



# OIT Family Operations Manual

Your Industrial Control Solutions Source

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For use with the following:

- OIT3160
- OIT3165
- OIT3175
- OIT3185
- OIT4160
- OIT4165
- OIT4175
- OIT4185

## Table of Contents

INTRODUCTION .....	5
Welcome .....	5
About Your Documentation.....	5
Conventions .....	5
OIT Models Supported.....	6
PLC Models Supported.....	6
<b>CHAPTER ONE.....</b>	<b>7</b>
Getting Started .....	7
What You Need .....	7
To Install OITware-200:.....	7
Creating an OITware-200 Project.....	8
Configure the Communication Settings.....	9
Downloading an OITware-200 Project.....	17
New OIT .....	17
Existing OIT .....	17
Verifying the OIT is Operational .....	19
OIT Power Up.....	20
<b>CHAPTER TWO.....</b>	<b>22</b>
Operational Overview .....	22
Message Request Register (MRR) .....	22
Message Request Sequence .....	23
Current Message Register (CMR).....	25
Key Coils .....	25
Control Key Coils .....	25
Function Key and Screen Dependent Function Key Coils .....	26
Status Coils.....	26
Register Monitoring.....	29
Performance Considerations.....	30
<b>CHAPTER THREE.....</b>	<b>31</b>
Stored Screens.....	31
Recipe Screens .....	32
Message Screens .....	33
Alarm Screens .....	36
Menu Screens.....	38
Screen Features .....	40
<b>CHAPTER FOUR.....</b>	<b>44</b>
PLC Register Monitors.....	44

PLC Register Monitor Formats.....	46
Accuracy.....	53
Out-of-Range Conditions: .....	53
Word Order.....	54
PLC Register Monitor Attributes.....	54
Separator Location.....	54
Blink if Bit Set.....	58
Set Points .....	60
<b>CHAPTER FIVE .....</b>	<b>63</b>
Displaying Stored Screens .....	63
Startup Screen.....	63
PLC Screen Request .....	63
Function Keys.....	66
Menu Selection .....	66
Message or Menu Chain — Page Up & Page Down Keys .....	66
Screen Stack — Last Msg & Next Msg Keys.....	67
Help Key .....	68
Screen Saver .....	69
Set Points .....	70
<b>CHAPTER SIX.....</b>	<b>71</b>
<b>Key Types .....</b>	<b>71</b>
Function Keys.....	71
Control Keys .....	76
Edit Keys .....	78
Numeric Keys .....	78
Control, Edit & Numeric Key Coils.....	79
<b>CHAPTER SEVEN .....</b>	<b>83</b>
Configuring the User-Definable Keypad .....	83
Using the Default Keypad Template.....	83
OIT3165, OIT3185, OIT4165 and OIT4185 Default Keypad Template .....	83
OIT3175 and OIT4175 Default Keypad Template (3175DEF.KTF) .....	83
Using a Predefined Keypad Template.....	84
Creating Your Own Keypad .....	85
<b>CHAPTER EIGHT .....</b>	<b>89</b>
Other OIT Operating Modes.....	89
OIT3165, OIT3185, OIT4165, and OIT4185 Factory Default Setup Mode Keypad	90
OIT3175 and OIT4175 Factory Default Setup Mode Keypad .....	90
<b>CHAPTER NINE.....</b>	<b>92</b>

Utilities.....	92
Read Project from OIT .....	92
<b>APPENDIX A.....</b>	<b>94</b>
Extended Character Sets.....	94
<b>APPENDIX B.....</b>	<b>95</b>
Slide-in Legend Templates .....	95
Blank Legends for Photocopying.....	95
Dimensions for Computer Generated Legends .....	96
<b>APPENDIX C.....</b>	<b>99</b>
Troubleshooting .....	99
Display Brightness and Viewing Angle .....	99
OIT Operation .....	99
OITware-200.....	100
OIT to PLC Communication .....	100
Alarms .....	102

## INTRODUCTION

### Welcome

Welcome to Maple Systems' OIT Family Operator Interface Terminals for use with Programmable Logic Controllers (PLCs). This powerful family of operator interface terminals was designed to provide the human-machine interface in industrial applications. This manual explains how the OIT Family Operator Interface Terminals operate as well as how to implement the many available features using the OITware-200 Configuration Software.

### About Your Documentation

The documentation for your OIT Family Operator Interface Terminal consists of:

- **Installation Manual** (shipped with each OIT) — Covers the installation requirements of your specific OIT Family Operator Interface Terminal. Each member of the OIT Family has a manual written to its unique specifications.
- **OIT Family Operation Manual for PLC Protocols** (shipped with OITware-200) — Covers the general operation and features of the OIT Family when using the PLC Protocols and implementation of those features using OITware-200.
- **OIT Family Operation Manual for ASCII Slave Protocol** — Covers the general operation and features of the OIT Family when using the ASCII Slave Protocol.
- **Controller Information Sheets** — Covers important information specific to each supported protocol.
- **OITware-200 On-line Help** — Covers the operation of OITware-200.

### Conventions

You will find the following typographic conventions throughout this manual.

- **Bold** Characters that you must type exactly as they appear. For example, if you are directed to type **a:setup**, you should type all the bold characters exactly as they are printed.
- *Italic* Place holders for information you must provide. For example, if you are directed to type *filename*, you should type the actual name for a file instead of the word shown in italic type.
- ALL CAPITALS Directory names, file names, key names, and acronyms.
- SMALLCAPS Non-printable ASCII control characters.
- KEY1 + KEY2 A plus sign (+) between key names means to press and hold down the first key while you press the second key.
- KEY1, KEY2 A comma (,) between key names means to press and release the keys one after the other.

## OIT Models Supported

OITware-200 supports the following OIT models:

- OIT3160
- OIT3165
- OIT3175
- OIT3185
- OIT4160
- OIT4165
- OIT4175
- OIT4185

## PLC Models Supported

OITware-200 supports many PLCs and controllers. To see a list of the supported PLCs and controllers:

1. Start OITware-200. If you have not installed OITware-200, refer to **CHAPTER 1: Getting Started** for instructions.
2. From the File menu, choose New. The New Project dialog box appears.
3. The PLC Type drop down list box displays the supported PLCs and controllers.

# CHAPTER ONE

## Getting Started

The Getting Started chapter walks you through all the steps required to setup your OIT:

- What You Need
- Installing OITware-200
- Creating an OITware-200 Project
- Downloading an OITware-200 Project
- Verifying the OIT is Operational

## What You Need

The table below lists the items you need to configure and operate your OIT.

	<b>OIT3100 and OIT4100 Series</b>
Configuration Software	OITware-200
Configuration Cable (OIT to PC)	7431-0096
Personal Computer	User Provided
Power Cable	6030-0009
½ Amp, 24 VDC Power Supply	User Provided
PLC	User Provided
Controller Information Sheet	The OITware-200 documentation includes Controller Information Sheets which contain important information specific to each PLC. <b>Please locate the sheet that corresponds to your PLC.</b>
Communication Cable (OIT to PLC)	Refer to Maple Systems' Price List for a list of available cables or build your own using the cable diagrams available on our web site ( <a href="http://www.maplesystems.com">www.maplesystems.com</a> ).

## To Install OITware-200:

1. If any applications are running, close them before continuing.
2. Place the OITware-200 Configuration Software installation disc into your computer's CD-ROM drive. The "AutoPlay" window should pop up. Select "Run autorun.exe."



**NOTE:** If AutoPlay does not pop up, double-click on autorun.exe on the CD directory.

3. Select "Install OITware-200" from the OITware Software CD menu.



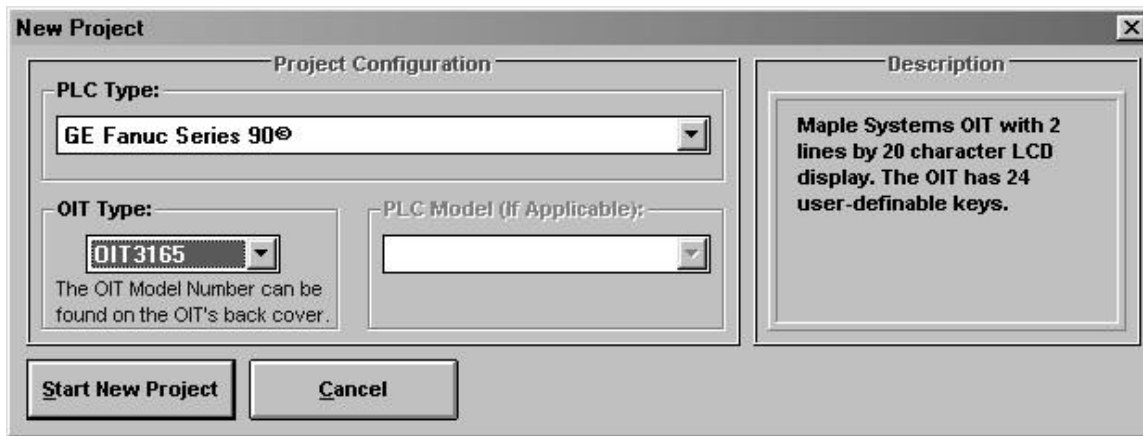
4. Follow the on-screen instructions to complete the installation.
5. Restart your computer when the installation has completed.

## Creating an OITware-200 Project

This step walks you through the creation of a basic OITware-200 project named SAMPLE.MAP. Once downloaded to the OIT, this basic configuration allows the OIT to connect to the PLC, display a startup message, and display a message containing one PLC register monitor when Function Key #1 is pressed.

1. Start OITware-200.
2. From the File menu, choose New. The New Project dialog box appears.





- In the PLC Type drop down list box, select the appropriate PLC model.

**NOTE:** It is important to select the correct PLC type. OITware-200 can not transfer a project from one PLC type to another.

- In the OIT Type drop down list box, select the appropriate OIT model.

**NOTE:** If you ever need to convert a project from one OIT type to another, refer to the Export Project to OIT section in CHAPTER 12: Utilities.

- Choose the Start New Project button. The OIT - Controller Settings dialog box appears.

## Configure the Communication Settings

This step guides you through the configuration of the OIT's communication settings.

**NOTE:** It is important to refer to the Controller Information Sheet that corresponds to your PLC. The Controller Information Sheets contain information you must have to configure the communication settings, status coils, message request register, and current message register.

- In the OIT - Controller Serial Communications Settings group box, select the correct Baud Rate, Parity, Data Bits, and Stop Bits for communication with your PLC.
- In the Controller Access Settings group box, select the correct Address, Source, Destination, and Password for your PLC. Refer to the Controller Information Sheet that corresponds to your PLC for more information on these settings.

**NOTE:** Not all of these settings are required for all PLCs. OITware-200 will gray out the settings that do not apply to the PLC Type you selected in the New Project dialog box.

**OIT - Controller Settings**

**OIT - Controller Serial Communications Settings**

**Baud Rate:**  
 19200    2400    300  
 9600    1200  
 4800    600

**Parity:**  
 Even    Mark  
 Odd    Space  
 None

**Data Bits:**  
 7 Bits  
 8 Bits

**Stop Bits:**  
 1 Bit  
 2 Bits

**Controller Access Settings**

**Status Coils:**  
 The Status Coils are provided as a means of monitoring the status of the OIT and PLC. The OIT regularly reads from and writes to a series of bits starting at the indicated address.

**Enable?**  
 Discrete: %M  
 945

**Address:** 0   **Source:**   **Destination:**   **Password:**

**Message Registers:**  
 The OIT can use a PLC Register to determine which Message to display.

### Configure the Status Coils

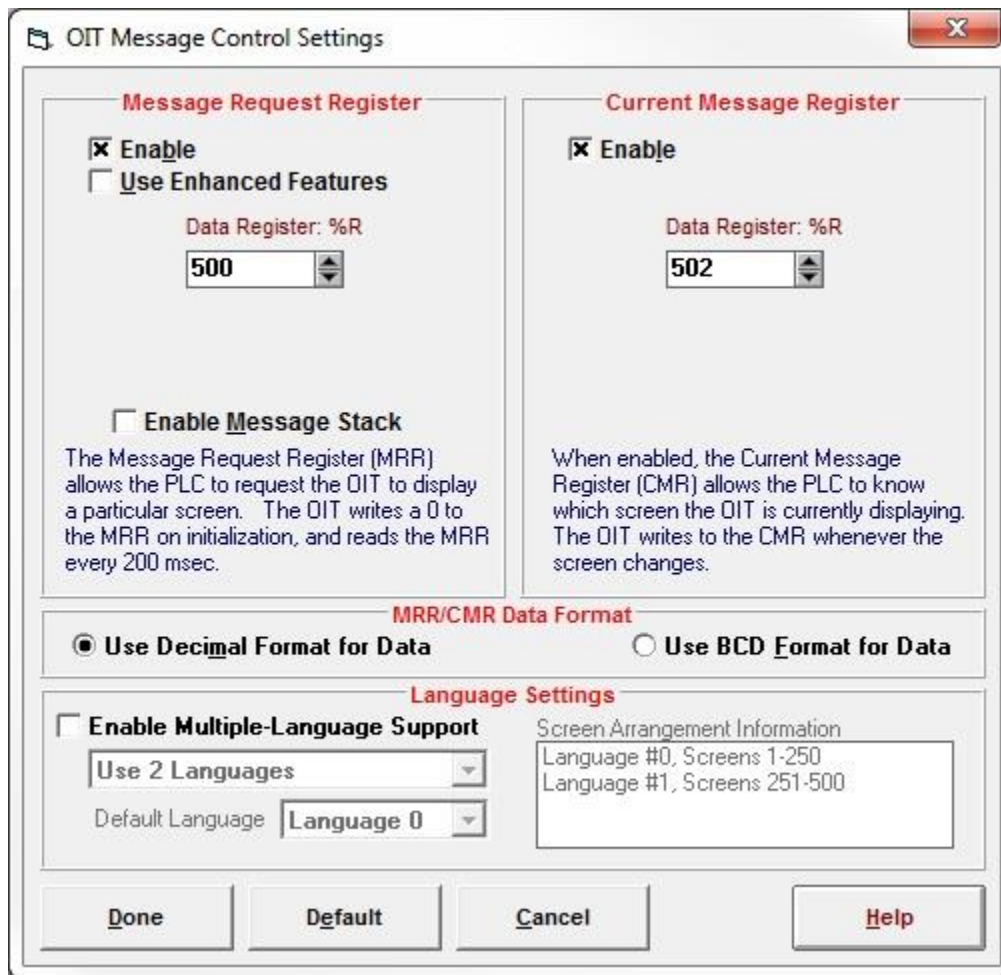
This step walks you through the configuration of the Status coils. The Status coils are a block of 16 discrete coils in the PLC that are used by the OIT to communicate information to the PLC. All of the Status coils are optional and none of them are required for the PLC to request screens. For more information on the Status coils refer to the Status Coils section in CHAPTER 2: Operational Overview.

8. To enable the Status Coils, in the Status Coils group box, if the *Enable* check box is not checked, select it.
9. In the Status Coils group box, in the scroll box, specify the starting PLC address for the Status coils.

### Configure the Message Request & Current Message Registers

This step walks you through the configuration of the Message Request Register (MRR) and the Current Message Register (CMR).

10. Choose the Configure Message Registers button. The OIT Message Control Settings dialog box appears.



The MRR is a data register in the PLC that allows the PLC to request screens for display on the OIT. The OIT writes a zero to the MRR on initialization and reads the MRR every 200 msec. For more information on the MRR, refer to the Message Request Register section in CHAPTER 2: Operational Overview.

11. To enable the MRR, in the Message Request Register group box, if the Enable check box is not checked, select the Enable check box.
12. In the Message Request Register group box, in the scroll box, specify the PLC address for the MRR.

These OIT models allow you to configure up to 32 “bit position” or “value” MRRs. “Bit position” MRRs allow the PLC to request a screen by setting a bit instead of writing a number. For this sample project, we will use a single “value” MRR. For more information on using multiple or “bit position” MRRs, refer to the PLC Screen Request section in CHAPTER 5: Displaying Stored Screens.

13. To disable the Enhanced Features, in the Message Request Register group box, if the Use Enhanced Features check box is checked, select the Use Enhanced Features check box to remove the check.

The Screen Stack stores PLC screen requests in a stack. This allows the OIT operator to view the screens using the Next Message and Last Message keys. When the Screen Stack is used, no screens are displayed on the OIT until the Next Message or Last Message keys are pressed.

For more information on the Screen Stack, refer to the Screen Stack section in CHAPTER 5: Displaying Stored Screens. For this sample project, we will disable the Screen Stack.

14. To disable the Screen Stack, in the Message Request Register group box, if the Enable Message Stack check box is checked, select the Message Stack check box to remove the check.
15. The CMR is a data register in the PLC that allows the PLC to determine which screen the OIT is displaying. The OIT writes the current screen number to the CMR whenever the screen changes. For more information on the CMR, refer to the Current Message Register section in CHAPTER 2: Operational Overview. For this sample project, we will enable the CMR and specify a PLC address.
16. To enable the CMR, in the Current Message Register group box, select the Enable? check box.
17. In the Current Message Register group box, in the scroll box, specify the PLC address for the CMR.
18. The MRR and CMR can be configured to use decimal or BCD format.
19. Specify the data format for the MRR and CMR.
20. To use decimal format, in the MRR/CMR Data Format group box, select the Use Decimal Format for Data option button.
21. To use BCD format, in the MRR/CMR Data Format group box, select the Use BCD Format for Data option button.
22. Choose the Done button to return to the OIT - Controller Settings dialog box.
23. Choose the Done button to return to the OITware-200 main screen.

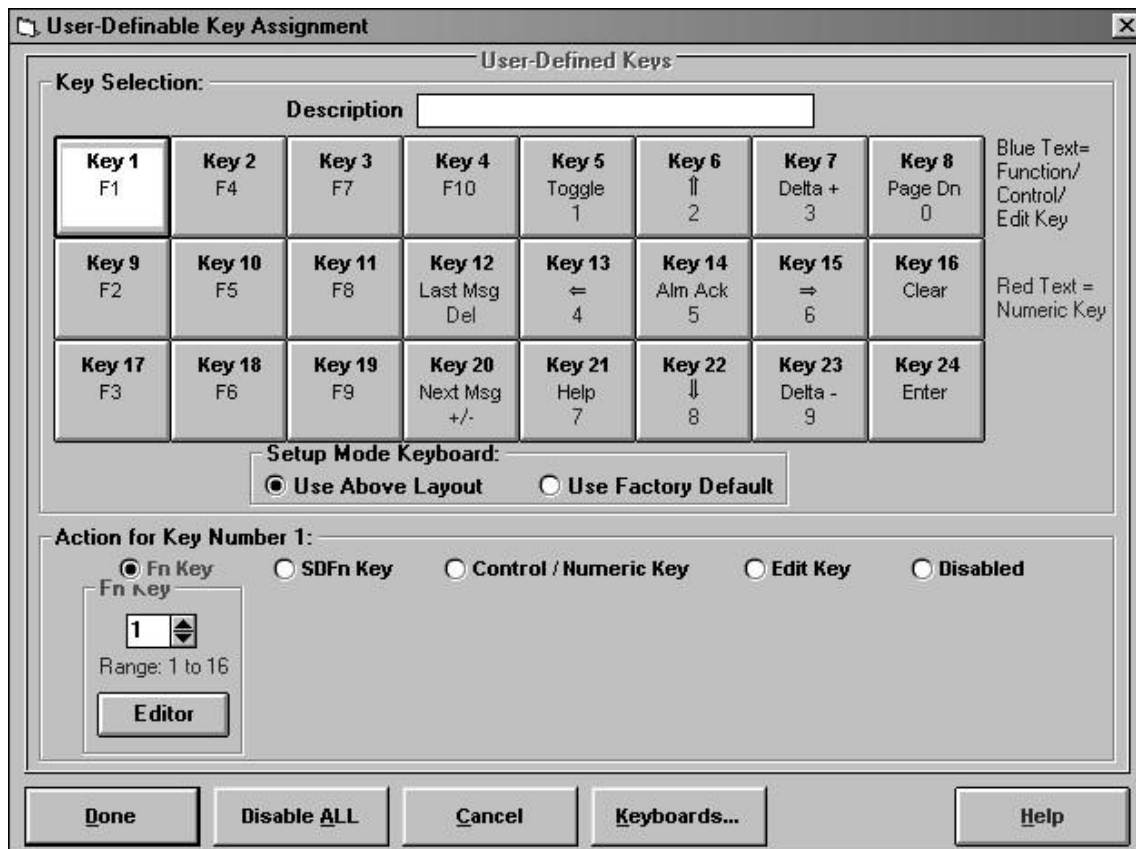
## Save the Project

1. From the File menu, choose Save As. The Save OIT Project File As dialog box appears.
2. In the File Name text box, type sample.map.
3. Choose the OK button to save the project and return to the OITware-200 main screen.

## Configure the User-Definable Keys

This step shows you how to access the User-Defined Key Editor and display the default keypad template. The OIT3100 and OIT4100 Series, except 3160/4160 allow you to configure the keypad by selecting the keys you want and arranging them in any order. When you start an OITware-200 project for one of these models, the default keypad template is automatically loaded. For more information on configuring the user-definable keys, refer to CHAPTER 7: Configuring the User-Definable Keypad.

1. From the Configuration menu, choose Keyboard Settings, then choose User-Defined Key Editor. The User-Definable Key Assignment dialog box appears.



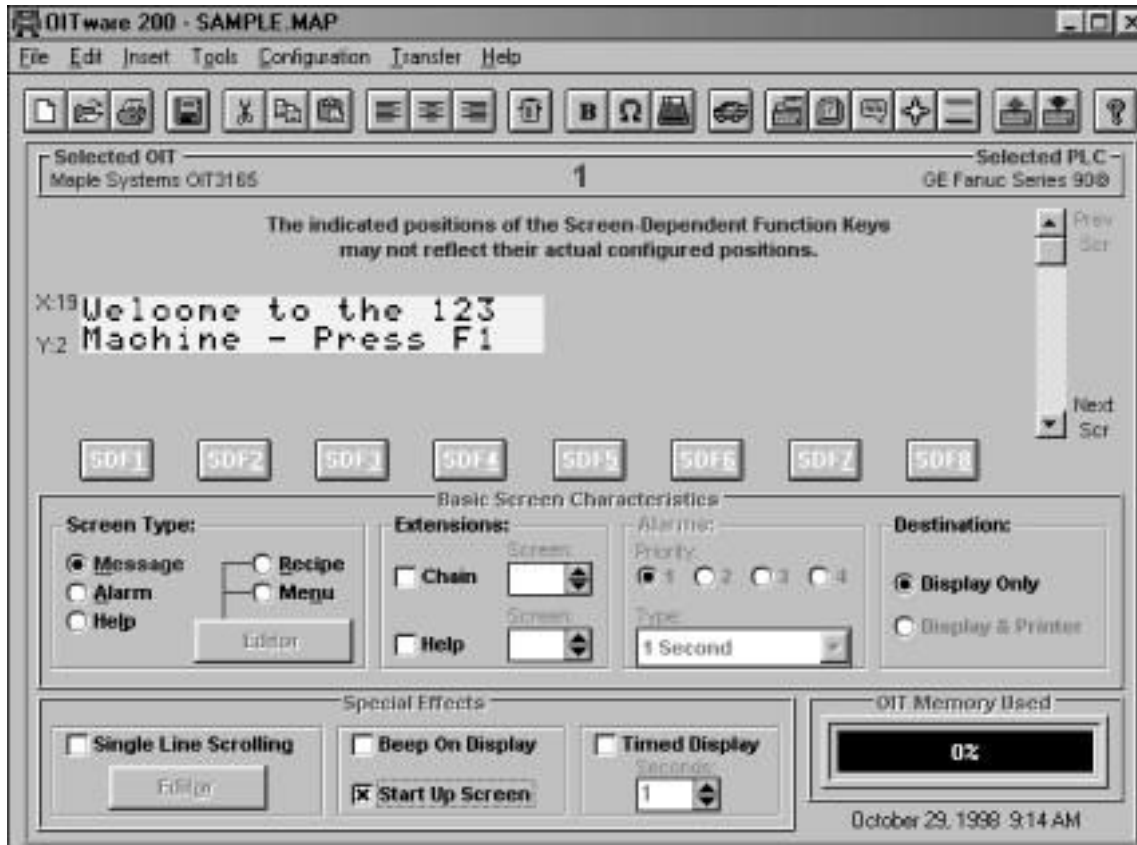
2. The default keypad template should be displayed. This is the screen you will use in the future to configure the keypad. To accept the default keypad template, choose the Done button to return to the OITware-200 main screen.

### Configure Screen #1 as the Startup Screen

This step walks you through the configuration of Screen #1 as the startup screen. The OIT stores up to 500 predefined screens. One of these predefined screens can be designated as the startup screen. The OIT automatically displays the startup screen whenever it is reinitialized. For more information on startup screens, refer to the Startup Screen section in CHAPTER 5: Displaying Stored Screens.

1. In the Screen Editor, type **Welcome to the 123** and press the PC's ENTER key.
2. In the Screen Editor, type **Machine - Press F1**.
3. In the Basic Screen Characteristics group box, select
  - Screen Type — Message
  - Extensions — none
  - Alarms — n/a
  - Destination — Display Only.
4. In the Special Effects group box, select the Start Up Screen check box.

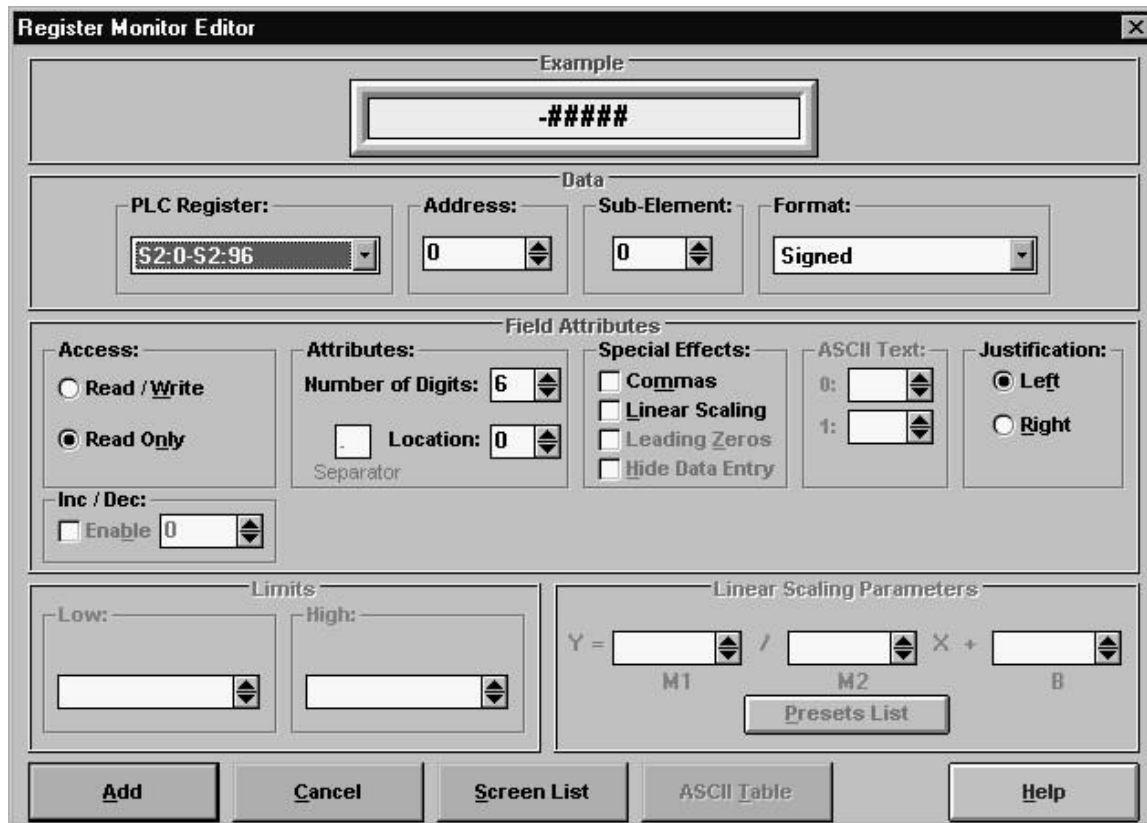
The OITware-200 main screen should look similar to the following screen.



