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PMD 180

user's manual

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PMD 180 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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1 Introduction

Congratulations on your decision to enhance your intra-plant communications by incorporating a UTICOR PMD into your system. With the help of this manual, you will soon be able to start using the versatile features of the PMD. The 'Getting Started' and 'Features and Controls' sections in this manual explain how to operate your unit. The additional sections provide more detailed information on the PMD's attributes and include a glossary and index for your quick reference. Of course, if you still encounter difficulty, call AVG UTICOR technical support at 1-800-TEC-ENGR.

OVERVIEW

The PMD 180 is a compact message display that can be interfaced to a name brand PLC through the PLC's program loader port. With the PMD 180, you will also receive programming software that you install on an IBM (or compatible) computer. Use the software to program messages online or offline, set up the computer's communication parameters, and load the PLC driver information into the PMD.

Depending on what options you order, the PMD can have 8K, 32K, 64K, or 128K of EEPROM or 32K or 128K of RAM. Also available as an option, is an extra board that adds a parallel, slave, and printer port to the unit.

Computer interface is available through RS-232C, RS-422A, or RS-485A with either UTICOR or ASCII protocol. The PLC interface can accommodate RS-232C, RS-422A, or current loop communications. RS-485A can only be used on the PLC port when the option board is present.

The PMD 180 is also available in a message controller model. The message controller has all the same features as the PMD 180 except the actual display. A UTICOR slave message display must be used with the message controller. The option board that includes the slave port is standard on the message controller model.

The PMD 180 has a 16-message circular queue. The message queue can be enabled or disabled and can be advanced manually or automatically. Messages can be assigned a priority when they are triggered by the PLC — only the messages in the queue with the highest priority will be displayed. (The higher the priority number assigned when the message is sent, the higher its priority.)

— continued

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1 Introduction

Hundreds of messages can be stored in the PMD 180 and selected by the PLC for displaying alarms, machine condition and operator prompting.

The PMD 180 is programmed with UTICOR supplied menu-driven software for IBM compatible computers. The software allows messages to be directly entered into the PMD 180 with RAM memory or be developed offline and downloaded as a complete message file. The software is completely menu driven with HELP information acquired by pressing the F1 key. Even if you're a "first time user" you'll have message programs up and running in no time.

PLC interface drivers are stored in the UTICOR programming software. You may select the desired PLC driver and download it to the PMD 180 to be stored in RAM or in EEPROM.

FRONT PANEL FEATURES

The front panel of the PMD 180 message display (figure 1-1) features several visual indicators and means for the operator to manually move through the message queue. The different features are lettered in the drawing below and correspond to the following lettered paragraphs describing these features.

Note: *Features A and B are located on the left side of the front panel on the models that have four lines of twenty characters.*

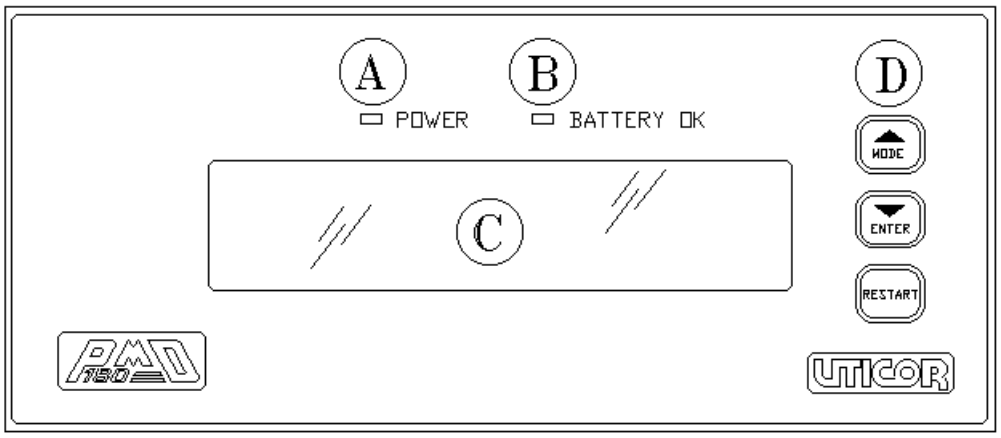


Figure 1-1

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A. The power indicating LED will be lit when the logic powers at a level acceptable for the internal circuitry to operate.

