

# 18.0 ONLINE MENU: MONITORING AND EDITING TASKS

AutoMax allows you to monitor and change the status of variables and I/O points, display and modify Ladder Logic sequences in real time, and force and unforce variables. In order to use any options except monitoring and adjusting tunable variables, the keyswitch must be in PROGRAM and the password must have been entered.

To begin monitoring, enter "M" for Monitor from the Online menu. The resulting **Monitor** menu shown in figure 18.1 in turn allows you to access six other menus which are described below.

*NOTE: If you want to monitor a PC/Ladder task, you must exit the Online Task Manager and choose the Monitor PC Program command from the Online menu in the System Configurator or the Task Manager.*

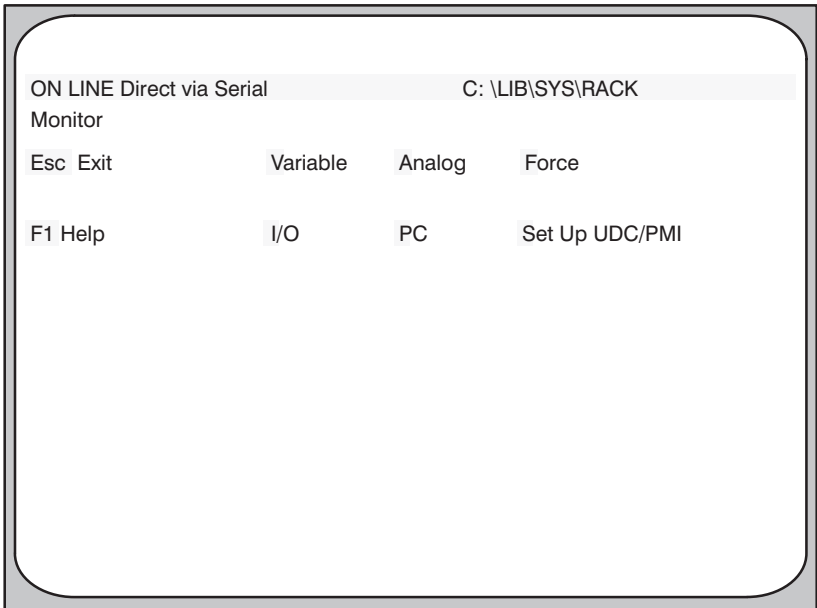


Figure 18.1 - Monitor Menu

**Monitor Variable:** used to display continuously current variable values and to change, force, and unforce variables. See 18.1 for more information.

**Monitor I/O:** used to output continuously the state of I/O registers and make changes to those registers. See 18.2 for more information.

**Monitor Analog:** used to output continuously up to two integer variables through the D/A converters located on a Drive Analog I/O module (B/M 57405). See 18.3 for more information.

**Monitor PC:** displays a message that tells you to access the online PC Monitor from the System Configurator or the Task Manager. See 18.4 for more information.

**Monitor Force:** used to force variables to a specific value. Once a variable is forced, it will retain the forced value until it is unforced. See 18.5 for more information.

**Monitor Set Up UDC/PMI:** used to select variables to drive the D/A analog outputs on the UDC and PMI Processors and to enter minimum and maximum values for scaling. See 18.6 for more information.

The six menus are identified in the upper left hand corner of the screen with the word "**Monitor**" followed by the kind of monitor, e.g. "**Variable**". Depending upon the option you choose from the menu, the field may display even more detail, e.g., "**Monitor Variable Modify**". The names of sub-menus available from the Monitor menu will be shown in boldface in this instruction manual to avoid any confusion between menu titles and the functions permitted from those menus.

The steps which describe the operations you can perform in the various **Monitor** menus are given in the order in which AutoMax prompts you for the information needed, such as variable name, register number, etc. In general, you will be prompted to enter the information from left to right into fields displayed on the screen in reverse video with a blinking cursor immediately following.

When you are finished entering the information for a particular field, type "Enter" or <CR> to indicate you are finished and the cursor will immediately move to the next field. You can use the arrow keys to move the cursor within the fields. You can also use the cursor to edit your entry if you have not completed entering all the required information for the option.

At times, certain fields will show a default. This default is usually the information you entered the last time you used the particular option. To select the default, type "Enter" or <CR> and go on to the next field. If you do not wish to select the default, simply type over the default.

In general, when you are finished entering the information required for the option, you must type "Enter" or <CR> to execute that option.



**Clear:** Removes a variable or all variables from the display list. See 18.1.2 for more information.

**Modify:** Allows you to modify a variable. See 18.1.6 for more information.

**Save:** Allows you to save a display list to your default path. See 18.1.3 for more information.

**Recall:** Allows you to recall a display list from your default path. See 18.1.4 for more information.

**Locate:** Allows you to display the variable name associated with an I/O address or display the I/O address associated with a variable name. See 18.1.5 for more information.

**Path:** Allows you to change the path.

**Files:** Allows you to display a directory of the files in the current path.

### 18.1.1 Displaying a Variable

Follow the directions below to display a variable on the screen.

