PMD 200

user's manual

PMD 200 Programmable Message Display
User's Manual

WARNING

In the application of AVG UTICOR Technology, LP programmable control devices, you should consider them components. Therefore, provisions other than the programmable control device, must be taken to protect personnel in the event of a programmable control device malfunction. Programmable control devices should not be used as stand-alone protection in any application. Unless proper safeguards are used, unwanted start-ups could result in equipment damage or personal injury. If programmable controllers are used with operator interface and like devices, this hazard should be of primary importance. The operator should be made aware of this hazard and appropriate precautions taken.

In addition, consideration should be given to the use of an emergency stop function that is independent of the programmable controller.

The diagrams and examples in this user manual are included for illustrative purposes only. AVG UTICOR Technology, LP cannot assume responsibility or liability for actual use based on the diagrams and examples.

AVG UTICOR will not be held responsible or liable for indirect or consequential damages resulting from application or use of its equipment.

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GENERAL SPECIFICATIONS

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Model Number 76536 Voltage Inputs:	115/230 VAC (102-132)/(194-250) 47-63 Hz (18 VA) (Jumper Selectable - See Appendix C.1)
Model Number 76539 Voltage Inputs:	+24 VDC (21.6-26.4) (18 VA)
Control Inputs:	+10 to +30 VDC, customer supplied, (75 mA at +10 VDC)(200 mA at +30 VDC) Sink/Source, Hardware Configured (See 2.6 and Appendix F) Inverted/Non-Inverted, Software Selectable (See 3.9.6) BCD/Binary, Software Selectable (See 3.9.6)
Built-In Supply:	12 VDC, 350 mA max. (Model 76536 only)
Relay Contacts:	3 Amps @ 230 VAC or 30 VDC, max.
OPERATING TEMPERATURE:	0 to 60 °C Ambient
STORAGE TEMPERATURE:	-40 to +95°C Ambient
HUMIDITY:	10-95% RH Non-condensing
ELECTRICAL INTERFERENCE TOLERANCE:	NEMA ICS 2-230 Showering Arc Test ANSI C37.90a-1974 (SWC) Surge Withstand Capability Test
FUSE TYPE: Model Number 76536:	115 VAC Operation - 0.750 Amp @ 250 V (factory installed) 230 VAC Operation - 0.375 Amp @ 250 V (customer supplied) 0.177" x 0.58", 2AG, Fast Acting (See Appendix C.1 for Replacement)
Model Number 76539:	1.5 Amp @ 250 V 0.177" x 0.58", 2AG, Slo-Blo
REAL-TIME CLOCK BATTERY:	Panasonic BR2032 - 3.0 V, coin-type cell Poly-carbonmonofluoride Lithium
BATTERY LIFE:	Typically 5 Years (Minimum 1 1/2 Years)
CLOCK ACCURACY:	1 Minute Per Month Error (Maximum)
EEROM LIFE:	Min. 10,000 Changes to a Given Location
OVERALL DISPLAY:	2 Lines of 20 Characters Vacuum Fluorescent (Blue)
DISPLAY CHARACTERS:	5 X 7 Dot Matrix - 11 mm High
CHARACTER SET:	All Standard ASCII Upper/Lower Case and Symbols (U.S.)
INTERNATIONAL CHARACTER SETS:	Cyrillic, France, Germany, England, Denmark, Sweden (See insert)
MEMORY USAGE:	Approximately 150 40-Character Messages Per 8K Bytes of EEPROM Memory
SPACE REQUIREMENTS: Panel Space:	14.370" Wide x 4.378" High (Standard Model) 14.870" Wide x 4.875" High (Stainless-Steel Model)
Unit Depth:	4.800" (All Models)
HOUSING: The Front Panel:	Black, Anodized Aluminum (Industrial Use) Oil Tight Gasketing Six Built-In Mounting Studs (Standard Model) Stainless-Steel (Indoor/Outdoor Use) Water Resistant Gasketing Eight Built-In Mounting Studs (Stainless-Steel Model)
The Body:	Black Anodized Aluminum
WEIGHT:	5 pounds, 10 ounces

CONNECTORS:	
RS-232 Port:	25-Pin "D"-Type Socket (Female) Connector
Power Input Terminal Block:	Wire-Clamp Screws for 12-18 AWG
All Other Terminations:	Wire-Clamp Screws for 18-22 AWG
PART NUMBER:	76536-1, 8K EEROM memory, 115/230 VAC 76536-3, 16K EEROM memory, 115/230 VAC 76536-5, 24K EEROM memory, 115/230 VAC 76536-7, 32K EEROM memory, 115/230 VAC 76539-1, 8K EEROM memory, +24 VDC 76539-3, 16K EEROM memory, +24 VDC 76539-5, 24K EEROM memory, +24 VDC 76539-7, 32K EEROM memory, +24 VDC 7653XSS-X, PMD 200 with Stainless-Steel Front Panel (Available for All Above Models)

SECTION 1. - INTRODUCING THE PMD 200

1.0 - INTRODUCTION

The PMD 200 Programmable Message Display is an intelligent, alphanumeric display panel which is user programmed with individualized messages. Its compact size reduces space previously required for annunciator panels and indicator lights. Unlike annunciator panels, the PMD 200 can be used to provide complete information of machine or process diagnostics, operator prompting, and fault indications.

A number of different models of PMD 200 displays are available to suit requirements for the amount of message memory, the input voltage, and the NEMA rating of the front panel. All other features are standard in the PMD 200, which is designed for maximum flexibility in interfacing and display features.

The PMD 200 can be interfaced to any type of controller. Specific interfacing examples are available upon request from UTICOR Technology, Inc.

The PMD 200 can be programmed using any ASCII terminal or personal computer with an RS-232C interface. Personal computers require software for terminal mode. Message programs can be stored on digital tape and reloaded into one or more message displays at any time. The PMD 200 can be interfaced to a printer, either to print the entire program or to print individual messages as they are selected.

The RS-422A port provides communication with up to 65520 slave displays that can be addressed both individually or in groups. Another RS-422A port provides computer interfacing capability, which allows a computer to share control of the PMD 200's operation via RS-422A serial link.

This manual provides the information necessary to install, program, and operate your PMD 200. Use of this manual will help you make full use of your PMD 200.

1.1 - PHYSICAL CHARACTERISTICS

The PMD 200 is housed in a rugged, black aluminum case. Panel cut-out and outline dimensions for the PMD 200 are located in Appendix B.

1.1.1 - THE FRONT PANEL

The front panel of the display contains the 40-character display and the mounting hardware for the unit.

The 40-character vacuum-fluorescent display consists of 2 rows of 20 characters which are 11 mm high. Each character location consists of a 5 x 7 dot matrix which will display all standard ASCII characters. Displayed messages are legible at a distance of 25 feet from the unit.

The front panel has oil-tight gasketing and built-in mounting studs. All PMD 200 Message Displays are available with stainless-steel front panels that provide NEMA 4X mounting.

1.1.2 - THE BACK PANEL

Section 2 of this manual covers the switches and connectors located on the back panel of the PMD 200.

The switches set the PMD 200 for the various modes of operation, and the connectors provide all terminations needed for the many interfacing possibilities of the unit.

1.2 - UNIT POWER UP AN MODE SELECTION

Each time the PMD 200 is powered up or the Restart Button of the unit is pressed, the software in the display performs a self-test to assure the soundness of the unit. While the self-test is underway, the unit will display a message to indicate this. Then the PMD 200 will enter the Mode for which the unit is set according to the external Mode Select and Function Select Switches.

In order to change modes of operation, you must first change the switch settings for the desired operation, and then press the Restart Button. The PMD 200 will not change modes unless the Restart Button is pressed, or power is removed and then re-applied to the unit.

When self-testing is complete, an appropriate message is displayed to indicate which mode the unit is currently in. The exception to this is the Display position of the Mode Select Switch. When the PMD 200 enters the Display Mode, the display will clear, and nothing will appear on its displays until the message control terminals indicate that a message select number is present.

1.3 - PROGRAMMING

No special training is required to program the PMD 200. The programming process is menu driven, and continual prompts take the guess work out of creating message programs and setting up the desired parameters of the unit.

Sections 3 and 4 of this manual provide programming information for the PMD 200. Section 3 covers operation of programming menus and sub-menus. Section 4 describes programming prompts encountered and display options available for messages that are added or edited in the message program. A totally customized message program is easily created and modified when programming the PMD 200.

1.3.1 - MAIN MENU

Programming commands allow you to add, edit, and delete messages, as well as clear the message program memory in the PMD 200. Messages can be viewed on the programming terminal or the PMD 200 display while you are programming. Other commands can search the current program and locate messages that contain particular words or characters or can display information regarding the number of messages programmed and the amount of unprogrammed memory available.

Reference 3.0 - Programming The PMD 200

1.3.2 - SET UP PARAMETERS MENU

A parameters menu provides software configuration of the back panel ports for the various modes of operation. The input terminals used to select messages, the RS-422A Computer Port used for computer interfacing, and the multi-purpose RS-232C Terminal/Printer Port used for Program, Tape, and Print Modes can be set up within this menu. Additionally, this menu is used to set the unit's real-time clock and define system time rates for scrolled and chained messages, as well as blinking characters.

Reference 3.9 - Set Up Parameters

1.4 - MESSAGE DISPLAY OPTIONS

Programming prompts allow you to program messages of various lengths that can be displayed in various ways.

1.4.1 - STANDARD MESSAGES

Standard messages contain 40 characters or less and can be displayed alone or with other messages:

1. They can be included in any number of chained messages and can be included multiple times within one chained message.

2. Messages can be overlaid on the display. Two or more messages can be displayed without clearing the display. The second message can cover parts of the first message and can skip over other parts of the first message where the second message is programmed with "null" characters. Large numbers of messages can be generated by overlaying several messages together.

Reference
4.3 - Chain Message
4.10 - Clears Display
4.12 - Enter Starting Position Of Msg
4.16.5 - Null Characters

1.4.2 - SCROLLING MESSAGES

Scrolled messages contain up to 235 "characters" and can scroll upward or from right to left. Upward-scrolling messages display two lines of text at a time. Each line of the message is displayed first on the lower line, next on the top line, and then is scrolled off the display. Left- scrolling messages scroll on either line of the display. The unused line can be blank or display one line of a standard message or another left-scrolling message.

Reference
4.8 - Scrolls Upward
4.9 - Scrolls Right To Left

1.4.3 - CHAINED MESSAGES

Chained messages link up to 115 individual messages together under one message number. While each message within a chained message can be displayed individually, it will also be displayed when a chained message, that contains its message number, is selected. Messages within a chained message are displayed in their programmed order for a user defined length of time. The message chain repeats until a new message is selected.

Reference
4.3 - Chain Message

1.5 - SPECIAL DISPLAY FEATURES

Any message can be programmed (by entering control characters or other characters on the programming terminal) to contain time, date, variable data from the controller, blinking characters, or null (non-programmed) characters. Additionally, a special programming prompt allows the entire message to blink.

When displayed, time and date within a message are continually updated by the unit's internal real-time clock. Variable data (up to four sets of up to five significant digits per message) is updated through the input terminals used to select messages (when the unit's four message control terminals indicate that data, rather than message information, is present at the inputs).

Reference
2.5 - Message Control Terminals
4.5 - Blink Entire Message
4.13 - Starting Data Set
4.16 - Other Display Features

1.6 - OTHER DISPLAY OPTIONS

Other display options that affect the manner in which messages are displayed are programmed into the message through responses to programming prompts.

1.6.1 - SCROLL OPTIONS

Scrolling messages can be programmed to repeat, and each message can be programmed to scroll at a unique rate. Left-scrolling messages can be displayed on either the upper or lower line.

Reference
4.8 - Scrolls Upward
4.9 - Scrolls Right To Left

1.6.2 - CENTERED/UNCENTERED OPTION

Standard and upward-scrolling messages can be programmed to center their "lines" of message text on the 20-character framework of the message line.

Standard, uncentered messages can begin at any character location between 1 and 40.

Upward-scrolling, uncentered messages begin at character position one.

Reference 4.11 - Center Message
4.12 - Enter Starting Position Of Msg

1.6.3 - CLEAR DISPLAY OPTION

Additionally, a standard message can be programmed to either clear the display area of all previous messages or layer the message on top of existing messages.

Reference 1.2.1 - Standard Messages
4.10 - Clears Display

1.7 - MESSAGE OUTPUTS

Messages can also be programmed (via programming prompts) to energize the relay output terminals of the back panel or to send the contents of the message to a printer or to slave message displays.

1.7.1 - RELAY OUTPUT

The relay output terminals are controlled by the message program and can be interfaced to an external device for a message activated alarm. These terminals are energized as long as the specified message is displayed and then de-energized when a new message is selected.

Reference 2.7 - Relay Output
4.7 - Alarm Relay

1.7.2 - PRINT OUTPUT

Programming prompts provide not only selection of which messages are to be printed when displayed, but also how each message is to be printed. The printed message will include real-time and variable data if they are part of the message and any characters that remain on the display from previously displayed messages. This feature provides selective data logging with a permanent record for each day's events.

Reference 2.10 - RS-232 Terminal/Printer Port
4.6 - Send Message To RS-232 Port

1.7.3 - SLAVE OUTPUT

Messages can be programmed to be echoed to PMD 200S Slave Displays connected to the PMD 200. The message can be directed to a specific slave, or to a group of slaves, depending on the Slave Address programmed into the message. This allows different messages to be displayed on different slaves at the same time. Messages sent to slaves are displayed just as on the master PMD 200.

Slave displays are connected serially to the PMD 200 via an RS-422A port. This allows the master PMD 200 to control a large number of slaves at distances up to 4000 feet.

Reference 2.8 - RS-422A Slave Port
4.4 - Send To Slave

1.8 - DISPLAY MESSAGES

Despite all of the features and flexibility built into the PMD 200, the most basic function of the unit is to provide information regarding the controlled process by displaying messages that have been programmed into the display.

To accomplish this, the PMD 200 must be interfaced to the controlled system. The display can be interfaced to a programmable controller through discrete, data, or relay output modules in the +10 VDC to +30 VDC range. Two optional input adapters, which attach to the parallel input terminals on the PMD 200, convert voltages so that either 102 VAC to 132 VAC or +4 VDC to +12 VDC outputs can direct the display.

The input lines on the PMD 200 are read by the unit as a number. This number can either be interpreted as a binary or BCD (Binary Coded Decimal) number which, in turn, is either converted into a Message Number (the location of a programmed message in the memory) or a Variable Data number (a value to be inserted into an assigned location in the displayed message).

Each terminal of the unit's input lines represents a binary/BCD number value thatwill be added to the values of the other terminals to form a Message/Data Number. The value on the terminal will be counted if current is present on the terminal (non- inverted mode) or current is absent on the terminal (inverted mode).

These values are read by the PMD 200 at regular intervals. Additional terminals must have current present so that the unit can determine whether the values it is reading is a message number or a data value. If no current is present on these terminals (the message control terminals), input information is disregarded by the PMD 200.

A message is displayed on the PMD 200 as soon as it is selected. Most messages remain on the display until a new message replaces it. When a new message is selected, it will replace the existing message, regardless of how long this message was displayed. If no message appears on the PMD 200 display when it is in the Display Mode, either no message has been selected since the unit entered the Display Mode, or the most recently selected message was a non-repeating, scrolled message.

Reference

2.4 - Parallel Input Terminal Block
2.5 - Message Control Terminals
7. - The Display Mode
A.2 - Adapters

1.9 - COMPUTER INTERFACE

Section 8 of this manual covers the Computer Interface Mode of the PMD 200. The PMD 200 can be controlled via a serial link to a computer or PLC, simultaneously with the Parallel Port. Via Computer Interface, the controlling computer can perform all of the functions possible in the normal Display Mode and also can read and program the PMD 200. In the Display Mode, the Computer Port is always active and ready for communications.

To use the Computer Interface Mode, you will need to write a program for your computer to allow it to interface with the PMD 200.

Several display functions are possible in the Computer Interface Mode that are not possible in the normal Display Mode. These include the ability to send a message or data to a slave without displaying it on the master and the ability to display message text sent from the controlling computer directly on the PMD 200 or at a slave connected to it.

There is considerable flexibility in the connection of the computer and PMD 200s in computer interface applications. Each PMD 200 can have an individual communications address, allowing many of them to be connected on the same RS-422 link to the controlling computer and yet to be individually addressed. Slave PMD 200s can reside on the same RS-422 link to the control computer as the master PMD 200s, or they can be connected to the master PMD 200's Slave Port.

1.10 - CONCLUSION

The essence of the PMD 200 is information: information that is fast, accurate, and complete: information where it is most needed. With appropriate planning, you can always be aware of the current status of your process and react immediately to unwanted situations.

The added benefit of the PMD 200 is distribution: distribution of the information to other components of the network: to master/slave displays in other areas of the plant and to information recording devices. The output capabilities of the PMD 200 make it a vital component of the network.

The PMD 200 is designed to provide maximum flexibility with minimum complexity. The primary requirement for application of the PMD 200 is understanding the system into which it will be incorporated and the needs of the personnel involved. The second step for integrating the PMD 200 Programmable Message Display is to become familiar with its built-in features so that you can determine how these features can best satisfy your needs. Because the PMD 200 is so versatile, the unit is used in a large variety of applications. And since machinery, processes, and electronic equipment vary from application to application, there are numerous ways to enter information into and extract information from your message display.

Get to know your new PMD 200 by first browsing through this manual. Section 2 will describe most of the components you will ever need to touch.

Next, when you program the unit, experiment with your messages to obtain the most effective method for displaying them. View your messages individually and in various sequences on the display when you are programming so that unforeseen effects can be easily edited and corrected. Sections 3 and 4 of the manual provide information on programming.

The rest of the manual is a reference for the other modes of operation of the PMD 200. Combine this information with your knowledge of your needs, your other equipment, and your imagination to make your control network one that is complete.

DATE 6/25/03 ROUTING OPERATION DESCRIPTION **INQUIRY** AMED46 C8

ITEM **EEC-14PIN-001** OPER SEQ **0020** FACILITY ID 6025
OPERATION DESCRIPTION **INCOMING INSPECTION** ADDL DESC COUNT 3

LINE	ADDITIONAL DESCRIPTION
10	HIROSE #CL586-0503-9
11	PART NAME #FH10A-14S-1SH
20	SPEED TECH CORP #Y13-117-2140

USE ROLL UP/DOWN
F03 PREV SCREEN
F24 END OF JOB

Preface

Using 10F50 Software

Insert the UTICOR 10F50 disk into an available drive.

Follow prompts to install software.

Run 10F50.

PMD PROGRAMMING SOFTWARE window will appear providing you with information about software version, date, manufacturer, etc. Press ENTER.

From Main Menu:

1. Select "7 – Product Selection" and choose the proper UTICOR display (PMD 150, 200, 300, etc.)

2. Select "2 – Communication Setup."

   a. Select Output Port (to change this setting, see PMD manual).

   b. Select the Baud Rate (300–9600). This is the Baud Rate for the computer. This Baud Rate MUST match the Baud Rate setting of the PMD. All PMDs shipped form the factory are set to 1200 Baud.

   c. Select: Parity = none; Data Bits = 8; Stop Bits = 1.

3. Press ESC key to exit and save changes.

4. Select "1 – Terminal Emulator" (from Main Menu).

5. Message "Put PMD in Program Mode" will appear, select OK (press ENTER).

You should now be communicating with the PMD.

If communications have not been established; check your cable connections; check that the proper COM port on the computer is used; verify the Baud Rate setting of 10F50 matches that of the PMD.

To program the PMD off-line, at the Main Menu, select "8 – Edit Message Program (Off-Line)."

Refer to this manual for proper operation and programming.

Getting Started with PMDs

The first step in programming a UTICOR Programmable Message Display is establishing communication between your computer and the PMD. Follow the guidelines below.

Computer Hardware

IBM or compatible computer
512K RAM
One RS-232 serial port (COM1 or COM2)
DOS 3.3 or later

The CONFIG.SYS file in the computer's root directory should have the following two statements:

```
FILES=20
BUFFERS=20
```

Software

UTICOR PMD Programming Software, part number 10F50

Note: any terminal emulation software can also be used.

Interconnect Cable

An RS-232 interconnect cable is required for proper communication. This cable will connect to the COM1 or COM2 port of the computer and the programming port of the PMD.

Computer 25 pin female	PMD male	Computer 9 pin female	PMD male
2	2	3	2
3	3	2	3
7	7	5	7

Note: Additional wires or jumpers in the cable may cause communication problems between the computer and the PMD.

GENERAL SPECIFICATIONS

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	Sink/Source, Hardware Configured (See 2.6 and Appendix F) Inverted/Non-Inverted, Software Selectable (See 3.9.6) BCD/Binary, Software Selectable (See 3.9.6)
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Relay Contacts:	3 Amps @ 230 VAC or 30 VDC, max.
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Reference 3.0 - Programming The PMD 200

1.3.2 - SET UP PARAMETERS MENU

A parameters menu provides software configuration of the back panel ports for the various modes of operation. The input terminals used to select messages, the RS-422A Computer Port used for computer interfacing, and the multi-purpose RS-232C Terminal/Printer Port used for Program, Tape, and Print Modes can be set up within this menu. Additionally, this menu is used to set the unit's real-time clock and define system time rates for scrolled and chained messages, as well as blinking characters.

Reference 3.9 - Set Up Parameters

1.4 - MESSAGE DISPLAY OPTIONS

Programming prompts allow you to program messages of various lengths that can be displayed in various ways.

1.4.1 - STANDARD MESSAGES

Standard messages contain 40 characters or less and can be displayed alone or with other messages:

1. They can be included in any number of chained messages and can be included multiple times within one chained message.

2. Messages can be overlaid on the display. Two or more messages can be displayed without clearing the display. The second message can cover parts of the first message and can skip over other parts of the first message where the second message is programmed with "null" characters. Large numbers of messages can be generated by overlaying several messages together.

Reference
4.3 - Chain Message
4.10 - Clears Display
4.12 - Enter Starting Position Of Msg
4.16.5 - Null Characters

1.4.2 - SCROLLING MESSAGES

Scrolled messages contain up to 235 "characters" and can scroll upward or from right to left. Upward-scrolling messages display two lines of text at a time. Each line of the message is displayed first on the lower line, next on the top line, and then is scrolled off the display. Left- scrolling messages scroll on either line of the display. The unused line can be blank or display one line of a standard message or another left-scrolling message.

Reference
4.8 - Scrolls Upward
4.9 - Scrolls Right To Left

1.4.3 - CHAINED MESSAGES

Chained messages link up to 115 individual messages together under one message number. While each message within a chained message can be displayed individually, it will also be displayed when a chained message, that contains its message number, is selected. Messages within a chained message are displayed in their programmed order for a user defined length of time. The message chain repeats until a new message is selected.

Reference
4.3 - Chain Message

1.5 - SPECIAL DISPLAY FEATURES

Any message can be programmed (by entering control characters or other characters on the programming terminal) to contain time, date, variable data from the controller, blinking characters, or null (non-programmed) characters. Additionally, a special programming prompt allows the entire message to blink.

When displayed, time and date within a message are continually updated by the unit's internal real-time clock. Variable data (up to four sets of up to five significant digits per message) is updated through the input terminals used to select messages (when the unit's four message control terminals indicate that data, rather than message information, is present at the inputs).

Reference
2.5 - Message Control Terminals
4.5 - Blink Entire Message
4.13 - Starting Data Set
4.16 - Other Display Features

1.6 - OTHER DISPLAY OPTIONS

Other display options that affect the manner in which messages are displayed are programmed into the message through responses to programming prompts.

1.6.1 - SCROLL OPTIONS

Scrolling messages can be programmed to repeat, and each message can be programmed to scroll at a unique rate. Left-scrolling messages can be displayed on either the upper or lower line.

Reference
4.8 - Scrolls Upward
4.9 - Scrolls Right To Left

1.6.2 - CENTERED/UNCENTERED OPTION

Standard and upward-scrolling messages can be programmed to center their "lines" of message text on the 20-character framework of the message line.

Standard, uncentered messages can begin at any character location between 1 and 40.

Upward-scrolling, uncentered messages begin at character position one.

Reference
4.11 - Center Message
4.12 - Enter Starting Position Of Msg

1.6.3 - CLEAR DISPLAY OPTION

Additionally, a standard message can be programmed to either clear the display area of all previous messages or layer the message on top of existing messages.

Reference
1.2.1 - Standard Messages
4.10 - Clears Display

1.7 - MESSAGE OUTPUTS

Messages can also be programmed (via programming prompts) to energize the relay output terminals of the back panel or to send the contents of the message to a printer or to slave message displays.

1.7.1 - RELAY OUTPUT

The relay output terminals are controlled by the message program and can be interfaced to an external device for a message activated alarm. These terminals are energized as long as the specified message is displayed and then de-energized when a new message is selected.

Reference
2.7 - Relay Output
4.7 - Alarm Relay

1.7.2 - PRINT OUTPUT

Programming prompts provide not only selection of which messages are to be printed when displayed, but also how each message is to be printed. The printed message will include real-time and variable data if they are part of the message and any characters that remain on the display from previously displayed messages. This feature provides selective data logging with a permanent record for each day's events.

Reference
2.10 - RS-232 Terminal/Printer Port
4.6 - Send Message To RS-232 Port

1.7.3 - SLAVE OUTPUT

Messages can be programmed to be echoed to PMD 200S Slave Displays connected to the PMD 200. The message can be directed to a specific slave, or to a group of slaves, depending on the Slave Address programmed into the message. This allows different messages to be displayed on different slaves at the same time. Messages sent to slaves are displayed just as on the master PMD 200.

Slave displays are connected serially to the PMD 200 via an RS-422A port. This allows the master PMD 200 to control a large number of slaves at distances up to 4000 feet.