B. The battery OK indicator will be illuminated when the unit is on as long as the battery is at a reasonable voltage level to retain correct time, date, and user RAM data if power to the unit is lost.

C. The display is used to show the operator either messages programmed in the PMD or messages sent through the computer interface.

D. The mode and enter button are used to select the PMD's mode of operation. They are also used to manually advance messages in the message queue.

BACK PANEL FEATURES

All connections to the PMD message display are made on the back panel (see figure 1-2). There are also switches that can be set on the back of the unit. These different connectors and switches are lettered in the drawing below and described in the following paragraphs.

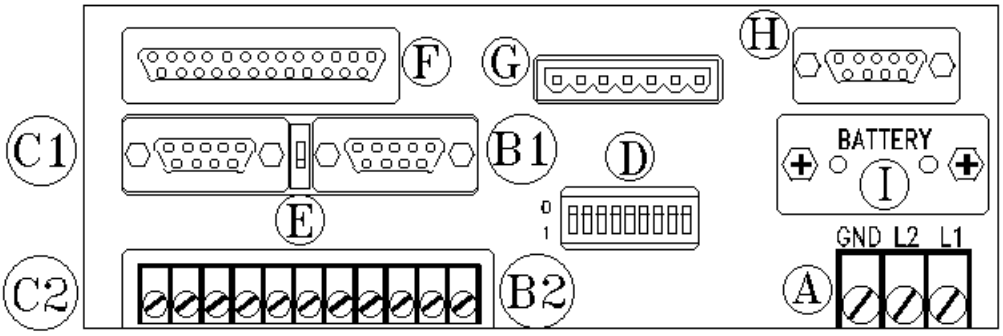


Figure 1-2

A. Use the power input terminals to connect the AC or DC voltage powering the unit. AC units are configured for 115 VAC from the factory but can be configured for 230 VAC. DC units operate at a nominal 24 VDC.

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1 Introduction

B1. A computer can be interfaced to the unit to program or control it through this 9-pin 'D'-type connector using RS-232C communications.

B2. The terminal blocks on the right side of this cluster are used for computer interface using either RS-422A or RS-485A standards. Only one communication standard can be used at a time.

C1. A PLC can be interfaced through the 9-pin 'D'-type connector when using RS-232 or current loop communications. Only one standard can be used at a time.

C2. The terminal blocks on the left side of this cluster are used for PLC interface using either RS-422A or RS-485A standards. Only one standard can be used at a time and the option board with the parallel, printer, and slave ports must be present to use RS-485.

D. The array of dip switches is used to set the computer port and PLC port terminal strips for RS-422 or RS-485 communications and to enable/disable the front panel mode buttons.

E. This switch is used to enable and disable the current loop interface.

F. The parallel port can be used to trigger messages and enter data set values through a discrete output module of the PLC.

G. The slave port sends data to any of UTICOR's slave message displays.

H. The printer port sends user message information to a serial printer via an RS-232C cable.

I. The battery can be changed by removing this panel.

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1 Introduction

CONNECTIONS

All connections to the PMD 180 message controller are made on the front of the unit (figure 1-3). The different connections and switches are shown in the drawing below and descriptions follow.