1. Enter "D" for "Display" from the Monitor Variable menu.
2. Enter the name of the task in which the variable in question is defined, followed by "Enter" or <CR>. If the variable is COMMON, use the "Enter" or <CR> key to skip over the field.
3. Enter the name of the variable, complete with any terminating character designating variable type ("@" for boolean, "%" for single precision integers, or "!" for double precision integers).
4. Enter the desired format of the display, choosing from the options listed below. The variable will be shown in the display.

"D" for Decimal

"B" for Binary

"H" for Hexadecimal

— see figure 18.3 for more information

Variables can be displayed in the following formats:

<u>Variable Type</u>	<u>Format</u>	<u>Range of Values</u>
Boolean	Boolean	TRUE/FALSE
Single Integer	Decimal	-32767 to +32767
	Hexadecimal	0 to FFFF
	Binary	0000000000000000 to 1111111111111111
Double Integer	Decimal	-2147483648 to +2147483647
Real	Decimal	+5.42101070E-20 to +9.22337177E18
		-2.71050535E-20 to -9.22337177E18

Figure 18.3 - Variable Display Format

Note that if the display is full (16 variables) and you attempt to add another variable to the list, you will be prompted to delete a variable from the list. The selected variable will be deleted, and the new variable will be added at the end of the list.

### 18.1.2 Clearing a Variable from the Display

Follow the directions below to clear a variable from the display.

1. Enter "C" for Clear from the **Monitor Variable** menu.
2. To clear one variable from the screen, enter the display position number (1-16) of the variable at the blinking cursor. To clear all variables from the screen, enter "A" for All.
3. Type "Enter" or <CR>. The variable will be cleared from the display.

### 18.1.3 Saving a Monitor Variable Display List

You can save the variables listed on the **Monitor Variable** display to the default path displayed in the upper right hand corner of the screen. Only the list of variables is saved, not the variable values. If your default destination is a floppy disk, it must not be write-protected.

You can give each list a standard 8-character filename. The AutoMax Executive software automatically attaches the file extension \$MV. You can later recall the list to the screen using the Recall option described in 18.1.5.

To save the current **Monitor Variable** list, follow the directions below:

1. If you have not already done so, enter "S" for Save from the **Monitor Variable** menu shown in figure 18.2.
2. Enter the filename (up to 8 characters) for the display list. Do not attach a file extension. The file will automatically be given the extension \$MV.
3. Type "Enter" or <CR>.
4. You can recall the screen display using the Recall option described in 18.1.4.

### 18.1.4 Recalling a Monitor Variable Display List

You can recall any previously saved **Monitor Variable** display list. To recall the **Monitor Variable** display list, follow the directions below.

1. From the Monitor Variable menu, select "R" for Recall.
2. Enter the name of the display list to recall,
3. Type "Enter" or <CR>.

## 18.1.5 Locating a Variable or I/O Address

The Locate command can be used to display the variable name associated with an I/O address and display the I/O address associated with a variable name. When you are locating a variable, you have the option of finding the variable using a local I/O address (slot, register) or a remote I/O address (slot, drop, slave slot, register). The information will be retrieved from the configuration file stored in the rack. Note that if you are using interface modules to communicate with foreign I/O, you will not be able to use this command to display Modbus, AutoMate, or A-B register numbers. This command **will** display Modbus, AutoMate, and A-B registers using the equivalent **Multibus** addresses.

- Step 1. Select "L" for Locate from the Monitor Variable menu.
- Step 2. Select "V" for Variable to locate the variable name.  
Continue with step 3.  
  
or  
  
Select "I" for I/O to locate the variable's I/O address. Skip to step 5.
- Step 3. Select either "L" for Local I/O Address or "R" for Remote I/O Address.
- Step 4. If you selected Local I/O Address, enter the slot, register, and bit number (for boolean variables). If you selected Remote I/O Address, enter the slot, drop, slave slot, register, and bit number (for boolean variables).  
  
The name of the variable that is assigned to the address entered will be displayed.  
  
If there are no variables mapped to the specified I/O point, then the message "There is no variable mapped to this I/O" will be displayed.
- Step 5. Enter the variable name.  
  
If the variable is a boolean mapped to an I/O point, the local I/O address (slot, register, bit) and remote I/O address (slot, drop, slave slot, register, bit) will be displayed.  
  
If the variable is an integer, double, or real mapped to an I/O point, the local I/O address (slot, register) and remote I/O address (slot, drop, slave slot, register) will be displayed.  
  
If the variable is not in the rack configuration, the message "Variable is either not found or is a LOCAL variable" will be displayed.  
  
If the variable is mapped to a memory location, the message "Variable is a common memory variable. No I/O address is available" will be displayed.

## 18.1.6 Modifying a Variable

### WARNING

DEPENDING ON THE APPLICATION, THE USE OF THE TUNE FUNCTION MAY RESULT IN INSTABILITY OF THE APPLICATION PROCESS. IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE POTENTIAL HAZARDS INVOLVED. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.