### Configure Screen #2 as a Message with a PLC Register Monitor

This step walks you through the configuration of Screen #2 as a message with one PLC register monitor. Any of the OIT's 500 predefined screens can be configured as message screens. Message screens are the simplest and most often used type of screen. They can provide the OIT operator with a means of changing data in the PLC or simply convey information. For more information on message screens, refer to the Message Screens section in CHAPTER 3: Stored Screens. For more information on PLC register monitors, refer to CHAPTER 4: PLC Register Monitors.

1. Press the PC's Page Down key to advance to the screen editor for screen #2.
2. In the Basic Screen Characteristics group box, select
  - Screen Type — Message
  - Extensions — none
  - Alarms — n/a
  - Destination — Display Only.
3. In the Special Effects group box, none of the check boxes should be selected.
4. In the Screen Editor, type Complete Qty:.
5. From the Insert menu, choose PLC Register Monitor. The Register Monitor Editor dialog box appears.
6. In the Data group box, select a PLC Register, Address, and Sub-Element of a register in your PLC that the OIT can pull data from when this same program is run.



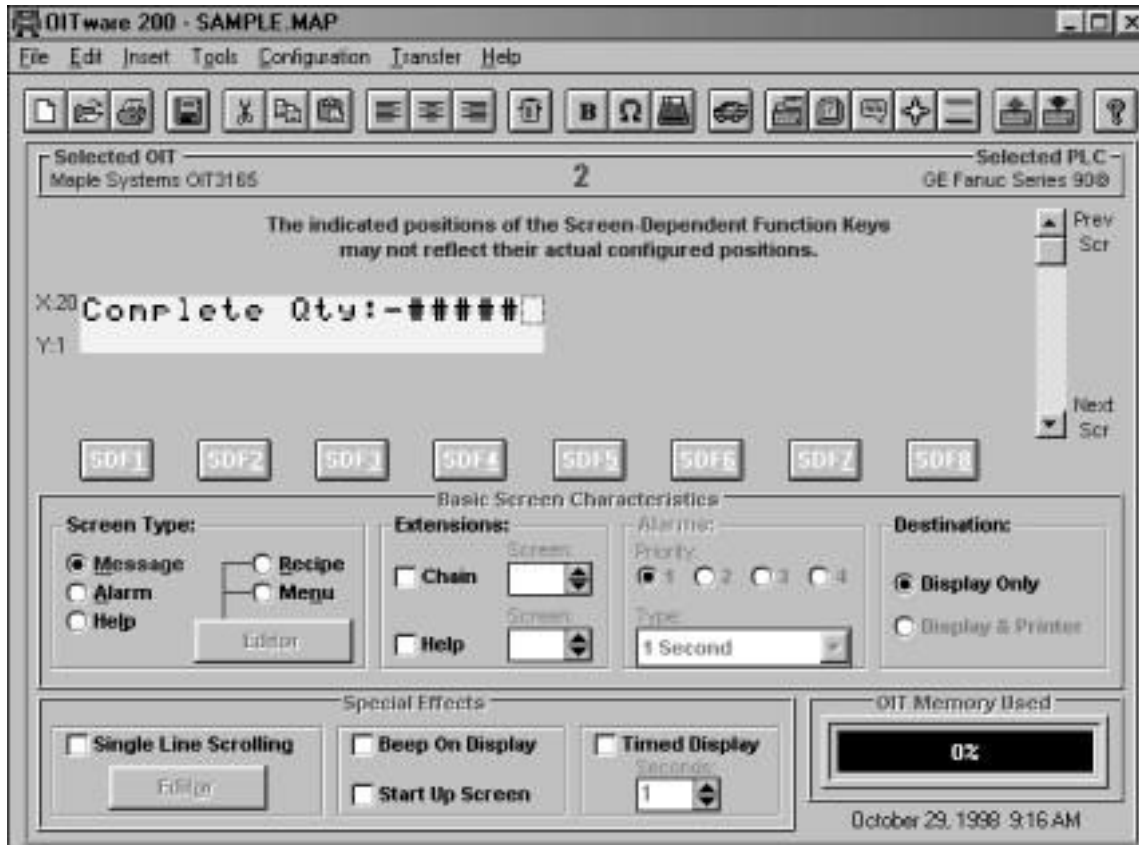
**NOTE:** The PLC register the OIT monitors for this sample project does not need to have any data in it. When this message screen is displayed on the OIT, zeros will be displayed if there is nothing at this register location.

7. In the Data group box, select the data format used in the PLC register selected in the previous step.

**NOTE:** If the selected PLC register is not going to have any data in it when you run this sample program, you can select any data format.

8. Choose the Add button to return to the OITware-200 main screen and insert the PLC register monitor.

The OITware-200 main screen should look similar to the following screen.



### Configure Function Key #1 to Display Screen #2

This step walks you through the configuration of Function Key #1 to display Screen #2. Each of the OIT's function keys can be configured to display a screen or simulate a momentary or push-on/push-off switch. For more information on Function Keys, refer to CHAPTER 6: Key Types.

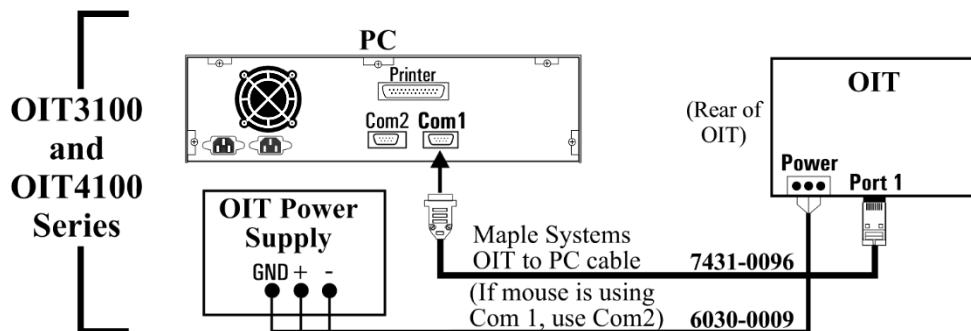
1. From the Configuration menu, choose Keyboard Settings, then choose Function Key Editor. The Function Key Editor appears.
2. In the Assignment group box, select the F1 option button.
3. In the Attributes For Key #1 group box:
4. In the Action drop down list box, select *Screen*
  - In the Screen scroll box, select 2.
  - Choose the Done button to return to the OITware-200 main screen.
5. From the File menu, choose Save.

**CONGRATULATIONS!** You have completed your first OITware-200 project.



## Downloading an OITware-200 Project

### Connect the OIT to the PC



### Place the OIT in Download/Upload Mode

#### New OIT

If the OIT has never been configured, the following message appears when power is applied:

OIT Model	Message
OIT3100 and OIT4100 Series	OIT not Configured! Press Key for Dnload

Pressing any key on the OIT causes the OIT to enter download/upload mode. The following message appears:

OIT Model	Message
OIT3100 and OIT4100 Series	**Download Mode** Please Load Project!

#### Existing OIT

If your OIT has already been configured, follow these steps to place it in download/upload mode:

1. While applying power to the OIT, press and hold the following key on the OIT while the "<<< Initializing >>>" message appears.

OIT Model	Key
OIT3160, OIT4160	CLEAR
OIT3100 and OIT4100 Series	bottom key on right side of keypad

The following message should appear:

OIT Model	Message
OIT3100 and OIT4100 Series	Setup Password:

2. Type the setup password and then press the following key on the OIT. If there is no setup password, just press the following key.

**NOTE:** You must start entering your password within 5 seconds, or the OIT exits setup mode.

OIT Model	Key
OIT3160, OIT4160	ENTER
OIT3100 and OIT4100 Series	bottom key on right side of keypad

The following message should appear:

OIT Model	Message
OIT3100 and OIT4100 Series	Dn/Upload Mode? YES

3. Press the following key on the OIT.

OIT Model	Key
OIT3160, OIT4160	ENTER
OIT3100 and OIT4100 Series, except 3160/4160	bottom key on right side of keypad

The following message should appear:

OIT Model	Message
OIT3100 and OIT4100 Series	Computer Comm Mode Computer must log-on

The OIT is now in download/upload mode waiting for instructions from OITware-200.

### **If You Have Trouble Entering Download/Upload Mode or OIT displays a blank screen**

1. If the “<<< Initializing >>>” message is followed by “Attaching to PLC”, the OIT did not enter setup mode and you need to repeat Step 1.
2. If the OIT’s display remains blank and you do not hear a steady beeping, the OIT may be communicating to the PLC. Apply power to the OIT and check that the “Initializing” and “Attaching to PLC” prompts appear. If you see these messages before the screen goes blank, then the OIT is communicating to the PLC and waiting for a command from the PLC to display a message.

### **Transfer the OITware-200 Project**

When you receive your OIT from the factory, it does not contain any information on how it is to operate. Therefore, the first time you download a project to the OIT you must also download the Operational Software. Downloading the Operational Software takes approximately three minutes to complete. Sending only the project file reduces the download time to approximately 30 seconds.

To download an OITware-200 project to the OIT:

1. Start OITware-200 and open your project.

**NOTE:** The OIT must be in download/upload mode to accept a project from OITware-200.

2. From the Transfer menu, choose Send to OIT. The OITware-200 - Send To OIT dialog box appears.
3. Choose the Options button. The Communication Options dialog box appears.
4. In the Download Only group box:

For this condition	Select this option button
The OIT does not contain the OIT Operational Software (new OITs).	Project, OIT Operational and OIT PLC Protocol Software
The OIT already contains the OIT Operational Software, but does not contain the OIT PLC Protocol Software.	Project and OIT PLC Protocol Software
The OIT already contains the OIT Operational and OIT PLC Protocol Software.	Project Only

5. If you want to keep unauthorized users from reading the project in the OIT, in the Read Protect OIT group box, select the Enable? Check box.
6. In the Upload & Download group box, select the COM port option button that corresponds to the COM port the OIT is connected to. If you are unsure, choose the Auto Detect button.

**NOTE:** To use the Auto Detect feature, the OIT must be in download/upload mode and properly connected to the PC.

7. Choose the Done button to return to the OITware-200 - Send To OIT dialog box.
8. Choose the OK button to start the transfer.

When the transfer is complete, the OIT restarts. The OIT is now ready to communicate with the PLC.

**NOTE:** If you are unable to transfer the project file to the OIT, please consult Appendix C: Troubleshooting section.

### Verifying the OIT is Operational

Now that you have successfully downloaded an OITware-200 project to the OIT, you can connect the OIT to a PLC and verify that the OIT is operational.

To verify the OIT is operational:

1. Connect the OIT to a PLC. Please read your OIT Installation Manual before connecting the OIT to a PLC.

2. Apply power to the OIT and PLC. The OIT should go through the OIT power up sequence defined below and then display the startup screen you configured in the Creating an OITware-200 Project section in this chapter.

## OIT Power Up

1. The first thing the OIT does during power up is display the “<<< Initializing >>>” message and perform a self-test.
  - The OIT checks the condition of the firmware stored in the flash EPROM. If this check reveals that the firmware is lost or incomplete, the OIT displays a blank screen and beeps continuously. If this occurs, then you must use the OITware-200 configuration software to download a project file to the OIT. The OIT is automatically in download mode while the screen remains blank and the OIT beeps continuously.
  - The OIT tests the static RAM. If the test fails, the OIT displays the following message:

OIT Model	Message
OIT3100 and OIT4100 Series	SRAM failure!!!

If the OIT determines that everything is in working order, the OIT displays the “Attaching to PLC” message and attempts to attach to the PLC.

2. The OIT attempts to communicate with the PLC. If not successful, the following message is displayed:

OIT Model	Message
OIT3100 and OIT4100 Series	Can't connect to PLC Retry in Progress!

3. The OIT attempts to write 0 to the MRRs (if feature not disabled in OITware-200). If not successful, the following message is displayed:

OIT Model	Message
OIT3100 and OIT4100 Series	Cannot write to Msg Request Register!

4. The OIT attempts to write 0 to the status coils (if feature not disabled in OITware-200). If not successful, the following message is displayed:

OIT Model	Message
OIT3100 and OIT4100 Series	Cannot write to the Status Coils!

5. The OIT attempts to write 1 to the Reset status coil (if status coils are enabled). If not successful, the following message is displayed:

OIT Model	Message
OIT3100 and OIT4100 Series	Cannot set the Reset Status Coil!

6. The OIT attempts to write 1 to the Alarm Stack Empty status coil (if status coils are enabled). If not successful, the following message is displayed:

OIT Model	Message
OIT3100 and OIT4100 Series	Cannot set the Alarm Empty Status Coil!

7. If the global function keys were configured for Default mode, the OIT attempts to write 0 to the function key coils. If the global function keys were configured for Retentive mode, the OIT attempts to read the function key coils. If not successful, the following message is displayed:

OIT Model	Message
OIT3100 and OIT4100 Series	Cannot write to the Function Key Coils!

8. If the OIT successfully completes the above steps, the following message is displayed:

OIT Model	Message
OIT3100 and OIT4100 Series	Connecting to PLC!

9. The OIT beeps for one second and then displays the startup message configured in OITware-200. If no startup message was configured, the OIT displays a blank screen.

# CHAPTER TWO

## Operational Overview

The OIT Family Operator Interface Terminals communicate with PLCs by using point-to-point serial communications to read from and write to the internal registers and coils of the PLC. Six sets of registers and coils located within the PLC's internal memory are designated for special purposes: the Message Request Register, Current Message Register, Key coils, Status coils, Status LED coils, and Function Key LED coils.

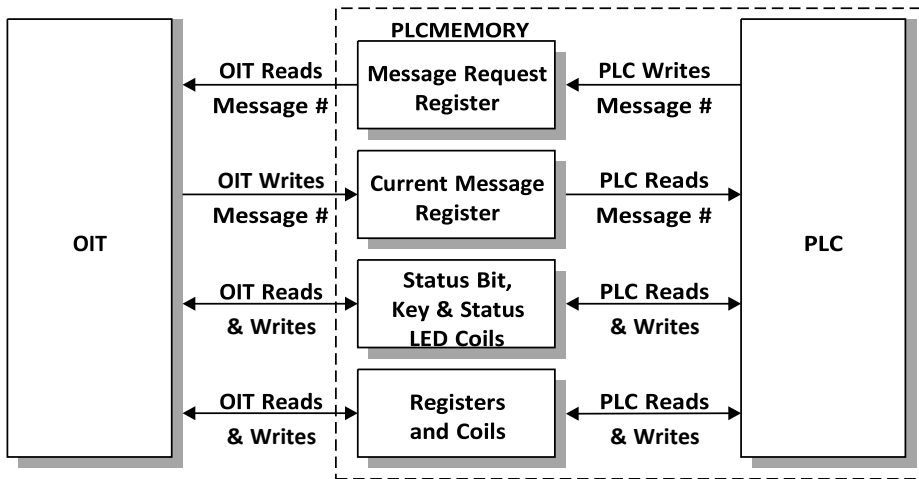


Figure 1: Interaction Between the OIT and PLC

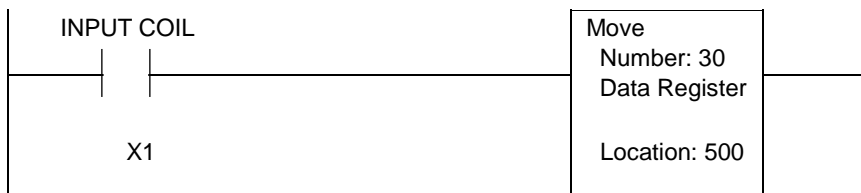
### Message Request Register (MRR)

The MRR is a data register in the PLC that is continuously monitored by the OIT. When the PLC enters a decimal or BCD number into this register, the OIT:

- Displays the screen that corresponds to that number (The screen can be a message, recipe, alarm, or menu)
- Performs any special function associated with the screen (For example, an alarm screen might sound the OIT's internal buzzer)
- And optionally sends the screen contents to a serial printer.

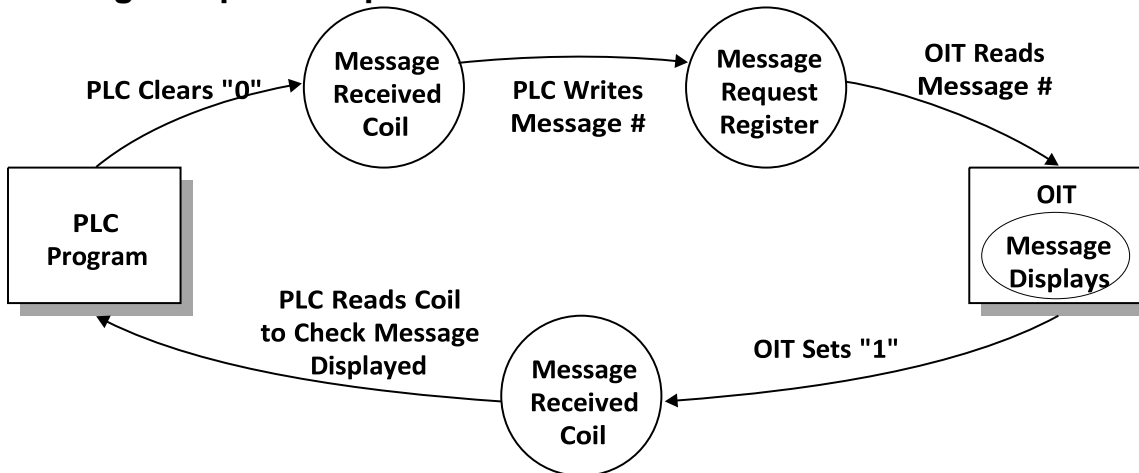
For example, you may want Screen #30 to be shown on the OIT whenever input coil X1 is turned on. Screen #30 might read: Oven Door is Open!!!

The relay ladder logic could be the following:



In this case, D500 is the MRR that the OIT has been configured to constantly monitor. When input coil X1 is activated, the PLC puts the decimal number 30 into the MRR. The OIT then sees the number 30 in the MRR and displays Screen #30.

## Message Request Sequence



To display a screen, the following activities occur within the PLC and the OIT:

- The PLC checks the message received status coil to ensure that the previous screen has already been processed by the OIT (optional).
- The PLC clears the message received status coil in preparation for writing a new screen number into the MRR (optional).
- The PLC writes the screen number into the MRR.
- The OIT polls the MRR for a new screen number once every 200 milliseconds.
- The OIT displays the screen, performing any special functions required by the screen contents (example: if screen is an alarm, sound buzzer).
- The OIT sets the message received status coil to inform the PLC that the screen was properly displayed. If the status coils are disabled, the OIT does not set the message received status coil.

**NOTE:** The status coils can only be disabled on the OIT3100 and OIT4100 Series.

Once the OIT displays the screen requested in the MRR, the OIT must see a **change in the number** in the MRR in order to display another screen request from the PLC. For example, the PLC requests that Screen #5 be displayed. The OIT operator then presses Function Key #1 which displays Screen #30. The number 5 is still in the MRR, but since no change has occurred it is ignored by the OIT. The PLC can get the OIT to display the same screen twice without an intervening PLC screen request, by simply putting the number 0 into the MRR between the two identical screen requests. The OIT does not perform any action as a result of seeing the number 0 in the MRR, but it does note that a change occurred.

To use the MRR, the MRR must be enabled and have a PLC address assigned to it. For instructions on configuring the MRR, refer to the Configuring the Message Request & Current Message Registers section in CHAPTER 1: Getting Started. During OIT power up, the MRR is set to 0.

### Enhanced MRR Features

The following enhanced MRR features are only available on the OIT3100 and OIT4100 Series.

#### Bit vs Value

The default MRR is a “value” MRR. Which means that the PLC calls screens by placing decimal or BCD numbers into the MRR. If you need the PLC to call a screen by setting a bit instead of writing a number, you need to use a “bit position” MRR. When using a bit position MRR, each bit in the specified

MRR address corresponds to one of 16 stored screens in the OIT. To determine which stored screen to display, the OIT examines each bit in the MRR and then displays the stored screen that corresponds to the first set bit. For directions on configuring a bit position MRR, refer to the MRR–Bit Position section in CHAPTER 5: Displaying Stored Screens.

### Multiple MRRs

Up to 40 MRRs can be created. For each bit position MRR, the PLC can request 16 different screens. With 40 bit position MRRs, the PLC can request all 500 OIT screens.

**NOTE:** Only one MRR is polled every 200 milliseconds. Therefore, if two MRRs are configured, it takes 400 milliseconds to poll them.

### Clear MRR After Each PLC Screen Request

When the OIT polls the MRR, it only displays a screen if the value in the MRR is different from the last polled value. Therefore, if the PLC requests the same screen twice without requesting a different screen between the two requests, the OIT does not recognize the second screen request.

If your application requires that the PLC be able to request the same screen without using an intervening screen, you should activate the Clear Register/Bit After Receiving Screen Request option. When this option is enabled, the OIT sets the MRR to 0 after each PLC screen request. For directions on configuring this option, refer to the MRR-Bit Position section in CHAPTER 5: Displaying Stored Screens.

### Clear MRRs During OIT Power Up

Each time the OIT powers up, the OIT can be configured to clear the MRRs or leave the MRRs in their existing state. The default is to clear the MRRs. For directions on configuring this option, refer to the MRR-Bit Position section in CHAPTER 5: Displaying Stored Screens.

### Multi-Language Support

This feature can be used to support control system applications in which multiple languages are required. For example, suppose that you are creating a control system that may be sold to companies with offices around the world. At the time of manufacture, you may not know which part of the world the system will be eventually shipped to. Without this feature, you would be forced to create multiple projects for the OIT, each a different language. Then you would have to wait until the destination was known before you could configure the OIT. The multi-language feature allows you to ‘split’ the 500 screens available in the OIT into 2, 5 or 10 separate groups or ‘languages’. Once configured, you create the screens that pertain to that language. When the control system is shipped to its final destination, the OIT operator places the OIT into the setup mode and selects which language is to be displayed.

#### To enable the multi-language feature:

1. In OITware, select the Configuration menu, then select Message Control Settings.
2. Check Enable Multiple-Language Support checkbox under Language Settings.
3. Use the pull-down box to select how many languages you want supported: 2, 5, or 10.
4. Select which Default Language you want the OIT to use on startup.

For example, suppose that you want to create a project that supports two languages: English and Spanish. After enabling the Multiple-Language feature, you select 2 Languages. You decide that Language 0 (screens 1-250) will represent English and Language 1 (screens 251-500) will represent Spanish. Therefore, you create all of your English language screens



using screens 1-250. Then using screens 251-500, you would create the Spanish counterpart, using the Copy-Paste feature of OITware then changing all English text to Spanish. So Screen #1 (English) would correspond to Screen #251 (Spanish), etc. You would configure all keys on the OIT that are used to display screens for screens 1-250. You would design the PLC ladder logic so that it would display only Language 0 screens (1-250). If the Default Language setting is Language 0 (in the OIT Message Control Settings dialog box), the screens 1-250 would be displayed.

If the Default Language setting is Language 1, then an offset is automatically added to each screen request by the OIT. For example, if the number 10 is placed into the MRR by the controller, the OIT will add +250 to this number, causing screen #260 to be displayed. This is how the OIT is able to display a 'different language' even though the same screen # is called.

### **Changing the language using OIT setup:**

Once the project has been created and downloaded into the OIT, the operator can always change to a different language by entering into Setup mode, (see Chapter 8: Other OIT Operating Modes, Setup Mode). If the multiple language feature is enabled, then the OIT will display "Change Language? Yes" after entering setup mode. Use the TOGGLE key to alternate between Yes and No. Press the ENTER key at the Yes prompt to display "Language: 0". Then use the TOGGLE key to increment the Language selection.

### **Current Message Register (CMR)**

The OIT can be programmed to send the number representing the screen currently displayed on the OIT to a data register in the PLC called the Current Message Register. The OIT can be programmed to place numbers into the CMR in decimal or BCD format. This register can be used by the PLC to determine which screen is shown on the OIT. It might be used to determine if a specific alarm screen has been acknowledged by the OIT operator or it might be used to determine which screen in a chained sequence is currently being displayed. To use the CMR, it must be enabled and have a PLC address assigned to it in the OIT Message Control Settings dialog box in OITware-200 (from the Configuration menu, choose Message Control Settings).

### **Key Coils**

There are three types of coils in the PLC that are used to pass keypress data from the OIT to the PLC: Control Key coils, Function Key coils, and Screen Dependent Function Key.

### **Control Key Coils**

Each key on the OIT (except function keys) can be configured to perform its normal OIT action and/or set a PLC coil. If the OIT Action function is enabled, the key performs its normal OIT action (for example, the ALARM ACK key acknowledges the current alarm). If the PLC Coil function is enabled, pressing the key sets the corresponding Control Key coil in the PLC and releasing the key clears the coil. If both functions are enabled, the key performs its normal OIT action and sets/clears its Control Key coil in the PLC. If both functions are disabled, the key does nothing. Each non-function key can be configured independently using the OIT Control Key Editor in OITware-200 (from the Configuration menu, choose Keyboard Settings, then choose Control Key Editor).

**NOTE:** Be careful when disabling a key's normal OIT action, since the key no longer performs its primary function once configured this way.

In order to use the PLC Coil function, a starting PLC address must be configured in the OIT Control Key Editor in OITware-200 (from the Configuration menu, choose Keyboard Settings, then choose Control Key Editor). Each non-function key is automatically mapped to a particular offset PLC coil from this starting address:

The PLC coil function is most often used to configure a non-function key to be used for some purpose defined by the system programmer. For instance, if the LAST MESSAGE and NEXT MESSAGE keys

are not being used to display a history of messages, then they can be programmed as momentary switches. The PLC coil function can also be used to notify the PLC when the OIT operator has pressed one of the non-function keys.

Read more about the OIT Control Key feature in Chapter 6: Key Types under the Control, Edit & Numeric Key Coils section.

## Function Key and Screen Dependent Function Key Coils

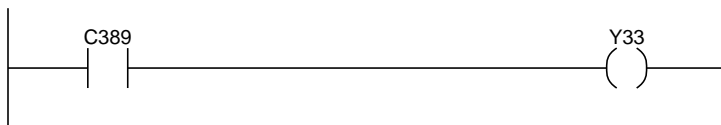
Each global and screen dependent function key on the OIT has a corresponding coil in the PLC. When the function key is pressed, the coil in the PLC is activated. When the coil is cleared depends on how the function key is configured (for more information on clearing the coils, refer to the Function Key sections in CHAPTER 6: Key Types).

How the Function Key and Screen Dependent Function Key coil addresses are assigned depends on the OIT model. The OIT3100 and OIT4100 Series allow each global or screen dependent function key to be assigned a unique PLC coil address. The other OIT models only allow the starting PLC address for each set of coils to be assigned. The Function Key coil address(es) is assigned in the Function Key Editor dialog box (from the Configuration menu, choose Keyboard Settings, then choose Function Key Editor).

