

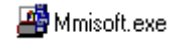
MMI Soft Tutorial

Run the MMISOFT.EXE on your PC.



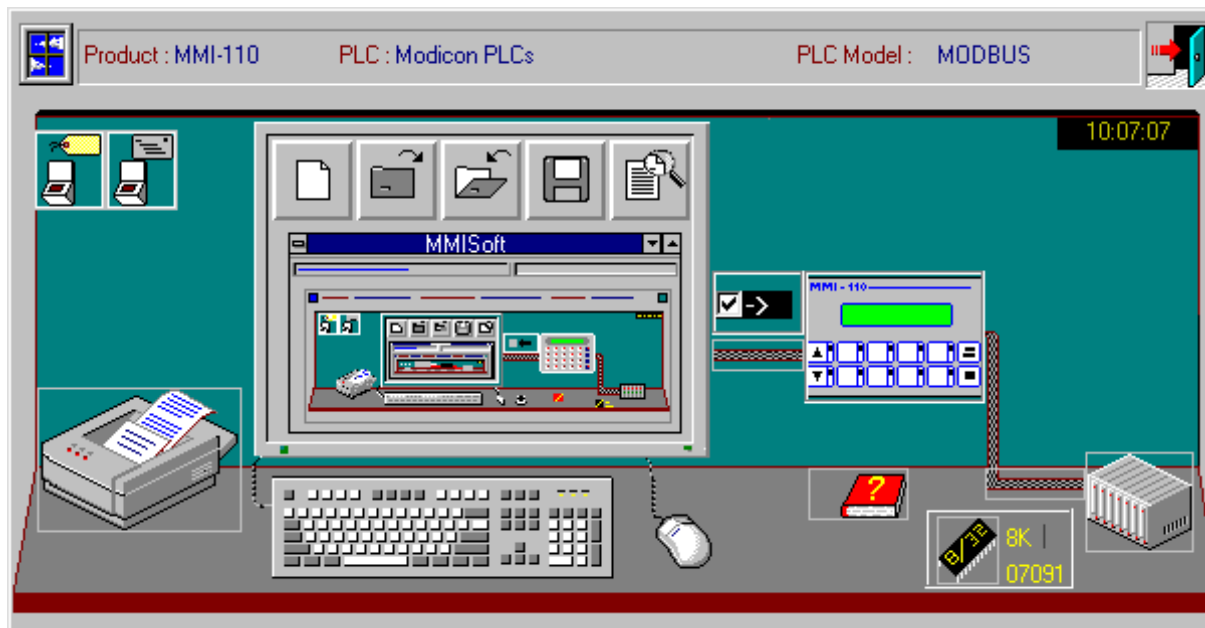
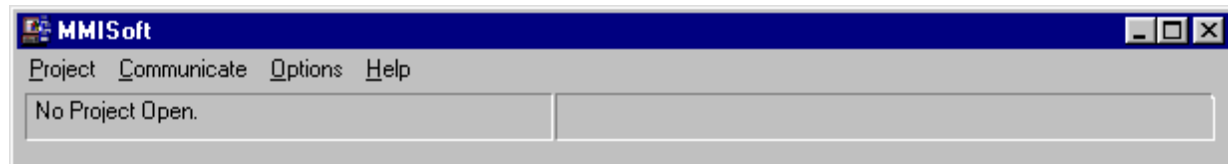
From the MMI Setup Group,
double click on the icon.

Or from the File Manager or
Explorer double click on....




After the start up screens, you will come to the main window. The window has two parts:
a traditional **Menu bar** and a graphical user interface called the "**Toolstation**".

The **Menu bar** operates in the usual manner. Click on the menu and the selections that you want just like any other windows based program.



The **Toolstation** is comprised of icons and graphical clues. The active regions are inside highlighted boxes. The graphic clues correspond to menu items and depict visually what it does.

For instance:

Clicking on the  area brings up the Help screen.

Whenever the cursor is over a selectable region, it changes to a pointing hand and a "Tool-tip" is displayed.

Project Operations

The tool bar of the Toolstation is used for Project Control. Each Icon corresponds to a menu item under the Project Menu.

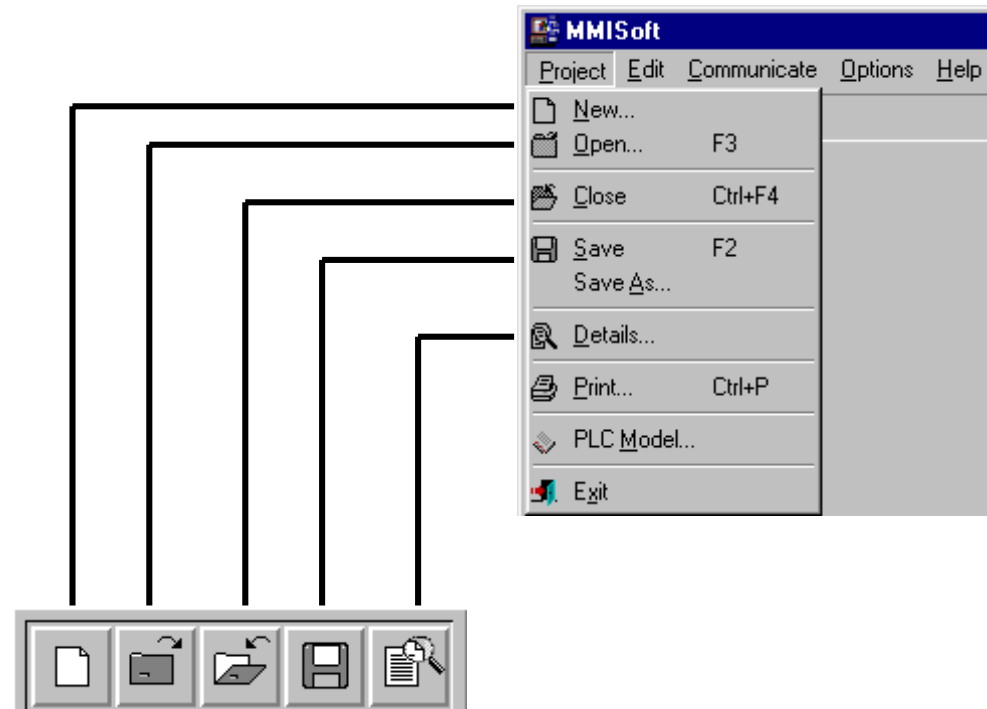
New: Used to initiate a new project. This is what we will do next. So, click on the New icon or menu item.

Open: Opens a previously saved project on disk.

Close: Closes an open project. A prompt to save work first is given.

Save: Opens the familiar windows dialog box for saving a new project or updates a previously saved project.

Details: Opens a window that allows the user to enter information about the project such as: project name, date created, programmers name, comments, etc.



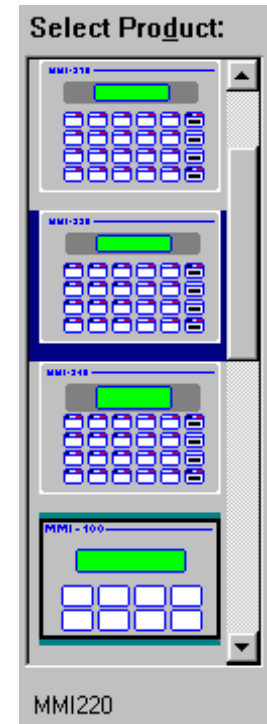
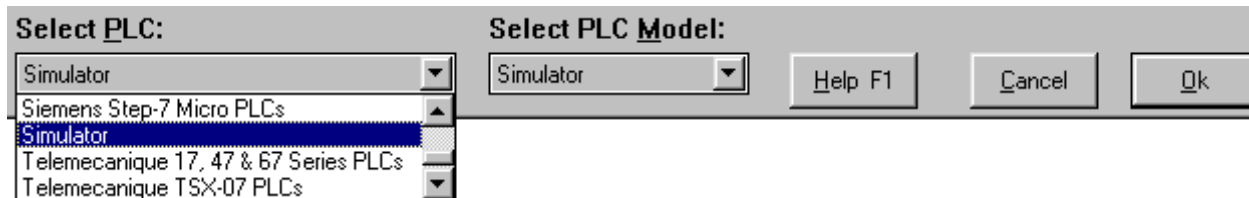
For the purposes of this tutorial we will be setting up an MMI-220 with the simulator driver. Not all features in the 220 are in all of the MMI products. You may want to browse through sections that don't apply to the product you will be using.




Click on the New Icon...

The program takes you to the product selection window. The available products are shown in small form on the right of the screen. The scroll bar can be used to view the entire product line. The product number selected is displayed under the list. The center-left shows the product selected as enlarged. Underneath these are the lists for selecting PLC Type, Model and exiting the window.

Select MMI-220 from the product list. →

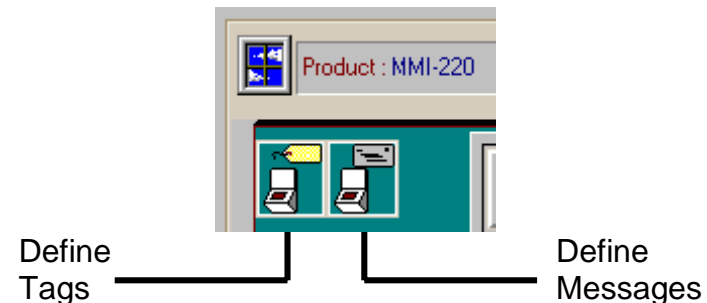


Use the Select PLC  button to pull down the list of available controllers. The list is in alphabetical order.

Select Simulator from the Select PLC list. The Select PLC Model list will automatically change to Simulator.

Press  to continue.

Now that the MMI-220 Simulator driver is selected the Main Window will show two additional buttons. They are used for defining **Tags** and entering **Messages**.



Tags

Tags are used to identify registers and bits that will be used in messages and unit setup parameters. Tag any register or coil that you want to use in the application. All the registers and coils that you will be using in your application should be defined beforehand. This will also help you in defining these registers/coils in your PLC and helps in preventing any problems with undefined registers.

The purpose of the tag is to attach a name that is recognizable to the programmer to a register or bit. Tag names can be up to 20 characters long. For example an input bit I0001 may be tagged with the name "Limit Switch 1". Later on, when embedding the bit status in a message, it is selected by its name instead of the cryptic I0001. This also makes changing input configuration easy. By changing a tag, all uses of the tag in the unit are automatically updated to the new parameters.



Click on the Tag button to bring up the Edit Tag database Dialog



New - Allows you to add a new tag to the list.

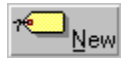
Delete - Deletes the highlighted tag that you have already created.

Import - Brings in tags from some previous project of the same PLC type.

Internal Reg... - Allows you to make some of the internal registers in the MMI available as nonvolatile storage.

The display shows all of the defined tags. You cannot change the tag number assigned to a tag. You can edit any tag's Register/Coil or Tag assignment just by double clicking on it.

Tags are saved automatically when the project is saved.



Click on the New Tag Button...

The Edit Tag database dialog expands to show the area for entering in all of the information needed to create a Tag.

The dialog box titled "MMISoft - Edit Tag database" contains a table with the following data:

No.	Register/Coil	Tag
0001	D001	LED Register
0002	D000	Message Trigger Reg

Below the table, a status message reads: "This tag is being used as LED Register."

The "Type" section has two radio buttons: "Coil" (selected) and "Register". Below them is a dropdown menu showing "B = Internal Coils (0 to 63)".

The "Register/Coil Number" section features a green indicator light, a text box containing "000", and a vertical spinner.

The "Tag Name" section has a text box.

On the right side, there are several buttons: "New" (with a tag icon), "Delete" (with a tag and minus icon), "Import" (with a tag and double arrow icon), "Add" (with a tag and plus icon), "Update" (with a tag and pencil icon), "Help F1", "Close", "Internal Reg...", "Add/New", and "Cancel".

At the bottom right, there are two status indicators: a red light labeled "Invalid Entry" and a green light labeled "Valid Entry".

Add - Adds the new tag to the list then retracts the expanded portion of the Edit Tag database dialog.

Add/New - Adds the new tag to the list and leaves the expanded portion of the Edit Tag database open.

Update - This is used when editing an existing tag. It updates the information in the tag shown in the list box and also retracts the expanded portion of the Edit Tag database dialog.

Cancel - Retracts the expanded portion of the Edit Tag database dialog without accepting changes.

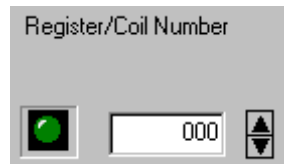


Select the Coil radio button


This means we will be assigning a tag to a coil in the simulator. If an actual Controller had been selected from the Controller list at the start, the **Type** drop down would give us a list of all the different coil types and the allowable range for each type. The Simulator only allows coils of type "B".

The "Type" dropdown menu is shown with the selected option "B = Internal Coils (0 to 63)".

Since there are only "B" type coils available we can skip down to the **Register/Coil Number** entry field.

A small window titled "Register/Coil Number" containing a green LED indicator, a text box with "000", and a spin control.

The spin control can be used to select a coil number or one can be entered by clicking the cursor on the box and using the keyboard.

 Notice the LED next to the number. This indicates if the number being used for this tag is valid.

A small window titled "Register/Coil Number" containing a red LED indicator, a text box with "100", and a spin control.

The indicator turns red if it is not.

A legend box showing a red LED labeled "Invalid Entry" and a green LED labeled "Valid Entry".

Enter 10 as the coil number.

The Tag Name field is where you enter a unique name to identify the tag. Try to pick a name that fits the purpose of the tag (such as limit switch, pilot light, output #33, motor status, etc.). For this tutorial...

Enter "MyTag" as the tag name.

A main configuration window with tabs for "Type" (Coil selected), "Register", and "Add/New". It includes a dropdown for "B = Internal Coils (0 to 63)", a "Register/Coil Number" field with "B010", a green LED indicator, a spin control showing "010", and a "Tag Name" field with "MyTag". Buttons for "Add", "Update", "Add/New", and "Cancel" are on the right. A legend for LED indicators is also present.

Click the Add/New button

A button labeled "Add/New".

We are now ready to create a tag for a register.



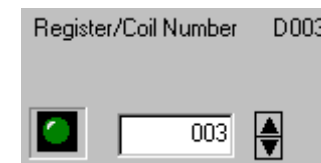
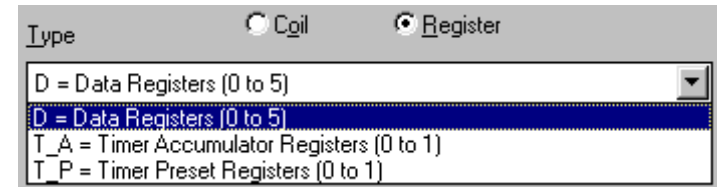
Click the New Button



Select the Register radio button

The **Type** drop down give us a list of all the different register types and the allowable range for each type. The Simulator has data registers and timers.