### WARNING

THE SET AND FORCE FUNCTIONS BYPASS CONTROL OF THE APPLICATION PROCESS BY THE APPLICATION TASKS. 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 WHICH 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.

Selecting "M" for Modify from the **Monitor Variable** menu allows you to set, tune, force, or unforce a variable. Set allows you to set a variable to a specified value. Note carefully that if application tasks are running, the value that you write may be overwritten by one of those tasks. Tune allows you to increment or decrement a tunable variable (defined as such in the application task) within its limits. Force allows you to force a variable to a value that is unaffected by any other action in application tasks or the state of physical I/O. Unforce returns a variable to the non-forced state.

Recall that to use any of these options, with the exception of tuning a variable, the keyswitch must be in PROGRAM and the password must be entered. See figure 18.4 for the **Monitor Variable Modify** menu.

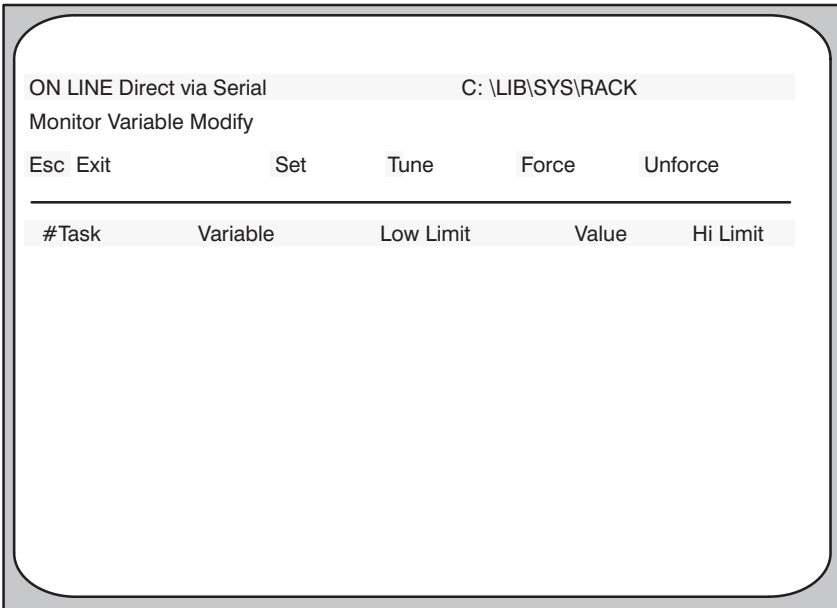


Figure 18.4 - Monitor Variable Modify Menu

18.1.6.1 - 18.1.6.4 below describe the options available from the **Monitor Variable Modify** menu in more detail.

#### 18.1.6.1 Setting a Variable to a Specific Value

You can set variables to specific values using “S” for Set from the **Monitor Variable Modify** menu. The variable you want to set does not need to be in the screen display for you to set it. Note that a variable that has been set may later be affected by an active application task. Follow the directions below to set a variable:

1. Display the variable on the screen following the directions in 18.1.1 above to verify the present value of the variable (optional).
2. Enter “S” for Set from the **Monitor Variable Modify** menu.
3. If the variable you want to set is not displayed on the screen, enter the name of the task where the variable is defined at the blinking cursor, followed by “Enter” or <CR>. Continue at step 4.

If the name of the variable you want to set is displayed on the screen, you can enter the number of the line (1-16) on which the variable name appears, followed by “Enter” or <CR>. The screen will display the task name in the “Task” field and the variable name in the “Var” field. Skip to Step 5.

4. Enter the name of the variable to be set, specifying variable type with the correct terminator at the blinking cursor, followed by “Enter” or <CR>.
5. The “Value” field will display the last value that was set for a variable. If this is the first time you are setting this variable, the field will be blank. Enter the desired value for the variable, typing

over the last value entered, if it is displayed. The syntax and range of the value you enter will depend on the variable type. See figure 18.3 for the value ranges of variable types. If you are setting a tunable variable, the value you enter must be within the range of the low and high limit.

### 18.1.6.2 Tuning a Variable

#### WARNING

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You can adjust the value of a variable designated as tunable in an application task by selecting “T” for Tune from the **Monitor Variable Modify** menu. The variable you want to tune does not need to be in the screen display for you to tune it. The value is set incrementally between the limits set in the application task. Follow the directions below to tune a variable.

1. Enter “T” for Tune from the **Monitor Variable Modify** menu.
2. If the variable you want to tune is not displayed on the screen, enter the name of the task containing the tunable variable, followed by “Enter” or <CR>. Continue at step 3.

If the name of the variable you want to tune is displayed on the screen, you can enter the number of the line (1-16) on which the variable name appears, followed by “Enter” or <CR>. The screen will display the task name in the “Task” field and the variable name in the “Var” field. The current value of the variable (“Value” field), high limit (“Hi” field), low limit (“Lo” field), and step value (“Step” field) will also be displayed. Skip to Step 4.