The Screen Dependent Function Key coil address(es) is assigned in the Screen-Dependent Function Key Default Actions dialog box (from the Configuration menu, choose Keyboard Settings, then choose Screen-Dep. Screen Editor).

### Function Key Coil Example

If you want a motor to run whenever the F1 function key is being pressed by the operator, the relay ladder logic could be the following:



In this case, internal control relay C389 has been configured as the Function Key coil for the F1 function key. If the F1 function key has been configured as momentary, then C389 will be activated as long as the F1 function key is being pressed by the operator. Internal control relay C389 is controlling output coil Y33 which is controlling a motor. Consequently, the motor runs whenever the operator is pressing the F1 function key.

### Status Coils

The Status coils are a block of discrete coils in the PLC that are used by the OIT to communicate information to the PLC. All of the Status coils are optional and none of them are required for the PLC to request screens. In order to use the Status coils, a starting PLC address must be configured in the OIT - Controller Settings dialog box in OITware-200 (from the Configuration menu, choose Controller Settings).

**NOTE:** In the OIT3100 and OIT4100 Series, the Status coils can be disabled (from the Configuration menu, choose Controller Settings).

Status Coil Address (offset)	Name
+0	Message Received bit
+1	Invalid Display Message Number bit
+2	Message/Keytable Error bit
+3	Reset bit
+4	Alarm Stack Full bit
+5	Message Stack Full bit
+6	Message Stack Empty bit
+7	Clear Alarm bit
+8	Clear Alarm Stack bit
+9	OIT Pulse bit
+10	Update PLC Clock bit
+11	Alarm Stack Empty bit
+12	Acknowledge Alarm bit
+13	Reserved for future use
+14	Reserved for future use
+15	Reserved for future use

Sample Status Coil Addresses		
GE Fanuc %M# Address	Allen-Bradley PLC-5 B3:0 Address	Status Coil
945	B3:0/0	Message Received bit
946	B3:0/1	Invalid Display Message Number bit
947	B3:0/2	Message/Keytable Error bit
948	B3:0/3	Reset bit
949	B3:0/4	Alarm Stack Full bit
950	B3:0/5	Message Stack Full bit
951	B3:0/6	Message Stack Empty bit
952	B3:0/7	Clear Alarm bit
953	B3:0/8	Clear Alarm Stack bit
954	B3:0/9	OIT Pulse bit
955	B3:0/10	Update PLC Clock bit
956	B3:0/11	Alarm Stack Empty bit
957	B3:0/12	Acknowledge Alarm bit
958	B3:0/13	Reserved for future use
959	B3:0/14	Reserved for future use
960	B3:0/15	Reserved for future use

### Message Received

The Message Received status coil is set by the OIT when a screen request has been successfully retrieved from the PLC. Therefore, it can be used by both the OIT and the PLC to perform handshaking when new screens are requested. For proper handshaking, the PLC should monitor this coil to determine if the last screen request sent to the OIT has been read. Additional screen requests should not be sent to the OIT until this coil has been set. It is the PLC's responsibility to clear this coil before sending another screen request to the OIT. For more information on the message request sequence, refer to the Message Request Register section in this chapter.

**NOTE:** The PLC can ignore this coil if the OIT's polling rate of the message request register (200 milliseconds) is faster than the PLC's message update rate.

### **Invalid Display Message Number**

The Invalid Display Message Number status coil is set by the OIT when the PLC requests a non-existent or empty screen. In systems designed for high integrity, the PLC should clear the coil, then activate an error coil indicating to the outside world that a problem exists so that the system programmer can correct the programming error either in the PLC or in the OIT.

### **Message/Keytable Error**

The Message/Keytable Error status coil is set by the OIT when it detects invalid or corrupted data in the screens or keytable. For instance, this coil is set if a function key is pressed that has been configured to display a screen that does not exist. This coil is also set by the OIT when it detects that the message or function key databases have been contaminated. Since all of the configuration data is stored in FLASH EPROM, this error should never occur. However, in the event of a component failure, this coil indicates that an error has been detected in the OIT.

### **Reset**

The Reset status coil is set by the OIT each time it powers up or performs a reinitialization due to exiting the OIT's local setup menu. This can be used by the PLC to indicate that the OIT has performed a reset. The PLC can clear the coil and decide what to do with the information. Since the OIT may have experienced a power down and will not know the current state of the system, we suggest that the PLC reset all I/O to a known neutral state before clearing this coil and continuing. For more information on the OIT's power up sequence, refer to the OIT Power Up section in CHAPTER 1: Getting Started.

### **Alarm Stack Full**

The Alarm Stack Full status coil is set by the OIT when the OIT's internal alarm stack is full. This feature allows the PLC to know that, although it may have sent several alarms to the OIT, nobody is acknowledging them. Additional alarms sent to the OIT cause the oldest alarm to be eliminated from the alarm stack. Typically, this coil is not set, but in the event that it is, a real problem exists: alarms are not being acknowledged by the operator, either because the alert was not heard or it is too short for an operator to recognize it. This coil allows the PLC to detect this problem and either issue a higher priority alarm that has a continuous alert tone or shut down critical parts of the system in case a hazardous potential exists. When the alarm stack is no longer full, the OIT clears this coil. For more information on alarms, refer to the Alarm Screens section in CHAPTER 3: Stored Screens.

### **Message Stack Full**

The Message Stack Full status coil is set by the OIT when the screen stack feature is enabled and the OIT's internal screen stack is full. This feature allows the PLC to know that, although it may have sent several screens to the OIT, nobody has read them yet. Therefore, this coil allows the PLC to take some sort of corrective action (such as sending an alarm, or not sending any more screens until this coil is cleared by the OIT). When the screen stack is no longer full, the OIT clears this coil. For more information on the screen stack, refer to the Screen Stack section in CHAPTER 5: Displaying Stored Screens.

### **Message Stack Empty**

The Message Stack Empty status coil is set by the OIT when the screen stack feature is enabled and the OIT's internal screen stack is empty. This feature could allow the PLC to send a burst of screen requests to the OIT, wait for the coil to be set, then send another set of screen requests. This offloads some of the overhead required by the PLC for interfacing with the operator. When the screen stack is no longer empty, the OIT clears this coil. For more information on the screen stack, refer to the Screen Stack section in CHAPTER 5: Displaying Stored Screens.

## Clear Alarm

The Clear Alarm status coil is monitored by the OIT (every 10 seconds) to allow the PLC to clear the currently displayed alarm. If this coil is set by the PLC, the OIT cancels any alarm that is in progress, and continues normal operation. Then the OIT clears this coil to indicate to the PLC that the action has been carried out. This feature can be used to allow the PLC to cancel an alarm if the condition which caused the alarm no longer exists. However, care should be exercised when using this feature if multiple alarms are in the stack, as the PLC does not know which alarm it is clearing unless the CMR is used. For more information on the CMR, refer to the Current Message Register section in this chapter. For more information on alarms, refer to the Alarm Screens section in CHAPTER 3: Stored Screens.

## Clear Alarm Stack

The Clear Alarm Stack status coil is similar to the Clear Alarm status coil except that this coil allows the PLC to clear the entire stack of alarms, including the currently displayed one. This feature could be used to cancel all existing alarms on the OIT if the PLC performs a system-wide reset. For more information on alarms, refer to the Alarm Screens section in CHAPTER 3: Stored Screens.

**NOTE:** Any alarms in the stack are automatically cleared whenever the OIT is reinitialized.

## OIT Pulse

The OIT Pulse status coil is pulsed by the OIT every 10 seconds. This allows the PLC to determine if the OIT is still communicating with the PLC.

## Update PLC Clock

The Update PLC Clock status coil is set by the OIT when it starts sending new time and date information to the PLC and cleared by the OIT when it finishes. To ensure that the time and date are not currently being updated, the PLC should verify that this coil is not set before using the time and date information.

## Alarm Stack Empty

The Alarm Stack Empty status coil is set by the OIT when the OIT initializes and when the OIT's internal alarm stack is empty. When an alarm is received, the OIT clears this coil. This feature allows the PLC to determine if the plant floor operator has acknowledged all currently active alarms. Once all alarms have been acknowledged, the PLC may go into a "normal" operating state. For more information on alarms, refer to the Alarm Screens section in CHAPTER 3: Stored Screens.

## Acknowledge Alarm

The Acknowledge Alarm status coil is set by the OIT when the operator presses the ALARM ACK key to clear an alarm. This can be used to signal to the PLC that normal operation can begin again. It is the PLC's responsibility to clear this coil once it has been set by the OIT. For more information on alarms, refer to the Alarm Screens section in CHAPTER 3: Stored Screens.

## Register Monitoring

The PLC's data and coil registers can be monitored, displayed, and updated by the OIT. This can be done by configuring the OIT screens to display PLC data and coil registers as embedded data fields (PLC register monitors). When the OIT displays a screen that contains a PLC register monitor, the OIT reads the specified PLC register address and then displays the data. If the PLC register monitor has been configured as read/write, when the operator changes the data in the PLC register monitor on the OIT's display the OIT writes the change to the PLC register.

Up to 25 read only or read/write PLC register monitors can be displayed in each OIT screen. If more than one PLC register monitor is on a screen, each one is updated by the OIT in continuous succession as rapidly as possible within the constraints of the particular PLC protocol and baud rate selected.

Therefore, the update rate of each PLC register monitor is determined by the number of PLC register monitors on the screen and the PLC protocol being used (baud rate, protocol overhead, PLC program, etc.). For more information on PLC register monitors, refer to CHAPTER 4: PLC Register Monitors.

## **Performance Considerations**

### **OIT Memory Requirements**

The OIT Family Operator Interface Terminals have FLASH memory for storing program code, protocol code, and system configuration information. These devices are of the latest technology and permit easy firmware upgrades, protocol enhancements, and safe storage of important configuration data. Each OIT is capable of storing a maximum of 500 screens.

Data is stored dynamically to get the most out of the memory space allocated for configuration data. Memory is used only as necessary instead of allocating a certain number of bytes per message in the OIT. This means that the maximum number of screens which can actually be created is determined by how many characters the system programmer places into each screen, how many PLC register monitors are on each screen, and how many special attributes are used (for example, blinking characters, scroll lines, etc.). Using this storage technique, it is very difficult to actually use all of the available memory in a single application.

The OIT Memory Used bar graph in the OITware-200 main screen keeps the system programmer informed of the remaining memory at all times System Speed

The OIT hardware and software were designed in such a way that system performance is only limited by the communications speed of the PLC, baud rate of the PLC, and the overhead associated with the PLC protocol driver (the number of characters over and above the actual data used for checksums, data formatting, etc.). In addition, some PLCs limit the amount of time spent communicating with external devices (such as OITs) based on how much time is expended executing ladder rungs. This affects performance of the OIT update rate for PLC register monitors on the display. For more information, refer to the Controller Information Sheet that corresponds to your PLC.

## CHAPTER THREE

### Stored Screens

Each OIT Family Operator Interface Terminal is capable of storing up to 500 user-defined screens. There are five different types of stored screens; each providing a unique function.

Screen Type	Screen Function
Message Screens	Convey information to the OIT operator and allow the OIT operator to change data in the PLC.
Recipe Screens	Allow the OIT operator to setup and start a batch process.
Alarm Screens	Notify the OIT operator of alarm conditions using a message and an audible alert.
Menu Screens	Allow the OIT operator to branch off to other message, recipe, or menu screens.
Help Screens	Convey information to the OIT operator specific to the screen being displayed when the OIT operator presses the HELP key.

To enhance communication, several screen features are available for use with stored screens. The following table lists the available features by screen type.

	Message	Recipe	Alarm	Menu	Help
<b>Blinking Characters</b>	X	X	X	X	X
<b>Special Characters</b>	X	X	X	X	X
<b>Screen Chain</b>	X			X	
<b>Help Screen</b>	X	X		X	
<b>Horizontal Scrolling</b>	X	X	X	X	
<b>Beep on Display</b>	X	X	9 Alerts	X	
<b>Startup Screen</b>	X	X		X	
<b>Timed Display</b>	X	X		X	
<b>PLC Register Monitors</b>	X	X	X	X	



## Recipe Screens

Recipe screens are screens that, when displayed on the OIT, allow the operator to download or upload preset values into PLC registers. These preset values are configured when programming the OIT and can also be modified at any time by the OIT operator. Recipe screens allow the OIT operator to configure and start a batch process.

Each recipe screen can include up to 20 'preset' values. Each recipe screen also includes:

- An initiator, which is a single character in the bottom right corner of the recipe screen that the OIT operator must change from 'N' to 'Y' to download the recipe to the PLC.
- A gate coil, which is a PLC relay coil that the OIT uses to signal the PLC that the recipe has been downloaded and the batch process is ready to start.

On the OIT3100/4100 Series, you can also configure any Screen-Dependent Function Key to upload or download a recipe. The PLC/Controller has the ability to send an upload or download command to the OIT using the Message Request Register.

### To download a recipe using the OIT keypad:

1. Display the Recipe Screen using a pre-programmed key or from a screen request by the PLC.
2. When the recipe screen is initially displayed, the initiator is set to "N" and the gate coil is set to "off" (the off state is configured by the system programmer to be either 0 or 1).
3. The OIT operator can use the arrow keys on the OIT keypad to move the focus cursor to alter any recipe presets or other register monitors that are on screen.
4. To download using the recipe initiator, move the cursor to the initiator using the arrow keys. Press the TOGGLE key to change the recipe initiator from "N" to "Y". Then press the ENTER key to begin the download process.



5. To download using a screen-dependent function key, press the function key when the recipe is displayed. It is not necessary to change the recipe initiator. If the recipe screen is not already displayed, pressing the screen dependent function key will display and download the recipe. See section “Screen Dependent Function Keys” in Chapter 6: Key Types for information about how to program the key to download a recipe.
6. The OIT writes the preset values to the predefined PLC registers and sets the gate coil to the ‘on’ state. By setting the gate coil to the on state, the OIT signals the PLC that the recipe has been downloaded and the batch process is ready to start.

This chapter explains how to configure the five types of stored screens and how to implement the available screen features using OITware-200. For more information on embedding PLC Register Monitors in stored screens, refer to CHAPTER 4: PLC Register Monitors.

Once you start creating screens, you can use the Screen Utilization dialog box to see at a glance which screens have been configured. From the Tools menu, choose Screen Utilization. The Screen Utilization dialog box appears. When finished, choose the Go To Screen or Done button.

## Message Screens

Message screens convey information to the OIT operator and through the use of PLC Register Monitors allow the OIT operator to change data in the PLC.



### To create a message screen:

1. In the Screen Type group box, select the Message option button.
2. In the Screen Editor, enter the text to be displayed.
3. In the Screen Editor, insert any necessary PLC Register Monitors. For more information on embedding PLC Register Monitors, refer to CHAPTER 4: PLC Register Monitors.
4. Configure any screen features (blinking, etc.) you want to use. For more information on configuring the available screen features, refer to the Screen Features section in this chapter.

**To download a recipe using the message request register (MRR)**

1. The PLC can start the download of a recipe by placing the screen number associated with that screen in the Message Request Register, (see “PLC Screen Request” section in Chapter 5: Displaying Stored Screens for more information about the Message Request Register). To get the OIT to download the recipe, add +1000 to the screen number before placing it into the MRR.
2. The OIT will read the MRR and display the recipe.
3. The OIT will automatically download the recipe.
4. The recipe screen will remain on the OIT display until another screen is requested.

**To upload a recipe using the OIT keypad:**

1. Display the Recipe Screen using a pre-programmed key or from a screen request by the PLC.
2. The recipe ‘initiator’ is only used for download purposes. Therefore, you must configure a screen-dependent function key to upload the recipe.
3. To upload using a screen-dependent function key, simply press the function key when the recipe is displayed. It is not necessary to change the recipe initiator. If the recipe screen is not already displayed, pressing the screen dependent function key will display and upload the recipe. See section “Screen Dependent Function Keys” in Chapter 5: Key types on how to program the key to upload a recipe.
4. During upload, the OIT first sets the gate coil to the ‘on’ state to indicate that an upload is in progress.
5. The OIT reads the preset values that currently reside in the predefined PLC registers and stores these values in the OIT.
6. After all preset values are read from the PLC, the OIT signals the PLC that the recipe has finished uploading by setting the gate coil back to the ‘off’ state.

**To upload a recipe using the Message Request Register (MRR):**

1. The PLC can start the upload of a recipe by simply placing the screen number associated with that screen in the Message Request Register, (see “PLC Screen Request” section in Chapter 5: Displaying Stored Screens for more information about the Message Request Register). To get the OIT to upload the recipe, add +2000 to the screen number before placing it into the MRR.
2. The OIT will read the MRR and display the recipe.
3. The OIT will automatically upload the recipe.
4. The recipe screen will remain on the OIT display until another screen is requested.

For example, a plastics factory makes three kinds of polyethylene bags. Each kind of bag has unique characteristics (see on next page):

	Length	Width	Thickness	Shape	Color
<b>Bag A</b>	11"	8.5"	3 mm	fold top	clear
<b>Bag B</b>	15"	4"	2 mm	sealed top	black
<b>Bag C</b>	10"	10"	1 mm	rounded	green

Since these parameters will usually not be changed, the system programmer configures them as preset ingredients in three separate recipe screens. (The Preset value can be changed at runtime – see chapter 4: PLC Register Monitors.) The OIT operator does need the ability to specify the number of bags to make in each run. So the system programmer configures a PLC Register Monitor in each recipe screen to store this information. In this scenario, the recipe screen for Bag A might look like the following screen.



#### To create a recipe screen:

1. In the Screen Type group box, select the Recipe option button.
2. In the Screen Type group box, choose the Editor button. The Recipe Editor dialog box appears. The Recipe Editor dialog box is divided into three sections, Register Data, Gate Data, and Recipe Presets List. The Register Data group box is used to enter the PLC address, format, value, and description of each preset ingredient. The Gate Coil group box is used to enable the gate coil, set the PLC address of the gate coil, and specify whether the “on” value of the gate coil is 0 or 1. The Recipe Presets List is used to list the preset ingredients that have been entered in the Register Data group box.

**Recipe Editor**

**Register Data**

PLC Register:  Address:  Sub-Element:   
 Range to 2048. Range to 0.

Format:  Value:   
 Range -32768 to 32767.

Description:   
 (25 Characters Maximum)

**Gate Data**

Gate Coil:  Enable

Coil Address:   
 %M Range to 1024.

Sub-Element:  Trigger:  0  1

**Recipe Presets List**

Recipe PLC Register:

Characteristics:

Address:	Sub-Element:	Value:
Description:		

3. In the Register Data group box, enter each preset ingredient:
  - In the PLC Register drop down list box, select the PLC register location.
  - In the Address and Sub-Element scroll boxes, select the PLC register address.
  - In the Format drop down list box, select the data format.
  - In the Value scroll box, select the default value.
  - In the Description text box, enter a description of this preset ingredient (up to 25 characters).
4. In the Gate Data group box, configure the gate coil:
  - In the Gate Coil group box, select the Enable check box if you want to use the gate coil.
  - In the Coil Address and Sub-Element scroll boxes, select the PLC register address.
  - In the Trigger group box, select the option button that corresponds to the gate coil's "on" state.
5. Choose the Done button to return to the Screen Editor.
6. In the Screen Editor, enter the text to be displayed.
7. In the Screen Editor, insert any necessary PLC Register Monitors. For more information on embedding PLC Register Monitors, refer to CHAPTER 4: PLC Register Monitors.
8. Configure any screen features (blinking, etc.) you want to use. For more information on configuring the available screen features, refer to the Screen Features section in this chapter.

## Alarm Screens

Alarm screens notify the OIT operator of alarm conditions using a message and an audible alert. The message text and the duration of the audible alert can be configured for each alarm screen. When the PLC requests an alarm screen:

**Audible Alert Types**

- 1 second
- 5 second
- 30 second
- 60 second
- Three beeps, once per sec.
- Five beeps, twice per sec.
- One beep per sec.
- Two beeps per sec.
- Continuous beep

- The prior screen is immediately replaced by the alarm
- The internal and external buzzers sound and the alarm LED blinks

Once an alarm screen is displayed, all other non-alarm screen requests are ignored until the OIT operator presses the ALARM ACKNOWLEDGE key or the PLC cancels the alarm using the Clear Alarm or Clear Alarm Stack status coil. For more information on using the status coils to clear an alarm, refer to the Status Coils section in CHAPTER 2: Operational Overview.

When an alarm is acknowledged or cleared:

- The prior screen is redisplayed
- The internal and external buzzers are silenced

**NOTE:** The OIT operator can silence the buzzer while continuing to view the alarm by pressing the CLEAR key.

- The alarm LED is cleared
- And the Acknowledge Alarm status coil is set (if the OIT operator acknowledged the alarm)

**NOTE:** The Acknowledge Alarm status coil can be monitored by the PLC to determine when normal operation can begin again. It is the PLC’s responsibility to clear this coil after the OIT sets it.



Each alarm screen needs an alarm priority to determine the order in which the alarm is placed into the alarm stack. The alarm stack is internal to the OIT and is used to store alarms when alarm conditions occur faster than the OIT operator can respond. The alarm stack continuously reorders new alarms by placing the highest priority alarms at the top of the stack—priority 1, followed by priority 2, priority 3, and priority 4. As each alarm is displayed, it is removed from the stack. In this manner, alarms which are more important than others can be given a higher priority to ensure that they are seen by the OIT operator first. The alarm stack holds a maximum of 10 alarms. When full, older alarms of lesser or equal priority are removed from the alarm stack as the PLC requests new alarms.

### To create an alarm screen:

1. In the Screen Type group box, select the Alarm option button.
2. In the Alarms group box, select the appropriate Priority option button.
3. In the Alarms group box, in the Type drop down list box, select the audible alert type.
4. In the Screen Editor, enter the text to be displayed.
5. In the Screen Editor, insert any necessary PLC Register Monitors. For more information on embedding PLC Register Monitors, refer to CHAPTER 4: PLC Register Monitors.
6. Configure any screen features (blinking, etc.) you want to use. For more information on configuring the available screen features, refer to the Screen Features section in this chapter.

## Menu Screens

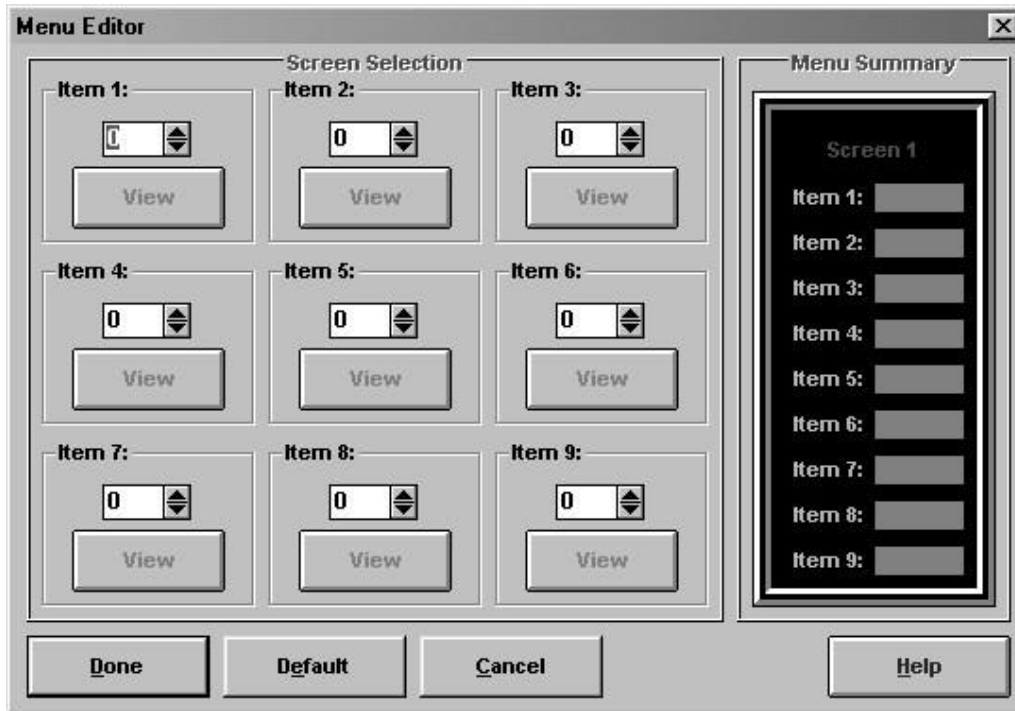
Menu screens allow the OIT operator to branch off to other message, recipe, or menu screens by pressing the associated numeric key. Each menu screen can branch to as many as nine other screens using the 1 through 9 keys.

Sometimes it is difficult to fit descriptions for all nine menu options on one screen. When this happens, all you need to do is configure two or more menu screens and chain them together. Then each screen can have the same nine options, but the descriptions can be divided between the screens. For more information on chaining menu screens, refer to the Screen Chain section in this chapter.



### To create a menu screen:

1. In the Screen Type group box, select the Menu option button.
2. In the Screen Type group box, choose the Editor button. The Menu Editor dialog box appears. The Menu Editor dialog box is used to assign the numeric keys to other message, recipe, or menu screens.



3. In the Screen Selection group box, select the screen to branch to for each numeric key.

**NOTE:** Any or all of the nine numeric keys can be used.

4. Choose the Done button, to return to the Screen Editor.
5. In the Screen Editor, enter the text to be displayed
6. In the Screen Editor, insert any necessary PLC Register Monitors. For more information on embedding PLC Register Monitors, refer to CHAPTER 4: PLC Register Monitors.
7. Configure any screen features (blinking, etc.) you want to use. For more information on configuring the available screen features, refer to the Screen Features section in this chapter.

### Help Screens

Help screens convey information to the OIT operator specific to the message, recipe, or menu screen being displayed when the OIT operator presses the HELP key. Help screens remain on the display as long as the HELP key is pressed. When the HELP key is released, the prior screen reappears.



### To create a help screen:

1. In the Screen Type group box, select the Help option button.
2. In the Screen Editor, enter the text to be displayed.
3. Configure any screen features (blinking, etc.) you want to use. For more information on configuring the available screen features, refer to the Screen Features section in this chapter.

## Screen Features

### Blinking Characters

Each character in a message, recipe, alarm, menu, or help screen (including text, special characters, and PLC Register Monitors) can be configured to blink. Those characters with the blink attribute enabled, will blink once per second for as long as the screen is displayed.

