PMD 200
**Programmable Message Display
User Manual**

PMD 200 Programmable Message Display

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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PMD 200

GENERAL SPECIFICATIONS

POWER REQUIREMENTS:

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 C to +60 C Ambient

STORAGE TEMPERATURE: -40 C 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 NUMBERS:

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

7653<u>X</u>SS-<u>X</u>, 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 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
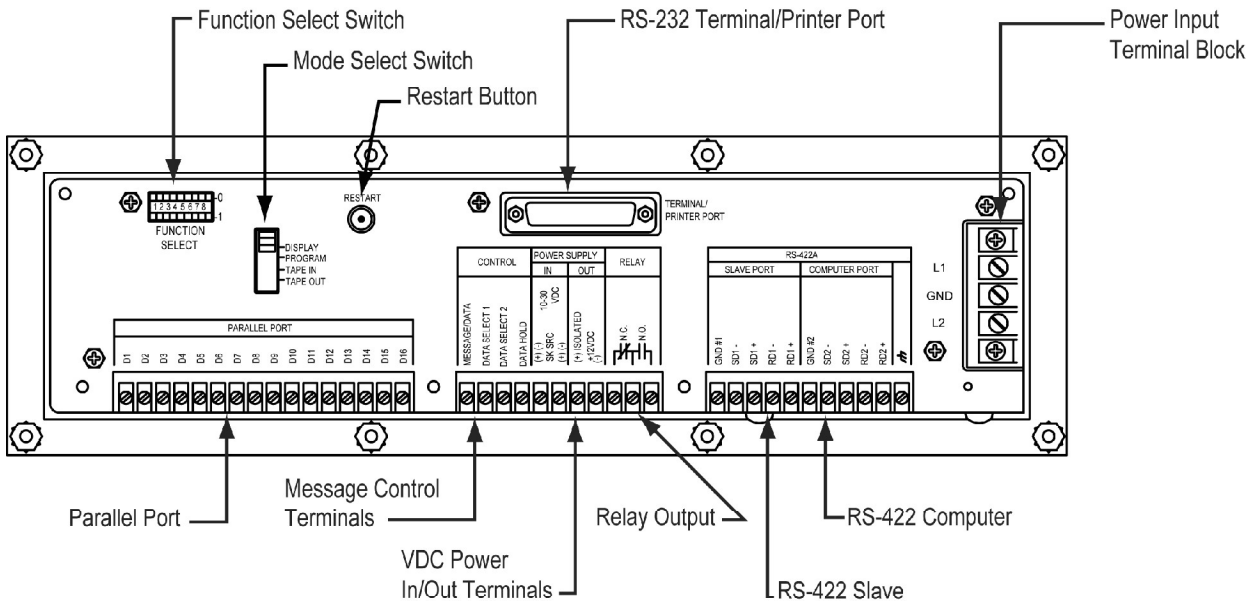3-POSITION POWER INPUT TERMINAL BLOCK

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

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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	7 = OFF

 - Active Only When In Tape Modes

ODD PARITY, TWO STOP BITS, 7 DATA BITS - (PROGRAM MODE) 8 = ON
NO PARITY, ONE STOP BIT, 8 DATA BITS - (PROGRAM MODE)   8 = OFF
Valid only with External Baud Rates

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
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.
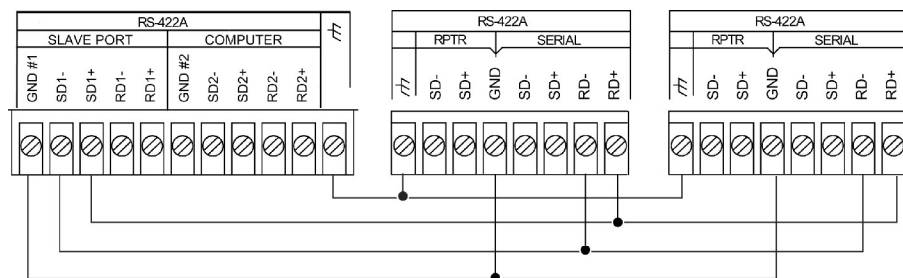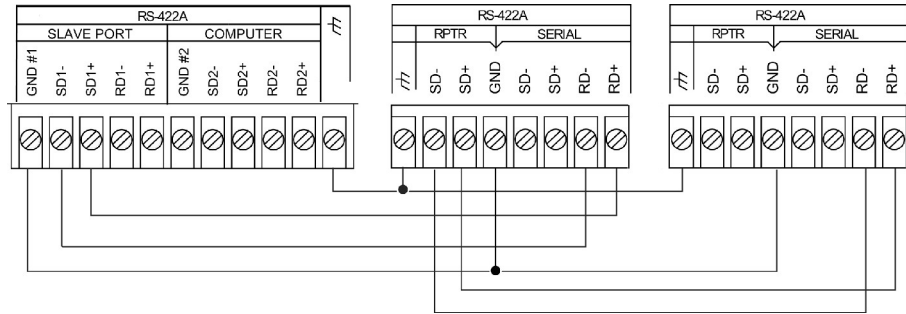

Figure 2-2.   (continued next page)

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.
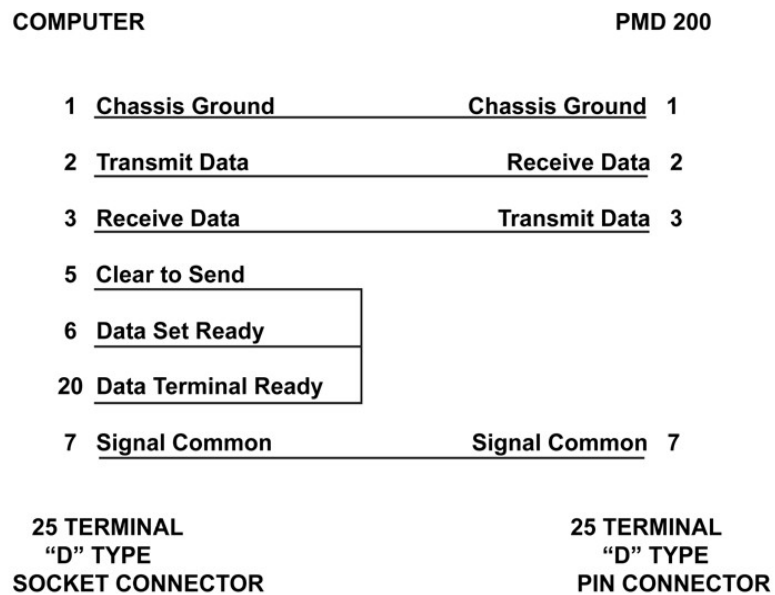

Figure 2-3.   Minimum Connections for the * IBM Computer.

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 $\underline{X}$

Revision $\underline{X}$ 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.

PMD 200 MANUAL   3-1

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 PARAMETERS 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.

3-2   PMD 200 MANUAL

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.

PMD 200 MANUAL   3-3

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:

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

PMD 200 MANUAL   **3-5**

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.

3-6   PMD 200 MANUAL

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:

PMD 200 MANUAL   3-7

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.

3-8   PMD 200 MANUAL

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.

PMD 200 MANUAL   3-9

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

Error Messages E.1 - Message <u>XXXX</u> 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.