Registers 0 and 1 are already in the list due to default assignments. We will get to those assignments shortly. In the mean time...



Enter a register number of 3.

Enter a Tag Name of "MyDataReg".



Click the Add Button

The main configuration window is shown with the following details:

- Type:** D = Data Registers (0 to 5)
- Register/Coil Number:** D003
- Tag Name:** MyDataReg
- Buttons:** Add, Add/New, Update, Cancel
- Indicators:** Invalid Entry (red light), Valid Entry (green light)

Exercise:

Try entering your own tag for a timer and timer preset.

Messages

Messages allow the PLC to "talk back" to the operator. They are used to:

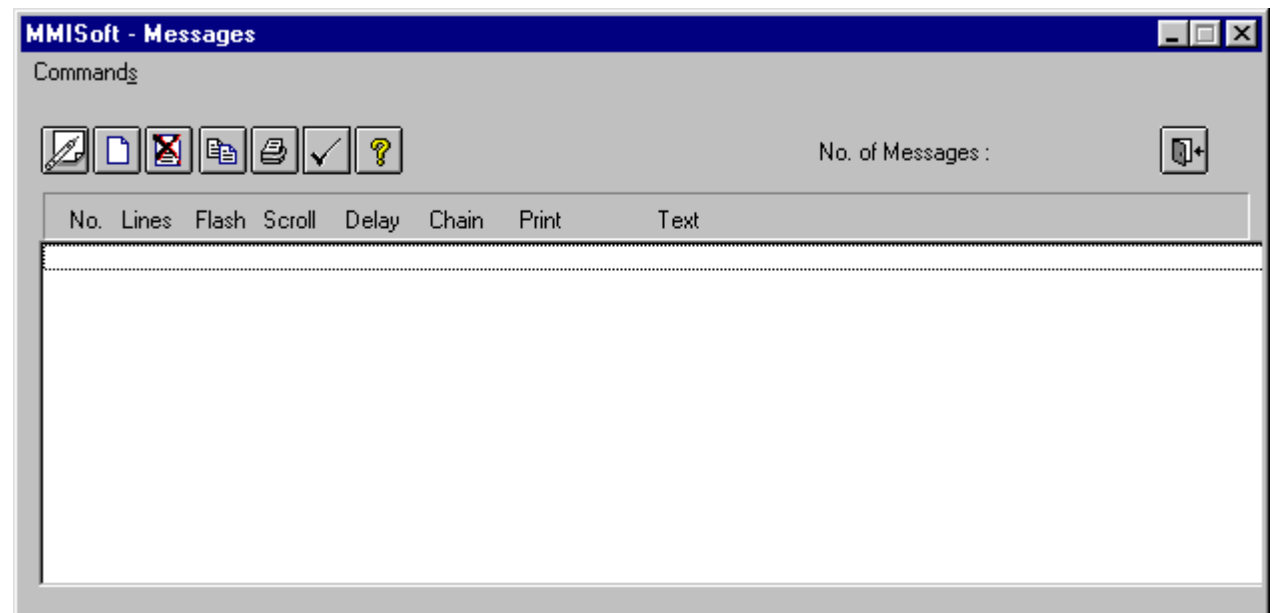
- Alert the operator of alarm conditions
- Inform the operator of machine status
- Prompt the operator to take action
- Allow the operator to view or modify machine parameters



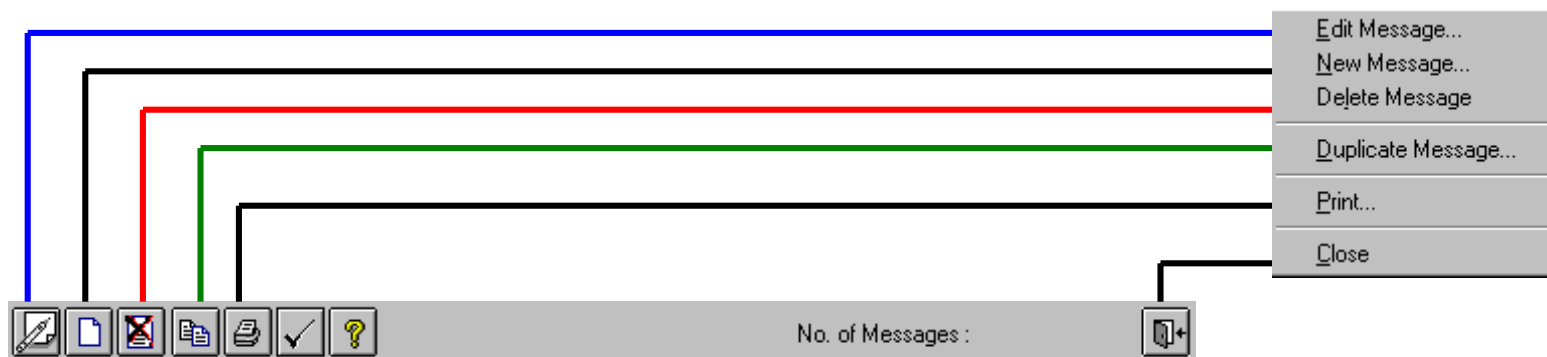
Click on the Message button to bring up the Messages Dialog

The display shows all of the defined messages. You can edit any message by double clicking on it.

Messages are saved automatically when the project is saved.



The **Toolbar** or **Commands** menu can be used to perform message-handling functions.



Edit - Allows you to edit an existing message.


New – Allows you to add a new message to the list.


Delete - Deletes the highlighted message.

Duplicate – Makes a copy of an existing message.

Print – Prints all of the messages along with their attributes.

Close – Closes this window.

 **Verify** – Checks that all of the messages are formatted properly and that any tags used are still valid.

 **Help** – Brings up the help dialog for messages.



Click on the New Message Button...

The New message dialog pops up to show the area for declaring a message number and type.

Cancel – Returns you to the Messages Dialog.

Ok – Brings up the Editing Message Dialog

Select Normal as the message type and click on Ok to continue.

Notice the LED next to the **Message Number**. This LED indicates if the message number is valid. The stoplight is the key for telling what the LED colors mean.

The range of valid message numbers for given right below the Message number text box for your reference.

Enter 1 as the message number.

There are 4 different **Message Types** to chose from.

Normal – Normal messages are used to display information or alarm conditions. Tag data can be embedded in the messages for viewing purposes only.

Link – A link message is simply a list of normal and special messages. There is no text in a link message, just numbers. When a link message is called, the PREV and NEXT buttons on the MMI-220 can be used to scroll through the list of messages.

Special – Special messages change or allow changes to data in the Controller. Each special message can act on one data bit or register.

Function – Function messages are used to set up the characteristics of a function key.

The Editing Message Dialog is used to enter the message and set its attributes.

Message Attributes

Display Half

All

Top

Bottom

Display Half

All – Takes up both lines of the display.

Top – Uses only the top line of the display.

Bottom - Uses only the Bottom line of the display.

Type	All	Top	Bottom
All	Overwrites all lines	Overwrites all lines	Overwrites all lines
Top	Overwrites top line Blanks bottom line	Overwrites top line Bottom line unaffected	Overwrites top line Bottom line unaffected
Bottom	Overwrites bottom line Blanks top line.	Overwrites bottom line Top line unaffected	Overwrites bottom line Top line unaffected

Editing Message #00001

Display Half

All

Flash

Print

Min. Time

Chained to

Embed Bit Text

Embed Register

Perform action on...

Action field here

Help F1

<< < > >>

Accept/New...

Cancel

Ok

☒ Flash

Flash - This causes the whole message to flash when it is displayed. The flash cycle is 0.5 seconds on, 0.5 seconds off.

☒ Print

Print – Causes the message to be printed out when it is called up.

Min. Time

3

Min. Time – Keeps the message on the display for at least the number of seconds entered.

Chained to

Chained to – Goes to the message specified once this message is done.

Scroll

No

Fast

Medium

Slow

Scrolling – Scrolling allows a long message to be put on a display. Characters are scrolled on to the display from the right-hand side. If a message is All lines then the bottom line scrolls in the

message until it is full then the bottom line is transferred to the top line as a whole set of 20 characters, scrolling then resumes on the bottom line.

Fast – Scrolls about 3 characters per second on to the display.

Medium – Scrolls about 1.5 characters on the display per second.

Slow – Scrolls about 1 character per second on to the display.

No – disables scrolling. This means the message will be limited to 40 characters (all lines type) or 20 characters (top or Bottom type).

For our example, leave the default settings as shown on the right.

Editing Message #00001

My Company MyTown US
A

My Company
MyTown USA

My Company
MyTown USA

Editing Message #00001

Display Half

All

Flash

Print

Min. Time

Chained to

Scroll

No

Embed Bit Text

Embed Register

Perform action on...

Action field here

Help F1

<< < > >>

Accept/New...

Cancel

Ok

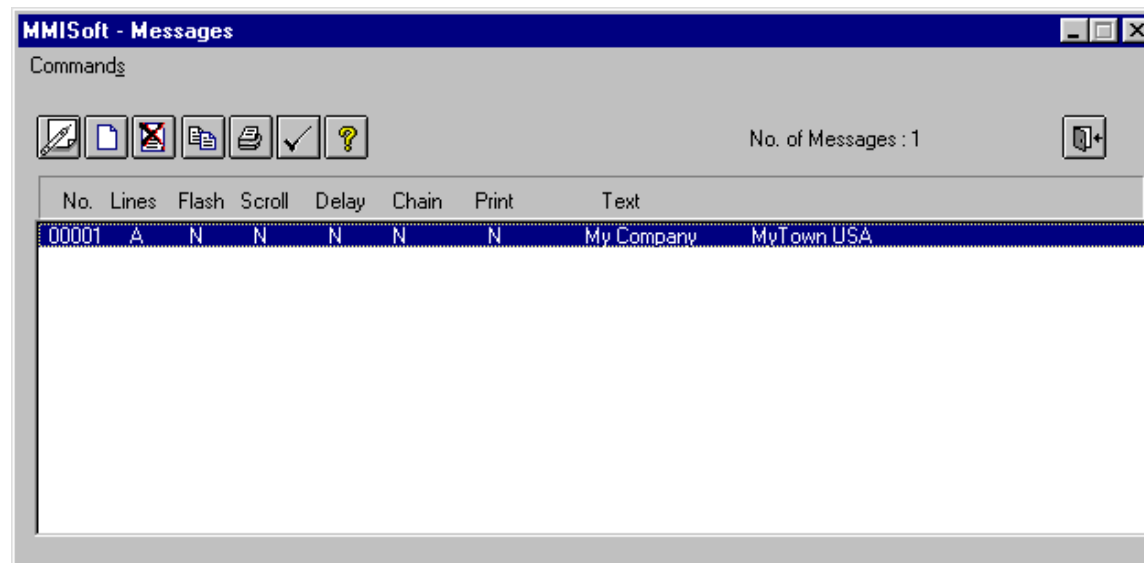
By now you have noticed the text editing box with its flashing cursor. Message text is entered in this box. Click on the box and enter your message.

For this example type in: “My Company MyTown USA” Add spaces in front of myTown until it is on the bottom line. Now add spaces in front of My Company until it is centered in the display.

Congratulations! You have entered your first message!

Click the  button to add your message to the message list.

Confirm that the message is now shown in the message box.




We will now add a second message to demonstrate how values are embedded into messages.

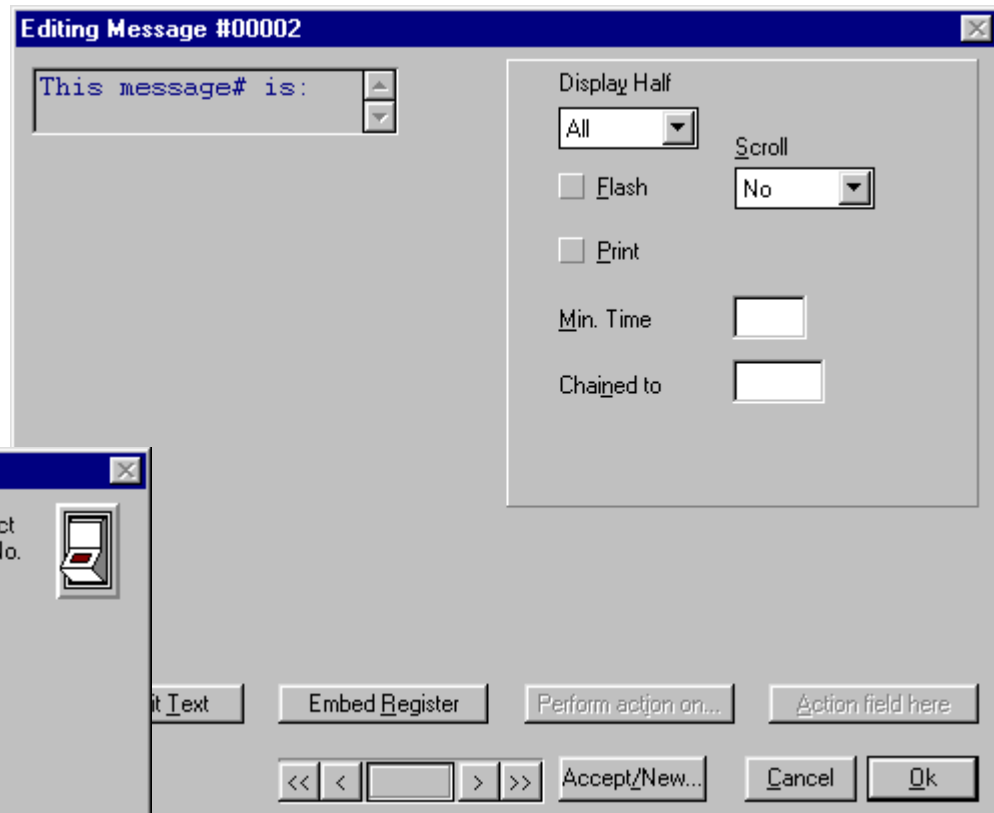
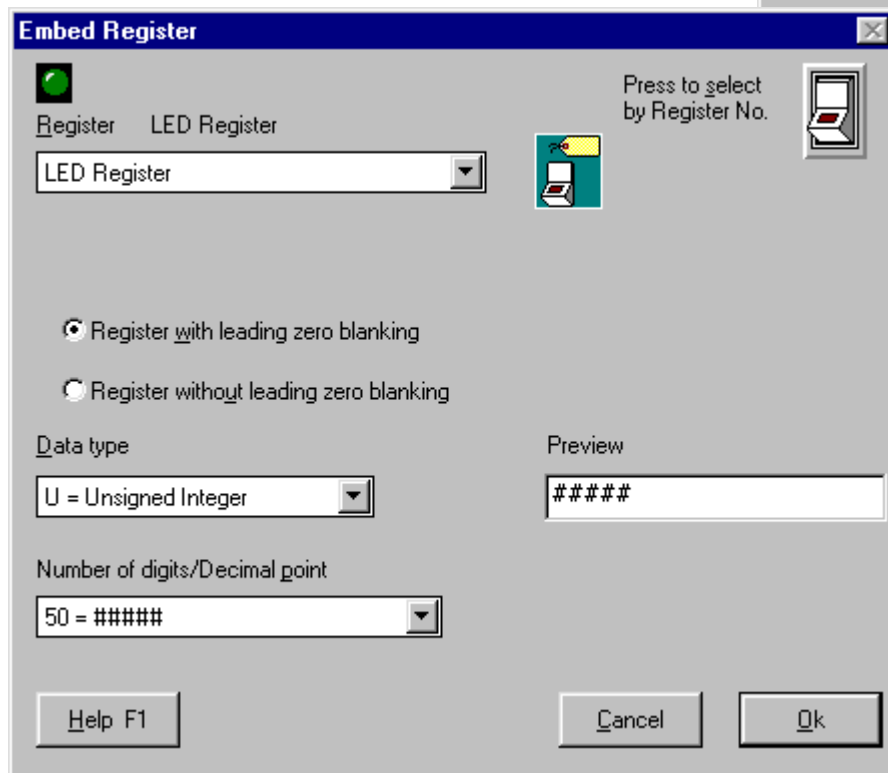
Click on the new icon and add message #2 as a Normal message.