### To configure a character to blink:

1. In the Screen Editor, use the mouse to select the characters that you want to blink.

**NOTE:** You must select the entire PLC Register Monitor when configuring it to blink.

2. From the Edit menu, choose Blink or from the toolbar, choose the Blink button.

**NOTE:** Characters with the blink attribute enabled, will blink in the Screen Editor.

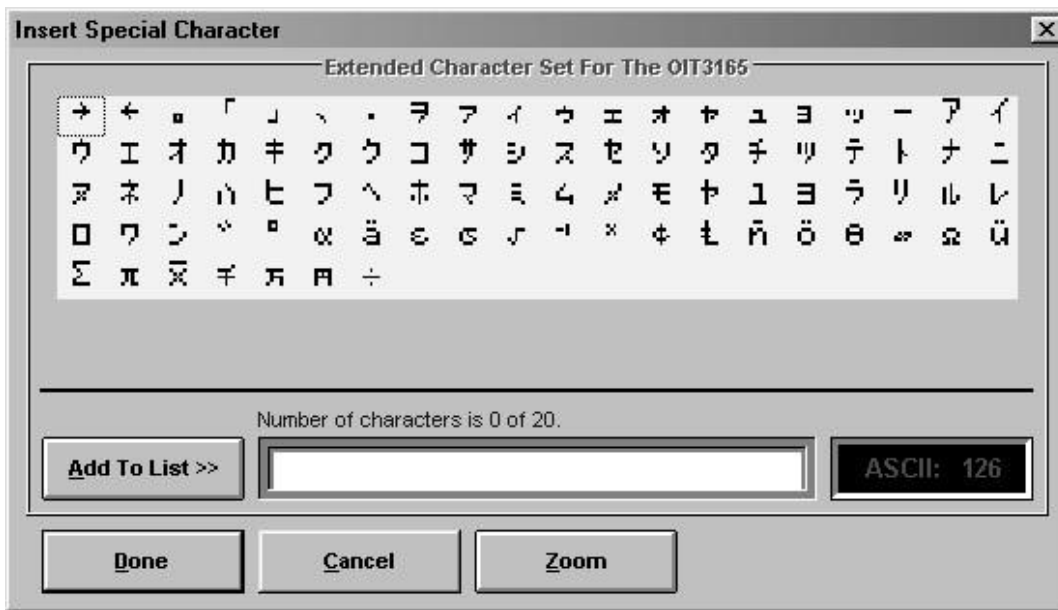
### Special Characters

Each OIT Family Operator Interface Terminal has a set of extended characters that can be embedded into each stored screen. Refer to APPENDIX A: Extended Character Sets to see the various extended character sets.

### To insert a special character:

1. In the Screen Editor, position the cursor where you want to insert the special character.
2. From the Insert menu, choose Special Character or from the toolbar, choose the Insert Special Character button. The Insert Special Characters dialog box appears.





3. Using the arrow keys, select any special character.
4. Choose the Add To List button. The selected special character displays in the text box next to the Add To List button.
5. Choose the Done button to return to the OITware-200 main screen. The special character(s) that were displayed in the text box next to the Add To List button will be added to the cursors location in the Screen Editor.

### Screen Chain

Often, an event occurs which requires a message or menu be sent to the OIT operator that is longer than the space provided on one screen of the OIT. To compensate for the limited size of the OIT's display, message or menu screens can be chained together so that they can be viewed in succession. When one of the chained screens is currently displayed, other screens that are chained to it can be displayed by using the PAGE UP and PAGE DOWN keys.

**NOTE:** The PAGE UP key is not available on the OIT3160 and OIT4160.

A message loop can be created by chaining the last screen in the chain to the first screen in the chain. In addition, a chained series of screens can be continuously displayed without any keypress or request from the PLC by configuring each screen in the chain for timed display. For more information on configuring screens for timed display, refer to the Timed Display section in this chapter.

In the following example, Screen #1 is chained to Screen #5 which is chained to Screen #3.

Screen #1	Screen #5	Screen #3
Gas Volume 22836 cf Flow Rate 15 cfm	Cooler Temp 50 Motor ON	Oven Door CLOSED Fluid Temp 60°C

When Screen #1 displays, a “->” symbol displays in the lower right corner of the screen. This symbol indicates that Screen #1 is chained to another screen. Pressing the PAGE DOWN key displays the next screen (Screen #5). Screen #5 displays with a “<->” symbol. This symbol indicates that the displayed screen is in the middle of a chained sequence. At this point, pressing the PAGE UP key displays the previous screen (Screen #1) and pressing the PAGE DOWN key displays the next screen (Screen #3). Screen #3 displays with a “<-” symbol. This symbol indicates that the displayed screen is the last screen of a chained sequence. At this point, pressing the PAGE UP key displays the previous screen (Screen #5).

**To configure message/menu screen chains:**

1. Create the message or menu screens using the Screen Editor.

**NOTE:** The lower right character in each chained screen is used to display the chain symbols and therefore is not available.

2. For each screen in the chain, in the Extensions group box, select the Chain check box and enter the screen number of the screen to link to.

**Help Screen**

Each message, recipe, or menu screen can display one help screen when the HELP key is pressed. The help screen can be different for each message, recipe, or menu screen.

**To link to a help screen:**

1. In the Extensions group box, select the Help check box and enter the screen number of the help screen you want displayed when the OIT operator presses the HELP key.

**Horizontal Scrolling**

Each message, recipe, alarm, or menu screen can have a single line of up to 128 characters that scrolls horizontally. The scrolling line travels at the rate of two characters per second starting with a blank line and scrolling from the right side of the display. This line can be used to get the attention of the OIT operator, or to display a string of text that is longer than the number of characters in the display.

**OIT3100 and OIT4100 Series Only**

These OIT models allow you to change the Horizontal Scroll Rate.

1. At the OITware-200 main screen, from the Configuration menu, choose General Settings. The OIT General Settings dialog box appears.
2. In the Horiz. Scroll Rate group box, select the number, from 1 (scrolls 1 character every 0.1 seconds) to 15 (scrolls 1 character every 1.5 seconds), that represents your desired scroll rate.

**To add a scrolling line to a screen:**

1. In the Special Effects group box, select the Enable? check box.
2. In the Special Effects group box, choose the Editor button. The Single Line Scroll Editor dialog box appears (see next page).



3. In the Location group box, select the line number that you want to scroll.
4. In the Text group box, type the string of text that you want to scroll.

**NOTE:** To delete the string of text from the Text group box, choose the garbage can button. To insert characters from the extended character set, from the Edit menu, choose Insert Special Character. The Insert Special Characters dialog box appears. For instructions on using this dialog box, refer to the Special Characters section in this chapter

### Beep on Display

Each message, recipe, or menu screen can be configured to beep for two seconds whenever it is initially displayed. This feature can be used as an attention-getting device.

#### To configure a screen to beep on display:

1. In the Special Effects group box, select the Beep on Display check box.

### Startup Screen

One message, recipe, or menu screen can be designated as the startup screen. The startup screen automatically appears whenever the OIT is powered up.

#### To configure a screen as the startup screen:

1. In the Special Effects group box, select the Start Up Screen check box.

### Timed Display

Normally, each screen remains on the display until another screen is displayed or the screen is cleared. However, the timed display attribute allows a message, recipe, or menu screen to be configured so that it displays for a set amount of time, 1 to 255 seconds, after which the prior screen is redisplayed. This could be used to display screens which should only be shown for a brief period of time.

If the screens in a message/menu chain are configured for timed display, each screen in the chain displays for the specified time and then the next screen in the chain is automatically displayed. This feature allows the system programmer to create a series of screens that can be continuously displayed without any keypress or request from the PLC.

**NOTE:** If the Screen Stack is enabled, then the timed display works differently. If several screens with a timed attribute are in the screen stack, each screen is displayed for the preset length of time, then the next screen in the stack is displayed. The last screen in the stack remains on the screen regardless of whether or not it is configured for a preset length of time.

#### To configure a screen for timed display:

1. In the Special Effects group box, select the Timed Display check box and enter the number of seconds the screen should be displayed.

## CHAPTER FOUR

### PLC Register Monitors

The PLC's registers and coils can be monitored, displayed, and updated by the OIT. This is done by configuring the OIT screens to display PLC registers and/or coils as embedded data fields (PLC Register Monitors). When the OIT displays a screen that contains a PLC Register Monitor, the OIT reads the specified PLC register address and then displays the data. If the PLC Register Monitor has been configured as read/write, when the OIT operator changes the data in the PLC Register Monitor on the OIT's display the OIT writes the change to the PLC register address.

A maximum of 25 "read only" or "read/write" PLC Register Monitors can be displayed on each Message, Alarm, Recipe, or Menu screen (Menu screens only accept read only PLC Register Monitors). If more than one PLC Register Monitor is on a screen, each is updated by the OIT in continuous succession as rapidly as possible within the constraints of the particular PLC protocol and baud rate selected. Therefore, the update rate of each PLC Register Monitor is determined by the number of PLC Register Monitors on the screen and the PLC protocol being used (baud rate, protocol overhead, PLC program, etc.).

The arrow keys move the cursor from one read/write PLC Register Monitor to another. Each time one of the arrow keys is pressed, the cursor moves to the next closest read/write PLC Register Monitor in the direction of the pressed arrow key. When the cursor is located at one of the edges of the display, additional keypresses in the direction of the display edge cause the cursor to wrap around, from top to bottom, etc.

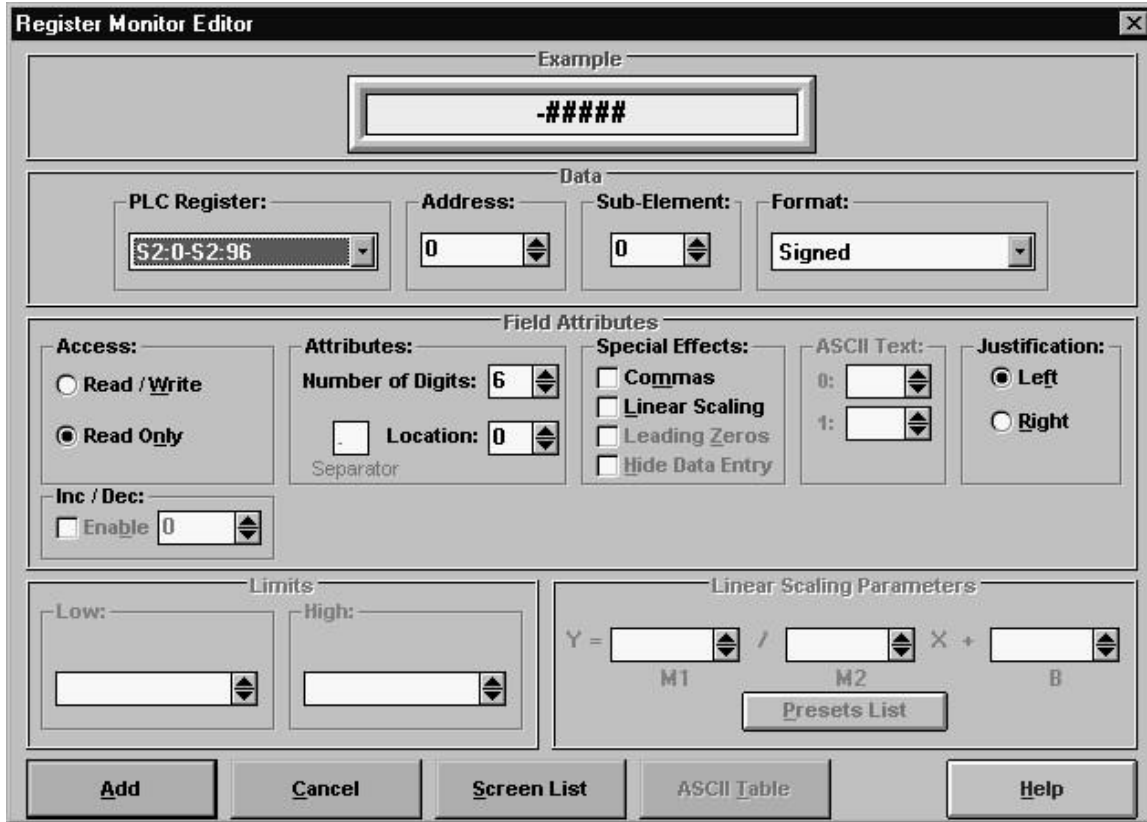
Once the cursor is positioned in the correct PLC Register Monitor, the OIT operator can:

- Press the TOGGLE key to alternate between "1" and "0" values in 1/0 Coil, On/Off Coil, or ASCII String PLC Register Monitor formats. The data is sent to the PLC immediately, so the OIT operator does not need to press the ENTER key.
- Press the DELTA+ and DELTA- keys to "jog" or adjust the value in the PLC Register Monitor by preset increments. The data is sent to the PLC immediately, so the OIT operator does not need to press the ENTER key. The preset increment is determined by the system programmer. When the value in the PLC Register Monitor bumps against the preset low or high limits, an error message is displayed and the delta keys are ignored.
- Press the CLEAR key to clear the PLC Register Monitor's contents and activate data entry mode. When data entry mode is activated, the PLC Register Monitor becomes blank and the cursor moves to the rightmost character position. The OIT operator can then enter a new value using the numeric keys on the OIT's keypad. When finished, the OIT operator presses the ENTER key. If the value is within the preset low and high limits, the entry is accepted and immediately written to the PLC. If the value is outside the preset limits, an error message is displayed indicating that the entered value is out of range.

**NOTE:** When the OIT operator enters data into a PLC Register Monitor that has the adjustable decimal point enabled, the OIT operator does NOT enter the decimal point, but simply enters the raw number. Once the data is sent to the PLC, the correct decimal position is shown.

#### To insert a register monitor into a screen:

1. From the Insert menu, choose PLC Register Monitor or choose the PLC Register Monitor button from the toolbar. The Register Monitor Editor dialog box appears.



2. In the Data group box, select the PLC Register, Address, and Sub-Element you want to monitor in the PLC.

**NOTE:** If you are inserting Time, Date, Message Stack Size, or Alarm Stack Size, skip this step.

3. In the Data group box, select the format that corresponds to the data format in the PLC register being monitored. For more information on the available formats, refer to the PLC Register Monitor Formats section in this chapter.
4. Use the Field Attributes, Limits, and Linear Scaling Parameters group boxes, to configure the attributes for this PLC Register Monitor. For more information on the available attributes, refer to the PLC Register Monitor Attributes section in this chapter.

### To Create a Recipe Preset Register Monitor

A Recipe Preset Register Monitor allows an operator to change the value of a Recipe Preset (see Chapter 3: Stored Screens) without having to reconfigure the OIT. This Register Monitor works in a manner similar to any other PLC Register Monitor. The difference is that the register being monitored and changed is a Recipe Preset instead of being a location in a PLC.

1. In the Data area, select [Recipe Preset] from the PLC Register List. It will be the last item in the list. When [Recipe Preset] is selected, the Address and Sub-Element boxes in the Data area of the Register Monitor Editor are changed to Screen and Preset, respectively.



2. In the Screen box, enter the number of the Recipe Screen whose Preset value is to be changed. The value entered into the Screen box must be an existing Recipe screen.
3. In the Preset box, enter the number of the Preset whose value is to be changed. The value entered into the Preset box must be a Preset that exists on the indicated Recipe screen.

**NOTE:** If either of these conditions is not met, OITware will generate a warning message when the Add/Replace button is selected.

4. The Format of the new Recipe Preset Register Monitor must match the format of the existing Recipe Preset.

There is one exception to this rule:

A format of **1/0 Coil**, **On/Off Coil**, or **ASCII String** may be used with a Recipe Preset whose format is 1/0 Coil.

**NOTE:** If the format is not compatible with the Recipe Preset, OITware will generate a warning message when the Add/Replace button is selected.

5. In order to make the Recipe Preset Register Monitor changeable, the Access of the new Register Monitor must be set to **Read/Write**. Any changes made to a Recipe Preset Value are saved in the OIT's non-volatile memory.

**WARNING:** The OIT will write the new Recipe Preset data to the internal FLASH PROM *every time* the value is changed. The PROM is capable of a maximum of 100,000 write cycles, after which the PROM can no longer be written to. This means not only that Recipe presets can no longer be changed, but also that the OIT can no longer be programmed.

Over a 10-year lifespan, 100,000 write cycles equates to 25 writes per day, 7 days a week. Therefore, we strongly recommend that the write cycle limitation be considered when changing Recipe Presets.

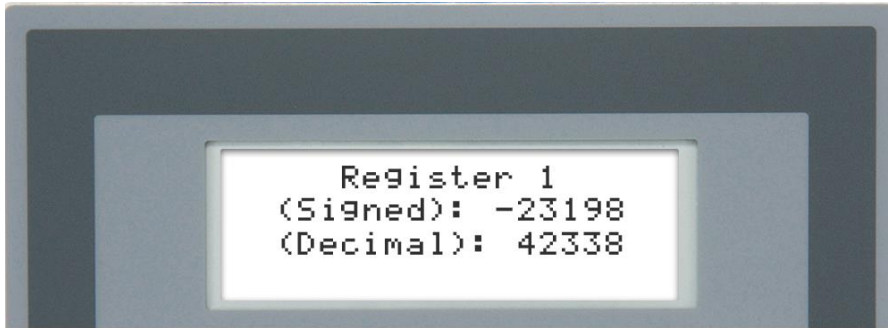
#### To view existing register monitors:

1. In the Register Monitor Editor, choose the Screen List button or from the Tools menu, choose Register Monitor List. The Register Monitor List dialog box appears.
2. Choose the Done button to close the Register Monitor List dialog box

### PLC Register Monitor Formats

To correctly monitor the data in a PLC register, the system programmer must select the proper data format for each PLC Register Monitor used. The following formats are available:

- signed
- decimal
- long
- 4-digit BCD
- 8-digit BCD
- 1/0 coil
- on/off coil
- bank 8
- bank 16
- message stack size
- alarm stack size
- ASCII character
- ASCII string
- date (European)
- time (12 hour)
- time (24 hour)
- date (US)
- floating point



### Signed

This format is used to represent a 16-bit register in the PLC as a signed integer value with a range of -32,768 to 32,767.

**Access:** Read/Write, Read Only

**Attributes:** Number of Digits, Decimal Location, Commas, Linear Scaling, Hide Data Entry, Left/Right Justification, Inc/Dec, Low/High Limits

### Decimal

This format is used to represent a 16-bit register in the PLC as an unsigned integer value with a range of 0 to 65,535.

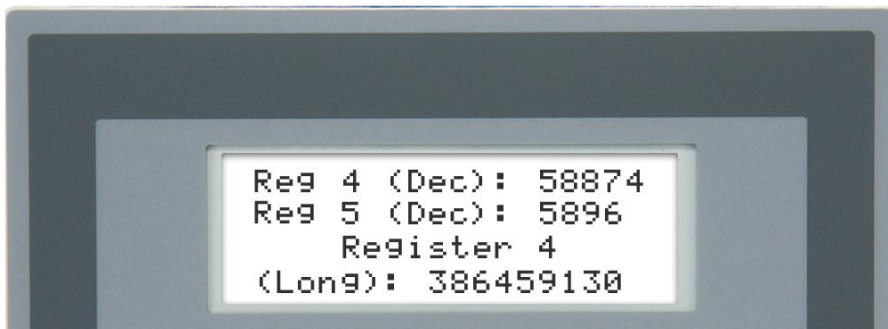
**Access:** Read/Write, Read Only

**Attributes:** Number of Digits, Decimal Location, Commas, Linear Scaling, Leading Zeros, Hide Data Entry, Left/Right Justification, Inc/Dec, Low/High Limits

### Long

This format is used to represent a 32-bit register or two consecutive 16-bit registers in the PLC as a signed long integer value with a range of -2,147,483,648 to 2,147,483,647.

**Access:** Read/Write, Read Only



**Attributes:** Number of Digits, Decimal Location, Commas, Linear Scaling, Hide Data Entry, Left/Right Justification, Inc/Dec, Low/High Limits

**NOTE:** If you are using one of the following PLC communications drivers, you have the option of selecting how the OIT interprets the word order when reading or writing to two consecutive 16-bit PLC registers using Long format:

- Emerson Motion Control Modbus
- Entertron Industries – Modbus

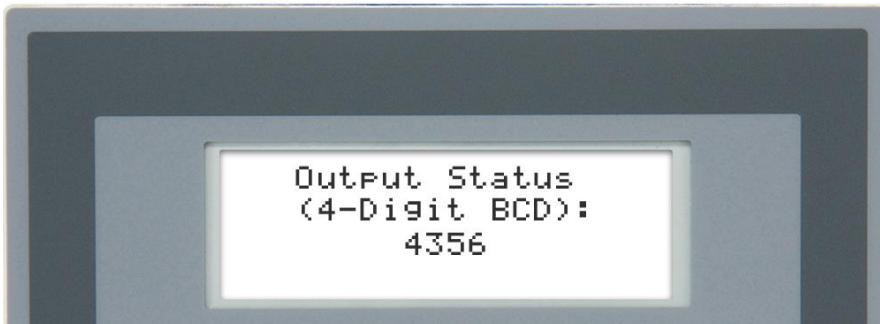
- Industrial Control Links Modbus
- Modbus Generic Network
- Modicon
- SAF Drives Modbus
- Sixnet – Modbus

To change the word order, from the Configuration Menu select Controller Settings and then in the Long Format box select Low Word First or High Word First. When set to High Word First, the default setting, the OIT regards the first PLC register as the most significant word and the second PLC register as the least significant word. When set to Low Word First the OIT considers the first PLC register as the least significant word and the second PLC register as the most significant word.

#### 4-Digit BCD

This format is used to represent a 16-bit register in the PLC as a BCD value with a range of 0 to 9,999. If the value in the PLC register is not in BCD format, then the OIT displays the value as hexadecimal.

**Access:** Read/Write, Read Only



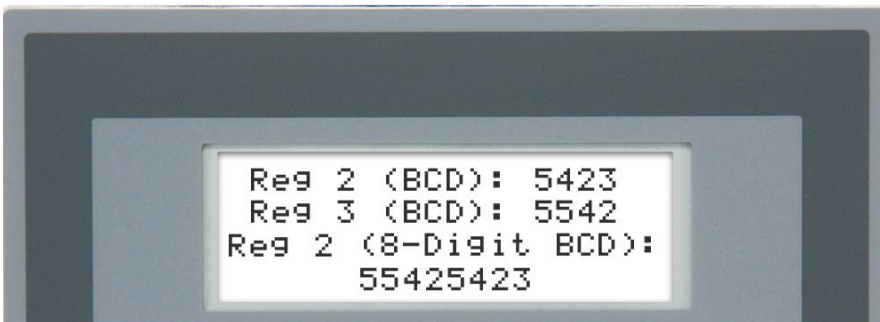
**Attributes:** Number of Digits, Decimal Location, Commas, Leading Zeros, Hide Data Entry, Left/Right Justification, Inc/Dec, Low/High Limits

#### 8-Digit BCD

This format is used to represent a 32-bit register or two consecutive 16-bit registers in the PLC as a BCD value with a range of 0 to 99,999,999. If the value in the PLC register is not in BCD format, then the OIT displays the value as hexadecimal.

**Access:** Read/Write, Read Only

**Attributes:** Number of Digits, Decimal Location, Commas, Leading Zeros, Hide Data Entry, Left/Right Justification, Inc/Dec, Low/High Limits



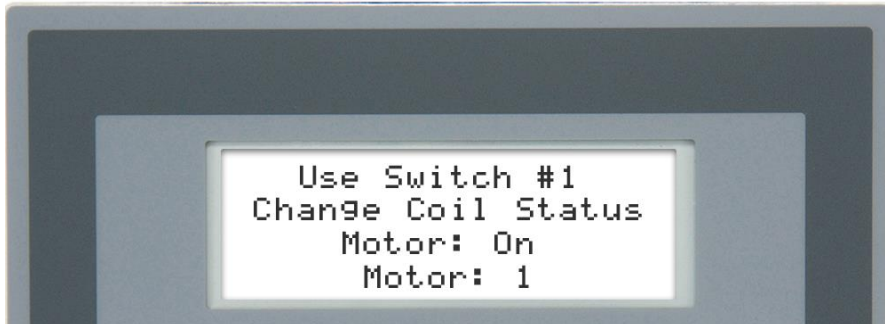


### 1/0 Coil

This format is used to represent a single coil in the PLC as a binary value with 0 indicating the coil is off and 1 indicating the coil is on.

**Access:** Read/Write, Read Only

**Attributes:** Blink if Bit Set



### On/Off Coil

This format is used to represent a single coil in the PLC as a binary value with “off” indicating the coil is off and “on” indicating the coil is on.

**Access:** Read/Write, Read Only

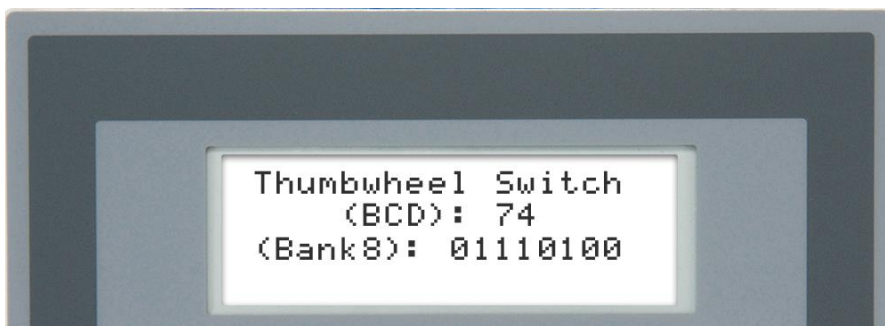
**Attributes:** Blink if Bit Set



### Bank 8

This format is used to represent eight consecutive coils in the PLC as binary values with 0 indicating the coil is off and 1 indicating the coil is on. The highest addressed coil is always displayed in the left-most position.

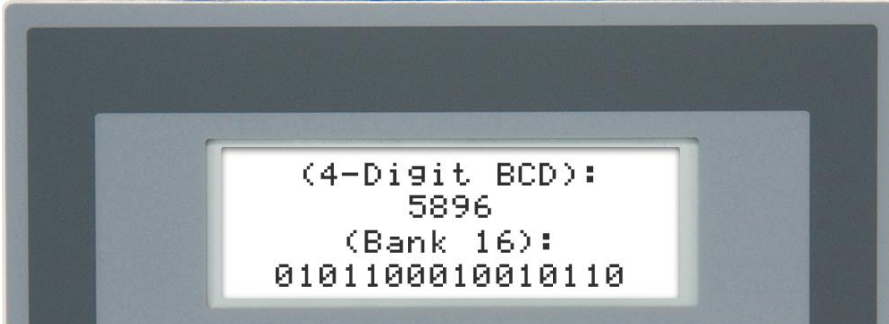
**Access:** Read Only



## Bank 16

This format is used to represent 16 consecutive coils in the PLC as binary values with 0 indicating the coil is off and 1 indicating the coil is on. The highest addressed coil is always displayed in the left-most position.

**Access:** Read Only



## Message Stack Size

This format is used to display the number of screens currently in the screen stack.

**Access:** Read Only

## Alarm Stack Size

This format is used to display the number of alarms currently in the alarm stack.

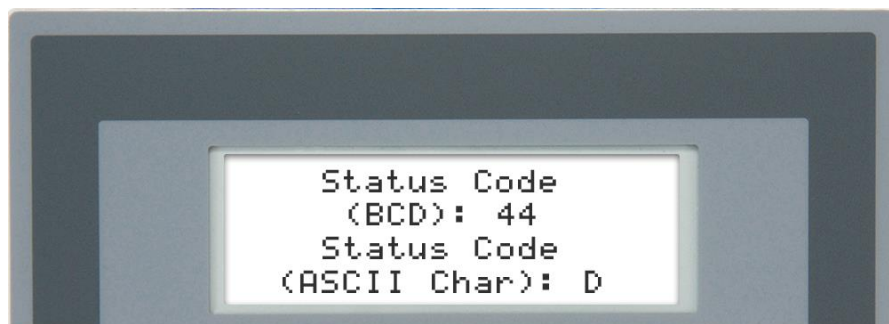
**Access:** Read Only

## ASCII Char

This format is used to represent a 16-bit register in the PLC as a corresponding ASCII character. If the Number of Digits in the OITware-200 Register Monitor Editor dialog box is set to 2, the OIT reads the 16-bit register as two 8-bit ASCII characters and displays them. If the Number of Digits in the OITware-200 Register Monitor Editor dialog box is set to 1, the OIT reads the lowest eight bits of the 16-bit register and displays one ASCII character. If the data in the PLC register does not correspond to a displayable ASCII character(s), the OIT continues to show the last displayable ASCII character(s), or if there never was one, a space.

