variables.

About the Set/Force/Unforce Dialog Box

Both setting and forcing operations for ladder programs are selected from the Set/Force/Unforce dialog box. This dialog box can be displayed in both a basic and an expanded form and is associated with only one rack connection at a time. When you choose the Set/Force/Unforce option from the Online menu, the basic Set/Force/Unforce dialog box is displayed. This basic dialog box takes up less room on the screen than the expanded dialog box so that you can view more of your program. The expanded dialog box takes up more room, but has more options.

You can switch back and forth between the basic and expanded dialog boxes using the More button in the basic dialog box and the Less button in the expanded dialog box.

To set, force, or unforce variables, you must have an online program window open. The same Set/Force/Unforce dialog box is used for each online program window using the same rack connection. Opening a program window using a different rack connection disables all fields on the Set/Force/Unforce dialog box, except the force list, that applied to the previous rack connection. Only the force list is actively updated on the Set/Force/Unforce dialog box for the online program window(s) using the previous rack connection. You can unfreeze this dialog by activating the online window that is used for the other rack connection. If you choose the Set/Force/Unforce command from the online program window with the new rack connection, the Set/Force/Unforce dialog box is updated to reflect the information for the new connection.

When you select an offline program window or the Verify output window, the Set/Force/Unforce dialog box remains in its current state.

5.12.1 Setting Variables

To set a variable is to write a value to it that can be over-written by any of the following:

- an instruction in the same program
- another program referencing the same variable
- by an external device if the variable is mapped to an input

You can set any global variable in the configuration or any local variable present in a task that is loaded into the rack.

To set a variable

Step 1. Make sure an online program window is open.

Step 2. Do one of the following:

- Click on 

  or

- From the Online menu, choose Set/Force/Unforce.

  The Set/Force/Unforce Variables dialog box is displayed. You should keep this dialog box open while you are setting, forcing, or unforcing multiple variables.

Step 3. If you want to set a local variable, enter the name of the program in which the variable is used in the Program field. If the variable is a global one, leave the field blank.

Step 4. Enter the name of the variable to be set. Only simple variables and array elements can be set.

If you had a simple variable selected before you chose the Set/Force/Unforce command, this variable is the default. If no variable was selected, the last variable set, forced, or unforced is the default.

Step 5. In the Value/State field, enter the value or state to set.

For Boolean variables, the valid range is on, off, true, false, T, F, 1, or 0. You can enter either decimal or hexadecimal values for non-Boolean variables.

Step 6. Click Set to set the variable.

Note: *A value displayed in the Value/State field is the last value set; it is not the current value. The value in this field is not monitored.*

Tip

To quickly fill in the Program and Variable Name field for a local variable you want to force, select the variable in the program before choosing the Set/Force/Unforce command. Selecting a global variable in the program before choosing the Set/Force/Unforce command fills in the Variable Name field in the Set/Force/Unforce dialog box.

Tip

Selecting a variable from the Set Variables List fills the parameters within the Current Selection group box with the information for the variable.

5.12.2 Forcing Variables

To force a variable is to write a value to it that cannot be over-written by another program referencing the same variable. You can force any simple global variable in the configuration or any simple local variable present in a task that is loaded into the processor. Only unforcing a variable permits it to be changed by a program or an external device.

IMPORTANT

You can force only simple variables. You cannot force element-indexed or bit-indexed variables. For example, you cannot force variables like: vat.13, array_var[11], array_var[index_name], array_var[11].12, or array_var[index_name].bit_name.

To force a variable

Step 1. Make sure an online program window is open.

Step 2. Do one of the following:

- Click on 

  or

- From the Online menu, choose Set/Force/Unforce.

  The Set/Force/Unforce Variables dialog box is displayed. You should keep this dialog box open while you are setting, forcing, or unforcing multiple variables.

Step 3. If you want to force a local variable, enter the name of the program in which the variable is used in the Program field. If you want to force a global variable, leave the field blank.

Step 4. Enter the name of the variable to be forced.

Only simple variables can be forced. The simple variable selected before choosing the Set/Force/Unforce command is the default. If no variable was selected, the last variable forced is the default.

Step 5. In the Value/State field, enter the value or state to force.

For Booleans, enter true, false, T, F, on, off, 1, or 0. You can enter either decimal or hexadecimal values for non-Boolean variables.

Step 6. Select the force page (1-4) on which to store the variable using the arrows in the Force Page field.

Specifying the force page lets you control how forced variables are grouped. Variables grouped on one force page can be unforced at the same time.

Step 7. Click Force to force the variable.

Forced variables change to the color you specified on the Colors tab. The default color for forced variables is red.

Tip

To quickly fill in the Program and Variable Name field for a local variable you want to force, select the variable in the program before choosing the Set/Force/Unforce command. Selecting a global variable in the program before choosing the Set/Force/Unforce command fills in the Variable Name field in the Set/Force/Unforce dialog box.

