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Series Five™ Programmable Controller Operator Interface Unit

User's Manual

GE Fanuc Automation

October 1988

GFK-0181

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Preface

The Operator Interface Unit (OIU) for the Series Five™ Programmable Logic Controller (PLC) is a compact portable hand-held device that allows the factory floor engineer or operator to monitor I/O and register references, diagnose system faults, display user defined messages, upload and download CPU memory to and from memory cartridges, configure a Genius™ I/O network, program EPROM memory cartridges, and perform a number of other functions.

This manual contains the information required by the user to install and operate the Series Five Operator Interface Unit.

Chapter 1, Introduction: provides an overview of the OIU, with emphasis on its physical capabilities, the function of each key, and its function within the Series Five PLC system.

Chapter 2, Monitor Mode: describes how to access the monitor mode of operation in order to monitor I/O references, monitor register references, use different display formats, set and search for overrides, force I/O references on or off, and write to I/O and register references.

Chapter 3, Menu Mode: describes the options available to the user when accessing any of the nine main menus and their sub-menus to perform any of the many operations available through these menus.

Chapter 4, Timer/Counter Mode: describes how to access timer and counter "special" registers, in order to monitor, write to, or set timer and counter preset and accumulator values.

Appendix A, Error Messages: provides a list of error messages that may be displayed on the OIU, the cause of each error, and the action required to clear the error.

Appendix B, Menu Map: provides a map of the operations and functions available through each of the OIU modes of operation.

Appendix C, Accessories and Serial Port Information: provides catalog numbers of the OIU and related accessories, and pin descriptions of the serial ports in the OIU.

Related Publications

- GFK-0122 Series Five™ PLC User's Manual
- GFK-0123 Series Five™ I/O Module Specifications
- GFK-0023 Logicmaster™ 5 Programming and Documentation Software User's Manual
- GEK-25376 Series Three™ PLC User's Manual
- GEK-90846 Genius™ I/O System Manual
- GFK-0248 Series Five™ Genius Bus Controller User's Manual

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Content

CHAPTER 1. INTRODUCTION

Purpose of the Operator Interface Unit	1-1
General Description	1-2
Operating Modes	1-3
Features of the OIU	1-3
Environmental Features	1-5
Using the OIU Keypad	1-5
Format Keys	1-6
Timer/Counter Keys	1-6
Table Keys	1-6
Data Entry Keys	1-7
Installing the OIU	1-7
OIU Power Consumption	1-8
Getting Started	1-8
Initial Communication	1-8
Communication Problems	1-9

CHAPTER 2. MONITOR MODE OF OPERATION

Monitoring I/O References	2-1
Monitoring Channelized I/O References	2-2
Moving the Cursor	2-3
Changing Display Formats While Monitoring I/O Reference Tables	2-4
Display Formats	2-6
Forcing I/O Points	2-7
Valid Ranges for Displays	2-7
Setting, and Resetting Overrides	2-9
Searching For Overrides	2-9
Forcing Values in Display Formats	2-10
Monitoring Data Registers	2-11
Display Formats for Monitoring Registers	2-11
Writing to Data Registers	2-12

CHAPTER 3. MENU MODE OF OPERATION

Accessing Menu Mode	3-1
Selecting a Menu or Sub-Menu	3-2
Description of Main and Sub-Menus	3-2
Main Menu 1 - PC Mode Control	3-2
Main Menu 2 - Operator Messages	3-3
Communications Pointers	3-3
Example of Message Display	3-4
Purpose of Register 4070	3-5
Main Menu 3 - Register Commands	3-6
Sub-Menu 31 - Clear All Registers	3-6
Sub-Menu 32 - Clear Register Range	3-7
Sub-Menu 33 - Data Search	3-8
Main Menu 4 - I/O Configuration	3-8
Sub-Menu 41 - System Allocation	3-9
Base Unit Display	3-9

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Sub-Menu 42 - Module Diagnostics 3-10
Sub-Menu 43 - LED Mode 3-11
Module Address Display Format 3-11
Sub-Menu 44 - Power-Up Configuration Check 3-12
Sub-Menu 45 - Select Configuration 3-13
Sub-Menu 46 - Force Configuration 3-14
Sub-Menu 47 - Read from or Write to an Intelligent Module 3-15
Main Menu 5 - CPU Configuration 3-16
Sub-Menu 51 - Show Program Name 3-17
Sub-Menu 52 - Set Date and Time 3-17
Sub-Menu 53 - Show Scan Times 3-18
Sub-Menu 54 - Set Software Watchdog Timer 3-19
Sub-Menu 55 - CPU ID 3-20
Sub-Menu 56 - Reset All Overrides 3-21
Main Menu 6 - OIU Configuration 3-21
Sub-Menu 61 - Show Revision Numbers 3-22
Sub-Menu 62 - Buzzer On/Off 3-22
Sub-Menu 63 - Back-Light On/Off 3-22
Sub-Menu 64 - OIU On/Off-Line 3-23
Sub-Menu 65 - Self-Diagnostics 3-23
Main Menu 7 - Memory Cartridge 3-25
Prompts for Copy Operations 3-26
Verification of Copy Operations 3-26
Storing User Logic and Data Registers 3-27
Copy Operations With Password Assigned 3-27
Example With Two CPUs Password Protected 3-27
Sub-Menu 71 - Copy Data from CPU MC to OIU MC 3-28
Sub-Menu 72 - Copy Data from OIU MC to CPU MC 3-29
Verify that Data in the CPU Equals Data in OIU Memory Cartridge 3-29
Checks Whether or Not the OIU Memory Cartridge is Blank 3-30
Sub-Menu 75 - Clear All Data in the OIU Memory Cartridge 3-30
Sub-Menu 76 - Display the Type and Size of the Memory Cartridge Currently Installed in the OIU and the CPU 3-31
Copy Data from Cassette Tape to the QIU Memory Cartridge 3-31
Loading a Program From Tape 3-32
Copy Data from the OIU Memory Cartridge to Cassette Tape 3-33
Storing a Program to Tape 3-33
Sub-Menu 79 - Verify Cassette Tape Data Equals OIU Memory Cartridge Data 3-34
Memory Cartridge Equals Tape Operation 3-34
Sub-Menu 7A - Copy Data from an External Computer to the OIU Memory Cartridge 3-34

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Sub-Menu 7B - Copy Data from the OIU Memory Cartridge to an External Computer 3-35
Main Menu 8 - Password Control 3-36
Sub-Menu 81 - Unlock CPU 3-36
Sub-Menu 82 - Lock CPU 3-36
Main Menu 9 - Genius Network Configuration 3-37
Sub-Menu 91 - Set Up Genius Bus Controller (GBC) 3-38
Starting Address 3-39
Broadcast Data Length 3-39
Directed Data Length 3-39
Serial Bus Address for Broadcast (Global) Data 3-39
Example of Setting Up a Genius Bus Controller 3-40
Sub-Menu 92 - Display Genius ID 3-41

CHAPTER 4. TIMER/COUNTER MODE
Timer/Counter Preset and Accumulate Registers 4-1
Monitoring Timers and Counters 4-2
Writing to Timers and Counters 4-4

APPENDIX A. Operator Interface Unit Error Messages A-1

APPENDIX B. Operator Interface Unit Menu Map B-1

APPENDIX C. Accessories and Serial Port Information C-1
Catalog Numbers for OIU and Accessories C-1
OIU 15-Pin Serial Port, OIU to CPU C-1
8-Pin Serial Port - For connection to cassette tape recorder or Personal Computer. C-2

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Figure			
	1-1	Operator Interface Unit	1-1
	1-2	OIU Installed on a Series Five PLC	1-2
	1-3	OIU Features	1-4
	1-4	OIU Keypad	1-5
	1-5	CPU Mode Selection Keyswitch	1-8
	2-1	Local Input Data Display (Default)	2-1
	2-2	Channelized Input Data Display (Default)	2-2
	2-3	Cursor Movement in Binary Format	2-3
	2-4	Moving the Display Window With Next and Prev Keys	2-4
	2-5	Changing Format of Data Display (I/O References)	2-5
	2-6	Changing Format of Data Display (Register References)	2-5
	2-7	Display for Binary Format (16 Bits)	2-6
	2-8	Display for Decimal Format (32 Bits)	2-6
	2-9	Display for Signed Decimal Format (32 Bits)	2-6
	2-10	Display for Double Precision Format (32 Bits)	2-7
	2-11	Display for Hexadecimal Format (32 Bits)	2-7
	2-12	Display for Text Format (64 Bits)	2-7
	2-13	Forcing an Output On	2-8
	2-14	Setting and Resetting Overrides	2-9
	2-15	Writing a Word to I/O (Signed Decimal Format)	2-10
	2-16	Writing a Word to I/O (Double Precision Format)	2-11
	2-17	Writing a Word to Register (Decimal Format)	2-12
	2-18	Writing a Word to Register (Hexadecimal Format)	2-13
	3-1	Example of User Defined Message Display	3-5
	3-2	Reading I/O Module Starting Address on Leds	3-12
	4-1	Monitoring Timer Registers	4-3
	4-2	Monitoring Counter Registers	4-3
	4-3	Moving to the Next and Previous Timer	4-4
	4-4	Writing a New Value to a Counter Accumulate Register	4-5
	B-1	Monitor Mode of Operation	B-1
	B-2	Timer/Counter Mode of Operation	B-1
	B-3	Menu Mode of Operation	B-2
	B-4	Menus 1 through 4	B-2
	B-5	Menus 5 through 9	B-3
	C-1	Pin Configuration, 8-pin Serial Port	C-2

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Table			
	1-1	Environmental Characteristics	1-5
	1-2	Reference Tables	1-6
	2-1	Valid Ranges for Format	2-8
	3-1	OIU Main Menus	3-1
	3-2	User Defined Message Storage	3-4
	3-3	Key Codes Generated in Menu 2	3-6
	3-4	Key Codes Generated in OIU Self-Check	3-24
	4-1	Example of Timer/Counter Special Register Area	4-2
	A-1	Operator Interface Unit Error Messages	A-1

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Chapter 1 Introduction

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This chapter provides the user with an introduction to and an overview of the use of the Operator Interface Unit (OIU) for the Series Five™ Programmable Logic Controller. It includes a discussion of the physical characteristics and features of the OIU, including the function or functions of each key, the modes of operation, and connection of the OIU to a Series Five CPU.

Purpose of the Operator Interface Unit

The OIU is designed to provide factory floor operators and engineers with a convenient "window" into the Series Five Programmable Logic Controller system. It is a compact, portable device capable of performing powerful operations on the control system, as well as monitor vital I/O or register references, diagnose system faults, and display pre-programmed messages under control of the user logic program to provide a visual indication of system status, or other relevant operator interface messages. An illustration of the OIU is shown below. The features of the OIU are discussed in the following paragraphs.

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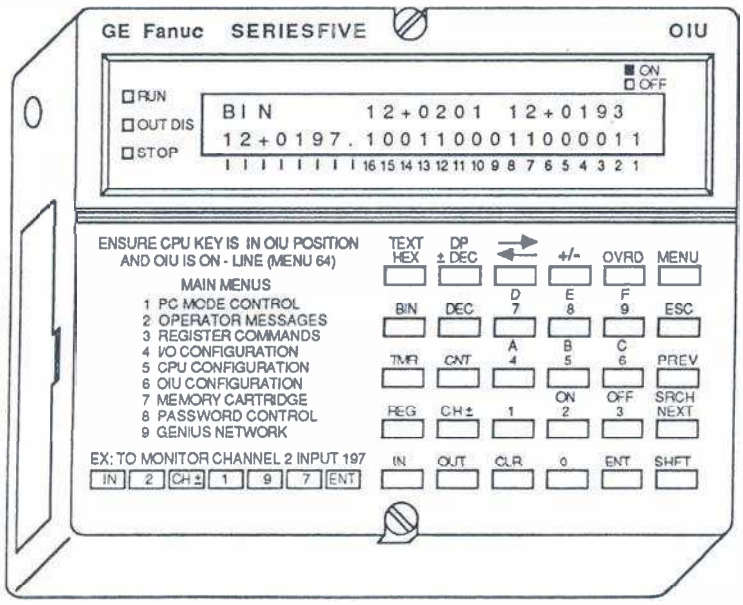


Figure 1-1. Operator Interface Unit

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General Description

The OIU is a compact device measuring only 4.6 inches (117 mm) x 5.6 inches (142 mm) x 1.2 inches (30 mm) and weighing 24.7 ounces (380 grams). Because of its small size, the OIU is very portable and is easily moved from system-to-system as required. The OIU is a powerful unit that allows the user to monitor both I/O and registers in any of six different formats, force (write to) I/O and register values, override selected I/O points, perform CPU and I/O system configuration operations, select the CPU operating mode, program PROM and EEPROM memory cartridges, test memory cartridges, and perform many other useful operations on the Series Five PLC system.

The OIU can be connected to any Series Five CPU by one of two methods. It can be plugged directly into the top CCM port connector (15 pin) on the CPU and secured by tightening the two captive screw fasteners located at the top and bottom center of the OIU front. The second method is to connect the OIU to the CPU through one of two available cables for user convenience. The catalog numbers and lengths of these cables are IC655CBL540, 5 feet (1.5 m), or IC655CBL541, 10 feet (3.0 m).

With the OIU connected to a Series Five CPU you can access I/O, register, and system data stored in the CPU. Or - if the CPU to which it is attached is one of several on a Genius™ network, it can access the I/O, register, and system data stored in any of the other CPUs on the network without the need to move the OIU from one CPU to another.

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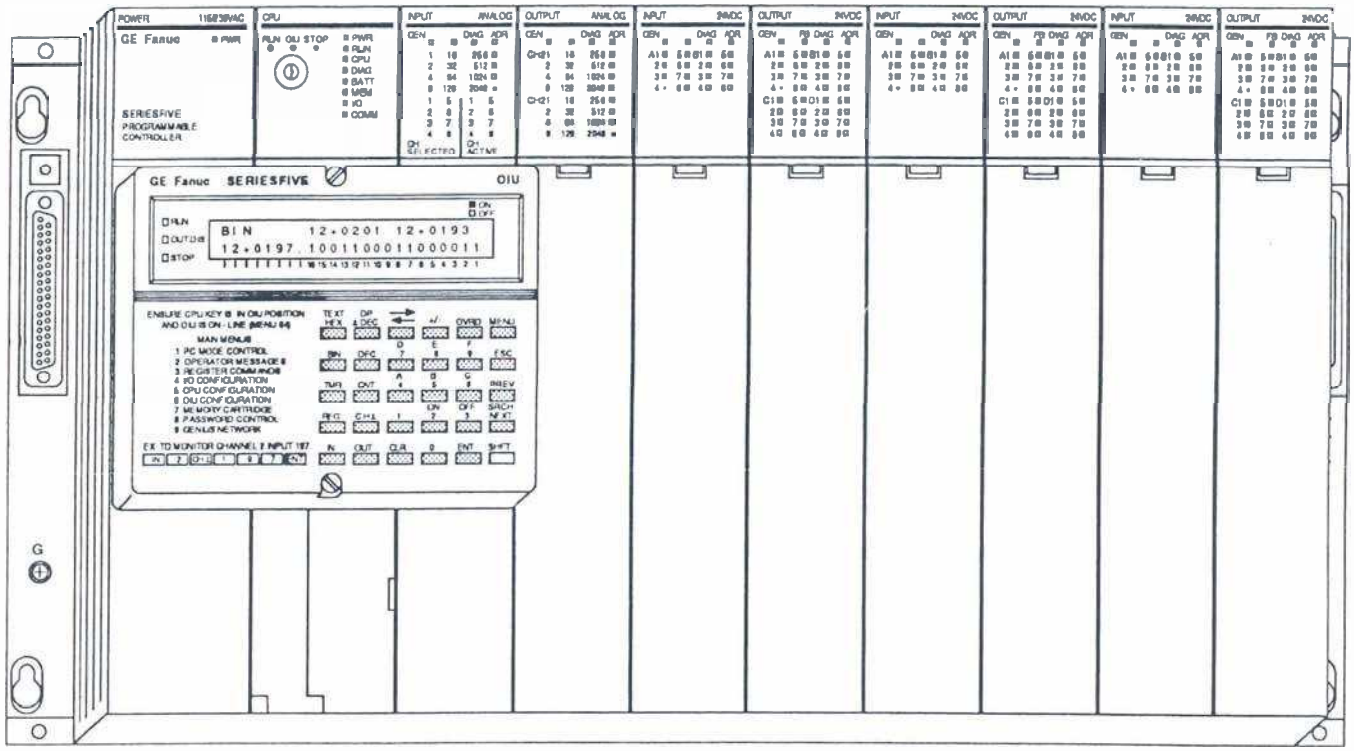


Figure 1-2. OIU Installed on a Series Five PLC

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Operating Modes

The OIU can be commanded to operate in one of three modes:

- **Monitor Mode:** Allows the user to monitor I/O and registers, write to I/O and registers, override I/O references, and force I/O references.
- **Menu Mode:** Allows the user to perform a wide variety of useful system operations.
- **Timer/Counter Mode:** Allows the user to monitor timers and counters, and force timer and counter preset and accumulator register values.

Features of the OIU

The physical features of the OIU are described below.

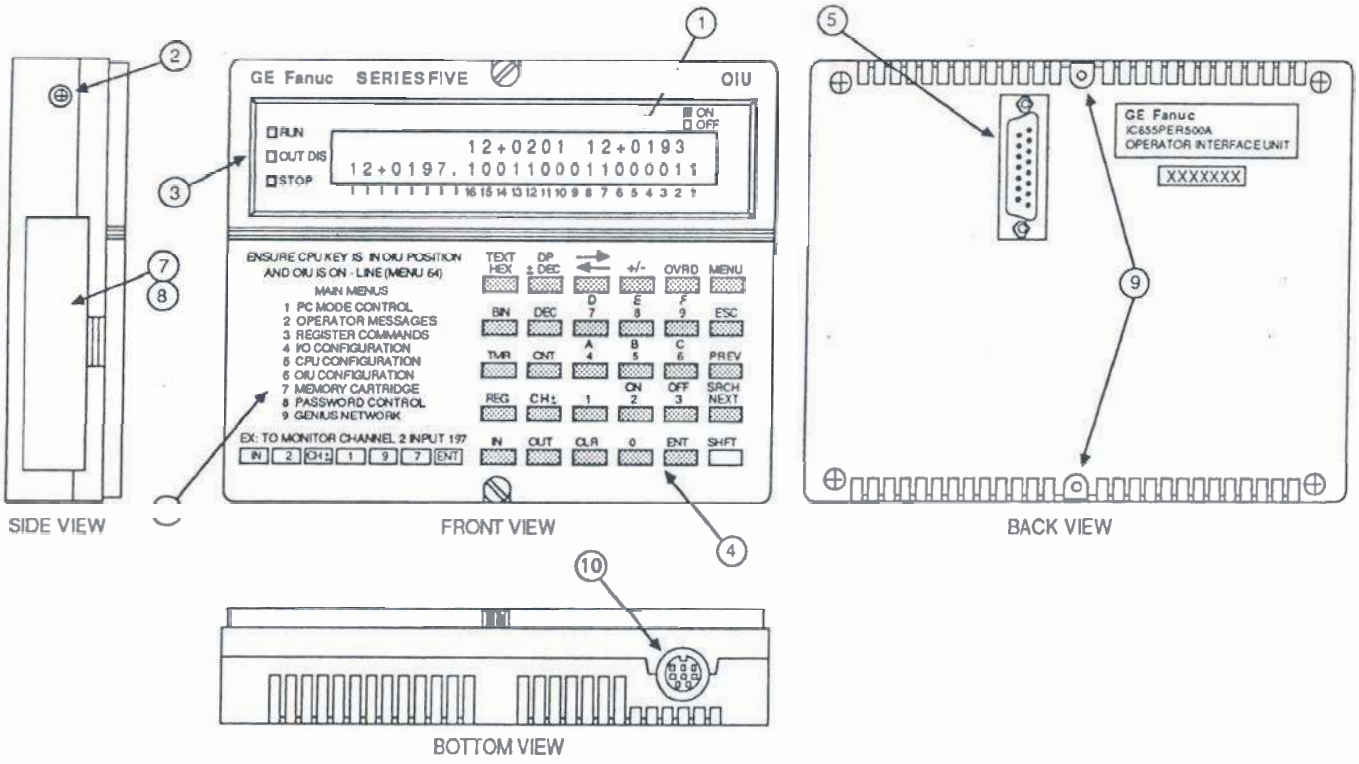
- *Liquid Crystal Display (LCD):* The display for the OIU is a Liquid Crystal Display with two lines, each 24 characters long. It provides a visual means for the user to monitor register and I/O values, force register and I/O values, display and select system parameters, and display diagnostic or error messages. The user can program certain informative messages into ladder logic which can be displayed on the LCD.
- *Contrast Adjustment Screw:* Located on the left side of the OIU, this screw allows the LCD viewing angle to be adjusted so that the characters on the screen can clearly be observed. This is especially useful when the unit is permanently mounted.
- *CPU Mode LEDs:* These are three indicators located at the upper left of the LCD display which show the current operating mode of the CPU, either RUN (green LED), RUN with outputs disabled (amber LED), or STOP (red LED).
- *Keypad:* This is a keypad having 6 columns and 5 rows of keys, with which the OIU functions are selected.
- *Port Connector:* This provides the physical means for the OIU to be connected to the CPU, either plugged directly into the CCM port's top connector on the Series Five CPU, or linked through a cable 5 feet (1.5m), IC655CBL540, or 10 feet (3.0m), IC655CBL541, in length.
- *Main Menu List:* A convenient list of the OIU's main menu and an example showing how to monitor specific references with the OIU is printed on the front of the OIU immediately to the left of the 6 x 5 keypad.
- *Memory Cartridge Slot:* A slot, accessed through a hinged plastic cover, which allows a Series Five PLC memory cartridge to be inserted in order to perform certain functions on it. These functions are: copy to/from the CPU memory cartridge, verify that the content of the memory cartridge in the OIU is the same as the content of the CPU memory cartridge, blank check or clear the memory cartridge, display the memory cartridge type in the CPU and the OIU, and upload/download a program from a cassette tape recorder or a personal computer. To perform these functions, the appropriate memory cartridge must be inserted into this slot.
- *EPROM Memory Burner:* A built-in EPROM burner for copying programs written on a memory cartridge residing in the CPU, onto an EPROM cartridge inserted in the slot on the left side of the OIU.
- *Captive Screw Fasteners:* Two captive screws, one each at the top and bottom center front of the OIU case, are used to attach the OIU securely to the CPU when the OIU is plugged into the top CPU port connector.
- *RS-232 Communications Port:* An RS-232 port, accessed through a miniature 8-pin DIN connector on the lower side panel of the OIU, which can connect to a cassette tape recorder or an external

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personal computer, or with a test connector installed, can perform certain diagnostic checks on the OIU.

The features described above are shown on the following illustration of an OIU.

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1. Liquid Crystal Display
2. Contrast Adjustment Screw
3. CPU Mode LEDs
4. Keypad
5. Port Connector
6. Main Menu List
7. Memory Cartridge Slot
8. EPROM Memory Burner
9. Captive Screw Fasteners
10. RS-232 Communications Port

Figure 1-3. OIU Features

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Environmental Features

Environmental characteristics of the OIU are listed in the following table.

Table 1-1. Environmental Characteristics

Operating Temperature:	0° to 60°C (32° to 140°F)
Storage Temperature:	-10 to 65°C (14°to 168°F)
Humidity:	20% to 90%, non-condensing
Atmosphere:	No corrosive gases
Vibration:	Meets or exceeds MIL-STD 810C, method 514.2
Shock:	Meets or exceeds MIL-STD 810C, method 516.2
Insulation:	1500 V ac for One minute

Using the OIU Keypad

The 6 x 5 keypad (6 columns x 5 rows) on the front of the OIU is used for selection of the OIU functions. These functions are activated by pressing the appropriate key or combination of keys. Shifted key functions are activated by pressing the *SHFT* (Shift) key followed by the appropriate key on the key pad. Whenever the *SHFT* keySHFT key is active, a ^ appears at the top right of the OIU display. The shifted function keys have yellow graphics above them to describe their function, while the descriptive graphics for unshifted functions are white. All of the keys are gray, except for the *SHFT* key, which is yellow.

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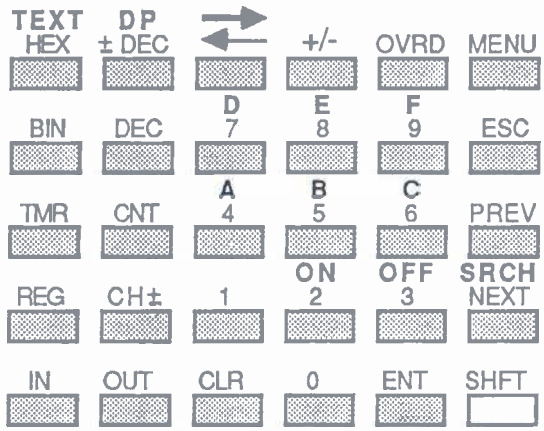


Figure 1-4. OIU Keypad

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The *SHFT* function will remain active under certain conditions without the user being required to reactive it more than once. An example of this is when entering a hexadecimal number, such as ABB3, the *SHFT* key need only be activated twice - once before entering the first digit A, and again (required to deactive (release) the *SHFT* key) before entering the final digit 3. In most cases, the *SHFT* key will remain active for only one key operation after it has been activated. This helps to reduce the number of keystrokes required to implement any given command on the OIU.

Format Keys

The four keys (four unshifted plus two shifted) in the top left corner of the keypad are the format keys. When monitoring I/O references or registers, or when forcing values, these keys are used to select the format in which the references will be displayed, or when data is entered by the user when forcing values.

The keys, a description of the formats, and an example of each format are shown below (the same value is shown for each example, but as the proper value for that format).

BIN - Display will appear in binary notation - *example: 1000100010001000*
HEX - Display will appear in hexadecimal notation - *example: 8888*
DEC - Display will appear in unsigned decimal notation - *example: 34952*
± DEC - Display will appear in signed decimal notation - *example: -30584*
TEXT - *Shifted Function.* Display will appear in ASCII notation - *example: H H*
DP - *Shifted Function.* Display will appear in signed double precision notation - *example: +0000034592*

Timer/Counter Keys

The two keys directly below the format keys (**TMR**and **CNT**) are used to access the TIMER/COUNTER mode of operation. Selection of one of these keys, followed by a timer or counter number used in the Series Five logic program, tells the OIU to monitor the Preset and Accumulator values of that timer or counter. It also gives the user the ability to force a new value into either of the registers containing the monitored values.

Table Keys

The group of four keys (**REG, CH±, IN, OUT**)in the lower left corner of the keypad are for selection of the table required for an operation. These keys specify whether the address selected is a register, a local input point, a local output point, or a channelized input or output point. The Series Five reference tables are listed in the following table.