**Access:** Read Only

**Attributes:** Number of Digits



## ASCII String PLC Coil

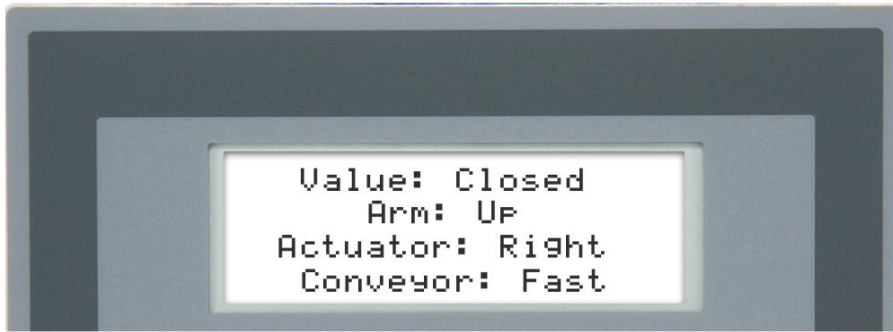
This format is used to represent a single coil in the PLC as a binary value with user-definable strings that indicate whether the coil is on or off. Two ASCII strings can be created to represent the PLC coil. For example, RUNNING to represent the 'on' state and STOPPED to represent the 'off' state.

In OITware, enter the strings to be displayed using the ASCII Table Editor. Up to 30 strings may be entered, each up to 16 characters in length. Then, in the ASCII Text box of the Register Monitor Editor in OITware, assign a string number to the off or '0' state and to the on or '1' state.

This format can also be used to represent a data register in the PLC. Select the ASCII String format, then check the 'By Value' box in the ASCII Text box of the Register Monitor Editor in OITware. String #1 in the ASCII Table Editor will correspond to data value '0', string #2 to data value '1', etc. If the data value is larger than 29, then string #30 will be displayed.

**Access:** Read/Write, Read Only

**Attributes:** Number of Digits, Blink if Bit Set, ASCII Text, Left/Right Justification



### To configure the 30 ASCII strings:

1. From the Configuration menu, choose ASCII Table Editor or in the Register Monitor Editor, choose the ASCII Table button. The ASCII Table Editor dialog box appears.
2. Enter the text for each string you want to configure.

**NOTE:** To delete all existing strings, choose the garbage can button. To insert characters from the extended character set, from the Insert menu, choose Special Character. The Insert Special Characters dialog box appears. For instructions on using this dialog box, refer to the Special Characters section in CHAPTER 3: Stored Screens.

3. Choose the Done button to return to the OITware-200 main screen or the Register Monitor Editor.

## ASCII String PLC 16-bit Register (OIT3100 and OIT4100 Series only)

This format is used to represent 16-bit data registers in the PLC with user-definable strings. A maximum of 30 ASCII strings, each up to 16 characters in length, can be programmed into the OIT. When the value in the PLC data register is from 0 to 29 the corresponding ASCII string is displayed (PLC value 0 = ASCII string 1; PLC value 1 = ASCII string 2, etc.). If the value in the PLC data register does not have a corresponding ASCII string, then the OIT displays a blank string. Each PLC Register Monitor using the ASCII String format can use any of the 30 strings. The length (Number of Digits) of the PLC Register Monitor should be set to match the longest of the selected ASCII strings.

**Access:** Read/Write, Read Only

**Attributes:** Number of Digits, ASCII Text, Left/Right Justification

**To configure the 30 ASCII strings:**

1. Refer to the ASCII String - PLC Coil section, above.

**Time (12 Hour)**

This format is used to display the current time from the OIT's real-time clock in HH:mMn format (for example: 1:00p).

**Access:** Read Only

**Time (24 Hour)**

This format is used to display the current time from the OIT's real-time clock in HH:MM format (for example: 13:00).

**Access:** Read Only

**Date (US)**

This format is used to display the current date from the OIT's real-time clock in MM/DD/YY format (for example: 12/31/16).

**Access:** Read Only

**Date (European)**

This format is used to display the current date from the OIT's read-time clock in DD/MM/YY format (for example: 31/12/16).

**Access:** Read Only

**Floating Point (OIT3100 and OIT4100 Series Only)**

This format is used to represent a 32-bit register in the PLC as a Floating Point value.

The Floating Point format is based on the IEEE 754 Basic Single Precision Floating Point specification:

Number of Bits [bit location]		
<u>sign</u>	<u>exponent</u>	<u>mantissa</u>
1 [31]	8 [30-23]	23 [22-0]
IEEE 754 Single Precision		

Due to limitations in the OIT, the implementation of floating point in the OIT is a subset of the IEEE 754 specification. The Decimal Point location determines the range of the Floating Point value (see next page):

Decimal Location	Range	
	Minimum	Maximum
0	- 2,147,483,647	+ 2,147,483,647
1	- 214,748,364.7	+ 214,748,364.7
2	- 21,474,836.47	+ 21,474,836.47
3	- 2.147.483.647	+ 2,147,483.647
4	- 214,748.3647	+ 214,748.3647
5	- 21,474.83647	+ 21,474.83647
6	- 2,147.483647	+ 2,147.483647
7	- 214.7483647	+ 214.7483647
8	- 21.47483647	+ 21.47483647
9	- 2.147483647	+ 2.147483647
10	- 0.2147483647	+ 0.2147483647

**Accuracy**

Due to limitations of the OIT, the Floating Point format is accurate to 6 digits. This means that values in the seventh and higher digits may not be correct.

For example, if the OIT displays a value of +12345.678, only the value 12345.6 is reliable. The remaining digits are displayed, but may not be accurate.

If the OIT displays a value of +2,147,483,647, then only the digits up to the “8” are reliable. The remaining digits are displayed, but may not be accurate.

**Out-of-Range Conditions:**

**NOTE:** In the examples below, commas are shown for clarity. The OIT will display commas only if the *Commas* checkbox in the *Special Effects* area is checked.

Any value read from the PLC that is outside the range specified above will be displayed as #####. See Example 1.

Example 1, Out Of Range Value (Overflow/Underflow)

PLC Register contains: -214,100.45  
 Decimal Location: 5 ( 21,474.83647 to + 21,474.83647)  
 OIT Displays: #####

PLC Register contains: +214,100.45  
 Decimal Location: 5 ( 21,474.83647 to + 21,474.83647) OIT Displays:  
 #####

If a value is within the specified range, but has a greater precision, then the OIT will *truncate* the number to the precision of the specified range. See Example 2.

### Example 2, Out Of Range Precision

PLC Register contains: +350.128 (3 decimal places) Decimal Location: 2  
(-21,474.836.47 to + 21,474.836.47) OIT Displays: +350.12 (displayed to 2 decimal places).

Note that the value displayed by the OIT is *truncated*, not rounded.

## Word Order

If you are using one of the following PLC communications drivers, you have the option of selecting how the OIT interprets the word order when reading or writing to two consecutive 16-bit PLC registers using the Floating Point format:

- Emerson Motion Control Modbus
- Entertron Industries Modbus
- Industrial Control Links Modbus
- Modbus Generic Network
- Modicon
- SAF Drives Modbus
- Sixnet Modbus

To change the word order, from the Configuration Menu select Controller Settings and then in the Floating Pt. box select Low Word First or High Word First.

When set to Low Word First, the default setting, the OIT considers the first PLC register as the least significant word and the second PLC register as the most significant word. When set to High Word First the OIT regards the first PLC register as the most significant word and the second PLC register as the least significant word.

## PLC Register Monitor Attributes

### Number of Digits

This attribute allows you to configure the number of character positions that the PLC Register Monitor occupies in the screen. If the data read from the PLC register requires more space than has been allocated, the overload character “#” appears in each character position of the PLC Register Monitor until a number within range is read.

Some of the other attributes (such as Decimal Location and Commas) increase the number of character positions that the PLC Register Monitor occupies in the screen.

### To configure the Number of Digits in a PLC Register Monitor:

1. In the Register Monitor Editor dialog box, in the Attributes group box, in the Number of Digits scroll box, select the required length.

## Separator Location

The Separator Location is the same as the Decimal Location described above, with the additional feature that you can configure any symbol to be displayed in place of the decimal point.

The Separator field is used to specify which character to place within the Register Monitor (instead of the Decimal Point), and the Location field is used to specify where in the Register Monitor the character is placed.

For example, if the Separator character is set as “^”, and the location is set as 2, the value 123456 would be displayed as “1234^56”. If the selected format does not support a Separator Location, or if the Separator Location is set to 0, the Separator field is disabled.

**NOTE:** The Ampersign character (“&”, ASCII 38D) is not allowed as a Separator character.

**NOTE:** When the Decimal or Separator Location is set to 1 or higher, the field width of the PLC Register Monitor is increased by one to include space for the decimal point or Separator character.

#### **To configure the Decimal or Separator Location in a PLC Register Monitor:**

1. In the Register Monitor Editor dialog box, in the Attributes group box, in the Decimal or Separator Location scroll box, select the number of characters from the right to place the decimal point or Separator character.

#### **Commas**

This attribute adds commas every three characters to the PLC Register Monitor (for example: 1,234,567 would display instead of 1234567).

**NOTE:** When Commas is enabled, the field width of the PLC Register Monitor is increased by one for every three numbers in the Number of Digits attribute.

#### **To enable Commas in a PLC Register Monitor:**

1. In the Register Monitor Editor dialog box, in the Special Effects group box, select the Commas check box.

#### **Linear Scaling**

Linear Scaling is the term used to describe the process of converting one unit of measure to another, usually from a machine format to an operator-readable format, so the OIT operator has the data presented in readily understandable terms. A common application involves converting analog or digital data into degrees, speed, voltage, or temperature. If linear scaling is used on a read/write register monitor, the OIT operator can modify the data in the operator-readable format and it will be converted back into the machine format before being sent to the PLC register. Linear Scaling is available with the Signed, Decimal, and Long formats.

The linear scaling conversion is accomplished using the simple equation  $Y=MX+B$ , where “X” is the raw data read from the PLC, “Y” is the data presented to the OIT operator after the conversion, “M” is used to convert the scale of one unit of measure to another unit of measure, and “B” is the offset variable used for alignment.

For example, if an 8-bit A/D converter (255 steps) is used to measure voltage ranging from 0 to 15 volts, the raw data needs to be reduced so that a value of 255 A/D units equals 15 volts. The OIT needs to multiply the raw data by  $1/17$  ( $255/15=17$ ) to properly convert the data into volts. Since the A/D value of 0 correctly represents 0 volts, the variable B is not used. The equation for this example would be  $Y = (1/17)X + 0$ .

Let’s look at a similar example. Suppose an 8-bit A/D converter (255 steps) is used to measure voltage ranging from 5 to 20 volts. Now we need to do two things, adjust the A/D range of 1-255 down to a range of 15 volts (20 volts-5 volts) and offset the data so that an A/D value of 0 represents 5 volts. Let’s start with the range conversion. As in the previous example, M is calculated by dividing the A/D range by the voltage range ( $255/15=17$ ). Since we are reducing the raw data, M must be  $1/17$ . Now to offset the raw data so that an A/D value of 0 represents 5 volts, set B to 5. The equation for this example would be  $Y = (1/17)X + 5$ .

The multiplier M can be entered in as a fraction which allows both range expansion and range reduction. To expand the range of the raw data, make sure the numerator (top number) is greater than the denominator (bottom number).

To reduce the range of the raw data, make sure the numerator is less than the denominator. In the previous examples, M would be specified as 1/17.

16-bit PLC registers using the Signed or Decimal formats and 32-bit PLC registers using the Long format can be converted using linear scaling. Therefore, the input variable X, which represents the raw PLC register value, can be a signed integer, unsigned integer, or signed long integer value. The output variable Y is determined by the linear equation. Therefore, it may be a positive or negative number with a maximum range of -2,147,483,648 to +2,147,483,647.

When using low and high limits, the values should be entered in the unit of measure being used by the OIT operator not the unit of measure being used in the PLC register.

The OIT always performs integer arithmetic when calculating the linear scaled values to be displayed. Therefore, you should be aware of what kind of accuracy you wish to have when using linear conversion. For example, if the OIT converts degrees Celsius to degrees Fahrenheit using the formula

$Y = (9/5)X + 32$ , 1°C would be converted to 34°F. Technically, this is inaccurate since 1°C=33.8°F. Fortunately, this can be corrected by simply using a different formula. If the conversion accuracy must be to one decimal point, then multiply the given equation on the left side by 10 (for example,  $Y = (90/5)X + 320$ ) and select a decimal point of 1 for the register monitor display. Finally, the above formulas only work if the Celsius temperature values stored in the PLC register are always integer whole number values. If the Celsius temperature values in the PLC register are to one decimal point and the Fahrenheit temperature values are to be displayed to one decimal point, the following formula should be used  $Y = (9/5)X + 320$ .

#### **To configure linear scaling in a PLC register monitor:**

1. In the Register Monitor Editor dialog box, in the Special Effects group box, select the Linear Scaling check box. The Linear Scaling Parameters group box activates.

You can easily calculate the values of M1, M2, and B if you know the following:

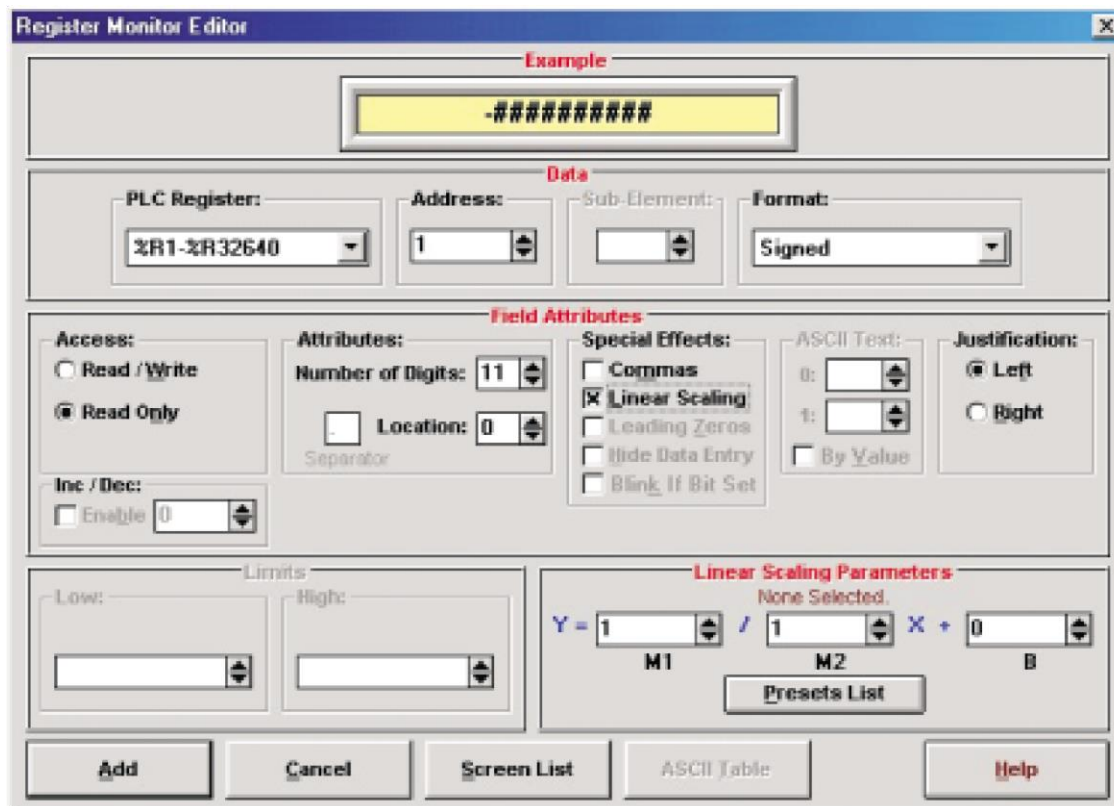
- XMIN- lowest value contained in the PLC register
- XMAX- highest value contained in the PLC register
- YMIN- lowest value to be displayed on the OIT screen
- YMAX- highest value to be displayed on the OIT screen

Using the above numbers:

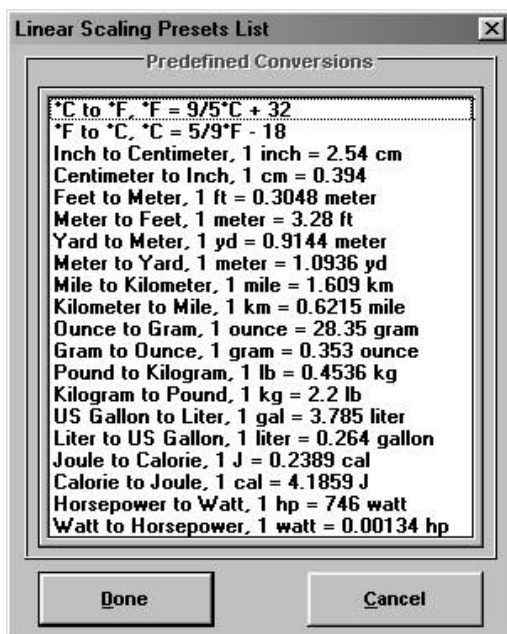
$$M1 = YMAX - YMIN$$

$$M2 = XMAX - XMINB = (YMAX XMIN - YMIN XMAX) / (XMIN - XMAX)$$





2. In the Linear Scaling Parameters group box, enter the M1, M2, and B values for your conversion formula or choose the Preset Lists button to select a preset formula from the Linear Scaling Presets List.



3. If this is a read/write register monitor, you can enter low and high limits to stop the OIT operator from entering invalid values.

**NOTE:** When using low and high limits, the values should be entered in the unit of measure being used by the OIT operator not the unit of measure being used in the PLC register.

## Leading Zeros

This attribute adds leading zeros to the PLC Register Monitor when the Decimal, 4-Digit BCD, or 8-Digit BCD format is used and the data read from the PLC register is shorter than the number specified in the Number of Digits attribute (for example: 0024 would display instead of 24 in 4-Digit BCD format).

### To enable Leading Zeros in a PLC Register Monitor:

1. In the Register Monitor Editor dialog box, in the Special Effects group box, select the Leading Zeros check box.

## Hide Data Entry

This attribute displays asterisks in the PLC Register Monitor instead of the data read from the PLC register or typed by the OIT operator. This allows the system programmer to configure a process with restricted access. For example, a PLC register is configured in the PLC ladder logic program so that whenever the data in the PLC register is equal to a specific number, the PLC starts a control process. Then a PLC Register Monitor is configured for that PLC register with the Hide Data Entry attribute enabled. Now the control process can only be started by an OIT operator who knows the correct access number. Data entry is secured since only asterisks are shown.

### To enable Hide Data Entry in a PLC Register Monitor:

1. In the Register Monitor Editor dialog box, in the Special Effects group box, select the Hide Data Entry check box.

## Blink if Bit Set

This attribute will blink the PLC Register Monitor field when the PLC coil is set. It will display the 'off' state continuously when the PLC coil is clear. This attribute can be used for I/O, On/Off, or ASCII String formats.

### To enable Blink if Bit Set in a PLC Register Monitor:

1. In the Register Monitor Editor dialog box, in the Special Effects group box, select the Blink if Bit Set check box.

## ASCII Text

This attribute is used to configure the two ASCII strings used to represent the state of the specified PLC coil when using the ASCII String - PLC Coil format. It is also used to activate the 30 ASCII strings when using ASCII String - PLC 16-bit Register format. For information on configuring the 30 user-definable ASCII strings, refer to the ASCII String section in this chapter.

### To specify the two ASCII Strings used in ASCII String-PLC Coil format:

1. In the Register Monitor Editor dialog box, in the ASCII Text group box, select the ASCII String number (1 to 30) for the 0 and 1 PLC coil states.

**NOTE:** If you need to see the user-defined ASCII strings, choose the ASCII Table button. The ASCII Table Editor dialog box appears.

### To activate the ASCII Strings in ASCII String-PLC 16-bit Register format:

1. In the Register Monitor Editor dialog box, in the ASCII Text group box, select the By Value check box.

## Left/Right Justification

This attribute displays the contents of the PLC Register Monitor with either left or right justification. Justification is the term used to describe placing all of the characters against the right or left margin regardless of the actual number of characters displayed.

### To specify left or right justification in a PLC Register Monitor:

1. In the Register Monitor Editor dialog box, in the Justification group box, select the Left or Right option button.

## Inc/Dec

This attribute allows you to enable the DELTA+ and DELTA- keys for use with the PLC Register Monitor and to configure the preset increment used by the DELTA+ and DELTA- keys to “jog” or adjust the value in the PLC Register Monitor.

### To enable the DELTA+ and DELTA- keys in a PLC Register Monitor:

1. In the Register Monitor Editor dialog box, in the Inc/Dec group box, select the Enable check box and then select the preset increment to use.

## Low/High Limits

This attribute allows you to configure the Low and High Limits used to keep the OIT operator from entering an out-of-range value into the PLC Register Monitor. If the value entered by the OIT operator is lower than the Low Limit or higher than the High Limit an out-of-range warning is displayed. An option can be set in the OIT General Settings that allows the OIT to display the Low or High Limit with the out-of-range warning.

### To configure the Low and High Limits in a PLC Register Monitor:

1. In the Register Monitor Editor dialog box, in the Limits group box, select the appropriate numbers for the Low and High limits.

### To enable the low and high limits display with the out-of-range warning:

1. In the OITware-200 main screen, from the Configuration menu, choose General Settings. The OIT General Settings dialog box appears.

2. In the Options group box, select the Show High and Low Limits with Out-Of-Range Warning check box.
3. Choose the Done button to return to the OITware-200 main screen.

## Set Points

Set Points may be used for a variety of things including system warnings or alarms, multi-point warnings or alarms, restarting a recipe after a given number of units have been batch processed, or providing the OIT operator with a choice of actions when a trip point has been exceeded. Each OIT can have up to 16 set points active simultaneously. The system programmer provides the following information about each:

- PLC register address to monitor (known as set point address)
- format of PLC register (signed, decimal, 4-digit BCD, 8-digit BCD or long)
- low limit
- high limit
- screen number to display upon low limit violation
- screen number to display upon high limit violation

The set point addresses are monitored continuously by the OIT. The OIT polls one of the set point addresses every second. Therefore, having 16 set points means each set point is polled every 16 seconds.

If the OIT determines that the current value in the set point address is below the low limit or above the high limit, then the appropriate screen is displayed on the OIT. The screen displayed can be an alarm, message, recipe, or menu.

Once an out-of-range condition has occurred, the set point screens cannot be activated again until the set point address value comes back into range. For example, suppose a set point has been configured to monitor PLC address ADD1. The set point is configured to display Screen #1 if ADD1 falls below -100 and Screen #2 if ADD1 rises above 100. The PLC address starts with a value of 0 (in range). Then ADD1 falls to -200 (low limit range exceeded) causing the OIT to display Screen #1. If the next value of ADD1 is 200 (high limit range exceeded) the OIT will not display Screen #2, because ADD1 did not go back into range (-100 to 100) after the low limit range was exceeded. However, if ADD1 had changed from -200 to 10 to 200, Screen #2 would have been displayed.

**NOTE:** Depending on the poll rate (number of set points), data may change many times before being detected by the OIT.

In addition to the possible delay based on the poll rate, the response time of low limit or high limit violations can vary depending on the communications speed and the amount of data overhead of each PLC protocol. Therefore, if the set points are used as alarms, they should be treated as auxiliary alarms and placed at priorities 3 and 4 while PLC generated alarms are placed at priorities 1 and 2.

**NOTE:** Under no circumstances should set points be used to monitor safety critical processes or limits!

**To configure a set point:**

1. From the Configuration menu, choose Set points Editor. The Set Points Editor dialog box appears.

2. In the PLC Interface group box, select the PLC Register and Address to be monitored.
3. In the PLC Interface group box, select the Format used in the selected PLC register.
4. In the Low Set Point group box, enter the Low Limit (trip point).
5. In the Low Set Point group box, enter the Screen to display upon low limit violation.

**NOTE:** Choose the VIEW button to view the selected screen.

6. In the High Set Point group box, enter the High Limit (trip point).
7. In the High Set Point group box, enter the Screen to display upon high limit violation.
8. Choose the Add To Set Points List button to create the set point. The new set point appears in the Set Points List group box.

**NOTE:** The Set Points List group box is used to view or remove existing set points.

**Set Points Editor**

**Characteristics**

PLC Interface	Low Set Point	High Set Point
<b>PLC Register:</b> %R1-%R2048	<b>Limit:</b> Range to -32768. 50	<b>Limit:</b> Range to 32767. 70
<b>Format:</b> Signed	<b>Screen:</b> Range 1 to 500. 3	<b>Screen:</b> Range 1 to 500. 4
<b>Address:</b> Range to 2048. 1	<b>View</b>	<b>View</b>
<b>Add To Set Points List</b>		

**Set Points List**

PLC Register:	Characteristics:	Low Limit:	High Limit:
Entry View 1. Total Entries is 1. %R1-%R2048	<b>PLC Interface:</b> Address: 1 Format: Signed	<b>Value:</b> 50 <b>Screen:</b> 3	<b>Value:</b> 70 <b>Screen:</b> 4
	<b>View</b>	<b>View</b>	<b>View</b>
	<b>Zoom</b>	<b>Delete Current Entry</b>	<b>Delete All Entries</b>

**Done**   **Cancel**   **Help**

## CHAPTER FIVE

### Displaying Stored Screens

This chapter describes the methods that can be used to display stored screens on the OIT.

#### Startup Screen

One message, recipe, or menu screen can be designated as the startup screen. The startup screen automatically appears whenever the OIT is powered up. For instructions on designating the startup screen, refer to the Startup Screen section in CHAPTER 3: Stored Screens.

#### PLC Screen Request

The PLC can request that the OIT display any stored screen using the Message Request Register (MRR). The MRR is a register in the PLC that is continuously monitored by the OIT. When a new value is read from the MRR, the corresponding screen is immediately displayed on the OIT with the following exceptions:

- When the screen stack is in Stacked mode, only alarm screens are immediately displayed, all other screens are stored in the stack until the OIT operator presses the NEXT MESSAGE key.
- The only screen request that can write over the top of an unacknowledged alarm screen is a higher priority alarm screen. Non-alarm screen requests received in this situation are ignored if the screen stack is in Standard mode and saved in the stack if the screen stack is in Stacked mode. Lower priority alarm screens received in this situation are stored in the alarm stack.

Once the OIT displays the screen requested in the MRR, the OIT must **see a change in the number** in the MRR in order to display another screen request from the PLC. For example, the PLC requests that Screen #5 be displayed. The OIT operator then presses Function Key #1 which displays Screen #30. The number 5 is still in the MRR, but since no change has occurred it is ignored by the OIT. The PLC can get the OIT to display the same screen twice without an intervening PLC screen request, by simply putting the number 0 into the MRR between the two identical screen requests. The OIT does not perform any action as a result of seeing the number 0 in the MRR, but it does note that a change occurred.

**NOTE:** The OIT3100 and OIT4100 Series offers a feature that allows the OIT to clear the MRR after each PLC screen request.

Two types of MRRs are available: Value and Bit Position.

#### MRR–Value

When a value MRR is used, the PLC requests screens by placing decimal or BCD numbers into the MRR.