Reference
2.8 - RS-422A Slave Port
4.4 - Send To Slave

1.8 - DISPLAY MESSAGES

Despite all of the features and flexibility built into the PMD 200, the most basic function of the unit is to provide information regarding the controlled process by displaying messages that have been programmed into the display.

To accomplish this, the PMD 200 must be interfaced to the controlled system. The display can be interfaced to a programmable controller through discrete, data, or relay output modules in the +10 VDC to +30 VDC range. Two optional input adapters, which attach to the parallel input terminals on the PMD 200, convert voltages so that either 102 VAC to 132 VAC or +4 VDC to +12 VDC outputs can direct the display.

The input lines on the PMD 200 are read by the unit as a number. This number can either be interpreted as a binary or BCD (Binary Coded Decimal) number which, in turn, is either converted into a Message Number (the location of a programmed message in the memory) or a Variable Data number (a value to be inserted into an assigned location in the displayed message). Each terminal of the unit's input lines represents a binary/BCD number value that

will be added to the values of the other terminals to form a Message/Data Number. The value on the terminal will be counted if current is present on the terminal (non- inverted mode) or current is absent on the terminal (inverted mode).

These values are read by the PMD 200 at regular intervals. Additional terminals must have current present so that the unit can determine whether the values it is reading is a message number or a data value. If no current is present on these terminals (the message control terminals), input information is disregarded by the PMD 200.

A message is displayed on the PMD 200 as soon as it is selected. Most messages remain on the display until a new message replaces it. When a new message is selected, it will replace the existing message, regardless of how long this message was displayed. If no message appears on the PMD 200 display when it is in the Display Mode, either no message has been selected since the unit entered the Display Mode, or the most recently selected message was a non-repeating, scrolled message.

Reference

2.4 - Parallel Input Terminal Block
2.5 - Message Control Terminals
7. - The Display Mode
A.2 - Adapters

1.9 - COMPUTER INTERFACE

Section 8 of this manual covers the Computer Interface Mode of the PMD 200. The PMD 200 can be controlled via a serial link to a computer or PLC, simultaneously with the Parallel Port. Via Computer Interface, the controlling computer can perform all of the functions possible in the normal Display Mode and also can read and program the PMD 200. In the Display Mode, the Computer Port is always active and ready for communications.

To use the Computer Interface Mode, you will need to write a program for your computer to allow it to interface with the PMD 200.

Several display functions are possible in the Computer Interface Mode that are not possible in the normal Display Mode. These include the ability to send a message or data to a slave without displaying it on the master and the ability to display message text sent from the controlling computer directly on the PMD 200 or at a slave connected to it.

There is considerable flexibility in the connection of the computer and PMD 200s in computer interface applications. Each PMD 200 can have an individual communications address, allowing many of them to be connected on the same RS-422 link to the controlling computer and yet to be individually addressed. Slave PMD 200s can reside on the same RS-422 link to the control computer as the master PMD 200s, or they can be connected to the master PMD 200's Slave Port.

1.10 - CONCLUSION

The essence of the PMD 200 is information: information that is fast, accurate, and complete: information where it is most needed. With appropriate planning, you can always be aware of the current status of your process and react immediately to unwanted situations.

The added benefit of the PMD 200 is distribution: distribution of the information to other components of the network: to master/slave displays in other areas of the plant and to information recording devices. The output capabilities of the PMD 200 make it a vital component of the network.

The PMD 200 is designed to provide maximum flexibility with minimum complexity. The primary requirement for application of the PMD 200 is understanding the system into which it will be incorporated and the needs of the personnel involved. The second step for integrating the PMD 200 Programmable Message Display is to become familiar with its built-in features so that you can determine how these features can best satisfy your needs. Because the PMD 200 is so versatile, the unit is used in a large variety of applications. And since machinery, processes, and electronic equipment vary from application to application, there are numerous ways to enter information into and extract information from your message display.

Get to know your new PMD 200 by first browsing through this manual. Section 2 will describe most of the components you will ever need to touch.

Next, when you program the unit, experiment with your messages to obtain the most effective method for displaying them. View your messages individually and in various sequences on the display when you are programming so that unforeseen effects can be easily edited and corrected. Sections 3 and 4 of the manual provide information on programming.

The rest of the manual is a reference for the other modes of operation of the PMD 200. Combine this information with your knowledge of your needs, your other equipment, and your imagination to make your control network one that is complete.

SECTION 2. THE BACK PANEL

2.0 - INTRODUCTION

The back panel of the PMD 200 contains connectors for the various interfacing capabilities and switches to enable the different modes of operation.

The following switches and connectors are located on the back panel:

SWITCHES: FUNCTION SELECT SWITCH
MODE SELECT SWITCH
RESTART BUTTON

CONNECTORS: 16-POSITION PARALLEL INPUT TERMINAL BLOCK

11-POSITION TERMINAL BLOCK WHICH CONTAINS

- 4 Message Control Terminals
- 2 VDC Power In And 2 VDC Power Out Terminals
- 3 Relay Output Terminals

RS-422A TERMINAL BLOCK WHICH CONTAINS

- Slave Port
- Computer Port

25-PIN "D"-TYPE RS-232 TERMINAL/PRINTER PORT CONNECTOR
3-POSITION POWER INPUT TERMINAL BLOCK

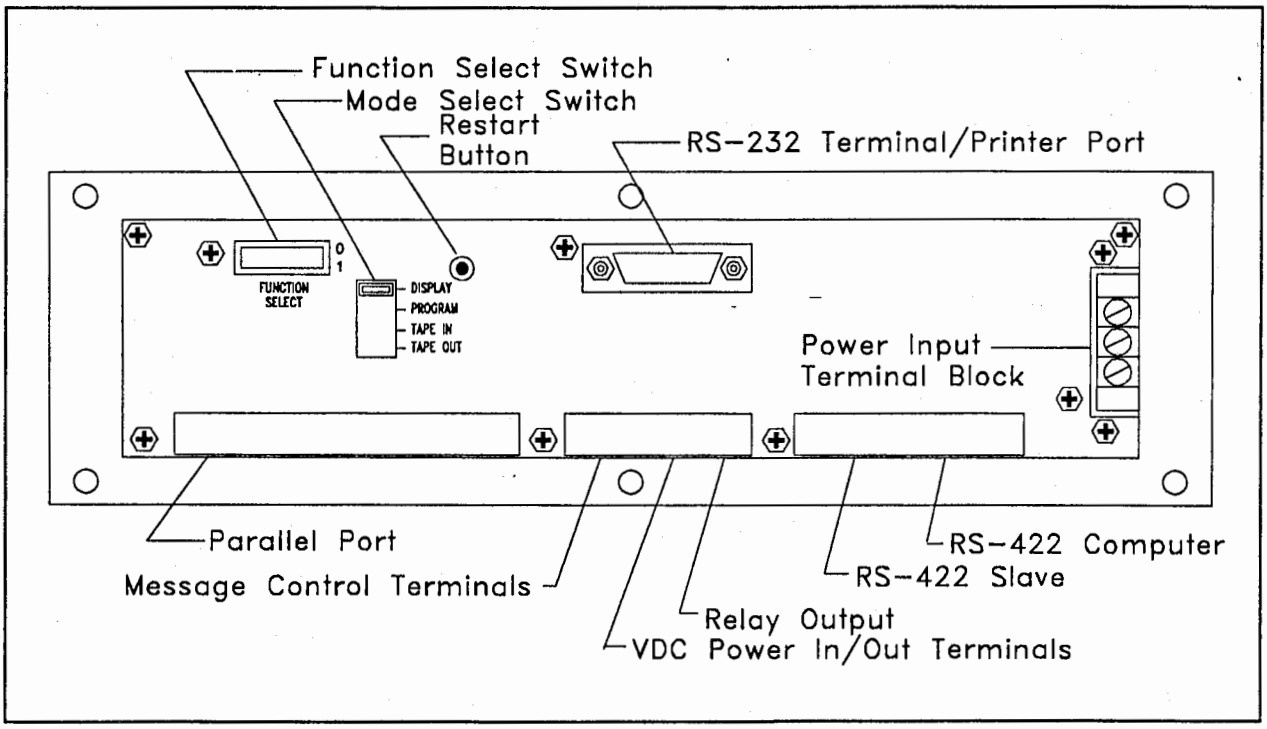

Figure 2-1. Back Panel Of The PMD 200.

2.1 - FUNCTION SELECT SWITCH

The function select Switch is an 8-position dip-switch which is used for the following purposes:

1. Sets the baud rate for the Program, Tape In, and Tape Out Modes externally or activates the internal settings.

2. Selects Program Mode or Print Mode.

3. Selects Display Mode or Computer Interface Mode.

4. Selects Tape In Mode or Verify Tape Mode.

5. Activates RS-232 Port/deactivates Slave Port or vice versa.

FUNCTION SELECT SWITCH SETTINGS

BAUD RATE - TAPE IN AND OUT AND PROGRAM MODES	SWITCH POSITION
* 300	1 = ON 2 = OFF
* 1200	1 = OFF 2 = ON
* 4800	1 = ON 2 = ON
SET INTERNALLY	1 = OFF 2 = OFF

* Set for 1 Stop Bit, No Parity, 7 or 8 data bits for the Program Mode

MODE	SWITCH POSITION
PRINT USER PROGRAM	3 = ON
POSITION 4 IS NOT USED	
VERIFY TAPE	5 = ON
SLAVE PORT ACTIVE	6 = ON
PRINTER PORT ACTIVE	6 = OFF
TAPE BAUD EXTERNAL	7 = ON
TAPE BAUD INTERNAL - Active Only When In Tape Modes	7 = OFF
ODD PARITY, TWO STOP BITS, 7 DATA BITS - (PROGRAM MODE)	8 = ON
NO PARITY, ONE STOP BIT, 8 DATA BITS - (PROGRAM MODE) Valid only with External Baud Rates	8 = OFF

Table 2-1. Function Select Switch Setting Definitions.

Reference 3.9.4 - Setup Serial Ports

2.2 - MODE SELECT SWITCH

The Function Select Switch defines the current mode of operation. A brief description of these modes follow:

DISPLAY — Operating mode - ready to accept communication from a controller or other device.

Can also be Computer Interface.

PROGRAM — Used to program the unit.

Can also be Print Program Mode.

TAPE IN — Loads message program from a digital cassette tape or another PMD 200.

Can also be Verify A Tape Mode.

TAPE OUT — Dumps message program to digital cassette tape for storage or to another PMD 200 to program that unit.

Reference Table 2-1.

2.3 - RESTART BUTTON

The Restart Button resets the unit. Press this button after changing the settings of either the Function Select Switch or the Mode Select Switch. When you press Restart, the unit will display the message "Self Testing" briefly while it conducts internal test routines. Then it will enter the selected mode of operation.

2.4 - 16-POSITION PARALLEL INPUT TERMINAL BLOCK

The Parallel Input Terminal Block is a 16-input port through which message numbers and data information from a controller or other device is entered into the PMD 200 when the unit is in the Display Mode of operation. These inputs (as well as the message control terminals) are opto-coupled to the outside world and require drivers capable of sinking 3.5 mA at +10 VDC or 10 mA at +30 VDC.

This port can operate with BCD or binary, inverted or non-inverted input signals (source or sink), and also, for 8- or 16-bit wide data signals. (Refer to Table 2-2.)

DEFINITIONS

ACTIVE: Current flow on input.

NON-ACTIVE: No current flow on input.

INVERTED: Active state reads logic '0'.
Non-active state reads logic '1'.

NON-INVERTED: Active state reads logic '1'.
Non-active state reads logic '0'.

BCD: The 16 bits are interpreted as four BCD digits and can specify a message number or data from 0-9999.

BINARY: The 16 bits are interpreted as a message number from 0-9999 (highest programmable message number) or data from 0-65535.

Note the following concerning this port:

1. This port can also identify the unit number of the display when using Computer Interface Mode.

2. A product bulletin for your specific interfacing needs is available upon request.

Reference 3.9.6 - Setup Parallel Port
8.1 - Unit Address

PARALLEL INPUT TERMINAL BLOCK

TERMINAL NUMBER	BCD	BINARY
D1	1	1
D2	2	2
D3	4	4
D4	8	8
D5	10	16
D6	20	32
D7	40	64
D8	80	128
D9	100	256

Table 2-2. (continued next page)

PARALLEL INPUT TERMINAL BLOCK		
TERMINAL NUMBER	**BCD**	**BINARY**
D10	200	512
D11	400	1024
D12	800	2048
D13	1000	4096
D14	2000	8192
D15	4000	16384
D16	8000	32768

Table 2-2. Terminal Assignments For The Parallel Input Terminal Block.

2.5 - MESSAGE CONTROL TERMINALS

The control terminals Message/Data, Data Select 1, Data Select 2, and Data Hold are the points where the control inputs to the PMD 200 are connected.

Like the parallel port input, these lines can be programmed for non-inverted or inverted operation and can be sourcing or sinking inputs.

A description of these lines follows:

DATA HOLD — Logic '1' on this input allows the information present on the parallel port to be accepted by the PMD 200. This information can be a message number or data.

Signals on the parallel port must be held constant for (scan time + debounce time) to be considered valid.

Reference — 3.9.9 - Select Debounce Time
7.4 - Display Mode Operation

MESSAGE/DATA — Logic '1' on this input signifies that the information present on the parallel port represents a message number.

Logic '0' on this input signifies that the information present on the parallel port represents data.

DATA SELECT 1 & 2 — When the Message/Data line indicates a message number is present (logic '1'), the state of these lines is inconsequential.

When the Message/Data line indicates data (logic '0'), the logic state of these two lines determines which data set will be assigned the value present on the parallel inputs.

Table 2-3 indicates the logic state of the two select lines for the four data sets.

DATA SELECT 2	DATA SELECT 1	DATA SET
0	0	1
0	1	2
1	0	3
1	1	4

Table 2-3. Data Set Truth Table.

Reference 4.13 - Starting Data Set
4.16.3 - Display Variable Data

2.6 - POWER IN AND POWER OUT TERMINALS

The two terminals marked "IN" are for biasing the devices driving the parallel inputs. The terminals are labeled (+)SK(-) and (-)SRC(+).

If the drivers connected to the parallel inputs of the PMD 200 are of the current sinking type, the (+)SK(-) label applies. Connect the (+) terminal to the proper bias voltage for the drivers (+10 to +30 VDC) and connect the (-) terminal to the same common to which the drivers are connected.

If the drivers are of the sourcing type, the (-)SRC(+) label applies. Connect the (+) terminal to the driver's positive common voltage and connect the (-) terminal to the power source's negative terminal.

The two terminals marked "OUT" are a source of +12 VDC power that can be used to power the controller's output card driving the PMD 200's parallel inputs.

NOTE: The +24 VDC PMD 200 display contains no internal +12 VDC power source.

Reference Appendix F - "Source" and "Sink" Inputs

2.7 - RELAY OUTPUT

The relay contact output terminals are connected to an internal relay which is controlled by the program. These terminals can be interfaced to an external device for a message selected alarm. Any message can be pre-programmed to energize the internal relay when selected in the Display Mode. The relay contact output is in the form of a SPDT arrangement providing both a NC and a NO contact.

Contact ratings for these terminals are 3 Amps at 230 VAC max. and 3 amps at +30 VDC max. (not internally fused).

2.8 - RS-422A SLAVE PORT

This RS-422A port is for interfacing to slave units. Up to 15 groups of 4095 slave units RS-422A can be addressed from one PMD 200 master unit.

These terminals are internally connected to the RS-232 port, and only one of these ports may be used at a time. Figure 2-2 illustrates two methods of interfacing the master display to slave units.

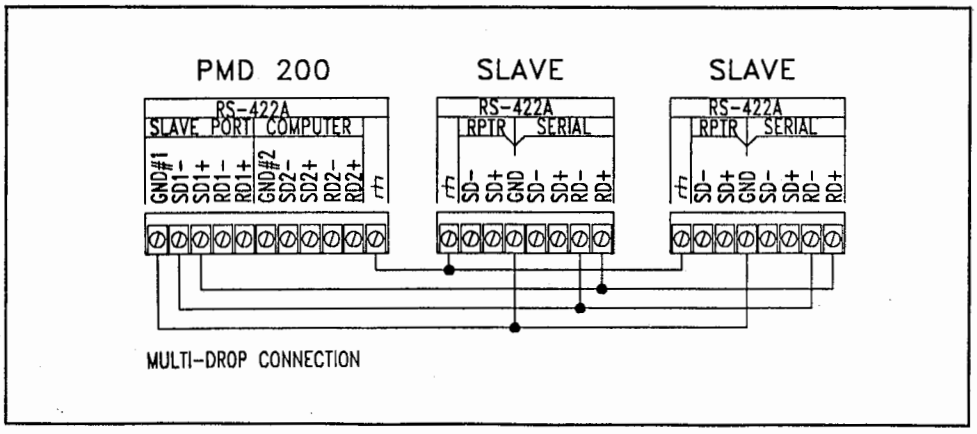

Figure 2-2. (continued next page)

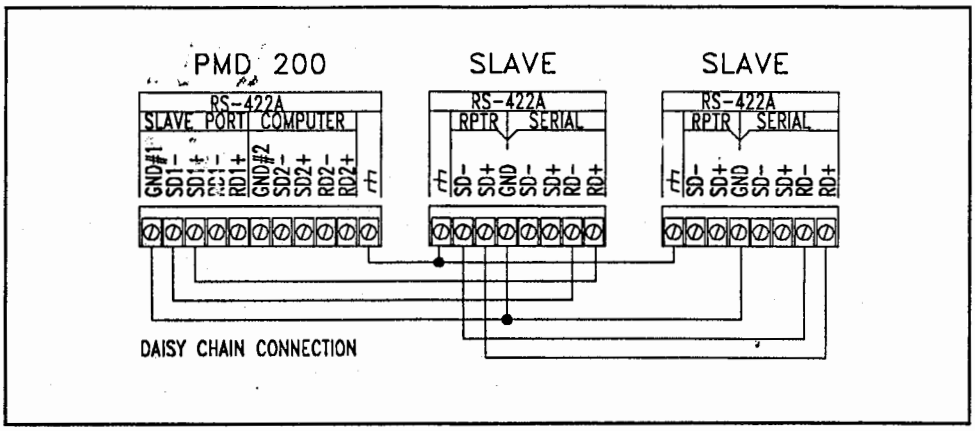

Figure 2-2. Slave Port Connections For Interfacing To Slave Units.

Note that Master/Slave communications are unidirectional (**from** the Master **to** the slave). The receive lines of the Master's Slave Port need no connections.

Reference 7.6 - Slave Display Interfacing

2.9 - RS-422A COMPUTER PORT

The RS-422A Computer Port is for interfacing the PMD 200 to a controlling computer (main frame, mini, personal, or PLC ASCII interface unit). This port uses RS-422 levels. This allows operation from up to 1220 meters (4000 feet) from the controlling computer and allows multi- drop (party-line) operation. Many controlling computers have only RS-232 ports. These computers can be adapted to RS-422 operation by the use of the Isolated Bidirectional Adapter (UTICOR Part Number 76535).

Reference
3.9.4 - Setup Serial Ports
8. - Computer Interface

2.10 - RS-232 TERMINAL/PRINTER PORT

This is a 25-pin "D"-type connector on which the RS-232 port is terminated.

The following equipment can be interfaced to this port:

1. Programming terminal - Program Mode.
2. Digital tape recorder - Tape Modes.
3. Printer - Print program or print messages in Display Mode.
4. Another PMD 200 - to directly load and dump message programs.

Rules that apply to this port:

1. The baud rate can be set internally for all modes.
2. The baud rate can be set externally for the Program and Tape Modes.
3. This port is de-activated when the Slave Port is activated.

Refer to Table 2-4 for terminal designations.

Reference
2.1 - Function Select Switch
2.8 - RS-422A Slave Port
3.9.4 - Setup Serial Port

RS-232 TERMINAL/PRINTER PORT	
PIN NUMBER	**ASSIGNMENT**
1	* Chassis Ground
2	* Receive Data
3	* Transmit Data
4	Request to Send
5	Clear to Send
7	* Signal Common
20	Data Terminal Ready

* Minimum cable connections for RS-232C communications when control signals for handshaking, etc. are not used. See Figure 2-3 for typical connections.

Table 2-4. Pin Number Assignment For The RS-232 Terminal/Printer Port.

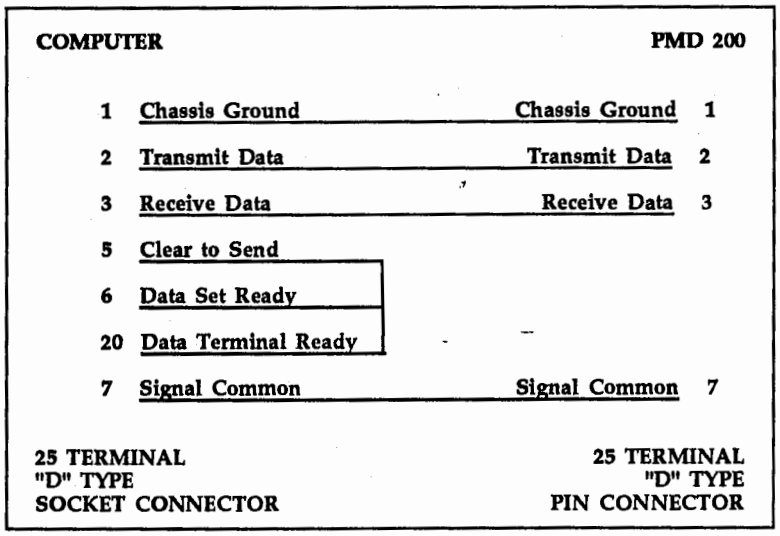

Figure 2-3. Minimum Connections for the * IBM Computer.

2.11 - POWER INPUT TERMINAL BLOCK

This 3-position terminal block is for connecting to an external power source to power the unit. Always connect the ground terminal to the safety ground.

Reference C.1 - Input Power Requirements

2.12 - CONCLUSION

The back panel connectors described in this section of the manual provide all of the connections to the unit from the outside world. The switches of the back panel provide an external baud rate setting for the Program and Tape Modes and allow you to put the unit into the various modes of operation.

The following sections of the manual provide information for the various modes of The PMD 200. Section 3 provides information on programming the unit.

SECTION 3. - PROGRAMMING THE PMD 200

3.0 - INTRODUCTION

This section describes the commands found in the Main Menu of the PMD 200's Program Mode. Use these commands to develop and maintain PMD 200 message programs.

A typical sequence to develop a new message program follows:

1. Set up PMD 200 and programming terminal for programming (see Preparation below).
2. Use the Clear All Messages Command to remove any existing program.
3. Use the options from the Set Up Parameters Menu to define parameter defaults.
4. Use the Add A Message Command to enter messages into memory.

Program Mode Preparation -

1. Connect power to the Power Input Terminal Block.
2. Connect the RS-232 Terminal/Printer Port to a programming terminal (either a dumb or smart terminal or a personal computer with a software program diskette for terminal mode). Refer to Figure 2-3 for cable information.
3. Set the baud rate on the Function Select Switch.
4. Set the Mode Select Switch to Program Mode and press the Restart Button.
5. The PMD 200 will display the message:

IN PROGRAM MODE
PMD 200 REVISION X

Revision X indicates the revision of the software in the unit.

The programming terminal will display the PMD 200's Main Menu shown below.

A	ADD A MESSAGE
C	CLEAR ALL MESSAGES AND SET PARAMETERS TO DEFAULTS
D	DELETE MESSAGES
E	EDIT A MESSAGE
F	FIND A STRING
H	LIST VALID COMMANDS
L	LIST MESSAGES
N	DISPLAY NUMBER OF FREE BYTES
S	SET UP PARAMETERS
V	VIEW MESSAGES ON DISPLAY
<CR>	LIST NEXT MESSAGE
ESC	ABORT COMMAND

3.1 - ADD A MESSAGE

This command allows you to create a new message. (Use the E command to modify an existing message.)

Enter A at the "> " prompt to add a message. The terminal will respond:

>ADD MSG #_

Enter a number between 0 and 9999 (for the desired message number location) and press <CR>. The terminal will respond with the current message option defaults, followed with:

CHANGE OPTION DEFAULTS ?_

Enter N for no to leave the control options as they are set.

Enter Y for yes to change the option defaults. The terminal will sequence through these prompts as shown in Table D-3 and described in Section 4.

When the terminal displays the "@_" prompt, you may enter the message text.

Once the message is added, you will return to the ">_" prompt.

Reference

4.1 - Change Option Defaults
4.3 - Chain Message
4.8 - Scrolls Upward
4.9 - Scrolls Right To Left
4.14 - @_
D.3 - Programming Prompts

Error Messages

E.1 - Msg Already Exists
Msg Number Out Of Bounds

3.2 - CLEAR ALL MESSAGES AND SET PARAMETERES TO DEFAULTS

Enter C to clear the message program in the PMD 200. The terminal will prompt you to confirm this:

```
>CLEAR ALL MESSAGES
ARE YOU SURE? _
```

Enter Y for yes to clear all messages. The terminal will respond:

```
CLEARING MESSAGES
>_
```

Or press N for no to abort this command. You will return to the ">_" prompt.

The Clear All Messages Command should be used prior to programming the PMD 200 for the first time.

3.3 DELETE MESSAGES

Enter D to delete one or more messages. The terminal will respond:

```
>DELETE
ENTER RANGE _
```

You have four options:

1. Enter a number and press <CR> (deletes one message).
2. Enter a number, a dash, a number, and press <CR> (deletes a block of messages).
3. Enter a number, a dash, an asterisk, and press <CR> (deletes from number specified to the end of the message program).
4. Enter an asterisk only to delete the highest numbered message in the program.

You will return to the ">_" prompt.

3.4 - EDIT A MESSAGE

Enter E to edit an existent message. The terminal will respond:

```
>EDIT MSG # _
```

Enter the message number and press <CR>. The terminal will respond with the message parameters that were programmed with the message, followed with:

```
REPLACE MESSAGE CONTROL OPTIONS(Y/N)? _
```

Enter N for no to leave the parameters as they are set.