3. Enter the name of the variable, complete with the terminating character that designates variable type, followed by “Enter” or <CR>.

The current value of the variable (“Value” field), along with the high limit (“Hi” field), low limit (“Lo” field), and step value (“Step” field) will be displayed.

4. Use the up arrow to increment the value in the Value field and the down arrow to decrement the value in the Value field by the Step value.

### 18.1.6.3 Forcing a Variable

#### WARNING

THE SET AND FORCE FUNCTIONS BYPASS CONTROL OF THE APPLICATION PROCESS BY THE APPLICATION TASKS. 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 WHICH 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.

You can force up to 64 variables at a time to specific values. Forcing variables while in the **Monitor Variable Modify** menu is essentially the same as using the Force option described in 18.5. Strings, array elements, and tunable variables cannot be forced. Only booleans, single precision integers, double precision integers, and reals can be forced. If you define bits in a register that is also defined as a register, neither the bits nor the register can be forced. A forced variable cannot be changed in any way by application tasks or the state of physical I/O. The value of a forced variable can only be affected by forcing it to another value or unforcing it. See 18.1.6.4 for more information about unforcing a variable. You can define a reserved common variable, **FORCINGSTATUS@**, that will indicate whether any variables in the rack have been forced. See 7.2.2 for more information.

Follow the directions below to force a variable.

1. Enter "F" for "Force" from the **Monitor Variable Modify** menu.
2. Enter the name of the task containing the variable to be forced at the blinking cursor. If the variable is a **COMMON**, you do not need to enter a task name.
3. Enter the name of the variable to be forced at the blinking cursor. The terminating character designating variable type is allowed, but not required.
4. If this is the first time you are forcing a variable, the "Value" field will be blank. Otherwise, the "Value" field will display the last value to which a variable was forced. Enter the desired value for the variable, typing over the last value entered, if it is displayed. The syntax and range of the value you enter will depend on the the variable type. See figure 18.3 for the value ranges of variable types.

#### 18.1.6.4 Unforcing Variables

Unforcing a variable returns it to the state in which it was before it was forced. You can unforce one or all variables that are currently forced. To unforce one or all currently forced variables, follow the steps below.

1. Select “U” for “Unforce” from the **Monitor Variable Modify** menu.
2. To unforce one variable, use the up and down arrows to move the “>” pointer until you reach the desired variable. Then type “Enter” or <CR> to unforce the variable.

To unforce all forced variables displayed on the screen enter “P” for Page.

## 18.2 Monitoring and Modifying I/O

The **Monitor I/O** menu is used to display the state of I/O registers continuously and to modify the state of registers. Registers on the UDC are considered I/O registers. This feature allows you to monitor I/O registers not defined in the configuration for the rack, as well as those that are defined. See figure 18.5 for the **Monitor I/O** menu.

To begin monitoring I/O enter “I” from the **Monitor** menu shown in figure 18.2. The resulting **Monitor I/O** menu, shown in figure 18.5 allows the following options:

**Display:** Adds an I/O register to the display list. See 18.2.2 for more information.

**Clear:** Removes a single I/O register or all I/O registers from the display list. See 18.2.3 for more information.

**Modify:** Allows you to modify an I/O register. See 18.2.7 for more information.

**Save :** Allows you to save a display list to your default path. See 18.2.4 for more information.

**Recall:** Allows you to recall a display list that was saved previously. See 18.2.5 for more information.

**Locate:** Allows you to display the variable name associated with an I/O address or display the I/O address associated with a variable name. See 18.2.6 for more information.

**Path:** Allows you to change the path.

**Files:** Allows you to display a directory of the files in the current path.



## 18.2.2 Displaying I/O Registers

You can display up to 16 registers on the screen at one time. The **Monitor I/O** screen display is described in 18.2.1. To display a register on the screen, follow the directions below:

1. Enter "D" for "Display" from the **Monitor I/O** menu shown in figure 18.5.
2. If the register you want to display is in the local rack, enter "L" for Local and go on to the section entitled "Displaying Local I/O". If the register is in a remote rack, enter "R" for Remote and go on to the section entitled "Displaying Remote I/O".

### 18.2.2.1 Displaying Local I/O

- a. Enter the slot number of the module on which the register is found.
- b. Enter the register number.
- c. Select the format of the display in the "Value" field as follows:  
"D" for decimal  
"H" for hexadecimal  
"B" for binary
- d. Type "Enter" or <CR> to display the register.

### 18.2.2.2 Displaying Remote I/O

- a. Enter the slot number of the Remote I/O master module (M/N 57C416) in the local rack.
- b. Enter the drop number of the remote chassis in which the module containing the register is located.
- c. Enter the slot number of the module in the remote rack that contains the register.
- d. Enter the register number.
- e. Select the format of the display in the "Value" field as follows:  
"D" for decimal  
"H" for hexadecimal  
"B" for binary
- f. Type "Enter" or <CR> to display the register.