Once in the Editing Message box, leave the attributes at their defaults and type in the following text:
"This message# is:"

You are now ready to embed a register value. The register we will embed is the message triggering register because it holds the message#.

Click on the  button.

The Embed Register Dialog should appear.



Click on the Register drop down and select Message Trigger Reg.



Features of the **Embed Register** Dialog



The Tag icon allows quick access to the Tag Edit window in case you need to create a tag for the data to be embedded.



The Switch icon allows you switch between viewing Register drop down contents as tag names or as alphanumeric PLC register designations.

☒ Register with leading zero blanking
☐ Register without leading zero blanking

The radio buttons allow selecting how the numerical value will be displayed, with or without leading zeros.

Data type

U = Unsigned Integer
 U = Unsigned Integer
 S = Signed Integer
 H = Hex Data
 B = Binary Data
 D = BCD Data
 G = Bar Graph

Data type – sets the numerical format of the displayed data.

For our example, leave as Unsigned Integer

Number of digits/Decimal point

30 = ###
 20 = ##
 33 = .###
 32 = #.##
 31 = ##.#
 30 = ####
 44 = .#####
 43 = #.#####
 42 = ##.###

Number of digits/Decimal point – This drop down gives all of the display possibilities for the data type selected. Just select the one that fits the message purpose. Note: the decimal point and sign take up extra spaces in the message text. Note: The decimal point is just a marker. The MMI does no mathematical scaling.

For our example, select 30

Preview

###

Preview – Shows how the value will look when it is displayed.

Embed Register

Register Message Trigger Reg

Message Trigger Reg

Press to select by Register No.

☒ Register with leading zero blanking
☐ Register without leading zero blanking

Data type U = Unsigned Integer Preview ###

Number of digits/Decimal point 30 = ####

Help F1 Cancel Ok

Verify the settings are as shown above and click

Ok

The message box should show the embedded data as fancy S's.



Press the **Accept/New...** button to add your message to the message list.

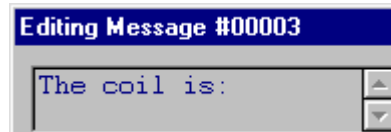
The **Accept/New...** button adds the message to the message list and begins new message editing automatically. This saves time when programming a large amount of messages.

We will now add a third message to demonstrate how coil values are embedded into messages.

In the New Message Dialog add message #3 as a Normal message.

Once in the Editing Message box, leave the attributes at their defaults and type in the following text:

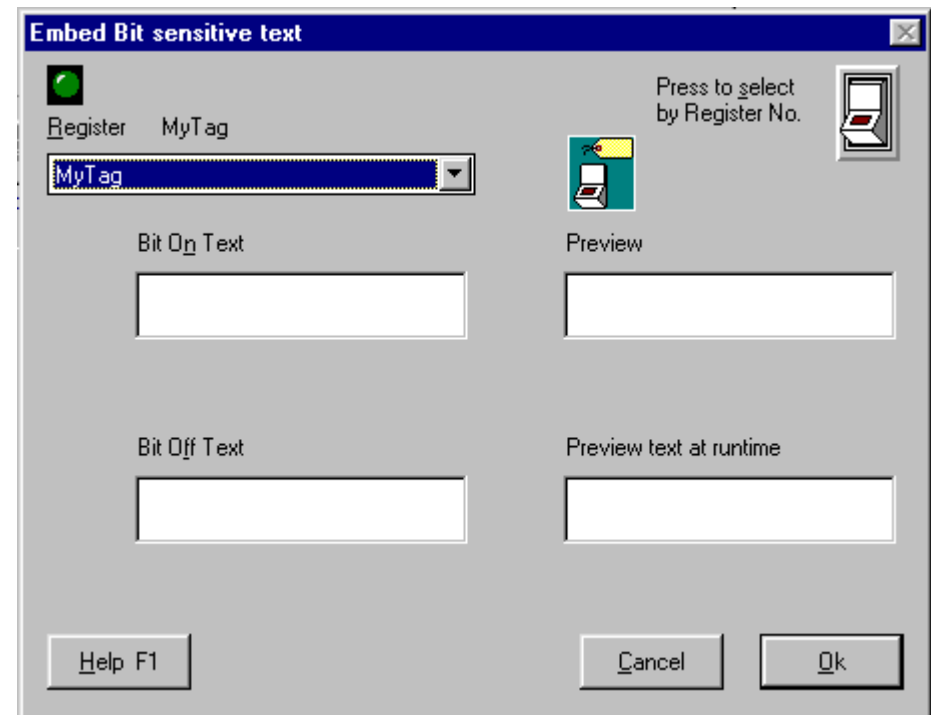
“The coil is:”



Then, click on the **Embed Bit Text** button.

The **Embed Bit Text** button is used to place bit sensitive text into a message.

The **Embed Bit sensitive text** Dialog will popup.



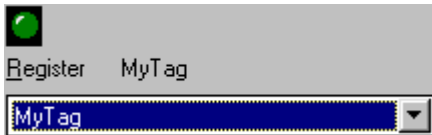
Features of the **Embed Bit sensitive text** Dialog



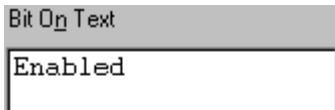
The Tag icon allows quick access to the Tag Edit window in case you need to create a tag for the data to be embedded.



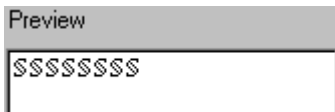
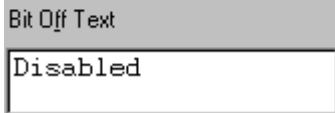
The Switch icon allows you switch between viewing Bit drop down contents as tag names or as alphanumerical PLC register designations.



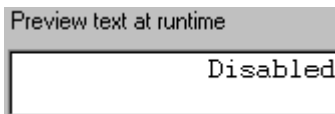
Register – This drop down shows all of the tagged bits. The bit to display is selected from this list.



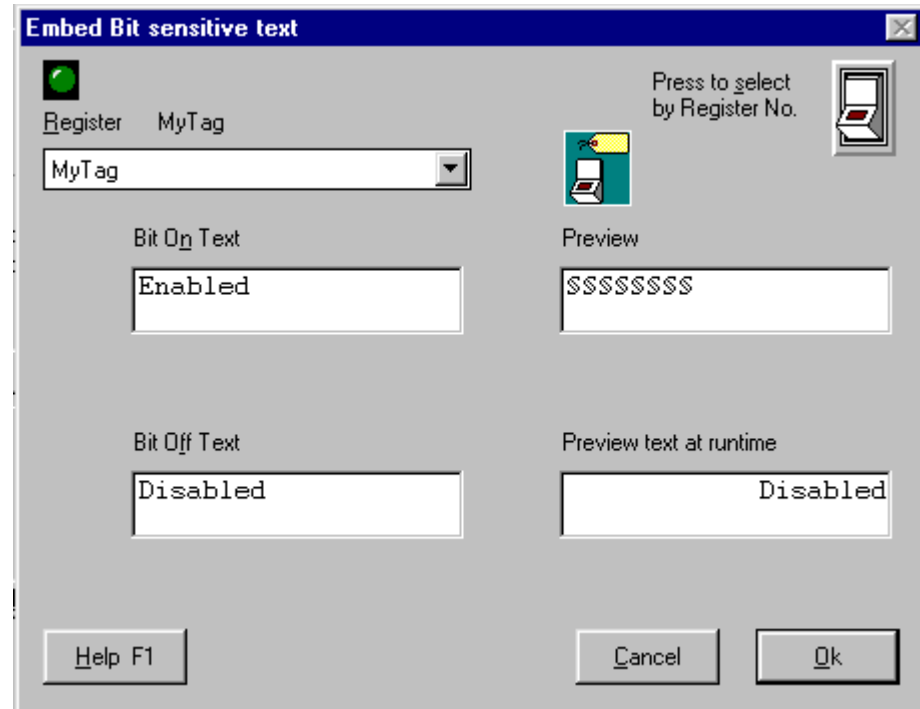
Bit On Text and Bit Off Text – These text boxes contain the text to be displayed when the bit is in their particular state.



Preview – Shows the number of places held for this embed.

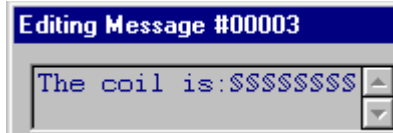


Preview text at runtime – Shows where the text will be and how it will appear once the application is running.



Select MyTag as the coil to embed. Type in Enabled in the On Text box and Disabled in the Off text box.

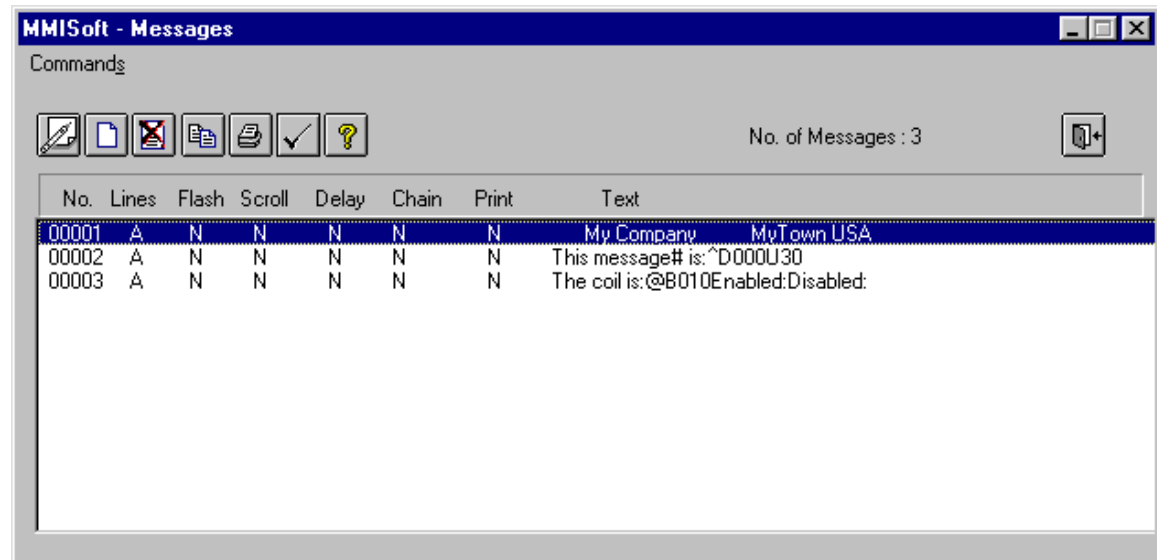
Click on  to finish the embedding and see how it looks in the Edit Message Dialog.



It should look like this!

Press the  button to add your message to the message list.

You will notice that there are some strange characters in your message. These are where there is embedded data. The ^ indicates an embedded Register and the @ is for embedded bits. You can safely embed up to 20 registers or bits into any message.



Now is a good time to Save your work.

Click on the  icon to save your work. Name the project "Tutorial".

Editing Messages

Once a message is entered it can still be changed through the editing process.



Double click on a highlighted message to edit it or highlight it and click on the edit tool.

The message editing box pops up. Locate the cursor in the text box where the editing is desired and delete and add characters as desired.

Edit message #2.
Change “This” to “The” and
add a space after the “:”

To edit an embedded values click the cursor on the value. A box will pop up below the message text box showing the embedded values attributes. Click on the edit or delete buttons as desired.

New embedded values can also be added to a message as well just click where you would like to embed the value and click on the Embed Data or Embed Bit buttons and proceed as described earlier. It is as simple as that.

Note: Make sure there is enough room in the text box to hold the new embedded values or text.

Click on the  button.

The image displays two screenshots of the "Editing Message #00002" dialog box. The top screenshot shows the initial state with the text "This message# is: \$\$\$" and a "Display Half" dropdown set to "All". The bottom screenshot shows the text changed to "The message# is: \$\$\$" and the "Display Half" dropdown still set to "All". Below the text box, there are checkboxes for "Flash" and "Print", and input fields for "Min. Time" and "Chained to". At the bottom of the dialog, there are buttons for "Embed Bit Text", "Embed Register", "Perform action on...", "Action field here", "Help F1", navigation arrows, "Accept/New...", "Cancel", and "Ok".

Special Messages

Special messages allow changes to be made to data in the PLC.

Start a new message. Set the Message Number as 5 and select it to be a Special message.

Click on the  button.