Enter Y for yes to change them. The terminal will sequence through the prompts as shown in Table D-3.

The terminal will then display the first line of the message, along with the prompt:

REPLACE THIS LINE(Y/N)? _

Enter N for no to leave the line of text as it is or enter Y for yes to replace it. Re-enter the line and press <CR>.

This process continues through each line of the message. Additional lines of text can be added to the end of scrolled messages. Terminate the editing of scrolled messages by pressing <CTRL> Z.

Editing a chained message involves changing the numbers in the list only.

You will return to the ">_" prompt.

Error Messages

E.1 - Message Number Out Of Bounds
Message Does Not Exist To Edit
Cannot Make Scrolling Message A Non-Scrolling Message

3.5 - FIND A STRING

To find messages that contain a particular character string, enter F, enter ", enter the character string you are searching for, and then press <CR>. The terminal will look similar to this:

```
>F "STRING
```

The PMD searches the program from the beginning. When the string is found, the terminal displays the message number, the parameters, and the message. It will also display the prompt:

```
FIND> _
```

Press <CR> only to find an additional message containing the string. This can be repeated until the terminal responds:

```
FIND>
STRING
WAS NOT FOUND
>_
```

To end the Find A String command prior to receiving the previous message, press <ESC>.

NOTE: This procedure may take minutes when the message program is large.

FIND LARGEST PROGRAMMED MESSAGE

Enter F and an asterisk to find the largest programmed message number in the PMD 200. The terminal will respond:

```
>F *
LARGEST MESSAGE NUMBER :  365
>_
```

You have returned to the ">_" prompt.

3.6 - LIST VALID COMMANDS

Enter H to view the Main Menu on the terminal. This menu is shown in Section 3.0.

Press <CTRL> S to stop scrolling. Press <CTRL> Q to resume scrolling.

3.7 - LIST MESSAGES

Enter L to list one or more messages on the terminal screen. The terminal will respond:

```
>LIST
ENTER RANGE
```

You have four options:

1. Enter a number and press <CR> (lists one message).
2. Enter a number, a dash, a number, and press <CR> (lists a block of messages).
3. Enter a number, a dash, an asterisk, and press <CR> (lists messages from number specified to the end of the message program).
4. Enter an asterisk only to list the highest numbered message in the program.

The terminal displays the message number, the parameters, and the message for all message numbers entered with the list command.

Press <CTRL> S to stop scrolling. Press <CTRL> Q to resume scrolling. Press <ESC> to abort listing process.

3.8 - DISPLAY NUMBER OF FREE BYTES

Enter N to display message program information on the terminal screen. An example follows:

```
>N
LARGEST MESSAGE NUMBER : 83
TOTAL NUMBER OF MESSAGES : 84
NUMBER OF FREE BYTES : 7123
NUMBER OF DELETED MESSAGES : 24
>_
```

You have returned to the ">_" prompt.

3.9 - SET UP PARAMETERS

Enter S to put the PMD 200 into the Set Up Parameters Mode. While in this mode, the PMD will display:

```
SET UP PARAMETERS
```

The terminal will display the Set Up Parameters Menu and Setup prompt as shown below:

```
1)      CHANGE BLINK ON AND OFF DELIMITERS
2)      SET/RESET HARD COPY STATE
3)      ENTER NUMBER OF NULLS
        PRINTED AFTER A <CR>
4)      SETUP SERIAL PORTS
5)      SETUP CLOCK
6)      SETUP PARALLEL PORT
7)      SETUP RATE FOR SCROLL AND MESSAGE
8)      CHANGE BLINK ON AND OFF RATES
9)      SELECT DEBOUNCE TIME
10)     SELECT CHARACTER SET
11)     CHANGE GROUP/UNIT CODE
<CR>    PRINT THIS LIST

SETUP>_
```

Press <CTRL> S to stop scrolling. Press <CTRL> Q to resume scrolling. Press <ESC> to exit Set Up mode.

To select an item from this menu, enter the corresponding number and press <CR> while in the Set Up Parameters Mode.

3.9.1 - CHANGE BLINK ON OFF DELIMITERS

This command is provided to allow the Blink On and Blink Off Delimiter characters to be changed. The PMD 200 defaults to "[" for the Blink On Delimiter and to "]" for the Blink Off Delimiter. If these characters are needed for display in a message, either or both can be exchanged for other characters. When they are changed, all usages of the blink characters in the program will automatically be changed to the new characters.

Enter 1 and press <CR> to select new Blink On and Blink Off Delimiters.

The terminal will respond:

```
BLINK ON AND BLINK OFF DELIMITERS
     CANNOT BE THE SAME CHARACTERS.
ENTER BLINK ON CHARACTER <[>_
```

Enter the new blink on delimiter and press <CR>, or press <CR> only to leave it in its current state. The current setting is shown within brackets.

Then the terminal responds:

```
ENTER BLINK OFF DELIMITER <]>_
```

Respond to this prompt in the same manner.

You will return to the ">_" prompt.

Rules that apply to this option:

1. Delimiters can be any printable characters (not control characters).
2. Characters used as delimiters cannot be used for any other purpose.
3. Blink On and Blink Off Delimiters cannot be the same characters.

Recommendations -

1. If you do not require the default delimiters (the [and] characters) in your message text, do not change this setting.

Reference 4.16.4 - Blinking Characters

3.9.2 - SET/RESET HARD COPY STATE

Enter 2 and press <CR> to change how the programming terminal will handle deleted characters. When you select option 2, the PMD 200 will toggle between Hard Copy and CRT modes, and the terminal will respond:

```
NOW SET UP FOR HARD COPY
```

Or:

```
NOW SET UP FOR CRT
```

You will return to the ">_" prompt.

Rules that apply to this option:

1. Null characters affect the speed of <CR> when set up for Hard Copy State.
2. Hard copy mode prints deleted characters as they are deleted.
3. CRT mode removes deleted characters from the screen as they are deleted.

Recommendations -

1. Unless your programming terminal cannot backspace to erase deleted characters, keep the terminal set for CRT.

Reference 3.9.3 - Enter Number Of Nulls

3.9.3 - ENTER NUMBER OF NULLS PRINTED AFTER A <CR>

Enter 3 and press <CR> to enter null characters to be sent to the RS-232 port after each <CR>. The terminal will respond:

```
ENTER NUMBER OF NULLS<0> ?_
```

Enter a number between 0 and 255 and press <CR>, or press <CR> to leave it in its current state (shown within brackets). Default is 0 characters.

You will return to the ">_" prompt.

Rules that apply to this option:

1. Some printers require a delay time after receiving a carriage return to prevent loss of characters at the beginning of lines. This command allows the creation of a delay (after <CR>) which may be adjusted to the required value.

2. Null characters affect the speed at which Hard Copy Mode operates.

Reference 3.9.2 - Set/Reset Hard Copy State
6.2 - Print Procedure

3.9.4 - SET UP SERIAL PORTS

Enter 4 and press <CR> to set up the RS-422A Computer Port and/or the RS-232 RS-232 Terminal/Printer Port. The terminal will respond with the following sub-menu:

```
SETUP>4
      SELECT WHICH MODE TO SETUP
   1) COMPUTER INTERFACE
   2) PROGRAM TERMINAL
   3) PRINTER
   4) TAPE IN AND OUT
   ? _
```

Select an item (1-4) and press <CR> to set up the port for that mode. The following prompts will be displayed and must be answered:

```
BAUD RATE (1=300, 2=600, 3=1200, 4=2400
                5=4800, 6=9600) <9600> ?_

STOP BITS (SELECT 1 OR 2)<1> ?_

PARITY ENABLED (SELECT Y OR N)<N> ?_

PARITY MODE (0=ODD, 1=EVEN)<1> ?_

CHECKSUM TYPE (0=CRC, 1=EOR)<0> ?_
```

Enter the proper letter or digit to select each item, or press <CR> to retain the current setting. Note that in some cases, some parameters are fixed and won't be included in prompts.

Computer Interface: Uses all prompts.
Program Terminal: No Checksum Type.
Printer: No Checksum Type.
Tape In And Out: Select Baud Rate Only.

You will return to the Setup Serial Ports sub-menu.

Rules that apply to this option:

1. Press <ESC> to exit the Setup Serial Ports Sub-menu.

2. The Parity Mode prompt will not be displayed when the Parity Enabled prompt receives a no response.

3. Parity Enabled = 7 Bit Word Length
   Parity Disabled = 8 Bit Word Length

4. See Section 2.1 for information on external serial port settings.

Reference

2.1 - Function Select Switch
2.9 - RS-422A Computer Port
2.10 - RS-232 Terminal/Printer Port
D.4 - Default Settings For The PMD 200

3.9.5 - SETUP CLOCK

Enter 5 and press <CR> to set time and date or check the current settings. The terminal Setup will respond with the following sub-menu:

```
SELECT CLOCK
1) DISPLAY DATE AND TIME
2) SETUP DATE
3) SETUP TIME
?_
```

Select an item (1-3) and press <CR> for desired option.

Option 1 Displays the following information:

```
DATE : 15-JAN-87
TIME : 02:12:37 PM
```

NOTE: Time is not updated on terminal screen. To update time, select 1 again.

Option 2 Displays the following prompts.

```
MONTH (SELECT 1 TO 12)<1> ?_
DAY OF MONTH (SELECT 1 TO 31)<15> ?_
YEAR (SELECT 0 TO 99)<87> ?_
```

Option 3 Displays the following prompts:

```
HOUR FORMAT (SELECT 12 OR 24)<12> ?_

* HOURS (SELECT 1 TO 12)<2> ?_
* HOURS (SELECT 1=AM OR 2=PM)<2> ?_

* HOURS (SELECT 0 TO 23)<14> ?_

MINUTES (SELECT 0 TO 59)<18> ?_
SECONDS (SELECT 0 TO 59)<14> ?_
```

* Prompts returned depend upon response to Hour Format prompt.

Rules that apply to this option:

1. Press <ESC> to exit the Setup Clock Sub-menu and return to the ">_" prompt.

3.9.6 - SETUP PARALLEL PORT

Enter 6 and press <CR> to set up the Parallel Input Terminal Block and the 4 Message Setup Control Terminals. The terminal will respond with the following prompts:

```
SETUP>6
SETUP PARALLEL PORT
  0=INVERTED,1-NONINVERTED<0> ?_
  0=BCD,1=BINARY<0> ?_
  0=8 BIT,1=16 BIT DATA<1> ?_
```

Enter 0 or 1 and press <CR> in response to these prompts, or press <CR> only to leave them in their current state.

Reference

2.4 - Parallel Input Terminal Block
2.5 - Message Control Terminals

3.9.7 - SETUP RATE FOR SCROLL AND CHAIN MESSAGES

Enter 7 and press <CR> to setup default time rates for chained and scrolling messages. The terminal will respond with the following sub- menu:

```
SETUP>7
1) DEFAULT TIME RATE FOR MESSAGES
2) DEFAULT TIME RATE FOR SCROLL UP
3) DEFAULT TIME RATE FOR SCROLL LEFT
? _
```

Select an item (1-3) and press <CR> for desired option. The terminal will return the following prompt:

```
ENTER TIME IN TENTHS OF SECONDS <5> ?_
```

For item 1, enter a number between 1 (0.1 second) and 255 (25.5 seconds) and press <CR>. This is the amount of time each message within a chained message will remain on the display.

For items 2 and 3, enter a number between 1 (0.1 second) and 99 (9.9 seconds) and press <CR>. This is the amount of time each message line will remain on each line of the display (item 2) or the amount of time each character will remain at each character location (item 3).

Rules that apply to this option:

1. Press <ESC> to exit the Setup Rate Sub-menu.

Reference

4.3 - Chain Message
4.8.2 - Set Scroll Time Interval
4.9.3 - Set Scroll Time Interval
D.4 - Default Settings For The PMD 200

3.9.8 - CHANGE BLINK ON AND OFF RATES

Enter 8 and press <CR> to select the rate at which blinking characters blink on and off. The terminal will respond:

```
SETUP>8
CHANGE BLINK ON AND OFF RATES

BLINK ON TIME IN TENTHS OF SECONDS<5>?_
BLINK OFF TIME IN TENTHS OF SECONDS<5>?
```

Enter a number between 1 (0.1 second) and 99 (9.9 seconds) and press <CR> for each prompt.

Reference

4.5 - Blink Entire Message
4.16.4 - Blinking Characters
D.4 - Default Settings

3.9.9 - SELECT DEBOUNCE TIME

Enter 9 and press <CR> to select the debounce time for the 16 parallel inputs and the 4 message control terminals. This returns the following prompt:

```
SETUP>9
1 = DC
2 = AC
3 = VARIABLE
? _
```

Select debounce time (1-3) and press <CR>.

Selection 1 (DC) sets the inputs for +5 VDC or +10 to +30 VDC operation. This debounce time is 5 msec.

Selection 2 (AC) sets the inputs for 115 VAC operation. This debounce time is 47 msec.

Selection 3 (Variable) returns the following prompt:

```
ENTER DEBOUNCE TIME(1-99): _
```

Enter a number (between 1 and 99) for the desired number of msec debounce time delay.

Purpose The debounce time selection will cause the indicated input signal delay (in addition to the scan time) to protect against noise when parallel inputs change.

Reference 2.4 - Parallel Input Terminal Block
7.4 - Display Mode Operation

3.9.10 - SELECT CHARACTER SET

Enter 10 and press <CR> to select one of the International character sets supported by the PMD 200 (default is U.S.). The terminal responds:

```
SELECT CHARACTER SET
(1=U.S.,2=CYRILLIC,3=FRANCE,4=GERMANY,
 5=ENGLAND,6=DENMARK,7=SWEDEN(<1>:_
```

Enter the number which corresponds to the desired character set and press <CR>. Or press <CR> only to keep the current setting shown within < >. Press <ESC> to abort the command.

Appendix H shows an ASCII code chart with the character sets. Refer to Table H-1 to program message text.

3.9.11 - GROUP AND UNIT NUMBER

Select 11 and press <CR> to set the Unit Address of the PMD 200. This Unit Address is Group the group and unit numbers that the PMD 200 will respond to. You will see the prompt:

```
GROUP = 0
UNIT = 0
SETUP GROUP NUMBER (Y/N) ?_
```

Enter N for no to keep the group number at its current setting or enter Y for yes to change the group number shown. The terminal will respond:

```
SETUP UNIT NUMBER (Y/N) ?_
```

Enter N for no to keep the unit number at its current setting or enter Y for yes to change the unit number shown. The terminal will respond:

```
UNIT<0> ?_
```

Enter a number between zero and 4095 and press <CR>. You will return to the ">_" prompt.

NOTE The terminal will not accept invalid numbers for the unit address.

Reference 8.1 - Unit Address

3.9.12 - <CR>

Press <CR> only in response to the "Setup>" prompt to view the Set Up Parameters Menu.

3.10 - VIEW MESSAGES ON DISPLAY

Enter V to view a programmed message on the PMD 200 display. The terminal will respond:

```
>VIEW _
```

You have three options:

1. Press <CR> only to view message number zero.
2. Enter a message number and press <CR> to view that message on the display.
3. Enter an asterisk only to view the highest numbered message in the program. Continue in the above manner or press <ESC> to exit the View Mode.

Rules that apply to this option:

1. No messages are output to slave in the View Mode.
2. Messages programmed to be output to the RS-232 port will be displayed on the terminal screen.

3. Variable data digits are represented as numbers (1-5) in the View Mode.

Error Messages E.1 - Message XXXX Not Programmed
Message Number Out Of Bounds

3.11 - <CR>

When <CR> only is pressed in response to the "> " prompt, the terminal will list the next message in the program (from the program position most recently addressed). If the most recent position is at the end of the program, <CR> will list message number zero.

3.12 - ESC

Press <ESC> at any time to abort a command and return to the "> " prompt.

When <ESC> is pressed during the editing process, the terminal responds with the prompt:

ABORT EDITING OF MESSAGE(Y/N)?_

Enter Y for yes to confirm this.

When <ESC> is pressed during Clear All Messages Command, some messages may be saved (parameters will be reset to default values).

When <ESC> is pressed during Delete Messages Command, some messages may be saved.

3.13 - CONCLUSION

The programming commands described in this section of the manual provide an easy and fast means to develop your message program and alter it when necessary. The Set Up Parameter menu commands allow you to determine the current settings of the display unit and/or change them.

Section 4 of this manual provides information concerning parameters and options for individual messages.

When you have finished programming your PMD 200, you can now put the unit to work for you. Section 7 of the manual will provide information on the Display Mode.

SECTION 4. - MESSAGE PARAMETERS

4.0 - INTRODUCTION

When you use the "Add A Message" or "Edit A Message" Commands while programming the PMD 200, the programming terminal will prompt you with message parameter prompts. You will never be dealing with all of the prompts when adding or editing a message, however. Table 4-1 below lists these prompts.

MESSAGE OPTION PROMPTS
CHANGE OPTION DEFAULTS ? (Add A Message) REPLACE MESSAGE CONTROL OPTIONS(Y/N) ? (Edit A Message)
CHAIN MESSAGE ?
SEND TO SLAVE ? TO ALL SLAVES ? GROUP <0>: UNIT <0>:
BLINK ENTIRE MSG ?
SEND MESSAGE TO RS-232 PORT ? ON ONE LINE ? <CR><LF> AT END OF MESSAGE ?
ALARM RELAY ?
SCROLLS UPWARD ? REPEATS ? SET SCROLL TIME INTERVAL ? ENTER SCROLL TIME INTERVAL:
SCROLLS RIGHT TO LEFT ? DISPLAYED ON UPPER LINE ? REPEATS ? SET SCROLL TIME INTERVAL ? ENTER SCROLL TIME INTERVAL:
CLEARS DISPLAY ?
CENTER MESSAGE ? ENTER STARTING POSITION OF MESSAGE >
STARTING DATA SET <N>
@ (Add A Message) REPLACE THIS LINE(Y/N) ? (Edit A Message)

Table 4-1. Message Option Prompts For The Program Mode.

4.1 - CHANGE OPTION DEFAULTS ?

When you add a message, the programming terminal will display the current defaults (those most recently used) and ask if you want to change them.

If you enter N for no, you may begin to enter your message. The message will be set up according to the parameters listed on the screen.

If you enter Y for yes, the "Chain Message ?" prompt will follow.

4.2 - REPLACE MESSAGE CONTROL OPTIONS ?

When you edit a message, your programming terminal will display the parameters that are currently set up for the message you want to edit and ask if you want to change them.

If you enter N for no, you may begin to edit your message line by line. The message parameters for the message will remain as they were previously set.

If you enter Y for yes, you will see the "Chain Message ?" prompt.

4.3 - CHAIN MESSAGE ?

A chained message can contain up to 115 message numbers. The chain message option assigns a message number to an ordered list of other message numbers. Chained messages display the selected sequence of messages repeatedly, until another message is selected.

Parameters and text for chained messages are set up within the individual messages to be displayed.

Enter Y for yes to enter a chained message.

Enter a message select number and press <CR> (up to 115 times).

To terminate entry of a chained message, press <CR> twice.

An example follows:

```
CHAIN MESSAGE ?Y

1>31
2>32
3>30
4>33
5>
PROGRAMMED AS MESSAGE # 50
```

The following rules apply to chained messages:

1. Message select numbers can be repeated within a chained message.

2. The message select number of a chained message is ignored when included in the message number list of a chained message.

After entering a chained message, you will return to the ">_" prompt.

When you enter N for no at the "Chain Message ?" prompt, the "Send To Slave ?" prompt follows.

Error Messages E.1 - Message Number Out Of Bounds

4.4 - SEND TO SLAVE ?

A message can be sent to one or more PMD 200S slave units each time it is displayed.

Enter N for no to display this message on the PMD 200 master unit only. The "Blink Entire Message ?" prompt will follow.

Enter Y for yes to program the message to be sent to slave(s). Now determine which slave(s). The "To All Slaves ?" prompt will follow.

Reference
2.8 - RS-422A Slave Port
7.5 - The Display Mode and Slave Message Displays
7.6 - Slave Display Interfacing
PMD 200S Slave Manual (UTICOR Part Number 79704)

4.4.1 - TO ALL SLAVES ?

Enter Y for yes to send the message to all slave units each time that it is selected and displayed. The "Blink Entire Message ?" prompt will follow.

Enter N for no to select which slave(s) will receive the message. The "Group <0>:" prompt will follow.

Reference 7.5 - The Display Mode and Slave Message Displays

4.4.2 - GROUP <0>:

At this prompt, enter a number between 0 and 15 and press <CR> to select the group number of the slave unit(s) to receive the message. The number within brackets is the current setting.

The "Unit <0>:" prompt will follow.

Reference 7.5 - The Display Mode and Slave Message Displays
8.1.1 - Defining The Unit Address

4.4.3 - UNIT <0>:

At this prompt, enter a number between 0 and 4095 and press <CR> to select the unit number of the slave unit(s) to receive the message. The number within brackets is the current setting.

The "Blink Entire Msg ?" prompt will follow.

Reference 7.5 - The Display Mode And Slave Message Displays
8.1.1 - Defining The Unit Address

4.5 - BLINK ENTIRE MESSAGE ?

Enter Y for yes at this prompt to have the entire message (including time, date, and variable data) blink on and off when it is being displayed.

Enter N for no at this prompt if less than the entire message will blink.

The "Send Message To RS-232 Port ?" prompt always follows this prompt.

The following rules apply to blinking messages:

1. Characters that remain on the display from previous messages will blink also.

2. Rule 1 does not apply when this message is a left-scrolling message.

Reference 4.16.4 - Blinking Characters

4.6 - SEND MESSAGE TO RS-232 PORT ?

Enter N for no if you don't want this message to be sent to the RS-232 Terminal/Printer Port when it is selected. The "Alarm Relay ?" prompt will follow.

Enter Y for yes if you want this message to cause a printout of the two lines of the display after the message is displayed. Note that characters from previous messages that remain on the display will be printed. When you select this option, you must determine how it will be printed. The "On One Line ?" prompt will follow.

The following rules apply to these messages:

1. Characters that remain on the display from previous messages are sent also.

2. Non-programmed (null) characters within the message are not sent.

3. The RS-422A Slave Port is internally connected to this port. When slave displays are interfaced to the PMD 200, messages programmed to be sent to the RS-232 port will NOT be output.

Reference 2.10 - RS-232 Terminal/Printer Port
3.9.4 - Setup Serial Ports

4.6.1 - ON ONE LINE ?

Enter Y for yes if you want the message to be printed on one line.

Enter N for no if you want the printer to print each line of the message on separate lines.

The "<CR><LF> At End Of Message ?" prompt always follows this prompt.

Rules that apply to this prompt:

1. On one line - one space is sent between the contents of each line.
2. Rule 1 does not apply to left-scrolling messages.
3. Scrolling messages printed on one line may cause "line wrap".

4.6.2 - <CR><LF> AT END OF MESSAGE ?

Enter Y for yes to have the printing element advance to the beginning of the next line after this message has printed.

Enter N for no to have the printer begin printing the next message on the same line as this one.

The "Alarm Relay ?" prompt always follows this prompt.

Reference 3.9.3 - Enter Number Of Nulls

4.7 - ALARM RELAY ?

Enter Y for yes to have this message energize the Alarm Relay Output Terminals on the back of the unit every time the message is selected and displayed.

The "Scrolls Upward ?" prompt always follows this prompt.

Rules that apply to this prompt:

1. Energization of these terminals is terminated when a new message is selected.

Reference 2.7 - Relay Output

4.8 - SCROLLS UPWARD ?

Enter Y for yes to have this message scroll upward when it is selected and displayed. The "Repeats ?" prompt will follow.

When you enter N for no, the "Scrolls Right To Left ?" prompt follows.

4.8.1 - REPEATS ?

Enter Y for yes to have this message repeat (until a new message is selected) when it is selected and displayed.

Enter N for no to have this message sequence through once and then clear the display.

The "Set Scroll Time Interval ?" prompt always follows this prompt.

4.8.1 - SET SCROLL TIME INTERVAL ?

Enter Y for yes to have this message move on the display at a time rate which is different from the system time rate for upward- scrolling messages. The "Enter Scroll Time Interval:" prompt follows.

Enter N for no to have this message scroll at the system-set rate for upward-scroll. The "Center Message ?" prompt follows.

Reference 3.9.7 - Setup Rate For Scroll And Msgs.

4.8.3 - ENTER SCROLL TIME INTERVAL:

Enter a number between 1 (0.1 second) and 99 (9.9 seconds) and press <CR>. The "Center Message ?" prompt follows.

4.9 - SCROLLS RIGHT TO LEFT ?

Enter Y for yes to have this message scroll from right to left when it is selected and displayed. The "Displayed On Upper Line ?" prompt will follow.

When you enter N for no, the "Clears Display ?" prompt follows.

4.9.1 - DISPLAYED ON UPPER LINE ?

Enter Y for yes to have this message scroll across the upper line of the display.

Enter N for no to have this message scroll across the lower line of the display.

The "Repeats ?" prompt always follows this prompt.

4.9.2 - REPEATS ?

Enter Y for yes to have this message repeat. It will repeat until a message that clears display is displayed or until another scrolling message is displayed on the same line of the display.

Enter N for no to have this message sequence through once and then clear the display.

The "Set Scroll Time Interval ?" prompt always follows this prompt.

4.9.3 - SET SCROLL TIME INTERVAL ?

Enter Y for yes to have this message move across the line of the display at a time rate which is different from the system time rate for left-scrolling messages. The "Enter Scroll Time Interval:" prompt follows.

Enter N for no to have this message scroll at the system-set rate for left-scroll. The "Clears Display ?" prompt follows.

Reference 3.9.7 - Setup Rate For Scroll And Msgs.

4.9.4 - ENTER SCROLL TIME INTERVAL:

Enter a number between 1 (0.1 second) and 99 (9.9 seconds) and press <CR>. The "Clears Display ?" prompt follows.