Tip

Selecting a variable from the Force Variables List fills the parameters within the Current Selection group box with the information for the variable.

Tip

You can also view the force table in the Expanded Set/Force/Unforce dialog box.

5.12.3 Unforcing Variables

Unforcing a variable allows it to be written to by any of the following:

- another instruction in the program
- another program
- an external device if the variable is mapped to an input

You can unforce any global simple variable or any local simple variable present in a task that is forced.

To unforce a variable from the Variables dialog box

- In the Set/Force/Unforce Variables dialog box, enter the variable and click Unforce. The selected variable must already be forced before you can unforce it.

To unforce a variable

Step 1. Make sure an online program window is open.

Step 2. Do one of the following:

- Click on 

  or

- From the Online menu, choose Set/Force/Unforce.

  The Set/Force/Unforce Variables dialog box is displayed. You should keep this dialog box open while you are setting, forcing, or unforcing multiple variables.

Step 3. If you want to unforce a local variable, enter the name of the program in which the variable is used in the Program field. If you want to unforce a global variable, leave the field blank.

Step 4. Enter the name of the variable to be unforced. Only simple variables can be forced. The simple variable selected before choosing the Set/Force/Unforce command is the default. If no variable was selected, the last variable set, forced, or unforced is the default.

Step 5. Click Unforce to unforce the variable.

Variables grouped on one force page can be unforced at the same time. See “Unforcing an Entire Force Page,” section 5.12.7.

Tip

Selecting a variable from the Force Variables List fills the parameters within the Current Selection group box with the information for the variable.

5.12.4 About the Expanded Set/Force/Unforce Dialog Box

Additional options not available in the basic Set/Force/Unforce Variables dialog box can be displayed by clicking More in the dialog box. Use the resulting expanded dialog for:

- Viewing the Total Number of Forced Variables
- Viewing a List of Set or Forced Variables
- Unforcing an Entire Force Page

You can toggle back and forth between the basic and expanded dialog boxes using the More and Less buttons.

5.12.5 Viewing the Total Number of Forced Variables

The Forced Variables group in the expanded Set/Force/Unforce variables dialog box allows you to view the total number of forced variables (Total Forced), which can be a maximum of 64. The total forced is useful if you want to force a large number of variables and need to keep track of how many more you can force or need to determine if forced variables are present on other force pages.

5.12.6 Viewing a List of Set or Forced Variables

You can view a list of set or forced variables in the list box of the expanded Set/Force/Unforce dialog box.

To view a list of set or forced variables

Step 1. Make sure an online program window is open.

Step 2. From the Online menu, choose Set/Force/Unforce. The Set/Force/Unforce dialog box is displayed.

Step 3. Click More.

Step 4. In the expanded Set/Force/Unforce dialog box, click Set Variables or Forced Variables. The list of variables for this edit session is displayed in the List box. Up to 64 set variables are displayed on a set variables list. Up to 64 variables are stored on a forced variables list (16 per force page). You can view only one page at a time.

5.12.7 Unforcing an Entire Force Page

You can unforce an entire page of forced variables. This option is useful when you have grouped related forced variables together on one page.

To unforce an entire force page

Step 1. Make sure an online program window is open.

Step 2. From the Online menu, choose Set/Force/Unforce. The Set/Force/Unforce dialog box is displayed.

Step 3. Click More.

Step 4. In the expanded Set/Force/Unforce dialog box, use the Current Page field to choose the force page you want to unforce.

Step 5. Click Unforce Page. The entire page is unforced.

5.12.8 Testing If Variables in the Rack Are Forced

Programs that are running can test if any variables in a rack are forced. The logic can access the reserved global variable FORCINGSTATUS@. This variable will be true if any variables in the rack are forced.

5.13 Viewing and Clearing Run-Time Errors

You can view any run-time errors that occur in an online program that you are monitoring. Use the Error Log to view error messages from the task information log. You can access this log from the Program Properties. The error log records the first, second, and last (most recent) error that occurred in the program. The last error number and its text message is displayed along with the rung number in which the error occurred. Information about any bus errors (Error 31) is also displayed.

For specific information about run-time error codes, see the AutoMax Enhanced Ladder Language Reference Manual, J2-3094.

To view run-time errors

Step 1. Make sure the online program for which you want to view run-time errors is the active program.

Step 2. Access Program Properties dialog box in one of following ways:

- With no program items selected, choose Properties from the File menu.

  or

- With no program items selected and the mouse pointer resting on the grid area away from any instructions or wires, press the right mouse button to display the pop-up menu. From the pop-up menu, choose Properties.

Step 3. Choose the Error Log tab.

To clear the error log

Step 1. Access the Error Log tab from the Program Properties dialog box. See step 2 above for more information.

Step 2. Click Clear Errors.

Step 3. Click OK.