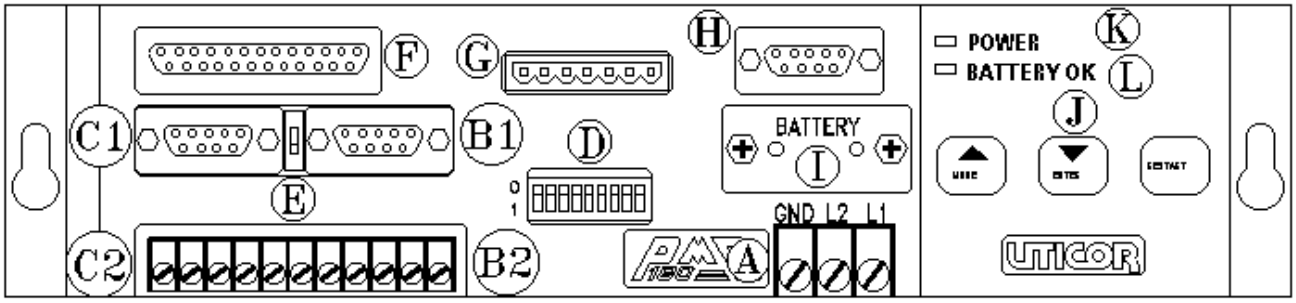


Figure 1-3

A. Use the power input terminals to connect the AC or DC voltage powering the unit. AC units are configured for 115 VAC from the factory but can be configured for 230 VAC. DC units operate at a nominal 24 VDC.

B1. A computer can be interfaced to the unit to program or control it through this 9-pin 'D'-type connector using RS-232C communications.

B2. The terminal blocks on the right side of this cluster are used for computer interface using either RS-422A or RS-485A standards. Only one communication standard can be used at a time.

C1. A PLC can be interfaced through the 9-pin 'D'-type connector when using RS-232 or current loop communications. Only one standard can be used at a time.

C2. The terminal blocks on the left side of this cluster are used for PLC interface using either RS-422A or RS-485A standards. Only one standard can be used at a time and the option board with the parallel, printer, and slave ports must be present to use RS-485.

D. The array of dip switches is used to set the computer port and PLC port terminal strips for RS-422 or RS-485 communications and to enable/disable the front panel mode buttons.

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1 Introduction

E. This switch is used to enable and disable the current loop interface.

F. The parallel port can be used to trigger messages and enter data set values through a discrete output module of the PLC.

G. Use the slave port to send data to any UTICOR slave message display.

H. The printer port is used to send user message information to a Serial printer via an RS-232C cable.

I. The battery can be changed by removing this panel.

J. The mode and enter buttons are used to select the PMD's mode of operation. They are also used to manually advance messages in the message queue.

K. The power indicating LED will be lit when the logic power is at a level acceptable for the internal circuitry to operate.

L. The battery OK indicator will be illuminated when the unit is on as long as the battery is at a reasonable voltage level to retain correct time, date, and user RAM data if power to the unit is lost.

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Figure 1-4, below, shows a block diagram of the PMD 180.