4.10 - CLEARS DISPLAY ?

Enter Y for yes to have the display and data set values cleared before this message is displayed.

Enter N for no to retain previously displayed characters in locations where this message does not overlay them.

The "Center Message ?" prompt always follows this prompt.

Reference 7.5 - Displaying Messages

4.11 - CENTER MESSAGE ?

Enter Y for yes to have this message centered on the lines of the display when it is selected and displayed. The "Starting Data Set <N>" prompt follows.

Enter N for no to position this message in a different manner. The "Enter Starting Position Of Message >" prompt follows.

Rules that apply to this prompt.

1. Left-scrolling messages cannot be centered.

4.12 - ENTER STARTING POSITION OF MESSAGE >

When you see this prompt, enter a number between 1 and 40 and press <CR> or press <CR> only to start the message at character position 1. The "Starting Data Set <N>" prompt follows.

Rules that apply to this prompt:

1. Character positions located before the starting position are null characters.
2. If this message does not clear the displays, characters of the previous message will remain on the display in null positions.
3. When this message is displayed on the terminal using Edit or List, null characters will be shown as periods.

Reference 4.10 - Clears Display
4.16.5 - Null Characters

4.13 - STARTING DATA SET <N>

Enter a number between 1 and 4 and press <CR> or press <CR> only to select the number shown within brackets on this prompt.

If this message will not contain variable data, this setting is inconsequential, however, you must respond <CR> to this prompt.

Once you respond to this prompt, you are ready to enter or edit the message.

Reference Table 2-3 - Data Set Truth Table
4.16.3 - Display Variable Data

4.14 - @_

At this prompt, begin to enter the message.

Rules that apply to this prompt:

1. The lines of the message are entered 20 characters at a time. Press <CR> to advance to the next line of text.
2. A 40-character message is terminated when the second <CR> is pressed.
3. A scrolling message can be 235 "characters" in length (a <CR> counts as a "character").
4. The line of the display which does not display the left-scroll message can be blank (Clear Display option) or characters from a previously displayed message can remain on this display line.
5. To stop entering scrolling message text, press <CTRL> Z.

4.15 - REPLACE THIS LINE(Y/N)?

When using the Edit A Message Command, you will see this prompt instead of the "@_" prompt.

Enter Y for yes to replace the line of text shown. Enter the new text and press <CR>.

Enter N for no to leave the line of text as it was.

This procedure repeats for each line of the message.

Additional lines of text may be added to the end of scrolling messages. Terminate the edit process on a scrolled message by entering <CTRL> Z.

4.16 - SPECIAL DISPLAY FEATURES

Some features are not handled by prompts. This section covers these options.

4.16.1 - DISPLAY TIME - <CTRL> <T>

To enter the time of day into a message, enter <CTRL> T. The terminal will display the indicator:

HH:MM:SS

Rules that apply to this option:

1. This option occupies 8 character locations of the message.
2. You cannot enter <CTRL> T beyond the 13th character location of any line of the message.

4.16.2 - DISPLAY DATE <CTRL> <D>

To enter the date into a message, enter <CTRL> D. The terminal will display the indicator:

DD-MMM-YY

Rules that apply to this option:

1. This option occupies 9 character locations of the message.
2. You cannot enter <CTRL> D beyond the 12th character location of any line of the message.

4.16.3 - DISPLAY VARIABLE DATA <CTRL> <U>, <V>, <W>, <X>, <Y>

Each message can have 4 separate data sets of up to 5 significant digits each. To enter variable data digits in a message, enter the designated control characters as shown <CTRL> below.

<CTRL> U	<CTRL> V	<CTRL> W	<CTRL> X	<CTRL> Y
MSD				LSD

Variable data sets of less than 5 significant digits are accomplished by omitting unnecessary control characters from the Most Significant Digit side of the chart.

Rules that apply to this option:

1. Either text or a <SPACE> character must separate variable data control characters of different data sets.

Reference 4.13 - Starting Data Set <N>

4.16.4 - BLINKING CHARACTERS

To have part of a message blink, enter the Blink On Delimiter (default is () before the first blinking character. Enter the Blink Off Delimiter (default is)) after the last character of blinking text is entered.

Blink delimiters have no effect on time, date, or variable data sets of messages. The Blink Entire Message option must be used to blink these items.

Reference 4.5 - Blink Entire Message

4.16.5 - NULL CHARACTERS

To enter null characters within the message text, enter a "^" character, followed by a "@" character (for each null location).

Rules that apply to this option:

1. If this message does not clear the displays, characters of the previous message will remain on the display in null positions.

2. When this message is displayed on the terminal using Edit or List, null characters will be shown as periods.

Reference 4.10 - Clears Display
4.12 - Enter Starting Position Of Msg.

4.16.6 - ASCII CONTROL CHARACTERS

To enter other ASCII control characters into messages, enter the "^" character, followed by the appropriate control code character.

4.17 - CONCLUSION

You will use the message parameter prompts and options covered in this section when you add or edit messages. Prompts will be displayed on the terminal screen and will require that you respond Y (yes) or N (no) or that you enter a number within the range specified.

Options covered in sections 4.16.1 through 4.16.4 are entered into the message along with the text. No prompts are displayed for these options.

Section 3 of this manual covers the use of the programming menus of the PMD 200. Sections 3 and 4 covers all information necessary for creating the exact message program you require.

Reference D.3 - Programming Prompts

SECTION 5. - FUNCTIONS OF THE TAPE MODES

5.0 - INTRODUCTION

Functions provided by the Tape Modes are:

1. Tape Out - Dumps message programs to a digital cassette recorder.
2. Tape In - Loads a stored message program into the PMD 200 from tape.
3. Verify A Tape - Compares a tape to the message program in the PMD 200.
4. Tape In and Tape Out - Loads a message program directly from one PMD 200 to another.

5.0.1 - THE BAUD RATE

The baud rate for the Tape Functions may be set either internally in the Set Up Parameters Mode or externally on the Function Select Switch.

Rules that apply to the baud rate:

1. The baud rate of the PMD 200 must match the baud rate of the tape recorder.
2. When using Tape In or Tape Verify, the PMD 200 must be set to the baud rate at which the tape was made.
3. When transferring message programs from one PMD 200 to another, both units must be set at the same baud rate.
4. A message program that is "dumped" at 9600 baud may not load correctly if it contains messages that are 130 bytes or more in length. This is due to the amount of time it takes to program EEROM memory chips.

Reference 2.1 - The Function Select Switch
3.9.4 - Setup Serial Ports

5.1 - TAPE OUT

The Tape Out function records the message program in the PMD 200 onto digital cassette tape for storage. The message program in the PMD 200 remains intact when it is "dumped to tape".

Rules that apply to this function:

1. When the PMD 200 is set to Tape Out, the unit is set for 2 stop bits, no parity, and 8-bit word length.
2. The tape is recorded in the character set for which the PMD 200 is set.

5.1.1 - TAPE OUT PROCEDURE

Use the following procedure to store the message program on tape:

1. Set the baud rate on the PMD 200.
2. Connect the tape recorder to the PMD 200 at the RS-232 Terminal Printer Port.
3. Set the PMD 200 Mode Select Switch to Tape Out.
4. Press the Record Button on the Tape Recorder and wait a few seconds for the leader on the tape.
5. Press the Restart Button on the PMD 200.

Reference 2.10 - RS-232 Terminal/Printer Port

5.1.2 - WHAT HAPPENS DURING TAPE OUT

You should see the following sequence of events when performing the Tape Out function:

1. The PMD 200 will display the message "Self Testing" for a minimum of 3 seconds.
2. "Dumping Messages" will appear on the top line of the display.
3. The total number of messages to be recorded will appear on the lower line of the display.
4. As each message is recorded to tape, the number of messages will be decremented by one.
5. When the complete program has been recorded, the PMD 200 will display the message "Dump Complete".

5.2 - VERIFY A TAPE

The Verify A Tape Function compares the memory of the PMD 200 with a digital tape to see if they are identical. This function DOES NOT load the contents of a tape into the PMD 200 memory. This function is used to verify that the messages and parameter settings in the PMD 200 match those on a selected tape.

5.2.1 - VERIFY A TAPE PROCEDURE

Use the following procedure to compare a message program on tape with the message in the PMD 200:

1. Set the baud rate on the PMD 200.
2. Connect the tape recorder to the PMD 200 the RS-232 Terminal Printer Port.
3. Set the PMD 200 Mode Select Switch to Tape In.
4. Set position 5 of the Mode Select Switch to the On position.
5. Press the Restart Button on the PMD 200.
6. Advance the tape to the beginning of the message program. Press the Play Button on the Tape Recorder.

Reference

2.1 - Function Select Switch
2.10 - RS-232 Terminal/Printer Port

5.2.2 - WHAT HAPPENS DURING TAPE VERIFY

You should see the following sequence of events when performing the Tape Verify function:

1. The PMD 200 will display the message "Self Testing" for a minimum of 3 seconds.
2. "Verifying Messages" will appear on the top line of the display. "Start Tape" will appear on the lower line of the display.
3. The total number of messages to be verified will appear on the lower line of the display.
4. As each message is compared, the number of messages will be decremented by one.
5. When the complete program has been verified, the PMD 200 will display either the message "Verify OK" or "Error Did Not Verify".

5.2.3 - TAPE VERIFICATION AND SYSTEM VARIABLES

System variables and individual message's parameters are stored in the PMD 200's memory. If these settings are changed in the PMD 200 after the tape was made, verification will fail.

Variables include:

1. All parameters entered in the Set Up Parameters Mode.
2. Parameters which were set up for each message.
3. The current state of the message parameters. These are called option defaults in the Add A Message Command. They are stored in the memory and transferred to tape when the tape is made. These parameters must match those currently set up in the PMD 200.

NOTE: If any messages were added, edited, or deleted after the tape was made, tape verification will fail.

5.3 - TAPE IN

The Tape In function programs a PMD 200 with a message program that is stored on digital tape.

Rules that apply to this function:

1. When the PMD 200 is set to Tape In, the unit is set for 1 stop bit, no parity, and 8-bit word length.
2. A tape of a message program from one software revision PMD 200 may or may not successfully load into a PMD 200 of another software revision.
3. When circumstances in Rule 2 above loads successfully, operation of the unit may still be affected by differences between the features of the software revisions.
4. The PMD 200 programs in the character set in which the tape was made.

Recommendations -

Exercise caution when transferring message programs created with one software revision into units of another software revision. Check the program in the unit to verify that it will operate as expected.

5.3.1 - TAPE IN PROCEDURE

Use the following procedure to load the PMD 200 memory with a program on tape.

1. Set the baud rate on the PMD 200.
2. Connect the tape recorder to the PMD 200 at the RS-232 Terminal Printer Port.
3. Set the Mode Select Switch to Tape In.
4. Press the Restart Button on the PMD 200.
5. Start the tape at the beginning of the message program.

Reference 2.10 - RS-232 Terminal/Printer Port

5.3.2 - WHAT HAPPENS DURING TAPE IN

You should see the following sequence of events when performing the Tape In function:

1. The PMD 200 will display the message "Self Testing" for a minimum of 3 seconds.
2. "Loading Messages" will appear on the top line of the display. "Start Tape" will appear on the lower line of the display.
3. The total number of messages to be loaded will appear on the lower line of the display.
4. As each message is loaded into the PMD 200, the number of messages will be decremented by one.
5. When the complete program has been loaded, the PMD 200 will display the message "Load Complete".

NOTE All attributes can be changed when loading a tape except the Unit Address.

Error Messages E.3 - Incompatible Type Error
You Do Not Have Enough EEROM Memory
Data Checksum Error
Line Of Data Lost

5.4 - MESSAGE PROGRAM TRANSFER FROM ONE PMD 200 TO ANOTHER

Message programs can be transferred directly from one PMD 200 to another PMD 200. This is accomplished by putting one unit in the Tape Out Mode and the other unit in the Tape In Mode.

Rules that apply to this function:

1. A special cable is required to connect the units at the Terminal/Printer Ports. Refer to Figure 5-1 for cable connections.
2. A message program from one software revision PMD 200 may or may not successfully load into a PMD 200 of another software revision.
3. When circumstances in Rule 2 above loads successfully, operation of the unit may still be affected by differences between the added features, etc. of the later software revisions.

Recommendations -

Exercise caution when transferring message programs created with one software revision into units of another software revision. Check the program in the unit to verify that it will operate as expected.

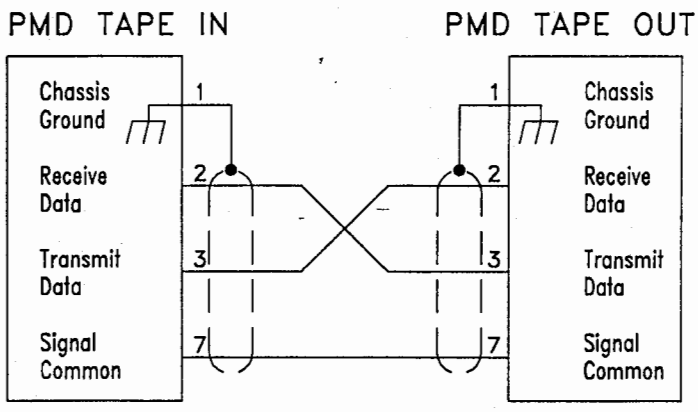

Figure 5-1. Cable Connections for Transferring Messages Between Two PMD 200s.

5.4.1 - PROGRAM TRANSFER PROCEDURE

Use the following procedure to transfer a program from one PMD 200 to another:

1. Set the baud rate on the PMD 200s.
2. Connect the units at the RS-232 Terminal Printer Port (see Figure 5-1).
3. Set the Mode Select Switch on the PMD 200 that you are loading messages into to Tape In.
4. Set the Mode Select Switch on the PMD 200 that you are loading messages from to Tape Out.
5. Press the Restart Buttons (first the Tape In, then the Tape Out).

5.4.2 - WHAT HAPPENS DURING TAPE IN

You should see the following sequence of events when transferring message programs:

1. The PMD 200 that is being programmed will behave identically to the sequence described in 5.3.2.

2. The PMD 200 that is dumping messages will behave identically to the sequence described in 5.1.2.

Error Messages

E.3 - Incompatible Type Error
You Do Not Have Enough EEROM Memory
Data Checksum Error
Line Of Data Lost

5.5 - CONCLUSION

The various functions of the Tape Modes covered in this section provide storage, verification, and loading of message programs via digital tape, as well as transfer of message programs directly from another PMD 200.

Section 6 of the manual describes the Print Mode of the PMD 200. The method used to print a hard copy of the message program is found in that section.

SECTION 6. - USING A PRINTER

6.0 - INTRODUCTION

The PMD 200 can output messages to a printer for two reasons:

1. To produce a hard copy of the entire message program.

2. To print a list of displayed messages that are programmed to be output to the RS-232 port.

This section deals with Option 1 above. It will describe the preparation and procedure for printing a hard copy of the entire message program.

Reference 4.6 - Send Message To RS-232 Port

6.1 - PRINT MODE PARAMETERS

The baud rate, stop bits, and parity settings of the RS-232 Port must be set to match those of the printer. These parameters are set internally in the PMD 200 in the Set Up Parameters Mode.

NOTE The Print Functions of the PMD 200 sends an ASCII character string to the RS-232 Terminal/Printer Port. When the unit is set for any of the international character sets, the manner in which these messages are printed is dependent upon the printer.

Refer to Section 6.4 for help with printing problems.

Reference 3.9.4 - Setup Serial Ports
6.4 - Printing Problems

6.2 - PRINT PROCEDURE

Use the following procedure to print a hard copy of the message program.

1. Set up number of nulls to be sent if necessary.

2. Set the baud rate, stop bits, and parity mode on the PMD 200 and the printer.

3. Connect the printer to the PMD 200 at the RS-232 Terminal/Printer Port.

4. Set position 3 of the Function Select Switch to the ON position.

5. Set the Mode Select Switch to Tape Out.

6. Press the Restart Button.

Rules that apply to this procedure:

1. Parity Enabled = 7 Bit Word Length
   Parity Disabled = 8 Bit Word Length

Reference 2.10 - RS-232 Terminal/Printer Port
3.9.3 - Enter Number Of Nulls
3.9.4 - Setup Serial Ports

6.3 - WHAT HAPPENS DURING PRINT

You should see the following sequence of events when printing a message program:

1. The PMD 200 will display the message "Self Testing" for a minimum of 3 seconds.

2. "Printing Messages" will appear on the top line of the display.

3. The printer will print a heading similar to the following:

DATE : 01-JAN-86 TIME : 12:00:00 AM
LARGEST MESSAGE NUMBER : 97
TOTAL NUMBER OF MESSAGES: 98
NUMBER OF DELETED MESSAGES : 12
THE BLINK ON CHARACTER IS (
THE BLINK OFF CHARACTER IS)

4. Then the printer will print out the messages and their control options.

5. When the complete program has been printed. the PMD 200 will display the message "Printing Complete".

6.4 - PRINTING PROBLEMS

If the printout is made up of "garbage" characters, verify that the PMD 200 and the printer are set for the same baud rate, parity and stop bits.

If characters are missing from the printouts, the PMD 200 is probably sending characters faster than the printer can print them.

You can correct this by either going to a lower baud rate with both the printer and the PMD 200 or by using handshaking between the printer and the PMD 200. Some printers provide a "Busy" or "RTS" output which goes low when the printer cannot accept any more characters. This line can be connected to the PMD 200's "CTS" line to implement handshaking.

If characters are missing from only the beginning of lines, the printer may require some (or more) null characters to be sent after the carriage return.

Determining the number of nulls will require some trial and error on your part.

Some options that work with the PMD 200 are:

*1. An OKIDATA (Microline 82A) printer at 300 baud (no nulls).

*2. An OKIDATA printer without Superspeed (Microline 82A) at 1200 baud with 75 nulls.

**3. An MPI (Model No. 88G) at 300 baud with 30 nulls (not using the handshaking capabilities of the printer).

**4. An MPI (Model No. 88G) at 300 baud or 1200 baud (using handshaking capabilities).

NOTE: The printer's RTS (Request To Send) line must be connected to the PMD 200's CTS (Clear To Send) line.

Reference

2.10 - RS-232 Terminal/Printer Port
3.9.3 - Enter Number Of Nulls
3.9.4 - Setup Serial Ports

6.5 - CONCLUSION

The Print Mode described in this section of the manual provides a hard copy of the entire message program. This includes all messages and their parameters, as well as the total number of messages in the program, the largest programmed message, and other information.

* OKIDATA, Microline, and Superspeed are registered trademarks of the Okidata Corporation.
** MPI is a trademark of Micro Peripherals, Inc.

SECTION 7. - THE DISPLAY MODE

7.0 - INTRODUCTION

The Display Mode is the operating mode for the PMD 200. While in the Display Mode, the PMD 200 is controlled by a programmable controller or other intelligent device. In addition to the control device, the PMD 200 may be interfaced to the following while in the Display Mode:

1. A printer for a hard copy of selected messages.
2. An alarm device for message selected alert.
3. Slave message display units to display selected messages in other locations.
4. A computer that can share control of the display.

Rules that apply to the Display Mode:

1. If the Slave Port is active, the RS-232 port is inactive. No messages programmed to be sent to the RS-232 port will do so when the Slave Port is active.

Reference

2.7 - Relay Output
2.8 - RS-422A Slave Port
2.10 - RS-232 Terminal/Printer Port
3.9.4 - Setup Serial Ports
4.4 - Send To Slave
4.6 - Send Message To RS-232 Port
4.7 - Alarm Relay
8. - Computer Interface

7.1 - DISPLAY MODE PREPARATION

Use the following procedure to prepare the PMD 200 for the Display Mode:

1. Connect AC and DC power lines to the PMD 200. (For 230 VAC operation, you must move the power input connector and change the fuse first.)
2. Enter the message program into the PMD 200 memory.
3. Set up the ports used (Parallel Input Ports, Printer Port), set the Unit Address, and set the debounce time.
4. Connect controller and other devices to ports on the PMD 200 back panel.
5. Set the Mode Select Switch to Display.
6. Press the Restart Button.

7.2 - WHAT HAPPENS DURING THE DISPLAY MODE

The following sequence of events will occur when the PMD 200 is put into the Display Mode:

1. The PMD 200 will display the message "Self Testing" for a minimum of 3 seconds.
2. The unit will display the revision code of the software and the group and unit number at which the PMD is set.
3. Then display will clear and enter the Display Mode. (Should any errors occur on power up, refer to Appendix E.)
4. If the Data Hold line of the Message Control Terminals is enabled and if the Message/Data line indicates that a message number is present on the Parallel Input Terminal Block, the message indicated will be displayed on the PMD 200 display.

   Or, if information is present on the computer port, this will be processed by the PMD 200.
5. The unit will remain in the Display Mode indefinitely.

7.3 - DISPLAY MODE OPERATION

In the Display Mode, the PMD 200's software operates in a repetitive loop: reading parallel inputs, and updating the display. This loop is the PMD 200's "scan", and its length may vary between 1 and 75 msec, depending upon the amount of the PMD's display that must be updated.

When changing from one message number to another on the parallel inputs to the PMD 200, there will be a transition time during which some of the inputs change from high to low and some change from low to high (also applies when changing data). If the PMD 200 reads the inputs during this transition time, it may read a number different from either of the two valid message numbers.

For a new message number to be accepted from the parallel inputs, the PMD 200 must read the same new value on two successive scans plus every scan after that for the amount of time specified by the debounce time parameter. If the inputs don't change for that period of time, the message whose number is read will be displayed.

Note that this means that the inputs to the PMD 200 must be held constant for at least one PMD 200 scan (up to 75 msec) plus the selected debounce time (or another PMD 200 scan if it is longer than the debounce time.

NOTE: The largest valid message number which can be programmed is 9999. The largest possible data which can be read from the Parallel Input Terminal Block is 9999 BCD or 65535 Binary.

Reference
2.4 - Parallel Input Terminal Block
2.5 - Message Control Terminals
3.9.9 - Select Debounce Time

Error Messages
E.2 - Message XXXX Not Programmed
Message XXXX Out Of Bounds

7.4 - DISPLAYING MESSAGES

When selected and displayed, a message will output information and display itself according to how it was programmed. Exceptions to this rule follow.

Output Exceptions

A message that is sent to slaves will not be sent to the RS-232 port even though it was programmed for this option. This is because the RS-232 port is de-activated when the Slave Port is activated.

Display Exceptions

Sometimes messages will be cleared from the displays even though the newly selected message was not programmed with the "Clear Display" option. These exceptions follow:

1. When the previous message contained the date or time.
2. When the previous message was a centered message containing control characters, time, date, variable data, or nulls.
3. If this message scrolls upward.
4. If an error message was previously being displayed.
5. If the previous message scrolled upward and the new message scrolls left.
6. If both this message and the previous one scroll left on the same line (the other line is not affected).

NOTE: If a message that does not clear the display is selected while a left-scrolling message is being displayed, the new message will scroll off the display (with the scrolling message) on the affected line.

7.5 - THE DISPLAY MODE AND SLAVE MESSAGE DISPLAYS

When a message is selected, the master PMD 200 displays the message on its display. If the message's parameters indicate it is also to be sent to slave(s), the master will send the message to the specified slave(s).

When the slave port of the master unit is enabled, any changes to any of the data sets will cause the master PMD 200 to send all four data sets to all slaves.

Reference 4.4 - Send To Slave
8.1.1 - Defining The Unit Address

7.6 - SLAVE DISPLAY INTERFACING

Slave message display units operate only while the Mode Select Switch of the master PMD 200 is in the Display Mode. Slave units which are interfaced to a master display will not affect the operation of the Program, Tape In, or Tape Out Modes.

Position 6 of the Function Select Switch on the back panel of the PMD 200 master unit must be in the ON position to activate the RS-422A Slave Port. If this is not done prior to powering up the unit, press the RESTART button to reset the Display Mode and activate the Slave Port.

Reference 2.9 RS-422A Slave Port

7.7 - CONCLUSION

Putting the PMD 200 into the Display Mode is a simple operation. Once in the Display Mode, the PMD 200 is operated solely by the control device and requires no user input.

Other than occasionally changing the batteries for the real-time clock, a user may never have to touch the unit again.

The following section of the manual covers the computer interfacing capabilities of the PMD 200. This is the other "operating" mode of the PMD 200 in which the controlling device is a computer. This mode also operates with the Mode Select Switch in the Display Mode. This method of control can be used as an alternative to or can share control with a controller that is interfaced to the parallel port. While more complex than the Display Mode, computer interfacing is also more versatile.

SECTION 8. - COMPUTER INTERFACE

8.0 - INTRODUCTION

The PMD 200 Computer Interface operating mode provides an alternative to the Display Mode. Computer Interface Mode allows a control computer (main-frame, minicomputer, personal computer or PLC ASCII interface that can handle 8-bit binary) to control the PMD 200's operation via RS-422A serial link.

This section of the manual describes the communication protocol that the PMD 200 expects and the commands to which it will respond. Each user will have to develop a program for his control computer to interface with the PMD 200 using these commands and protocol.

8.1 - UNIT ADDRESS

Each PMD 200 message display is assigned a unit address, which is sent in each message to specify which PMD 200 should respond. This unit address consists of two bytes which contain two identifiers. These two identifiers consist of a group number and a unit number. Group numbers range from 0 to 15, and unit numbers range from 0 to 4095.

This unit address must be set from the Set Up Parameters menu of the Program Mode.

8.1.1 - ADDRESSING TECHNIQUES

The unit addresses are divided into group and unit numbers to allow the controlling computer to communicate with selected subsets of all the PMD displays connected to it. The following list shows the possibilities:

1. Group #00, Unit #0000 - addresses all units
2. Group #XX, Unit #0000 - addresses all units in group #XX
3. Group #15, Unit #4095 - addresses all 'active' slave units
4. Group #XX, Unit #XXXX - addresses the specific unit indicated

When the group and unit number equal zero, messages broadcast by the control computer will be processed by all units (masters and slaves) attached.