#### MRR–Bit Position

When a bit position MRR is used, the PLC requests a screen by setting a bit instead of writing a number. Each bit in the specified MRR address corresponds to one of 16 stored screens in the OIT. To access more than 16 of the OIT's 500 stored screens, you must configure multiple bit position MRRs. Up to 40 can be configured.

**NOTE:** Only one MRR is polled every 200 milliseconds. Therefore, if two MRRs are configured, it takes 400 milliseconds to poll them.

To determine which stored screen to display, the OIT examines each bit in the polled MRR and then displays the stored screen that corresponds to the first set bit.

### **Configuring the MRR without Enhanced Features**

1. From the Configuration menu, choose Message Control Settings. The OIT Message Control Settings dialog box appears.
2. In the Message Request Register group box, select the Enable check box.
3. In the Message Request Register group box, in the scroll box, specify the PLC address for the MRR.
4. In the MRR/CMR Data Format group box, specify the data format for the MRR and CMR.
5. Choose the Done button to return to the OITware-200 main screen.

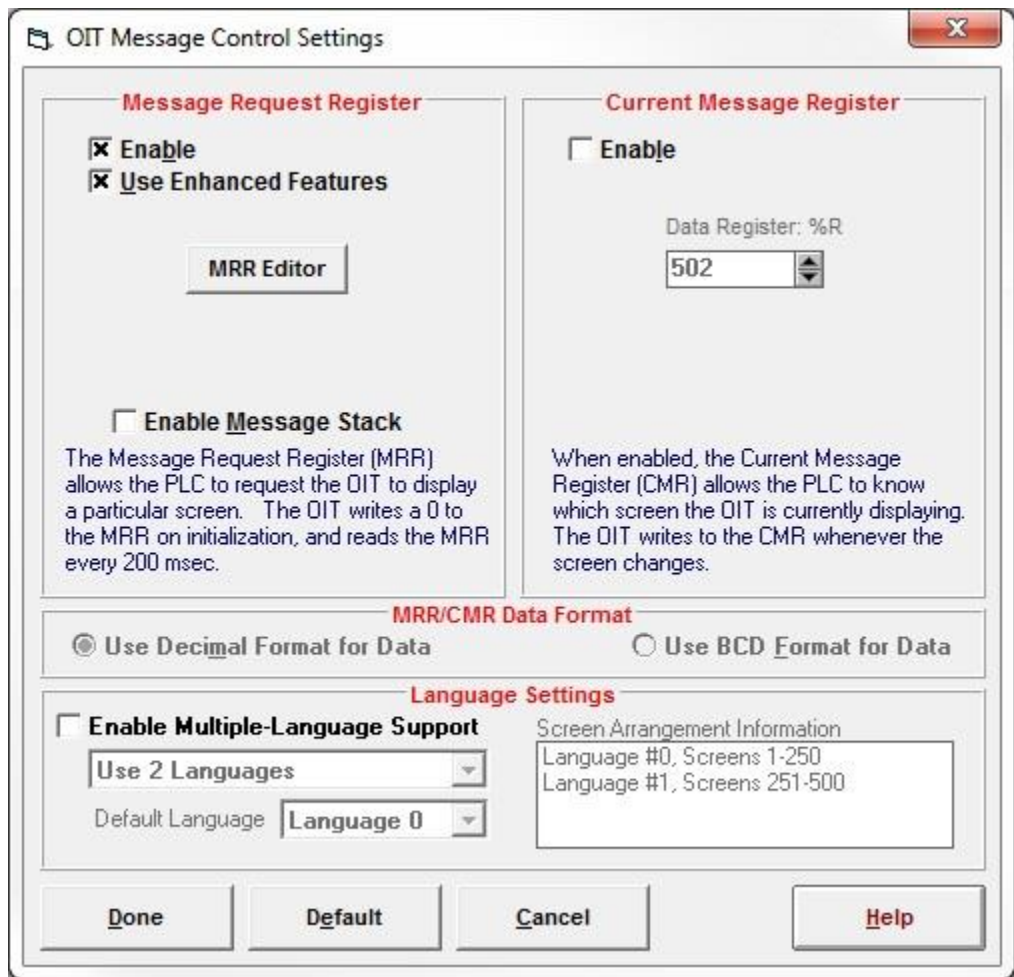
### **Configuring the MRR with Enhanced Features**

(OIT3100 and OIT4100 Series)

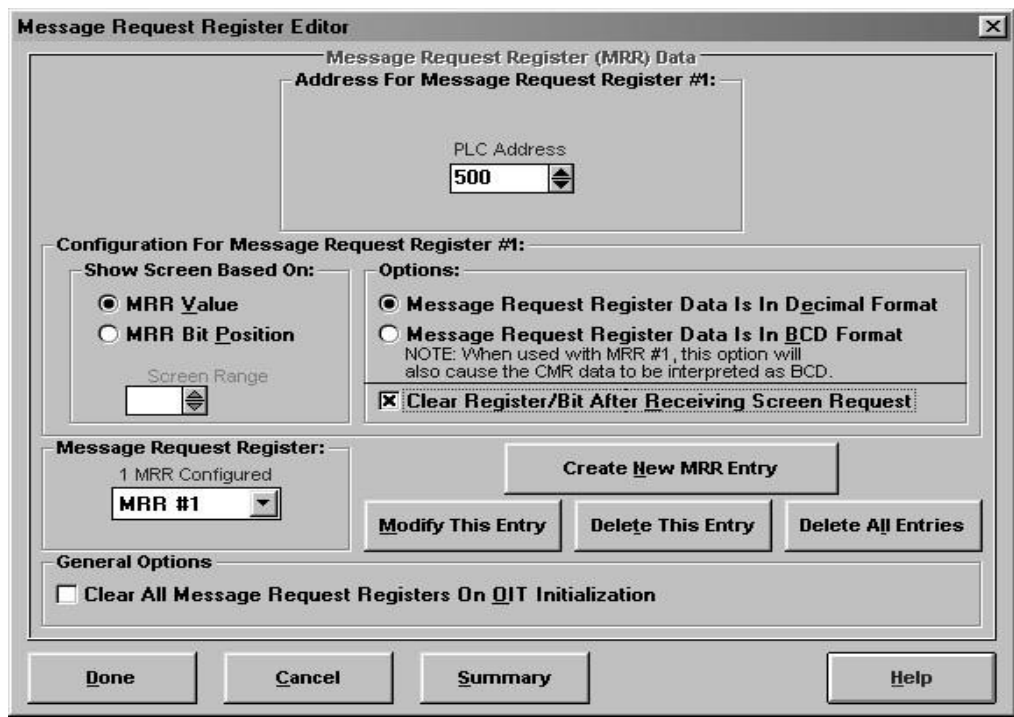
To use a bit position MRR, use multiple MRRs, clear the MRR after each PLC screen request, or leave the MRR(s) in their existing state on OIT power up, requires the enhanced features.

1. From the Configuration menu, choose Message Control Settings. The OIT Message Control Settings dialog box appears.
2. In the Message Request Register group box, select the Enable check box.
3. In the Message Request Register group box, select the Use Enhanced Features check box. The MRR Editor button activates.





4. Choose the MRR Editor button. The Message Request Register Editor dialog box appears



5. Choose the MRR Editor button. The Message Request Register Editor dialog box appears.
6. In the Address For Message Request Register #1 group box, in the scroll box, specify the PLC address for this MRR.
7. In the Show Screen Based On group box, select the MRR Value or MRR Bit Position option button.
8. If creating a bit position MRR, in the Show Screen Based On group box, in the scroll box, select the starting screen number for this MRR's sixteen screen range.
9. If creating a value MRR, in the Options group box, specify the data format for this MRR.
10. If you want the OIT to clear the MRR after each PLC screen request, in the Options group box, select the Clear Register/Bit After Receiving Screen Request check box.
11. Choose the Create New MRR Entry button. This MRR is added.
12. Repeat steps 5 through 10 for each additional MRR to be created.
13. If you want the OIT to set all MRRs to 0 whenever the OIT powers up, in the General
  - Options group box, select the Clear All Message Request Register On OIT Initialization check box.
14. Choose the Done button to return to the OIT Message Control Settings dialog box.
15. Choose the Done button to return to the OITware-200 main screen.

## Function Keys

Every global and screen-dependent function key on the OIT can be programmed to display a stored screen. Whenever the function key is pressed, the corresponding screen is immediately displayed, unless an alarm is active or a security password is being used. For more information on configuring function keys, refer to CHAPTER 6: Key Types.

**NOTE:** When a function key displays an alarm or help screen, the screen is treated like a simple message screen.

## Menu Selection

Menu screens allow the OIT operator to branch off to other message, recipe, or menu screens by pressing the associated numeric key. Each menu screen can branch to as many as nine other screens using the 1 through 9 keys. For more information on configuring menu screens, refer to the Menu Screens section in CHAPTER 3: Stored Screens.

## Message or Menu Chain — Page Up & Page Down Keys

Message or menu screens can be chained together to form multiple screen messages or menus. This allows a group of screens to be displayed with only one PLC screen request, or one function key press, or one menu selection. For more information on configuring message/menu screen chains, refer to the

Screen Chain section in CHAPTER 3: Stored Screens. The PAGE DOWN and PAGE UP keys are used by the OIT operator to view the screens in a chain. PAGE DOWN is used to view the next screen in a chain; PAGE UP is used to view the prior screen.

**NOTE:** The PAGE UP key is not available on the OIT3160 or OIT4160.

Three special symbols are used in the screens to indicate to the OIT operator which screen in the chain is being displayed. The “->” symbol is used in the first screen, the “<->” symbol is used in the middle screens, and the “<-” symbol is used in the last screen.

## Screen Stack — Last Msg & Next Msg Keys

The OIT has a screen stack that temporarily stores up to 10 screens requested by either the PLC or OIT. The following are not stored in the screen stack:

- Alarm screens requested by the PLC
- Help screens requested by the HELP key
- Any screen requested by a function key that uses a password • startup screen
- Screen saver

The LAST MESSAGE and NEXT MESSAGE keys are used to view the messages in the screen stack. There are two available screen stack operating modes: Standard and Stacked.

### Standard Mode

In Standard mode, screens requested by the PLC or OIT enter the stack only after being displayed. When an alarm screen is displayed, all non-alarm screen requests are ignored; they are not displayed or stored in the stack. When the stack contains 10 screens, adding another screen causes the oldest screen to fall out of the stack.

When the OIT operator presses the LAST MSG key, the most recent screen in the stack is redisplayed. Pressing the LAST MSG key again, redisplay the next oldest screen in the stack.

When the OIT operator presses the NEXT MSG key:

- If a screen from the stack is currently being redisplayed, the next newest screen in the stack is redisplayed.
- Otherwise, nothing happens.

If the stack contains a screen that is part of a chain, the OIT operator can use the PAGE DOWN and PAGE UP keys to view the other screens in the chain.

**NOTE:** The LAST MESSAGE, NEXT MESSAGE, and PAGE UP keys are not available on the OIT3160 or OIT4160.

### To configure the screen stack for Standard mode:

1. From the Configuration menu, choose Message Control Settings. The OIT Message Control Settings dialog box appears.
2. In the Message Request Register group box, make sure the Enable Message Stack group box is not selected.
3. Choose the Done button to return to the OITware-200 main screen.

## Stacked Mode

In Stacked mode, **screens requested by the PLC** are sent directly to the stack. The OIT operator must press the NEXT MSG key to display them. This ensures that the OIT operator has enough time to read each screen. However, screens requested by the OIT (except timer event screens) still operate the same as in Standard mode.

If an alarm screen is displayed when the PLC requests a non-alarm screen, the non-alarm screen is sent directly to the stack, where it can be displayed by the OIT operator after the alarm is acknowledged. In this situation, non-alarm screens requested by the OIT (except timer event screens) are still ignored; they are not displayed or stored in the stack.

The stack only holds 10 screens; this includes historical screens and screens waiting to be displayed. Adding an 11<sup>th</sup> screen causes the oldest historical screen to fall out of the stack. If there are no historical screens, then the oldest screen waiting to be displayed falls out of the stack.

When the OIT operator presses the LAST MSG key, the most recent historical screen in the stack is redisplayed. Pressing the LAST MSG key again, redisplay the next oldest historical screen in the stack. When the OIT operator presses the NEXT MSG key:

- If there are any screens waiting to be displayed, the oldest one is displayed.
- If there are no screens waiting to be displayed and a historical screen is currently being redisplayed, the next newest historical screen in the stack is redisplayed.

If the stack contains a screen that is part of a chain, the OIT operator can use the PAGE DOWN and PAGE UP keys to view the other screens in the chain.

**NOTE:** The LAST MESSAGE, NEXT MESSAGE, and PAGE UP keys are not available on the OIT3160 or OIT4160.

There are two ways to inform the OIT operator when new screens are in the stack:

- Embedding the Message Stack Size register monitor in each screen. For more information on using this register monitor format, refer to CHAPTER 4: PLC Register Monitors.

### To configure the screen stack for Stacked mode:

1. From the Configuration menu, choose Message Control Settings. The OIT Message Control Settings dialog box appears.
2. In the Message Request Register group box, select the Enable Message Stack group box.
3. Choose the Done button to return to the OITware-200 main screen.

## Help Key

Each message, recipe, or menu screen can have one help screen assigned that is displayed whenever the OIT operator presses the HELP key. The help screen remains on the display as long as the HELP key is pressed. When the HELP key is released, the prior screen reappears. If the HELP key is pressed for a screen that does not have an assigned help screen, an error message is displayed. For more information on configuring a help screen, refer to the Help Screens section in CHAPTER 3: Stored Screens.

## Screen Saver

The screen saver is a single line of up to 128 characters that can be configured to display whenever there has been no keyboard activity or PLC screen request for a predefined length of time. Although originally designed to prevent phosphor burn on vacuum fluorescent displays, the screen saver is an option available for all OIT Family Operator Interface Terminals. The single line of text scrolls across the top line of the display at a rate of two characters per second until the OIT operator presses a key or the PLC requests a screen.

### To enable the screen saver:

1. From the Configuration menu, choose General Settings. The OIT General Settings dialog box appears.



2. In the Screen Saver group box, select the Enable? check box. The Editor button activates.
3. In the Screen Saver group box, choose the Editor button. The Screen Saver Editor dialog box appears.



4. In the Delay group box, in the Minutes drop down list box, select the number of minutes the OIT should wait when inactive before starting the screen saver. The available options include every 5 minutes from 5 to 60.
5. In the Text group box, type the text to display when the screen saver is active.

**NOTE:** To delete the string of text from the Text group box, choose the garbage can button. To insert characters from the extended character set, from the Edit menu, choose Insert Special Character. The Insert Special Characters dialog box appears. For instruction on using this dialog box, refer to the Special Characters section in CHAPTER 3: Stored Screens.

6. Choose the Done button, to return to the OIT General Settings dialog box.
7. Choose the Done button, to return to the OITware-200 main screen.

### **Set Points**

Each OIT can have up to 16 set points. For each set point, the OIT monitors the value in a PLC register. When that value exceeds the specified low or high limit, the specified stored screen is displayed. For more information, refer to the Set Points section in CHAPTER 4: PLC Register Monitors.

## CHAPTER SIX

### Key Types

#### Function Keys

Each OIT has many function keys which can be programmed to display screens or turn on/off PLC coils. The following modes of operation are available for each function key.

Function Key Mode	Operation
Disabled	No operation.
Push On/Off	Emulates on/off switch. Sets assigned PLC coil when pressed; clears PLC coil when pressed again.
Latched	Sets assigned PLC coil when pressed. PLC must clear coil.
Momentary	Emulates momentary switch. Sets assigned PLC coil when pressed; clears PLC coil when released.
Screen Display	When pressed, displays assigned stored screen unless password protection is enabled or an alarm screen is currently displayed. If password protection is enabled, the OIT operator is prompted for a password and the screen is only displayed if the password is entered correctly. If an alarm screen is displayed, the function key is ignored.

#### Passwords

Each function key configured as Screen Display can have one of four password levels assigned to it. This provides the ability to restrict access to certain messages. Each password must be four digits long and contain only numbers (the default for each password is 0000). The four password levels from highest to lowest level of access are Level 1, Level 2, Level 3, and Level 4. Therefore, if a function key is assigned Level 3, the Level 1, Level 2, and Level 3 passwords all allow the OIT operator to view the screen.

**NOTE:** Any screens that are displayed by a password-protected function key are not stored in the screen stack. Therefore, these screens cannot be redisplayed using the LAST MESSAGE key. This includes screens chained to a password-protected screen.

When a function key is pressed that has been assigned a password level, the OIT operator is allowed five seconds to enter the four digit password. As the digits are entered, asterisks appear on the OIT. If the five second time-out occurs before the four digits are entered, the prior screen is redisplayed. If the OIT operator enters an invalid password, an error message is displayed for a few seconds and then the prior screen is redisplayed.

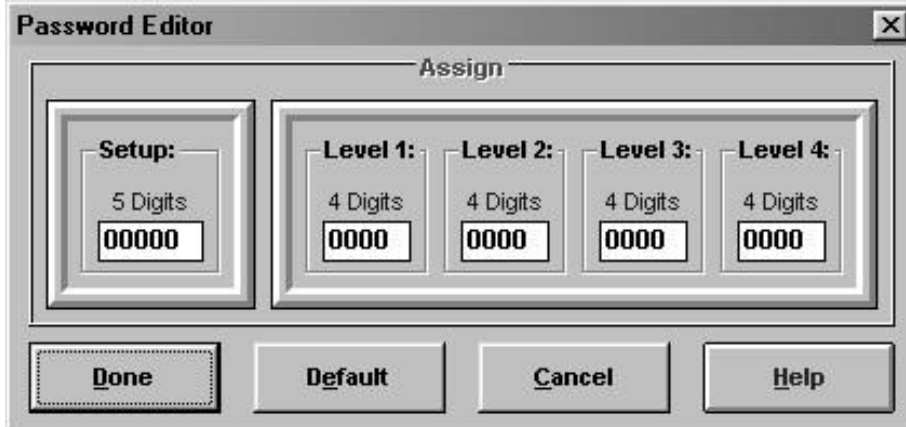
To ensure that the password-protected screens are removed from the OIT, it is a good idea to configure these screens with the timed display feature. For more information on using timed display, refer to the Timed Display section in CHAPTER 3: Stored Screens.

### To configure the Level 1, Level 2, Level 3, and Level 4 passwords:

1. From the Configuration menu, choose General Settings. The OIT General Settings dialog box appears.



2. In the Passwords group box, choose the Editor button. The Password Editor appears.



3. In the Level 1 through Level 4 group boxes, enter the passwords. The passwords must be four digits and contain only numbers.
4. Choose the Done button to return to the OIT General Settings dialog box.
5. Choose the Done button to return to the OITware-200 main screen.



### Global Function Keys

Each global function key can be configured to perform one function regardless of which stored screen the OIT is displaying. When the OIT is programmed, each function key is assigned to a particular PLC coil. If the function key is configured as Push On/Off, Latched, or Momentary, the corresponding coil is controlled by the function key. If the function key is configured as Screen Display or Disabled, the corresponding coil can be used by the PLC for other purposes.

**NOTE:** The OIT3160 and OIT4160 have no global function keys. However, each screen dependent function key can be configured with a global function that allows it to operate like a global function key.

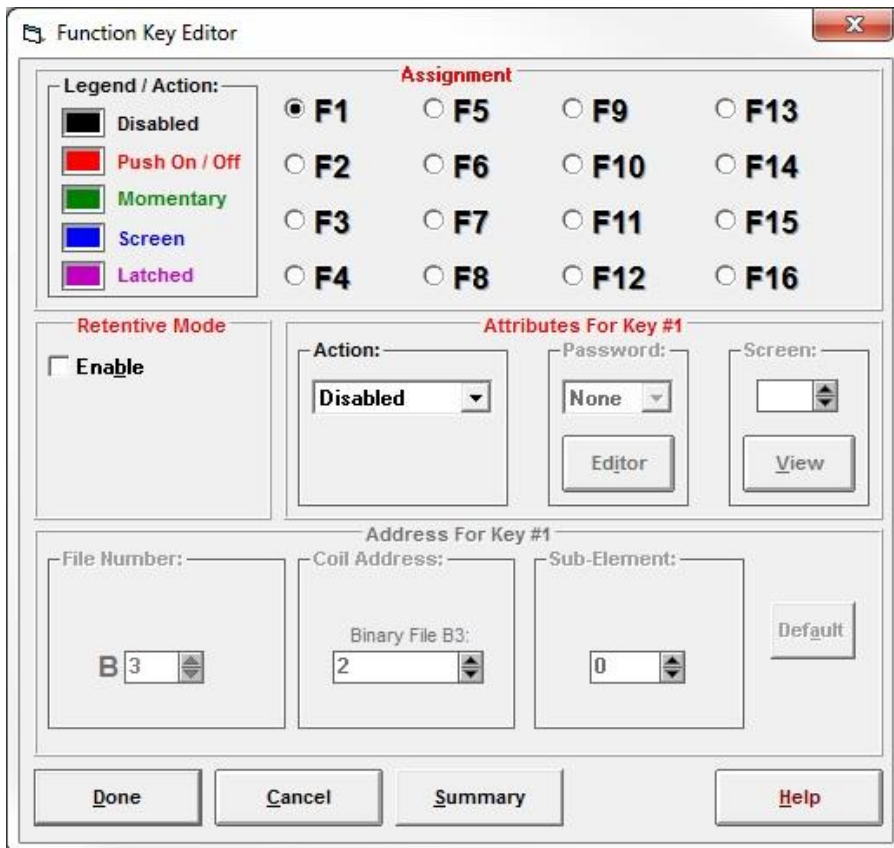
When the OIT powers up, the global function keys can be initialized in one of two modes: Default or Retentive. In default mode, each global function key coil in the PLC is reset according to the configuration of each global function key:

- If the global function key is configured as Screen Display or Disabled, no change is made to the global function key coil in the PLC.
- If the global function key is configured as Push On/Off, Latched, or Momentary, the global function key coil in the PLC is cleared to 0.

In retentive mode, each global function key coil in the PLC is read and the state of each Push On/Off global function key is set to match. This ensures that a process controlled by a Push On/Off function key is not stopped just because the OIT reinitialized during operation.

### Configuring the global function keys:

1. From the Configuration menu, choose Keyboard Settings, then choose Function Key Editor. The Function Key Editor dialog box appears.



2. In the Function Key Coils Starting Address group box, select the starting PLC coil address to use for the global function key coils. The global function key coils are a consecutive block of coils, one for each global function key on your OIT, that start at the selected PLC address.
3. In the Retentive Mode group box, select the Enable check box if you want the global function key coils in the PLC to retain their last known state when the OIT reinitializes. For more information, refer to the OIT Initialization section in this chapter.
4. In the Assignment group box, choose the option button that corresponds to the global function key you want to configure.
5. In the Action group box, choose the action this global function key will perform.
6. If you selected Screen, in the Screen scroll box, select the stored screen number to display when this global function key is pressed.
7. If you selected Screen and want to use the password feature, in the Password drop down list box, select the appropriate password level. For more information on passwords, refer to the Passwords section in this chapter.
8. Repeat steps 4 through 7 for each global function key.
9. Choose the Done button to return to the OITware-200 main screen.

### **Screen Dependent Function Keys**

Each screen dependent function key can be configured to perform a different function in each of the OIT's stored screens. In addition, each screen dependent function key can be configured with a global function.

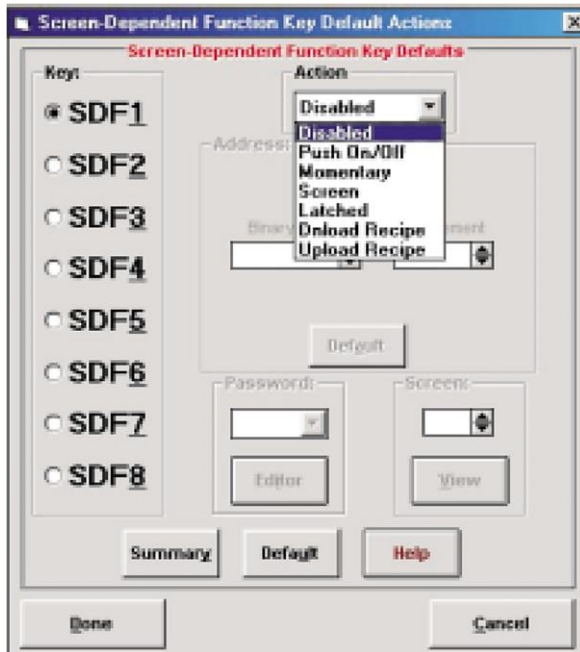
When you start a new project in OITware-200, each screen dependent function key's global function is set as disabled. If you want a screen dependent function key to perform the same function in many or all of the OIT's stored screens, you should configure its global function for that purpose.

When you configure a new stored screen, each screen dependent function key defaults to its global function. However, you can override the global function, by configuring the screen dependent function key specifically for use in the new stored screen.

Unlike the global function key coils, the OIT does not initialize the screen dependent function key coils during power up. Instead, when the OIT displays a stored screen, the associated Push On/Off screen dependent function keys are set to match the state of the function key coils in the PLC.

#### **Configuring the global function for each screen dependent function key:**

1. In the screen editor, choose the button for any screen dependent function key. The Screen-Dependent Function Key Editor dialog box appears.
2. Choose the Default Settings button. The Screen-Dependent Function Key Default Actions dialog box appears.



3. In the Key group box, choose the option button for the screen dependent function key you want to configure.
4. In the Action drop down list box, choose the action you want this screen dependent function key to perform.
5. If you selected Push On/Off, Momentary, or Latched, in the Address group box, select the PLC coil address to use for this screen dependent function key.
6. If you selected Screen, Download Recipe, or Upload Recipe in the Screen scroll box, select the stored screen number to display when this screen dependent function key is pressed.
7. If you selected Screen, Download Recipe, or Upload Recipe and want to use the password feature, in the Password drop down list box, select the appropriate password level. For more information on passwords, refer to the Passwords section in this chapter.
8. Repeat steps 3 through 7 for each screen dependent function key.
9. Choose the Done button to return to the Screen-Dependent Function Key Editor dialog box.
10. Choose the Done button to return to the OITware-200 main screen.

### Configuring a screen dependent function key for a specific stored screen:

1. In the screen editor, display the screen you want to configure the screen dependent function key for.
2. In the screen editor, choose the button for the screen dependent function key you want to configure. The Screen-Dependent Function Key Editor dialog box appears.
3. In the Action drop down list box, choose the action you want this screen dependent function key to perform.

4. If you selected Push On/Off, Momentary, or Latched, in the Address group box, select the PLC coil address to use for this screen dependent function key.
5. If you selected Screen, Download Recipe, or Upload Recipe in the Screen scroll box, select the stored screen number to display when this screen dependent function key is pressed.
6. If you selected Screen, Download Recipe, or Upload Recipe and want to use the password feature, in the Password drop down list box, select the appropriate password level. For more information on passwords, refer to the Passwords section in this chapter.
7. Choose the Done button to return to the Screen-Dependent Function Key Editor dialog box.
8. Choose the Done button to return to the OITware-200 main screen.

## Control Keys

Following is a description of how each control key operates. If you are configuring an OIT3100 or OIT4100 Series product, except OIT3160 or OIT4160, you should use the requirements paragraphs when deciding which keys to place on your user-defined keypad.

### Alarm Acknowledge

The ALARM ACKNOWLEDGE key is used to acknowledge the alarm currently in progress and remove it from the alarm stack.