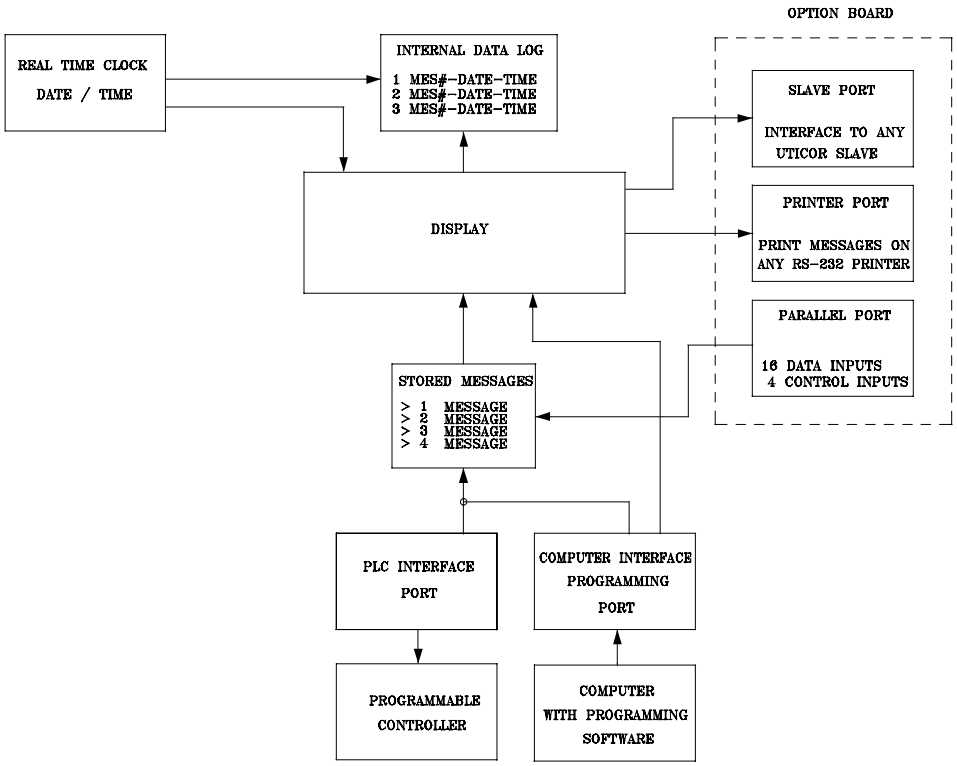


Figure 1-4

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1 Introduction

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2 Getting Started

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
640K RAM
One serial port (COM1, COM2, COM3, or COM4)
DOS 2.1 or later

CONFIG.SYS file in the computer's root directory should have the following two statements: FILES=20; BUFFERS=20

SOFTWARE

UTICOR programming software (Part Number 10F54)

INTERCONNECT CABLE

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

An interconnect cable is required for proper communication. This cable will connect to the COM1, COM2, COM3, or COM4 port of the computer and the programming port of the PMD. The drawing shown is for RS-232C communications. However, RS-422A and RS-485A connections are also available.

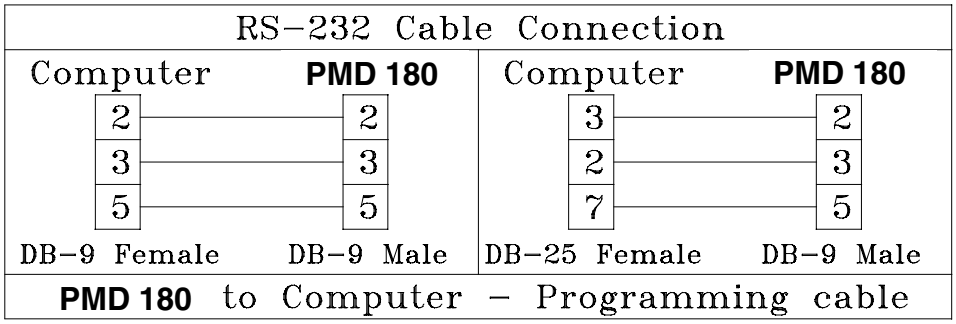


Figure 2-1

USING 10F54 SOFTWARE

Boot the IBM/Compatible using MS/PC DOS. Insert the UTICOR 10F54 disk into an available drive. (In this example we will use drive A:>.)

Select the hard drive where the 10F54 disk is to be installed. (In this example, we will use the C drive.)

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2 Getting Started

At the C:> prompt, type **A:\INSTALL** followed by the **ENTER** key. The 'install' program will prompt you through the process.

After the program is installed, bring up the subdirectory where the program is stored and enter **PMD180** followed by the **ENTER** key for a color monitor. If using a monochrome monitor, type **PMD180-MON** followed by the **ENTER** key. If using an LCD monitor, type **PMD180 - LCD** followed by the **ENTER** key.