With a non-zero group number with the unit number of zero, all units with that group number will process the message.

Messages sent to Group #15 and Unit #4095 will be processed by all slave units that are currently 'active' and ignored by all 'inactive' slaves. A master display addressed to Group #15, Unit #4095 will also respond. (This communication technique applies to the Computer Interface Mode only.)

Reference 8.1.2 - Active/Non-Active Slave Units
8.20 - Select Active Slave

When a message sent to an individual display is received, that display sends a reply to the control computer. When a message is received that used any of the address grouping techniques (options 1, 2, and 3 above), no reply is returned. Note that certain messages (those that require a reply other than the standard reply) cannot be processed when the units are addressed by any of the grouping techniques. The specific message types which cannot be processed with these techniques are noted in Table 8-1.

8.1.2 - ACTIVE/NON-ACTIVE SLAVE UNITS

The computer interface protocol provides another means to send messages to specific collections of PMD 200S slave units beyond using group numbers. A computer interface command is provided to allow the controlling computer to 'activate' or 'de-activate' the slaves connected to it.

Slaves power up 'activated'. After that, the controlling computer can, by group or individual unit, activate or de-activate the slaves. Then, it can utilize the Group #15, Unit #4095 addressing mode described in 8.1.1.

8.2 - PMD 200 SETUP FOR COMPUTER INTERFACE

To set the PMD 200 unit(s) for computer interface, follow the steps below:

1. Define individual unit address for the message display.
2. Connect your computer to the computer interface terminal block on the back of the unit. (Refer to Figure 8-2.)
3. Set the fourth position of the Function Select Switch to the ON position.
4. Set the Mode Select Switch to the Display Mode.
5. Press the Restart Button.

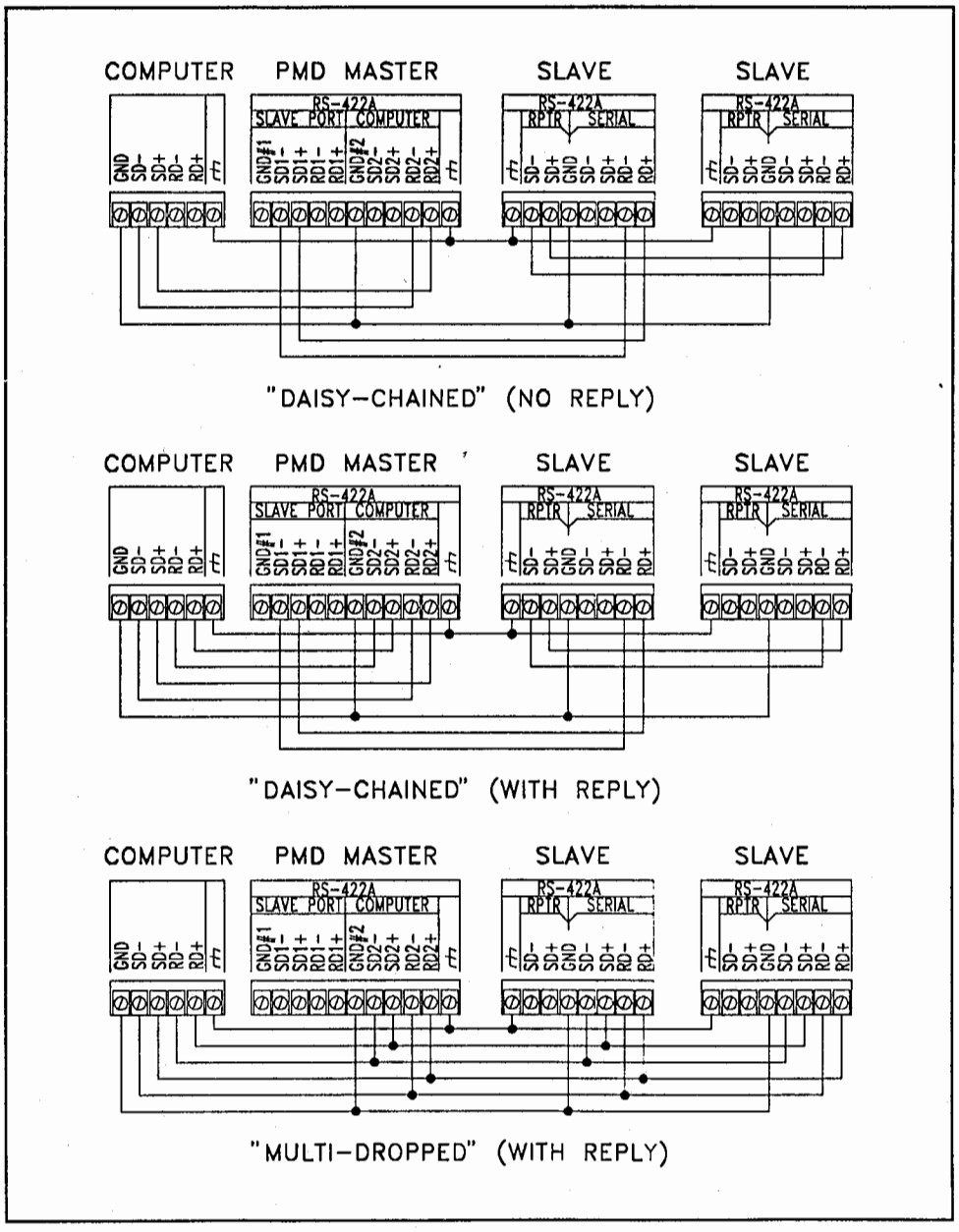

Figure 8-2. Computer Interface Connections For PMD 200 Masters And Slaves.

8.3 - COMPUTER INTERFACE GENERAL MESSAGE FORMAT

General message format for messages sent via computer interface is shown below in Figure 8-3.

GENERAL MESSAGE FORMAT

HEX AA	One Byte -	Indicates start of message
LENGTH	One byte -	Indicates message length minimum valid message length is 8 bytes
UNIT ADDRESS	Two bytes -	Indicates unit address
MESSAGE CODE	One byte -	Code for message "type"
DATA	X bytes -	Message/reply data
CHECKSUM	Two bytes -	See Appendix G - Checksum Bytes (optional)

Table 8-1. Message Format For Computer Interface.

Note that **all** messages, including replies sent from the PMD 200, must begin with a hex byte equal to AA to indicate the start of a message.

Also note that the checksum of a message is calculated by using the bytes that represent: Length, Unit Address, Message Code, and Data.

The length byte is always the length of the entire communications message, less one (for the AA). The length specifically does include the length byte and checksum.

Unit address bytes are stored most significant byte first, least significant byte second. Refer to Figure 8-1.

8.4 - MESSAGE CODES

Message codes are required to define the type of communication to take place. The PMD 200 is programmed to process various types of messages, and these have been assigned Message Code Numbers.

Table 8-1 defines message code numbers:

CODE	COMMAND
00	STANDARD REPLY
01	DISPLAY PROGRAMMED MESSAGE
02	DISPLAY PACKET MESSAGE
03	PROGRAM MESSAGE
04	CODE INVALID
* 05	READ MESSAGE
* 06	READ ATTRIBUTES
07	PROGRAM ATTRIBUTES
* 08	LOAD MEMORY
* 09	DUMP MEMORY
10	DELETE MESSAGE
11	CLEAR MEMORY
* 12	READ TIME AND DATE
13	SET TIME AND DATE
14	WRITE DATA SET DATA
15	SELECT SLAVE(S)
16	WRITE DATA SET DATA TO MASTER
17	CODE INVALID
* 18	STATUS/ID MESSAGE
	ALL NUMBERS ARE IN DECIMAL

Table 8-2. Message Code Number Designations.

* - Allowed only when individual units are addressed.

8.5 - MESSAGE REPLIES

All messages sent to individual PMD 200 units (as opposed to any of the group addressing techniques) will indicate the success or failure of processing the command and will indicate that the PMD unit is ready to process another command.

In most cases, this message will be the "standard reply" described in the next section. Some commands (those that read data from the PMD 200) will cause the unit to send special forms of replies.

The time delay between when the control computer finishes sending a command until the PMD 200 begins to reply depends upon the specific command and the amount of data sent with the command. The longest possible turn-around time is generated by the Load Memory command, which can, in the worst-case, take up to 1.3 seconds. Commands which write to the PMD 200's EEPROM memory (Message Codes 07, 08, 10, and 11) will take considerably longer to begin the reply than the other command types.

PMD 200 displays do not "stack" commands. It is best to wait for a reply to a command before sending any more commands.

The following section covers the format of the message codes and provides a brief description of each.

8.6 - CODE 00 - STANDARD REPLY FORMAT

FORMAT -

REPLY	
BYTE NUMBER	**VALUE**
1	HEX AA = Start Of Message Byte
2	8 Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number
5	00 Message Code
6	Reply To Message Code
7	Reply Error Code 0 = No Error 1 = Checksum Error 2 = Timeout 3 = Invalid Message Code 4 = Start Load Not Requested 5 = Start Dump Not Requested 6 = Insufficient Memory In PMD 7 = Invalid Message Number 8 = Invalid Message Length 9 = Incompatible Type
8	Checksum (2 bytes)

DESCRIPTION

This is the standard format for a PMD 200 reply to the computer. When using the message commands described in this section, refer to this chart whenever a message command chart indicates that the reply is of standard format.

Error Messages

E.4 - Computer Interface Errors

8.7 - CODE 01 - DISPLAY PROGRAMMED MESSAGE

FORMAT -

COMMAND	
BYTE NUMBER	**VALUE**
1	HEX AA = Start Of Message Byte
2	9 Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number
5	01 Message Code
6	Control Byte B0: 1 = Master Unit (0 = Not to Master) B1: 1 = Slave Unit (0 = Not to Slave) B2-B7 = Not Used
7	Programmed Message Number (2 bytes) MSB,LSB Binary
9	Checksum (2 bytes)
REPLY = STANDARD REPLY	

DESCRIPTION

This command is used to select a message number in the PMD 200 unit and to display that programmed message on its displays.

Byte 6

(The Control Byte) - indicates whether the message is to be displayed at the master, its slaves, or both. If the control byte indicates that the message is to be displayed at the slaves, the message will be displayed on the slaves which are addressed in the message itself, or if the message does not address slaves, it will be displayed on all active slaves.

Error Messages

E.4 - Computer Interface Errors

8.8 - CODE 02 - DISPLAY PACKET MESSAGE

FORMAT -

COMMAND	
BYTE NUMBER	**VALUE**
1	HEX AA = Start Of Message Byte
2	7+X Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number
5	02 Message Code
6	Control Byte B0:1 = Master Unit (0 = Not To Master) B1:1 = Slave Unit (0 = Not To Slave) B2-B7 = Not Used
7	Message (X bytes)
7+X	Checksum (2 bytes)
	REPLY = STANDARD REPLY

DESCRIPTION

This command is used to display a valid message contained within the command on the PMD 200 displays. The message to be displayed must follow the format of stored messages in the PMD 200's message program.

Byte 6 — (The Control Byte) - determines whether the master unit, slave unit(s), or both will respond to this command. The message will be sent to the slave unit(s) indicated within the message or, if not indicated within the message, to active slave units.

Byte 7 — (First Message Text Byte) - is where the message to be displayed begins. As specified in Section 8.23, the first byte of the message to be displayed is the length byte. It must occupy byte 7, followed by the balance of the message.

Error Messages — E.2 - Computer Interface Errors

Reference — 8.23 - PMD 200 Stored Message Format
8.23.1 - Message Example

8.9 - CODE 3 - PROGRAM MESSAGE

FORMAT -

COMMAND	
BYTE NUMBER	**VALUE**
1	HEX AA = Start Of Message Byte
2	8+X Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number
5	03 Message Code
6	Number of Message To Be Programmed (2 bytes) (2 bytes) MSB,LSB Binary
8	Message (X bytes)
8+X	Checksum (2 bytes)
	REPLY = STANDARD REPLY

DESCRIPTION

This command is used to program a message in the PMD 200 with a valid message contained within the command. This can be a message which currently exists, one which has been deleted or one which has never been programmed. The command must contain the message number location (0-9999) of the message to be changed, programmed, or created.

Byte 8 (First Message Text Byte) - is where the message to be programmed begins. As specified in Section 8.23, the first byte of the message to be displayed is the length byte. It must occupy byte 8, followed by the balance of the message.

Error Messages E.4 - Computer Interface Errors

Reference 8.23 - PMD 200 Stored Message Format
8.23.1 - Message Example

8.10 - CODE 05 - READ MESSAGE

FORMAT

COMMAND		REPLY	
BYTE NUMBER	**VALUE**	**BYTE NUMBER**	**VALUE**
1	HEX AA = Start Of Message Byte	1	HEX AA = Start Of Message Byte
2	8 Length	2	8+X Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number	3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number	4	8 Least Significant Bits Of 12-Bit Unit Number
5	05 Message Code	5	05 Message Code
6	Programmed Message Number (2 bytes) MSB,LSB	6	Programmed Message Number (2 bytes) MSB,LSB
8	Checksum (2 bytes)	8	X Amount of Data
		8+X	Checksum (2 bytes)

DESCRIPTION

This command is used to read message text and data for a message number location in the PMD 200 unit.

The reply to this command will be as shown above on the right if no error conditions are encountered. If an error occurs, the standard reply will be returned, including the appropriate error code.

Byte 8 — (Reply First Message Text Byte) - is where the message text begins. This message text conforms to the PMD 200 stored message format.

Error Messages — E.4 - Computer Interface Errors

Reference — 8.23 - PMD 200 Stored Message Format
8.23.1 - Message Example

8.11 - CODE 06 - READ ATTRIBUTES

FORMAT -

COMMAND		REPLY	
BYTE NUMBER	**VALUE**	**BYTE NUMBER**	**VALUE**
1	HEX AA = Start Of Message Byte	1	HEX AA = Start Of Message Byte
2	6 Length	2	70 Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number	3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number	4	8 Least Significant Bits Of 12-Bit Unit Number
5	06 Message Code	5	06 Message Code
6	Checksum (2 bytes)	6-69	64 Bytes of Data (see Table 8-2)
		70	Checksum (2 bytes)

DESCRIPTION

This command is used to read message program attributes from the display. You will always receive 64 bytes of attribute data although not all 64 bytes will be defined.

Table 8-2 defines attribute code numbers.

Error Messages E.4 - Computer Interface Errors

BYTE NUMBER	ATTRIBUTE	VALID VALUES	DEFAULT
1	Blink On Time Interval	0-99	5
2	Blink Off Time Interval	0-99	5
3	Time Interval Between Upward Scrolls	0-99	5
4	Time Interval Between Right-to-Left Scrolls	0-99	5
5	Hard Copy Terminal Flag	0 = CRT 128 = HC	0
6	Number of Nulls to Print After <CR>	0-255	0
7	Character Used as Blink On Delimiter	Any ASCII Character	(
8	Character Used as Blink Off Delimiter	Any ASCII Character	)
9	Starting Data Set	1-4	1
10	Editor Defaults (Reference 8.23)	Options Byte 1 Options Byte 2 Scroll Options Byte Scroll Time Byte	0 0 0 0
14	Default Starting Position	1-40	00
15	Tape Baud Rate	* See Baud Rates	2

Table 8-2.

(continued next page)

BYTE NUMBER	ATTRIBUTE	VALID VALUES	DEFAULT
16	Computer Port Baud Rate	* See Note 1	5
17	Computer Port Parity	* See Note 1	0
18	Computer Port Stop Bit	* See Note 1	0
19	Computer Port Checksum	0 = CRC 1 = XOR 2 = NONE	1
20	RS-232 Port - Program Mode Baud Rate	* See Baud Rates	2
21	RS-232 Port - Program Mode Parity	* See Parity	0
22	RS-232 Port - Program Mode Stop Bits	* See Stop Bits	0
23	RS-232 Port Print/Display Modes Baud Rate	* See Baud Rates	2
24	RS-232 Port - Print/Display Modes Parity	* See Parity	0
25	RS-232 Port Print/Display Modes Stop Bits	* See Stop Bits	0
26	Inverted Parallel Input Lines	0 = Inverted 1 = Non-Inv.	0
27	BCD Input Setting for Parallel Input Lines	0 = BCD 1 = Binary	0
28	8/16 Bit Data	0 = 8 Bit 1 = 16 Bit	1
29	Clock Hour's Format	0 = 12 Hour 1 = 24 Hour	0
30	Chain Time Interval	1-255, 10ths/secs	100
31-34	Not Defined		00
35	8 Least Significant Bits Of 12-Bit Binary Slave Unit Number That Was Most Recently Used When Adding a Message	000-255	000
36	B0-B3 = Most Significant Bits Of 12-Bit Binary Slave Unit Number That Was Most Recently Used When Adding a Message	00-15	00
	B4-B7 = Binary Slave 4-Bit Group Number that was Most Recently Used When Adding a Message	00-15	00
37	The Parallel Port and Control Terminal Debounce Time	0-99 msec	5 msec
38	International Character Set Definition	00 = American 01 = Cyrillic 02 = French 03 = German 04 = English 05 = Danish 06 = Swedish	00
39-64	Not Defined		00

*** BAUD RATES -** 0=300, 1=600, 2=1200, 3=2400, 4=4800, 5=9600
*** PARITY SETTINGS -** 0=No Parity, 1=Odd Parity, 3=Even Parity
*** STOP BIT SETTINGS -** 0=1 Stop Bit, 1=2 Stop Bits

NOTE 1: These attributes cannot be changed by computer interface.

Table 8-2. Attribute Code Number Designations.

8.12 - CODE 07 - PROGRAM ATTRIBUTES

FORMAT -

COMMAND	
BYTE NUMBER	**VALUE**
1	HEX AA = Start Of Message Byte
2	70 Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number
5	07 Message Code
6-69	64 Bytes of Data
70	Checksum (2 bytes)
REPLY = STANDARD REPLY	

DESCRIPTION

This command is used to send attributes to the PMD 200. The attributes are always 64 bytes in length.

Their format and values must be as defined in the previous command.

Error Messages E.4 - Computer Interface Errors

8.13 - CODE 08 - LOAD MEMORY

DESCRIPTION

This command is used to load a message program and attributes to a PMD 200. It is used with three different formats to accomplish the loading process:

1) Start Loading
2) Continue Loading
3) End Loading

8.13.1 - Start Loading

COMMAND	
BYTE NUMBER	**VALUE**
1	HEX AA = Start Of Message Byte
2	81 Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number
5	08 Message Code
6	Status Byte 00 = Start Loading
7	Program Length (2 bytes) MSB,LSB
9	Largest Message Number (2 bytes) MSB,LSB
11	Attribute Bytes (64 bytes)
75	Set to 02
76	Set to 01
77	Number Of Messages In Program (2 bytes) MSB,LSB
79	Checksum (2 bytes)
REPLY = STANDARD REPLY	

DESCRIPTION

This command is used to request the PMD 200 to begin loading a new program from the computer. It begins by clearing its old program and recording the new attributes. It then waits for Continue Loading or End Loading commands.

Byte 7 (Program Length) - when a program is stored to the PMD 200's memory, the following items are included:

- 1 byte of overhead for the PMD 200's software
- 64 attribute bytes
- 4 index bytes per message (used by the PMD 200 to locate messages in its memory)
- The messages themselves (see 8.23 for stored message format)

The program length is, therefore:

LENGTH = 65 + 4x number of messages + total length of messages

Byte 9 (Largest Message Number) - are two bytes containing the number of the highest numbered message included in the program to be sent.

Byte 11 (Attribute Bytes) - are 64 bytes containing the attributes for the program to be loaded. The format and codes for these bytes are defined in section 8.11.

Byte 77 (Number of Messages In Program) - are two bytes containing the total number of messages in the message program to be sent.

Error Messages E.4 - Computer Interface Errors

NOTE If an error occurs before the end load message is sent, then the memory in the PMD 200 will not be valid.

8.13.2 - Continue Loading

FORMAT 2 -

COMMAND	
BYTE NUMBER	**VALUE**
1	HEX AA = Start Of Message Byte
2	81 Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number
5	08 Message Code
6	Status Byte nn = Number of Complete Messages Within This Message (Must Be >=1)
LL	Message Number (2 bytes) MSB,LSB and Data of Message If nn > 1, Second Message Same Format
7+LL	Checksum (2 bytes)
REPLY = STANDARD REPLY	

DESCRIPTION This command is used to continue loading messages. The start load command must be sent before sending this command.

Byte 6 (The Status Byte) - Indicates how many complete messages are to be loaded. The message number precedes each message sent.

LL = length of each message + 2 x number of messages + 7

The total length of this command cannot exceed 256 bytes.

Error Messages E.4 - Computer Interface Errors
Line Error

8.13.3 - End Loading

FORMAT 3 -

COMMAND	
BYTE NUMBER	**VALUE**
1	HEX AA = Start Of Message Byte
2	7 Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number
5	08 Message Code
6	Status Byte 255 = End Loading
7	Checksum (2 bytes)
	REPLY = STANDARD REPLY

DESCRIPTION This command is used to indicate the completion of loading messages into the PMD 200.

Byte 6 (The Status Byte) - is set to 255 (HEX FF).

Error Messages E.4 - Computer Interface Errors

8.14 - CODE 09 - DUMP MEMORY

DESCRIPTION

This command is used to read a message program and attributes from a PMD 200. The command has two formats and the reply has three formats:

COMMANDS		REPLIES	
1)	Start Dumping	1)	Start Of Dump
2)	Continue Dumping	2)	Continuation Of Dump
		3)	End Of Dump

8.14.1 - Start Dumping

FORMAT 1 -

COMMAND		REPLY	
BYTE NUMBER	**VALUE**	**BYTE NUMBER**	**VALUE**
1	HEX AA = Start Of Message Byte	1	HEX AA = Start Of Message Byte
2	7 Length	2	81 Length Reply to Start Dumping
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number	3	B4-B7 = 4-Bit Group Number Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number	4	8 Least Significant Bits Of 12-Bit Unit Number
5	09 Message Code	5	09 Message Code
6	Status Byte 00 = Start Loading	6	Status Byte 00 = Start Dumping
7	Checksum (2 bytes)	7	Program Length (2 bytes) MSB,LSB
		9	Largest Message Number (2 bytes) MSB,LSB
		11	Attribute Bytes (64 bytes)
		75	PMD Type - Set to 02
		76	Dump Type - Set to 01
		77	Number Of Messages In Program (2 bytes) MSB,LSB
		79	Checksum (2 bytes)

DESCRIPTION

This command is used to request the PMD 200 to begin dumping a program to the computer. The reply includes the program's attributes and some parameters. The PMD 200 then waits for Continue Dumping commands. If any commands other than Continue Dumping are received, they will be serviced, but the PMD 200 will remember the progress of the dump and will continue whenever Continue Dumping commands are received.

Byte 7 (Program Length) - see Byte 7 of the Start Loading command.

Byte 9 (Largest Message Number) - are two bytes containing the number of the highest numbered message included in the program.

Byte 11 (Attribute Bytes) - are 64 bytes containing the attributes for the program being read. The format and codes for these bytes are defined in section 8.11.

Byte 77 (Number Of Messages In Program) - are two bytes containing the total number of messages in the message program being read.

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8.14.2 - Continue Dumping

FORMAT 2 -

	COMMAND		REPLY
BYTE NUMBER	**VALUE**	**BYTE NUMBER**	**VALUE**
1	HEX AA = Start Of Message Byte	1	HEX AA = Start Of Message Byte
2	7 Length	2	7+LL Length (While Dumping)
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number	3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number	4	8 Least Significant Bits Of 12-Bit Unit Number
5	09 Message Code	5	09 Message Code
6	Status Byte 01 = Continue Dumping	6	Status Byte nn = Number Of Complete Msgs In This Msg and Data Of Message If nn > 1,
7	Checksum (2 bytes	7+LL	Checksum (2 bytes)

DESCRIPTION

This command is used to request that the PMD 200's message program continue to be dumped to the command computer.

Byte 6 — (Command status Byte) - this byte must be set to non-zero to continue dumping the program.

Byte 6 — (Reply Status Byte) - this byte indicates the number of messages contained in the message data section of the reply.

Byte 7 to 7+LL — (Reply Message Data) - for each message contained in the reply, there will be two bytes contained the message number (MSB,LSB), followed by the message. The reply can contain any number of complete message, up to an amount that totals 248 bytes.

Reference — 8.23 - PMD 200 Stored Message Format

Error Messages — E.4 - Computer Interface Errors

8.14.3 - End Dumping

FORMAT 3 -

COMMAND		REPLY	
BYTE NUMBER	**VALUE**	**BYTE NUMBER**	**VALUE**
1	HEX AA = Start Of Message Byte	1	HEX AA = Start Of Message Byte
2	7 Length	2	7 Length (Reply To End Dumping)
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number	3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number	4	8 Least Significant Bits Of 12-Bit Unit Number
5	09 Message Code	5	09 Message Code
6	Status Byte 01 = Continue Dumping	6	Status Byte 255 = End Dumping
7	Checksum (2 bytes)	7	Checksum (2 bytes)

DESCRIPTION This third part of the Dump command is the End Dumping reply to a Continue Dumping command. It indicates that the reply to the previous Continue Dumping command contained the end of the program.

Byte 6 (Reply Status Byte) - this byte will be set to 255 to indicate End Dumping response.

Error Messages E.4 - Computer Interface Errors

8.15 - CODE 10 - DELETE MESSAGE

FORMAT -

COMMAND	
BYTE NUMBER	**VALUE**
1	HEX AA = Start Of Message Byte
2	8 Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number
5	10 Message Code
6	Programmed Message Number To Be Deleted (2 bytes) MSB,LSB Binary
8	Checksum (2 bytes)
REPLY = STANDARD REPLY	

DESCRIPTION This command is used to delete an existing message in the PMD 200's message program.