**Requirements:** If using alarm screens, the ALARM ACKNOWLEDGE key is required unless you use the PLC to clear the alarms. Using the PLC to clear alarms is not recommended, since there will be no way to know if the OIT operator saw the alarm.

## Arrow

The arrow keys are used to move the cursor from one read/write PLC register monitor to another. Each time one of the arrow keys is pressed, the cursor moves to the next closest read/write PLC register monitor in the direction of the pressed arrow key. When the cursor is located at one of the edges of the display, additional keypresses in the direction of the display edge cause the cursor to wrap around.

**Requirements:** If using read/write PLC register monitors, either the right arrow key or left arrow key is required. Additional arrow keys can reduce the keypresses required to access certain read/write PLC register monitors on the screen, but are not necessary.

## Delta+ & Delta-

The DELTA+ and DELTA- keys are used in read/write PLC register monitors that have been configured with a preset increment/decrement value. When the cursor is on a read/write PLC register monitor with a preset increment/decrement value, the DELTA+ key increments the value in the PLC register monitor on the screen by the preset value and the DELTA- key decrements the value. These changes are immediately written to the PLC register. If pressing the DELTA+ or DELTA- key causes the value in the PLC register monitor to bump against the preset low or high limit, the key is ignored.

**Requirements:** If using preset increment/decrement values with a read/write PLC register monitor, the DELTA+ key is required to increment and the DELTA- key is required to decrement.

## Help

The HELP key is used to display an attached help screen from a message, recipe, or menu screen. The help screen is displayed as long as the HELP key is pressed. When released, the original message, recipe, or menu screen is redisplayed.

**Requirements:** If using help screens, the HELP key is required.

## Last Message & Next Message

The LAST MESSAGE and NEXT MESSAGE keys are used to display the screens in the screen stack.

**NOTE:** The LAST MESSAGE and NEXT MESSAGE keys are not available on the OIT3160 or OIT4160.

**Requirements:** If using the screen stack in Stacked mode, the NEXT MESSAGE key is required to display new screens and the LAST MESSAGE and NEXT MESSAGE keys are required to redisplay screens from history. If using the screen stack in Standard mode, the LAST MESSAGE and NEXT MESSAGE keys are required to display screens from history.

## Page Up & Page Down

The PAGE UP and PAGE DOWN keys are used to move through a group of chained screens.

**NOTE:** The PAGE UP key is not available on the OIT3160 or OIT4160.

**Requirements:** If using chained screens, the PAGE DOWN key is required to move forward through the chain. The PAGE UP key is used to move backwards through the chain and is optional. Linking the last screen in the chain to the first screen in the chain forms a loop and allows the OIT operator to display previous screens in the chain when only the PAGE DOWN key is available.

## Setup

The SETUP key is used to place the OIT into setup mode during operation.

**NOTE:** The SETUP key is not available on the OIT3160 or OIT4160.

**Requirements:** The SETUP key is required to enter setup mode during operation. If using an OIT3100 and OIT4100 Series, the SETUP key is not required to enter setup mode during operation press the ENTER key 3 times.

## Toggle

The TOGGLE key is used to perform two functions:

- In setup mode, pressing TOGGLE advances through the various selections for the current menu.
- When the cursor is on a binary read/write PLC register monitor, pressing TOGGLE changes between the two binary values. The change is immediately written to the PLC register.

**Requirements:** To make changes in setup mode or to change the value in a binary read/write PLC register monitor, the TOGGLE key is required.

## Edit Keys

### Clear

The CLEAR key is used to perform three functions:

- If an alarm is active, pressing CLEAR turns off the buzzer.
- In setup mode, pressing CLEAR backs out of the menus and eventually exits setup mode without saving any changes.
- When the cursor is on a read/write PLC register monitor, pressing CLEAR activates data entry mode and clears the register monitor's contents.

**Requirements:** The CLEAR key is not required when using alarms, since the ALARM ACKNOWLEDGE key also turns off the buzzer. The CLEAR key is not required in setup mode, since you do not have to back out of the menus. The CLEAR key is required to change the value in a read/write PLC register monitor when using the numeric keys. However, you can configure read/write PLC register monitors with preset increment/decrement values and then use the DELTA+ and DELTA- keys to change the read/write PLC register monitor value instead of using the numeric, CLEAR, and ENTER keys.

### Enter

The ENTER key is used to perform two functions:

- In setup mode, pressing ENTER accepts the current entry and advances to the next menu.
- When the cursor is on a read/write PLC register monitor, pressing ENTER accepts the data entered by the OIT operator and updates the PLC register.

**Requirements:** The ENTER key is required to use setup mode. The ENTER key is required to change the value in a read/write PLC register monitor when using the numeric keys. However, you can configure read/write PLC register monitors with preset increment/decrement values and then use the DELTA+ and DELTA- keys to change the read/write PLC register monitor value instead of using the numeric, CLEAR, and ENTER keys.

## Numeric Keys

### 0 to 9

The 0 to 9 keys are used to enter passwords (setup, alarm, or function key) and to change values in read/write PLC register monitors.

**Requirements:** The 0 to 9 keys are required when using passwords. However, all passwords are optional. The 0 to 9 keys are not required to change the value in a read/write PLC register monitor.

Instead you can configure read/write PLC register monitors with preset increment/decrement values and then use the DELTA+ and DELTA- keys to change the read/write PLC register monitor values.

### **+/-**

The +/- key changes the sign of the value in the current read/write PLC register monitor.

**Requirements:** The +/- key is not required unless the OIT operator needs to enter negative values into read/write PLC register monitors.

### **Delete**

The DELETE key is used, when editing a read/write PLC register monitor, to perform a destructive backspace at the cursors current position in the screen.

**Requirements:** The DELETE key is not required if you have a CLEAR key, since the CLEAR key clears the entire entry and lets you start over.

## **Control, Edit & Numeric Key Coils**

The OIT Control Key feature provides the ability to configure any of the non-function keys of the OIT so that they can set/reset a PLC coil that is assigned to it. This feature is useful in applications in which the PLC ladder logic must know when certain keys are pressed, (i.e. the [ENTER] key). It is also useful in OIT models that do not have a mappable keyboard that the programmer wishes to convert an action key such as the [LastMsg] key to a momentary function key.

Each of the OIT's control, edit and numeric keys can be programmed to:

- Only perform normal OIT action
- Only set/clear a PLC coil

**NOTE:** Pressing the key sets the coil; releasing the key clears the coil.

- Perform normal OIT action and set/clear a PLC coil
- Do nothing (disabled)

When a new OITware-200 project is started, all of the control, edit and numeric keys default to OIT Action mode (they only perform their normal OIT action). If you want one or all of the keys to function in a different mode, you need to use the OIT Control Key Editor.

### **To configure the control, edit and numeric key coils:**

1. From the configuration menu, choose Keyboard Settings, then choose Control Key Editor. The OIT Control Key Editor dialog box appears with each available control, edit and numeric key listed.

**NOTE:** Some of the control keys listed cannot be configured using the OIT Control Key feature. Which keys can be configured is based upon the model OIT selected.

Mode			
Key	OIT Action	PLC Coil	Mode
0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
9	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
Clear	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
Enter	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
Delete	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
Last Msg	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
Next Msg	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
Page Up	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
Page Dn	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
+/-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
Toggle	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIT Action
Delta +	<input type="checkbox"/>	<input type="checkbox"/>	
Delta -	<input type="checkbox"/>	<input type="checkbox"/>	
Alm Ack	<input type="checkbox"/>	<input type="checkbox"/>	
Help	<input type="checkbox"/>	<input type="checkbox"/>	
Setup	<input type="checkbox"/>	<input type="checkbox"/>	
Reserved			
←	<input type="checkbox"/>	<input type="checkbox"/>	
⇒	<input type="checkbox"/>	<input type="checkbox"/>	
↑	<input type="checkbox"/>	<input type="checkbox"/>	
↓	<input type="checkbox"/>	<input type="checkbox"/>	

- Each available key has two associated check boxes: OIT Action and PLC Coil. For each key select the appropriate box(es):
  - To only perform normal OIT action, select only the OIT Action check box
  - To only set/clear a PLC coil, select only the PLC Coil check box
  - To perform normal OIT action and set/clear a PLC coil, select both the OIT Action and PLC Coil check boxes
  - To do nothing (disable), do not select either the OIT Action or the PLC Coil check boxes.
- If you selected any PLC Coil check boxes, in the Address scroll box, set the starting PLC address for the key coils.

**NOTE:** This address represents the first bit in the Bit Memory area of the PLC to use for the control, edit and numeric key coils. Every available control, edit and numeric key is assigned a coil; even if the associated PLC Coil check box for the key was not selected. The first bit represents the 0 key, the second bit the 1 key, etc.

#### OIT3160/4160 OIT Control Key Coils

The address entered on the OIT Control Key Editor represents the first bit in the Bit Memory area in the PLC. For example, if the GEF protocol is selected and 993 is entered, the 0 key will set bit %M993, the 1 key will set bit %M994, the 2 key will set bit %M995, etc. See the table on the next page.



PLC Coil Offset	Example Address (For GE Fanuc)	OIT Keyboard Key
+0	%M993	[0]
+1	%M994	[1]
+2	%M995	[2]
+3	%M996	[3]
+4	%M997	[4]
+5	%M998	[5]
+6	%M999	[6]
+7	%M1000	[7]
+8	%M1001	[8]
+9	%M1002	[9]
+10	%M1003	[CLEAR]
+11	%M1004	[ENTER]

**NOTE:** If a Control Key is not configured to set a PLC coil, then that bit is not used. For example, if only the [0] and [ENTER] keys are configured to set coils, the only bits %M993 and %M1004 will be set. The remaining bits are not used.

#### OIT3100 and OIT4100 Series, except 3160/4160 OIT Control Keys Coils

The address entered on the OIT Control Key Editor represents the first bit in the Bit Memory area in the PLC. For example, if the GEF protocol is selected and 993 is entered, the [CLEAR] key will set bit %M993, the [ENTER] key will set bit %M994, etc.

See the table on the next page.

PLC Coil Offset	Example Address (for GE Fanuc)	OIT Keyboard Key
+0 +1 +2	%M993 %M994 %M995	[CLEAR] [ENTER] <i>RESERVED</i>
+3 +4 +5	%M996 %M997 %M998	[LAST MESSAGE] [NEXT MESSAGE] [PAGE UP]
+6 +7 +8	%M999 %M1000 %M1001	[PAGE DN] <i>RESERVED</i> [TOGGLE]
+9 +10 +11	%M1002 %M1003 %M1004	[DELTA +] [DELTA -] [ALM ACK]
+12 +13 +14	%M1005 %M1006 %M1007	[HELP] [SETUP] <i>RESERVED</i>
+15 +16 +17	%M1008 %M1009 %M1010	[Left arrow] [Right Arrow] [Up Arrow]
+18 +19	%M1011 %M1012	[Down Arrow] <i>RESERVED</i>

**NOTE:** If a Control Key is not configured to set a PLC coil, then that bit is not used. For example, if only the [CLEAR] and [ENTER] keys are configured to set coils, the only bits %M993 and %M994 will be set. The remaining bits are not used.

# CHAPTER SEVEN

## Configuring the User-Definable Keypad

### (OIT3100 and OIT4100 Series, except 3160/4160)

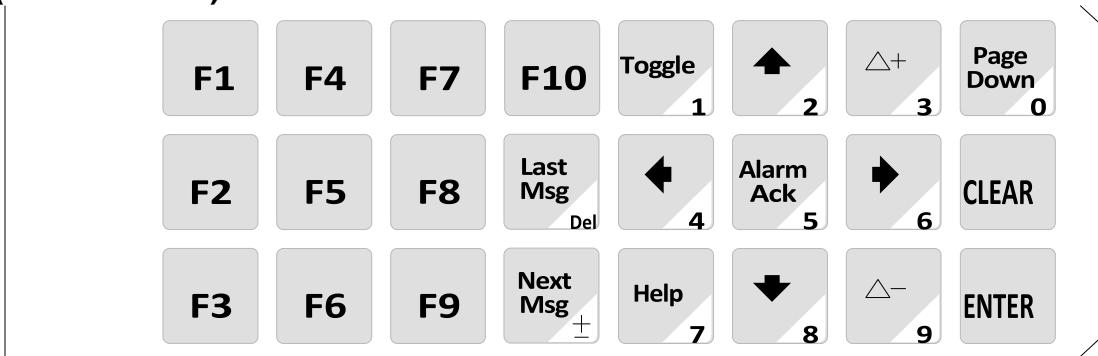
The OIT3100 and OIT4100 Series, except 3160/4160 allow you to choose the exact keys that your application requires and then arrange those keys in any order. The OIT3165, OIT3185, OIT4165, and OIT4185 have 24 user-definable keys; the OIT3175, and OIT4175 have 16. This chapter explains how to configure the user-definable keypad.

These products also have a Slide-in Legend that allows you to easily and inexpensively label the keys with any combination of text, graphics, and colors. If your application does not require all the keys, you can use the extra space on the Slide-in Legend for your company logo or other information. For information on creating a Slide-in Legend, refer to APPENDIX B: Slide-in Legend Templates.

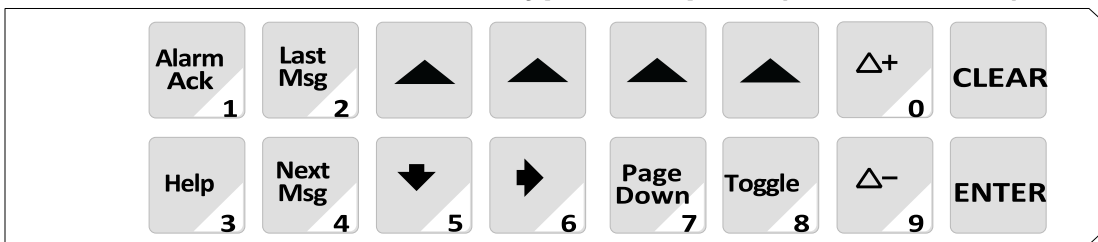
## Using the Default Keypad Template

The OIT3165, OIT3175, OIT3185, OIT4165, OIT4175, and OIT4185 ship with a Slide-in Legend installed that matches the default keypad in OITware-200. If you like the default keypad, you can skip this chapter.

### OIT3165, OIT3185, OIT4165 and OIT4185 Default Keypad Template (3165DEF.KTF)



### OIT3175 and OIT4175 Default Keypad Template (3175DEF.KTF)



## Using a Predefined Keypad Template

We have included some predefined keypad templates for each product.

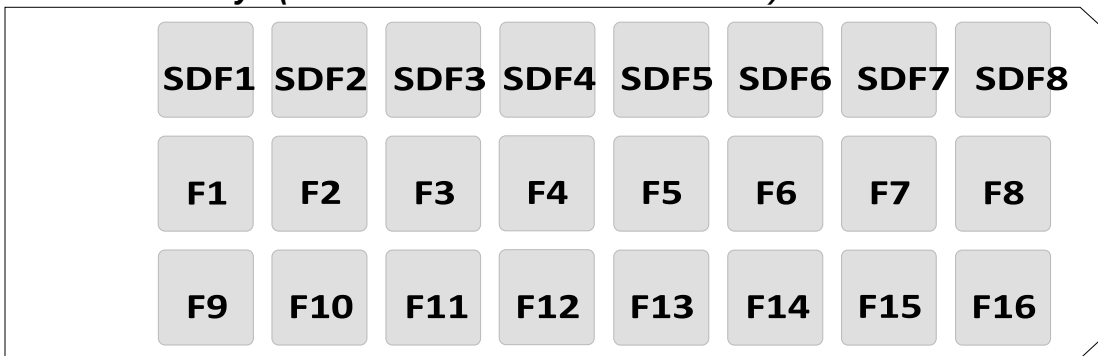
### To use one of the predefined keypad templates:

1. From the configuration menu, choose Keyboard Settings, then choose User-Defined Key Editor. The User-Definable Key Assignment dialog box appears.
2. Choose the Keyboards button, then choose Open Keyboard Template. The Keyboard File Selection dialog box appears.

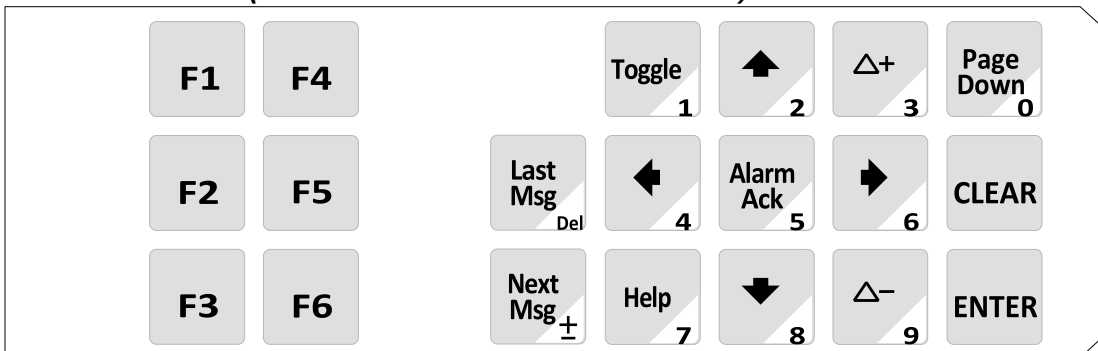


3. In the Available Keyboard Files drop down list box, select the template you want to use.
4. Choose the OK button to return to the User-Defined Key Assignment dialog box. The selected template appears.
5. Choose the Done button to return to the OITware-200 main screen.

### OIT3165, OIT3185, OIT4165, and OIT4185 Predefined Keypad Templates 24 Function Keys (3165EX1.KTF and 3185EX1.KTF)

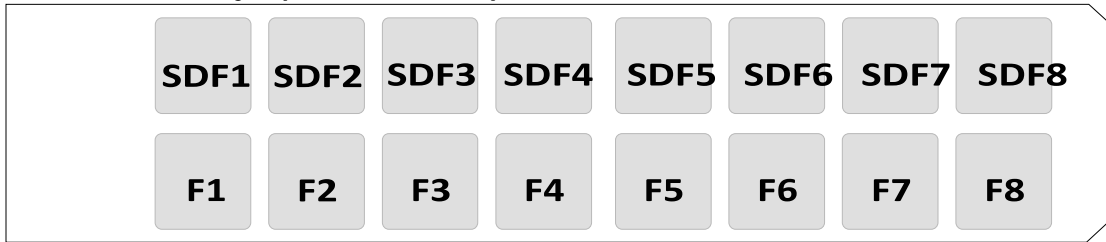


### 3160 Emulation (3165EX2.KTF and 3185EX2.KTF)

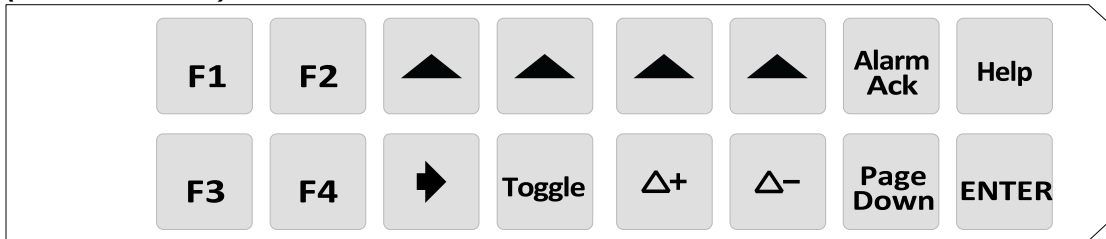


## OIT3175 and OIT4175 Predefined Keypad Templates

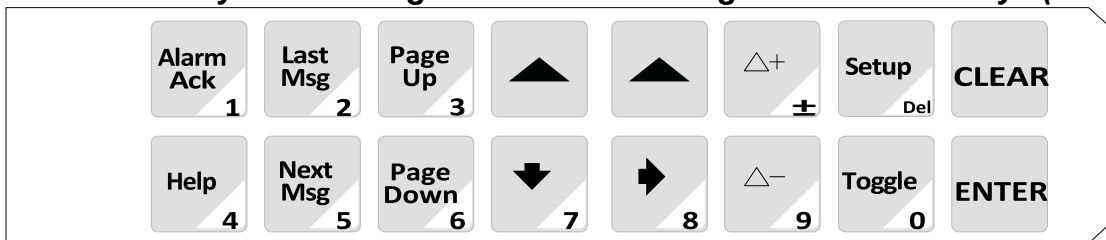
### 16 Function Keys (3175EX2.KTF)



### 8 Function Keys & PLC Register Monitor Editing without Numeric Keys (3175EX1.KTF)



### 2 Function Keys & PLC Register Monitor Editing with Numeric Keys (3175EX3.KTF)



## Creating Your Own Keypad

### Choose the Keys

The first step when creating your own keypad is choosing the necessary keys. Refer to CHAPTER 6: Key Types for a description of the possible uses of each key and a list of the features that require each key. When choosing keys, keep in mind that each key can be configured as:

- A Screen Dependent Function key (8 maximum per keypad)
- A Global Function key (16 maximum per keypad)
- An Edit key
- A Control key
- A Numeric key
- A Control key & Numeric key (Control and Numeric are the only key types that can be combined on one key).

Using the following list, please pick up to 24 keys if you are using the OIT3165, OIT3185, OIT4165 or OIT4185; up to 16 keys if you are using the OIT3175 or OIT4175.

**NOTE:** When you combine a Control key with a Numeric key it counts as only one key.

Screen Dependent Function Keys	Global Function Keys	Edit Keys	Control Keys	Numeric Keys
SDF1	F1	Clear	Alarm Acknowledge	0
SDF2	F2	Enter	Right Arrow	1
SDF3	F3		Down Arrow	2
SDF4	F4		Left Arrow	3
SDF5	F5		Up Arrow	4
SDF6	F6		Delta+	5
SDF7	F7		Delta-	6
SDF8	F8		Help	7
	F9		Next Message	8
	F10		Last Message	9
	F11		Page Down	+/-
	F12		Page Up	Delete
	F13		Setup	
	F14		Toggle	
	F15			
	F16			

### Arrange the Keys

Now that you have chosen the keys you want to use, it is time to arrange them. Photocopy this page, then use one of the following blank keypads to arrange your keys.

**NOTE:** You do not have to use every key position. If you will be using the HELP key with menu screens, do not combine the HELP key with any numeric key that is used in a menu screen.

**Blank Keypad: OIT3165, OIT3185, OIT4165, and OIT4185 (not to scale)**


**Blank Keypad: OIT3175 and OIT4175 (not to scale)**

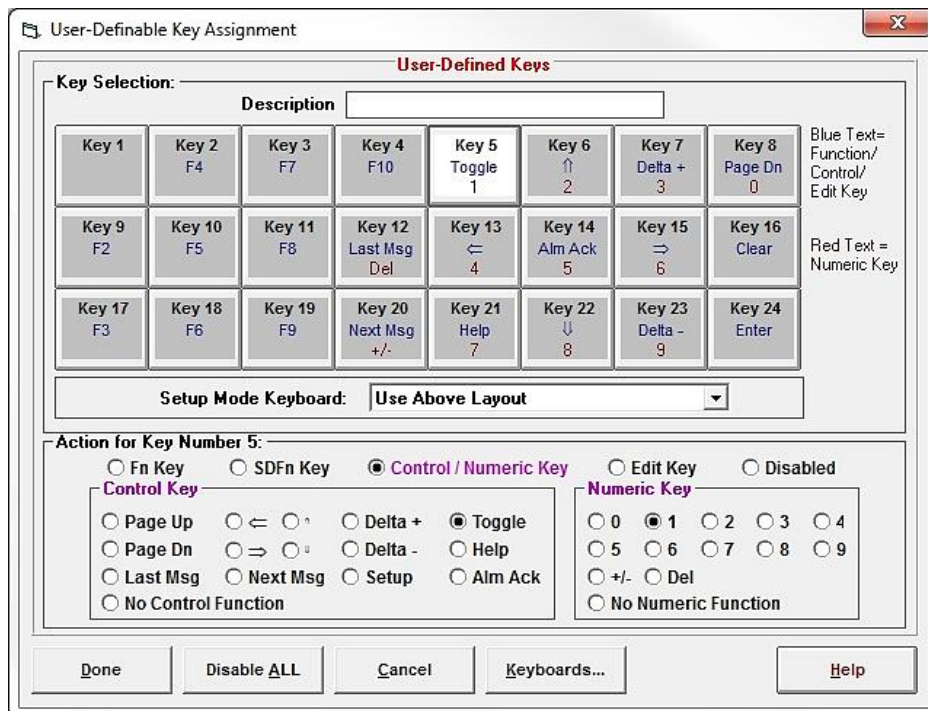

Maple Systems also provides key legend editor software for the OIT3165/75/85 and OIT4165/75/85 that allows you to create customizable inserts. The program allows you to create and edit text, bitmaps, icons, or metafiles. It also includes some standard symbols that can be used for graphics. This software is available on our website: [www.maplesystems.com](http://www.maplesystems.com).

**Configure the Keypad**

Now that you have arranged the keys, it is time to configure the keypad using OITware-200.

**Configuring the user-defined keypad:**

1. From the configuration menu, choose Keyboard Settings, then choose User-Defined Key Editor. The User-Definable Key Assignment dialog box appears.



2. Unless your keypad arrangement is similar to the default keypad, choose the Disable ALL button to clear the default keypad.
3. In the Key Selection group box, choose the key to configure.
4. In the Action for Key Number group box, select the option button that corresponds to the key type for the key being configured.
5. If configuring a global function key, in the Fn Key scroll box, select the global function key number for this key. Must be from 1 to 16.
6. If configuring a screen dependent function key, in the SDFn Key scroll box, select the screen dependent function key number for this key. Must be from 1 to 8.
7. If configuring a control, numeric, or control/numeric key:
  - In the Control Key group box, select the option button that corresponds to the control function for this key.
  - In the Numeric Key group box, select the option button that corresponds to the numeric function for this key.
8. If configuring an edit key, in the Edit Key group box, select the option button that corresponds to the edit function for this key.
9. Repeat steps 3 through 8 for each key.
10. Choose the Done button to return to the OITware-200 main screen.



# CHAPTER EIGHT

## Other OIT Operating Modes

### Setup Mode

Setup mode allows the OIT to communicate with a PC using the OITware-200 configuration software. It also provides the ability to make the following changes to the operation of the OIT without using OITware-200.

### OIT3160, OIT4160

#### To enter setup mode:

1. If the OIT is already powered, press the ENTER key three times. Otherwise, while applying power to the OIT, press and hold the CLEAR key while the “<<< Initializing >>>” message appears. The “Setup Password:” message should appear.

#### NOTE:

- To exit configuration mode, press the CLEAR key.
  - If the “<<< Initializing >>>” message is followed by “Connecting to PLC!”, the OIT did not enter setup mode and you need to repeat step 1.
  - If the OIT’s display remains blank and you hear a steady beeping, the OIT does not contain a complete project and is waiting in download mode for OITware-200 to download a project. For instructions on downloading a project from OITware-200, refer to the Downloading an OITware-200 Project section in CHAPTER 1: Getting Started.
2. Type the setup password and then press the ENTER key. If there is no setup password, just press the ENTER key. The “Dn/Upload Mode? YES” message should appear.

**NOTE:** You must start entering your password within 5 seconds, or the OIT exits setup mode.

3. Use the TOGGLE key to alternate between YES and NO.

Option	Result
YES	Enters download/upload mode for communication with a PC.
NO	Displays “Setup Correct? YES”. Press ENTER to exit setup mode.