## 18.2.3 Clearing I/O Registers from the Display

To clear I/O from the **Monitor I/O** display, follow the directions in "Clearing a Single Display" or "Clearing the Entire Display," whichever is appropriate. Refer to 18.2.5 for directions on saving a **Monitor I/O** screen if necessary.

### 18.2.3.1 Clearing a Single Display

1. From the **Monitor I/O** menu, enter "C" for clear.
2. Enter the display position (1-16) of the register you want to clear from the screen.

### 18.2.3.2 Clearing the Entire Display

1. From the **Monitor I/O** menu, enter "C" for clear.
2. Enter "A" to clear all I/O registers from the screen.

## 18.2.4 Saving a Monitor I/O Display List

You can save the variables listed on the **Monitor I/O** display to the default path. Only the list of variables is saved, not the variable values. If your default is a floppy disk, it must not be write-protected.

You can give each list a standard 8-character filename. The AutoMax Executive software automatically attaches the file extension ".\$IO". You can later recall the list to the screen using the Recall option described in 18.2.6.

To save the current **Monitor I/O** list, follow the directions below:

1. If you have not already done so, enter "S" for Save from the **Monitor I/O** menu shown in figure 18.5.
2. Enter the filename (up to 8 characters) for the display list. Do not attach a file extension. The file will automatically be given the extension \$IO.
3. Type "Enter" or <CR>.
4. You can recall the screen display using the Recall option described in 18.2.6.

## 18.2.5 Recalling a Monitor I/O Display List

You can recall any previously saved **Monitor I/O** display list. To recall the **Monitor I/O** Display list, follow the directions below.

1. From the **Monitor I/O** menu, select "R" for Recall.
2. Enter the name of the display list to recall,
3. Type "Enter" or <CR>.

## 18.2.6 Locating a Variable or I/O Address

The Locate command can be used to display the variable name associated with an I/O address and display the I/O address associated with a variable name. When you are locating a variable, you have the option of finding the variable using a local I/O address (slot, register) or a remote I/O address (slot, drop, slave slot, register). The information will be retrieved from the configuration file stored in the rack. Note that if you are using interface modules to communicate with foreign I/O, you will not be able to use this command to display Modbus, AutoMate, or A-B register numbers. This command **will** display Modbus, AutoMate, and A-B registers using the equivalent **Multibus** addresses.

- Step 1. Select "L" for Locate from the Monitor Variable menu.
- Step 2. Select "V" for Variable to locate the variable name.  
Continue with step 3.  
  
or  
  
Select "I" for I/O to locate the variable's I/O address. Skip to step 5.
- Step 3. Select either "L" for Local I/O Address or "R" for Remote I/O Address.
- Step 4. If you selected Local I/O Address, enter the slot, register, and bit number (for boolean variables). If you selected Remote I/O Address, enter the slot, drop, slave slot, register, and bit number (for boolean variables).  
  
The name of the variable that is assigned to the address entered will be displayed.  
  
If there are no variables mapped to the specified I/O point, then the message "There is no variable mapped to this I/O" will be displayed.
- Step 5. Enter the variable name.  
  
If the variable is a boolean mapped to an I/O point, the local I/O address (slot, register, bit) and remote I/O address (slot, drop, slave slot, register, bit) will be displayed.  
  
If the variable is an integer, double, or real mapped to an I/O point, the local I/O address (slot, register) and remote I/O address (slot, drop, slave slot, register) will be displayed.  
  
If the variable is not in the rack configuration, the message "Variable is either not found or is a LOCAL variable" will be displayed.  
  
If the variable is mapped to a memory location, the message "Variable is a common memory variable. No I/O address is available" will be displayed.

## 18.2.7 Modifying I/O Registers

### WARNING

**MODIFYING I/O REGISTERS MAY AFFECT THE OPERATION OF CONTROLLED MACHINERY. IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE POTENTIAL HAZARDS INVOLVED. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.**

The modify option is used to change the value of a register. The register you want to modify does not need to be in the screen display for you to modify it. Recall that if application tasks are running, the value that you write to a register using this option may be overwritten by one of those application tasks.

You must be familiar with how the registers on the module you are working with are organized in order to use this option. Refer to the documentation for the individual module for any questions on register organization.

Follow the directions in 18.2.7.1 for modifying local I/O and in 18.2.7.2 for modifying remote I/O.

### 18.2.7.1 Modifying Local I/O Registers

### WARNING

**THIS FUNCTION MAY BYPASS CONTROL OF THE APPLICATION PROCESS BY THE APPLICATION TASKS. IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE POTENTIAL HAZARDS INVOLVED. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.**

To modify a local I/O register, follow the directions below.

1. If you have not already done so, enter "M" for modify from the **Monitor I/O** menu shown in figure 18.5.
2. Enter "L" for "Local" I/O.
3. Enter the slot number of the module on which the register is found.
4. Enter the register number.
5. Enter the desired value of the register. You may enter a decimal or hexadecimal value only. If you enter a hexadecimal value, the last character of the value must be the letter "H" in upper- or lower-case.
6. Type "Enter" or <CR> to write the value to the register.