Table 1-2. Reference Tables

TABLE	ADDRESS RANGE
Local Input	I1 to I1024
Local Output	O1 to O1024
Channel 1+ Input	I1+1 to I1+1024
Channel 1+ Output	O1+1 to O1+1024
Channel 2+ Input	I2+1 to I2+1024
Channel 2+ Output	O2+1 to O2+1024
Channel 1- Special Purpose Inputs	I1-1 to I1-512 (Read Only)
Channel 1- Internal Coils	O1-1 to O1-1024
Channel 2- Internal Coils	O2-1 to O2-1024
Data Registers	R1 to Rmax *

* Rmax will be either 4096 or 16384, as determined by the size of the Register Memory RAM installed in the CPU.

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For more detailed information about each of the reference tables, refer to the Series Five PLC User's manual, GFK-0122.

Data Entry Keys

The group of keys to the right center of the keypad are for selection of numerical values to be entered on the OIU. These keys are labeled 0 through 9, and shifted functions A through F.

The remaining keys all have individual meanings, and are discussed separately.

--> <-- Key	This key has two functions. The left arrow (<--) can be used to erase the last character entered on a display in which the user is required to make an entry. Both the left (<--) and right (-->) arrows can be used to move the cursor on the LCD display when in certain menus and monitor formats. These arrow movements are described in detail in the applicable sections later in this manual.
+/- Key	This key is used in conjunction with the numerical keys when forcing values in either the double precision or signed decimal formats. The + and - signs are toggled on alternate depressions of the key and must be pressed immediately before the value to be entered.
OVRD Key	This key is used when in the Monitor Mode to set or reset overrides on individual I/O points. Overridden references can then be forced on or off using the ON or OFF keys, which are shifted functions, located on the keypad above the numbers 2 (ON) and 3 (OFF) keys.
MENU Key	This key is used, in conjunction with the numerical keys, to access the MENU Mode of operation. Refer to Chapter 3 for a detailed discussion of this mode.
ESC Key	This key is used when in the MENU mode to either cancel the current operation or to exit from the MENU mode. It is also used in the TIMER/COUNTER and MONITOR modes to cancel a forced write to a register or I/O table.
PREV and NEXT Keys	These keys are used in both the MONITOR and MENU modes. In the MENU mode, they are used to page forward or backward through the menu options, and in MONITOR mode to page through groups of references, which can be either I/O tables or registers.
SRCH Key	This key is used to search for overridden references; for example, when you want to leave the system to operate normally after performing some tests using the override function. The key is valid only when in the MONITOR mode and each I/O table needs to be checked. If an override is found, the cursor will appear under this reference and the user can then reset the override with the OVRD key. When there are no more overrides set in the current table, the message *NO OVERRIDES FOUND* will be displayed.
CLR Key	This key is used to clear the content of the current entry on the LCD display, whether it is a monitor screen, an incomplete forced value, or an exit from MENU mode after certain menus have been used.
ENT Key	This key is used to complete entry of any required reference or value, or as the confirmation that you wish to access a particular menu or operation within a menu.

Installing the OIU

Installation of the OIU is easy, simply connect the OIU to the top CCM port connector on the Series Five CPU. When the OIU is connected through a cable, and is in the on-line mode, communications will be lost with any device that is attached to the lower port connector. The user must be aware of this when using the OIU with a system that is in the CPU RUN mode and if there is a serial device (such as a Workmaster computer) attached to the lower port connector. However, after connection to the CPU, the

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OIU, if in the ON-LINE mode, can be forced OFF-LINE by accessing MENU 64, which allows the device connected to the lower port connector to regain communications.

NOTE

The OIU, when connected, will power-up in the mode that it was in the last time that it was connected to the CPU. For example, if it had been commanded to be OFF-LINE, it will power-up OFF-LINE.

OIU Power Consumption

When the OIU is connected to the CPU, the OIU draws its power from the Series Five power supply. The OIU typically consumes approximately 400 mA of current, however, it can use up to 1 A when burning EPROMs. This maximum current consumption figure must be included in the system loading calculations when selecting a power supply for the CPU base unit.

Getting Started

When the OIU is initially connected, the amber colored backlight on the LCD display will turn on, and one of the three LEDs at the left of the LCD will also turn on to indicate the current mode of the CPU, which will be either RUN, OUT DIS (RUN with Outputs Disabled), or STOP. The user must be aware that the OIU will only be able to perform two-way communications with the CPU if the three-position mode selection keyswitch on the CPU is in the OIU (center or vertical) position.

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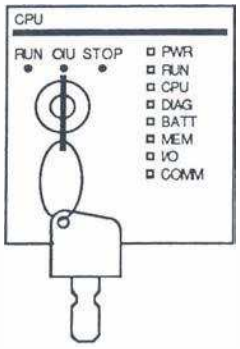


Figure 1-5. CPU Mode Selection Keyswitch
Switch shown in correct position for communication with the OIU.

Initial Communication

When the OIU is first connected, the LCD display will normally be blank. Certain menu displays may be retained at power-down and displayed on power-up, such as "*USER PROGRAM MESSAGES*". Also, if there is an error in the system, or a communications problem exists between the OIU and the CPU, an error message will be displayed. This error message gives the user an indication of the cause of the fault. For example, if the error is:

```
E252 NEW I/O CONFIG
```

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the user must access MENU 45 (see details in Chapter 3) before trying to put the CPU into the RUN mode. If no error messages are displayed, then all self checking of the OIU has been completed successfully. The user can then access one of the three OIU modes (MONITOR, MENU, or TIMER/COUNTER) to exchange and display information on the LCD.

A complete list of error messages, their probable cause, and what to do to fix the problem causing the error can be found in Appendix A of this manual.

Communication Problems

If for some reason, there does not seem to be any communication between the OIU and the CPU, check the following.

1. If connected through an OIU to CPU cable, ensure that the cable is firmly connected to both the OIU and the CPU, and is securely tightened with the cable's captive screw fasteners.
2. If the OIU is connected directly to the CPU without a cable, ensure that the two captive screws on the OIU have been securely tightened.
3. Ensure that the OIU is ON-LINE (MENU 64).
4. Ensure that the CPU mode selection keyswitch is in the OIU position.

If after these checks have been made, you still do not have communications between the OIU and the CPU, please call your local GE Fanuc PLC distributor for technical support.

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Chapter 2

Monitor Mode of Operation

This chapter provides the information required to access and use the MONITOR MODE of operation with the Series Five OIU. It describes the available options for monitoring or forcing references or values. The different types of data formats are described, along with the override capabilities of the OIU, the search for overrides feature, and the forcing of discrete references on and off.

Monitoring I/O References

The OIU can monitor I/O tables and data registers in any one of six different formats; binary, hexadecimal, decimal, signed decimal, double precision, and text. The default format for monitoring I/O points is binary, which is automatically displayed on the LCD display when the reference for an I/O point is entered with the keypad, similar to the example printed on the front of the OIU. In this format, 16 consecutive references are monitored simultaneously.

A specific I/O point is monitored by entering the reference for that point. The starting number on the display defaults to the first reference of the byte in which the requested reference occurs. Before doing all of this, ensure that you are not in the MENU mode. If you are - exit that mode by using either the ESC or CLR key (determined by where you are in the menu), then you are ready to enter the MONITOR mode.

The following example shows how to monitor a reference in the Local I/O chain. First, clear the LCD display - then, enter the reference, by first pressing either the IN or the OUT key, followed by the point reference number, and finally the ENT key.

a42570

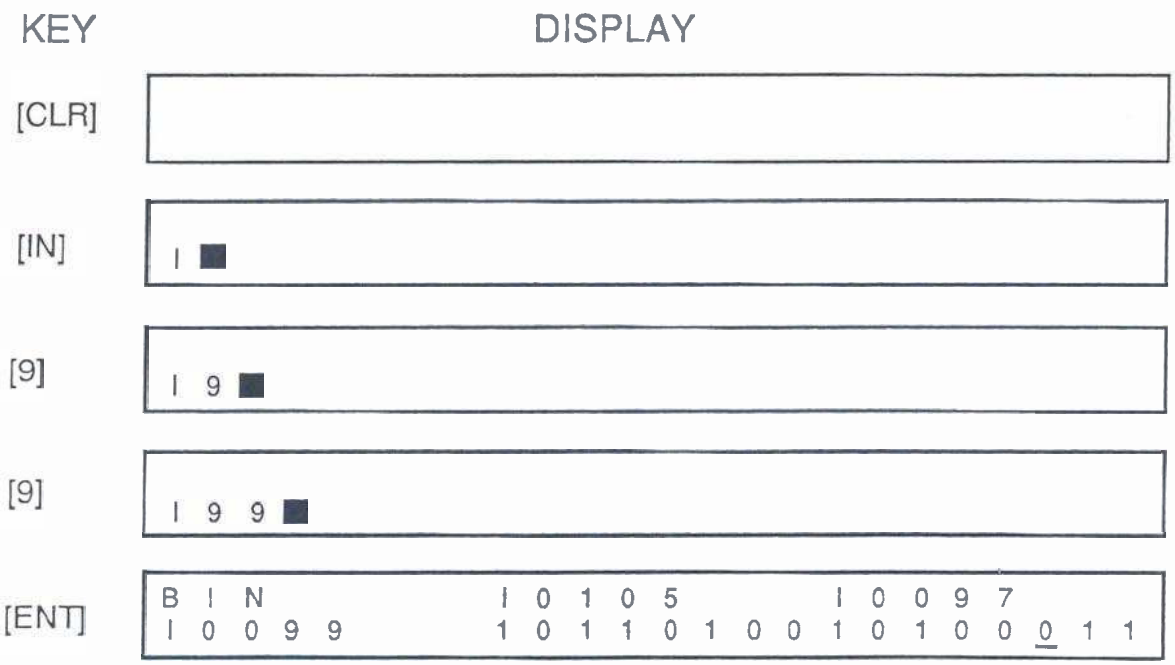


Figure 2-1. Local Input Data Display (Default)

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Monitoring Channelized I/O References

To monitor any of the channelized I/O references, i.e., Channel 1+, Channel 2+, Channel 1-, or Channel 2-, the channel number and + or -, as applicable, must be specified. First enter IN or OUT, then the channel number. Next, pressing the CH key once selects a +, which is displayed after the channel number. Alternate pressing of this key toggles between the + and -. After the desired channel and reference table have been selected, select the reference number, followed by the ENT key.

a42571

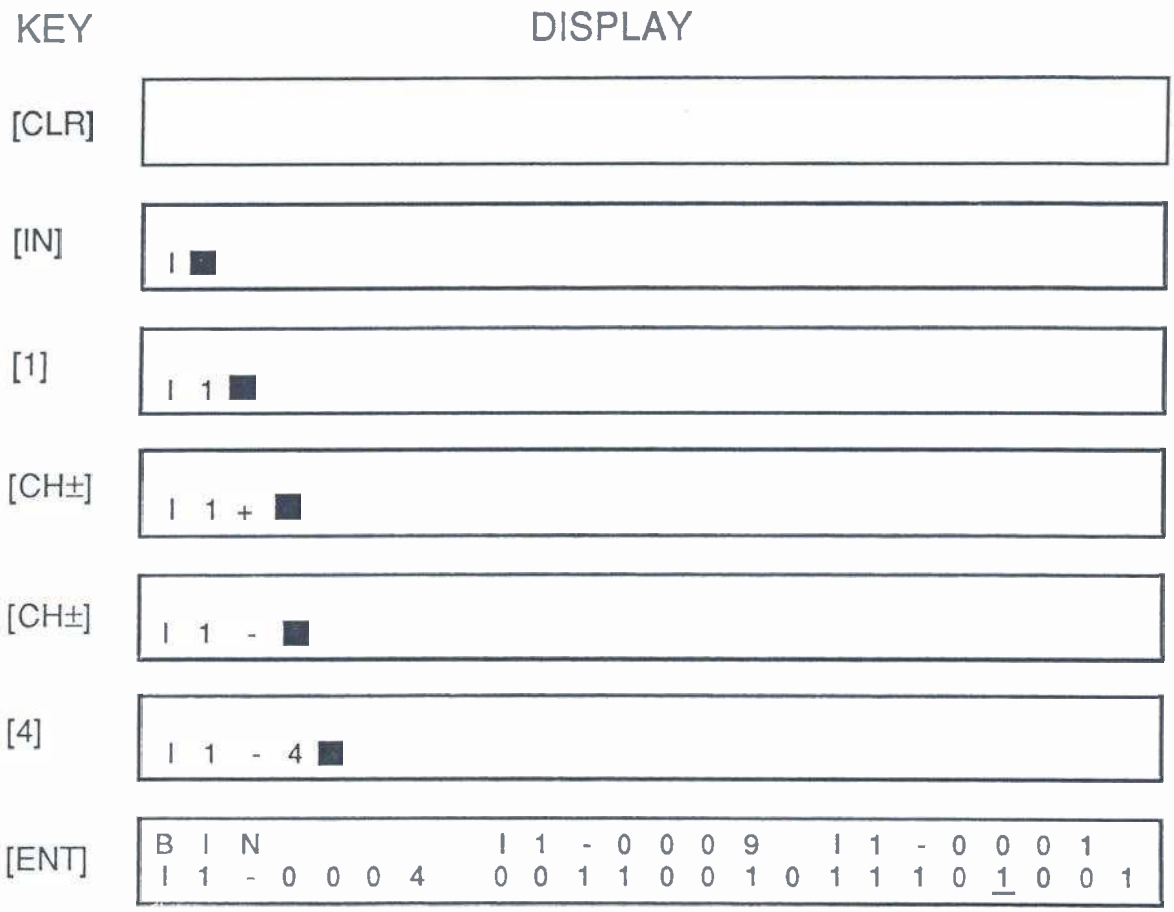


Figure 2-2. Channelized Input Data Display (Default)

The <-- key can be used anytime before the ENT key is pressed to delete the last character entered, or the CLR key can be pressed to clear the complete entry if you wish to restart the sequence. If an invalid

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address is entered, it will be detected by the OIU after the ENT key is pressed. You can change your entry anytime before this without an error being detected.

After these keystrokes have been completed, the LCD will display:

1. The default format (BIN) in the leftmost position on the top row of the display.
2. The reference keyed in is displayed in the leftmost position of the bottom row
3. Two reference values on the top row, which are the addresses of the references on the byte boundaries (first reference of each byte) immediately below and above the keyed-in reference
4. The status of the 16 references, beginning with the first reference of the least significant byte (lower byte). The reference that you keyed-in is distinguished by an underscore cursor directly below the reference bit position.

Moving the Cursor

The cursor can be moved among the 16 displayed points by using the left and right arrow keys. The reference value in the lower left of the display will change to reflect the cursor position as the cursor moves. The cursor will wraparound at either end of the display as illustrated in the following example.

a42572

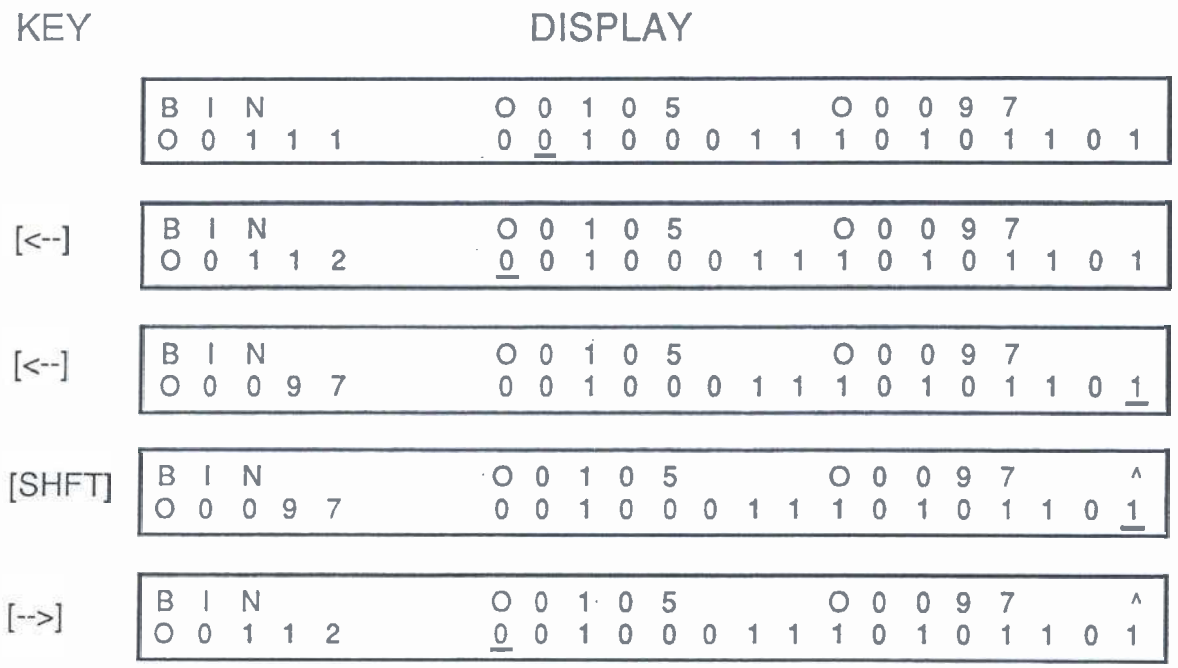


Figure 2-3. Cursor Movement in Binary Format

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The NEXT and PREV keys can be used to move 16 references at a time. The NEXT key increments both the byte boundary references and the cursor reference by 16 bits, while the PREV key decrements these references by 16 bits. I/O references in binary format are incremented and decremented by 8 bits.

a42573

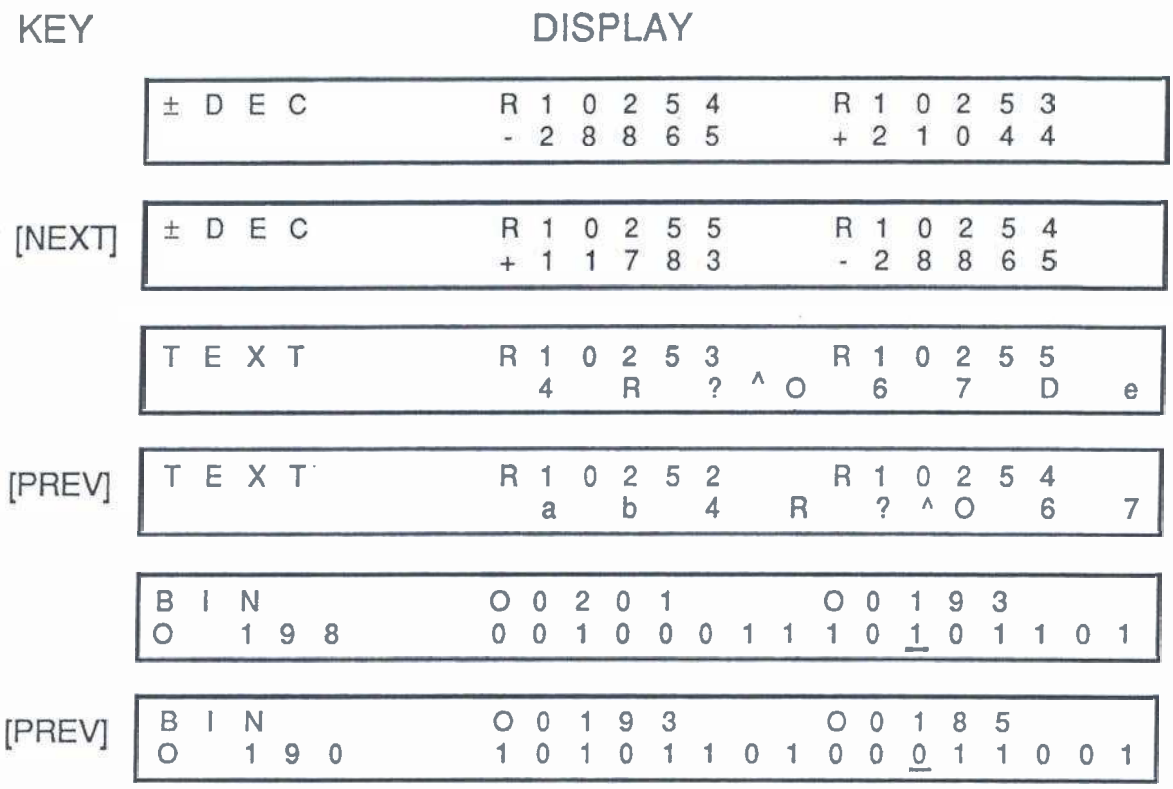


Figure 2-4. Moving the Display Window With Next and Prev Keys

To change from monitoring one I/O table to a different table, or to make a large jump in references monitored, simply key-in the new reference. As soon as either the IN or OUT key is pressed, the bottom line of the display will clear to accept the new references. When the ENT key is pressed, the display will change to the specified table and reference address.

Changing Display Formats While Monitoring I/O Reference Tables

While in MONITOR mode, the display format can easily be changed by pressing the key corresponding to the desired format. For example, to change from the default binary format to double precision (which requires the shifted function key, DP), press the SHFT key, then the DP key. To revert back to binary format, press the BIN key.

Several differences will occur in the display when changing formats. We have seen that in binary format 16 bits of I/O information are displayed. However, when in decimal, signed decimal, double precision, and hexadecimal formats the equivalent of 32 bits of information is displayed, and in text format the equivalent of 64 bits of information is displayed.

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a42574

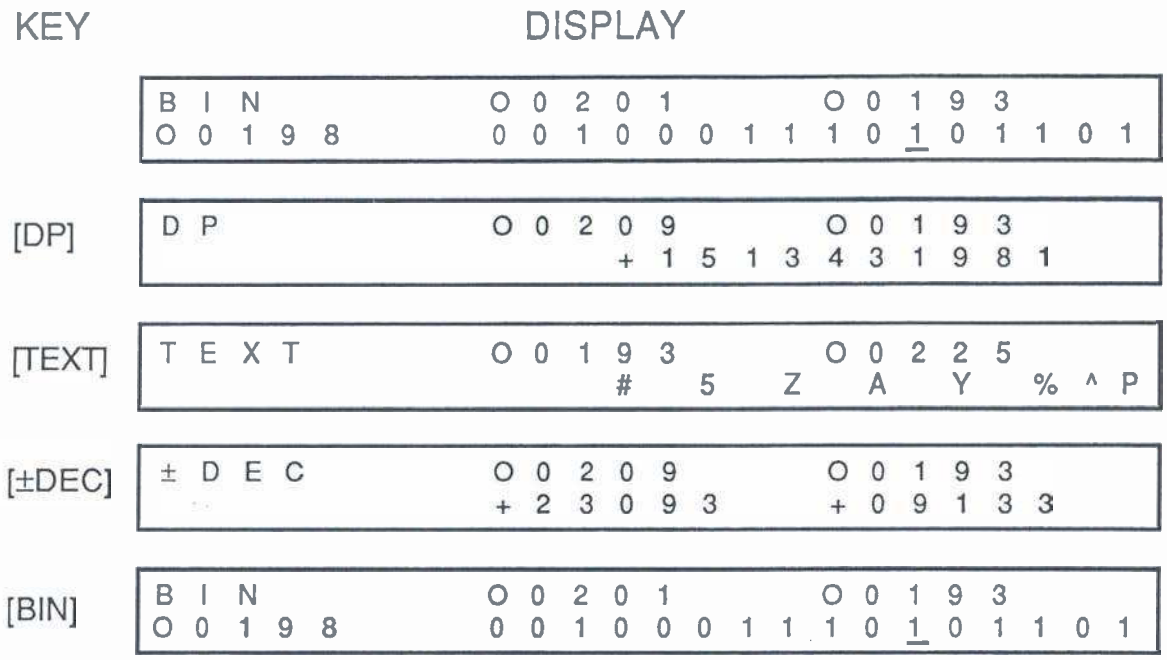


Figure 2-5. Changing Format of Data Display (I/O References)

a42575

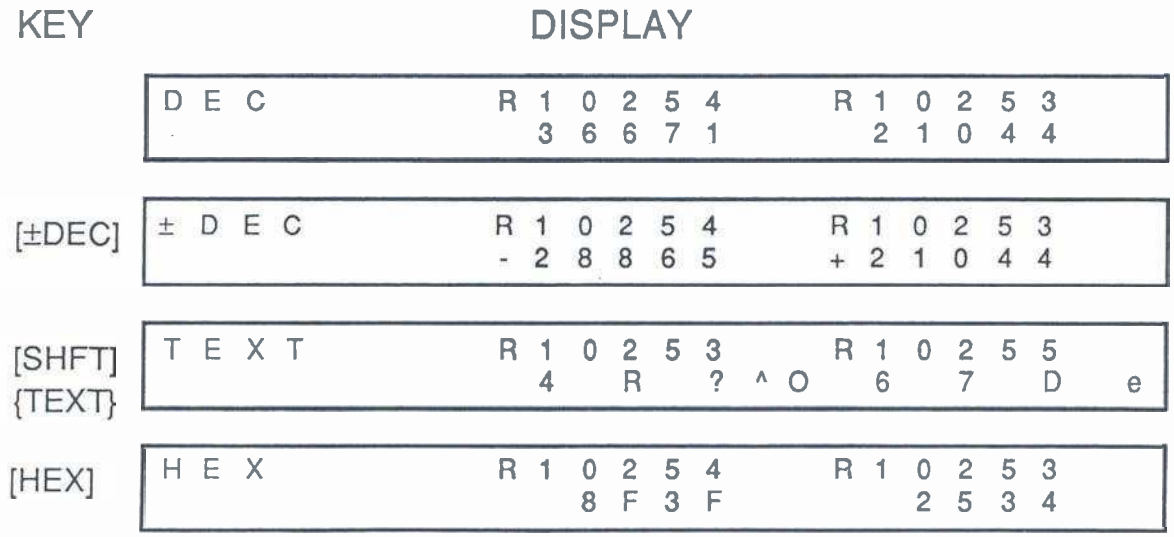


Figure 2-6. Changing Format of Data Display (Register References)

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Display Formats

The cursor seen beneath the particular I/O bit being monitored will disappear when a display format other than binary is selected. The cursor will reappear in the same position relative to the display, even though the display range may have been changed while in another format. This cursor position is to aid the user when monitoring a particular bit; for example, by paging through the I/O tables to monitor the third bit in each group of 16 bits.

The address of the I/O bit that the cursor is positioned beneath will also disappear when any format other than binary is selected.