Now that you have entered the program, use the Communications Setup selection to make sure that the communications parameters of the PMD match those of the computer. The default parameters of the PMD are as follows:

Group Number = 1
Unit Number = 1
Baud Rate = 9600
Parity = None
Data Bits = 8
Stop Bits = 1
Requires CTS = No
Requires RTS = No
Checksum = CRC

The default parameters of the computer set up by the programming software are:

Group Number = 1
Unit Number = 1
Communication port = COM1
Baud Rate = 9600
Parity = None
Data Bits = 8
Stop Bits = 1
Requires CTS = No
Requires RTS = No
Checksum = CRC

You should now be able to communicate with the PMD.

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2 Getting Started

Use the Mode and Enter buttons on the front of the PMD to set up the computer interface port parameters. The Mode key is used to toggle through the options and the Enter key is used to select the option displayed on the screen. Use the Mode key to proceed after the port is set up. Make sure that both ports match. Save port settings and return to the main menu. Select the Online Network option of 10F54 and press S to check the Status ID of the PMD. If communication has been established, you will see the current status of the unit. If there is no communication, there will be a communication error message. If communications have not been established, then check your cable connections, proper COM port on the computer, and verify the baud rate setting of 10F54 matches that of the PMD.

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2 Getting Started

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3 Display Front Panel Features and Controls

The front panel of the PMD 180 is available in both NEMA 12 and NEMA 4X. It features a vacuum fluorescent display, battery and logic power status indicators, and mode select keys.

V. F. DISPLAY

The PMD 180 comes with a multi-character vacuum fluorescent display. Its characters are composed in a 5 x 7 matrix. An inherent characteristic of vacuum fluorescent displays is that they tend to show uneven illumination if the same message is left on them for a long period of time. UTICOR has devised two ways in which to battle this problem. One is the 'Display Saver Timeout' feature. When enabled, the display will go blank if a message is left on the display longer than the preset amount of time determined by the user. When another message is triggered on the display, the new message will be displayed. The other way UTICOR fights this problem is the 'Display Test' found under 'Test Functions' with the 'Mode Select' keys. By running this test for an extended period of time, some of the evenness will return to the display.

BATTERY OK LED

The 'Battery OK' LED is used to indicate to the operator whether or not the battery is at a voltage level which could sustain the clock and the user RAM in the event that supply power is lost. The LED is only lit when the unit is powered and the battery is good. When the unit is programmed, a message can be dedicated as the 'low battery' message.

POWER LED

The 'Power' LED is used to indicate to the operator that logic power is at a valid level for proper operation of the unit.

MODE BUTTONS

There are three Mode keys on the front of the unit (Mode, Enter, and Restart). These keys are used to select the Setup modes for the PMD 180. Use the Mode key to advance through the different Setup modes. When you have reached the Setup mode you need, use the Enter key to select it. Likewise, use the Mode key to advance through the different options offered for each step of the setup and the Enter key to select the option you want when it is shown on the unit's display. After pressing restart and the unit times out, the Mode and Enter keys are used to scroll through the message queue.

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3 Display Front Panel Features and Controls

Below are listed the different Setup Modes and the options within each of them.

Display Mode

Computer Interface/Program Port

Baud rate: 300, 600, 1200, 2400, 4800, or 9600*
Parity: Off*, Odd, or Even
Stop Bits: 1* or 2
RS-485: No* or Yes
Protocol: PMD* or ASCII
Checksum: CRC*, EOR, or None
Group: 01*, Unit: 0001*

* *Default Values*

PLC Port Baud rate: 300, 600, 1200, 2400, 4800, 9600, or 19200
Parity: Off, Odd, or Even
Stop Bits: 1 or 2
Data Bits: 7 or 8

Set Clock Mode: AM, PM, or 24 (Factory setting is AM/PM mode)
Time: HH:MM:SS
Date: DD-MMM-YY

Data Logging

Test Functions Setup Mode
Computer Interface Diagnostics
Display Test
Operator Interface
Parallel Port Test

Demonstration Mode

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3 Display Front Panel Features and Controls

DISPLAY MODE

The display mode is the operating mode of the PMD 180. Both programming and general operation are performed while in this mode.