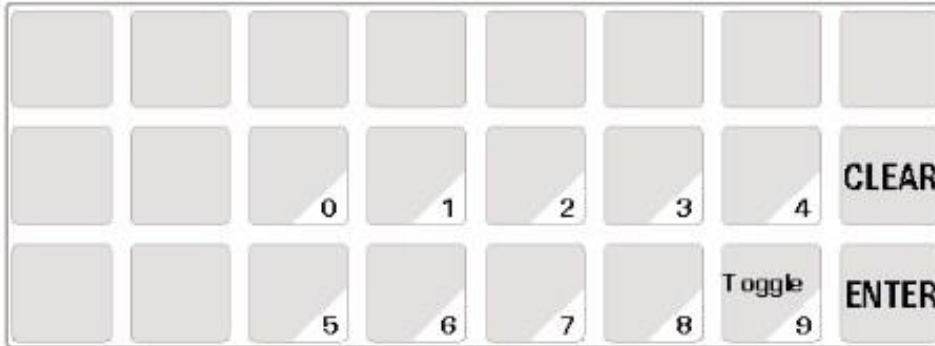
Press the ENTER key to accept and continue.

### OIT3165, OIT3175, OIT3185, OIT4165, OIT4175, OIT4185

The OIT3165, OIT3175, OIT3185, OIT4165, OIT4175, and OIT4185 have a factory default setup mode keypad that is automatically activated when you enter setup mode during power up. The factory default setup mode keypad is also activated when you enter setup during operation (unless you specify the user-defined keypad as the setup mode keypad in OITware-200).

**NOTE:** Do not specify the user-defined keypad as the setup mode keypad unless the user-defined keypad includes the ENTER and TOGGLE keys. If you are using a setup password, the numeric keys must also be included.

### OIT3165, OIT3185, OIT4165, and OIT4185 Factory Default Setup Mode Keypad



### OIT3175 and OIT4175 Factory Default Setup Mode Keypad



#### To specify the user-defined keypad as the setup mode keypad:

1. From the Configuration menu, choose Keyboard Settings, then choose User-Defined Key Editor. The User-Definable Key Assignment dialog box appears.
2. In the Setup Mode Keyboard group box, select the Use Above Layout option button.
3. Choose the Done button to return to the OITware-200 main screen.

#### To enter setup mode:

- If the OIT is already powered, press the SETUP key once (on the user-defined keypad) or the ENTER key three times (on the user-defined keypad).
- The "Setup Password:" message should appear. At this point the factory default setup mode keypad is active.

**NOTE:** It is possible to disable the ability to enter Setup mode by pressing the ENTER key three times. In OITware-200, click on the Keypad icon to display the Keyboard Settings dialog box. Then check the Disable Run-Time Setup Access box. You will still be allowed to enter Setup Mode by holding down the CLEAR key during power-up.

- If the OIT is not powered, while applying power to the OIT, press and hold the bottom key on the right side of the keypad while the "<<< Initializing >>>" message appears.
- The "Setup Password:" message should appear. At this point the setup mode keypad specified in OITware-200 is active (it can be the factory default or the user-defined keypad).

**NOTE:**

- To exit configuration mode, press the CLEAR key.
- If the “<<< Initializing >>>” message is followed by “Connecting to PLC!”, the OIT did not enter setup mode and you need to repeat step 1.
- If the OIT’s display remains blank and you hear a steady beeping, the OIT does not contain a complete project and is waiting in download mode for OITware-200 to download a project. For instructions on downloading a project from OITware-200, refer to the Downloading an OITware-200 Project section in CHAPTER 1: Getting Started.

4. Type the setup password and then press the ENTER key. If there is no setup password, just press the ENTER key. The “Down/Upload Mode? YES” message should appear.

**NOTE:** You must start entering your password within 5 seconds, or the OIT exits setup mode.

5. Use the TOGGLE key to alternate between YES and NO.

Option	Result
YES	Enters download/upload mode for communication with a PC.
NO	Displays “Setup Correct? YES”. Press ENTER to exit setup mode.

Press the ENTER key to accept and continue.

## CHAPTER NINE

### Utilities

#### Read Project from OIT

This utility makes it possible for OITware-200 to read an existing project file from an OIT.

##### To read a project from an OIT:

1. Perform the following steps from CHAPTER 1: Getting Started:
  - Connect the OIT to the PC
  - Place the OIT in Download/Upload Mode
2. Start OITware-200.
3. From the Transfer menu, choose Read from OIT. The OITware 200 - Read From OIT dialog box appears.
4. Choose the Options button. The Communication Options dialog box appears.
5. In the Upload & Download group box, select the COM port option button that corresponds to the COM port the OIT is connected to. If you are unsure, choose the Auto Detect button.

**NOTE:** To use the Auto Detect feature, the OIT must be in download/upload mode and properly connected to the PC.

6. If you want the project automatically saved after it is read from the OIT, select the “Prompt For Save As Project?” check box. If this box is checked, you will be prompted to enter a file name for the project.
7. Choose the Done button to return to the OITware 200 - Read From OIT dialog box.
8. Choose the OK button to start the transfer.

#### Export Project to OIT

This utility makes it possible to export an existing OITware-200 project to a different OIT model. Please note that because there are differences in operation from one OIT model to another, in most cases this export routine cannot perform a 100% conversion. For instance, the Control Keys feature is not exported from one OIT to another. Also, an OIT project file which uses Function Key LEDs may not be exported to an OIT that does not have Function Key LEDs. The primary intent of this utility is to convert as much of the project file created for one particular OIT to another without sacrificing reliability. Therefore, you should always thoroughly check the converted file to ensure that the project is accurate.

##### To export an OITware-200 project to a different OIT model:

1. Open the original project in OITware-200.
2. From the File menu, choose Export To OIT, then choose the new OIT model.
3. If a warning message appears, choose OK to continue or CANCEL to stop.

4. The Export Current Project To An OIT dialog box appears. Select the name and directory location for the new project, then choose the OK button.
5. When the export completes, the original project will still be active in OITware-200. To open the new project, from the File menu, choose Open. Select the new project and then choose the OK button.

# APPENDIX A

## Extended Character Sets

For information on using the extended character sets, refer to the Special Characters section in CHAPTER 3: Stored Screens.

### OIT3100 and OIT4100 Series

→	←	□	「	」	、	・	ヲ	ア	イ	ウ	エ	オ	ヤ	ユ	ヨ	ッ	ー	ア	イ
ウ	エ	オ	カ	キ	ク	コ	サ	シ	ス	セ	ソ	タ	チ	ツ	テ	ト	ナ	ニ	
ヲ	ネ	ノ	ハ	ヒ	フ	ヘ	ホ	マ	ミ	ム	メ	モ	ヤ	ユ	ヨ	ラ	リ	ル	レ
ロ	ワ	ン	ン	□	α	ä	ε	σ	♪	+	×	φ	ε	ñ	ö	θ	ω	Ω	Ü
Σ	π	α	κ	π	μ	÷													

## APPENDIX B

### Slide-in Legend Templates

Some of the OIT Family Operator Interface Terminals contain clear windows that allow you to insert your own legends to customize the text, colors and graphics of certain keys. In some models you can also add your own logo or model identification. These legends can be inexpensively made and are environmentally sealed when installed.

The slide-in legends can be made on any non-glossy stock between 0.004 inches [0.1 mm] and 0.008 inches [0.2 mm] thick by using either of the following methods:

- Photocopy a blank legend and hand illustrate. Refer to the “Blank Legends for Photocopying” section.
- Use the dimensions to create a computer generated legend. Refer to the “Dimensions for Computer Generated Legends” section.

Refer to the Installation Manual shipped with your OIT for instructions on installing the slide-in legends.

Maple Systems also provides key legend editor software for the OIT3165/75/85 and OIT4165/75/85 that allows you to create customizable inserts. The program allows you to create and edit text, bitmaps, icons, or metafiles. It also includes some standard symbols that can be used for graphics. This software is available on our website: [www.maplesystems.com](http://www.maplesystems.com).

### Blank Legends for Photocopying

The blank legends on the following pages can be photocopied and hand illustrated to create custom slide-in legends.

#### When photocopying:

- Use only non-glossy stock which is 0.004 - 0.008 inches [0.1 - 0.2 mm] thick.
- Check photocopy accuracy with the printed check dimension.

#### When illustrating (OIT3165, OIT3175, OIT3185, OIT4165, OIT4175, and OIT4185):

- Use the tick marks to locate the switch centers. Refer to the dimension in the “Dimensions for Computer Generated Legends” section if unsure.

**NOTE:** Pressing the center of the switch is critical for switch actuation.

- Recommended key size is 0.500 inches [12.7 mm] square.
- Background colors should extend to the solid lines.
- All text and graphics should be 0.070 inches [1.8 mm] within the solid lines.

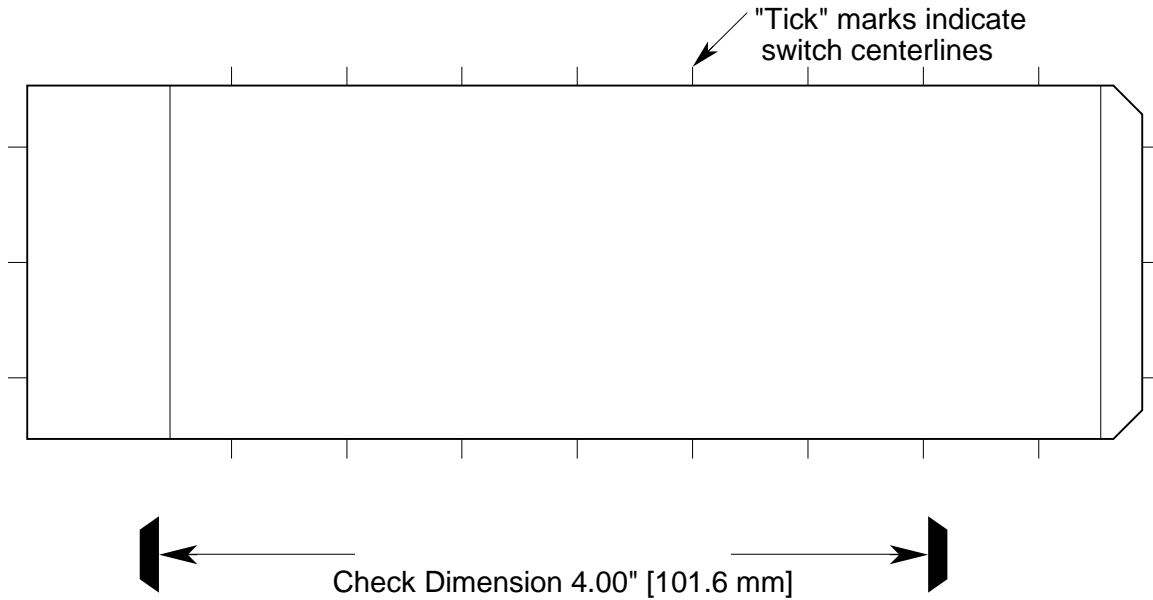
**NOTE:** Do not affix anything to the legend using glue, tape, stickers, etc.

When illustrating (all models except OIT3165, OIT3175, OIT3185, OIT4165, OIT4175, and OIT4185):

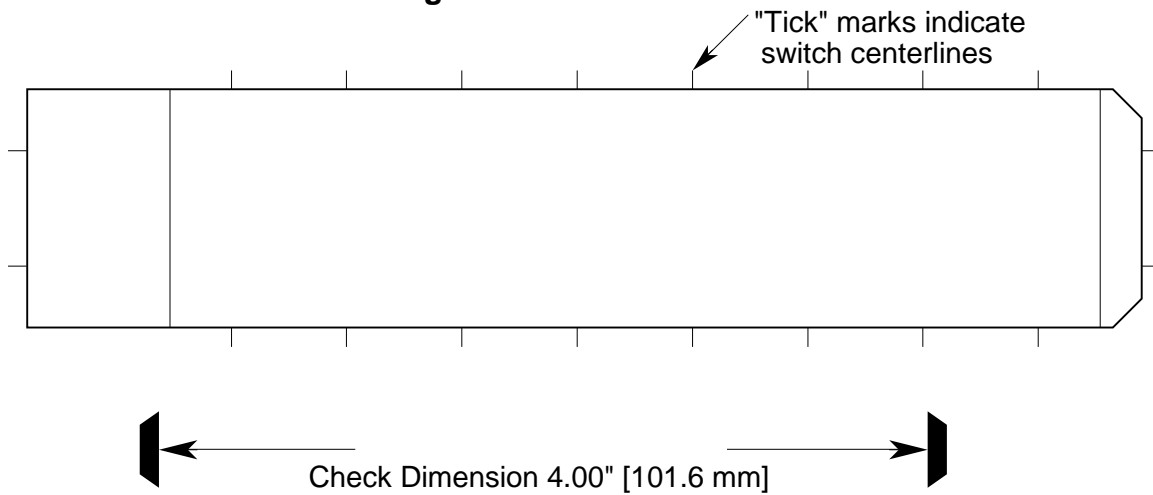
- Background colors should extend to the solid lines.
- The tick marks define the edge of the viewable area. Keep all text and graphics within the tick marks.

**NOTE:** Do not affix anything to the legend using glue, tape, stickers, etc.

**OIT3165A, OIT3185A, OIT4165A and OIT4185A Legend**



**OIT3175A and OIT4175A Legend**



**Dimensions for Computer Generated Legends**

The dimensions on the following pages can be used to create legends using a computer graphics program.

When creating (OIT3165, OIT3175, OIT3185, OIT4165, OIT4175, and OIT4185):

- Dimensions are in inches [mm].
- Recommended key size is 0.500 inches [12.7 mm] square.

**NOTE:** Pressing the center of the switch is critical for switch actuation.



- Background colors should extend to the upper and lower edges of the legend and to the 2 vertical lines marked "BACKGROUND."
- All text and graphics should be within the dashed rectangle.

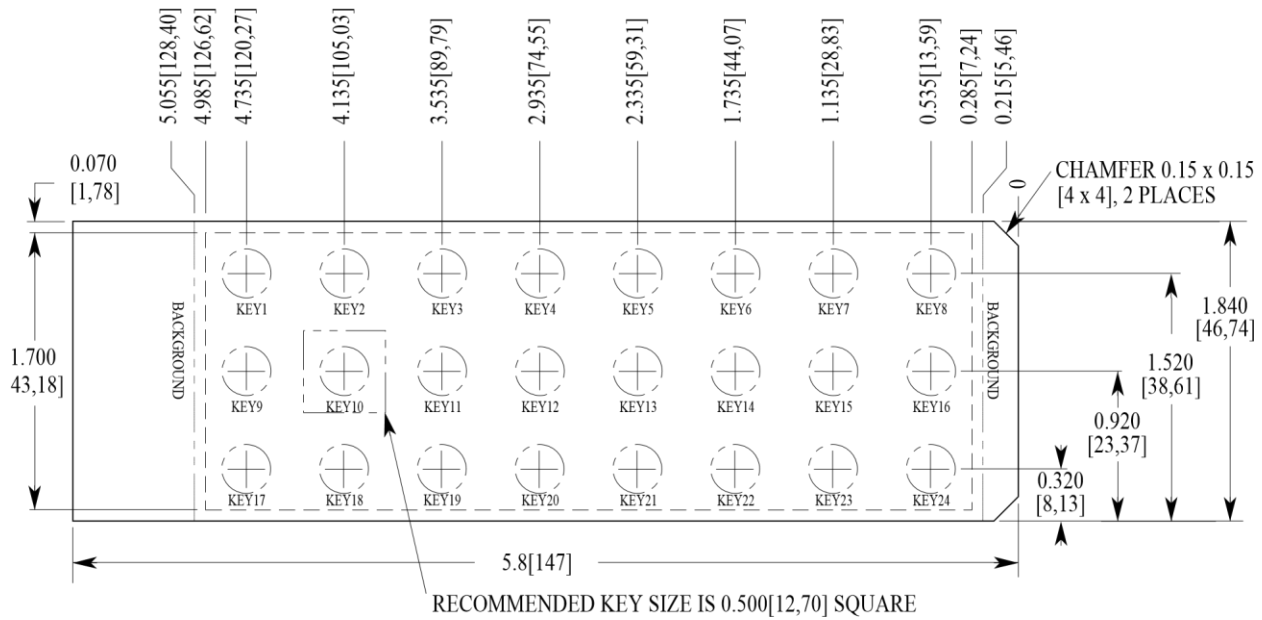
When creating (all models except OIT3165, OIT3175, OIT3185, OIT4165, OIT4175, and OIT4185):

- Dimensions are in inches [mm].
- Background colors should extend to the solid lines.
- All text and graphics should be within the dashed rectangles.
- 

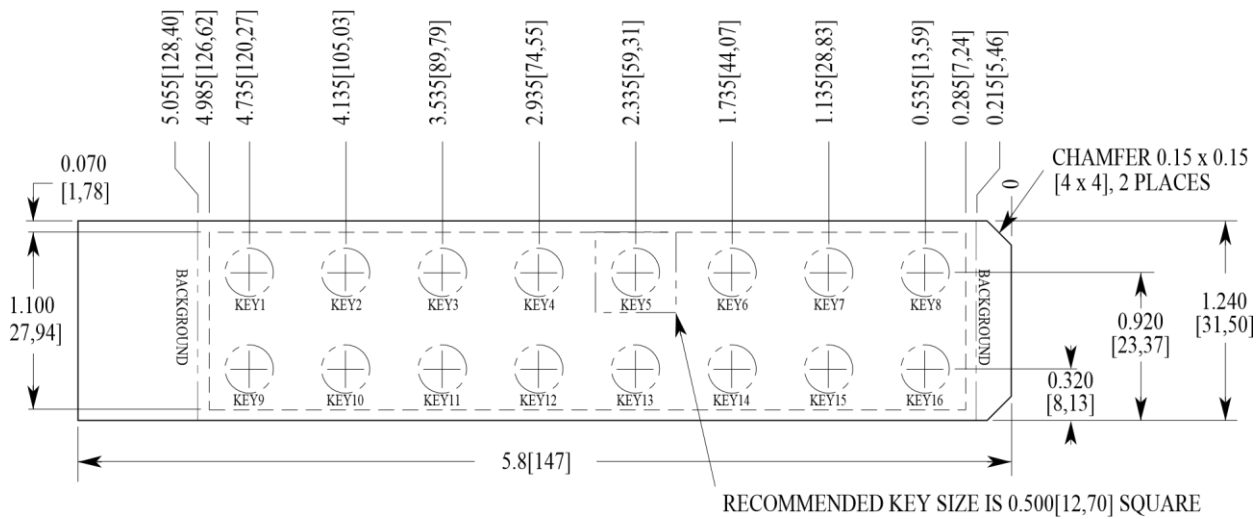
When printing:

- Use only non-glossy stock which is 0.004 - 0.008 inches [0.1 - 0.2 mm] thick.
- Check printing accuracy.

### OIT3165A, OIT3185A, OIT4165A and OIT4185A Legend



### OIT3175A and OIT4175A Legend



# APPENDIX C

## Troubleshooting

### Display Brightness and Viewing Angle

#### Can the VFD Brightness be Changed?

Yes. In OITware-200 press SHIFT+F4 to open the OIT General Settings dialog box. In the Brightness group box, select the 100%, 75%, 60%, or 30% option button.

#### Can the LCD Viewing Angle be Changed?

Yes; for the OIT3160, OIT3165, OIT3175, OIT3185, in OITware-200 press SHIFT+F4 to open the OIT General Settings dialog box. In the LCD Contrast group box, select the appropriate option button.

## OIT Operation

### OIT Displays a Blank Screen when power is applied

#### Possible Causes:

- If the OIT displays a blank screen and you hear a steady beeping, then the OIT does not contain a complete project and is waiting in download/upload mode for OITware-200 to download a project. Simply connect the OIT to your computer and use OITware-200 to download a new project to the OIT.
- If the OIT displays a blank screen after displaying “Initializing” and “Attaching to PLC”, then the OIT is communicating to the PLC, waiting for a command from the PLC or from the keyboard to display a message. Configure one of your messages as a startup message if you want a message to automatically display on the OIT after power is applied.

#### Possible Solutions:

- Download the OITware-200 project, OIT operational software, and PLC protocol software to the OIT again. Follow the steps in the Downloading an OITware-200 Project section in CHAPTER 1: Getting Started.
- Configure one of the messages as a startup message.

### OIT is Not Displaying Expected Information on the Display

#### Possible Causes:

- The OIT does not contain the entire OITware-200 project, OIT operational software, or PLC protocol software.
- The OITware-200 project was not configured to do what you expect.

#### Possible Solutions:

- Download the OITware-200 project, OIT operational software, and PLC protocol software to the OIT again. Follow the steps in the Downloading an OITware-200 Project section in CHAPTER 1: Getting Started. Observe the messages on both the PC and OIT. Note any messages that indicate a problem.
- Review the OITware-200 project.

## When the PLC Requests the Same Screen Twice the Screen is Not Displayed

### Possible Cause:

- If the MRR already contained the screen number that the PLC requested, the OIT would not recognize the screen request.

### Possible Solution:

- Modify the PLC program so that when the MRR already contains the screen number that the PLC is requesting, the PLC writes a zero to the MRR before writing the screen number.
- If using an OIT3100 and OIT4100 Series, activate the Clear Register/Bit After Receiving Screen Request feature. Refer to the Configuring the MRR with Enhanced Features section in CHAPTER 5: Displaying Stored Screens.

## OITware-200

### PC Displays: “Out of Memory” When Starting OITware-200

#### Possible Cause:

- The computer does not have sufficient resources to run OITware-200.

#### Possible Solution:

- Use a computer that has at least 4MB of RAM.

### OITware-200 Displays: “Timeout Detected. OIT did not respond.”

#### Possible Causes:

- The OIT is not connected to the PC or is not in Download/Upload Mode.
- OITware-200 is not using the correct COM port.
- The configuration cable is not wired correctly.
- The configuration cable is not connected to the correct port on the OIT or the PC.
- If your OIT has two serial ports, something is connected to the RTS/CTS lines on port 1.

#### Possible Solutions:

- Verify that the configuration cable is wired correctly and is in good condition.
- Follow the steps in the Downloading an OITware-200 Project section in CHAPTER 1: Getting Started.
- If your OIT has two serial ports, verify nothing is connected to the RTS/CTS lines on port 1.

## OIT to PLC Communication

### OIT Displays:

- “Cannot Connect To PLC During Startup. \*\*\* Reconnect in progress \*\*\*”
- “Can’t connect to PLC. Retry in Progress!”

#### Possible Causes:

- The PLC’s mode switch is not in the correct position.
- The PLC password in the OIT does not match the PLC.
- The communication settings (baud rate, parity, data bits, stop bits) for the OIT and PLC do not match.
- The communication cable is not wired correctly.
- The communication cable is not connected to the correct port on the OIT or PLC.
- The wrong PLC protocol was downloaded to the OIT

**Possible Solutions:**

- Verify that your PLC's mode switch (if applicable) is in the correct position. The switch may need to be in a mode other than run mode; such as terminal mode or xxxxxx mode. Refer to your controller operations manual or the applicable Controller Information Sheet from Maple Systems.
- Verify that the PLC password in the OIT matches the password in your PLC. In OITware-200 press F4 to open the OIT - Controller Settings dialog box. In the Password group box, enter the correct PLC password.
- Verify that the communication settings in the OIT and PLC match. In OITware-200 press F4 to open the OIT - Controller Settings dialog box. In the OIT - Controller Serial Communications Settings group box, select the correct communication settings.
- Verify that the communication cable is wired correctly and in good condition.
- Verify that the OIT and PLC are connected correctly. Refer to the Installation Manual that came with the OIT.
- Download the project with the correct PLC protocol from OITware-200. Follow the steps in the Downloading an OITware-200 Project section in CHAPTER 1: Getting Started.

**OIT Displays:**

- "Cannot write to Msg Request Register!"
- "Error: Setting up Mailbox During Startup"

**Possible Cause:**

- The PLC address for the Message Request Register (MRR) is outside the memory supported by the PLC's CPU.

**Possible Solution:**

- Change the PLC address for the MRR. In OITware-200 press SHIFT+F6 to open the OIT Message Control Settings dialog box. In the Message Request Register group box, select a supported PLC address. If you are using the MRR enhanced features, to set the PLC address(es) for the MRR(s), refer to the Configuring the MRR section in CHAPTER 5: Displaying Stored Screens.

**OIT Displays:**

- "Cannot write to the Status Coils!"
- "Error: Setting up StatusCoils On Startup"
- "Cannot set the Reset Status Coil!"
- "Error: Setting STAT\_RESET during Startup"
- "Cannot set the Alarm Empty Status Coil!"
- "Error: Setting ALM\_EMPTY During Startup"

**Possible Cause:**

- The PLC address for the Status Coils is outside the memory supported by the PLC's CPU.

**Possible Solution:**

- Change the PLC address for the Status Coils. In OITware-200 press F4 to open the OIT Controller Settings dialog box. In the Status Coils group box, select a supported PLC address.

**OIT Displays:**

- “Cannot write to the Function Key Coils!”
- “Error: Setting up KeyCoils On Startup”

**Possible Cause:**

- The PLC address for the Function Key Coils is outside the memory supported by the PLC’s CPU.

**Possible Solution:**

- Change the PLC address for the Function Key Coils. In OITware-200 press F5 to open the Function Key Editor dialog box. In the Coil Address group box, select a supported PLC address.

**Alarms****How Many Alarms are Supported?**

Each OIT can store and display up to 500 screens. Of these 500 screens, any or all can be alarms.

**How are Alarms Displayed?**

The PLC requests an alarm screen by placing the number that corresponds to that screen in the Message Request Register (MRR). When the OIT reads the number in the MRR, the OIT displays the corresponding alarm screen, sounds the audible alert, and blinks the alarm LED. Refer to the Alarm Screens section in CHAPTER 3: Stored Screens for more information.

**What Happens When the OIT Operator Pushes the Alarm Ack Key?**

The audible alert is silenced, the alarm LED is cleared, and the Acknowledge Alarm status coil is set. If the alarm stack contains additional alarms, the next alarm in the stack is displayed. Otherwise, the prior non-alarm screen is displayed.

**Is There an Alarm Stack?**

Yes, but only for pending alarms. Once the OIT operator acknowledges an alarm screen, the alarm request is terminated and discarded.

**Alarms are Cleared Before the OIT Operator Acknowledges Them****Possible Cause:**

- The PLC is setting the Clear Alarm or Clear Alarm Stack status coil.

**Possible Solution:**

- Modify the PLC program so that the PLC does not set the Clear Alarm or Clear Alarm Stack status coils. From the starting PLC address for the status coils, the Clear Alarm status coil is offset 7 bits and the Clear Alarm Stack status coils is offset 8 bits. To determine the starting PLC address for the status coils, press F4 in OITware-200. The OIT - Controller Settings dialog box appears. The Status Coils group box contains the starting PLC address for the status coils.

## When the PLC Requests the Same Alarm Twice the Alarm is Not Displayed

### Possible Cause:

- If the MRR already contained the screen number that the PLC requested, the OIT would not recognize the screen request.

### Possible Solutions:

- Modify the PLC program so that when the MRR already contains the screen number that the PLC is requesting, the PLC writes a zero to the MRR before writing the screen number. This allows the OIT to recognize the alarm request and does not clear the OIT's display.
- If using an OIT3160, OIT3165, OIT3175, OIT3185, OIT4160, OIT4165, OIT4175, or OIT4185, activate the Clear Register/Bit After Receiving Screen Request feature. Refer to the Configuring the MRR with Enhanced Features section in CHAPTER 5: Displaying Stored Screens.

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