When in decimal, signed decimal, double precision, or hexadecimal formats, the starting addresses seen on the upper left of the LCD will reflect that 32 bits are being monitored by being separated by 16 bits, rather than 8 bits when in binary mode. Both of the displayed addresses always start on a byte boundary, the same as in binary mode. Examples of each of the format displays for both I/O and registers are shown in the following group of illustrations.

a42576

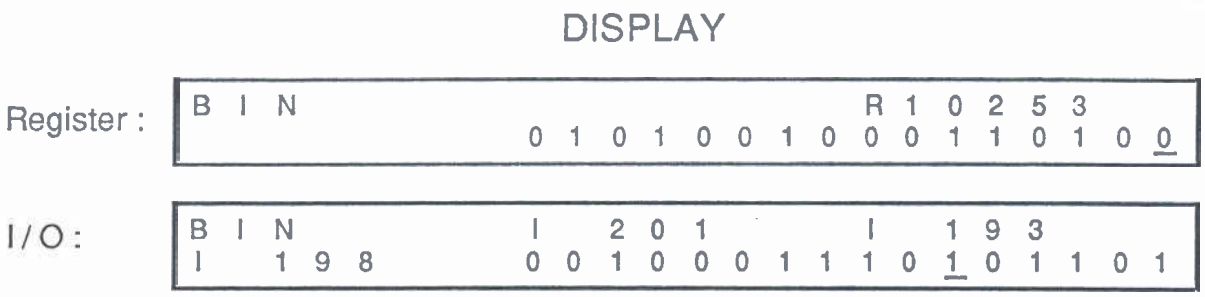


Figure 2-7. Display for Binary Format (16 Bits)

a42577

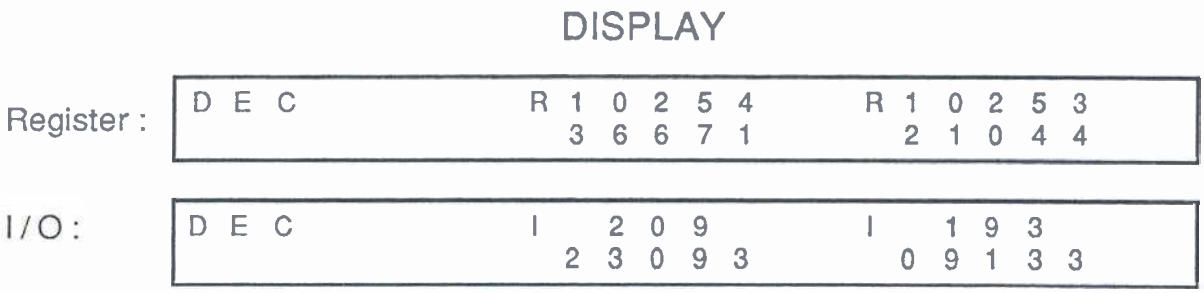


Figure 2-8. Display for Decimal Format (32 Bits)

a42578

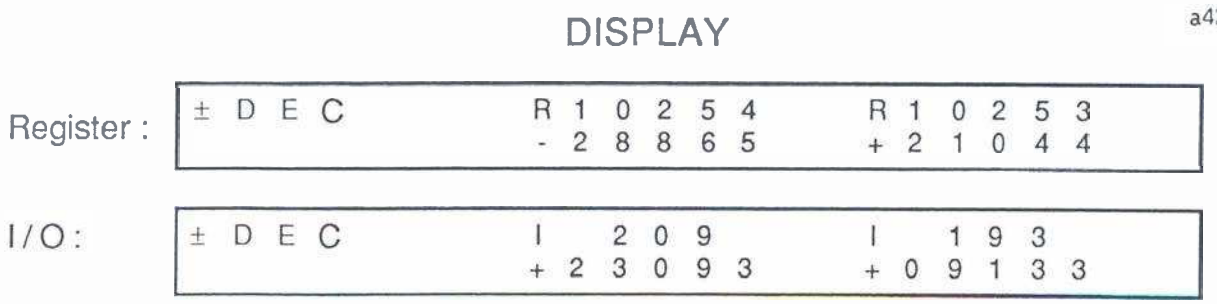


Figure 2-9. Display for Signed Decimal Format (32 Bits)

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a42579

DISPLAY

Register :	D P	R 1 0 2 5 4 R 1 0 2 5 3 - 1 8 9 1 6 7 5 5 9 6
I/O :	D P	I 2 0 9 I 1 9 3 + 1 5 1 3 4 3 1 9 8 1

Figure 2-10. Display for Double Precision Format (32 Bits)

a42580

DISPLAY

Register :	H E X	R 1 0 2 5 4 R 1 0 2 5 3 8 F 3 F 2 5 3 4
I/O :	H E X	I 2 0 9 I 1 9 3 5 A 3 5 2 3 A D

Figure 2-11. Display for Hexadecimal Format (32 Bits)

a42581

DISPLAY

Register :	T E X T	R 1 0 2 5 3 R 1 0 2 5 5 4 R ? ^ O 6 7 D e
I/O :	T E X T	I 1 9 3 I 2 2 5 # 5 Z A Y % ^ P

Figure 2-12. Display for Text Format (64 Bits)

Forcing I/O Points

It is possible to force I/O bits on or off in all display formats, except text. However, since Channel I1- is read only, it can only be monitored with the OIU. There are two operations in which you can write to I/O references - bit write and word write. Bit write operations write to an individual bit when in binary display format, while word write operations write to a group of 16 consecutive bits, or to 32 consecutive bits when in double precision display format.

I/O points can be overridden and then forced on or off individually, however, there is no limit to the number of individual points that can be overridden in the system.

Valid Ranges for Displays

Valid ranges for each of the formats are listed in the following table.

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Table 2-1. Valid Ranges for Format

FORMAT	RANGE
Decimal	0 to 65,536
Signed Decimal	-32,768 to +32,767
Double Precision	-2,147,483,648 to +2,147,483,647
Hexadecimal	0000 to FFFF
Binary	0000000000000000 to 1111111111111111
Text	All ASCII characters programmed into OIU firmware.

The LCD display must be in binary format to force an I/O point on or off. To force an I/O point on or off, move the cursor to the desired I/O point with the PREV, NEXT, -->, and <-- keys. Then, by pressing the SHFT and ON keys the point is forced to a logical 1, or by pressing the SHFT and OFF keys, the point is forced to a logical 0. However, since these points have not been overridden, any input reference will only remain in its forced state for one scan, and any output reference will only remain in its forced state while it is not written to by the user logic program. An example is shown below.

a42582

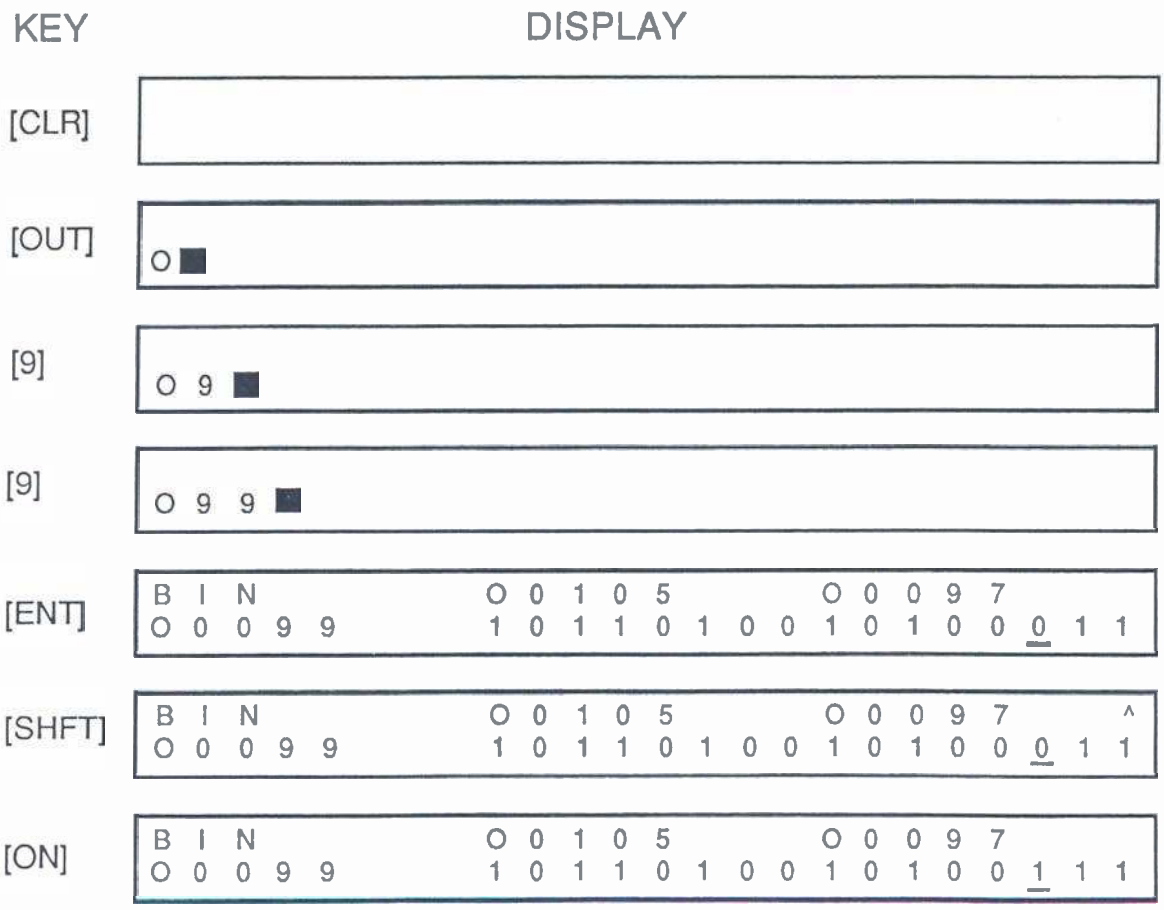


Figure 2-13. Forcing an Output On

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Setting, and Resetting Overrides

In order to maintain an individual I/O point in the forced state, the reference must first be overridden by pressing the OVRD key while the cursor is beneath the reference. You can then force the overridden reference to a logical 1, using the SHFT ON key sequence, or to a logical 0, using the SHFT OFF key sequence. To release a reference from the overridden state, reposition the cursor under the reference, which will be flashing, and press the OVRD key.

a42583



Figure 2-14. Setting and Resetting Overrides

Searching For Overrides

While in the MONITOR mode, you can search for overridden references in the current I/O table with the SHFT SRCH key sequence. This function looks for the next overridden reference and positions the cursor underneath of it, thereby allowing you to check for overrides before putting the system in RUN mode or perhaps, while debugging your system.

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If no overridden references are found after entering the SHFT SRCH key sequence, the message

```
NO OVERRIDES FOUND
```

will be displayed on the LCD display. All of the overrides currently set in a system can be reset with a single command while in sub-menu 56. A description of how to use that function can be found in Chapter 3.

Forcing Values in Display Formats

As mentioned previously, values can be forced (written to) in all display formats, except text format. While monitoring any of the numerical format displays, you can enter a new value as required. When the first numeric key is pressed, the lower line of the LCD display will be blanked (except for the value just entered) and you can proceed to enter the rest of the required value. When forcing these values, remember that output references may be overwritten by the user program and input references will be overwritten on the next scan *UNLESS* they have been previously overridden on a point-by-point basis using the OVRD key.

When forcing a value in binary mode, enter the number as a string of 0's and 1's, then press the ENT key. Leading zeros can be ignored or included. In the decimal, signed decimal, and hexadecimal formats which display the equivalent of 32 bits of information, only the least significant 16 bits can be written to. The OIU will not let you enter more than 5 digits. When forcing a value in double precision format, you can write to all 32 bits.

a42584

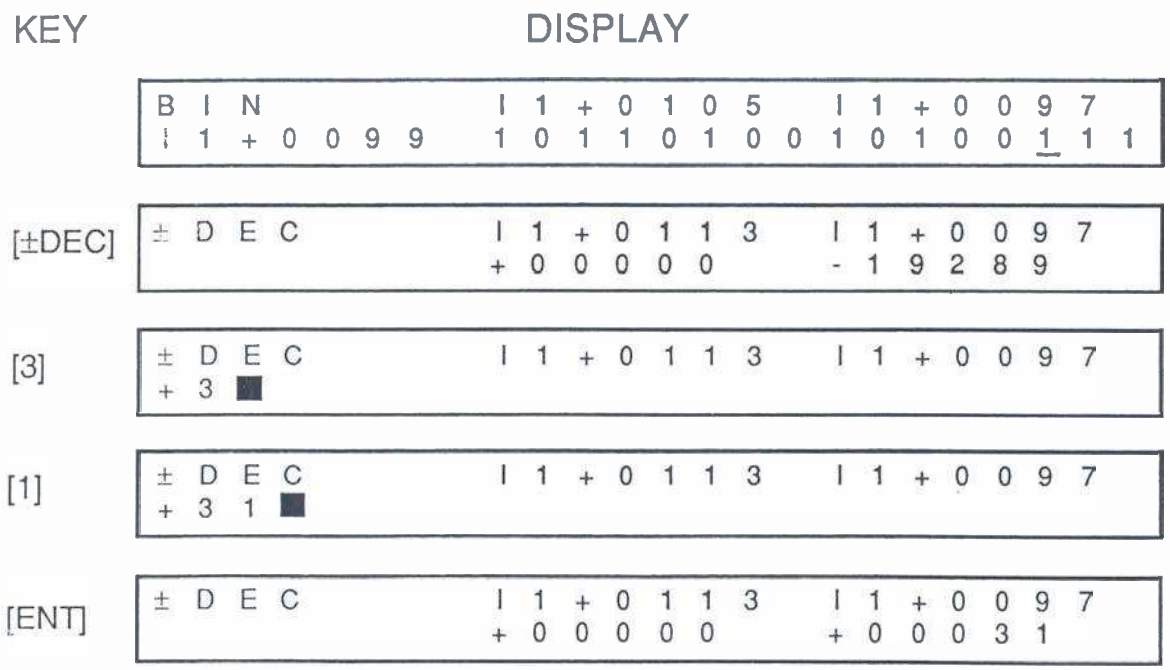


Figure 2-15. Writing a Word to I/O (Signed Decimal Format)

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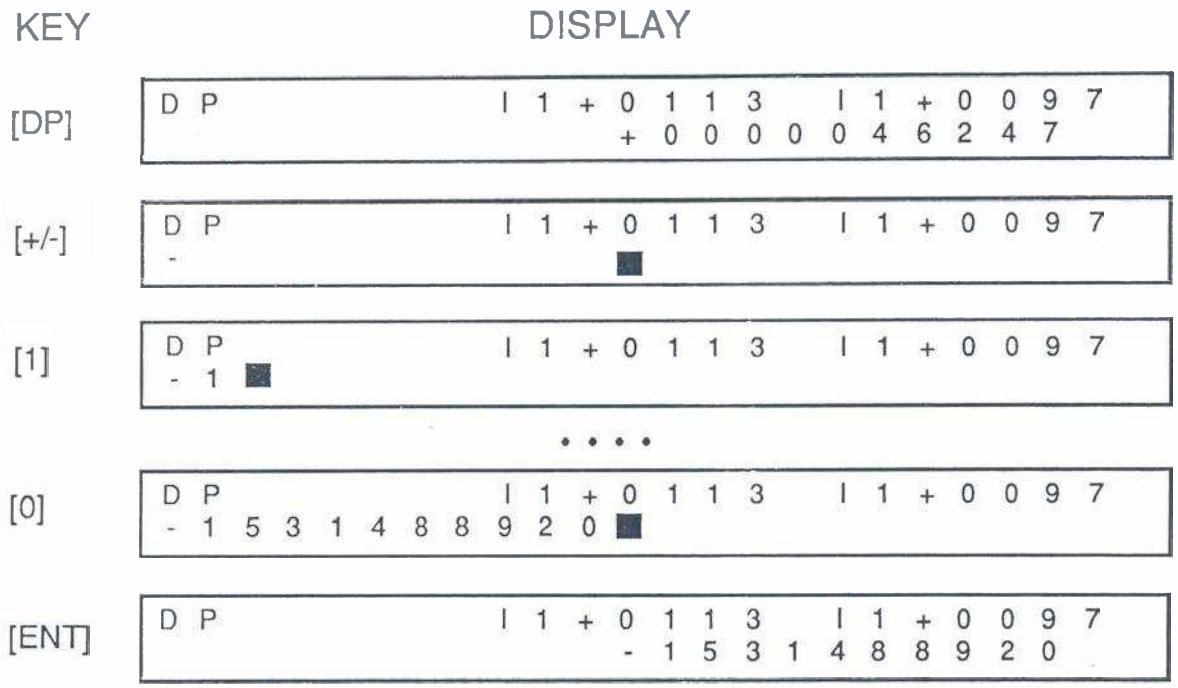


Figure 2-16. Writing a Word to I/O (Double Precision Format)

Monitoring Data Registers

As with the I/O references, data registers can be monitored in all six display formats. The number of data registers available depends on which RAM register memory device is installed in the CPU. This can be either 4096 registers, which is standard, or 16384 registers (16K RAM supplied with 16K memory cartridges).

NOTE

The register range, R3848 through R4096 is reserved for use by the Series Five CPU. It is recommended that you do not use the monitor mode to write data to these registers.

To monitor a particular register, press the REG key, type the register number, then press ENT. The LCD display will show two registers, with the register you entered on the right side of the LCD, and the register with the next higher address on the left side. The value contained in the registers is displayed on the bottom line, and the register reference numbers are displayed on the top line, above the value.

Display Formats for Monitoring Registers

The default format for monitoring registers is *unsigned decimal*. This is indicated by DEC, which is displayed in the top left corner of the LCD display. The procedure for changing the display format is the same as with I/O monitoring - just press the desired format key. In signed decimal and hexadecimal

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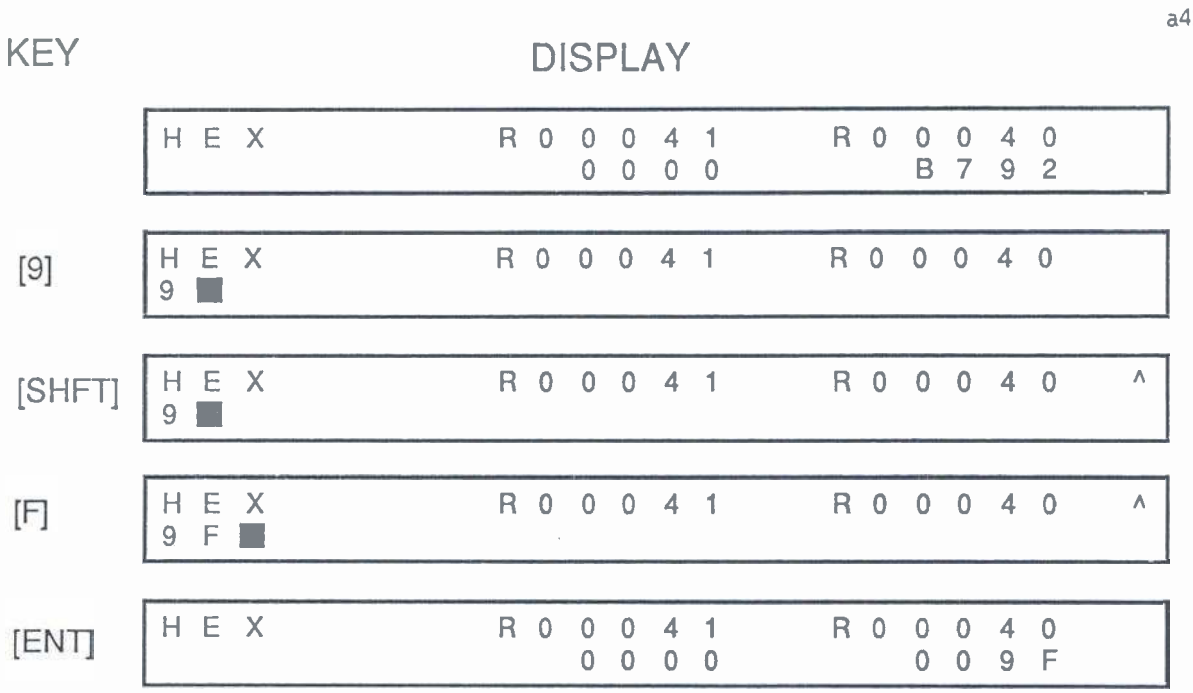


Figure 2-18. Writing a Word to Register (Hexadecimal Format)

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Chapter 3

3-1

Menu Mode of Operation

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This chapter describes the options available to the user when using the OIU in the Menu mode of operation. The functions available for each of the nine main menus and each of their sub-menus are described. Most of these functions are available only with the OIU, however, some are also available with Logicmaster 5 programming software. Those that are also available with Logicmaster 5 have a statement to that effect in their description.

Accessing Menu Mode

As stated previously, the keyswitch on the CPU must be in the OIU position to have two-way communications between the OIU and a Series Five CPU. The Menu mode is selected by pressing the MENU key located in the top right corner of the keypad. There are nine main menus, each having two or more sub-menus associated with them. Before entering the MENU mode, you should ensure that the LCD display is blank, otherwise various error messages may be generated and displayed on the LCD. A summary of the function of the nine main menus is provided in the following table.

Table 3-1. OIU Main Menus

MENU NUMBER	MENU NAME	FUNCTION OF MENU ITEMS
1	PC MODE CONTROL	Selects the CPU operating mode.
2	OPERATOR MESSAGES	Displays messages generated by ladder logic program in the CPU, and allows the operator to input instructions to the program about those messages.
3	REGISTER COMMANDS	Clear register ranges and search for data in specific registers.
4	I/O CONFIGURATION	Perform I/O diagnostics, select I/O configuration, display Local I/O Chain module types, and base unit and slot addresses.
5	CPU CONFIGURATION	Display and change some CPU parameters.
6	OIU CONFIGURATION	Display revision levels for firmware in OIU and CPU, display and change certain OIU parameters, initiate self tests.
7	MEMORY CARTRIDGE OPERATIONS	Copy either system parameters, register contents, or user ladder logic from one memory cartridge to another, program EPROM memory, erase contents of RAM and EEPROM memory cartridges, verify content of memory cartridge in OIU against the memory cartridge in the CPU, upload or download a program from a cassette tape recorder or personal computer.
8	PASSWORD CONTROL	Used to logon and logoff a CPU to gain access to user logic program.
9	GENIUS NETWORK CONFIGURATION	Used in a system that links CPUs through a Genius network to configure certain parameters for each bus controller in the network.

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Selecting a Menu or Sub-Menu

One of the following procedures can be used to select a specific menu or sub-menu.

1. After ensuring that the LCD display is blank, enter the menu and sub-menu numbers on the keypad, followed by the ENT key. The selected sub-menu will then be activated and displayed on the LCD. For example, to activate sub-menu 3 (*SHOW SCAN TIMES*) in main menu 5 (*CPU CONFIGURATION*), press the following keys:

   ```
   5 3 MENU ENT
   ```

2. The order of the above procedure can be altered, to produce the same results, as shown below.

   ```
   MENU 5 3 ENT
   ```

3. Press the MENU key, then use the PREV and NEXT keys to page through the main menus. When the desired main menu is displayed, select it with the ENT key, Then again using the PREV and NEXT keys, page through the sub-menus of the selected main menu, and select the desired sub-menu with the ENT key. For example, to select sub-menu 2 of main menu 3, the key sequence would be:

   ```
   MENU NEXT NEXT ENT NEXT EN
   ```

Description of Main and Sub-Menus

Each of the main menus and sub-menus are described on the following pages. Throughout these descriptions, the figure shown below is used to show in which CPU mode or modes a sub-menu may be activated without causing an error message to be generated and displayed on the OIU's LCD display. The mode or modes that can be used are indicated by an "X" in the appropriate box.

Run	Run W/Outputs Disabled	Stop
		X

In the example of the figure, as shown above, the menu can be used only when the CPU is in the STOP mode. An attempt to use that particular menu when the CPU is in any other mode, will result in an error message being generated and displayed on the LCD display.

NOTE

Remember - the CPU keyswitch must always be placed in the OIU position to use the OIU functions.

Main Menu 1 - PC Mode Control

Run	Run W/Outputs Disabled	Stop
X	X	X

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This menu allows you to select the operating mode that the Series Five CPU should be forced into. These modes are either RUN, RUN with outputs disabled, or STOP. The number and name (exactly as they appear on the LCD) of the sub-menus accessed from this main menu are:

```
M11 GO TO RUN MODE
M12 RUN - O/P DISABLE
M13 GO TO STOP MODE
```

When going From RUN-O/P DISABLE to RUN, or RUN to RUN-O/P DISABLE, first go to STOP then select the desired mode. An example of the use of this menu is as follows. If the CPU is currently in the STOP mode and you want to put it into the RUN mode, use the following steps.

PRESS THIS KEY	DISPLAY SHOWS	COMMENT
1	1	Main menu number
1	11	Sub-menu number
MENU	M1* PC MODE CONTROL	Main menu title
	M11 GO TO RUN MODE	Sub-menu title
ENT	RUN MODE?	Prompt for you to confirm choice
ENT	IN RUN MODE	Confirmation of change to the user

Observe that the LEDs to the left of the LCD display on the OIU will change from STOP to RUN to indicate that the CPU is now in the RUN mode. To clear the last confirmation message, press the CLR key. At any stage in the above steps, if you wish to cancel the operation - simply press the CLR or ESC key to exit.

Main Menu 2 - Operator Messages

Run	Run W/Outputs Disabled	Stop
X	X	X

This menu provides a method of simple communications between the user logic in the Series Five CPU and the system operator. It will support maintenance, diagnostic and program status displays, and can be used to process associated operator inputs from the OIU in ladder logic. Up to 24 characters of user defined messages can be displayed on the LCD, and a key code will be sent back to a special register in the Series Five CPU. This key code can then be read by user logic, and the ladder logic program can act on the value of this code.

There are no sub-menus in menu 2. When the menu is selected, the OIU will display the prompt, "*ACTIVATE?*". To activate the message display, press the ENT key - the user defined message will be displayed. If power is removed, and the *USER PROGRAM MESSAGE* display is selected, it will be displayed on the next power-up.

Communications Pointers

In order to display any user defined messages, 12 consecutive registers must be reserved in the Series Five data register memory for each message to be displayed. Communication between the OIU and the user ladder logic program for purposes of message display is accomplished through the use of two special registers - R4069 and R4070.

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R4069 is the TEXT TABLE POINTER register. This register contains a pointer to the start of a block of 12 registers which contain the ASCII codes for a message having up to 24 characters. Twelve registers are required, since each ASCII character is 8 bits in length. In the ladder logic program, the user can write the starting register of the message to be displayed on the OIU.

The TEXT TABLE POINTER register R4069 is used to specify whether or not a message is to be displayed. There are two possible conditions for the content of this register.

1. R4069 = zero (0) - In this case the LCD display will be blank.
2. R4069 < > zero (0) - In this case, the register contains the address of the first of the 12 consecutive data registers that contain the message to be displayed. This value must be between 1 and Rmax (where Rmax = 4096 or 16384).