## WARNING

**THIS FUNCTION MAY BYPASS CONTROL OF THE APPLICATION PROCESS BY THE APPLICATION TASKS. IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE POTENTIAL HAZARDS INVOLVED. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.**

To modify a remote I/O register, follow the directions below.

1. If you have not already done so, enter “M” for Modify from the **Monitor I/O** menu shown in figure 18.5.
2. Enter “R” for “Remote” I/O.
3. Enter the slot number of the Remote I/O master module (M/N 57C416) in the the local rack.
4. Enter the drop number of the remote chassis in which the module containing the register is located.
5. Enter the slot number of the module in the remote rack that contains the register.
6. Enter the register number.
7. Enter the desired value of the register. You may enter a decimal or hexadecimal value only. If you enter a hexadecimal value, the last character of the value must be the letter “H” in upper- or lower-case.
8. Type “Enter” or <CR> to write the value to the register.

## 18.3 Outputting Analog Signals

If your system configuration incorporates a DCS 5000 micro-regulator drive, the **Monitor Analog** menu allows you to output two analog signals that are proportional to the values of the specified integer variables. These signals can be used to drive a chart recorder, oscilloscope, or other test instrument. The **Monitor Analog** is functional only with a Processor containing a current minor loop (CML) application task, i.e., a task containing the CML control block. See J-3676 for more information on the Control Block language.

The analog signals are obtained from the the D/A converters located on the Drive Analog I/O Module (B/M 57405). The variable values are scaled and updated once every clock tick as long as the CML task is running. The D/A voltage is:

$$D/A(\text{volts}) = \text{variable} * \text{scale} * (10 \text{ volts}/4096 \text{ counts})$$

A maximum of two single precision integer variables can be displayed simultaneously for each CML task, one per channel. Each variable is identified by the D/A channel from which the signal is obtained. The lower channel is identified as 0, and the upper channel is identified as 1.

### 18.3.1 Monitor Analog Display

The following fields will be displayed on the **Monitor Analog** screen for each variable:

- |          |  |
|----------|--|
| (#)      | - Identifies the D/A channel (0 or 1) through which the value will be displayed.                       |
| Task     | - Identifies the task in which the variable is defined. This field is blank if the variable is common. |
| Variable | - Variable name, including the type character “%” for single precision integers.                       |
| Scale    | - Identifies a scale factor of *16, *8, *4, *2, *1, *1/2, *1/4, *1/8, or *1/16.                        |

### 18.3.2 Outputting a Variable

The procedure for adding a variable is the same whether you are actually adding the variable, or replacing a variable with another variable.

Follow the procedure below to output a variable.

1. From the **Monitor** menu, select “A” for analog.
2. Enter the slot number of the Processor on which the CML task is running.
3. Select “A” for Add to add a variable.
4. Enter the D/A converter through which the signal is obtained (0 or 1). The converter corresponds to the display position. If you enter a display position currently on the screen, the variable associated with it will be replaced by the new variable you enter in step 5 below.
5. If the variable in question is a local variable, enter the name of the task in which the variable is defined. If the variable is a common variable, i.e., configured for the rack using the Variable Configurator, press the “Enter” key or <CR> to skip over the “Task” field.
6. Enter the name of the variable in the “Variable” field. Include the type character “%” for single precision integers. Type “Enter” or <CR>.
7. When the cursor has moved to the “Scale” field, use the up and down arrow keys to scroll through the available scale factors described in 18.3.1 above. The default scale factor is 1.
8. Press “Enter” or <CR> to terminate the entry and add it to the display.

## 18.4 Monitoring and Editing PC Tasks

The **Monitor PC Program** command is used to access the AutoMax Ladder Editor which is used to monitor Ladder programs. This command appears under the System Configurator Online menu and the Task Manager Online menu. You cannot access the Ladder Editor while online. If you attempt to access the AutoMax Ladder Editor from the Online Task Manager by selecting PC from the Monitor menu screen, you will receive the following message: "Monitor PC Task via the System Configurator or Task Manager." You must exit the Online Task Manager and access the AutoMax Ladder Editor by using the Monitor PC Program command. Refer to J2-3093 for information on using the AutoMax Ladder Editor to monitor and edit PC tasks online.

## 18.5 Forcing Variables

### WARNING

**THE SET AND FORCE FUNCTIONS BYPASS CONTROL OF THE APPLICATION PROCESS BY THE APPLICATION TASKS. 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 WHICH 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.**

From the **Monitor** menu shown in figure 18.1, you can select "F" for Force to force and unforce up to 64 variables at the same time. Note that the limit of 64 forced variables applies regardless of the number of users who have access to the rack. You can only force boolean, single precision integer, double precision integer, and real variables. Strings, array elements, and tunable variables cannot not be forced. A variable that is forced cannot be altered by any application task or the status of physical I/O. A forced variable will retain its forced value until it is unforced or forced to a different value.

See 18.5.1 for an explanation of the screen display and 18.5.2 and 18.5.3 for instructions on forcing and unforcing variables.