The 'New message' dialog box is shown. It has a title bar 'New message' with a close button. Inside, there is a 'Message Number' field with the value '5' and a green indicator light. To the right of the field is a traffic light icon with three lights (red, green, yellow) and text: 'Invalid message number.', 'Valid new number.', and 'Number is already defined.' Below this, 'Valid numbers: 00001 to 65494' and 'F01 to F40' are listed. The 'Message Type' section has four radio buttons: 'Normal' (For monitoring status and alarms.), 'Link' (For viewing a list of messages easily.), 'Special' (selected, For changing data in the PLC.), and 'Function' (For defining the Function Keys.). At the bottom are 'Help F1', 'Cancel', and 'Ok' buttons.

The **Edit Action field for message** dialog comes up. All of the information for the special message action is entered in this dialog. Only one action can be assigned to a special message.

Features of the **Edit Action field for message** Dialog



The Tag icon allows quick access to the Tag Edit window in case you need to create a tag.



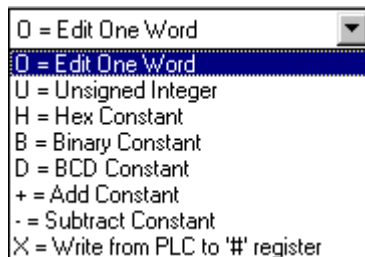
The Switch icon allows you switch between viewing Register drop down contents as tag names or as alphanumeric PLC register designations.

Register – This drop down displays all of the tagged registers.

For our example, select **Message Trigger Reg**

Operation on tag – This drop down displays the possible data operations for a special message. The drop down changes depending on if the Register selected is a data register or a bit/coil.

Operation on tag



O = Edit One Word – Allows the operator to change the contents of a register.

U = Unsigned Integer, H = Hex Constant, B = Binary Constant and D = BCD Constant - Used to force a number of the named format into a register.

+ = Add Constant and - = Subtract Constant - Used to increment and decrement a register by a fixed amount.

X = Write from PLC to # register - Used to transfer data from the PLC to an internal register.

For our example, leave as Edit One Word

Data type

- U = Unsigned Integer
- S = Signed Integer
- H = Hex Data
- B = Binary Data
- D = BCD Data
- G = Bar Graph

Data type – sets the numerical format of the data if Edit one word is selected.

For our example, select “U”

Number of digits/Decimal point

- 30 = ###
- 20 = ##
- 33 = .###
- 32 = #.##
- 31 = ##.#
- 30 = ###
- 44 = .####
- 43 = #.###
- 42 = ##.##

Number of digits/Decimal point – This drop down gives all of the display possibilities for the data type selected. Just select the one that fits the message purpose. Note: the decimal point and sign take up extra spaces in the message text. Note: The decimal point is just a marker. The MMI does no mathematical scaling.

For our example, select 30

Preview

D0000U30

Preview – Shows how the message prefix will look when it is displayed in the main Messages dialog.

Preview text at runtime

1111

Preview text at runtime – Shows how the value will look when it is displayed in the message text box.

Note: If a tag that is assigned to a Bit/Coil is selected the following dialog changes are displayed:

Bit/Coil Drop Down

E = Edit – Allows the operator to change the status of the bit/coil.

E = Edit

F = Turn Off

N = Turn On

F = Turn Off - Used to force a bit/coil OFF.

N = Turn On - Used to force a bit/coil ON.

Bit On Text

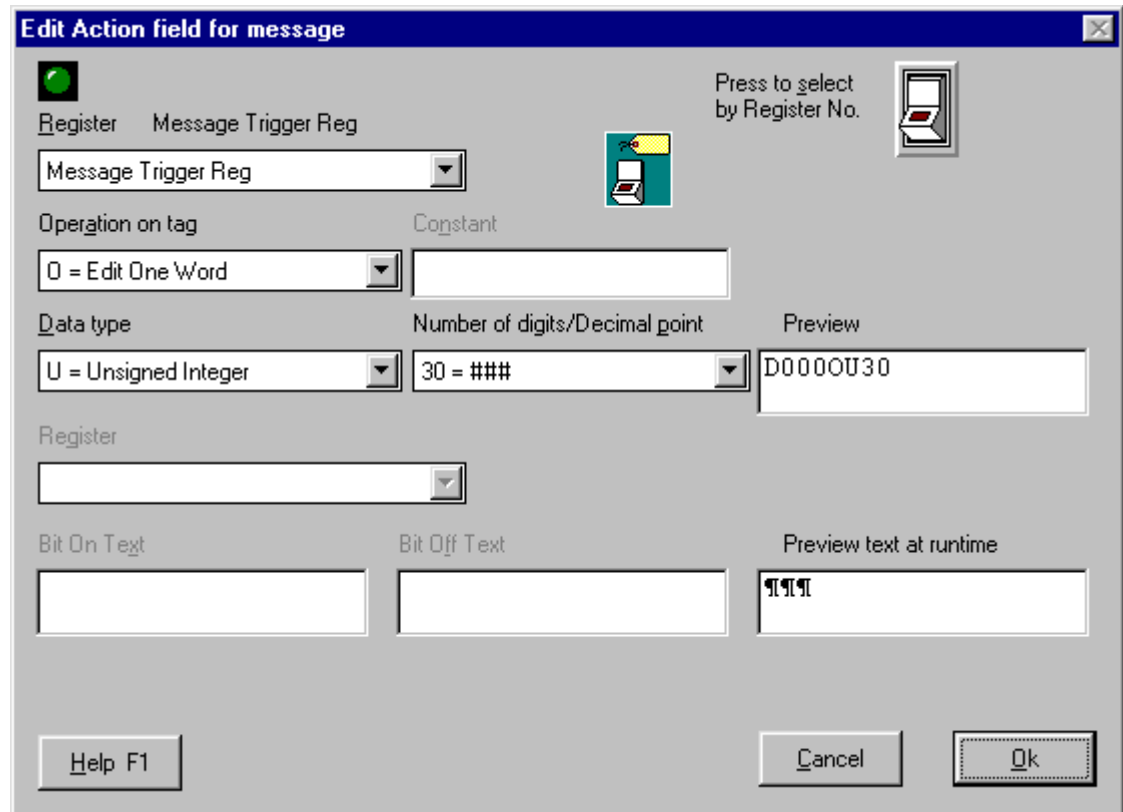
Bit Off Text

Bit On Text and Bit Off Text - The text that corresponds to the bit/coil states when editing a bit/coil.

Select the Message Trigger Reg as the register to act on. Select O = Edit One Word, U = Unsigned Integer and Number of digits/Decimal point as 30 = ###.

Verify the settings are as shown to the right and click .

You may have noticed that there is second **Register** drop down in this dialog. This is used for data transfer actions. We cover its function in the section on internal registers.



Edit Action field for message

Register Message Trigger Reg

Message Trigger Reg

Operation on tag Constant

O = Edit One Word

Data type Number of digits/Decimal point Preview

U = Unsigned Integer 30 = ### D0000U30

Register

Bit On Text Bit Off Text Preview text at runtime

#####

Help F1 Cancel Ok

The Editing Special Message dialog pops up. Leave the default attribute settings as they are.

Type in the message “Enter new message”, 3 spaces and “number here - - > “

Now we will embed the data for the special message. This will allow the operator to see the value in the PLC and change it.

Click on the  button.

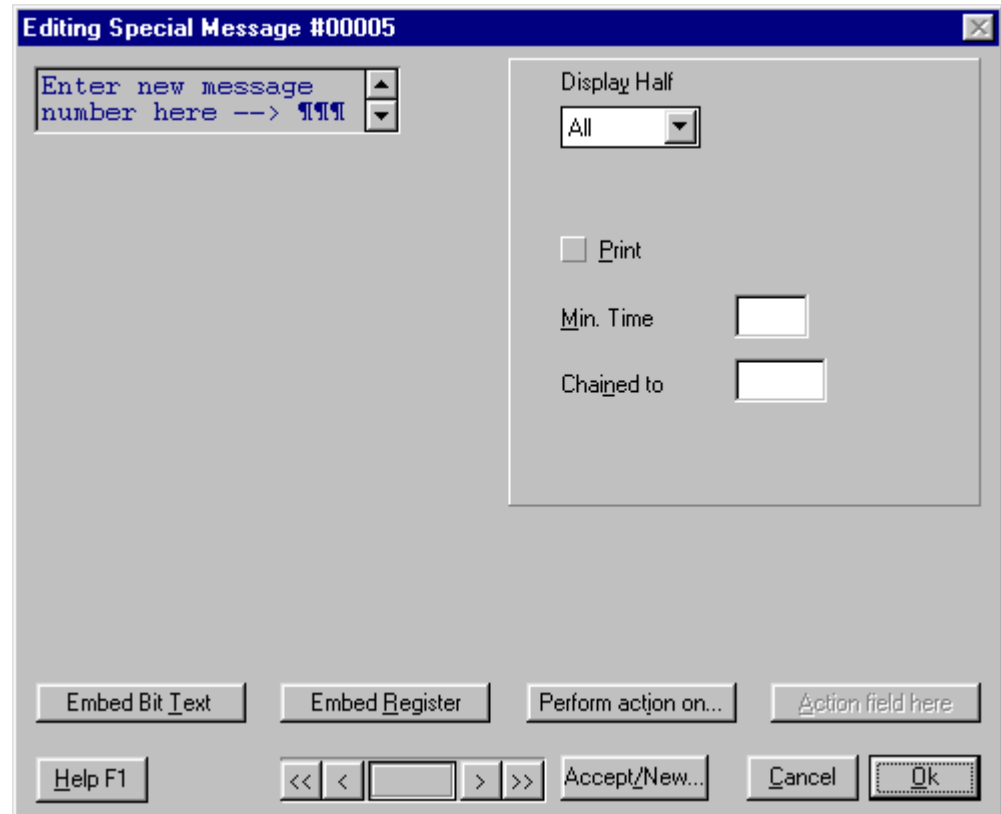
The value is placed at the end of the message using backward P's as placeholders.

Click on the  button.

Exercise:

Enter another special message #10 that forces 1 into the register tagged as Message Trigger Reg. Make up your own text.

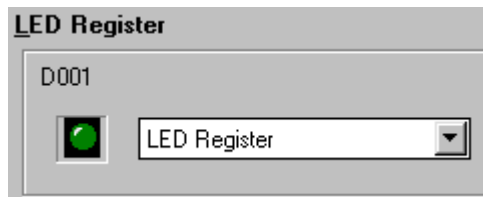
Note: The **Action field here** button is grayed out for the exercises message because there is no operator action needed. The MMI will automatically put the constant value into the register when the special message is called up. If desired, the register can be put in the message by using the Embed Register button.



The image shows a screenshot of the 'Editing Special Message #00005' dialog box. The title bar is blue with white text. The main area has a light gray background. At the top left, there is a text input field containing 'Enter new message' and 'number here --> ' followed by two backward placeholder characters. To the right of this field are two small vertical arrows. On the right side of the dialog, there is a section titled 'Display Half' with a dropdown menu set to 'All'. Below this is a checkbox labeled 'Print' which is unchecked. Further down are two labels, 'Min. Time' and 'Chained to', each followed by an empty text input field. At the bottom of the dialog, there is a row of five buttons: 'Embed Bit Text', 'Embed Register', 'Perform action on...', and 'Action field here' (which is grayed out). Below this row is another row of buttons: 'Help F1', a set of navigation arrows (left, right, and a central box), 'Accept/New...', 'Cancel', and 'Ok' (which is highlighted with a dashed border).

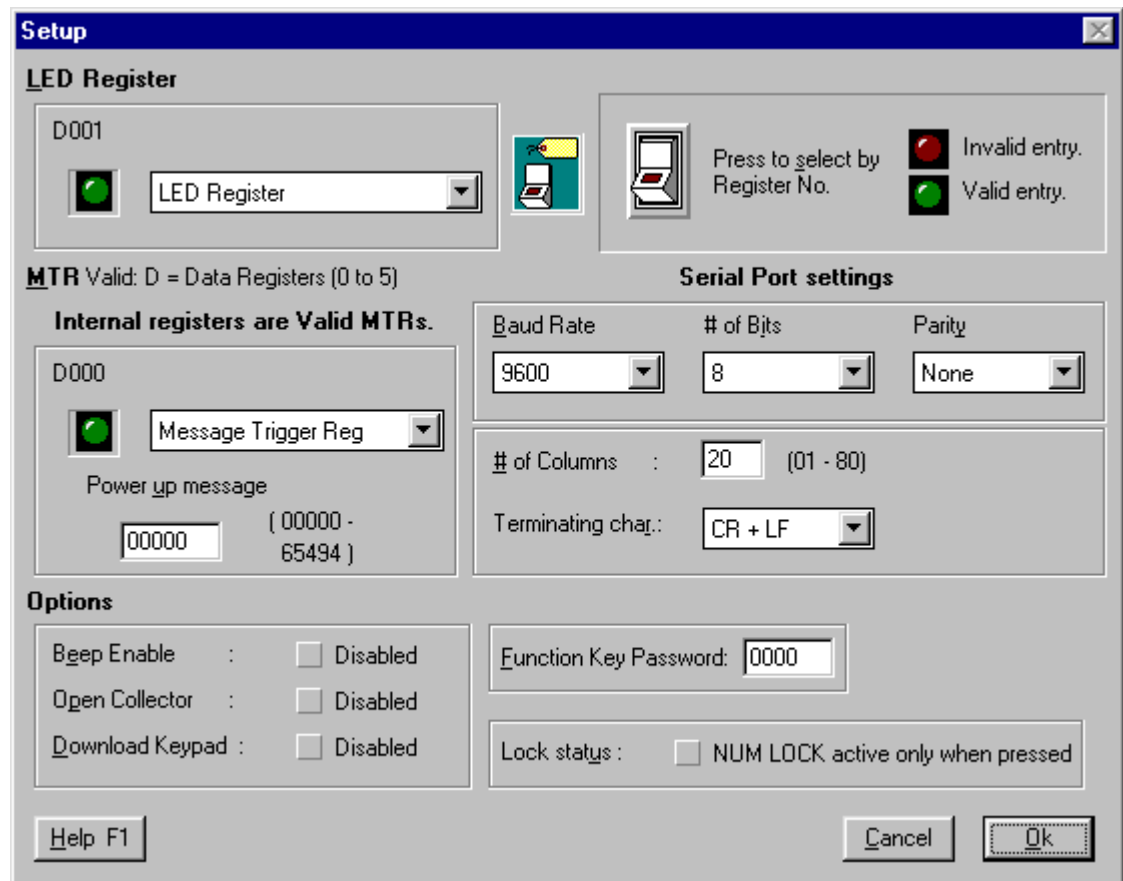
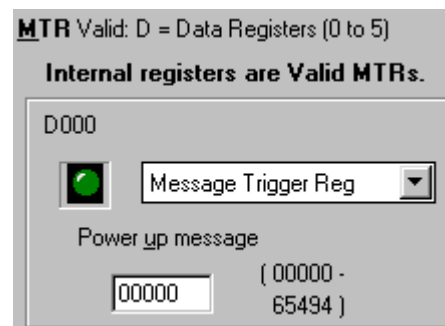
Setup Dialog

Click on the Edit|Setup menu selection. The project **Setup** dialog appears. The setup takes care of things that are outside the scope of messages. It is here that we set all of the parameters particular to MMI operation.