Example of Message Display

The following example illustrates how a typical user defined message that had been stored in data registers is displayed on the OIU. *Note that this message can be entered using LM5 in the text mode.* In the example, register 21 is the first register of 12 consecutive registers containing data to be displayed.

Table 3-2. User Defined Message Storage

REGISTER	MOST SIGNIFICANT BYTE		LEAST SIGNIFICANT BYTE	
	HEXADECIMAL	ASCII	HEXADECIMAL	ASCII
R21	56	V	4F	O
R22	52	R	45	E
R23	4F	O	4C	L
R24	44	D	41	A
R25	50	P	20	
R26	4D	M	55	U
R27	20		50	P
R28	34	4	23	#
R29	48	H	20	
R30	44	D	59	Y
R31	2E	.	52	R
R32	20		20	

In order for the message stored in data registers 21 through 32 to be selected for display, R4069 must contain the value 21, which is a pointer to register 21. To display the message on the OIU, the following key sequence is entered on the OIU.

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a42588

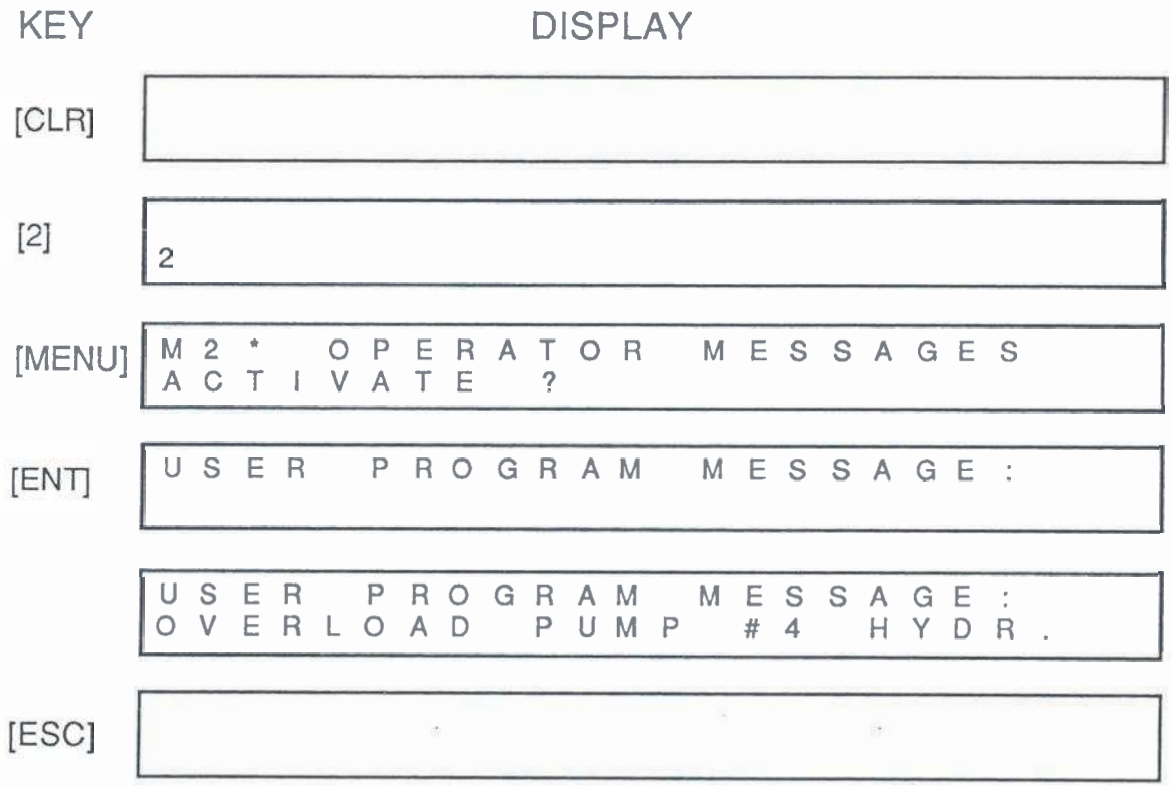


Figure 3-1. Example of User Defined Message Display

Purpose of Register 4070

R4070 is the KEY CODE BUFFER register. This register provides a way for the operator to provide feedback to the user logic in the Series Five CPU. Each key that is pressed while in Menu 2 generates a predefined code that is then stored in this register. Each successive code overwrites the previous stored code. If no key is pressed a special "no key pressed" code will be sent to the register. These codes provide a tool for the user when designing the ladder logic program so that it can respond in different ways to the different key codes.

It is the user's responsibility to determine how to use the code in the ladder logic program. For instance, it might initiate an orderly system shutdown, or cause additional user defined messages to be displayed on the OIU, if it is appropriate to do so. The possibilities are many and varied, and it is up to the user to decide how to efficiently use this feature in the ladder logic program.

The following table lists the key codes that are generated and sent to Register 4070, as each of the OIU keys are pressed, while in this menu. Notice that the keys having shifted functions do not have two different key codes associated with them.

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Table 3-3. Key Codes Generated in Menu 2

KEY	CODE (HEX FORMAT)	KEY	CODE (HEX FORMAT)	KEY	CODE (HEX FORMAT)
HEX	11	<--	08	OVRD	10
BIN	12	7	37	9	39
TMR	D4	4	34	6	36
REG	D2	1	31	3	33
IN	C9	CLR	0C	ENT	0D
± DEC	13	±	CD	MENU	05
DEC	14	8	38	ESC	06
CNT	C3	5	35	PREV	0B
CH ±	CB	2	32	NEXT	0A
OUT	D1	0	30	SHFT	0F

* No key input = 0FF (Hexadecimal)

The last key code that will be sent to Register 4070 will be the code for the ESC key (06H), since this is the key that is used to exit from menu 2.

When using a Logicmaster 5 program with this feature of the OIU, ensure that your ladder logic is programmed so that when the ESC key is read from R4070, a value of 0 (zero) is written to R4069. This will prevent the last message displayed (whose address would otherwise still be in R4069) from being displayed again the next time the menu is activated, if it is not required.

Main Menu 3 - Register Commands

This menu allows clear and data search operations to be performed on a range of data registers. There are three sub-menus associated with this main menu.

M31 *CLEAR ALL REGS* - This sub-menu is used to clear all registers, i.e., set them to a logic 0. *Note that registers may also be cleared by downloading a program to the CPU from Logicmaster 5 in the Off-Line mode, or by using the CPU initialize function in LM5.*

M32 *CLEAR REG RANGE* - This sub-menu is used to clear a specific range of data registers.

M33 *DATA SRCH* - This sub-menu allows you to search through a specified range of registers for a specific data value.

Sub-Menu 31 - Clear All Registers

Run	Run W/Outputs Disabled	Stop
X	X	X

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All of the system's data registers can be cleared by selecting this sub-menu. When Main Menu 3 is initially selected by pressing the key sequence 3 and MENU, the display will be:

```
M3*   REGISTER COMMANDS
M31   CLEAR ALL REGS
```

When the ENT key is pressed to get you into this sub-menu, a confirmation prompt will be displayed.

```
CLEAR ALL REGS    ?
```

To confirm that you wish to clear all registers, press ENT, or to cancel the operation you can press either the CLR or the ESC key. When the ENT key is selected, and all of the registers have been set to 0, the acknowledgement "*OK*", will be displayed on the LCD.

Sub-Menu 32 - Clear Register Range

Run	Run W/Outputs Disabled	Stop
X	X	X

Selection of this sub-menu allows you to clear a selected range of data registers. When you select this sub-menu, the display will be:

```
M3*   REGISTER COMMANDS
M32   CLEAR REG RANGE
```

To select this sub-menu, press the ENT key. You will then be prompted for the address of the first register in the range of registers to be cleared.

```
M32   CLEAR REG RANGE
FROM       R      □    (□ indicates cursor position)
```

Enter the first register at the cursor position, and press ENT. You will then be prompted for the last register in the range of registers to be cleared.

```
M32   CLEAR REG RANGE
TO              R  □
```

Enter the last register at the cursor position, and press ENT. A message will then be displayed to confirm that you wish to continue.

```
M32   CLEAR REG RANGE
RXXXXX < - > RXXXXX ?
```

If the register range is correct, press the ENT key. The specified range of registers will be cleared and a message will be displayed confirming that the registers have been cleared. This display will also prompt you for another range of registers.

```
REGISTER RANGE CLEARED
FROM      R      □
```

Another range of registers to be cleared can be entered - or to exit this sub-menu, press the ESC key.

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Sub-Menu 33 - Data Search

Run	Run W/Outputs Disabled	Stop
X	X	X

Selection of this sub-menu allows you to search for a specific data value within a range of registers. When this sub-menu is selected, the display will be:

```
M3*   REGISTER COMMANDS
M33   DATA SRCH
```

When the ENT key is pressed to activate this sub-menu, you will first be prompted for the range of registers to be searched, then for the data value to search for.

```
M33   DATA SEARCH
FROM       R       ☐ Enter the first register here and press ENT.

M33   DATA SEARCH
TO         R       ☐ Enter the last register here and press ENT.

M33   DATA SEARCH
DATA               ☐ Enter data to be searched for here and press ENT.
```

The data value must be entered in hexadecimal format. The LCD will then prompt you for confirmation of the register range and value by displaying the register addresses that you keyed-in, and the data value. You should then press the ENT key to confirm, CLR to allow you to change the selection, or ESC to exit this sub-menu.

```
M33   DATA SRCH
RXXXXX < - > RXXXXX XXXX ?
```

The OIU then scans the selected range of registers. It will stop and display the address of each register, within the selected range, that contains the specified data. To continue the search after a register containing the data is located, press the ENT key. The OIU will then search for the next occurrence of the specified data value.

If the data value is not found within the register range that was specified, or no further occurrence of the value is found between the last register at which the value was found and the last register in the range, the following message will be displayed:

```
E603 DATA MISSING
```

If the CLR key is pressed after this message is displayed, you will be prompted for a new register start address. You can then specify another range of registers to be searched and the data to search for, or you may leave this sub-menu by pressing the ESC key.

Main Menu 4 - I/O Configuration

This menu allows you to display and configure certain I/O module features, and perform special system checks on power-up. There are seven sub-menus associated with this menu

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M41 *SYSTEM ALLOCATION* - This sub-menu displays and identifies the catalog number and type of base unit, power supply, and module installed in each slot and base unit in a Local I/O chain.

M42 *MODULE DIAGS* - Displays the cause and location of an I/O module malfunction.

M43 *LED MODE* - Gives the user the option of having the starting address of each I/O module in the Local I/O system displayed on the LEDs on each module's faceplate instead of the normal I/O status display.

M44 *PWRUP CONFIG CHK* - Provides a power-up check to detect any change in the I/O configuration since the last power cycle and prevents the CPU from going into the RUN mode if a change is detected.

M45 *SELECT CONFIG* - Used in conjunction with sub-menu 44 to select whether to allow the CPU to go to the RUN mode with the OLD or NEW I/O module configuration if a configuration change has been detected through sub-menu 44 during a power cycle.

M46 *FORCE CONFIG* - Used to change the starting address of individual I/O modules if the user does not want to use the previously assigned addresses.

M47 *R/W SMART MDL* - Used to read from or write to an intelligent I/O module.

The functions selected through sub-menu's 42 through 46 are also available with Logicmaster 5 software.

Sub-Menu 41 - System Allocation

Run	Run W/Outputs Disabled	Stop
X	X	X

Selection of this sub-menu allows you to view a display of the types of modules, and their base unit and slot location, that are installed in the Local I/O system.

Access this sub-menu by entering the required key sequence (4 1 MENU, or MENU NEXT NEXT NEXT ENT). The initial display will be of the base unit having base unit address 0. Pressing the NEXT or PREV keys allows you to move the display slot-by-slot through the entire Local I/O chain.

To access a specific base unit while in this sub-menu, press the CLR key followed by the base unit address (ID number), and then NEXT. This will cause the selected base unit to be displayed immediately, without the need to use the PREV and NEXT keys repetitively to get to that base unit.

Base Unit Display

A typical base unit display is as shown below.

```
M41 I/O BASE      0/SLOTB
CHS508 :8 SLOT BASE UNIT
```

The 0 before the slash mark at the top right is the base unit address (ID number) selected by the user with the small rotary switch located above the I/O expansion connector on the left side of the base unit. This number will always be 0 through 7, and must not be used by another base unit. The base unit containing the CPU must always be assigned ID 0. The slot address indication (letter or number immediately after SLOT) will be either P (power supply), C (CPU or Local I/O Interface) or 0 through 7. Zero (0) is the first I/O module slot and is adjacent to the CPU/Local I/O Interface slot, and 7 is the last I/O slot in an 8-slot base unit. *Slot address 6 and 7 will be displayed for a 6-slot base unit, even though the slots do not physically exist, however, no module type will be displayed.*

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The bottom line of the display shows the last six characters of the catalog number for the base unit, and a description of that unit. The possible displays are:

```
CHS506  :6 SLOT BASE UNIT
CHS508  :8 SLOT BASE UNIT
```

An I/O module type, when displayed on the lower line of the LCD, will show the last six characters of the module's catalog number, and a brief description of the module. A typical module display is as follows:

```
M41 I/O BASE      0/SLOT1
MDL502 :12-24Vdc NEG 32I
```

This display shows that the module located in slot 1 of the base unit having an ID of 0, is a 32 point, 12-24 V dc Negative Logic Input module, with the catalog number IC655MDL502 (IC655 is implied, since it is the same for all Series Five components).

Sub-Menu 42 - Module Diagnostics

Run	Run W/Outputs Disabled	Stop
X	X	X

This function is also available with Logicmaster 5 software. Selection of this sub-menu provides a display of the probable cause and location in the Local I/O chain, of an I/O module that has a malfunction.

If the Series Five CPU detects one or more faults in an I/O module, at least two LED indicators turn on to identify the fault - the red I/O LED on the CPU and the red DIAG LED on the faulty I/O module. However, since the Local I/O chain can be up to 200 feet (60 meters) from the CPU to the last expansion base unit, it may not always be easy to quickly identify the faulty module, especially if it is at the end of the Local I/O chain. This sub-menu allows you to quickly locate a faulty module in the Local I/O chain.

When this sub-menu is initially accessed, the display will be as shown below.

```
M4*   I/O CONFIGURATION
M42   MODULE DIAGS
```

To activate the Module Diagnostic check, press the ENT key. If there are no I/O module faults detected, the display will be:

```
I/O CHECK OK
```

This sub-menu provides you with the tool to quickly identify the faulty module's location and type of fault. Examples of these faults are: a missing or loose terminal block, a module type change since the last power-down, or a faulty or missing 24 Vdc external power supply, if required by the module. An example of the LCD display generated by the CPU detection of a fault for an I/O module is as follows:

```
M42 I/O BASE    0/SLOT3
E201 MISSING TERM STRIP
```

The top line of the display identifies the location in the Local I/O chain of the faulty I/O module. In this example, it shows that the module is in the base unit with an ID of 0, and it is in slot 3 of that base unit. The bottom line displays the error number of the fault, and gives a brief description of the fault. The example shows that error 201 was detected by the CPU, and the problem is that the terminal block on

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that module is missing (or loose). To fix the problem causing the error, power-down the base unit containing the faulty module, fix the problem, and reapply power to the base unit. To verify that the fault has been fixed, again enter sub-menu 42 and activate the Module Diagnostic check. The display should then be:

```
I/O CHECK OK.
```

For a complete list of error messages, their meaning, and the action you should take to clear the error, refer to Appendix A in this manual.

Sub-Menu 43 - LED Mode

Run	Run W/Outputs Disabled	Stop
X	X	X

This function is also available with Logicmaster 5 software. This menu allows you to change the function of the status LEDs on I/O modules in the Local I/O chain. You can command the I/O modules to display each module's starting I/O address as an alternative to the normal display of the ON or OFF state of each point on a module.

When this sub-menu is initially accessed, the display will be as shown below.

```
M4*    I/O CONFIGURATION
M43    LED MODE
```

To activate the LED Mode, press the ENT key. The display will change to:

```
M43    LED MODE
IO:    I: O:RST
```

You are given the choice of displaying the starting addresses of all of the output modules in the Local I/O chain, the starting addresses of all of the input modules in the Local I/O chain, or the starting addresses of both the input and output modules in the Local I/O chain. To make your selection, use the <-- and --> arrows to move the blinking cursor displayed on the R when first entering the display, to either O, I, or IO, then press the ENT key. The display will then show your selection.

The green ADR indicator on the selected module types will turn ON, and each module's starting address will be displayed on the 16 LEDs (top 16 LEDs on a 32 point module). While a module is displaying its address, the status of its points are not indicated on the LEDs, however this in no way affects system operation - the system will run normally. If only input modules (or only output modules) were selected to display addresses in LED mode, the status of the output modules (or input modules) will continue to be displayed on the LEDs on the module's faceplate. To exit from the LED mode, position the cursor over RST and press the ENT key. This returns the display on the lens of each module to the normal I/O status display. To leave this menu, press the CLR or ESC key.

Module Address Display Format

The address on the faceplate of each type of selected module is displayed in BCD format as illustrated by the following figure. Each BCD digit is represented by a group of four vertical LEDs. The address shown is 0193.

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a42589

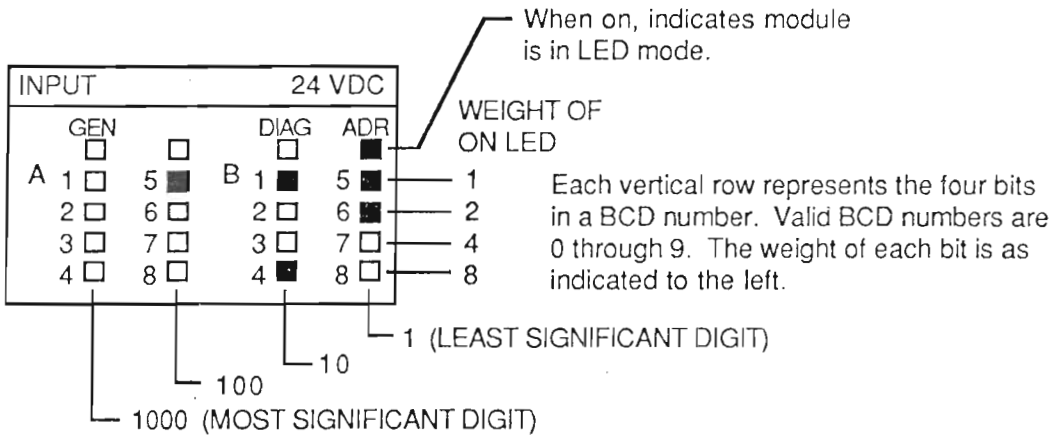


Figure 3-2. Reading I/O Module Starting Address on Leds

Sub-Menu 44 - Power-Up Configuration Check

Run	Run W/Outputs Disabled	Stop
		X

This function is also available with Logicmaster 5 software. This sub-menu allows you to enable or disable the power-up configuration check. There are two options available through this sub-menu.

1. ENABLE POWER-UP CHECK. If there has been an I/O configuration change during a power-down condition, on power-up the operator may select to allow the system to go into RUN mode only after confirmation by the operator.
2. DISABLE POWER-UP CHECK. Alternately, on an I/O configuration change occurring during a power-down condition, the operator can choose to allow the system to go into the RUN mode without requiring confirmation.

In systems that are installed and operational, it is recommended that the power-up check be enabled as a safety precaution. However, when testing or debugging new systems, it is often not convenient to have to confirm each module change that may be made. In this case, it may be more convenient to disable the power-up configuration check.

When this sub-menu is initially accessed, the display will be as shown below.

```
M4*    I/O CONFIGURATION
M44    PWRUP CONFIG CHK
```

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To activate the power-up configuration check, the CPU must be in the STOP mode. Press the ENT key, the display will change to:

```
M44   PWRUP CONFIG CHK
          (Y /N  )
```

Using the <-- and --> cursor control keys, move the blinking cursor over your choice, either Y for YES - to enable the power-up configuration check, on N for NO - to disable the power-up configuration check. After making your selection, press the ENT key to activate the selection. If Y is selected, the display will read:

```
PWRUP CHK ON
```

Or, if N is selected, the display will read:

```
PWRUP CHK OFF
```

To change the power-up configuration enable/disable selection, again select this sub-menu and repeat the steps described above.

Sub-Menu 45 - Select Configuration

Run	Run W/Outputs Disabled	Stop
		X

This function is also available with Logicmaster 5 software. This sub-menu is used in situations where the power-up configuration check has been enabled using sub-menu 44. Through this sub-menu the user selects which configuration is valid after a configuration change when a power-down has been detected by the Series Five CPU.

When first entering this sub-menu, the display is as shown below.

```
M4*   I/O CONFIGURATION
M45   SELECT CONFIG
```

The CPU will not go into the RUN mode until the user has selected either *NEW* - to run with the configuration it is now reading (the current real configuration), or *MEM* - to run with the configuration that was stored in its scratch pad memory when it was last powered-down.

After activating this sub-menu by pressing the ENT key, the display will be:

```
M45   SELECT CONFIG
          (NEW/MEM)
```

Using the <-- and --> cursor control keys, move the blinking cursor over your choice, either *NEW* - to tell the CPU to go into the RUN mode using the new I/O configuration, or *MEM* - to tell the CPU to go

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into the RUN mode using the previous configuration. When *NEW* is selected by pressing the ENT key, the display will show:

```
CONFIG =  NEW
```

NOTE

The user must be aware that selecting "NEW" will cause the CPU to assign addresses starting at I0001 or O0001 to any installed I/O modules that have not yet been assigned addresses by the user.

Alternately, the user can select MEM by moving the cursor over MEM, and pressing the ENT key. This selection tells the CPU to go into the RUN mode using the I/O module configuration that was stored in scratch pad memory at the time of the last power-down. When MEM is selected, the display will be:

```
CONFIG =  MEM
```

Sub-Menu 46 - Force Configuration

Run	Run W/Outputs Disabled	Stop
		X

This function is also available with Logicmaster 5 software. This sub-menu is used to allow the user to change the I/O addresses of individual I/O modules in a system. When this sub-menu is initially selected, the display will be:

```
M4*   I/O CONFIGURATION
M46   FORCE CONFIG
```

I/O modules can be assigned addresses in one of two ways, either user assigned (recommended method), or CPU assigned. I/O modules can be automatically assigned I/O addresses by the Series Five CPU without the need to set DIP switches. However, this automatic addressing system closes the gap between module addresses if there are no empty slots between modules. This can be an inconvenience when a user is initially wiring a system, and debugging the logic program. Any empty module slots will cause modules downstream in the I/O chain to have the wrong address relative to the address that they will have when the system is complete. This situation can cause the user to be unable to evaluate the system thoroughly with wired modules until the system is complete. To avoid this situation, the user, through this sub-menu or with LM5, can force each module to occupy the address that it will have when the system is complete.

After entering this sub-menu and pressing the ENT key the display will be as shown below.

```
M46   FORCE CONFIG
      1->AUTO  2->FORCE □
```

If you want to confirm that it is OK for the CPU to automatically assign addresses, select the AUTO option by entering a 1. This entry will be displayed where the blinking cursor appears on the LCD. After entering 1 and pressing the ENT key, the display will be:

```
M46   FORCE CONFIG
      OK
```

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If you want to force the I/O configuration, enter a 2, then after pressing the ENT key, the display will be:

```
M46   FORCE CONFIG
0/0 -------  -------
```

This display shows the location of the first I/O module slot in the system. The 0 (zero) to the left of the slash mark is the base unit ID number, and the 0 to the right of the slash mark is the module slot number in that base unit.

The next entries will be either IN or OUT and the address you will assign to the module in that slot location. The address assigned to a module should always start on a byte boundary. If you enter an address for the module that is not on a byte boundary, the CPU will assign the lower byte boundary address (in which your assigned address is included) to the module.

After you have entered the module type and address, and pressed the ENT key, the module will be forced to that address. When you press the ENT key, the type of module, either I or O, and its forced address will be displayed. The slot number will also advance to the next slot number. To move to other slot locations, use the PREV and NEXT keys. After slot 7 has been displayed, the display will advance to the next slot, which is also in the next base unit. The display will then change to:

```
M46   FORCE CONFIG
1/0   -------  -------
```

As an example of forcing I/O addresses - if the module in base unit 0/slot 0, is to be given a starting address of 33, the required key entries would be:

```
OUT  3  3  ENT
```

After entering this key sequence, the display will then show the next slot (0/1). To check the forced address, press the PREV key and the display will show:

```
M46   FORCE CONFIG
0/0    O    3
```

NOTE

Once the first I/O module address has been forced, all other I/O modules located downstream of this module will have to be forced to avoid generating an address conflict.

To reset individual modules with a CPU assigned address, use the PREV and NEXT keys to select each module. As each module is displayed, press the SHFT and PREV keys. A confirmation prompt will appear on the display.

```
SLOT AUTO?
```

Now press the ENT key for confirmation that you want the CPU to assign the module's address. This method of addressing modules should be used with caution.

Sub-Menu 47 - Read from or Write to an Intelligent Module

Run	Run W/Outputs Disabled	Stop
X	X	X

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Through selection of this sub-menu, you can read data from an intelligent I/O module or write data to an intelligent I/O module.

For details of the data to be read to or written from an intelligent I/O module, refer to the particular module's specifications, which can be found in the applicable user's manual.

When this sub-menu is first accessed, the initial display will be:

```
M4*    I/O CONFIGURATION
M47    R/W SMART MDL
```

After pressing the ENT key to activate this sub-menu, the display will be:

```
M47    R/W SMART MDL
 /    /    /  BASE ?□
```

You now need to enter the base unit address in which the intelligent I/O module is located that you wish to read from or write to. Key-in the base unit ID number (0 through 7), then press the ENT key to confirm the entry. The display will change to show the base unit ID number (0 in the example) and prompt you for the slot number in which the intelligent I/O module is located.

```
M47    R/W SMART MDL
0/    /    /  SLOT ?□
```

Now enter the slot number (0 through 7) of the intelligent I/O module, and confirm the entry by pressing the ENT key. The display will again change and will now show the base unit ID number and the slot number you have entered. In the following example, 5 was entered as the slot number.

```
M47    R/W SMART MDL
0/5/      /  ADDR ?□
```

At this point the display is prompting you to enter the starting byte address from which the module is to read to or write from. This address (0 through 255) must correspond to the request queue of the intelligent I/O module. Confirm the address by pressing the ENT key. The next display is as shown (address 12 used in the example) below.

```
M47    R/W SMART MDL
0/5/012/     BYTES?□
```

This display prompts you for the number of bytes that are to be read or written. The valid entries for this prompt are 1 through 4, and the entry is confirmed by pressing the ENT key. The next display is as shown below (assuming that 4 bytes were requested to be read).

```
M47    R/W SMART MDL
0/5/012/4          XYXYXYXY
```

Each XY shown in the display represents the value of the specified bytes, 12 to 15. The cursor will be over the first value (XY) position. To write to these addresses, enter the new values to be written, then press the ENT key to confirm the new value.