### 18.5.1 Monitor Force Screen Display

The forcing table for a rack is divided into four pages. Each page can list up to 16 variables, numbered 1 to 16. Pages can be switched by using <Page Up> to display the next page in the table and <Page Down> to display the previous page in the table. The page numbers will scroll, meaning that, if you press <Page Up> from page 4 of the table, page 1 will be displayed. If you press <Page Down> from page 1 of the table, page 4 will be displayed.

The columns in the force table contain the following information:

- (#) - Force table (page) position (1-16).
- Task - The task in which the variable is defined. This field is blank if the variable is COMMON.
- Variable - Name of the variable being forced, including the type character.
- Value - The current forced value of the variable.

See figure 18.7 for a the **Monitor Force** menu.

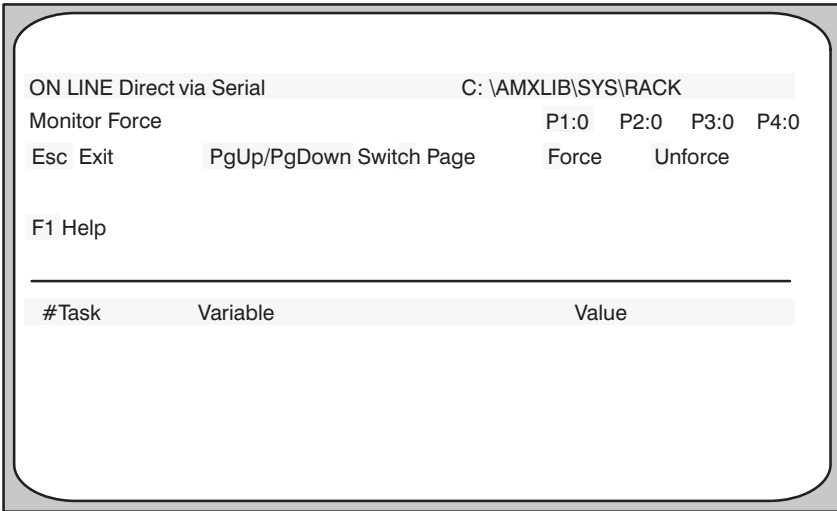


Figure 18.7 - Monitor Force Menu

### 18.5.2 Forcing a Variable

To force a variable, follow the directions below.

1. At the **Monitor** menu, enter "F" for Force. See Figure 18.8 for a sample screen containing 14 forced variables. Note that no task is shown for common variables.

ON LINE Direct via Serial		C: \AMXLIB\SYS\RACK			
Monitor Force		P1:0	P2:0	P3:0	P4:0
Esc Exit	PgUp/PgDown	Switch Page	Force	Unforce	
F1 Help					
# Task	Variable	Value			
1	C@	TRUE/ON			
2	C%	12345			
3	C!	12345678			
4	C	+ 123456789E+09			
5 FRCS1BAS	L@	TRUE/ON			
6 FRCS1BAS	L%	1111			
7 FRCS1BAS	L!	222222			
8 FRCS1BAS	L	+ 33333334E+09			
9 FRCS1BLK	L@	FALSE/OFF			
10 FRCS1BLK	L%	777			
11 FRCS1BLK	L!	88888			
12 FRCS1BLK	L	+ 99999992E+08			
13 FRCS1PC	LB@	TRUE/ON			
14 FRCS1PC	LI%	32767			

Figure 18.8 - Sample Monitor Force Display

- Enter the name of the task in which the variable is to be forced.
- Enter the name of the variable, terminated by the appropriate character (“@” for boolean, “%” for single precision integers, or “!” for double precision integers).
- Enter the value to which the variable is to be forced in the “Value” field.
- You can enter different values for the same variable if you have not exited using the <Esc> key. Simply use the arrow keys to move the cursor to the “Value” field again and enter the new value over the old.
- To exit, type <ESC>.
- To unforce one variable or all variables on that page, follow the directions in 18.5.3.

### 18.5.3 Forcing a Variable

You can unforce variables by removing them from the Force table. To remove variables from the Force table, follow the directions below.

- Enter “U” for “Unforce”.
- To unforce all variables in the displayed page of the Force table, enter a “P”. To unforce one variable, enter the display position of the variable to be unforced. If the force table is emptied, the system will exit to the **Monitor** menu.
- To exit the function, type <ESC>.

## 18.6 Setting Up the UDC and PMI Meter Ports

If your system configuration incorporates an AutoMax Distributed Power drive, the **Monitor Set Up UDC/PMI** menu allows you to select variables to drive the four D/A output ports (labeled “Meter Ports”) on each of the UDC modules and PMI Processors. The analog signals output by these ports can be used to drive meters, chart recorders, or other test instruments. Refer to the appropriate DPS Configuration and Programming instruction manual for more information on connecting equipment to the UDC and PMI meter ports.

After the slot number of a UDC module is entered, the user can enter or modify setup information about the meter ports for the UDC module or for either of the PMI Processors associated with that UDC module. See figure 18.9 for the UDC Setup screen display.