LED Register – Allows us to control the LED's via the bit status of a register. The register must have a tag assigned to it.

MTR – This stands for message triggering register. This is the register that controls what is on the display. The number in this register is the message number that the MMI should display.




The **Power up message** is a message that is executed but not displayed during startup.

Set the Power up message to 10.

This will execute the special message you made earlier, which will force a constant of 1 into Message Trigger Reg and thus display message 1.

Serial Port settings – These settings are for configuring the PC port for serial output to a printer or other device. They have nothing to do with PC to MMI communications or MMI to PLC communications.

Options – Enable or disable features, assign a password to the function keys and set how the NUM LOCK operates.



The Options dialog box contains the following settings:

Option	Value
Beep Enable	<input type="checkbox"/> Disabled
Open Collector	<input type="checkbox"/> Disabled
Download Keypad	<input type="checkbox"/> Disabled
Function Key Password	0000
Lock status	<input type="checkbox"/> NUM LOCK active only when pressed

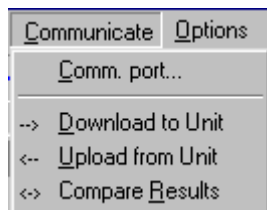
Use the  key to read how these selections affect MMI operations.

You will notice there are some other options not shown. Various options are visible depending on the PLC type. Be sure to consult the Help whenever using the option settings. When you are done reading the Help...

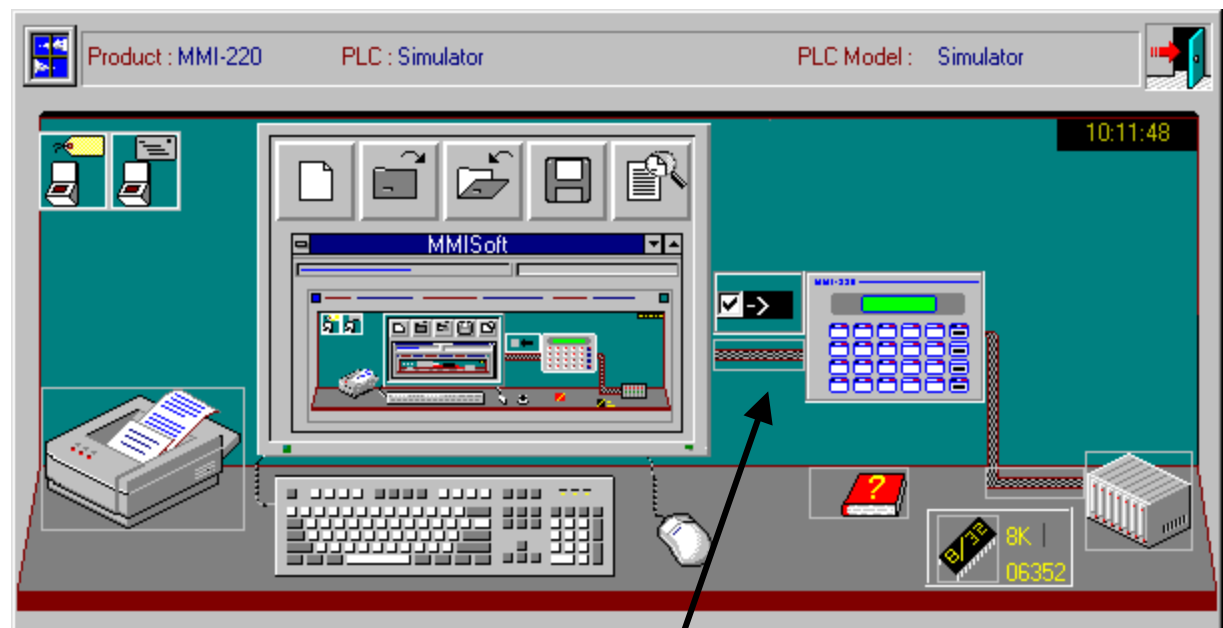
Click on  to close the dialog and click on the  icon to save your work.

Now is a good time to download your project and try it out. Power up and connect your MMI to the PC as per the manual. You can start the download one of two ways...

Click on the Communicate|Download to Unit Menu.

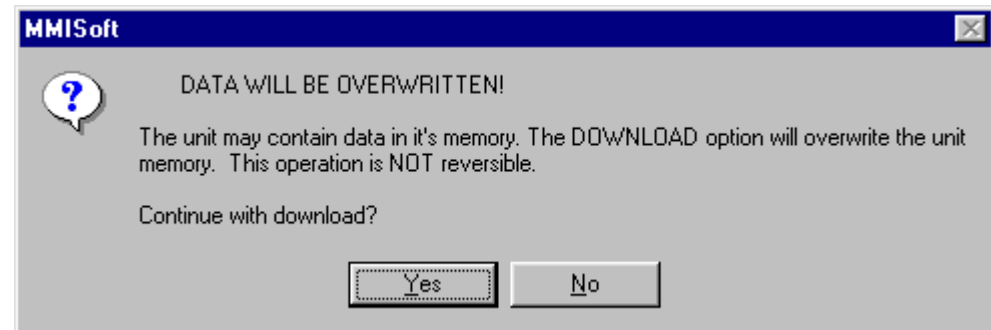


Or Click on the cable in the Toolstation.



Click  to continue with the download.

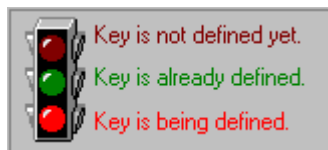
Once the download is complete, the MMI-220 should resume operation displaying message 1.
By changing the constant in message 10, any message can be displayed after startup.



Function Keys

Function keys are Special messages that have been assigned to the keys on the front of the MMI.

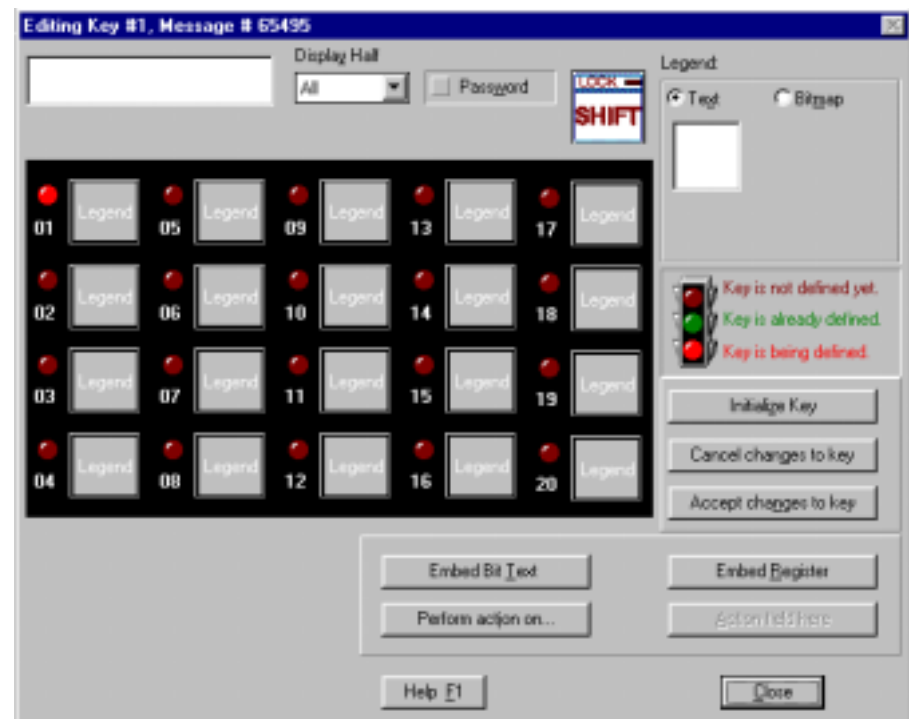
Click on the picture of the MMI-220 to bring up the function key dialog.



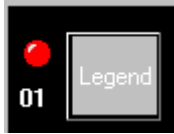
The LED's next to each key indicate if it has been defined.



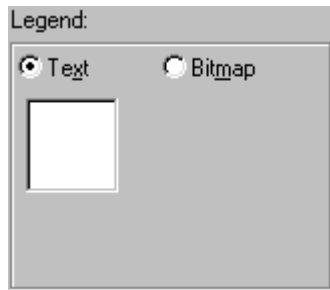
Shift – Shift is used to call up the key designations for shifted keys (Key numbers 21 to 40).



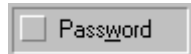
Additional features of the **Editing Key** Dialog



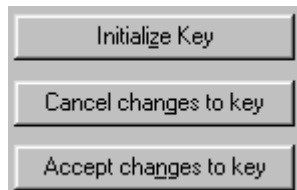
Key status display – LED indicates if key is defined. Legend is as set in the Legend frame. Click on the key to begin editing that key.



Legend – Used to assign a legend to a key. This is a useful way to remember what each key does while programming. The legends can be printed out and glued to strips to create inserts for the keys.



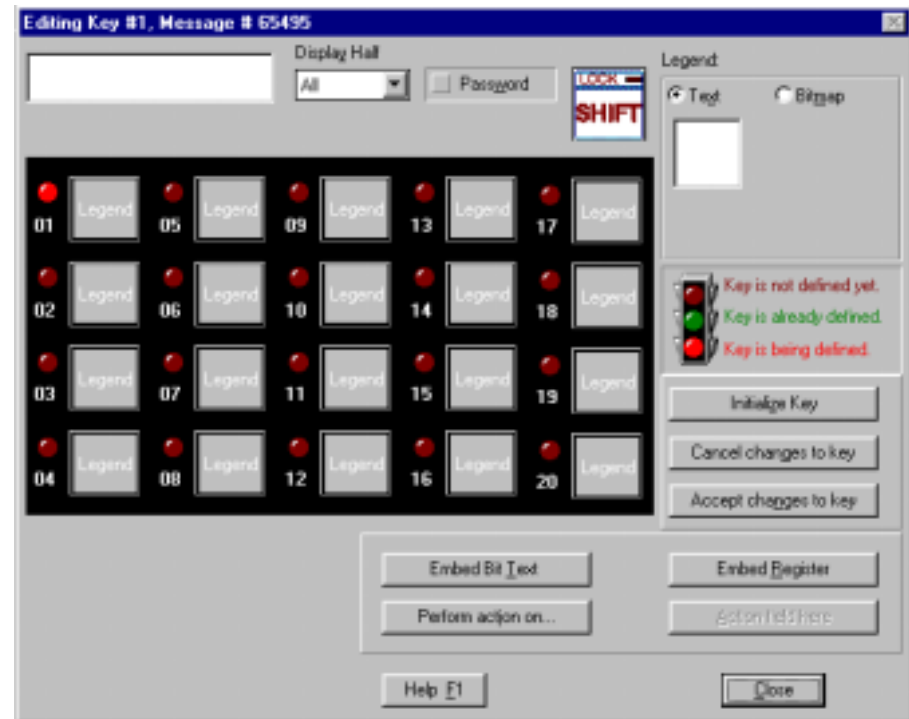
Password – If checked this will force the operator to enter the proper password before the function key's action is carried out.



Initialize Key – Clears all of keys settings.

Cancel changes to Key – Returns a Key to its last saved settings.

Accept changes to key – Verifies for proper assignment and saves the key settings.



All other setting are the same as Special or Normal message controls. You may have noticed that the fields for flashing, scrolling, printing, chaining and minimum time are not present. Function key messages are not allowed to scroll or flash. Printing, chaining and minimum time fields can be accessed through the Message Editing process.

Click on key 01

Click on the  Text button under Legend and type “#3” in the Legend text box

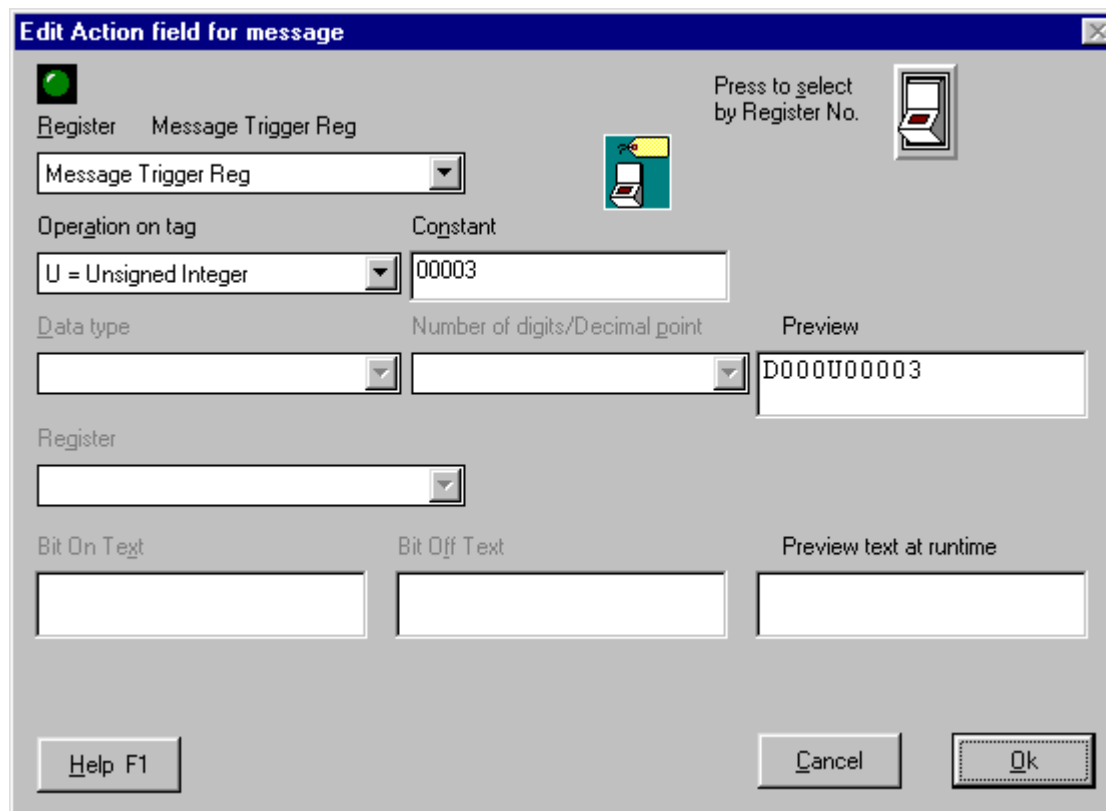
Click on 

Select Message Trigger Reg from the register list.