8.16 - CODE 11 - CLEAR MEMORY

FORMAT -

COMMAND	
BYTE NUMBER	**VALUE**
1	HEX AA = Start Of Message Byte
2	6 Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number
5	11 Message Code
6	Checksum (2 bytes)
REPLY = STANDARD REPLY	

DESCRIPTION

This command is used to clear the PMD 200's message program and reset the attributes to their default values.

8.17 - CODE 12 - READ TIME AND DATE

FORMAT 1 -

COMMAND		REPLY	
BYTE NUMBER	**VALUE**	**BYTE NUMBER**	**VALUE**
1	HEX AA = Start Of Message Byte	1	HEX AA = Start Of Message Byte
2	6 Length	2	13 Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number	3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number	4	8 Least Significant Bits Of 12-Bit Unit Number
5	12 Message Code	5	12 Message Code
6	Checksum (2 bytes)	6	HOUR MODE - 0 = 12 Hour Time 1 = 24 Hour Time
		7	HOURS - 1-12: 12 Hour Time 0-23: 24 Hour Time
		8	MINUTES - 00-59
		9	SECONDS - 00-59
		10	MONTHS - 1-12
		11	DATE - 1-31
		12	YEAR - 00-99
		13	Checksum (2 bytes)

DESCRIPTION

This command is used to read the current time and date settings of the real-time clock in the PMD 200 unit. This is the same function as the "Display Date and Time" in the "Setup Clock" option in the Set Up Parameters Mode.

Byte 7

(Reply Hours) - when Byte 6 selects the 12-hour format, the hours byte indicates AM or PM in the high bit (D7).

D7 of byte 6: 0 = AM
1 = PM

Error Messages

E.4 - Computer Interface Errors

8.18 - CODE 13 - SET TIME AND DATE

FORMAT -

COMMAND	
BYTE NUMBER	**VALUE**
1	HEX AA = Start Of Message Byte
2	13 Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number 2
5	13 Message Code
6	HOUR MODE - 0 = 12 Hour Mode 1 = 24 Hour Mode
7	HOURS - 1-12 for 12 Hour Time (D7 = 1 = PM) 0-23 for 24 Hour Time
8	MINUTES - 00-59
9	SECONDS - 00-59
10	MONTHS - 1-12
11	DATE - 1-31
12	YEAR - 00-99
13	Checksum (2 bytes)

DESCRIPTION

This command is used to set the real-time clock in the PMD 200 to the values indicated in this command. This is the same function as the "Setup Time" and "Setup Date" in the "Setup Clock" option in the Set Up Parameters Mode.

Byte 7

(Hours) - when Byte 6 selects the 12-hour format, the hours byte indicates AM or PM in the high bit (D7).

D7 of byte 6: 0 = AM
1 = PM

Error Messages

E.4 - Computer Interface Errors

8.19 - CODE 14 - WRITE DATA SET DATA

FORMAT -

COMMAND	
BYTE NUMBER	**VALUE**
1	HEX AA = Start Of Message Byte
2	7+X Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number
5	14 Message Code
6	Status Byte, 0 = BCD 255 = Binary
7	Data Set 1 (2 bytes) MSB,LSB
9	Data Set 2 (2 bytes) MSB,LSB
11	Data Set 3 (2 bytes) MSB,LSB
13	Data Set 4 (2 bytes) MSB,LSB
15	Checksum (2 bytes)
REPLY = STANDARD REPLY	

DESCRIPTION

This command is used to define the values of the four data sets used by the PMD 200 master. All four data sets must be defined in the command. The data sent by this command will be used by the master or slave units to which it is addressed. Another command (Message Code 16) has been defined which provides the functionality of this command plus allows data sets to be relayed to the slaves connected to a master.

Byte 6 (Status Byte) - indicates whether the data is BCD or binary.

0 = BCD
255 = Binary

Error Messages E.4 - Computer Interface Errors

8.20 - CODE 15 - SELECT ACTIVE SLAVE

FORMAT -

COMMAND	
BYTE NUMBER	**VALUE**
1	HEX AA = Start Of Message Byte
2	7+X Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number
5	15 Message Code
6	Active Units Control Byte
7	X Amount Of Data In The Form Of 2 Byte Group And Unit Numbers. Form Is The Same As Bytes 3 And 4 In Message
* 7+X	Checksum (2 bytes)
REPLY = STANDARD REPLY	

* - X must be less than, or equal to 248, which can represent 124 (Group,Unit) number combinations.

DESCRIPTION

This command allows the control computer to specify which of the PMD 200S slaves are to be activated or de-activated.

Bytes 3 & 4 (Unit Address Bytes) - specify which master unit(s) are to process the command. When a master processes this message it sends this same command to all slaves connected to it (i.e. slave Group #0, Unit #0).

Byte 6 (Active Units Control Byte) - this byte is used to specify the application of the activate or de-activate command to the various slaves.

Bit 0 of this byte indicates the requested state of the slaves whose addresses are contained in the list beginning at Byte 7. A "1" in this position indicates those slaves are to be activated. A "0" indicates they should be de-activated.

Bit 7 of this byte indicates what the status of slaves that receive the command, but are not in the list at Byte 6, should become. If bit 7 is a "0", all of these slaves activation status is unchanged by this command. If it is set to "1", these slaves are activated when bit 0 is a "1".

B7	B0	APPLICATION
0	0	De-activate specified slaves only
0	1	Activate specified slaves only
1	0	De-activate specified slaves - Activate other slaves
1	1	Activate specified slaves - Deactivate other slaves

Byte 7 A list of unit and group numbers of slave displays to be activated or de-activated.

Reference 8.1.2 - Active/Non-active Slave Units

Error Messages E.4 - Computer Interface Errors

8.21 - CODE 16 - WRITE DATA SET DATA TO MASTER

FORMAT -

COMMAND	
BYTE NUMBER	**VALUE**
1	HEX AA = Start Of Message Byte
2	16 Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number
5	16 Message Code
6	Control Byte Master Unit = 01 Slave Unit = 02 Both = 03
7	Status Byte 0 = BCD 1 = Binary
8	Data Set 1 (2 bytes) MSB,LSB
10	Data Set 2 (2 bytes) MSB,LSB
12	Data Set 3 (2 bytes) MSB,LSB
14	Data Set 4 (2 bytes) MSB,LSB
15	Checksum (2 bytes)
REPLY = STANDARD REPLY	

DESCRIPTION

This command is used to define the values of the four data sets used by the PMD 200 master and/or slaves. This command is valid only for PMD 200 master units. This command is similar to Message Code 14 but allows specification of the destination for the data sets to include either the master, the active slaves connected to the master, or both. All four data sets must be defined in the command.

Byte 6 — (Control Byte) - This byte specifies the destination for the data set data included in the message. If bit 0 is a "1", the data sets will be used by the master PMD 200. If bit 1 is a "1", the data sets will be sent to the active slaves by the master PMD 200. If bits 0 and 1 are both "1's", the data will be used by both master and its active slaves.

Byte 7 — (Status Byte) - This byte indicates the format of the data included in the message. If it is set to 00, the data must be in BCD format. If it is set to 01, the data will be defined as binary.

Bytes 8-15 — (Data Set 1-4) - These bytes must contain the four data set values, with data set 1's MSB first and data set 4's LSB last.

Note that this command is the only way to send data to a master's slaves in the Computer Interface Mode.

Error Messages — E.4 - Computer Interface Errors

8.22 - CODE 18 - STATUS/ID MESSAGE

FORMAT -

COMMAND		REPLY	
BYTE NUMBER	**VALUE**	**BYTE NUMBER**	**VALUE**
1	HEX AA = Start Of Message Byte	1	HEX AA = Start Of Message Byte
2	6 Length	2	19 Length
3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number	3	B4-B7 = 4-Bit Group Number B0-B3 = Most Significant Bits Of 12-Bit Unit Number
4	8 Least Significant Bits Of 12-Bit Unit Number	4	8 Least Significant Bits Of 12-Bit Unit Number
5	18 Message Code	5	18 Message Code
6	Checksum (2 bytes) LSB,MSB	6	Device Type - HEX 03 = Master
		7	Revision Code - ASCII Character for Revision Letter
		8	Amount of EEROM Memory
		9	Largest Message Number (2 bytes) MSB,LSB
		11	Total Number of Messages (2 bytes) MSB,LSB
		13	Number of Free Bytes (2 bytes) MSB,LSB
		15	Deleted Messages (2 bytes) MSB,LSB
		17	Checksum (2 bytes)

DESCRIPTION

This message requests some status information from the PMD 200. The reply contains the requested information.

Byte 6 (Reply Device Type) - This byte identifies the addressed device as either a master or slave PMD 200 unit. HEX 02 is the code for PMD 200 devices. If the upper bit of the byte is set, (makes 82), the responding device is a slave unit. Other codes for other device types are not defined.

Byte 7 (Revision Code) - this byte is an ASCII code for the revision letter of the software in the device. For revision "E", this value is HEX 45.

Byte 8 (Amount of EEPROM Memory in the PMD 200) - this will be 0 for slaves and 8, 16, 24, or 32 for masters, indicating the number of K bytes (1024 bytes per K) in the PMD 200.

Byte 9 (Largest Message Number) - these two bytes indicate the largest message number contained in the PMD 200's message program.

Byte 11 (Total Number of Messages) - these two bytes indicate the total number of messages in the PMD 200's message program.

Byte 13 (Number of Free Bytes) - these two bytes indicate the total number of free bytes remaining in the PMD 200's memory.

Byte 15 (Number of Deleted Messages) - these two bytes indicate the total number of messages that have been deleted, and not replaced at their number or any other message number.

8.23 - PMD STORED MESSAGE FORMAT

The formats for message storage within the PMD 200's memory and for messages sent within computer interface communications messages is shown in Figure 8-4. This is the structure of the data area shown in Figure 8-2. The beginning of the message is made up of option selection bytes. Depending on the message options selected, the number and meaning of option bytes varies. There are seven different message formats.

Which of the seven formats is appropriate depends upon the options required by the message. Table 8-4 relates the selected options to the formats shown in Table 8-3 (A)- (G). For example, a message with no options selected, would be structured as shown in 8- 3 (A). A message that should scroll left and be sent to slaves would be formatted as in 8-3 (F).

BYTE	1	2	3	4	5	6	7	8	n
Format A	length byte (n)	control byte #1	message data						last byte msg/data
Format B	length byte (n)	control byte #1	control byte #2	message data					last byte msg/data
Format C	length byte (n)	control byte #1	control byte #2	scroll options	message data				last byte msg/data
Format D	length byte (n)	control byte #1	control byte #2	scroll options	scroll time	message data			last byte msg/data
Format E	length byte (n)	control byte #1	control byte #2	scroll options	scroll time	LSB unit #	MSB unit #	message data	last byte msg/data
Format F	length byte (n)	control byte #1	control byte #2	scroll options	LSB unit #	MSB unit #	message data		last byte msg/data
Format G	length byte (n)	control byte #1	control byte #2	LSB unit #	MSB unit #	message data			last byte msg/data

Table 8-3. Stored Message Format Of The PMD 200.

FORMAT B	Same As Format A Plus Energize Alarm, Blink Entire Message, Log Message, Invisible Message
FORMAT C	Same As Format B, Plus Scroll Up, Scroll Left, Repeat Message
FORMAT D	Same As Format C, Plus Select Scroll Time Interval
FORMAT E	Same As Format D, Plus Send To Slaves
FORMAT F	Same As Format C, Plus Send To Slaves
FORMAT G	Same As Format B, Plus Send To Slaves

Table 8-4. Message Options Versus Message Formats.

8.23.1 - MESSAGE EXAMPLE

Figure 8-4 illustrates a "byte diagram" of a message example to show how bytes are utilized in message memory. The third through sixteenth bytes in this example represent the message data itself and are contained in the message data bytes area shown in Table 8-3.

HEX CODE		
10	16	Indicates that the message text is 16 bytes long (Byte 1 in Table 9-5) - Minimum valid message is 8 bytes
10	00010000	Indicates the message is centered (Byte 2 in Figure 9-5) Up to 6 control bytes are used for each message (1 control byte per message minimum)
41	A	'A' is the first character of the first line
20		<SPACE> byte
4D	M	
53	S	
47	G	
2E	.	
FF	FF	End of line marker for line 1
53	S	'S' is the first character of the second line
41	A	
4D	M	
50	P	
4C	L	
45	E	
FF	FF	End of line marker for line 2

Figure 8-4. Byte Diagram Of A Message Example.

As you can see in the Figure 8-4, every byte needed to represent the message counts as a byte of the message and is counted as part of the total size of the message. Notice that the length byte also counts itself.

8.23.2 - CONTROL BYTE 1

Control byte one selects some of the options possible for the message. A diagram of this byte is shown in Table 8-5 to illustrate the definitions of the 8 bits of this byte.

B7	Chained Msg Bit	B3	On One Line Bit
B6	Clear Display Bit Repeat Chain Bit	B2	<CR><LF> Bit
B5	Send to RS-232 Bit	B1	Control Character Bit
B4	Center Message Bit	B0	Byte 3 Bit

Table 8-5. Bit Diagram Of Control Byte 1.

Table 8-6 below designates how byte 2 of each message is read:

BIT NUMBER	IF BIT = 1	IF BIT = 0
B7	Message Is Chained	Message Is Not Chained
B6	B7 = 0 then Overlay Existing Msg B7 = 1 then Repeat Chain	Message Clears Display Chain Does Not Repeat
B5	Send Message to RS-232	Do Not Output Message
B4	Center Message	Message Not Centered
B3	Send On One Line (B5 must equal 1)	Send On Multiple Lines (B5 must equal 1)
B2	<CR><LF> At End of Msg (B5 must equal 1)	No <CR><LF> At End of Msg (B5 must equal 1)
B1	Msg Has Control Char.	Msg Has No Control Char.
B0	Byte 3 Control Byte	No More Control Bytes Entire Msg Does Not Blink Msg Does Not Scroll No Relay Alarm Output Msg Not Sent To Slave

Table 8-6. Bit Designations For Control Byte 1.

NOTES B7 - If message is chained, all other bits are set to 0.

B3 & B2 - Refers to RS-232 port printouts (B5 must = 1)

B1 - Set if message contains any ASCII control characters (HEX 00-1F). (Does not include time, date, or data set characters.)

B0 - Set to enable second options byte.

8.23.3 - OPTION BYTE 2

Control byte one indicates whether the third byte of the message is a control byte (Control Byte 2). Control byte 2 will indicate if the message is to energize the alarm relay output, if the message will scroll, and if the entire message is to blink. A diagram is shown in Table 8-7 of control byte 2.

B7	Energize Alarm Relay Output	B3	Invisible Message Bit
B6	Scrolled Message Bit	B2	Log Message Bit
B5	Message Sent to Slave Bit Indicates 2 bytes after last control byte	B1	Not Used
B4	Blink Entire Message Bit	B0	Not Used

Tale 8-7. Bit Diagram Of Control Byte 2.

BIT NUMBER	IF BIT = 1	IF BIT = 0
B7	Message Energizes Alarm Relay	Does Not Energize Relay
B6	Message Scrolls - Enable Scroll Options Byte	Message Does Not Scroll
B5	Message Sent To Slaves Enable Unit No. Bytes	Message Not Sent To Slaves
B4	Entire Message Blinks	Message Does Not Blink
B3	Message Is not Displayed	Display Message on Master
B2	Log Message on Data Log Stack	Do Not Log Message
B1	Not Used (Default = 0)	
B0	Not Used (Default = 0)	

Table 8-8. Bit Designations For Control Byte 2.

8.23.4 - SCROLL OPTIONS BYTE

As noted previously in 8.23.3, if control byte two indicates that a message will scroll, a third control byte (byte 4) is necessary to determine control options for scrolling.

Table 8-9 shows a diagram of byte 4 as the scroll option control byte.

B7	Scroll Time Enable Bit	B3	Lines to Scroll Msg On Bit
B6	Repeat Message Bit	B2	Lines to Scroll Msg On Bit
B5	Lines to Scroll Msg On Bit	B1	Scroll Msg Right to Left Bit
B4	Lines to Scroll Msg On Bit	B0	Scroll Msg Up Bit

Table 8-9. Bit Diagram Of Control Byte 3.

BIT NUMBER	IF BIT = 1	IF BIT = 0
B7	Message Contains Scroll Time Interval Information In Byte 5	Message Does Not Contain Scroll Time Interval
B6	Message Repeats	Message Does Not Repeat
B5	Message Scrolls on Line 4	Does Not Scroll on Line 4
B4	Message Scrolls on Line 3	Does Not Scroll on Line 3
B3	Message Scrolls on Line 2	Does Not Scroll on Line 2
B2	Message Scrolls on Line 1	Does Not Scroll on Line 1 Line
B1	Scrolls Right to Left	Does Not Scroll Left
B0	Message Scrolls Upward	Does Not Scroll Upward

Table 8-10. Bit Designations For Control Byte 3.

B2 & B3 - Select upon which line a left-scrolling message is to be displayed. For left- scrolling messages, one of these bits must = "1" and the other must = "0". Both bits should be set when specifying an upward- scrolling message.

8.23.5 - SCROLL TIME BYTE

If byte 5 is used as the scroll time byte, the contents of the byte will specify how often the PMD 200 will shift the scrolled message, either upwards or left. The time is specified in units of 0.1 seconds.

8.23.6 - UNIT ADDRESS BYTES

When a message is to be sent to slave unit(s) via computer interface, two bytes are required to indicate which unit(s) are to receive the message. The format of these unit addresses is exactly the same as is used in computer interface commands. Reference Figure 8-1.

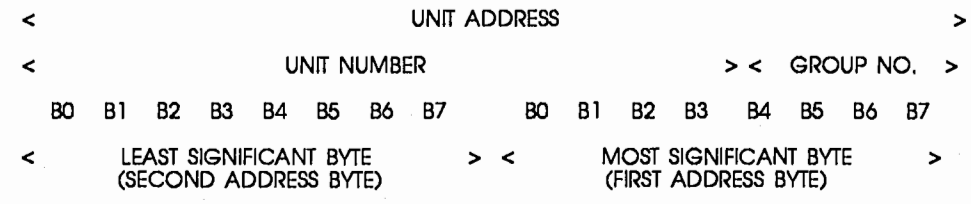


Figure 8-2. Bit Designations for Slave Address Bytes.

8.24 - MESSAGE TEXT

Message text is to be entered as the last part of the message. A non-scrolling message must have two lines of 0 to 20 ASCII characters, each line terminated by HEX FF.

A scrolling message's text can be composed of any number of lines, each terminated by HEX FF. The total length of the message, including all control bytes and the size byte must be 235 characters or less.

8.24.1 - BLINKING CHARACTERS

Blinking of individual characters is coded into the message text by setting the most significant bit (B7) of the byte of the ASCII character to be blinked. Blink delimiters are not used in the stored message format. Also, note that time, date, and data set bytes have the most significant bit set, but cannot be made to individually blink.

8.24.2 - TIME AND DATE CHARACTERS

To enter the time into a message, enter the Hex character code for the time (HEX 81) eight times (to represent the eight time characters HH:MM:SS).

To enter the date into a message, enter the Hex character code for the date (HEX 82) nine times (to represent the nine date characters DD-MMM-YY).

If you enter too few characters to represent the entire time or date in a message, the rightmost character(s) will be deleted from the message. For instance, entering 5 time characters will represent HH:MM only.

You may place the time and date next to each other, and you may place two time or two date strings next to each other.

HEX 81	Character Code Used to Indicate Character of Time in a Message
HEX 82	Character Code Used to Indicate Character of Date in a Message

Table 8-11. Character Codes For Time And Date.

8.24.3 - VARIABLE DATA CHARACTERS

Table 8-12 lists the character codes for all five characters of each of the four data sets maintained by the PMD 200 displays. Unlike operation with Add A Message or Edit A Message, these codes can be entered in any order, anywhere in a message.

CHARACTER CODES USED TO REPRESENT DATA SET # 1 CHARACTERS				
MSD				LSD
HEX 85	HEX 86	HEX 87	HEX 88	HEX 89
CHARACTER CODES USED TO REPRESENT DATA SET # 2 CHARACTERS				
MSD				LSD
HEX 8A	HEX 8B	HEX 8C	HEX 8D	HEX 8E
CHARACTER CODES USED TO REPRESENT DATA SET # 3 CHARACTERS				
MSD				LSD
HEX 8F	HEX 90	HEX 91	HEX 92	HEX 93
CHARACTER CODES USED TO REPRESENT DATA SET # 4 CHARACTERS				
MSD				LSD
HEX 94	HEX 95	HEX 96	HEX 97	HEX 98

Table 8-12. Character Codes For Variable Data.

To put variable data into a message via the computer interface, enter the Hex character code for the desired digit(s) for the desired data set(s) into the message at the desired location(s).

8.24.4 - END OF LINE

Character code HEX FF indicates the end of a line of message text. Hex FF (<CR>) **must** be entered after every 20 characters and spaces of text (maximum). Even left-scrolling messages are entered in 20-character "lines".

8.25 - CONCLUSION

When interfaced (via an RS-232/RS-422 adapter) to the RS-422A Computer Port of the PMD 200, a computer can be the controlling force of the message display network. Using an individually developed program and specified hexadecimal character codes, the computer can send information to and receive information from all master and slave PMD 200 displays.

All functions of the Program and Display Modes can be accomplished with computer interfacing. Messages can be displayed, programmed, edited, deleted, or added. Unit parameters and real-time data can be read or changed. Memory can be dumped or loaded, and, additionally, non- programmed messages can be sent and displayed.

APPENDICES

APPENDIX A - ACCESSORIES

The following accessories are available for the PMD 200 Programmable Message Display:

Stainless Steel Front Panel
PMD 200S Slave Message Displays
Adapter Modules -
- 115 VAC Input Adapter
- 230 VAC Input Adapter
- 5 VDC Input Adapter

A.1 - PMD SLAVE DISPLAYS

The PMD 200 is compatible with all PMD slave displays. These are available in several sizes. Character size and number of characters differ from model to model. These products are listed below:

PMD 150S	5.05 mm high vacuum-fluorescent characters, 1 or 2 lines of 20 characters, compact, panel-mount display
PMD 200S	11 mm high vacuum-fluorescent characters, 2 lints of 20 characters, panel-mount display
PMD 300S	12.51 mm high vacuum-fluorescent characters, 4 lines of 20 characters, panel-mount display
PMD 3000	2", 4", 6",and 8" high red LED characters, available in several size configurations

PMD slave displays provide a cost-effective means to network messages to various locations. While not originating or storing messages, the slave unit displays messages that are sent from PMD master unit, a computer, or other intelligent device. Up to 15 groups of up to 511 masters and slaves can be connected together into one system and individually addressed. Figures 2-2 and 9-1 of this manual show interfacing example using slave displays.

Reference
2.8 - RS-422A Slave Port
8.1.1 - Defining The Unit Address

A.2 - ADAPTERS

Three adapter modules, which allow a variety of input levels, are available for the PMD 200 Master Display. Each adapter is connected to the rear terminals and bolted to the back panel. External field wiring is connected to terminals located on the bottom of the adapter.

Mounting dimensions for the adapters are located in Appendix B.

115 VAC INPUT ADAPTER

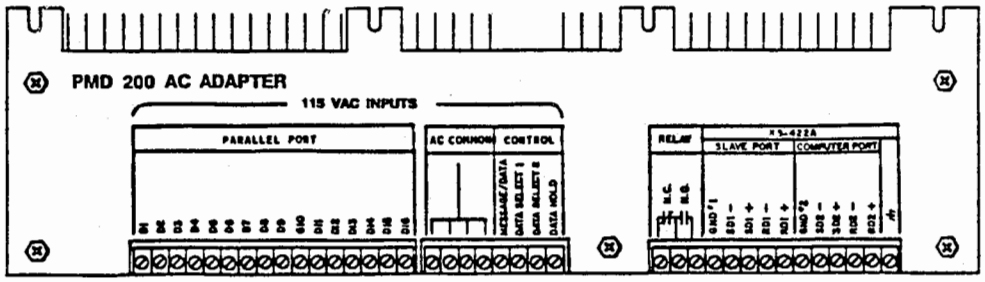
The 115 VAC Input Adapter (Part Number 76540) accepts inputs for the parallel port and message control terminals at the 115 VAC level and converts them to the input voltage range acceptable to the PMD 200 display.

230 VAC INPUT ADAPTER

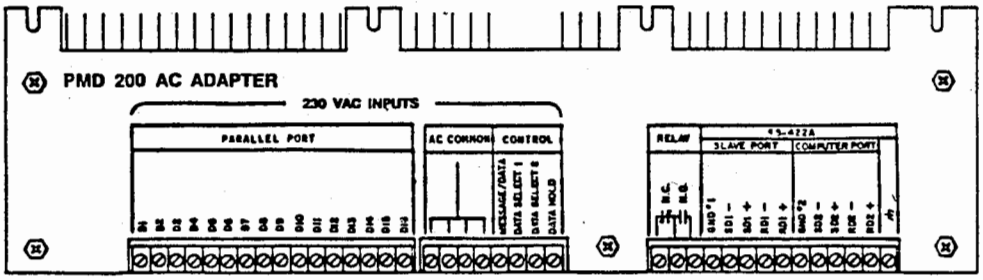
The 230 VAC Input Adapter (Part Number 76545) accepts inputs for the parallel port and message control terminals at the 230 VAC level and converts them to the input voltage range acceptable to the PMD 200 display.

5 VDC INPUT ADAPTER

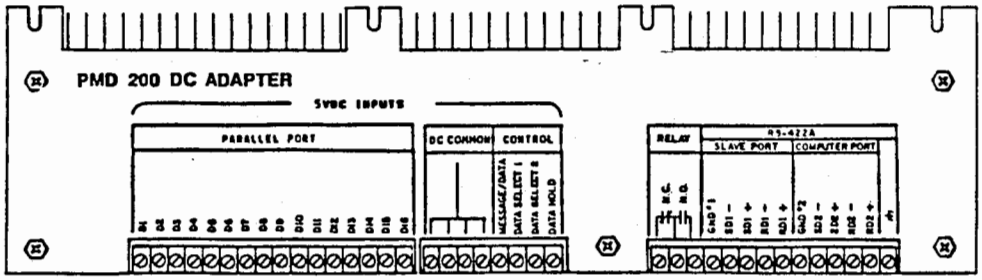
The 5 VDC Input Adapter (Part Number 76541) allows inputs to the message and control terminals of the PMD 200 unit to be at the +4 VDC to +12 VDC (source) level.