**Note that both the configuration file and the drive parameter file (.POB file) must be downloaded to the UDC before you can set up the UDC or PMI meter ports using Monitor.**

### Other Methods of Setting UP Meter Ports

PMI meter ports can be set up during DPS parameter entry on the Monitor Setup UDC/PMI menu. UDC meter ports can be set up via registers 1001–1017 in a UDC application task or on the Monitor Setup UDC/PMI menu. The setup information may be retained after a Stop All or power cycle depending on the method used. See the table below.

Table 18.1 - Meter Port Setup Retention

	UDC Setup via Monitor Menu	UDC Setup via Application Task (Reg. 1001- 1017)	PMI Setup during Parameter Entry	PMI Setup via Monitor Menu
Retained after Stop All?	Yes	Yes*	Yes	No**
Retained after power cycle	No	Yes*	Yes	No**

\*Original task setup is retained.

\*\*If the PMI meter ports are set up using the parameter screens and then later set up again using the Monitor menu, the setup in the parameter screens will still be retained.

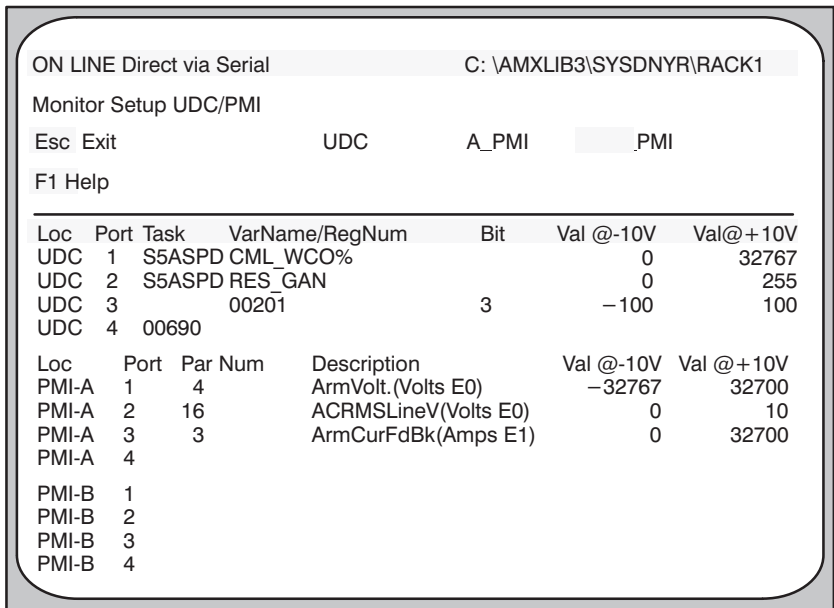


Figure 18.9 - UDC Setup Screen

You can display and output to the selected port any variable mapped to a UDC register (common) or any local variable. The task name is required for local variables.

Each UDC entry has a port number (1-4), a variable name or register/bit number, and a minimum (Val @ -10V) and maximum (Val @ +10V) value. "Val @ -10V" specifies the value of the variable that will be output as the minimum voltage, and "Val @ +10V" specifies the value of the variable that will be output as the maximum voltage. This allows a small area of the signal range to be displayed over the full range of the 8-bit digital-to-analog converter. Values are transferred to the analog output every scan if CCLK has been turned on in a UDC task that is running, and every 5 milliseconds if CCLK is off.

Each PMI entry has a port number (1-4), a parameter number and description, and a minimum and maximum value. You can select the parameter from a list of available parameters and set the "Val @ -10V" and "Val @ +10V" values in the same way as for a UDC module. Only data that exists on the selected PMI Processor can be output to one of its meter ports. Values are transferred to the analog output after every current minor loop scan in the PMI Processor.

Use the following procedure to set up the meter ports for the UDC modules and PMI Processors.

- Step 1. Enter "S" for Set Up UDC/PMI from the **Monitor** menu shown in figure 18.1.
- Step 2. Enter the slot number of the UDC module. The screen will display the current variable name (or register and bit number) and the minimum and maximum values for each port on the UDC module. It will also display the parameter number and name and the minimum and maximum values

for each port on the PMI Processors associated with the selected UDC module (A and B).

- Step 3. Enter "U" to select the UDC analog outputs, "A" to select the PMI-A analog outputs, or "B" to select the PMI-B analog outputs.
- Step 4. Enter the port (1-4) you want to configure.
- Step 5. If you entered "U" (UDC) above, enter the task name (for LOCAL variable), the variable name or register and bit number of the variable you want to assign to the selected UDC meter port.  
  
If you selected "A" (PMI-A) or "B" (PMI-B), select the parameter you want to assign to the port. Use the Up Arrow and Down Arrow keys to scroll through the list of available parameters displayed on the screen.
- Step 6. Enter a minimum and maximum value for the selected variable in the "Val @ -10V" and "Val @ +10V" fields, respectively.
- Step 7. When you are finished setting up the UDC and PMI meter ports, press <ESC> to return to the Monitor menu.