Select U = Unsigned Integer from the Operation on tag dropdown.

Type 3 into the Constant field.

Click  to close the dialog.




The dialog box is titled "Edit Action field for message". It contains several fields and buttons. At the top left is a green circle icon. Below it is a "Register" label and a "Message Trigger Reg" dropdown menu. To the right of the dropdown is a small icon of a computer monitor. Below the dropdown is a "Constant" field containing the value "00003". To the right of the constant field is a "Press to select by Register No." label and a small icon of a document. Below the constant field is a "Data type" dropdown menu set to "U = Unsigned Integer". To the right of the data type dropdown is a "Number of digits/Decimal point" dropdown menu. Below the number of digits dropdown is a "Preview" field containing the text "D0000U000003". Below the preview field is a "Register" dropdown menu. At the bottom of the dialog are three buttons: "Help F1", "Cancel", and "Ok".

Click  to save the key definition.

You have created a key that will call up message #3 when pressed!

Click on key 02


Click on the  Text button under Legend and type “Tog Tag” in the Legend text box

Click on 

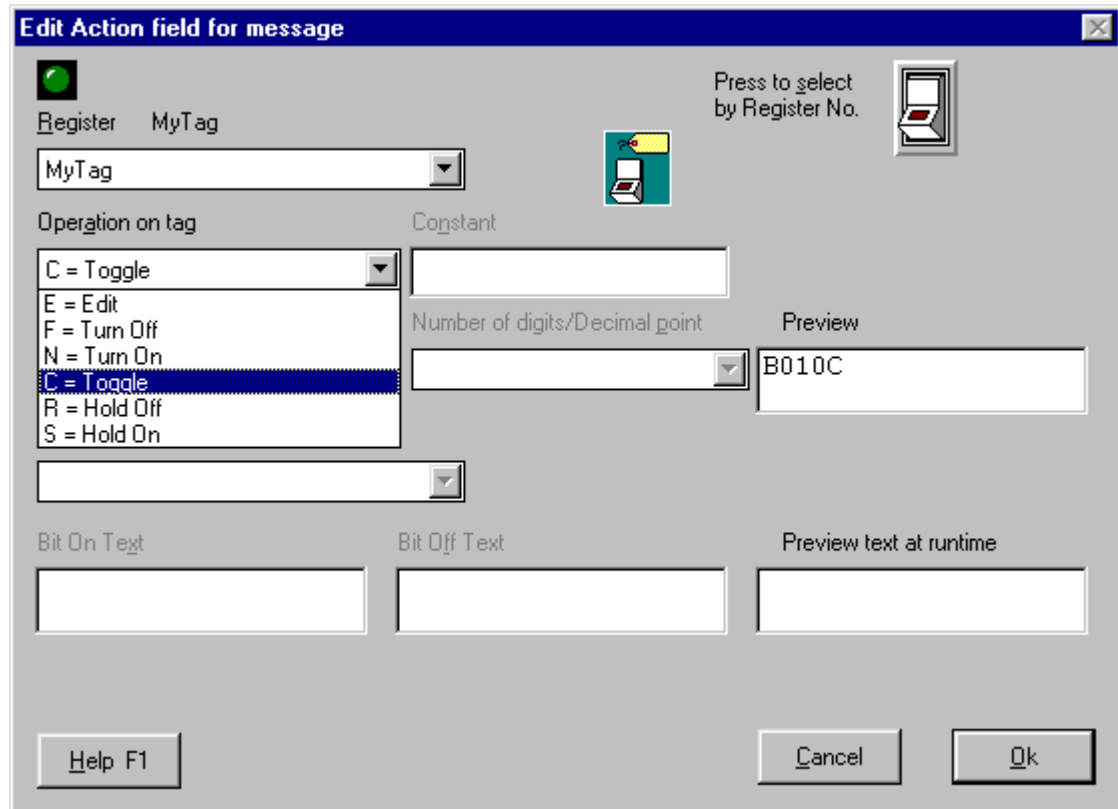
Select MyTag from the register list.

Select C = Toggle from the Operation on tag dropdown.

Click  to close the dialog.

Click  to save the key definition.

You have created a key that will toggle the state of the bit/coil you have tagged as MyTag!



Your screen probably looks something like this...

Click 

Save and Download the program to the MMI.

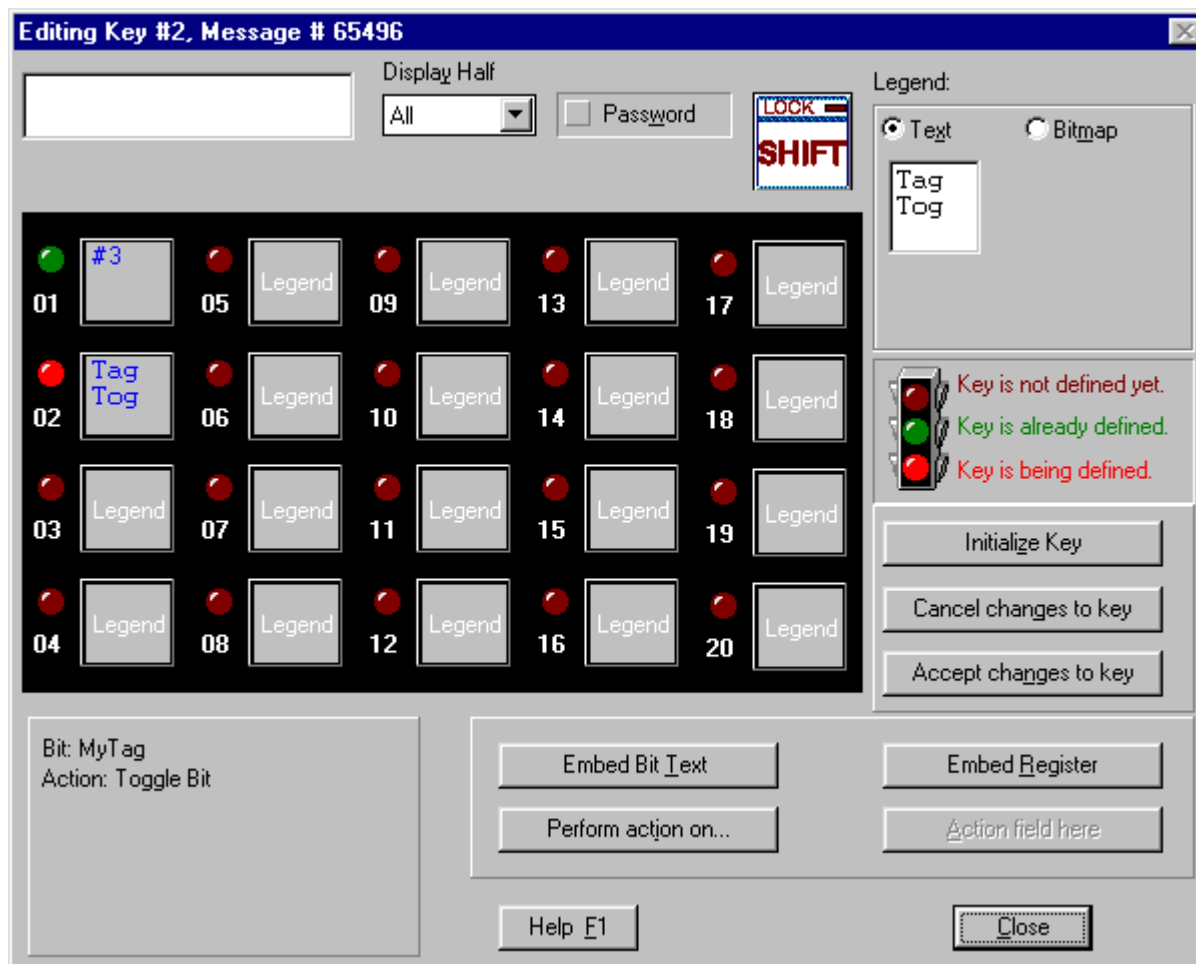
The MMI will show message one as before.

Now press the first function key on the MMI.

Message 3 will be displayed. It will show the status of MyTag.

Now press function key #2.

Message 3 will change to show the new status of MyTag.



The rest of this tutorial will involve programming an MMI-220 for a hypothetical application. The application will use all of the features of MMISoft. It is assumed that you are familiar with navigating MMISoft screens and are comfortable with creating tags messages and function key definitions.

Demonstration Application

Automatic Box Labeler

Process summary:

Box comes down conveyor to weigh platen, box is weighed, weight is fed to PLC register 21 by scale, label containing box ID and weight is printed on side of box, box is fed down conveyor to palletizer.

Specifications:

Modicon PLC (Modbus)

Interface must allow the operator to:

1. Access and change the location of the label on the box via 2 fixed setups and one customizable setup. (Register 41-X position inches, 42-Y position inches)
2. Manually step through the process. (Auto/Man- Bit 5, Start- Bit 3, Feed- Bit 20, Weigh- Bit 21, Print Label- Bit 22, Stop- Bit 4)
3. Adjust speed of conveyor. (Register 16)
4. Weigh platens settle time. (Register 11)
5. View the batch count (Register 7)
6. Reset alarm (Bit 6)

Interface must provide a way to display alarm messages when:

1. No boxes arrive after 10 minutes (Bit 26)
2. Exit conveyor backs up (Bit 12)
3. Box is under weight (Bit 73)
4. Printer is out of paper (Bit 9)
5. Conveyor jams (Bit 48)
6. Box label mechanism has a problem (Bit 13)

Interface must make a print out of each box's ID and weight.
Printer will be RS232, 9600 baud, No parity, 8 bits, 1 stop bit, 24character column width.

A word about project planning.

- Look at the project over all.
- How many tags will you need?
- How many messages?
- What features of the MMI-220 will make this user friendly?
- What should the function keys do?

It is obvious that we will need a tag for every register and bit mentioned in the specification.
We will need at least the alarm messages and then some.

But first plan out what the function keys will do. There are 40 definable function keys on an MMI-220. The function keys will be assigned to do the functions listed in the specification.

- 13. Start the machine
- 14. Switch between Automatic and Manual.
- 15. Setup Menu (used to setup label position, conveyor speed and settle time for the scale)
- 16. Reset alarms
- 17. Stop the machine (Not an Emergency Stop!)
- 18. Feed a box into the weigh platen (box on platen advances to palletizer)
- 19. Weigh the box
- 20. Label the box (and print data out)
 - 1. Pre-configured setup #1
 - 2. Pre-configured setup #2
 - 3. User-configured setup

The inserts for the Function Keys could look something like this...

	<div>PRESET 1<div></div></div>			START	STOP	
	<div>PRESET 2<div></div></div>			AUTO MANUAL	FEED	
	<div>PRESET 3<div>?</div></div>			SETUP	WEIGH	
				RESET ALARM	LABEL	

Second step is to create the anticipated tags. We should be able to enter all the obvious ones from the specifications. We may need to add some later on.

Create the following tags.

Message Trigger Reg (Default Register 40001)

Batch Count (Register 40007)

Settle Time (Register 40011)

Speed Adjust (Register 40016)

Box Weight (Register 40021)

X position (Register 40041)

Y position (Register 40042)

Start (Bit 00003)

Stop (Bit 00004)

Auto/Man (Bit 00005)

Reset alarm (Bit 00006)

Paper out (Bit 00009)

Exit back up (Bit 00012)

Mech Prob (Bit 00013)

Feed (Bit 00020)

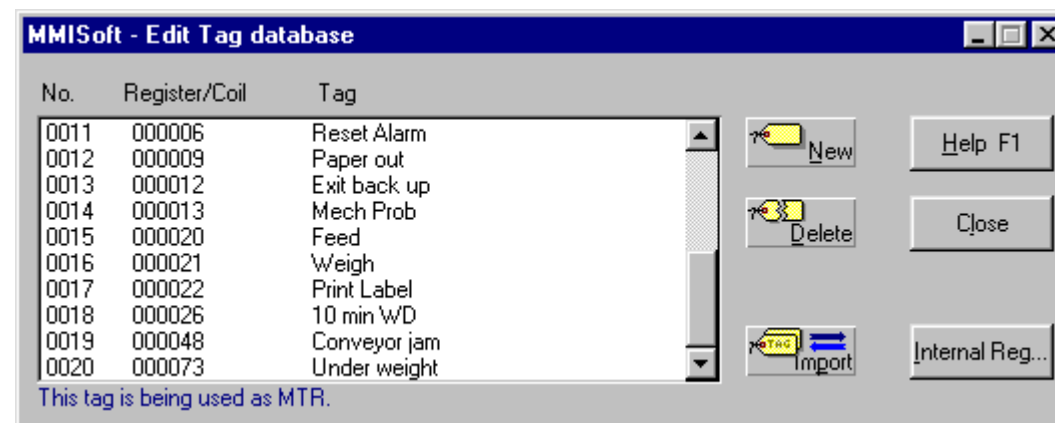
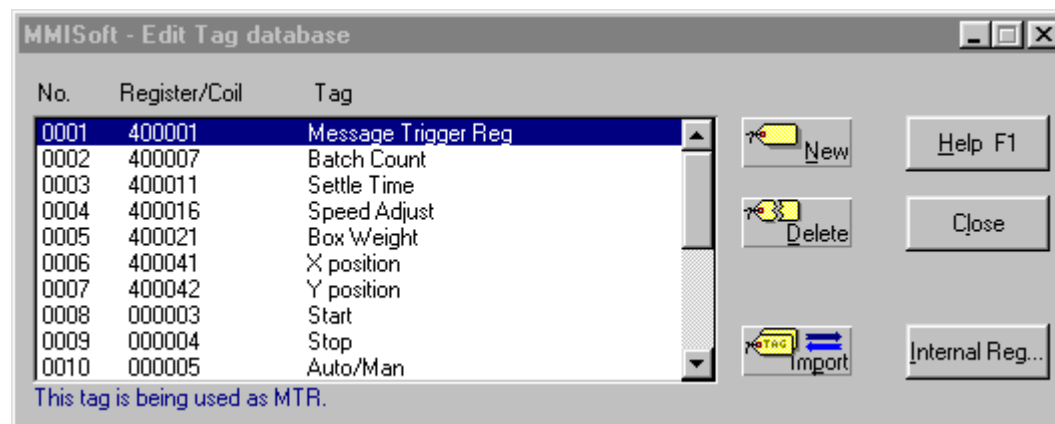
Weigh (Bit 00021)