This sub-menu can be exited at any time by pressing the ESC key.

Main Menu 5 - CPU Configuration

This menu allows you to display or configure certain CPU parameters. There are six sub-menus associated with this menu. *Some of the listed functions are also available with Logicmaster 5 software.*

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M51 *SHOW PROGRAM NAME* - This sub-menu displays the user assigned name for the current program in the Series Five CPU.

M52 *SET DATE AND TIME* - This sub-menu is used to display or change the Series Five real-time clock/calendar.

M53 *SHOW SCAN TIMES* - This sub-menu provides a display of the current, maximum, and minimum scan times of the program running in the CPU.

M54 *SET WDOG* - This sub-menu allows you to set a maximum scan time for the program to reach before shutting down.

M55 *CPU ID* - This sub-menu allows you to display or set the CCM address of the Series Five CPU, and it also allows you to select parity.

M56 *RESET ALL OVRD* - This sub-menu allows you to simultaneously reset all existing overrides in the Series Five I/O system.

Sub-Menu 51 - Show Program Name

Run	Run W/Outputs Disabled	Stop
X	X	X

*This function is also available with Logicmaster 5 software.*This sub-menu allows you to display the name of the CPU ladder logic program that is stored in the memory cartridge in the CPU. The program name can only be displayed, it cannot be changed with the OIU. The program name that is displayed is the name assigned when storing the program using Logicmaster 5. When this sub-menu is accessed, the initial display is:

```
M5*    CPU CONFIGURATION
M51    SHOW PROGRAM NAME
```

The sub-menu is activated by pressing the ENT key. When this is done the program name will be displayed as shown in the following example.

```
PROGRAM NAME
```

To exit this sub-menu, press the CLR or ESC key.

Sub-Menu 52 - Set Date and Time

Run	Run W/Outputs Disabled	Stop
X	X	X

*This function is also available with Logicmaster 5 software.*This sub-menu allows you to display or change the date and time of the real-time clock/calendar in the Series Five CPU. The date and time values are stored in data registers 4087 through 4093 in the CPU. These registers and their date and time data content are as follows:

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R4087 Seconds	R4090 Day of week
R4088 Minutes	R4091 Day
R4089 Hour	R4092 Month
	R4093 Year

The initial display that you will see upon selecting this sub-menu is:

```
M5*   CPU CONFIGURATION
M52   SET DATE AND TIME
```

Pressing the ENT key to activate this sub-menu will cause the current date to be displayed as shown.

```
M52   SET DATE AND TIME
YMD   88/04/13/3(WED)
```

The form of the date display is YY/MM/DD/DAY, with YY the current year, MM the current month, DD the current day of the month and DAY the current day of the week (0 = Sunday, 1 = Monday, 2 = Tuesday, 3 = Wednesday, 4 = Thursday, 5 = Friday, 6 = Saturday). By using the --> and <-- cursor control keys, the cursor can be positioned over any of the displayed values to change that value(s).

When changing any of the date values, you must enter only valid dates; the system will not accept invalid values for any field. After changing a date value, pressing the ENT key writes the new date to the CPU, and the current time is displayed, as shown.

```
M52   SET DATE AND TIME
TIME   17:05:30
```

The form of the time display is HH:MM:SS, with HH the current hour (24 hour clock), MM the current minutes, and SS the current seconds. If any changes are to made to the time as it is displayed, position the cursor over the the value to be changed, and key-in the new time. Pressing the ENT key writes the new time to the CPU, and both the date and time are displayed in the upper right of the LCD display, as shown in the example below. If no changes are made, the current date and time are displayed as they initially appeared.

```
88/04/14 10:07:35
```

To exit this sub-menu before the final display, press the ESC key. To clear the final display, press the ESC or CLR key.

Sub-Menu 53 - Show Scan Times

Run	Run W/Outputs Disabled	Stop
X	X	X

This function is also available with Logicmaster 5 software. This sub-menu allows you to display the current, maximum, and minimum scan times for the Series Five CPU while it is running a user logic program. The initial display that you will see upon entering this sub-menu is:

```
M5*   CPU CONFIGURATION
M53   SHOW SCAN TIMES
```

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To activate the scan time display, press the ENT key. The display will then show the applicable scan times.

```
SCAN     MAX    MIN
XXXX    XXXX    XXXX
```

If the CPU is in the STOP mode, the displayed values will be the last, maximum, and minimum scans valid for the last time the CPU was in the RUN mode. However, a power cycle, or STOP to RUN transition, will zero these values. The scan times (in milliseconds) displayed are:

SCAN = the time duration for the latest (current) complete scan (read from register 4094).

MAX = the longest scan time since going to RUN mode (read from register 4095).

MIN = the shortest scan time since going to RUN mode (read from register 4096).

This menu can be exited by pressing the ESC or CLR key.

Sub-Menu 54 - Set Software Watchdog Timer

Run	Run W/Outputs Disabled	Stop
		X

This function is also available with Logicmaster 5 software. This sub-menu allows you to set the Watchdog Timer value. If a maximum time needs to be set, which when reached, should cause the CPU to go to the STOP mode, you can specify a value for a software timeout (Watchdog Timer) when the CPU scan exceeds that value. The Watchdog Timer can be set to any value between 20 and 998 milliseconds, in 2 millisecond increments, with the OIU. The factory set default value for the Watchdog Timer is 200 milliseconds.

The maximum scan time register R4096 can be used in user logic to provide the means to initiate an orderly shutdown if the scan time should become too long for safe operation of the controlled system, before the Watchdog times out.

The initial display upon entering this sub-menu is:

```
M5*   CPU CONFIGURATION
M53   SET WDOG
```

When the ENT key is pressed, this sub-menu is activated, and the current setting for the Watchdog Timer is displayed as shown:

```
M54   SET WDOG
0200  MSEC      □
```

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A blinking cursor will be seen at the right on the bottom line. To change the time of the Watchdog Timer key-in the new value while the current setting is being displayed. When the new value entry is confirmed by pressing the ENT key, the display changes to:

```
M54    SET WDOG
OK
```

NOTE

A setting value between 0 and 19 milliseconds that is entered for the software Watchdog Timer, will automatically be set to 20 milliseconds by the OIU. It is recommended that the setting value be 20% higher than the expected maximum scan time.

Exit this sub-menu by pressing either the ESC or CLR key.

Sub-Menu 55 - CPU ID

Run	Run W/Outputs Disabled	Stop
		X

*This function is also available with Logicmaster 5 software.*This sub-menu allows you to display or configure the CCM ID number of the CPU and select parity for communicating as a slave device in a network system through the CPU's built-in CCM port. The display upon accessing this sub-menu by pressing the ENT key is:

```
M5*    CPU CONFIGURATION
M55    CPU ID
```

NOTE

Valid ID numbers for the CCM port are 1 through 90. When setting this value to any number other than 1, DIP switch position 2 in the group of four switches located directly above the red RESET pushbutton on the CPU, must be set to the OFF position. Refer to the Series Five User's manual, GFK-0122, for more information on CPU switch settings.

When the ENT key is pressed while in this sub-menu, the display shows the current CPU CCM ID.

```
M55    CPU ID
CPU    ID  01      □
```

To change the ID number, enter the new number. The new entry is displayed on the bottom line at the blinking cursor position. When the entry is confirmed by pressing the ENT key, the display then changes and prompts you for parity selection.

```
M55    CPU ID
ODD    / NONE
```

The parity selections are either ODD parity or NO parity. To select the desired parity option, move the cursor with the cursor control keys so that it is positioned over the selection, and press the ENT key. As a confirmation that your selection was accepted, the display will change to:

```
M55    CPU ID
OK
```

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To exit this sub-menu, press the ESC or CLR key.

Sub-Menu 56 - Reset All Overrides

Run	Run W/Outputs Disabled	Stop
X	X	X

This sub-menu allows you to reset all overrides currently set in all reference tables without having to search through each individual reference table using the SEARCH function, as described in Chapter 2. The display upon selecting this sub-menu is:

```
M5*    CPU CONFIGURATION
M56    RESET ALL OVRD
```

When the ENT key is pressed, a prompt is displayed as a confirmation to ensure that you want to take this action to clear all system overrides.

```
M56    RESET ALL OVRD
RST ALL?
```

Press the ENT key to confirm this action, or the ESC key to exit with no action taken. If the ENT key is pressed and any overrides are set in the system, they will then be reset. When this action is complete, the display will change as shown below to confirm that all overrides have been found and reset.

```
M56    RESET ALL OVRD
OK
```

If no overrides are found, the following message is displayed on the LCD:

```
M56    RESET ALL OVRD
NO OVERRIDE FOUND
```

To exit this sub-menu, press either the ESC or CLR key.

Main Menu 6 - OIU Configuration

This menu allows you to set certain OIU attributes, perform self tests, display firmware revision numbers, and force the OIU on or off-line.

M61 *SHOW REV. NUMBERS* - This sub-menu displays the firmware revision numbers of the OIU, CPU, and the CPU's gate array.

M62 *BUZZER ON/OFF* - This sub-menu allows you to disable or enable the audible tone that accompanies each keystroke on the OIU.

M63 *BACK-LIGHT ON/OFF* - This sub-menu allows you to turn on or off, the amber back-light of the LCD display.

M64 *OIU ON/OFF-LINE* - This sub-menu allows you to force the OIU on or off-line, when both the OIU and a second serial device are connected to the CCM port on the CPU.

M65 *SELF DIAG* - This sub-menu allows you to initiate several self-tests on the OIU.

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Sub-Menu 61 - Show Revision Numbers

Run	Run W/Outputs Disabled	Stop
X	X	X

This sub-menu, when selected, provides a display of the revision numbers for the firmware in the CPU, the CPU's gate array, and the OIU. The revision numbers can only be displayed, they cannot be changed or in any way be written to. This is a handy feature to use for verifying that the firmware revisions are the most current revisions available, or to verify that the installed firmware may be the cause of a problem, if a certain revision is known to have a problem.

When this sub-menu is first selected, the display is:

```
M6*   OIU CONFIGURATION
M61   SHOW REV. NUMBERS
```

Pressing the ENT key to activate this display causes the revision numbers to be displayed as shown below. *The revision numbers shown in this example may not be the same as the revision numbers for your firmware, since this is intended to be viewed as an example.*

```
REV. NUMBERS    OIU:TEST4
 CPU:G2.6       GA :G 2.0
```

To exit this sub-menu, press either the CLR or ESC key.

Sub-Menu 62 - Buzzer On/Off

Run	Run W/Outputs Disabled	Stop
X	X	X

This sub-menu allows you to toggle on or off the audible tone that sounds each time any of the keys on the OIU keypad are pressed. The initial display for this sub-menu is:

```
M6*   OIU CONFIGURATION
M62   BUZZER ON/OFF
```

Any time that this sub-menu is entered by pressing the ENT key, the toggle will occur, and the display will be blanked (nothing displayed). If the buzzer is off, it will turn on - if off it will turn on.

NOTE

The OIU will power-up with the buzzer configuration it was in when power was last removed.

Sub-Menu 63 - Back-Light On/Off

Run	Run W/Outputs Disabled	Stop
X	X	X

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GFK-0181

This sub-menu allows you to toggle on or off the amber back-light on the LCD display. The initial display for this sub-menu is:

```
M6*   OIU CONFIGURATION
M63   BACK-LIGHT ON/OFF
```

Similar to the previous sub-menu, any time that this sub-menu is entered by pressing the ENT key, the toggle will occur, and the display will be blanked (nothing displayed). If the LCD display back-light is on, it will turn off -if it is off, it will turn on. *When the OIU is powered-up, the back-light configuration will be as it was when power was last removed.*

Sub-Menu 64 - OIU On/Off-Line

Run	Run W/Outputs Disabled	Stop
X	X	X

This sub-menu allows you to force the OIU to either On-Line or Off-line. This is a necessary function when the OIU is connected to the upper port connector of the Series Five CPU, and another serial device, for example, an OPTI-BASIC Operator Interface terminal, or a programming device such as a Workmaster or Cimstar computer is connected to the lower port connector. Since the upper port connector takes priority if the OIU powers-up on-line, no communication is possible through the lower port if the OIU had been in the On-Line mode the last time that it was connected. *The OIU powers up in the mode it was in when it was last powered-down.* The initial display upon selecting this sub-menu is:

```
M6*   OIU CONFIGURATION
M64   OIU ON/OFF-LINE
```

When the ENT key is pressed, the resultant display is:

```
ON-LINE
          (ON/OFF)
```

You are prompted to select either ON or OFF by moving the blinking cursor with the cursor control keys, <-- and -->. After making your selection, press the ENT key to confirm that selection. The On or Off-Line status of the OIU is then displayed on the LCD, as shown below. The LEDs to the left of the LCD display will also reflect your On or Off-Line selection. The LED applicable to the current mode that the CPU is in will turn on if you force the OIU On-Line, or turn off if you force the OIU Off-Line. *The CPU mode is not changed by this function, only the On or Off-Line status of the OIU.*

```
ON-LINE  or  OFF-LINE
```

Sub-Menu 65 - Self-Diagnostics

Run	Run W/Outputs Disabled	Stop
X	X	X

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This sub-menu allows you to initiate several self-checks on the OIU, that may be required periodically for maintenance purposes or to check the performance of the items checked by these diagnostics. When this sub-menu is initially selected, the display is:

```
M6*    OIU CONFIGURATION
M65    SELF DIAG
```

The self checks included in this sub-menu are each described below. The checks are selected by using the PREV and NEXT keys until the desired check is displayed. When the check is displayed on the LCD, press the ENT key to start that check.

(1) KEYBOARD CHECK? - This check verifies that any key that is pressed on the OIU keypad sends the correct code to the CPU. Each time that a key is pressed after this sub-menu is activated, and the ENT key is pressed - a code corresponding to that key is displayed on the LCD. The following table lists the code transmitted by each key.

Table 3-4. Key Codes Generated in OIU Self-Check

	0	1	2	3	4	5
1	HEX	DEC	<---	±	OVRD	MENU
2	BIN	DEC	7	8	9	ESC
3	TMR	CNT	4	5	6	PREV
4	REG	CH	1	2	3	NEXT
5	IN	OUT	CLR	0	ENT	SHFT

Codes are read in hexadecimal format. The vertical column of numbers is the most significant digit of the generated code, and the horizontal row of numbers is the least significant digit of the generated code. For example, pressing the PREV key will cause the code 35H to be displayed, and pressing the 7 key will cause the code 22H to be displayed. An exception to this test procedure, is that when the ENT key is pressed, the Keyboard Check is exited, and the next test is displayed.

(2) DISPLAY CHK? - This self-check allows you to view each displayable character and its associated ASCII code. After pressing the ENT key to activate this check, the first character to be displayed - 0 (zero) and its ASCII code (30H) will appear on the LCD as shown below.

```
M65    SELF DIAG
ASCII CODE    -->30H=0
```

NOTE

The Codes that are displayed in this self-check are industry standard ASCII codes. They are not the same as the codes generated while in the Keyboard Check. The codes generated in the Keyboard Check are unique in the OIU.

All displayable ASCII characters that are programmed into the OIU firmware can be viewed by paging through them using the PREV and NEXT keys. Pressing the ENT key leaves this check and advances the display to the next check.

(3) LED/BACKLIGHT CHK? - Selection of this check initiates a display pattern that checks all 48 character positions on the LCD, the amber back-light, and the three LEDs which are the CPU mode indicators. Pressing the ENT key activates the check. The three areas checked will turn on one second

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and off one second for about five seconds. When the check is complete, the display will automatically advance to the next self-check.

(4) TAPE PORT CHK? - This check allows you to perform a communications check on the RS-232 port located on the lower side panel of the OIU. The check verifies that the RS-232 signals are properly transmitted and received through the port. This port is accessed through an 8-pin miniature DIN connector. To perform this check requires the installation of a loop-back connector. Refer to Appendix C for the RS-232 pinout for this port.

(5) MC OPERATIONS CHK? - This check is used to verify that the OIU is correctly writing to RAM and EPROM memory cartridges, for example, when the content of the memory cartridge in the CPU is to be copied to a memory cartridge installed in the OIU. When this check is activated by pressing the ENT key, you are prompted to select the type of memory cartridge to be checked.

```
M65   SELF DIAG
MC TYPE        (RAM/UVPROM)
```

Select either RAM or UVPROM by moving the cursor over your selection and pressing the ENT key. If the selection is UVPROM, the check is initiated, and the memory cartridge will be tested. If it is operating normally, the following message will be displayed.

```
M65   SELF DIAG
UVPROM OUTPUTTING 6V&12V
```

When RAM is selected, the CMOS RAM memory cartridge will be checked. While it is being checked, an informative message is displayed:

```
M65   SELF DIAG
BUSY - RAM CHECK
```

If the check is passed, the display will again show the first test - (1) KEYBOARD CHK?.

If either the RAM check or the UVPROM check detects a problem with the applicable memory cartridge, a test failed message will be displayed. In this case, you should replace the failed memory cartridge.

Main Menu 7 - Memory Cartridge

This menu allows you to perform the operations necessary to upload and download data from one memory cartridge to another, to a cassette recorder, or to an external computer. These operations can be performed on all three types of memory cartridges used in the Series Five PLC - CMOS RAM, EPROM (UVPROM), and EEPROM, since the OIU has a built-in PROM writer.

There are eleven sub-menus associated with this menu.

M71 *CPU TO MC* - Copies data from the CPU memory cartridge to the memory cartridge in the OIU.

M72 *MC TO CPU* - Copies data from the memory cartridge in the OIU to the memory cartridge in the CPU.

M73 *VERIFY MC = CPU* - Verifies that the CPU and OIU memory cartridges contain the same data.

M74 *BLANK CHK* - Checks to verify that the OIU memory cartridge does not contain any data (is blank).

M75 *CLR MC* - Clears contents of the OIU memory cartridge (RAM and EEPROM only).

M76 *DISPLAY MC TYPES* - Display type of memory cartridge in both the CPU and OIU.

M77 *TAPE TO MC* - Copies data from cassette recorder to OIU memory cartridge.

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M78 *MC TO TAPE* - Copies data from the OIU to a cassette recorder.

M79 *VERIFY MC = TAPE* - Verifies that the memory cartridge in the OIU and the cassette recorder contain the same data.

M7A *COMPUTER TO MC* - Copies data from an external computer to the OIU memory cartridge.

M7B *MC TO COMPUTER* - Copies data from the OIU memory cartridge to an external computer.

CAUTION

When performing any of the memory cartridge operations available from this menu, power must be removed from the OIU or CPU, as applicable, before inserting or removing a memory cartridge. If this caution is not followed, the memory cartridge may be damaged. Handle RAM memory cartridges with care, since excess charges of static electricity could damage the memory devices in the cartridge.

Prompts for Copy Operations

The prompts associated with most of these sub-menus follow a similar pattern. In all of the copy operations, you are prompted for the type of data to be copied, either program (user logic), data registers, or system parameters. When user logic or system parameters are selected, all of the data will be copied. When data registers are selected to be copied, you will be prompted to specify an address range for data to be copied. When copying data between the memory cartridge in the CPU and the memory cartridge in the OIU, there are three types of data that can be copied:

1. *User program data* - this copies the ladder logic program.
2. *Register data* - this copies the data in a specified range of registers.
3. *System parameter data* - this copies data associated with the CPU set-up parameters, including scratch pad data, and the I/O configuration.

NOTE

When copying user logic or data registers, ensure that the memory cartridges used are large enough for the operation involved. Do not try to copy 16K of program or registers onto a 4K memory cartridge, or 16K registers from the OIU memory cartridge onto a 4K memory cartridge in the CPU.

Verification of Copy Operations

For certain operations involving the copying of registers, a verification of the copy is performed immediately after the copy is completed. For data copies that include the special register area (R3848 to R4096), certain registers that contain dynamic data, such as the CPU real-time clock or the current scan time counter, will have changed value by the time that the verification is done. This will cause the error message

```
E640 MISCOMPARE
```

to be displayed on the LCD. Verification can be performed using sub-menu 73, and specifying register ranges that omit the special register area.

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Storing User Logic and Data Registers

In the CPU, register data is always stored on a register chip (either 4K or 16K), and user logic is always stored on the memory cartridge. However, when copying both register data and user logic to a memory cartridge in the OIU for back-up purposes or to simulate one system on another CPU, two separate memory cartridges must be used. Register and user logic data are both stored to the same area in the OIU memory cartridge, and will overwrite one another if an attempt is made to store both on the same memory cartridge. *Do not store user logic and data registers onto the same memory cartridge.*

Copy Operations With Password Assigned

In order to use any of the operations in this menu which involve copying data if a password has been assigned to a CPU, and the CPU is locked, the user will first have to logon to the system from sub-menu 81 (described later in this chapter).

Additionally, for operations where data from another system is involved, and a password has been saved with that data, the user must know both passwords -that of the current CPU, and the password that was relevant for the system from which other data was taken.

Example With Two CPUs Password Protected

Suppose that you have logged onto a locked CPU, (e.g CPU ID1) and system parameters from another CPU (e.g. CPU ID3) are to be downloaded to the memory cartridge in the first CPU (ID1). Register and system parameters came from a CPU (ID3) password protected with the code - *12345678*; the current CPU *(ID1)* is password protected with - *99*. To perform this operation, you would first logon to the current CPU (ID1) through sub-menu 81, and enter the password *99*. *Note that leading zeros are not required when entering a Series Five password.*

Next insert the memory cartridge having the register and system parameters into the OIU (with power removed). To copy this data to the CPU, access sub-menu 72. When the operation is attempted, the OIU will prompt you to enter the password for the memory cartridge in the OIU. The steps and resulting displays to this point are:

```
M7*   MEMORY CARTRIDGE
M72   MC TO CPU
```

Press the ENT key to select this sub-menu.

```
M7*   MEMORY CARTRIDGE
OIU   MC CODE: □
```

Key-in the password for the memory cartridge in the OIU.

```
12345678 (If there is no password, key-in ENT)
1:PG/2:RG/3:SYS     □
```

Following this sequence, which applies to sub-menus 71, 72, 73, 75, 77, 78, 79, 7A, and 7B, the normal sequences described for each sub-menu apply.

NOTE

In all prompts in this menu, the abbreviation MC (Memory Cartridge), represents the memory cartridge in the OIU, not the memory cartridge in the CPU. If an attempt is made to access any sub-menu with no MC in the OIU, the error message - *E622 NO MC IN OIU* - is displayed on the LCD.

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Sub-Menu 71 - Copy Data from CPU MC to OIU MC

Run	Run W/Outputs Disabled	Stop
X	X	X

This sub-menu allows user logic, register data, and system parameters to be copied from the memory cartridge in the CPU to the memory cartridge in the OIU. In this sub-menu, as in all sub-menus in main menu 7, you are prompted for type of data - either user logic, register, or system data.

All user logic and system data are always completely copied, while with register data, you are prompted to specify a range of registers to be copied, which may include the total register range, if required. This sub-menu is especially useful for copying programs developed on CMOS RAM memory cartridges onto EPROM cartridges, to have a non-volatile back-up copy of that program.

The initial display upon accessing this sub-menu is:

```
M7*   MEMORY CARTRIDGE
M71   CPU TO MC
```

Pressing the ENT key causes the display to change to:

```
M71   CPU TO MC
1:PG/2:RG/3:SYS □
```

At this prompt, enter the number for the required operation, and confirm your entry by pressing the ENT key. Keying-in either 1 or 3 will show a confirmation prompt for the selected operation, and pressing the ENT key to confirm will initiate the data copy from the CPU memory cartridge to the OIU memory cartridge.

NOTE

At this point, if the memory cartridge in the OIU already contains data, i.e., it is not a blank cartridge, the message - *MC IS NOT BLANK* - will be displayed. You will then have to either remove that cartridge and insert a known blank cartridge, or exit this sub-menu, and go to sub-menu 75 and clear the cartridge first installed in the OIU. Only RAM and EEPROM memory cartridges can be cleared in the OIU, EPROM cartridges must be cleared externally by exposing them to a source of ultra violet light.

The time required for the copy depends on the type of memory cartridge used, and the amount of memory to be transferred. While the copying is in progress, the LCD displays the amount of data copied and updates that number to keep the user informed of the progress of the operation. The numbers shown are 1, for 1K of memory, 2, for 2K of memory, etc.

Keying in 2 at the prompt for data type, will cause the OIU to prompt you to enter a register start address and a register end address. Only the specified range of registers will be copied. The format for this prompt is:

```
M71   CPU TO MC
1st       R 00001  □
```

Key-in the number of the first register in the range, press ENT, the display changes to:

```
M71   CPU TO MC
LAST      R 04096  □
```

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The display shows the register corresponding to the last register for the chip in the CPU, and will be either 4096 or 16384. Key-in the last register in the range that you wish to have copied, and press the ENT key. The register range you entered will be displayed, and you are prompted for confirmation that it is correct.

If it is correct, again press ENT, to begin the copying operation.

```
M71    CPU TO MC
R XXXXX  -  R XXXXX ?
```

Again, if the OIU detects that the memory cartridge is not blank, the message - *MC IS NOT BLANK* - will be displayed, otherwise the copying operation begins.

Sub-Menu 72 - Copy Data from OIU MC to CPU MC

Run	Run W/Outputs Disabled	Stop
		X

This sub-menu allows user logic, register data, and system parameters to be copied from the memory cartridge in the OIU to the memory cartridge in the CPU.

The format for the prompts, user required entries, and sequence of operation are the same for this sub-menu as for sub-menu 71. The only difference is that the direction of the copy operation is reversed, - data is copied from the memory cartridge in the OIU to the memory cartridge in the CPU.

Sub-Menu 73 - Verify that Data in the CPU Equals Data in OIU Memory Cartridge

Run	Run W/Outputs Disabled	Stop
X	X	X

This sub-menu verifies that the data on two different memory cartridges is equal, and is OK to use after that data has been copied from one memory cartridge to another. The format for the prompts, user required entries, and sequence of operation are the same for this sub-menu as for sub-menus 71 and 72.

The only difference is that the data stored in the memory cartridge in the OIU is compared to the data stored in the memory cartridge in the CPU to verify that they are the same. When this sub-menu is selected, the initial display is:

```
M7*    MEMORY CARTRIDGE
M73    VERIFY MC = CPU
```

You are then prompted for the data type to be verified in the same manner as the previous two sub-menus. Select the data type, and press the ENT key to initiate the compare operation. The memory cartridge type installed in the OIU is displayed, and the specified data is compared. If the data in the OIU's memory cartridge is the same as the data in the CPU's memory cartridge, the message shown below is displayed.

```
VERIFICATION OK
```

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If the data is not equal between the two memory cartridges, a miscompare error message will be displayed, as shown below.

```
E640 MISCOMPARE
```

Sub-Menu 74 - Checks Whether or Not the OIU Memory Cartridge is Blank

Run	Run W/Outputs Disabled	Stop
X	X	X

This menu initiates a check to see if any program, register, or system parameter data already exists on the memory cartridge installed in the OIU. This check does not specify what type of data exists on the memory cartridge if any is found, only that it is there.