115 VAC INPUT ADAPTER
Part Number 76540



230 VAC INPUT ADAPTER
Part Number 76545



5 VDC TTL INPUT ADAPTER
Part Number 76541

Figure A-1. PMD 200 Message Display Adapters.

APPENDIX B - PANEL CUT-OUT AND OUTLINE DIMENSIONS

The following figures provide information necessary for mounting the PMD 200 Master and Slave Displays (standard and stainless-steel versions) and for mounting the three available adapters.

B.1 - STANDARD MODEL

Figure B-1 shows the panel cut-out and outline dimensions for the PMD 200 Programmable Message Display (and the PMD 200S Slave Display) - standard model.

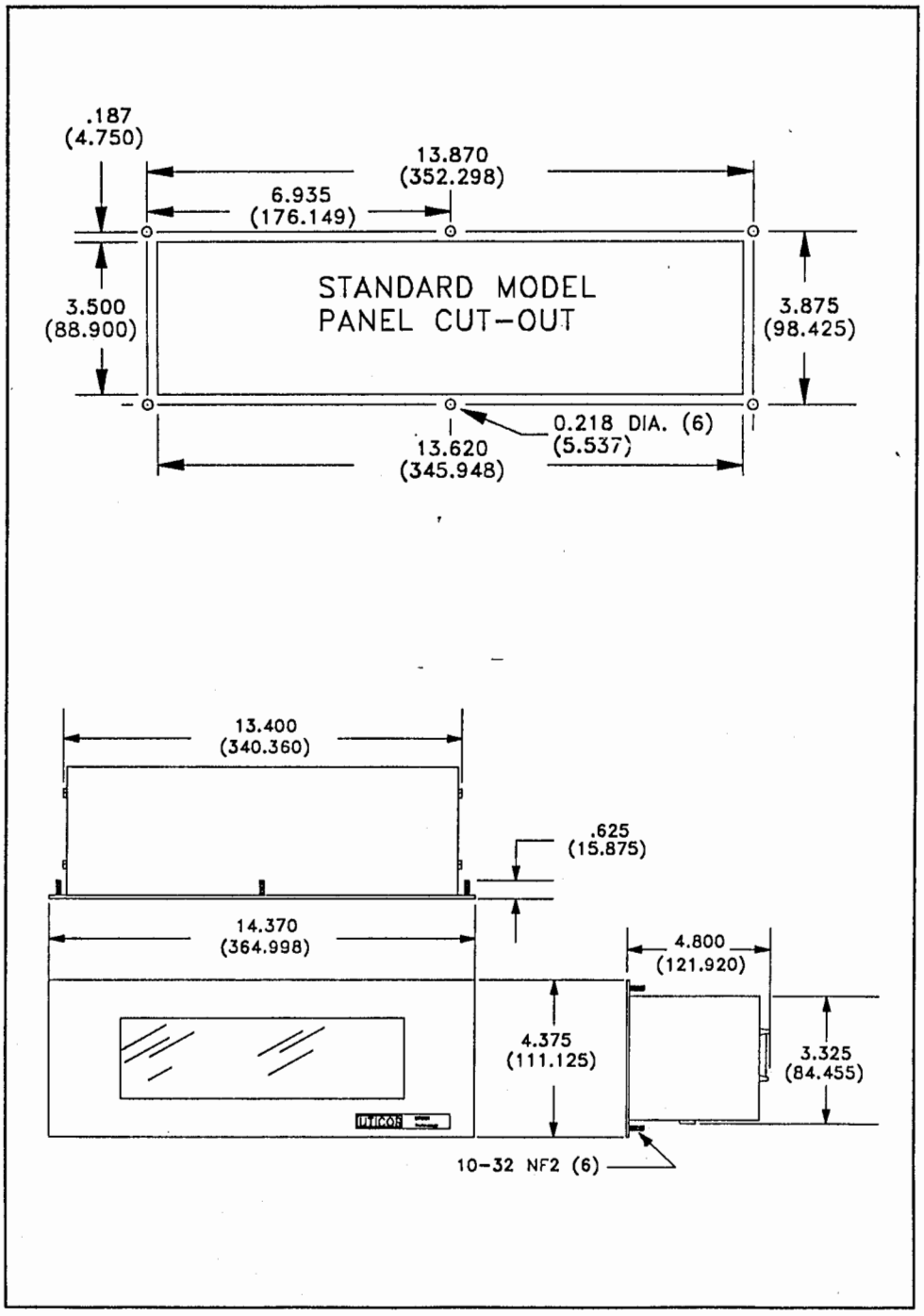


Figure B-1. Panel Cut-Out And Outline Dimensions For Standard Model Displays.

B.2 - STAINLESS STEEL MODEL

Figure B-2 shows the panel cut-out and outline dimensions for the PMD 200 Programmable Message Display and the PMD 200S Slave Display (stainless-steel models).

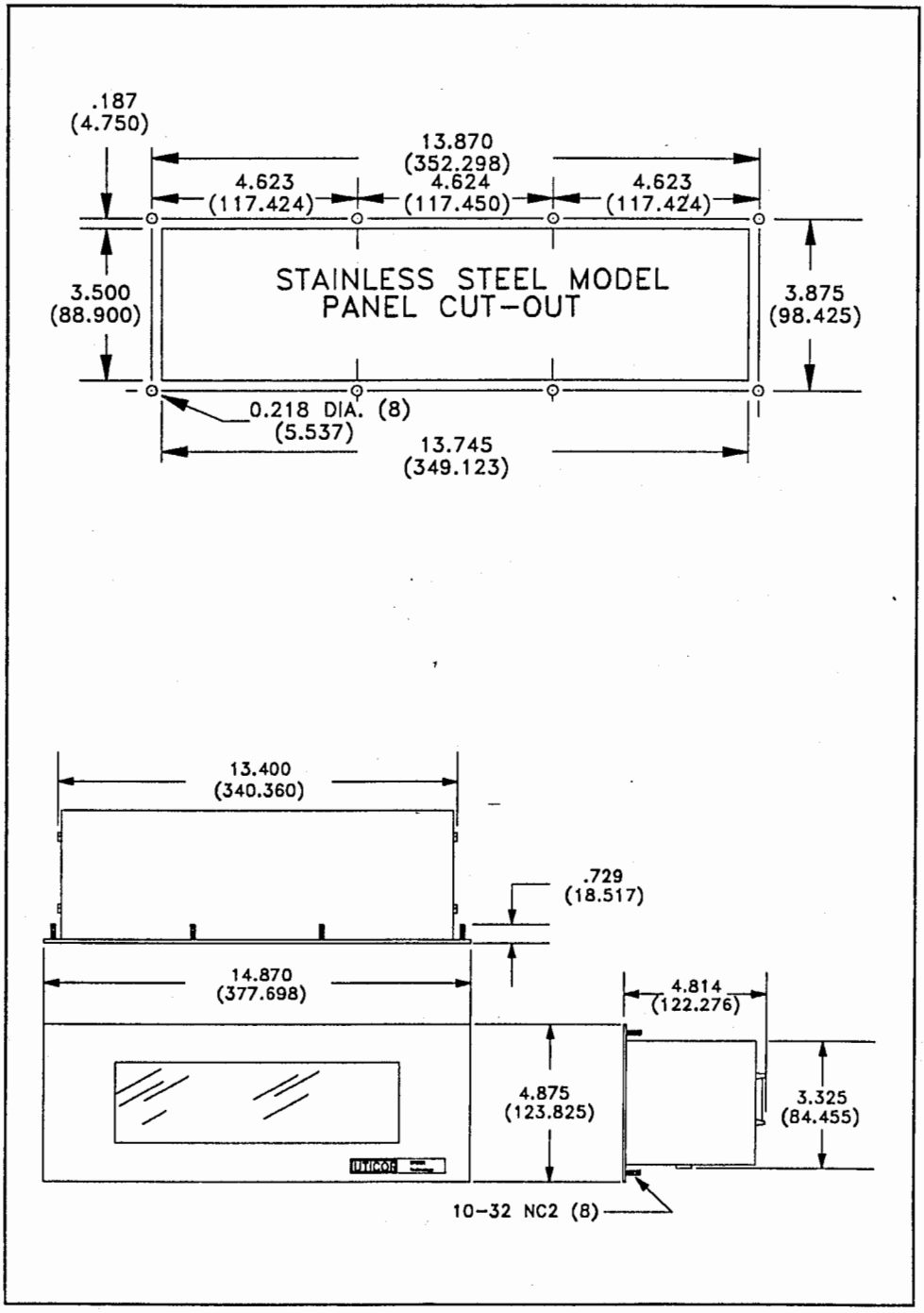


Figure B-2. Panel Cut-Out And Outline Dimensions For Stainless-Steel Model Displays.

B.3 - ADAPTER MOUNTING AND OUTLINE DIMENSIONS

Figure B-3 shows the mounting and outline dimensions of the PMD 200 Adapter Modules.

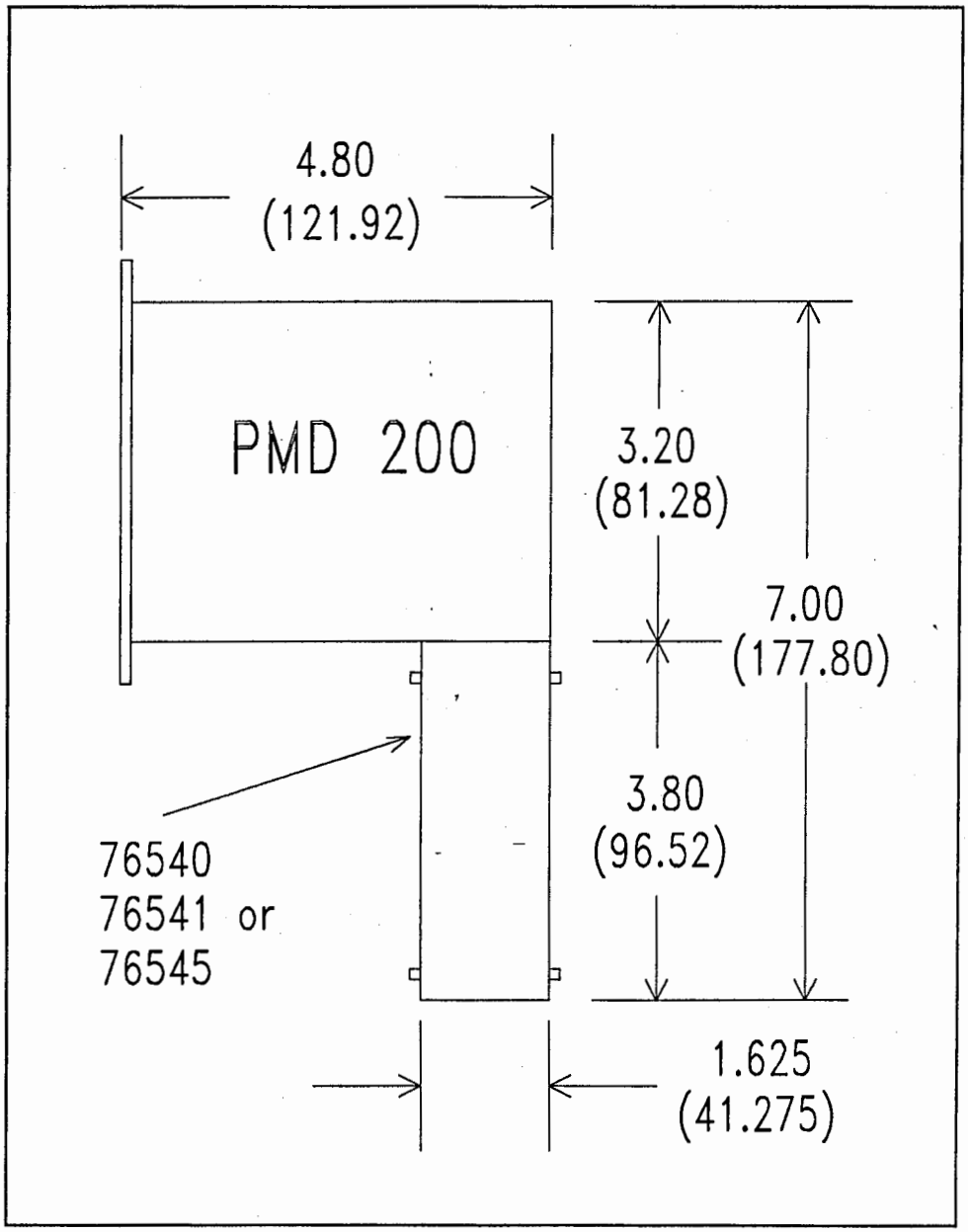


Figure B-3. Adapter Mounting And Outline Dimensions.

APPENDIX C - REMOVING THE TOP COVER

The top cover of the PMD 200 must be removed to change the input power requirements from 115 VAC to 230 VAC (Model 76536), to change the fuse, and to change the real-time clock battery.

Refer to Figure C-1 to remove the top cover of the unit. Refer to Figure C-2 for location of the various P.C. Boards of the unit.

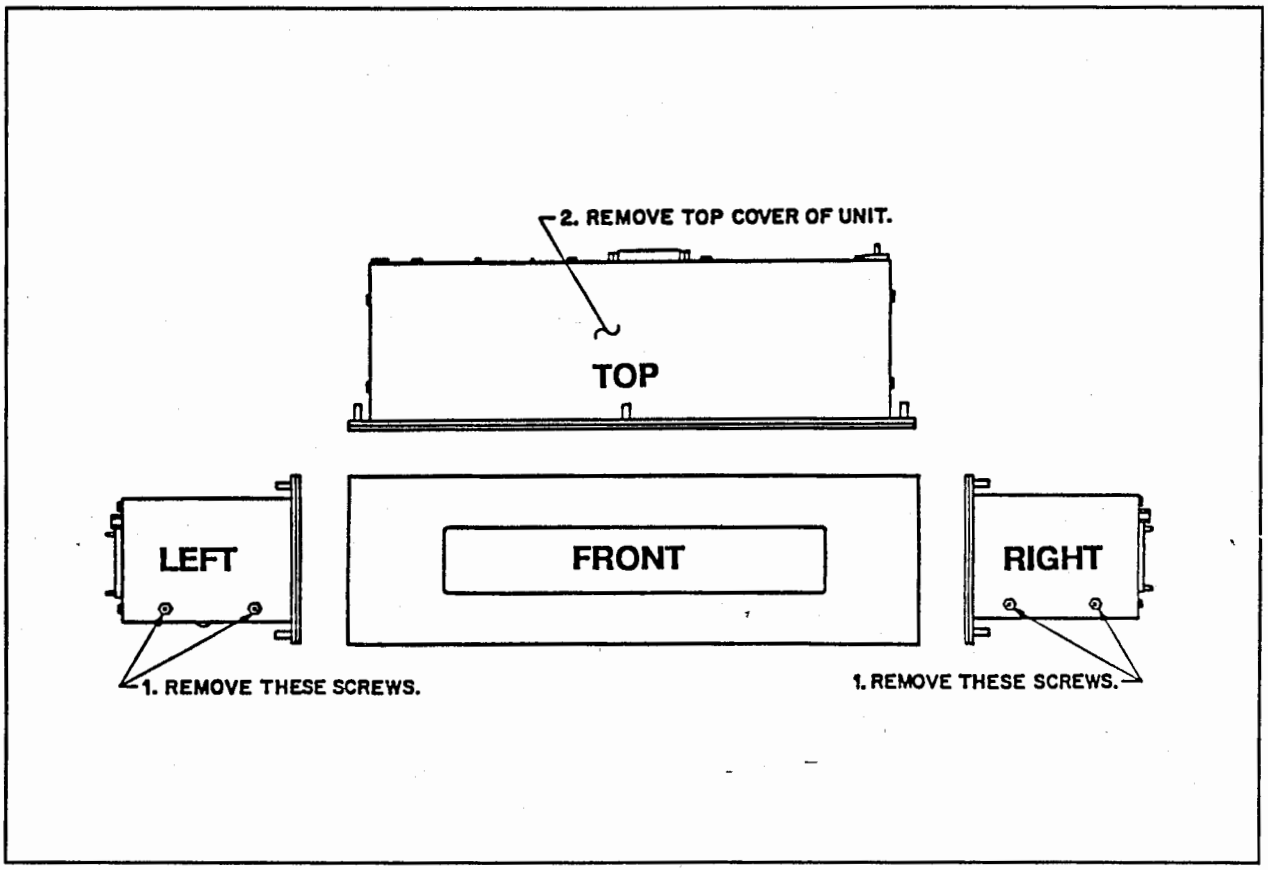


Figure C-1. Removing the Top Cover.

Figure C-2 shows location of the P.C. Boards and the transformer of the PMD 200. These will be referred to in C.1 and C.2.

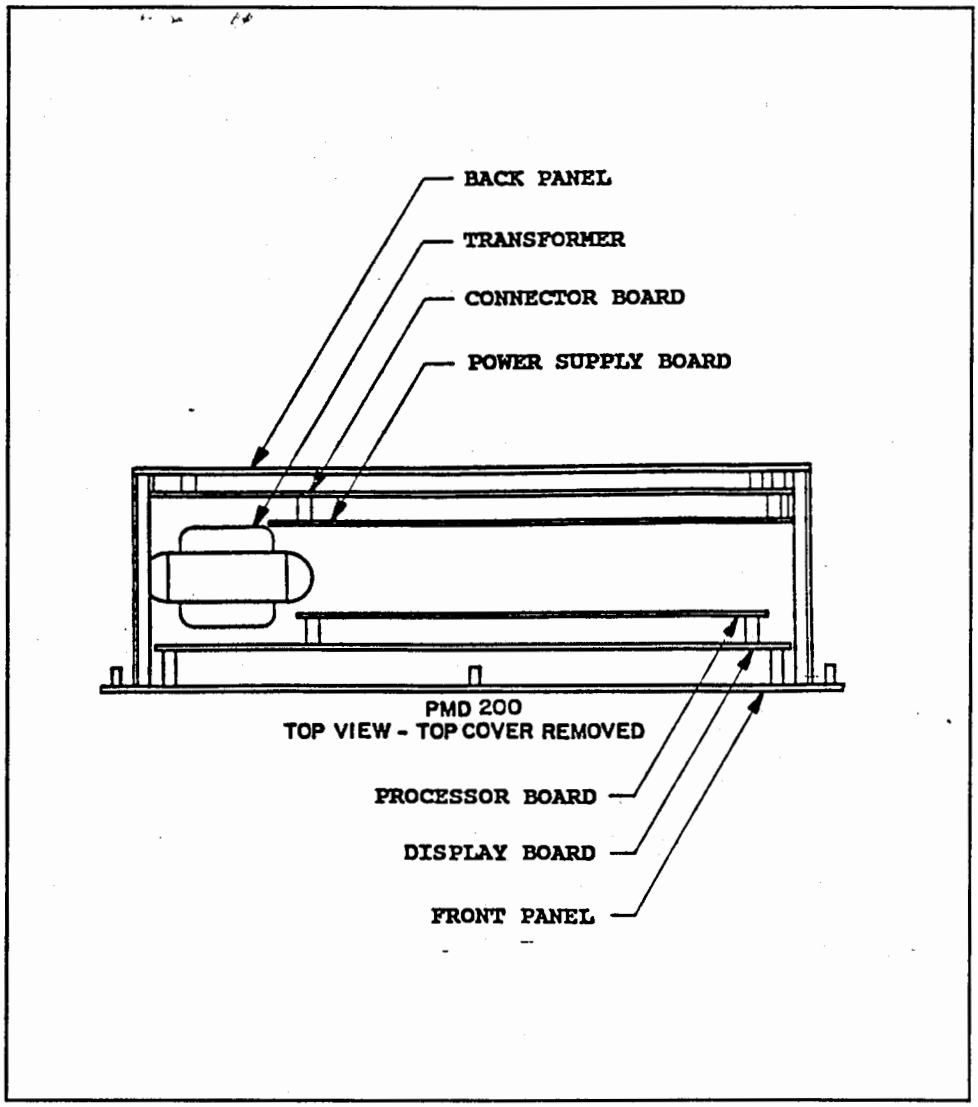


Figure C-2. P.C. Board And Transformer Locations.

C.1 - INPUT POWER REQUIREMENTS

The Model 76536 display can operate on 115 (110-132) VAC or 230 (194-250) VAC input power.

115 VAC Operation

To operate the Model 76536 display at 115 VAC:

1. The power input connector (from the transformer to the connector board) must be plugged into the 115 VAC position connector.
2. The input fuse must be a .177" x .57", 2AG, 3/4 Amp Fast Acting 250 V (factory installed).

NOTE: The Model 76536 is shipped from the factory configured for 115 VAC operation.

230 VAC Operation

To operate the Model 76536 display at 230 VAC:

1. The power input connector (from the transformer to the connector board) must be plugged into the 230 VAC position connector.

2. The input fuse must be a .177" x .57", 2AG, 3/8 Amp Fast Acting 250 V (customer supplied).

The power input connectors and the fuse are located on the "connector board" which is mounted to the inside of the back panel. To access the connector board, remove the top cover of the unit as shown in Figure C-1. Locate the connectors and fuse in Figure C-3 to make the necessary adjustments.

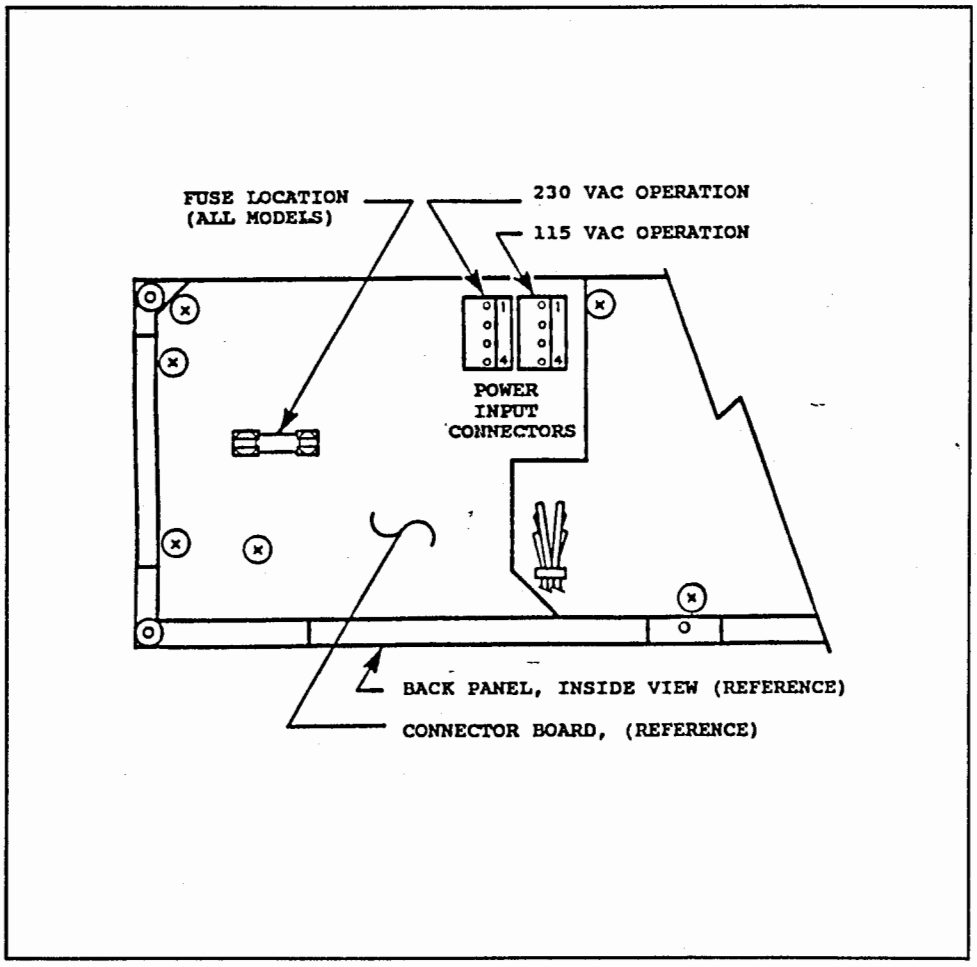


Figure C-3. Connector Board With Power Input Connector And Fuse Locations.

WARNING - DISCONNECT AC POWER FROM THE UNIT BEFORE CHANGING THE FUSE!

C.2 - CHANGING THE BATTERY FOR THE REAL-TIME CLOCK

The PMD 200 unit contains a lithium battery for the real-time clock. To change the battery, remove the top cover as described in Figure C-1. Refer to Figure C-4 for battery location.

To remove battery, insert a blunt, non-metallic tool (through the access slot at the top of the holder) between the bottom face of the cell and the holder. Remove with fingers or an insulated tweezer.

Do not use uninsulated metal tools to change the battery. Take care not to short the terminals of the battery to each other or to any part of the circuitry.

Insert new battery at an angle with the negative (-) side facing the battery holder. When the battery is inserted correctly, the top contact of the holder will snap closed.