Print Label (Bit 00022)

10 min WD (Bit 00026)

Conveyor jam (Bit 00048)

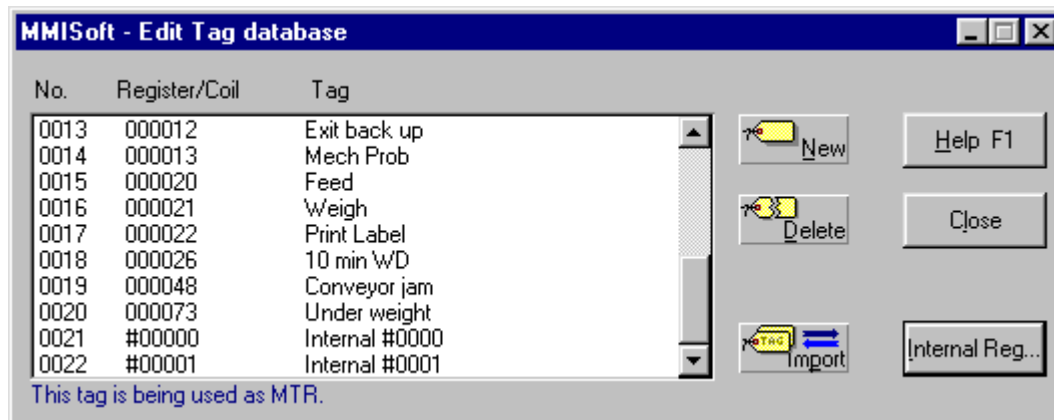
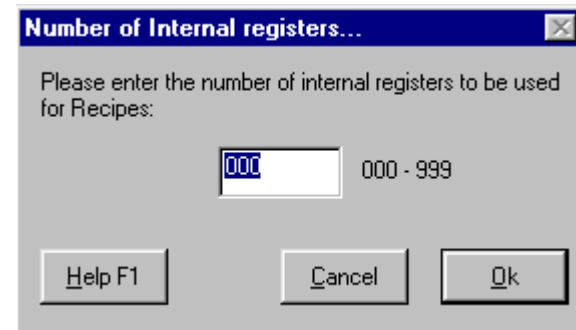
Under weight (Bit 00073)



According to the specifications there are 2 fixed setups and 1 variable setup. We may need registers to hold the variable setup. The MMI has internal registers that we can access. We will need 2 internal registers, one for X position and one for Y position.

Click on the  button.

Put 2 in the text box and click on .



You will notice two new tags located at the bottom of the tag list. All internal registers are automatically assigned default tags when they are created.

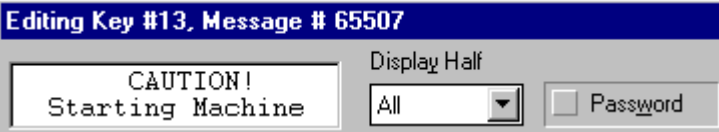
Edit the tags (by double clicking on them) to be "X Variable" and "Y Variable".

Now that the tags are in place we can set up the function keys.

Call up the function key editing screen and program the keys as follows:

Key13:

Tag: Start
Action: S=Hold On
Display Text: "CAUTION! Starting Machine"
Legend text: "Start"



Editing Key #13, Message # 65507


CAUTION!
Starting Machine

Display Half: All

☐ Password

Key 17:

Tag: Stop
Action: S=Hold On
Display Text: "Stopping Machine"
Legend text: "Stop"



Editing Key #17, Message # 65511

Stopping Machine

Display Half: All

☐ Password

Note: Function keys that have no display text assigned to them do not interrupt the display. By assigning a message to the key, the display will update when the key is pressed. Messages with minimum times will be over-riden by function keys with message text. Keys 13 and 17 will interrupt the display.

Key14:

Tag: Auto/Man
Action: C=Toggle
Display Text: None
Legend text: "Auto Man"



The keys so far...

Key 16:

Tag: Reset alarm
 Action: S=Hold On
 Display Text: "Resetting Alarms"
 Legend text: "Reset"

All of these keys simply turn a bit on in the PLC for as long as the key is pressed. Can you think of another way this can be done to give the same results?

Hint: The MMI cannot over ride the PLC program. If ladder logic turns a bit off the MMI cannot turn it on.

Key 18:

Tag: Feed
 Action: S=Hold On
 Display Text: None
 Legend text: "Feed"

Key 19:

Tag: Weigh
 Action: S=Hold On
 Display Text: None
 Legend text: "Weigh"

Key 20:

Tag: Print Label
 Action: S=Hold On
 Display Text: None
 Legend text: "Label"



Key Layout

Finally, we come to the key that will enable us to do all of the setup for the machine, key #15.

Key 15:

Tag: Stop
 Action: S=Hold On
 Display Text: None
 Legend text: "Setup"

That's right! We want to stop the machine before the setup procedure. This is all we have to do to key #15 for now. We will finish editing key #15 in the message section of the setup.

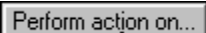
We are going to program some messages and then go back to finish up the function keys. We will need messages to show the alarms, enter in parameters and show machine status. The first thing we can do is finish up function key #15. There are some things that need to be done so that the setup goes smoothly.

1. We need to let the machine know it is in setup mode
2. We need to create a way for the operator to step through the setup parameters
3. We need to let the machine know when the setup mode is done.

A quick call to the machine maker reveals that he has already allocated Bit 00007 as master control relay to inhibit start and alarms!



Call up the message dialog and double click (edit) F15.

Click on  button then...



Click on the  button when the Edit Action field dialog pops up.

Add a new tag assigned to coil 00007 named "Setup".

Assign the new tag as, N=Turn On, to the function key Action.

This will let the PLC know it is in setup mode and also prevent unwanted alarms and start-ups.

MMISoft - Messages

Commands

No. of Messages : 8

No.	Lines	Flash	Scroll	Delay	Chain	Print	Text
F00013	A	X	X	N	N	N	000003S CAUTION! Starting Machine
F00014	A	X	X	N	N	N	000005C
F00015	A	X	X	N	N	N	000004S
F00016	A	X	X	N	N	N	000006S
F00017	A	X	X	N	N	N	000004S Stopping Machine
F00018	A	X	X	N	N	N	000020S
F00019	A	X	X	N	N	N	000021S
F00020	A	X	X	N	N	N	000022S

Edit Action field for message

 Register Setup

Setup

Operation on tag Constant

N = Turn On

While we are editing message F15 we can add a chain to message. This will allow us to continue the action of this function once it has turned on the bit.

Set the chain to box to read 100. Click to Ok to continue.

Notice the indicator that appears next to the tool bar. This indicates that there is a chained to message undefined. In this case, it is message 100.

Editing Function key #15, Message # 65509

Bit: Stop
Action: Hold Bit On

Display Half: All

☐ Print

Min. Time:

Chained to: 100








'Chained to' Message, not defined yet.

☐ Password Protected

Register: Perform action on... Action field here

< > >> Accept/New... Cancel Ok

MMISoft - Messages

Commands:       

No. of Messages : 8

No.	Lines	Flash	Scroll	Delay	Chain	Print	Text
F00013	A	X	X	N	N	N	000003S CAUTION! Starting Machine
F00014	A	X	X	N	N	N	000005C
F00015	A	X	X	N	00100	N	000007N
F00016	A	X	X	N	N	N	000006S
F00017	A	X	X	N	N	N	000004S Stopping Machine
F00018	A	X	X	N	N	N	000020S
F00019	A	X	X	N	N	N	000021S
F00020	A	X	X	N	N	N	000022S

Now we will create the setup menu.

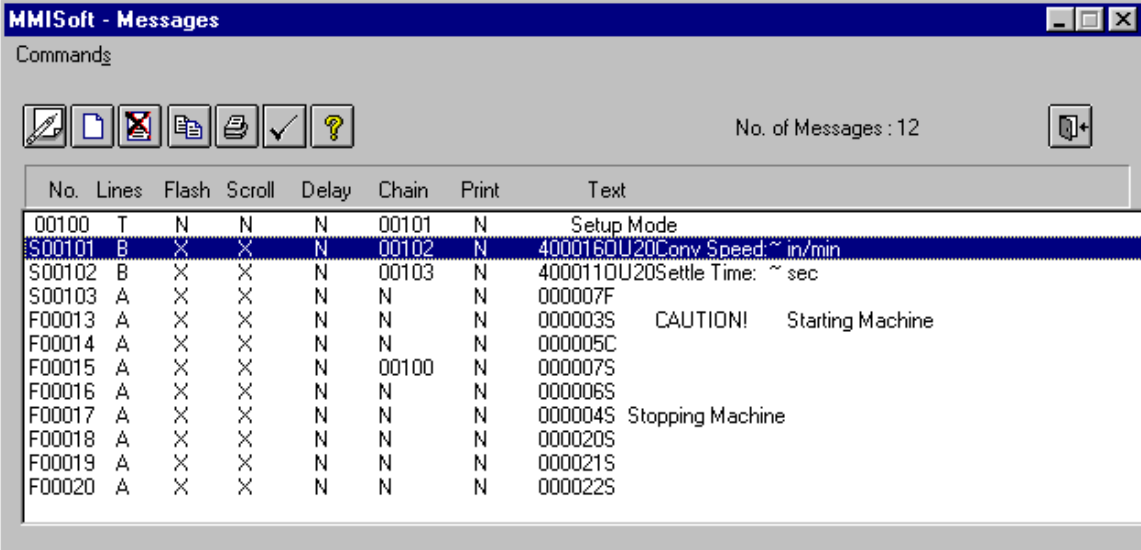
Enter the proposed messages as follows:

MSG #	Attributes	Text
100	Normal; Top line; Chained to 101	Setup Mode
101	Special; bottom line; chain to 102 Action: Speed Adjust, Edit One word, Unsigned, Format: 20	Conv Speed: 00 in/min
102	Special; bottom line; chain to 103 Action: Settle Time, Edit One word, Unsigned, Format: 20	Settle Time: 00 sec
103	Special; Action: Tag = Setup, Turn Off	(No message)

A short menu but it accomplishes what the end user needs. It is easy to see how this menu can be expanded by adding more "chain to" messages.

These are the messages so far. Not very impressive, but we will add more...

The next issue we will need to address is how the display will look during normal operation. We know the operator needs to know the batch count. He also will need to see any alarms that occur.



No.	Lines	Flash	Scroll	Delay	Chain	Print	Text
00100	T	N	N	N	00101	N	Setup Mode
S00101	B	X	X	N	00102	N	4000160U20Conv Speed: ~ in/min
S00102	B	X	X	N	00103	N	4000110U20Settle Time: ~ sec
S00103	A	X	X	N	N	N	000007F
F00013	A	X	X	N	N	N	000003S CAUTION! Starting Machine
F00014	A	X	X	N	N	N	000005C
F00015	A	X	X	N	00100	N	000007S
F00016	A	X	X	N	N	N	000006S
F00017	A	X	X	N	N	N	000004S Stopping Machine
F00018	A	X	X	N	N	N	000020S
F00019	A	X	X	N	N	N	000021S
F00020	A	X	X	N	N	N	000022S

The proposal is to put a message on the top line that shows the batch count and the status; on the bottom line, alarms will be displayed. We would like the status message to come up as soon as the machine starts. This will require a startup message.

Define two messages.

MSG #	Attributes	Text
10	Special; Action: Message Trigger Reg, Unsigned, Constant: 11	(No message)
11	Normal, Top Line, default attributes	Mode:(embed Setup bit 00007 as OFF = Run , ON = Setup)3 spaces (embed Batch Count register)

We will use S10 as the startup message to force 11 into the Message Trigger Reg. From there the MMI will read the number and display message 11. This will work unless there is an alarm at startup.

Press F9 on your PC keyboard to call up the Setup dialog.

Set the MTR to be Message trigger Register.

Set the LED register to be LED register.

While we are here, we will confirm that the Serial port settings to match the printer that will be used.

In this case, the only adjustment we might consider is to the **# of Columns**. Since the message display is 20 characters wide and the printer is 24 characters wide, we can just leave the setting at 20.

No other changes are needed to the setup dialog

Click to Ok to continue.

Setup

LED Register

400002

LED Register

MTR Valid: 4 = Holding registers (1 to 65536)

Internal registers are Valid MTRs.

400001

Message Trigger Reg

Power up message

00010 (00000 - 65494)

Serial Port settings

Baud Rate: 9600 # of Bits: 8 Parity: None

of Columns: 20 (01 - 80)

Terminating char.: CR + LF

Options

Beep Enable : ☐ Disabled

Open Collector : ☐ Disabled

Download Keypad : ☐ Disabled

Function Key Password: 0000

Lock status : ☐ NUM LOCK active only when pressed

Help F1 PLC data Cancel Ok

Next we need to enter the alarm messages. The alarm messages will start at 200, they will all flash and all be bottom line messages. Go back to the message dialog and enter the following **Normal** messages:

```
200 TIME OUT! Check line
201     EXIT JAMMED!
202   Box under weight!
203 Printer out of paper
204   CONVEYOR JAMMED!
205 MECHANISM FAILURE!
```

No.	Lines	Flash	Scroll	Delay	Chain	Print	Text
00200	B	Y	N	N	N	N	TIME OUT! Check line
00201	B	Y	N	N	N	N	EXIT JAMMED!
00202	B	Y	N	N	N	N	Box under weight!
00203	B	Y	N	N	N	N	Printer out of paper
00204	B	Y	N	N	N	N	CONVEYOR JAMMED!
00205	B	Y	N	N	N	N	MECHANISM FAILURE!

There are only a few things left to do. The first thing is to put the last three function key definitions into the program. These keys are the ones that contain the fixed and user setups.