The initial display upon entering this sub-menu is:

```
M7*    MEMORY CARTRIDGE
M74    BLANK CHK
```

When the ENT key is pressed to activate this check, the message

```
M74    BLANK CHK
CHECK MC IS BLANK?
```

is displayed on the LCD as a confirmation prompt. If you wish to continue with the check, press the ENT key. If the result of the check is that there is no data on the memory cartridge, the message

```
MC CLEARED
```

will be displayed.

However, if any data is currently saved on the memory cartridge, the message as shown below will be displayed. You will need to either clear the current contents of the memory cartridge, or use another one.

```
E621 MC NOT BLANK
```

Sub-Menu 75 - Clear All Data in the OIU Memory Cartridge

Run	Run W/Outputs Disabled	Stop
X	X	X

This sub-menu allows you to clear all data in the RAM or EEPROM memory cartridge currently installed in the OIU. All of the memory in the cartridge will be cleared regardless of the size. *EPROM memory cartridges can be cleared of their current memory contents by subjecting them to a source of ultra-violet light for a specific period of time. This is done on equipment external to the Series Five PLC.* The initial display on the LCD upon selecting this sub-menu is as shown below.

```
M7*    MEMORY CARTRIDGE
M75    CLR MC
```

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GFK-0181

Press the ENT key to start the operation. *If a password is stored in the cartridge, you are prompted to enter the password.* A confirmation prompt is then displayed as a reminder that all memory will be cleared. To proceed with the memory clear operation, again press the ENT key.

```
M75    CLR MC
CLEAR ENTIRE MC?
```

When all memory is cleared, a confirmation message is displayed.

```
MC CLEARED
```

To verify that the memory cartridge has been completely cleared, again select sub-menu 74, and initiate a blank check on the memory cartridge.

Sub-Menu 76 - Display the Type and Size of the Memory Cartridge Currently Installed in the OIU and the CPU

Run	Run W/Outputs Disabled	Stop
X	X	X

This sub-menu provides a display of the type and size of the memory cartridge currently installed in the OIU and the CPU. The initial display for this sub-menu is:

```
M7*    MEMORY CARTRIDGE
M76    DISPLAY MC TYPES
```

When the ENT key is pressed the display will show the type and size of the CPU and OIU memory cartridge. The display as shown below is an example only, the actual memory cartridges installed in your system will be displayed.

```
   PC            OIU
CMOSRAM 04K UVEPROM 08K
```

Sub-Menu 77 - Copy Data from Cassette Tape to the OIU Memory Cartridge

Run	Run W/Outputs Disabled	Stop
X	X	X

This sub-menu allows you to copy data previously recorded on cassette tape, to the memory cartridge in the OIU. The format and prompts are similar to sub-menu 71. The cassette recorder connects to the OIU through the serial communications port on the bottom panel of the OIU. A cable must be made for this purpose. Wiring details, port specifications, and specifications for a cassette recorder can be found in Appendix C.

The initial display upon selecting this sub-menu is:

```
M7*    MEMORY CARTRIDGE
M77    TAPE TO MC
```

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Most audio cassette recorders with auto-level control can be used for recording purposes with the Series Five PLC. It is recommended that the recorder have a counter to allow multiple programs to be recorded on tape. For proper operation, the tone control should always be set to its maximum, and the volume level control at approximately 75% of maximum. If the volume control level is set at the wrong range for a successful data transfer, the error message

```
E641 VOLUME LEVEL
```

will be displayed on the OIU when the load operation is attempted.

Loading a Program From Tape

To load a program recorded on tape to the memory cartridge in the OIU, rewind the tape to a point just before the beginning of the recorded program that you want to copy. This must be a blank area of tape. After accessing sub-menu 77 and pressing the ENT key, a prompt will appear.

```
M77   TAPE TO MC
PRGM ID:      □
```

If an identification number had been assigned to the program to be loaded when it was recorded, enter this number (eight digits) followed by ENT. If no identification number was assigned to the program, just press the ENT key. You will then see the prompt for the type of data to be loaded.

```
M77   TAPE TO MC
1;PG/2:RG/3:SYS
```

Select the type of data that was saved on the tape at this tape address (determined by the tape counter) by keying-in the appropriate number, followed by ENT. The OIU prompt will then change to:

```
M77   TAPE TO MC
START?
```

At this prompt, press the PLAY button on the cassette recorder and the ENT key on the OIU to begin the operation to load the program on tape to the memory cartridge in the OIU. If the OIU detects a program ID or data type other than that specified by the user while searching for the correct data, an informative message is displayed.

```
M77   TAPE TO MC
            XXX BUSY
```

XXX in the message will be either PG, RG, or SYS, indicating that the section of tape that is playing contains this type of data, but not the specified data. When the correct data is located, another message will be displayed.

```
M77   TAPE TO MC
YYYYYYYY     XXX FOUND
```

In this message, YYYYYYYY represents the ID number of the specified program, and XXX is the specified data type. The OIU then starts to read the data and when the load has been successfully completed, the acknowledgement ''OK'', is displayed. A search of data may be terminated at any time by pressing the CLR key on the OIU keypad.

If a checksum error is detected while data is being copied, an error message is displayed.

```
E642 CHKSUM ERROR
```

If this error message is displayed, repeat the load operation.

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Sub-Menu 78 - Copy Data from the OIU Memory Cartridge to Cassette Tape

Run	Run W/Outputs Disabled	Stop
X	X	X

This sub-menu allows you to copy data stored on an OIU memory cartridge to a cassette recorder. The format and prompts are similar to sub-menu 71. The OIU connects to the cassette recorder through the serial communications port on the bottom panel of the OIU. A cable must be made for this purpose. Wiring details, port specifications, and specifications for a cassette recorder can be found in Appendix C.

The initial display upon selecting this sub-menu is:

```
M7*   MEMORY CARTRIDGE
M77   TAPE TO MC
```

Most audio cassette recorders with auto-level control can be used for recording purposes with the Series Five PLC. It is recommended that the recorder have a counter to allow multiple programs to be recorded on tape. For proper operation, the tone control should always be set to its maximum, and the volume level control at approximately 75% of maximum. If the volume control level is set at the wrong range for a successful data transfer, the error message

```
E641 VOLUME LEVEL
```

will be displayed on the LCD when the load operation is attempted.

Storing a Program to Tape

After connecting the OIU to the cassette recorder through the required cable, access sub-menu 78, and press the ENT key to activate this sub-menu. The initial prompt will be displayed. Pressing the ENT key will cause the following prompt to be displayed.

```
M78   MC TO TAPE
PRGM ID:          □
```

You are prompted to enter an optional eight digit identification number, that can be from 00000000 to 99999999. This ID number is used to locate the specified data on tape when using sub-menus 77 or 79. After entering the number or no number, press the ENT key, which causes the next prompt to be displayed.

```
M78 MC TO TAPE
1:PG/2:RG/3:SYS
```

Select the type of data stored on the memory cartridge to be stored to tape, by entering the appropriate number, followed by the ENT key. Remember, that for registers, the appropriate register range to be transferred must be specified. Press the RECORD button (RECORD and PLAY on some recorders) on the cassette recorder and then the ENT key on the OIU to start the store-to-tape operation. When a successful transfer is completed, the acknowledgement "OK" will be displayed on the LCD.

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Sub-Menu 79 - Verify Cassette Tape Data Equals OIU Memory Cartridge Data

Run	Run W/Outputs Disabled	Stop
X	X	X

This sub-menu allows you to verify that the data stored on cassette tape is equal to the data stored on the memory cartridge in the OIU. The format and prompts are similar to sub-menu 71. The OIU connects to the cassette recorder through the serial communications port on the bottom panel of the OIU. A cable must be made for this purpose. Wiring details, port specifications, and specifications for a cassette recorder can be found in Appendix C.

The initial display upon selecting this sub-menu is:

```
M7*    MEMORY CARTRIDGE
M79    VERIFY MC = TAPE
```

Memory Cartridge Equals Tape Operation

Rewind the cassette tape to a point just before where the data to be verified is stored. This must be a blank area of tape. Press the ENT key on the OIU. You will be prompted to enter the data identification number, followed by the ENT key.

```
M79  VERIFY MC = TAPE
PRGM  ID:          □
```

Select the appropriate data type to be verified (program, registers, or system parameters), and press ENT. The START prompt will be displayed - press the ENT key on the OIU ,then the PLAY button on the cassette recorder. The data on tape will the be verified against the data stored on the memory cartridge. At the end of a successful verification that the data is the same, the acknowledgement "OK" will be displayed on the OIU. If there is a mismatch of data, an error message will be displayed.

```
E640 MISCOMPARE
```

If this message is displayed, repeat the verify operation to ensure data integrity.

NOTE

If any problems are experienced in any of the data transfer operations between the OIU and the cassette recorder, it is recommended that you try operating the cassette recorder with batteries.

Sub-Menu 7A - Copy Data from an External Computer to the OIU Memory Cartridge

Run	Run W/Outputs Disabled	Stop
X	X	X

This sub-menu allows you to copy data stored on an MS-DOS based personal computer to the memory cartridge installed in the OIU. The serial port of the computer must be connected to the serial port on the bottom panel of the OIU through a cable made for this purpose. Refer to Appendix C for serial port information. Set serial port 1 on the computer by entering the following command on the computer at

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:-0181

DOS prompt for the drive that contains the MS-DOS program. The A prompt is shown as an ımple.

```
A> MODE COM1:9600,8,odd,1,p
```

ıe initial display upon selecting this sub-menu is:

```
M7*    MEMORY CARTRIDGE
M7A    COMPUTER TO MC
```

he prompt for the type of data to be read from the personal computer is displayed after pressing the NT key.

```
M7A    COMPUTER TO MC
1:PG/2:RG/3:SYS
```

ielect the data type on the OIU, and then enter the following DOS COPY command on the personal :omputer to start the operation

```
A> COPY filename.ext/B AUX:
```

Where *filename* is the name of the file on the diskette to be copied to the OIU. At the end of a successful data transfer from the computer to the OIU, the acknowledgement "*OK*" will be displayed on the OIU.

Sub-Menu 7B - Copy Data from the OIU Memory Cartridge to an External Computer

Run	Run W/Outputs Disabled	Stop
X	X	X

This sub-menu allows you to copy data stored on a memory cartridge in the OIU to an MS-DOS based personal computer that is not running Logicmaster 5 software. The serial port of the computer must be connected to the serial port on the bottom panel of the OIU through a cable that must be made for this purpose. Set serial port 1 on the computer by entering the following command on the computer at the DOS prompt for the drive that contains the MS-DOS program. The A prompt is shown as an example.

```
A> MODE com1:9600,8,odd,1,p
```

The initial display upon selecting this sub-menu is:

```
M7*    MEMORY CARTRIDGE
M7B    MC TO COMPUTER
```

The prompt for the type of data to be read from the personal computer is displayed after pressing th ENT key. Enter the type of data to be written to a file in the personal computer. Then enter th following DOS command on the personal computer to start the operation.

```
A> COPY AUX:/A filename/A
```

Where filename is the name of the file to which the data will be saved on the personal computer. At t end of a successful data transfer from the memory cartridge in the OIU to the personal computer, acknowledgement "OK" will be displayed on the OIU.

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Main Menu 8 - Password Control

This menu is used to logon or logoff of a Series Five CPU that is password protected in order to perform operations from Main Menu 7. The password is an eight digit code which is set using Logicmaster 5 software. Once it is set, this password cannot be displayed with Logicmaster 5 or with the OIU, however the password may be changed with LM5. There are two sub-menus associated with this menu.

M81 *UNLOCK CPU* - this sub-menu allows you to logon to a Series Five CPU.

M82 *LOCK CPU* - this sub-menu is used to logoff of a Series Five CPU.

NOTE

Only operations that are accessed through Main Menu 7 are affected by password status. All other OIU functions are always available.

Sub-Menu 81 - Unlock CPU

Run	Run W/Outputs Disabled	Stop
X	X	X

When this sub-menu is initially selected, the display will be

```
M8*   PASSWORD CONTROL
M81   UNLOCK CPU
```

When this sub-menu is accessed by pressing the ENT key, the LCD display will indicate the current state of the Series Five CPU - either *CPU LOCKED*, or *CPU UNLOCKED*. If the CPU is unlocked, it means that the password had been entered prior to accessing this sub-menu. This could be the case if the last user did not logoff, or it could also mean that there is no password protection set for this CPU. In either of these cases, you are not required to enter a code to access the menus that can be protected.

If the message indicates that the CPU is locked, you must key in the password, then press the ENT key to confirm the password. If the correct password has been entered, the message *CPU UNLOCKED* will be displayed, and you can then also access the operations available from Main Menu 7, in addition to all other OIU functions and menus. If the password is incorrect, the message *CPU LOCKED* will be displayed and you should then verify and re-enter the password.

If, at any stage of this operation, you try to access a password protected function in Main Menu 7 without logging on, the error message

```
E540 CPU LOCKED
```

will be displayed, and you will not be able to continue with the operation until you have logged-on.

Sub-Menu 82 - Lock CPU

Run	Run W/Outputs Disabled	Stop
X	X	X

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)181

:n this sub-menu is initially selected, the display will be

```
M8*   PASSWORD CONTROL
M82   LOCK CPU
```

en this sub-menu is accessed by pressing the ENT key, the LCD display will show the current status he CPU. If the status is *CPU LOCKED*, no action needs to be taken. If the CPU is unlocked, the ssage display will be

```
CPU UNLOCKED
LOCK?
```

lock the CPU requires a confirmation by pressing the ENT key. This confirms that you want to lock : CPU and at the same time, this sub-menu performs a global search on the CPU's I/O range for any errides that are currently set, before locking the CPU. If any overrides are found, you will be ompted by the display

```
LEAVE OVERRIDES SET
```

eying-in ENT leaves the overrides set, and locks the CPU. The displayed message changes to

```
CPU LOCKED
```

lowever, if there is no password set for this CPU, and the ENT key is pressed at this stage, the message lisplay will change to

```
NO PASSWORD
```

Pressing the ESC or CLR key exits this sub-menu. If any overrides had been set, the user can now release all overrides by accessing sub-menu 56 (*Reset All Overrides*), or by selectively releasing specific overrides in Monitor Mode by using the OVRD key.

Main Menu 9 - Genius Network Configuration

This menu is used to configure a Genius communications link for each CPU on a Genius network. Onc this network has been configured with the OIU, no user logic is required for selected data to be globall transmitted to all CPUs on the network, or directed from one CPU to other targeted CPUs on th network. For detailed guidelines that must be followed when configuring such a network, refer GFK-0248, the Series Five Genius Bus Controller manual. The basic rules that must be followed a outlined below.

- Each device on a Genius network must have a different *Serial Bus Address* (SBA), and this must between 0 and 31. Usually 0 is reserved for a Genius Hand Held Monitor.
- **Global Data**, which is common to all CPUs on one Genius LAN, *can, for the Series Five, use in references from Channel 1+ and Channel 2+ or register references. No two CPUs on a network n have overlapping global reference ranges*. If this were to happen, it could cause two CPUs to s different data at the same time to another CPU on the network.
- **Directed Data** which may be "received" by a CPU on a Genius LAN *can use output references fr Channel 1+ or Channel 2+, or register references.*. Thus, if one CPU is receiving directed data f one source - *no other CPU may direct data to this CPU.*
- Each Genius Bus Controller is configured for the range of global data it is to broadcast, and the r of directed outputs it is to receive.

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- For a given Genius Bus Controller, Global and Directed data may be either register references or I/O references, but not a mixture of the two.
- When using I/O references, broadcast inputs and directed outputs must start at "equivalent" I/O addresses. When using register references, the Directed data range must immediately follow the Global data range.

There are two sub-menus associated with main menu 9.

M91 *SET UP GBC* - used to configure each Genius Bus Controller in a Genius network system.

M92 *DISPLAY GENIUS ID* - used to display the Serial Bus Address of each Genius Bus Controller in the CPU base unit, and the Serial bus addresses of all other bus controllers that will receive directed data from a particular bus controller.

Sub-Menu 91 - Set Up Genius Bus Controller (GBC)

Run	Run W/Outputs Disabled	Stop
		X

This sub-menu allows the user to configure any Genius Bus Controller installed in the CPU base unit to form a link on a Genius network. When this sub-menu is initially selected, the display will be:

```
M9*   GENIUS NET CONFIG
M91   SET UP GBC
```

Press the ENT key to activate this sub-menu. The display changes to:

```
M91   SET UP GBC
0/16   A IO1+0000 □
```

In this example of the display, there is a Genius Bus Controller in slot zero in the CPU base unit. This is indicated by the 0 to the left of the slash on the bottom line of the display. Slot 0 will always be displayed when this display is first accessed. The Serial Bus Address of this Genius Bus Controller has been set by configuring the DIP switches, on the side of the Genius Bus Controller module, to 16, which is the number shown to the right of the slash. The cursor prompt is waiting for the start address for both broadcast and directed data for this genius Bus Controller to be entered. If there is no Genius Bus Controller installed in slot 0, the display will be:

```
M91   SET UP GBC
0/--   A IO1+0000 □
```

If this were the case (no GBC in slot 0), since there is no Genius Bus Controller, you cannot set up any system parameters, therefore, a slot must be selected that does have a Genius Bus Controller. If, for instance, slot 3 in the CPU base unit contains a Genius Bus Controller, key-in:

```
CLR   3   NEXT
```

The display will then change to show that slot 3 is the slot containing the Genius Bus Controller that you are going to configure. This example assumes that the Serial Bus Address is set to 25.

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GFK-0181

```
M91    SET UP GBC
3/25    A IO1+0000 □
```

NOTE

Since Genius Bus Controllers can only be installed in the CPU base unit, this menu only accesses the CPU base unit - never an I/O expansion base unit.

Starting Address

Referring back to the first display example (GBC in slot 0) - at the *A* prompt, key-in the start address, which can be an I/O reference consisting of a channel number and reference between 1 and 2041, or register reference between 1 and 16384. Your entry will be normalized on a byte boundary (starting address of byte, for the entered address). This is a valid range, since both channel 1+ and channel 2+ may be used for communications, and there are 1024 inputs and 1024 outputs in each channel. Also, the minimum amount of broadcast or directed data that may be specified is 8 bits (for I/O references) or one register.

When the START address has been entered and confirmed, the resultant display will be:

```
M91    SET UP GBC
0/16    BLEN        □
```

Broadcast Data Length

This display (Broadcast LENgth) prompts you for the broadcast data length to be transferred to all other CPUs on the network starting from the address specified above. Confirm your entry by pressing the ENT key. If the number of inputs entered is greater than the inputs available, beginning at the starting address, the error message - *E504 BAD REF/VAL* - is displayed. Valid entries for bit references are 0 o 1024 (OIU converts to bytes). Valid entries for word references are 0 to 64 registers (OIU converts to bytes, twice the value entered). If the entry is valid, the display changes to:

```
M91    SET UP GBC
0/16    DLEN        □
```

Directed Data Length

This display (Directed LENgth) prompts you for the number of directed outputs this Genius Bus Controller will receive from the Genius network and will be mapped into this CPUs output table starting at the specified address. Again, if the number of outputs entered is greater than the outputs available beginning at the starting address, the error message - *E504 BAD REF/VAL* - will be displayed. Valid entries are the same as for broadcast data length. If the entry is valid, the display changes to:

```
M91    SET UP GBC          00
0/16 ENBL         000000000□
                  9 <----- 0 = First group of output enable bits
```

Serial Bus Address for Broadcast (Global) Data

The final setting that must be made is to enable output bits corresponding to the Serial Bus Addresses on the link to which this Genius Bus Controller will direct its output points. With broadcast data, the specified number of inputs or registers are sent to every Serial Bus Address on the network.

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However, with directed data, the specified number of outputs or registers are sent only to specific target Serial Bus Addresses.

The Genius Bus Controllers with these Serial Bus Addresses must be configured to receive the directed output data from this Genius Bus Controller. This method allows one CPU to direct different data to different CPUs.

There are a total of 32 possible output enable bits. This display represents the first group of 10 (0 to 9) output enable bits for SBAs to which the CPU can send its directed data outputs. Each position represents an output enable bit starting with the number displayed at the right on the top line. The number displayed for the first group is 00. The cursor is positioned on the first position to the right on the lower line, and can be moved using the cursor control keys, <-- and -->.

To select output enable bits for SBAs to which output data is to be directed, position the cursor over the appropriate position, and key-in *SHFT ON*. The value of this point will change from 0 (zero) to 1 (one). When all required output enable bits in this group have been selected, press the NEXT key.

This causes the next group of output enable bits (10 to 19) to be displayed, and the number on the top line to change to 10.

```
M91   SET UP GBC          10
0/16 ENBL          000000000□
                  19 <---- 10 = Second group of output enable bits.
```

Repeat this process until all of the desired output enable bits have been selected.

```
M91   SET UP GBC         30
0/16 ENBL        000000000□
                  31 <-- 30 = Last two output enable bits
```

After selecting the output enable bits in the last group, which corresponds to Serial Bus Addresses 30 and 31, press the ENT key to increment the display to the next slot (slot 1) in the CPU base unit, which may or may not have a Genius Bus Controller. Repeat the set up process for all Genius Bus Controllers in the CPU base unit.

Exit this sub-menu by pressing the ESC key.

Example of Setting Up a Genius Bus Controller

This example takes you through the steps required to set up a Genius Bus Controller. Assume that a Genius Bus Controller is installed in slot 5 in the CPU base unit, has been assigned a Serial Bus Address of 24, and is to be configured as described below.

Input points I1+25 to I1+64 (total of 40 input references) are to be broadcast to all Serial Bus Addresses on the Genius network. Output points O1+25 to O1+ 96 (total of 72 output references) are to be pulled from the output table of the CPU having this Genius Bus Controller as one of its target Serial Bus Addresses. Finally, this CPU will direct data to Genius Bus Controllers having Serial Bus Addresses 13 and 27.

To set up this configuration, the following operations would be performed using the OIU.

1. Access Sub-Menu 91 and activate it by pressing the ENT key.
2. Enter, *CLR 5 NEXT*, to select slot 5 of this CPU base unit.
3. Key-in *IN 1 CH+ 2 5 ENT* in response to the *A* prompt.
4. Key-in *4 0 ENT* in response to the *BLEN* prompt.

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5. Key-in *7 2 ENT* in response to the *DLEN* prompt.
6. Key-in *NEXT* to move the output enable bit range to 10 to 19.
7. Key-in <-- three times to position the cursor over output enable bit 13.
8. Key-in *SHFT ON* to set this enable bit which selects the corresponding SBA as a target Serial Bus Address for this CPU.
9. Key-in *NEXT* to move the output enable bit range to 20 to 29.
10. Key-in <-- seven times to position the cursor over output enable bit 27.
11. Key-in *SHFT ON* to set this bit which selects the corresponding SBA as a target Serial Bus Address for this CPU.
12. Key-in NEXT NEXT to complete this Genius Bus Controller's slot settings.
13. Press the ESC key to leave this sub-menu.

Sub-Menu 92 - Display Genius ID

Run	Run W/Outputs Disabled	Stop
X	X	X

This sub-menu allows the user to see which Serial Bus Addresses have been assigned to devices on the same network as a particular Genius Bus Controller installed in the CPU base unit. When this sub-menu is selected, the initial display is:

```
M9*   GENIUS NET CONFIG
M92   DISPLAY GENIUS ID
```

When this sub-menu is activated with the ENT key, slot 0 of the CPU base unit is displayed.

```
M92   DISPLAY GENIUS ID
SLOT 0 __              __
```

If this slot contains a Genius Bus Controller with Serial Bus Address 25, and is on a network that also has active Serial Bus Addresses of 23 and 30 - the following information is displayed:

```
M92   DISPLAY GENIUS ID
SLOT 0 25              23
```

This display shows the Genius Bus Controller in this CPU base unit, its Serial Bus Address of 25, and the first Serial Bus Address of a device on the same network. Key-in NEXT to show the next active Serial Bus Address.

```
M92   DISPLAY GENIUS ID
SLOT 0 25              30
```

Key-in next to show the next Serial Bus Address on the link, or if there is none, the display advances to the next slot in the CPU base unit.

```
M92   DISPLAY GENIUS ID
SLOT 1 __              __
```

This indicates that there is no Genius Bus Controller in slot 1.

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To exit this sub-menu, press the ESC key.

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Chapter 4

Timer/Counter Mode

GFK-0181

This chapter provides the information required to access and use the TIMER/COUNTER mode of operation with the Series Five OIU. It describes the available options for monitoring, writing to, or setting timer and counter preset and accumulator values. It also explains how programs written with Logicmaster 5 software should be constructed to make full use of this feature, which allows up to 999 timers and 999 counters to be monitored with the OIU. *The functions described in this chapter are also available with Logicmaster 5 software.*

Timer/Counter Preset and Accumulate Registers

Use of the OIU in this mode of operation simplifies monitoring timers and counters. Functionally, this mode is identical to monitoring registers in decimal format, however it differs in the way that Preset and Accumulate registers are referenced, and the way in which their contents are represented on the LCD. To make full use of this mode of operation, the rules listed below must be followed:

1. All Preset and Accumulate registers for timers must be placed in one area of consecutive data registers. The same applies for counters.
2. The data described below must be stored in the special registers of the Series Five CPU.
   - The *start address of the timer register area* must be stored in Register 4065.
   - The *total number of timers in the timer register area* must be stored in Register 4066. The valid range for this number is 1 through 999.
   - The *start address of the counter register area* must be stored in Register 4067.
   - The *total number of counters in the counter register area* must be stored in Register 4068. The valid range for this number is 1 through 999.
3. Beginning with the start address specified in Register 4065, two consecutive registers must be assigned to each timer. The first register in each pair is the Preset register, and the second register in each pair is the Accumulate register.
4. Beginning with the start address specified in Register 4067, two consecutive registers must be assigned to each counter. The first register in each pair is the Preset register, and the second register in each pair is the Accumulate register.

By following these rules, it is possible to display and modify the content of the Preset and Accumulate registers by specifying the timer counter number instead of the register reference. Timers and counters will be numbered from 1 to the total number in your program specified in Register 4066 (timers) or Register 4068 (counters).

If the values in any of the above registers (4065, 4066, 4067, or 4068) are zero or invalid values, Timer/Counter mode cannot be accessed.

With the annotation features of Logicmaster 5, nicknames may be assigned to each timer and counter to correspond with the timer and counter references displayed with the OIU.