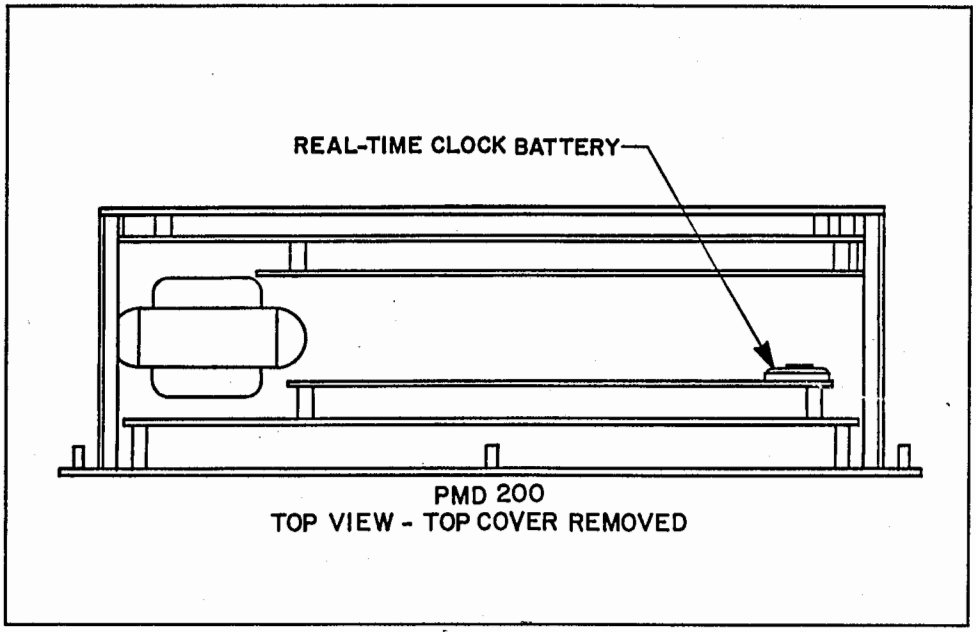


Figure C-4. Real-Time Clock Battery Location.

BATTERY WARNING: **Fire, Explosion, and Severe Burn Hazard!**

Do Not Recharge, Disassemble, Heat Above 212 F, Incinerate, or expose contents to water.

APPENDIX D - PROGRAMMING MENUS

The following tables provide a reference of the Main Menu and Set Up Parameters menu of the Program Mode and of the default settings of the PMD 200.

D.1 - MAIN MENU

Table D-1 lists the Main Menu of the Program Mode.

MAIN MENU	
A	ADD A MESSAGE
C	CLEAR ALL MESSAGES AND SET PARAMETERS TO DEFAULTS
D	DELETE MESSAGES
E	EDIT A MESSAGE
F	FIND A STRING
H	LIST VALID COMMANDS
L	LIST MESSAGES
N	DISPLAY NUMBER OF FREE BYTES
S	SETUP PARAMETERS
V	VIEW MESSAGES ON DISPLAY
<CR>	LIST NEXT MESSAGE
ESC	ABORT COMMAND

Table D-1. Program Mode Main Menu.

D.2 - SET UP PARAMETERS MENU

Table D-2 lists the Set Up Parameters Menu of the Program Mode and the sub-menus of the Set Up Parameters Mode.

SET UP PARAMETERS MENU

1) HARD COPY / CRT STATE
2) NUMBER OF NULLS PRINTED AFTER A <CR>
3) SERIAL PORTS
4) CLOCK
5) PARALLEL PORT
6) RATE FOR SCROLL AND CHAIN MESSAGES
7) BLINK ON AND OFF RATES
8) DEBOUNCE TIME
9) CHARACTER SET
10) SET GROUP/UNIT CODE
<CR> LIST SETUP COMMANDS
ESC ABORT COMMAND

SERIAL PORTS SUB-MENU

1) COMPUTER INTERFACE
2) PROGRAM TERMINAL
3) PRINTER
4) TAPE IN AND OUT

CLOCK SUB-MENU

1) SETUP DATE
2) SETUP TIME

RATE FOR SCROLL AND CHAIN MESSAGE

1) DEFAULT TIME RATE FOR CHAIN MESSAGES
2) DEFAULT TIME RATE FOR SCROLL UP
3) DEFAULT TIME RATE FOR SCROLL LEFT

DEBOUNCE TIME SUB-MENU

1) DC
2) AC
3) VARIABLE

Table D-2. Program Mode Set Up Parameters Menu and Sub-Menus.

D.3 - PROGRAMMING PROMPTS

When messages are added or edited, various terminal prompts are involved to set up the desired parameters for the message. Table D-3 contains a flow-chart that demonstrates the manner in which these prompts are encountered.

The flow-chart does not show what prompts are specifically encountered, just the order in which they may occur. For example, the "CENTER MESSAGE" prompt is not shown with a message that scrolls left.

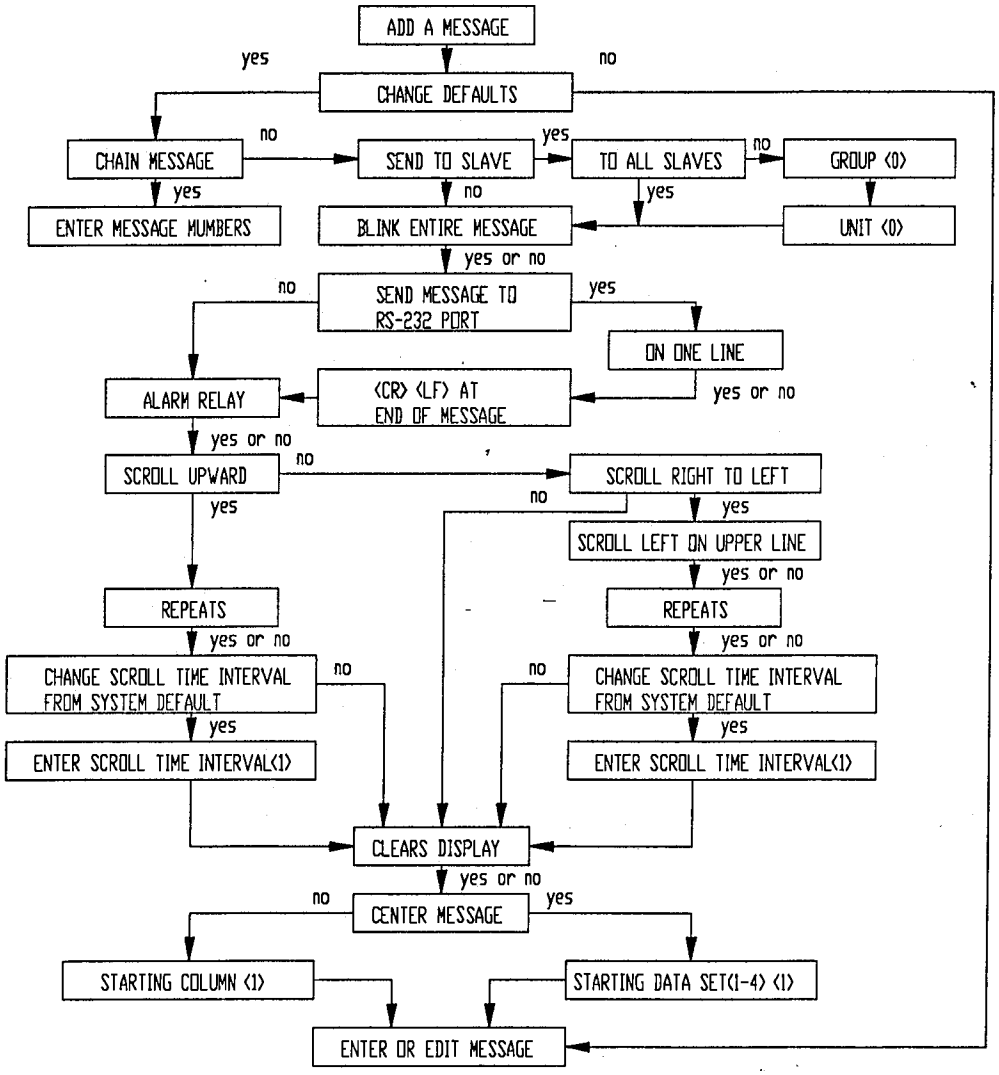


Table D-3. Programming Prompt Flowchart.

D.4 - DEFAULT SETTINGS FOR THE PMD 200

Table D-4 lists the default settings of the PMD 200 after the memory is cleared.

SYSTEM DEFAULTS

Number of Nulls Printed after a <CR> = 0

SERIAL PORTS SETUPS
- Computer Port
  (Not available on PMD 150)
  - Baud Rate = 9600 • Stop Bits = 1
  - Parity Enabled = No
  - Checksum Type = 1 (XOR)
- Program Terminal
  - Baud Rate = 1200 • Stop Bits = 1
  - Parity Enabled = No • CRT State
- Printer
  - Baud Rate = 1200 • Stop Bits = 1
  - Parity Enabled = No
- Tape In and Out
  - Baud Rate = No default

CLOCK - Time hour format = 12
- (not selectable without Clock)

PARALLEL PORT
- Inverted, BCD,
- 8-bit (8 input display) • 16-bit (16 input display)

RATE FOR SCROLL AND CHAIN MESSAGES
- Chain Messages = 100 (sec)
- Scroll Up = 5 (sec)
- Scroll Left 5 (sec)

BLINK ON AND OFF RATES
- Blink ON Time = 5 (tenths of secs)
- Blink OFF Time = 5 (tenths of secs)

DEBOUNCE TIME - 5 (msec)

CHARACTER SET - U.S.

UNIT ADDRESS (PMD 160 only)
- Group Number = 0 • Unit Number = 0

MESSAGE OPTION DEFAULTS
- Clears Display
- Starting Data SEt = 1
- Starting Position of Message = 1

Table D-4. PMD 200 Default Settings.

APPENDIX E - ERROR MESSAGES

The PMD 200 will return error messages - either on its display, on the programming terminal, or in computer interface command message replies - when problems occur during the various modes of operation.

The following sections cover the error messages sent by the PMD 200.

E.1 - PROGRAMMING ERRORS

Blink On And Blink Off Delimiters Cannot Be the Same Character - When changing Blink On and Off Delimiters - the Blink Off Delimiter cannot be defined as the same character set up for the Blink On Delimiter. Enter a different character.

Cannot Make Scrolling Message Non-Scrolling Message - When Editing a message - Scrolling messages cannot become non-scrolling messages. To enter a scrolling message at this location, delete the current message using the Delete Command, and add the scrolling message using the Add Command.

Message Number Out of Bounds - When entering a chained message - You entered a message select number that is higher than the largest programmed message select number in the unit.

When editing a message - This message number was larger than any existing message number in the unit.

When viewing a message - This message number is larger than the largest programmed message in the unit.

Message XXXX Not Programmed - When viewing a message - This message was deleted and not replaced. Or, the message was never programmed and messages exist in the program with larger message numbers.

E.2 - DISPLAY ERRORS

Message XXXX Not Programmed - When selected in the Display Mode -This message was deleted and not replaced. Or, the message was never programmed and messages exist in the program with larger message numbers.

Message XXXX Out of Bounds - When selected in the Display Mode - This message number is larger than the largest programmed message in the unit.

E.3 - TAPE ERRORS

Data Checksum Error- Tape In - The unit has detected a checksum error on a line of the program on the tape. Retry procedure.

Did Not Verify - Tape Verify - The program on the tape did not match the program in the unit.

Incompatible Type - Tape In - The program on the tape was made from a display whose software revision is not compatible with the software of the unit currently being loaded.

Line Of Data Lost - Tape In - A line of data was "skipped over" on the tape. Retry procedure.

You Do Not Have EEROM Memory - Tape In - The memory capacity of the PMD 200 is not large enough for the message program.

E.4 - COMPUTER INTERFACE ERRORS

Error Code 1 = Checksum Error - returned if the Checksum (or CRC Code) received at the end of a command does not agree with the Checksum the PMD 200 calculated as it received the message.

Error Code 2 = Timeout Error - returned if control computer waits too long between sending characters once it has begun a message. This timeout will be a minimum of 820 msec.

Error Code 3 = Invalid Message Code - returned if the message code sent by the control computer is an invalid number, or if a code other than "CONTINUE LOADING" or "END LOADING" is sent after a "BEGIN LOADING" code.

Error Code 4 = Start Load Not Requested - returned in reply to Code 8 (Load Memory) when "CONTINUE LOADING" or "END LOADING" commands were sent prior to the "BEGIN LOADING" command.

Error Code 5 = Start Dump Not Requested - returned in reply to Code 9 (Dump Memory) when "CONTINUE DUMPING" or "END DUMPING" commands were sent prior to the "BEGIN DUMPING" command.

Error Code 6 = Insufficient Memory In The PMD 200 - returned in reply to Code 3 (Program Message) and Code 8 (Load Memory). The previous memory in the PMD 200 remains intact.

Error Code 7 = Invalid Program Message Number - returned in reply to Codes 1, 5, or 10 if a non-existent program message number is selected. Returned in reply to Code 3 if a message number greater than 9999 is specified.

Error Code 8 = Invalid Message Length - returned in response to Codes 3 and 8 if either attempts to program a message with a length byte of greater than 235.

Error Code 9 = Incompatible Type - returned in reply to format 1 of Code 8 (Load Memory) - if the data at offsets 73 and 74 indicate that the program to be sent will be incompatible with the PMD 200's software version.

APPENDIX F - "SOURCE" AND "SINK" INPUTS

The Parallel Input Terminal Block and the Message Control Terminals can be software configured for either "source" or "sink" operation. Figure F-1 shows how these terminals should be interfaced for "source" mode and Figure F-2 shows how interfacing for the "sink" mode.

F.1 - "SOURCE" INPUTS

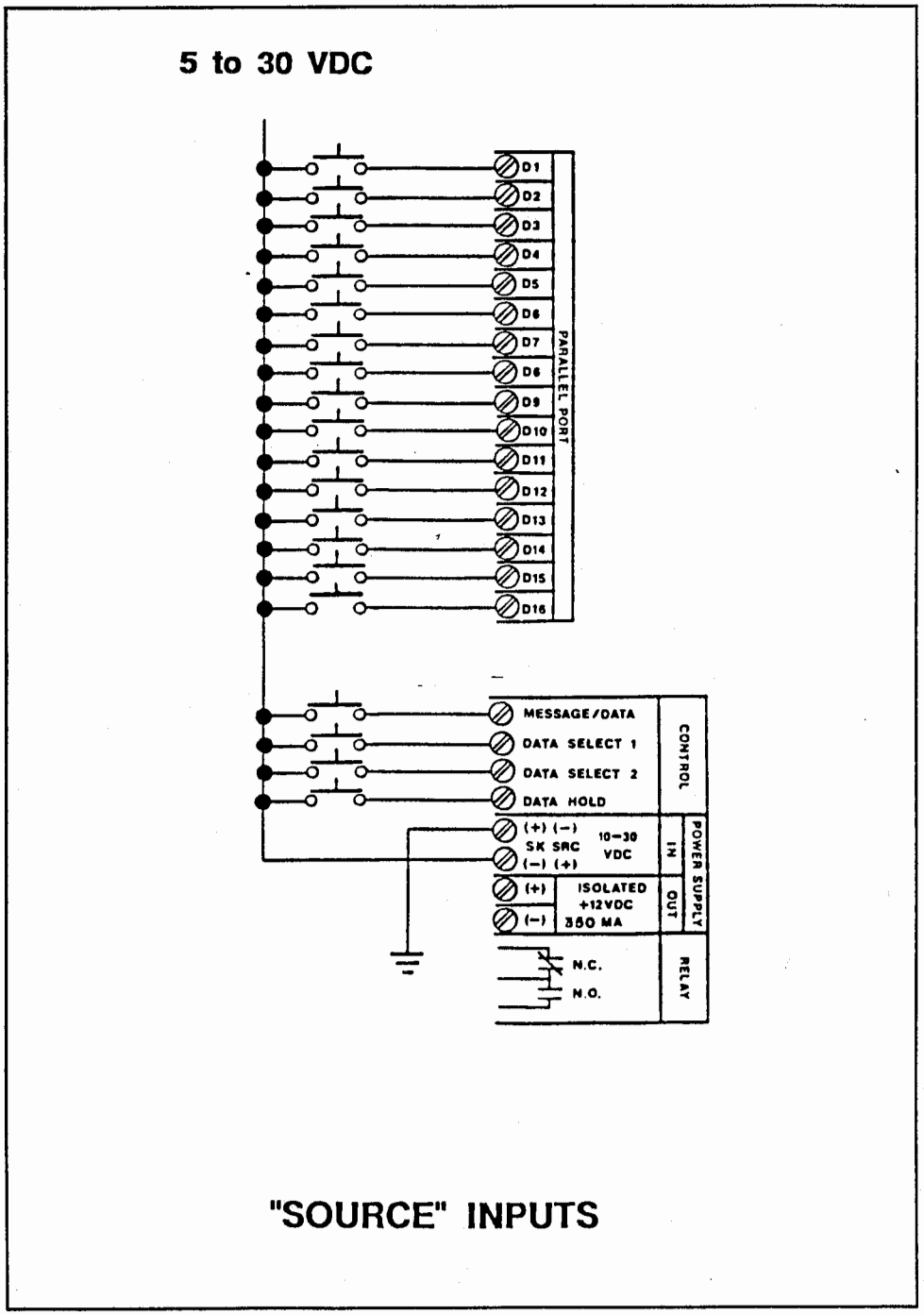


Figure F-1. "Source" Input Interfacing.

F.2 - "SINK" INPUTS

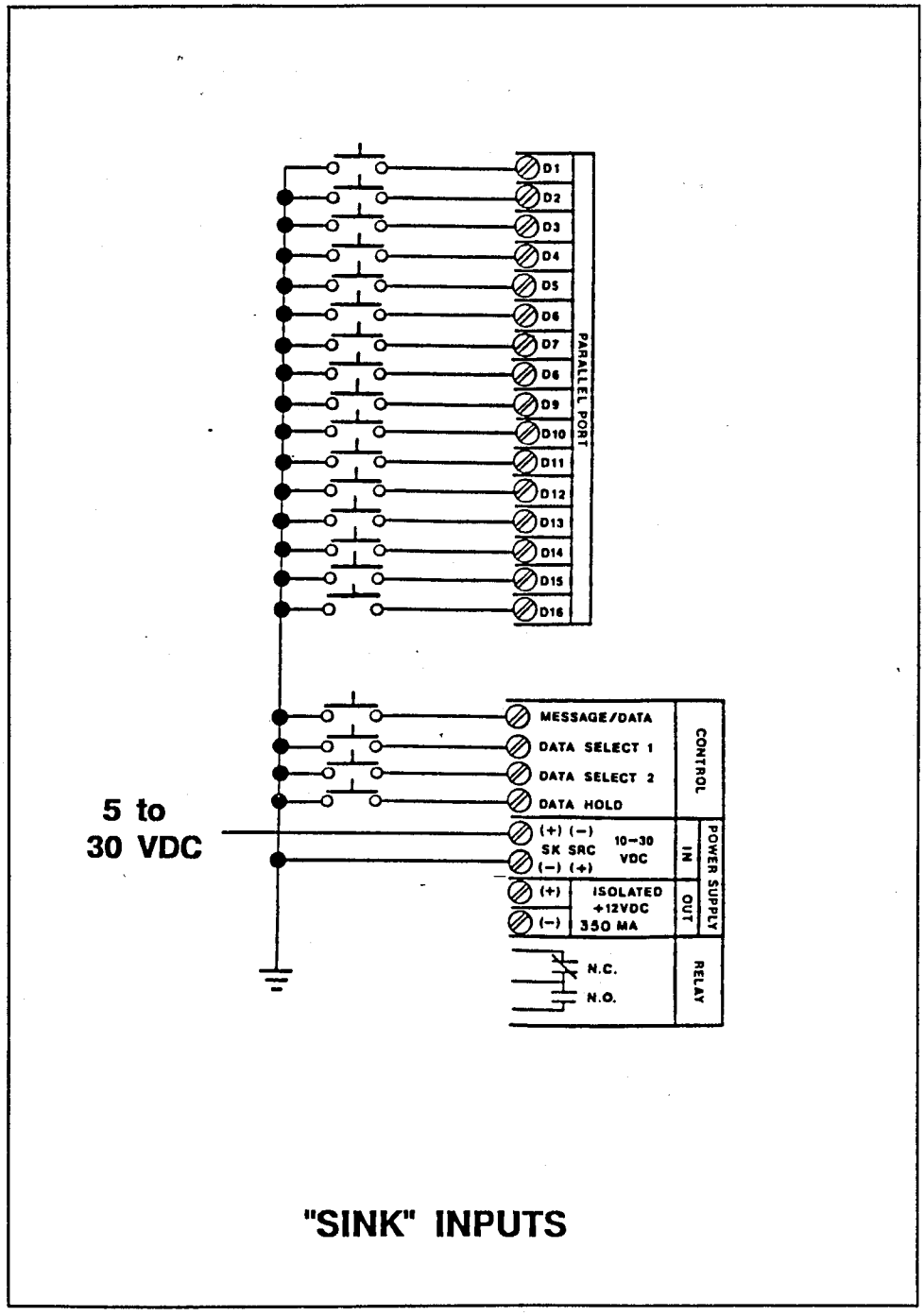


Figure F-2. "Sink" Input Interfacing.

APPENDIX G - CHECKSUM TYPES

The PMD 200 supports two different communications error detection code types in Computer Interface Mode. These are the EOR (Exclusive-OR) checksum and a CRC (Cyclic Redundancy Check) code.

G.1 - EOR CHECKSUM

The EOR checksum of a message for the PMD 200 computer interface applications is derived as follows:

The length byte is XORed with the unit number bytes. The result is XORed with the message code byte. The new result is XORed with the first data byte, etc. until the EOR of the last data byte is taken. The result of this EOR operation is the first byte of the two-byte EOR checksum. The one's compliment of the first byte becomes the second byte of the checksum. If, for instance, the first byte happens to be 06 HEX, then the two-byte EOR checksum would be 06F9 HEX.

G.2 - CRC CHECKSUM

The PMD 200 uses the CCITT error checking polynomial:

$$X^{16} + X^{12} + X^{5} + 1$$

for CRC error checking.

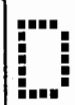
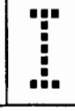
APPENDIX H - PROGRAMMING MESSAGES USING NON-U.S. CHARACTER SETS

To program messages in a non-U.S. character set, refer to the charts on the following pages. Enter the ASCII character or code equivalent to the non-U.S. character desired. Blank areas on the chart indicate no change from the American set. If no character is shown for the character set in use, the American character is displayed.

For example, when using the English character set, enter the "#" character (Program Mode) or HEX 23 (Computer Interface Mode) to program and display the "£" character.

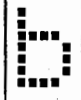
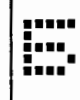
NOTE The programming terminal or computer always shows only the American character set. To check your messages, use the View Command of the Program Mode.

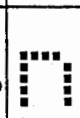
Table H-1 on the following pages shows ASCII charts for the international character sets.

	AMERICA	CYRILLIC	GERMANY	ENGLAND	DENMARK	SWEDEN	FRANCE
# 35							
$ 36							
@ 64							
A 65							
B 66							
C 67							
D 68							
E 69							
F 70							
G 71							
H 72							
I 73							

	AMERICA	CYRILLIC	GERMANY	ENGLAND	DENMARK	SWEDEN	FRANCE
J 74							
K 75							
L 76							
M 77							
N 78							
O 79							
P 80							
Q 81							
R 82							
S 83							
T 84							
U 85							

	AMERICA	CYRILLIC	GERMANY	ENGLAND	DENMARK	SWEDEN	FRANCE
V 86							
W 87							
X 88							
Y 89							
Z 90							
[91							
\ 92							
] 93							
^ 94							
— 95							
` 96							
a 97							

	AMERICA	CYRILLIC	GERMANY	ENGLAND	DENMARK	SWEDEN	FRANCE
b 98							
c 99							
d 100							
e 101							
f 102							
g 103							
h 104							
i 105							
j 106							
k 107							
l 108							
m 109							

	AMERICA	CYRILLIC	GERMANY	ENGLAND	DENMARK	SWEDEN	FRANCE
n 110							
o 111							
p 112							
q 113							
r 114							
s 115							
t 116							
u 117							
v 118							
w 119							
x 120							
y 121							

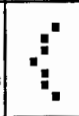
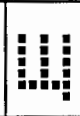
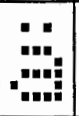
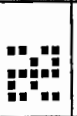
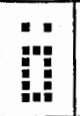
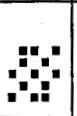
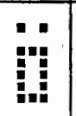
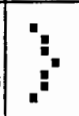
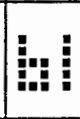
	AMERICA	CYRILLIC	GERMANY	ENGLAND	DENMARK	SWEDEN	FRANCE
z 122							
{ 123							
| 124							
} 125							
~ 126							

Table H-2. ASCII Chart for International Character Sets.

PMD 200 Message Display
User's Manual

WARNING

In the application of UTICOR Technology, LP programmable control devices, you should consider them components. Therefore, provisions other than the programmable control device must be taken to protect personnel in the event of a programmable control device malfunction. Programmable control devices should not be used as stand-alone protection in any application. Unless proper safeguards are used, unwanted start-ups could result in equipment damage or personal injury. If programmable controllers are used with operator interface and like devices, this hazard should be of primary importance. The operator should be made aware of this hazard and appropriate precautions should be taken.

In addition, consideration should be given to the use of an emergency stop function that is independent of the programmable controller.

The diagrams and examples in this user's manual are included for illustrative purposes only. UTICOR Technology, LP cannot assume responsibility or liability for actual use based on the diagrams and examples.

IMPORTANT: Static messages that remain on the display for an extended period of time may cause uneven illumination of the display's dot matrix grid. This is caused by the inherent properties of all vacuum fluorescent display technology. To avoid uneven character display, use the DISPLAY SAVER TIME-OUT feature described in the manual. Do not leave the same message on the display for indefinite periods of time.

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CAUTION!

In the application of UTICOR Technology, Inc. programmable control devices, they should be considered a component. Therefore, provisions, other than the presence of the programmable control device, must be taken to protect personnel if the programmable control device hardware or software should malfunction. Programmable control devices should not be used as stand alone safety protection on any application.

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