Press F7 on the PC to call up the Edit key programming dialog. Enter the following function keys:

Key 1:

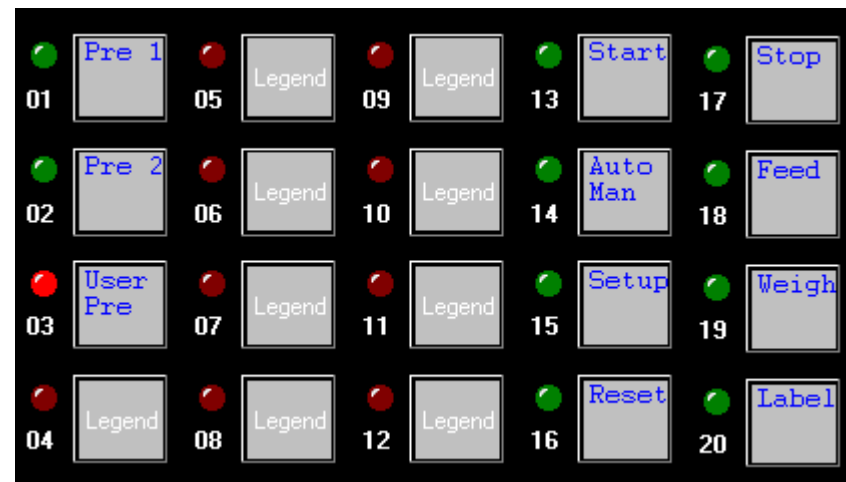
Tag: X position
 Action: U = Unsigned Integer; Constant =100
 Display Text: "Preset 1 now active" (Bottom line)
 Legend text: "Pre 1"

Key 2:

Tag: X position
 Action: U = Unsigned Integer; Constant =300
 Display Text: "Preset 2 now active" (Bottom line)
 Legend text: "Pre 2"

Key 3:

Tag: X position
 Action: O = Edit one word; Data type: U = Unsigned Integer; Decimal location=42;
 Display Text: "Enter X pos: 00.00in" (Bottom line)
 Legend text: "User Pre"



Again we have to the message dialog to finish up the function key actions.

Close the Edit Key dialog and call up the Message dialog.

Add the following 3 new messages to finish up the function calls:

MSG #	Attributes	Text
21	Special; Action: Y position, Unsigned, Constant: 100	(No message)
22	Special; Action: Y position, Unsigned, Constant: 300	(No message)
23	Special; Bottom line Action: Y position, Edit one word, Format: 42	Enter Y pos: ¶¶.¶¶in

Edit F01 from the message dialog. Assign it to chain to message 21.

Edit F02 from the message dialog. Assign it to chain to message 22.

Edit F03 from the message dialog. Assign it to chain to message 23.

Note that function keys one and two leave the preset status on the bottom line. However, Function key 3 will leave message 22 on the bottom line. We can add one more message to indicate user preset status.

Add the following message and chain message 23 to this message:

24	Normal; Bottom line	User Preset active
----	---------------------	--------------------

This concludes our first round of development on this project. The machine builder is told that the MTR is 40001, the LED register is 40002 and that the alarm bits must trigger ladder logic to move their respective alarm message numbers into the MTR. The project is sent off to the machine builder.

The machine builder evaluates our work and suggests some additions.

1. Make the CLR function key clear the batch total and make it password protected. (Password to be 2165)
2. Use the setup key to enter the user X and Y positions and have function key 3 just download them.
3. Make 40100 the MTR and 40101 the LED register.

Lets address these changes/additions one by one....

Password

The password is used to prevent unwanted function key access to data in the PLC. When a key that is password protected is pressed, the user will be prompted to enter a 4 digit password. If the password is correct the function key action is executed. If a wrong password is entered the MMI displays a message indicating that the entered password was wrong and returns to normal operation.

1. Make the CLR function key clear the batch total and make it password protected. (Password to be 2165)

a. Open the Setup dialog (F9) and set the password to be 2165

b. Open the function Edit Key dialog and define key 4

Key 4:

Tag: Batch Count

Action: U = Unsigned Integer; Constant=0;

Display Text: None

Legend text: "Clear Count"

Password: Enabled

2. Use the setup key to enter the user X and Y positions and have function key 3 just download them.

a. Add new special messages to edit the X and Y variables we created but did not use.

30	Special; Bottom line, chain to message 31 Action: X Variable; Edit one word; Unsigned; Format:42	Enter X pos: in
31	Special; Bottom line Action: Y Variable; Edit one word; Unsigned; Format:42	Enter Y pos: in

b. Change Function key 3

Change the Working register tag to X Variable.

Select W=Write from # to PLC register.

Select the target register to be X position.

Delete all message text assigned to key 3.

The above steps are used to transfer data from the MMI internal registers to the PLC.

Press to select by Register No.

Register X Variable

Operation on tag Constant

Data type Number of digits/Decimal point Preview

Register X position

Bit On Text Bit Off Text Preview text at runtime

Help F1 Cancel Ok

Data Transfer

To **write** data from the MMI internal registers to the PLC, select the tag register to be an internal register and the target register a register in the PLC or another internal register. Select “**W=Write from # to PLC register**” as the **Operation on tag**.

To **read** data from the PLC to the MMI internal registers, select the tag register to be a register in the PLC and the target register an internal register. Select “**X=Write from PLC to '#' register**” as the **Operation on tag**.

Change Special message 23 so that it transfers the data from internal register 'Y Variable' to PLC register 'Y position'. Be sure to erase any message text for message 23.

3. Make 40100 the MTR and 40101 the LED register.

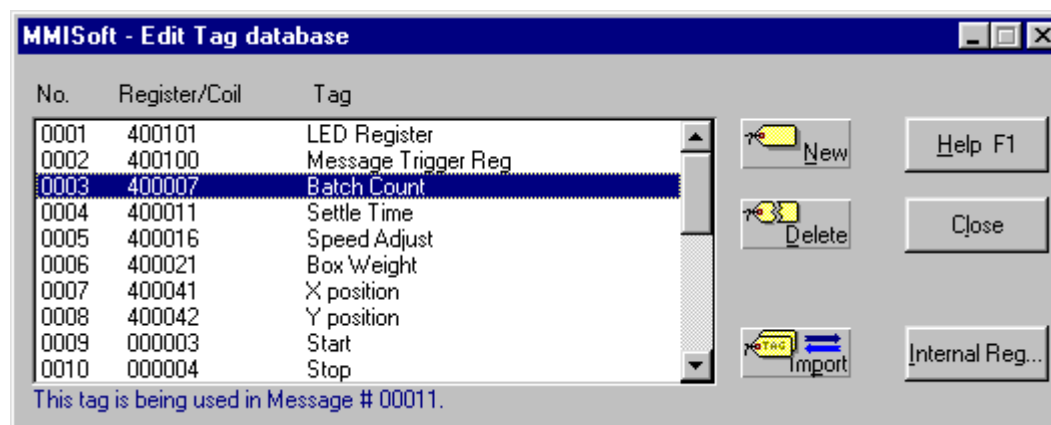
Edit the Message Trigger Reg and LED register tags, assigning them to their new register locations.

You will have to use the  Update button instead of add.



When the update button is clicked all places that the modified tag is used are changed to the new tag characteristics. This greatly simplifies changes to the PLC program. The programmer no longer has to search through messages to make sure all instances of the tag have been updated.

To check the above change, just call up the Setup dialog and view the tags by register number. You will see that they have changed.



This concludes the Automatic Box Labeler programming example.

Exercises


1. Define 4 function keys that will allow the operator to reposition the label mechanism by incrementing and decrementing the X and Y position registers.
2. Create a function key that will allow the operator to review the machine settings without being able to change them. Then make the Setup key (Key 15) password protected.

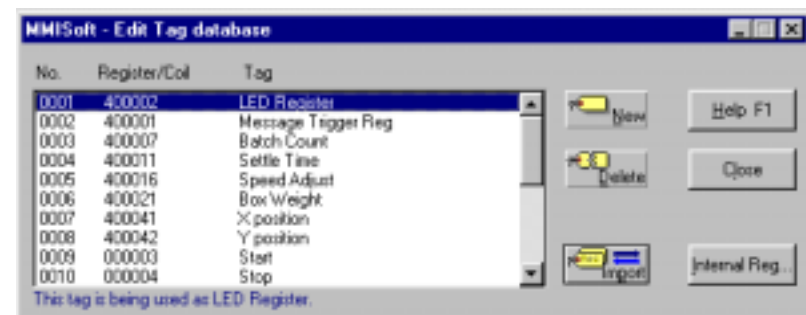
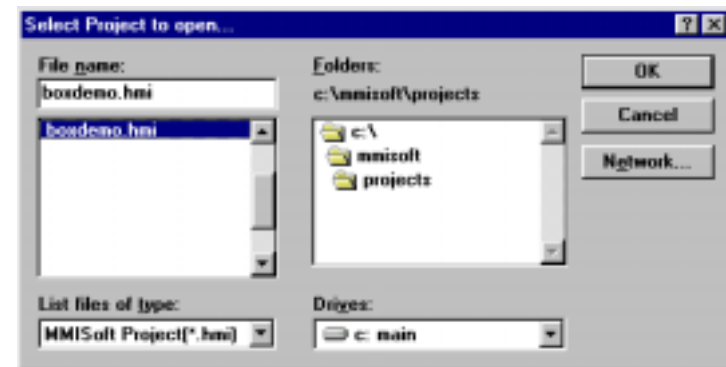
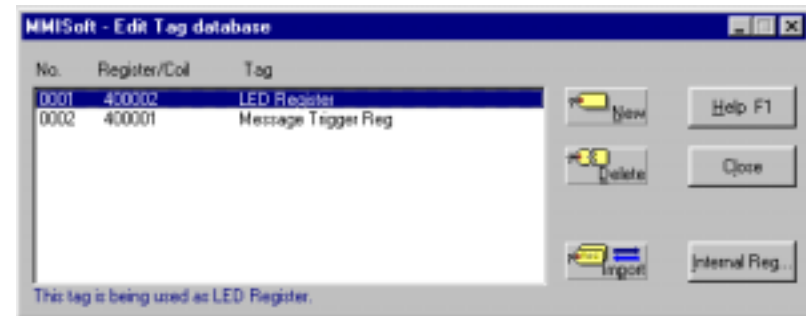


Importing tags

One of the advantages of a tag-based program is the ability to import tags from one project to the next. This avoids the tedious job entering tags over and over again. If you have created a project for an MMI-110 and would like to use the tags in an MMI-240 importing them can do this.

To Import tags, use the following steps:

1. Open the Edit Tag dialog
2. Click on the  button
3. Select the project that has the tags you need and click OK.
4. Click OK to the error box that pops up. It is reminding you that you are overwriting any existing tags, which probably are the default tags that are generated when any new project is started.
5. Save the project



Link Message

In the Automatic Box Labeler program, exercise 2 asks the programmer to “Create a function key that will allow the operator to review the machine settings without being able to change them.”

In the Automatic Box Labeler program this would be done through a series of chained messages. This same task could also be achieved by the use of a Link message.

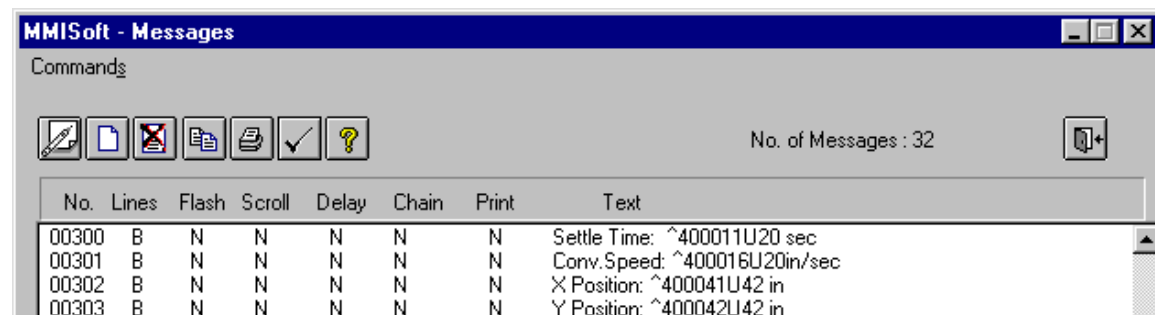
Link messages are message composed of message numbers. This sounds confusing but once you have programmed one, you see what a powerful feature this is.

Linked messages allow the operator to use the PREV and NEXT keys on the MMI-220/240 (up and down arrows on MMI-110/140) to step through a list of messages.

Enter the following messages into the Automatic Box Labeler program

300	Normal, bottom line	Embed: Settle Time; Unsigned, Format:20	Settle Time: \$\$ sec
301	Normal, bottom line	Embed: Speed Adjust; Unsigned, Format:20	Conv.Speed: \$\$in/sec
302	Normal, bottom line	Embed: X position; Unsigned, Format:42	X Position: \$\$.\$\$ in
303	Normal, bottom line	Embed: Y position; Unsigned, Format:42	Y Position: \$\$.\$\$ in

Start a new message, 400 and select it to be a Link Message.



Features of the **Link Message** Dialog

Message List: Gives a listing of all of the programmed messages just like the Message Dialog.

Message Display Box: Displays how the message will look in the Message Dialog once it is accepted.

The screenshot shows the 'Link Message' dialog box. The 'Message List' on the left contains the following messages:

S00102	4000110U20Settle Time: ~ sec
S00103	000007F
00200	TIME OUT! Check line
00201	EXIT JAMMED!
00202	Box under weight!
00203	Printer out of paper
00204	CONVEYOR JAMMED!
00205	MECHANISM FAILURE!
00300	Settle Time: ^400011U20 sec
00301	Conv.Speed: ^400016U20in/sec
00302	X Position: ^400041U42 in
00303	Y Position: ^400042U42 in

The 'Message List edit box' on the right shows the linked message numbers: 00300, 00301, 00302, 00303. The 'Message Position' field shows 'No. in link 01'. The 'Message text box' shows 'Settle Time: \$\$ sec'. The 'Message Display Box' shows the formatted message '00300:00301:00302:00303:'.

Message List edit box: Shows the message numbers linked and the order of linking from top to bottom.

Message Position: Displays the position of the selected message in the list.

Message text box: Displays the text of the selected message.

Insert: Inserts the message number selected in the Message List above the message number highlighted in the Message List edit box.

Add: Adds the message number selected in the Message List below the last message in the Message List edit box.

Delete: Removes the highlighted message number in the Message List edit box.

Up: Moves the highlighted message number in the Message List edit box up one position in the list.

Down: Moves the highlighted message number in the Message List edit box down one position in the list.

Next: Displays the text of the next message in the list in the Message text box.

Add messages 300 to 303 to the Message List edit box.

Create a function key to call up message 400.

Download your project and call up message 400.

Use the PREV and NEXT keys on the MMI-220 to step up and down through the linked messages.

Some things to note about link messages.

Linked messages disable minimum times and chaining attributes of messages. A linked message will be displayed until the operator steps to a different message or the value in the message trigger register changes or a function key with message text is pressed.

When stepping down the list and the bottom of the list is reached, the MMI jumps back to the top of the list. When stepping up the list and the top of the list is reached, the MMI jumps to the bottom of the list.

Only Normal and Special messages are allowed in a linked list. You cannot put a Function Key message or another Link message in a list.

Special messages with no text will have their actions carried out without interrupting the last displayed message of the link. The message action will be done every time the special message is stepped to.