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Table 4-1. Example of Timer/Counter Special Register Area

NICKNAME of Associated Output Coil (LM5)	ADDRESS	CONTENT	DEFINITION
	R4065	10000	Timer area start address
	R4066	500	Number of timers = 500
	R4067	11000	Counter area start address = 11000
	R4068	200	Number of counters = 200
			• • •
TMR#1	R10000	1234	Preset register, Timer 1 = 1234
	R10001	8765	Accumulate register, Timer 1 = 8765
TMR#2	R10002	0000	Preset register, Timer 2 = 0000
			• • •
TMR#500	R10999	750	Accumulate register, Timer 500 = 750
CNT#1	R11000	0000	Preset register, Counter 1 = 120
	R11001	500	Accumulate register, Counter 1 = 500
CNT#2	R11002	2500	Preset register, Counter 2 = 2500
			• • •
CNT#200	R11398	60	Preset register, Counter 200 = 60
	R11399	500	Accumulate register, Counter 200 = 500

Monitoring Timers and Counters

To monitor a specific timer or counter, requires pressing the TMR or CNT keys on the OIU keypad, followed by the number of the timer or counter to be monitored. The following examples show the key sequence and resulting display for monitoring a timer (Timer 1) and a counter (Counter 20).

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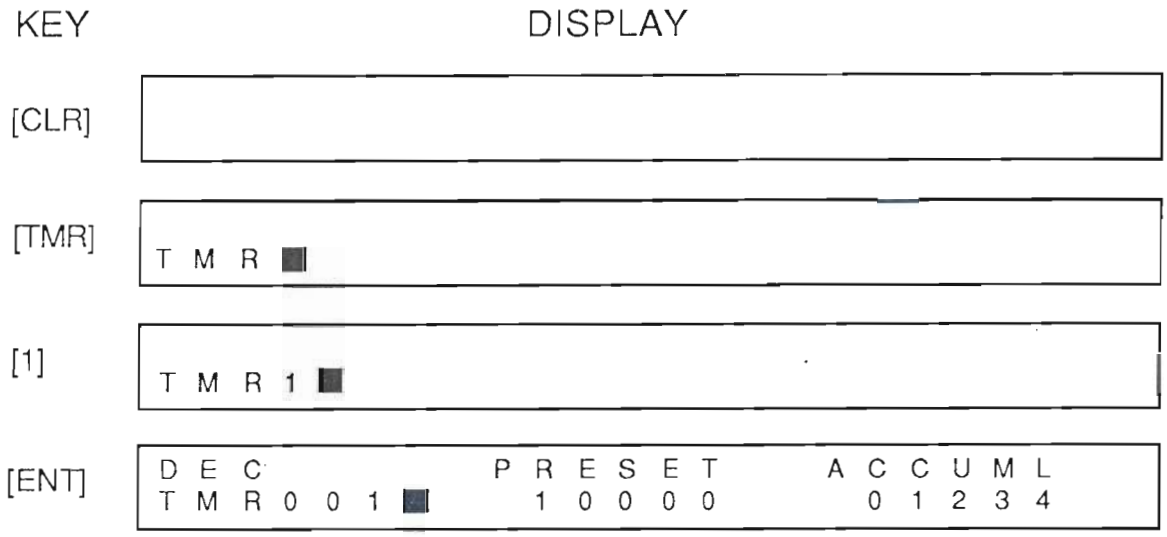


Figure 4-1. Monitoring Timer Registers

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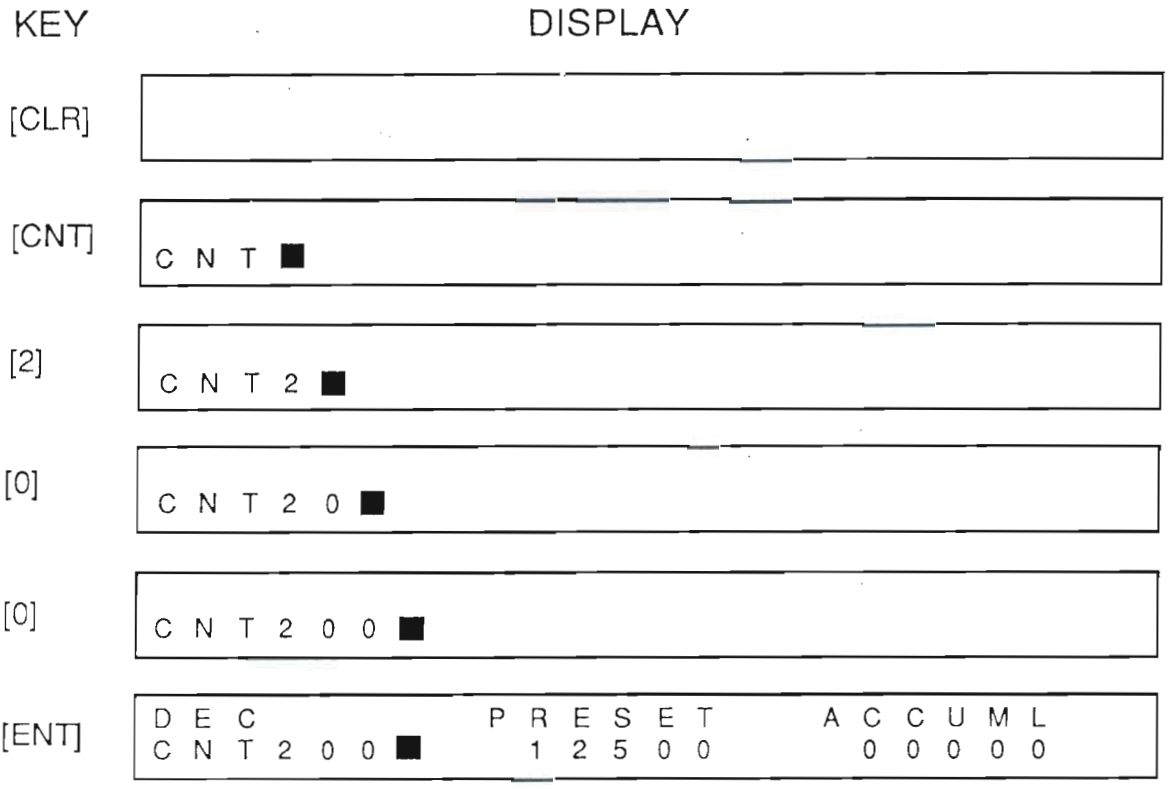


Figure 4-2. Monitoring Counter Registers

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To move between adjacent timer and counter registers while monitoring, use the PREV and NEXT keys. Again, the resultant displays are shown.

a42594

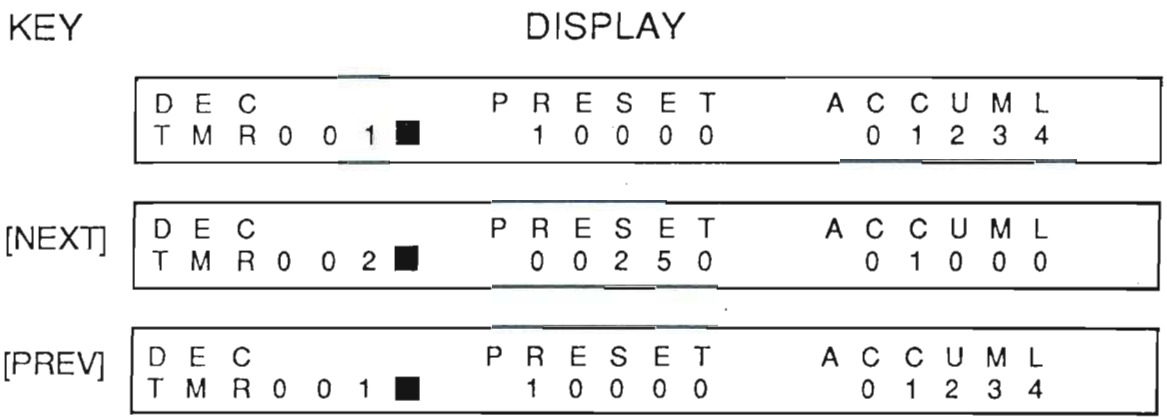


Figure 4-3. Moving to the Next and Previous Timer

Writing to Timers and Counters

There are three fields that are observed in every timer or counter display:

1. The Timer or Counter number (field label: TMR or CNT)
2. The Preset value (field label: PRESET)
3. The Accumulate Value (field label: ACCUML)

When a timer or counter is selected to be monitored, a blinking cursor is positioned to the right of the reference number. The cursor can be moved across the display to the Preset and Accumulate fields, using the <-- and --> cursor control keys. A new value can be written to either of these fields.

To change a value, the cursor must be positioned to the right of the appropriate field, and the value keyed-in. As soon as the first digit of the new value is entered, the current value display is blanked, and the new value can be entered. Additionally, the field label will blink on and off as a reminder that the data currently being entered is not valid until the entry is completed by pressing the ENT key.

The following illustration is an example of entering new field values, and the result of using the cursor control keys.

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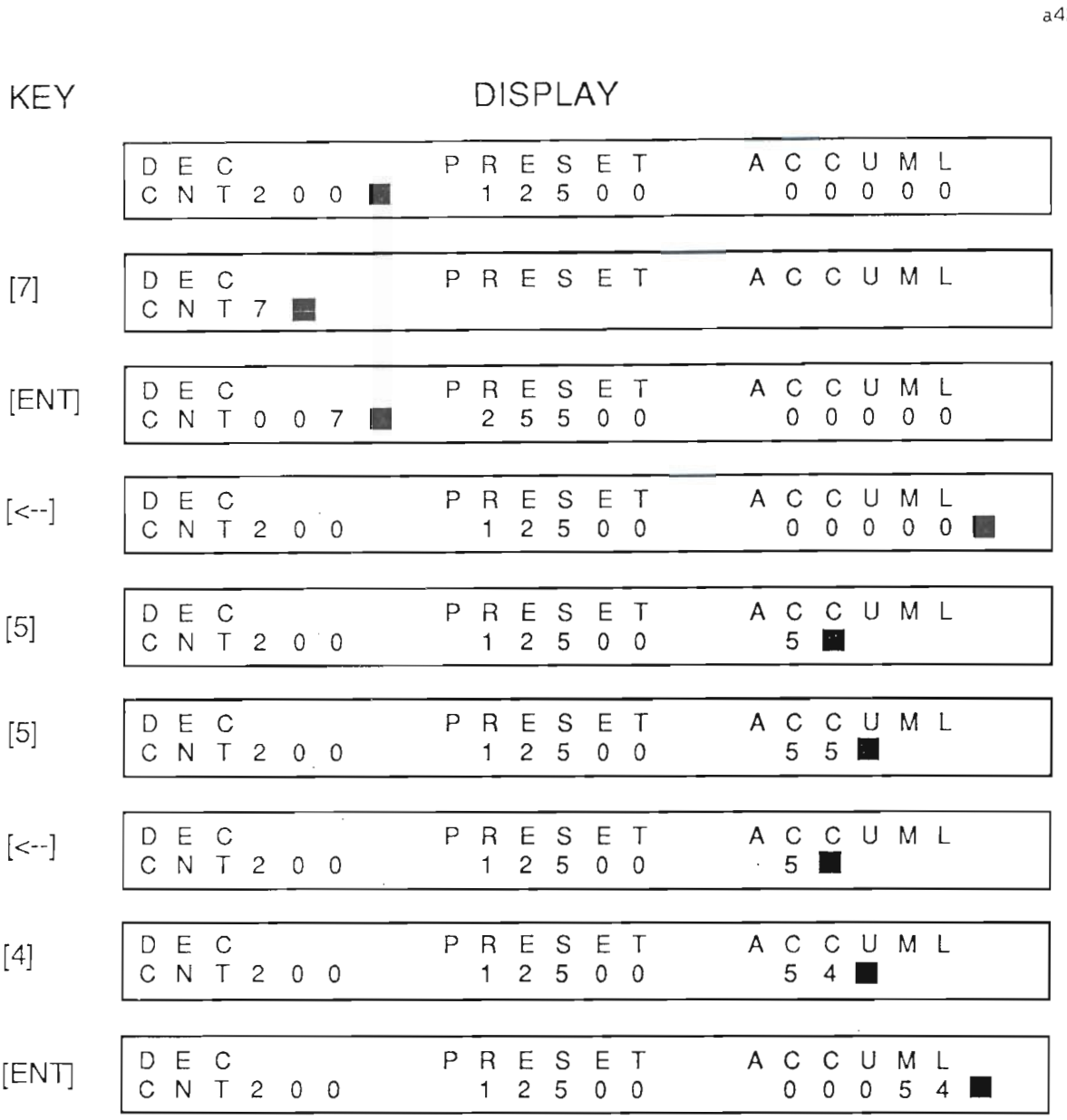


Figure 4-4. Writing a New Value to a Counter Accumulate Register

When entering a new value, you can use the <-- key to correct mistakes, or change the value. If the entry is to be cancelled before it is confirmed, pressing the ESC key recalls the previous value to the field, and the field label will stop blinking.

To monitor a different timer or counter then the one currently being monitored, position the cursor to the right of the TMR or CNT field label, and key-in the new timer or counter reference. When the ENT key is pressed, all fields are blanked, and all values are updated for the new timer or counter.

To clear the LCD and leave the Timer/Counter mode, press the CLR key after all entries have been completed and there are no blinking field labels.

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Appendix A
Operator Interface Unit Error Messages

This Appendix is a list of OIU error messages, including the cause of each error and the action required to clear the error. The Special Contact column indicates the Special Contacts in Channel 1-, which are activated to indicate certain types of faults and can be used in logic programs to initiate an orderly system shutdown, if required. Following is a list of the special contacts and the type of fault that will activate them.

I1-0036	Battery fault
I1-0037	Memory fault
I1-0038	I/O fault
I1-0039	Communications fault
I1-0042	Watchdog timeout
I100043	Program error
I1-0045	Background communications error (intelligent I/O module)

Table A-1. Operator Interface Unit Error Messages

ERROR MESSAGE	SPECIAL CONTACT	CAUSE OF ERROR	ACTION TO CLEAR ERROR
E003 S/W TIMEOUT	I1-42	CPU scan time was greater than software watchdog timer.	Set longer software watchdog (Menu 54) or change ladder logic.
E041 CPU BATTERY LOW	I1-36	Low voltage on CPU back-up battery.	Replace CPU battery, Cat. No. IC655ACC550
E042 NO CPU BATTERY	I1-36	Missing or disconnected CPU battery.	Install or reconnect CPU battery.
E043 CPU MC BATTERY LOW	I1-36	Low voltage on CMOS RAM memory cartridge battery.	Copy program to another memory cartridge & replace battery (IC655ACC549).
E044 NO MC BATT	I1-36	Missing CMOS RAM memory cartridge battery.	Install battery in memory cartridge.
E101 NO CPU MC	I1-37	Attempt to access CPU MC when it is not installed.	Insert memory cartridge into CPU.
E102 MC HOLDS SYS DATA	I1-37	Attempt to run CPU with MC installed that contains only system parameter data.	Replace with a program memory cartridge.
E103 MC HOLDS REG DATA	I1-37	Attempt to run CPU with a memory cartridge that contains register data.	Replace with a program memory cartridge.
E104 WRITE FAILED	I1-37	Copy operation to CPU MC in menu 7 failed because cartridge is write protected.	Reconfigure the jumper in memory cartridge to the write enable position. If problem still exists - replace memory cartridge.

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Table A-1. Operator Interface Unit Error Messages - Continued

ERROR MESSAGE	SPECIAL CONTACT	CAUSE OF ERROR	ACTION TO CLEAR ERROR
E151 BAD COMMAND	I1-37	Parity check detects error in program stored on the CPU memory cartridge.	Rewrite the invalid code to correct the logic.
E2XX DIAG ERROR MENU 42	I1-38	An I/O diagnostic error has been reported to the CPU.	Use menu 41 or visual inspection to determine the type of error, and take corrective action. Error can be one or more of errors E201 to E262.
E201 MISSING TERM BLOCK	I1-38	Loose or missing terminal block on I/O module.	Use menu 41 or visual inspection to find module location. Tighten or fit terminal block on module.
E202 MISSING I/O MODULE	I1-38	I/O module loose or missing since last power cycle.	Use menu 41 or visual inspection to determine module type and location of missing module, install and secure to base unit.
E203 I/O MDL FUSE BLOWN	I1-38	Fuse blown on an output module.	Use menu 41 or visually find module type and location, and replace fuse.
E206 LOW VOLTAGE EXT PS	I1-38	External 24 Vdc power supply is too low or has failed.	Adjust voltage, correct fault or replace supply.
E221 NO SERIES 3 I/O PS	I1-38	Power supply failed or power off on Series 3 I/O base unit.	Turn on power, repair or replace power supply.
E222 S3 I/O ABNORMAL OP	I1-38	Series 3 I/O module or modules functioning abnormally.	Determine which module is defective and replace.
E226 PS OVERLOAD	I1-38	CPU has detected that I/O loading in a base unit exceeds the power supply capacity.	Use high capacity power supply or adjust I/O module arrangement.
E250 I/O CHAIN	I1-38	Faulty link in the I/O chain.	Check I/O expander cables, Local I/O Interface module.
E251 I/O BUS PARITY	I1-38	Parity error on I/O bus due to electrical noise or other type of interference.	Cycle power, if CPU won't enter RUN mode, replace base unit or device on bus.
E252 NEW I/O CONFIG/	I1-38	Current I/O configuration is different than the one stored in CPU memory cartridge.	Use menu 45 to select the former or the new config, or change I/O config to its previous configuration.
E261 I/O ADDR CONFLICT	I1-38	Attempt made to force a module to an address already assigned to another module.	Use menu 46 to change one of the modules address to a avoid duplication.
E262 I/O OUT OF RANGE	I1-38	Attempt made to force a module address to an invalid address.	Use menu 46 to re-enter a valid address.
E311 COMM ERROR 1	I1-39	A non-existent operation code was included during a CCM communications session.	Key-in CLR to retry the communications.

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Table A-1. Operator Interface Unit Error Messages - Continued

ERROR MESSAGE	SPECIAL CONTACT	CAUSE OF ERROR	ACTION TO CLEAR ERROR
E312 COMM ERROR 2	I1-39	A non-existent operation code included during communications with a programmer.	Key-in CLR to retry the communications.
E313 COMM ERROR 3	I1-39	A non-existent address was included during communications with a programmer.	Key-in CLR to retry the communications.
E316 COMM ERROR 6	I1-39	A non-existent mode was included during communications with a programmer.	Key-in CLR to retry the communications.
E320 OIU-CPU TOUT	I1-39	Communications time out between CPU and OIU.	Cycle power. If problem persists - replace faulty unit (OIU or CPU).
E321 OIU-CPU COMM	I1-39	No reply or NAK from the CPU to an OIU ENQ.	Check link between the OIU and the CPU. Cycle power. If problem persists - replace the CPU.
E350 MODULE ADDR	I1-45	A base unit and slot address has been specified that does not contain an intelligent module - when attempting communications between intelligent modules or between OIU to intelligent modules.	Reassign the intelligent module address either in the user logic program or through menu 47 on the OIU.
E351 MODULE ID	I1-45	Invalid communications ID number specified for an intelligent module during communications between intelligent modules.	Reassign the correct intelligent module ID in user logic program.
E352 BGND SETTING	I1-45	Syntax error occurred during background communications.	Key-in CLR and retry communications.
E353 BGND TOUT	I1-45	Communications time out during communications session between two intelligent modules.	Key-in CLR and retry communications.
E360 TIME OUT	I1-45	During communications between a personal computer and OIU, the personal computer did not respond to an enquiry.	Press the CLR key and retry communications.
E361 COMM ERROR	I1-45	Communications problems between CPU and OIU.	Retry communications, check cable connections, check OIU mounting to CPU.
E4XX NO PROGRAM	I1-43	Mode keyswitch turned to RUN with no program in the CPU memory cartridge.	Download program from computer to CPU, or insert memory with program.
E501 BAD ENTRY	n/a	Invalid key sequence attempted before ENT, PREV, or NEXT keys.	Rekey correct sequence of keys.

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Table A-1. Operator Interface Unit Error Messages - Continued

ERROR MESSAGE	SPECIAL CONTACT	CAUSE OF ERROR	ACTION TO CLEAR ERROR
E504 BAD REF/VAL	n/a	Reference number or value entered is out of range.	Re-enter correct value.
E52A0 BAD OP-RUN	n/a	Attempt made to perform an operation which is illegal when the CPU is in the RUN mode.	Change CPU mode to allow the operation.
E521 BAD OP-RDIS	n/a	Attempt made to perform an operation which is illegal when the CPU is in the RUN w/OUTPUTS DISABLED mode.	Change CPU mode to allow the operation.
E524 BAD OP-STOP	n/a	Attempt made to perform an operation which is illegal when the CPU is in the STOP mode.	Change CPU mode to allow the operation.
E525 KEYSWITCH	n/a	CPU mode keyswitch not in the OIU position.	Turn key to OIU position.
E526 OIU OFFLINE	n/a	Attempt to perform an operation while OIU is off-line.	Use sub-menu 64 to put OIU on-line.
E540 CPU LOCKED	n/a	Attempt to perform a password protected operation without logging-on to the locked CPU.	Logon to the locked CPU with sub-menu 81, and repeat operation.
E541 WRONG PWORD	n/a	Wrong password entered for the memory cartridge in the OIU.	Re-enter correct password for the memory cartridge in the OIU.
E601 MEMORY FULL	n/a	Attempt to program instruction too large for available memory.	Copy program onto a larger memory cartridge and continue entering program.
E603 DATA MISSING	n/a	While searching for data in registers (sub-menu 33), no data that was specified was found in the specified register range.	Press CLR and respecify data value or register range.
E610 BAD I/O TYPE		Attempt made to read/write an intelligent I/O module through sub-menu 47; however, location specified was for a conventional I/O module.	Retry operation - specify correct base unit/slot for the intelligent module.
E611 BAD COMMS ID	n/a	Attempt made to communicate with a CCM station ID that does not exist.	Set correct CCM ID.
E620 OUT OF MEM	n/a	Copying operation incomplete because of insufficient memory remaining on memory cartridge.	Change to larger memory cartridge, or restructure program.
E621 MC NOT BLANK	n/a	(1) Blank check with sub-menu 74 has detected data on the OIU memory cartridge. (2) Attempt to copy to or erase a write protected RAM or EEPROM cartridge.	Clear the memory cartridge using sub-menu 75 or use another memory cartridge. Change jumper in memory cartridge to unprotected position.

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Table A-1. Operator Interface Unit Error Messages - Continued

ERROR MESSAGE	SPECIAL CONTACT	CAUSE OF ERROR	ACTION TO CLEAR ERROR
		(3)Attempt to copy to UVEPROM cartridge that already contains data.	Erase contents of UVEPROM cartridge with an ultra violet lamp, or use another UVEPROM cartridge.
E622 NO MC IN OIU	n/a	Attempt made to transfer data to or from a memory cartridge in the OIU with no memory cartridge installed in the OIU.	Insert an appropriate memory cartridge into the OIU.
E623 SYSTEM MC	n/a	Attempt made to transfer user logic from OIU memory cartridge to CPU memory cartridge when OIU memory cartridge contains other than user logic.	Remove memory cartridge from OIU and insert one that contains user logic.
E624 REGS ONLY	n/a	Attempt made to transfer user logic from OIU memory cartridge to CPU memory cartridge when OIU memory cartridge contains register data.	Remove memory cartridge from OIU and insert one that contains user logic, or select register option from sub-menu 72.
E625 PROG ONLY	n/a	Attempt made to transfer registers from the OIU memory cartridge to the CPU memory cartridge when the OIU memory cartridge contains user logic.	Remove memory cartridge from OIU and insert one that contains register data, or select program option from sub-menu 72.
E626 EPROM MC	n/a	Attempt made to copy data onto an EPROM memory cartridge installed in the CPU.	Install a RAM or EEPROM cartridge in the CPU, or insert the EPROM memory cartridge in the OIU to copy data.
E627 BAD WRITE	n/a	RAM or EEPROM cartridge in OIU is write protected, or UVEPROM cartridge in OIU has not been erased, or CPU has detected a mismatch of data while copying data with sub-menus 71 or 72.	Reconfigure the memory cartridge jumper to the write enable position.
E640 MISCOMPARE	n/a	Data mismatch detected while performing a verification in sub-menus 73 or 79.	Clear the OIU or CPU memory cartridge, as applicable, and retry the copy operation.
E641 VOLUME LEVEL	n/a	Cassette recorder volume level set too high or too low when in sub-menu 77, 78, or 79.	Readjust volume level and repeat operation.
E642 CHKSUM ERROR	n/a	Checksum error when copying between cassette tape and OIU, or external computer and OIU.	Repeat operation, after clearing the OIU memory cartridge, or other medium where appropriate.

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Table A-1. Operator Interface Unit Error Messages - Continued

ERROR MESSAGE	SPECIAL CONTACT	CAUSE OF ERROR	ACTION TO CLEAR ERROR
E650 MACHINE CODE	n/a	CPU detected an unknown op code value during execution of a program instruction.	Press CLR key. If problem persists, reload program or provide more protection from electrical noise or other interference for CPU.
E651 SYSTEM ROM	n/a	Checksum error exists in OIU ROM.	Press CLR key and repeat operation. If problem persists - replace the OIU.
E652 SYSTEM RAM	n/a	Checksum error exists in OIU RAM	Press CLR key and repeat operation. If problem persists - replace the OIU.
E653 MC BATT LOW	n/a	Battery voltage in OIU memory cartridge low.	Replace battery in memory cartridge, or use another memory cartridge.

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Appendix B
Operator Interface Unit Menu Map

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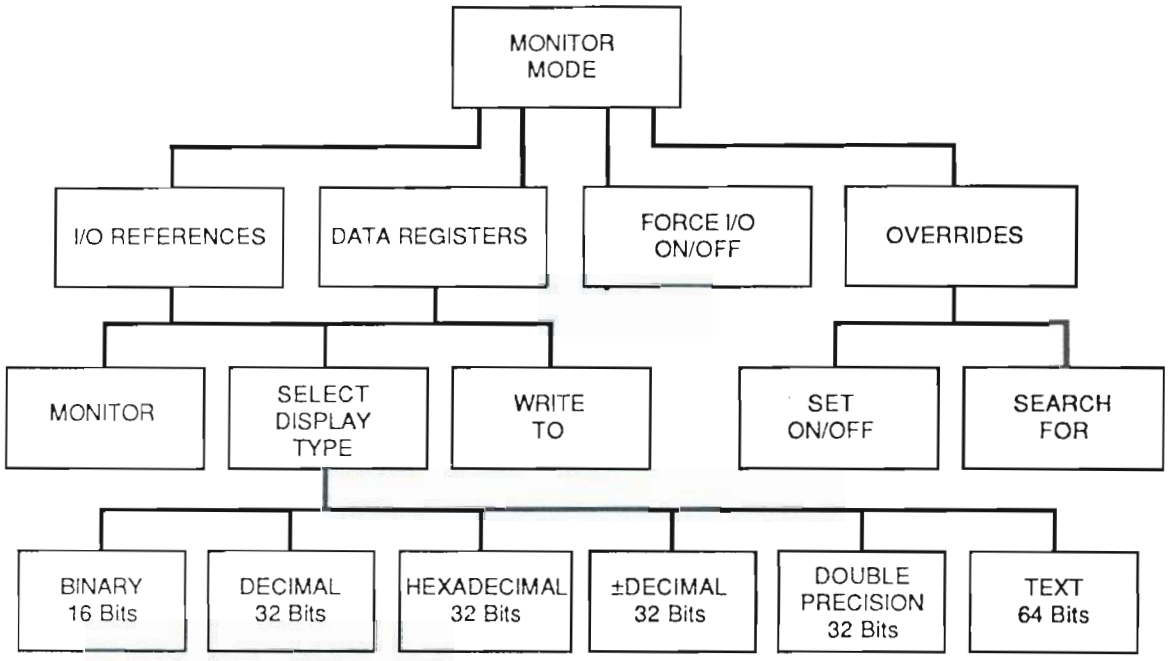


Figure B-1. Monitor Mode of Operation

a42597

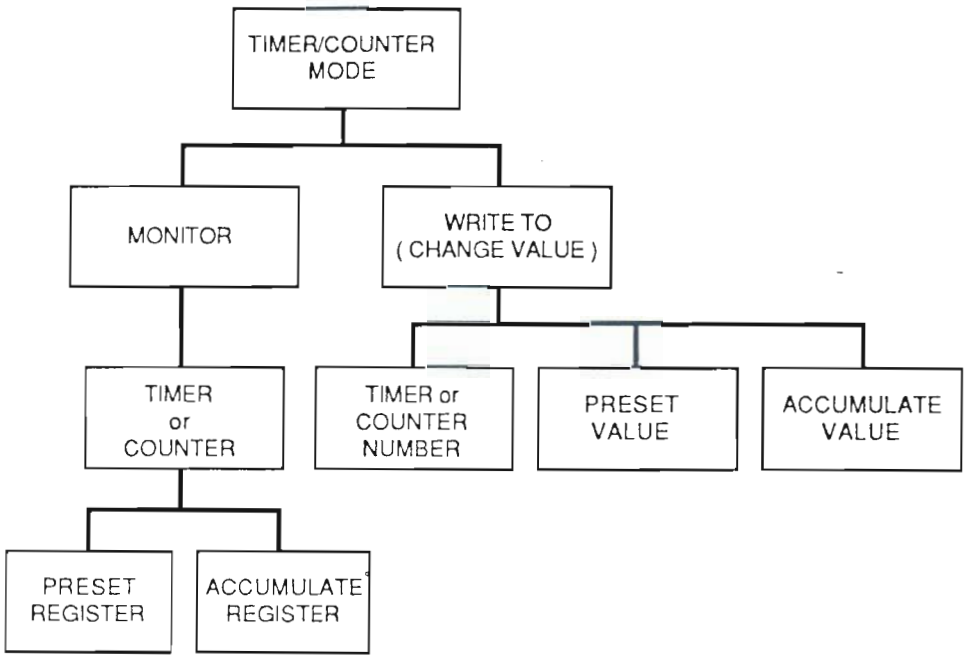


Figure B-2. Timer/Counter Mode of Operation

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a42598

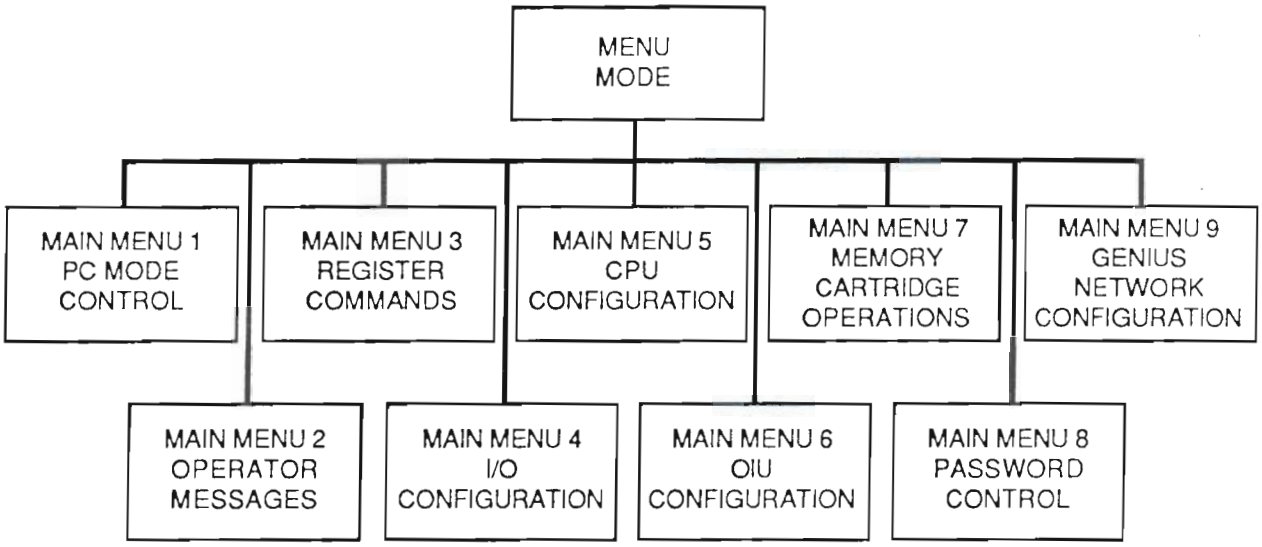


Figure B-3. Menu Mode of Operation

a42599

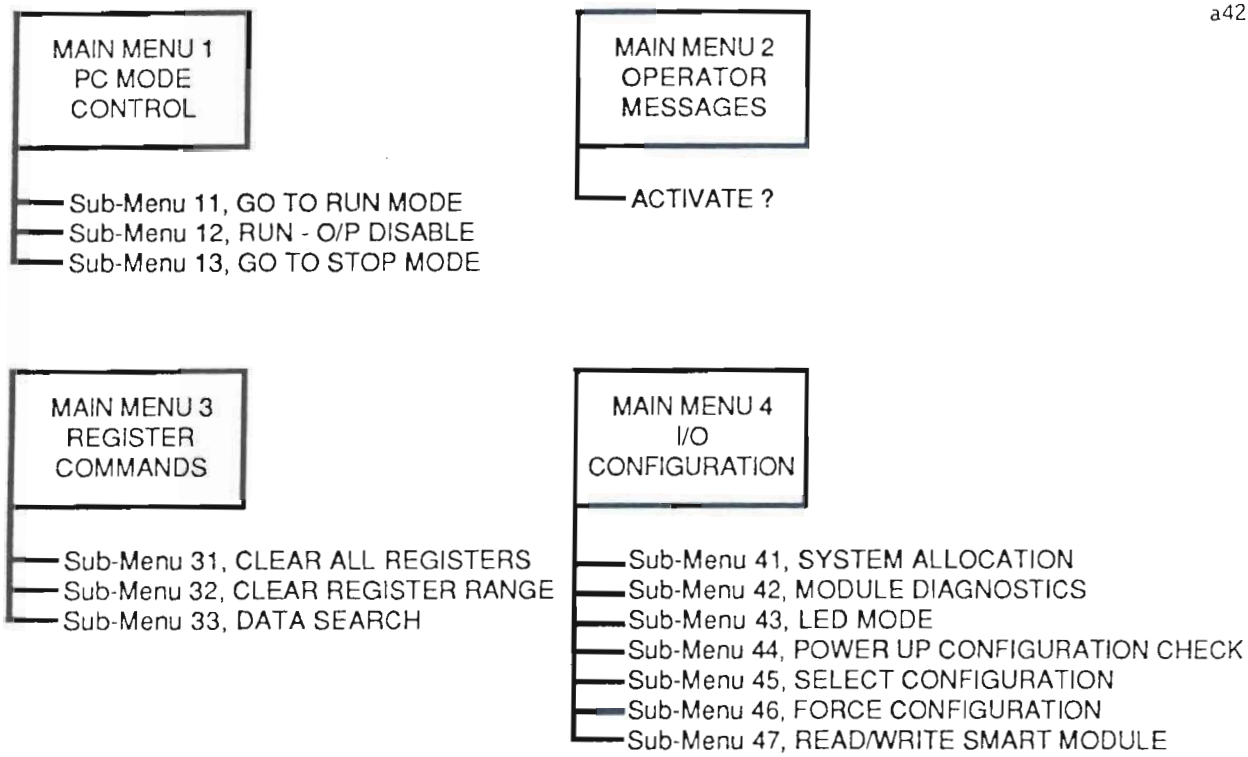


Figure B-4. Menus 1 through 4

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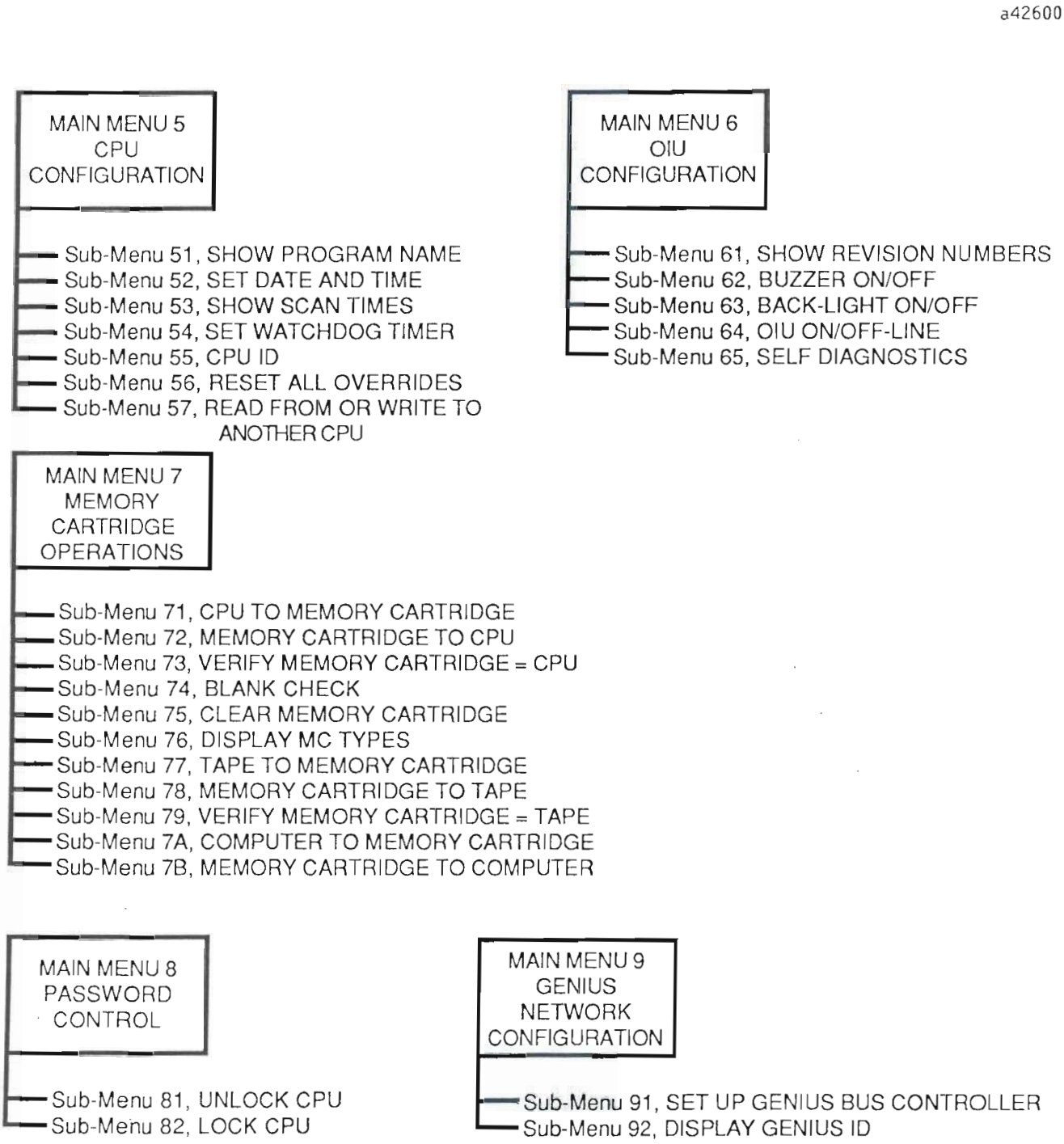


Figure B-5. Menus 5 through 9

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Appendix C
Accessories and Serial Port Information

Catalog Numbers for OIU and Accessories

DESCRIPTION	CATALOG NUMBER
OIU	IC655PER500
CPU to OIU cable, 5 feet (1.5 meters)	IC655CBL540
CPU to OIU cable, 10 feet (3.0 meters)	IC655CBL541
Memory Cartridge, 4K CPU RAM/24K ABM RAM	IC655MEM501
Memory Cartridge, 16K CPU RAM	IC655MEM503
Memory Cartridge, 8K CPU EPROM/24K ABM EPROM	IC655MEM512
Memory Cartridge, 16K CPU EPROM	IC655MEM513
Memory Cartridge, 4K CPU EEPROM	IC655MEM521
Battery, Memory Cartridge	IC655ACC549

OIU 15-Pin Serial Port, OIU to CPU

Signal Level: RS-232C
Data Transmission: Half-Duplex, asynchronous communications
Transmission Rata: 9600 Bps
Data Format: Start, 1 bit
Data, 8 bits
Parity, Odd
Stop, 1 bit

PIN	SIGNAL NAME	SIGNAL LEVEL	DESCRIPTION
1	YOP		OIU connection check by CPU
2	RXD	RS-232C	Receive Data
3	TXD	RS-232C	Transmit Data
4	ONLINE	TTL	Communications request
5	ABNO	TTL	CPU abnormal
6	PRDY	TTL	Communications acknowledgement
7	CTS		For CPU
8	YOM		OIU connection check by CPU
9	n/c		
10	LCBL	TTL	Cable length check
11	5V2		+5 V dc logic
12	5V2		Back-light and DC-to-DC converter
13	GND		Signal ground (0 V)
14	GND		Signal ground (0 V)
15	GND		Signal ground (0 V)

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8-Pin Serial Port - For connection to cassette tape recorder or Personal Computer.

The pin configuration and signal description for the 8-pin serial port are provided for those who may wish to build a cable for cassette/OIU, or Personal Computer/OIU operations. The connector required for connection to this port is an 8-pin DIN, male.

a42601

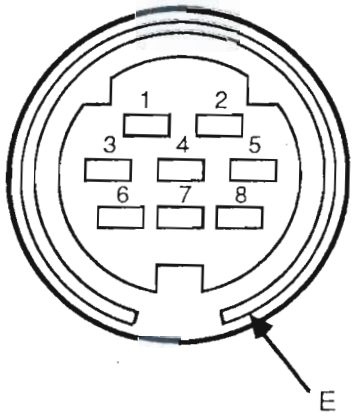


Figure C-1. Pin Configuration, 8-pin Serial Port

PIN	SIGNAL NAME	SIGNAL LEVEL	DESCRIPTION
1	GND		Signal ground (0 V)
2	TXD	RS-232C	Transmit Data
3	RXD	RS-232C	Receive Data
4	CSTI	5 V (p-p)	Tape interface input
5	CSTO	100 mv (p-p)	Tape interface output
6	RDY	RS-232C	Ready Input
7	n/c		
8	n/c		
E	GND		(Connector shell) Signal ground (0 V)

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Index

GFK-0181

A

Accessing Menu Mode, 3-1
Address Range, 1-6

B

Base Unit Display, 3-9
Broadcast Data Length, 3-39

C

Captive Screw Fasteners, 1-3
Catalog Numbers for OIU and Accessories, C-1
Changing Display Formats, 2-4
clock/calendar, 3-18
CLR Key, 1-7
CNT, 1-6
Communication Problems, 1-9
Communications Pointers, 3-3
Contrast Adjustment Screw, 1-3
Copy Operations With Password Assigned, 3-27
CPU Mode LEDs, 1-3
CPU RUN mode, 1-7
Cursor Control Keys, 1-7

D

Data Entry Keys, 1-7
Data registers, 2-12
date and time values, 3-18
default format, 2-3
default format for monitoring registers, 2-11
Description of Main and Sub-Menus, 3-2
Directed Data, 3-37
Directed Data Length, 3-39
DISABLE POWER-UP CHECK, 3-12
Display Chk?, 3-24
Display for Binary Format, 2-6
Display for Decimal Format, 2-6
Display for Double Precision Format, 2-7
Display for Hexadecimal Format, 2-7
Display for Signed Decimal Format, 2-6
Display for Text Format, 2-7
Display Formats, 2-6

E

ENABLE POWER-UP CHECK, 3-12
ENT Key, 1-7
Environmental characteristics, 1-5
EPROM Memory Burner, 1-3
ESC Key, 1-7
Example of Message Display, 3-4

F

Features, 1-3
Forcing I/O Points, 2-7
Forcing Values, 2-10
Form of the time display, 3-18
Format Keys, 1-6
  ASCII notation, 1-6
  binary notation, 1-6
  hexadecimal notation, 1-6
  signed decimal notation, 1-6
  signed double precision notation, 1-6
  unsigned decimal notation, 1-6

G

General Description, 1-2
Genius Bus Controller, 3-37
Global Data, 3-37

I

Illustration of the OIU, 1-1
Installing the OIU, 1-7

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K

Key Code Buffer register, 3-5
Keyboard Check?, 3-24
Keypad, 1-3

L

LCD display, 1-8
LED/Backlight Chk?, 3-24
Left arrow key, 1-7
Liquid Crystal Display, 1-3
Loading a Program From Tape, 3-32

M

M31 Clear all Regs, 3-6
M32 Clear Reg Range, 3-6
M33 Data Srch, 3-6
M41 System Allocation, 3-8
M42 Module Diags, 3-8
M43 LED Mode, 3-8
M44 Pwrup Config Chk, 3-8
M45 Select Config, 3-8
M46 Force Config, 3-8
M47 R/W Smart MDL, 3-8
M51 Show program Name, 3-16
M52 Set Date and Time, 3-16
M53 Show Scan Times, 3-16
M54 Set Wdog, 3-16
M55 CPU ID, 3-16
M56 Reset all Ovrd, 3-16
M61 Show Rev. Numbers, 3-21
M62 Buzzer On/Off, 3-21
M63 Back-Light On/Off, 3-21
M64 OIU On/Off- Line, 3-21
M65 Self Diag, 3-21
M71 CPU to MC, 3-25
M72 MC to CPU, 3-25
M73 Verify MC = CPU, 3-25
M74 Blank Chk, 3-25
M75 Clr MC, 3-25
M76 Display MC Types, 3-25
M77 Tape to MC, 3-25
M78 MC to Tape, 3-25
M79 Verify MC = Tape, 3-25
M7A Computer to MC, 3-25
M7B MC to Computer, 3-25
M81 Unlock CPU, 3-36
M82 Lock CPU, 3-36
M91 Set Up GBC, 3-38
M92 Display Genius ID, 3-38
Main Menu 1 - PC Mode Control, 3-2
Main Menu 2 - Operator Messages, 3-3
Main Menu 3 - Register Commands, 3-6
Main Menu 4 - I/O Configuration, 3-8
Main Menu 5 - CPU Configuration, 3-16
Main Menu 6 - OIU Configuration, 3-21
Main Menu 7 - Memory Cartridge, 3-25
Main Menu 8 - Password Control, 3-36
Main Menu 9 - Genius Network Configuration, 3-37
Main Menu List, 1-3
MC Operations Chk?, 3-25
Memory Cartridge Equals Tape Operation, 3-34
Memory Cartridge Slot, 1-3
MENU Key, 1-7
Menu Mode, 1-3, 3-1
Menu Mode of Operation, B-2
Menus 1 through 4, B-2
Menus 5 through 9, B-3
mode selection keyswitch, 1-8
Module Address Display Format, 3-11
Monitor Mode, 1-3, 2-1
Monitor Mode of Operation, B-1
Monitoring, 2-11
  unsigned decimal, 2-11
Monitoring Channelized I/O References, 2-2
Monitoring Counter Registers, 4-3
Monitoring Data Registers, 2-11
  binary format, 2-12
  double precision format, 2-12
  text format, 2-12
Monitoring I/O References, 2-1
Monitoring Timer Registers, 4-3
Monitoring Timers and Counters, 4-2
Moving the Cursor, 2-3
Moving the Display Window, 2-4

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O

OIU 15-Pin Serial Port, C-1
OIU Features, 1-4
OIU Keypad, 1-5
OIU Main Menus, 3-1
OIU, illustration of, 1-1
OIU, installation of, 1-7
ON-LINE mode, 1-8
Operating Modes, 1-3
Operator Interface Unit Error Messages, A-6
Operator Interface Unit Menu Map, A-6
overview, 1-1
OVRD Key, 1-7

P

Port Connector, 1-3
Power Consumption, 1-8
Preset and Accumulate Registers, 4-1
PREV and NEXT Keys, 1-7
Prompts for Copy Operations, 3-26
Purpose of the OIU, 1-1

R

Reading I/O Module Starting Address on LEDs, 3-12
Real-time clock/calendar, 3-18
Reference Tables, 1-6
REG, CH±, IN, OUT, 1-6
Register data, 3-26
Registers, 16384, 2-11
Registers, 4096, 2-11
Resetting Overrides, 2-9
Right arrow key, 1-7
RS-232 Communications Port, 1-3

S

Searching For Overrides, 2-9
Selecting a Menu or Sub-Menu, 3-1
Serial Bus Address, 3-37
Serial Bus Address for Broadcast (Global) Data, 3-39
Serial Port, 8-Pin, C-2
Setting Overrides, 2-9
Setting Up a Genius Bus Controller, 3-40
SHFT key, 1-5
SRCH Key, 1-7
Starting Address, 3-39
Storing a Program to Tape, 3-33
Storing User Logic and Data Registers, 3-27
Sub Menu 81 - Unlock CPU, 3-36
Sub-Menu 32 - Clear Register Range, 3-6
Sub-Menu 33 - Data Search, 3-7
Sub-Menu 42 - Module Diagnostics, 3-10
Sub-Menu 43 - LED Mode, 3-11
Sub-Menu 44 - Power-Up Configuration Check, 3-12
Sub-Menu 45 - Select Configuration, 3-13
Sub-Menu 46 - Force Configuration, 3-14
Sub-Menu 47 - Read from or write to an Intelligent Module, 3-15
Sub-Menu 51 - Show Program Name, 3-17
Sub-Menu 52 - Set Date and Time, 3-17
Sub-Menu 53 - Show Scan Times, 3-18
Sub-Menu 54 - Set Software Watchdog Timer, 3-19
Sub-Menu 55 - CPU ID, 3-20
Sub-Menu 56 - Reset All Overrides, 3-21
Sub-Menu 61 - Show Revision Numbers, 3-21
Sub-Menu 62 - Buzzer On/Off, 3-22
Sub-Menu 63 - Back-Light On/Off, 3-22
Sub-Menu 64 - OIU On/Off-Line, 3-23
Sub-Menu 65 - Self-Diagnostics, 3-23
Sub-Menu 71 - Copy Data from CPU MC to OIU MC, 3-27
Sub-Menu 72 - Copy Data from OIU MC to CPU MC, 3-29
Sub-Menu 73 - Verify that Data in the CPU Equals Data in OIU Memory Cartridge, 3-29
Sub-MENU 74 - Checks Whether or Not the OIU Memory Cartridge is Blank, 3-30
Sub-Menu 75 - Clear All Data in the OIU Memory Cartridge, 3-30
Sub-Menu 76 - Display the Type and Size of the Memory Cartridge Currently Installed in the OIU and the CPU, 3-31

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Sub-Menu 77 - Copy Data from Cassette Tape to the OIU Memory Cartridge, 3-31
Sub-Menu 78 - Copy Data from the OIU Memory Cartridge to Cassette Tape, 3-32
Sub-Menu 79 - Verify Cassette Tape Data Equals OIU Memory Cartridge Data, 3-33
Sub-Menu 7A - Copy Data from an External Computer to the OIU Memory Cartridge, 3-34
Sub-Menu 7B - Copy Data from the OIU Memory Cartridge to an External Computer, 3-35
Sub-Menu 82 - Lock CPU, 3-36
Sub-Menu 92 - Display Genius ID, 3-41
System parameter data, 3-26

T

Table Keys, 1-6
Tape Port Chk?, 3-25
Text Table Pointer register, 3-4
Timer/Counter Keys, 1-6
Timer/Counter Mode, 1-3, 4-1
Timer/Counter Mode of Operation, B-1
Timer/Counter Special Register Area, 4-1
TMR, 1-6
Two CPUs Password Protected, 3-27

U

User defined message, 3-4
User program data, 3-26

V

Valid ranges, 2-7
Valid Ranges for Format, 2-8
Verification of Copy Operations, 3-26

W

Watchdog Timer value, 3-19
Writing a Word to I/O, 2-11
Writing to Data Registers, 2-12
Writing to Timers and Counters, 4-4

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GEK-_____ DATE OF MANUAL _____

We invite your comments and welcome suggestions to make this manual more useful.

GENERAL COMMENTS

	Improve	Acceptable	Good	Excellent
Organization	☐	☐	☐	☐
Ease of Locating Data	☐	☐	☐	☐
Clarity	☐	☐	☐	☐
Simple Language	☐	☐	☐	☐
Completeness	☐	☐	☐	☐
Examples/Illustrations	☐	☐	☐	☐

DETAILED COMMENTS (Correct, Expand, etc. - Please be specific.)

Page No. Comments

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

SYSTEM SOFTWARE ERROR INFORMATION (If it applies to your equipment)

_____

_____

NEW PRODUCT/ENHANCEMENTS DESIRED: _____

_____

_____

USER/FUNCTION INFORMATION

Please indicate the type of user/reader or function that you most nearly represent.

- ☐ Installation
- ☐ Maintenance
- ☐ Service
- ☐ Distributor
- ☐ System Designer
- ☐ Part Programmer
- ☐ Machine Operator
- ☐ Other (Please Specify:) _____

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Total I/O Points	_____	_____	_____
Memory Used	_____	_____	_____
I/O Types:			
115 VAC/In	No. _____	No. _____	No. _____
115 VAC/Out	No. _____	No. _____	No. _____
24 VAC/In	No. _____	No. _____	No. _____
24 VAC/Out	No. _____	No. _____	No. _____
Relay	No. _____	No. _____	No. _____
Analog/In	No. _____	No. _____	No. _____
Analog/Out	No. _____	No. _____	No. _____

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