COMPUTER INTERFACE

The computer interface mode allows you to set up the PMD's computer port to match the communication parameters of the host computer. The 10F54 programming software operates with both PMD and ASCII protocol.

PLC PORT

The PLC port mode lets you set up the PMD's PLC port to match the port parameters of the PLC being monitored.

SET CLOCK

The 'Set Clock' option allows you to set the clock to the current time and date. The clock information can be used in messages or stamped on the data log.

DATA LOGGING

The Data Logging option allows the user to display or print (if option board is present) the contents of the data log if it is not empty. In the "Display" option, the MODE button moves to the next entry and the ENTER button displays the message text one screen at a time.

TEST FUNCTIONS

Test Functions provide a test of the integrity of the connections that have been made to the PMD 180, and test the display. The Setup Mode option takes you out of Test Functions. Computer Interface Diagnostics will display the different bytes received from the computer in hexadecimal. The Display Test option lets you check the operation of the display. This test also can be used to rejuvenate the evenness of intensity on the display. The Operator Interface option is not present on the PMD 180. The Parallel Port test will give you a hexadecimal representation of the data and control bits.

DEMONSTRATION MODE

The 'Demonstration Mode' is an illustration tool. When this option is selected, message #1 will be displayed.

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3 Display Front Panel Features and Controls

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4 Back Panel Features and Controls

The back panel of the PMD 180 is used to make all the interfacing connections to the PLC and other devices being used to control the unit. In this section the different back panel features will be discussed.

POWER INPUT

The power input connectors (figure 4-1) are used to apply the proper voltage potential to the unit. AC units can operate at either a nominal 115 VAC or 230 VAC. DC units operate at a nominal 24 VDC. The specific operating voltage range is shown in Section 10, General Specifications, of this manual.

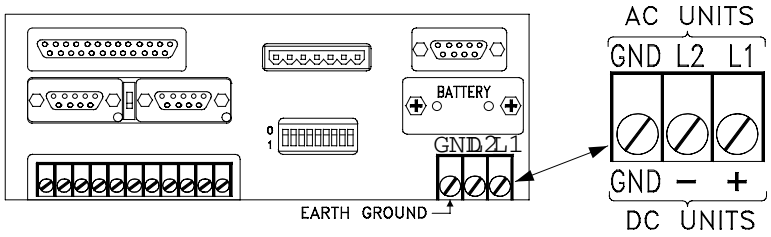


Figure 4-1

COMPUTER INTERFACE

There are two computer interface connectors. One is a 9-pin 'D'-type connector. This connector is used solely for RS-232C communications. There are also screw-clamp terminals for computer interface. These terminals are used for either RS-422A or RS-485A communications. ***Remember —*** that only one type of communication parameter can be used at any one time.

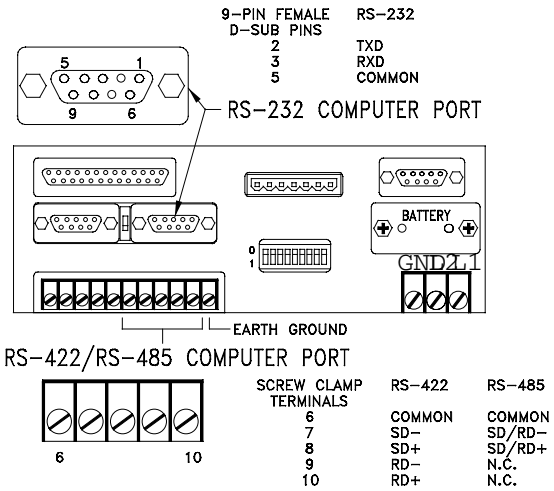


Figure 4-2

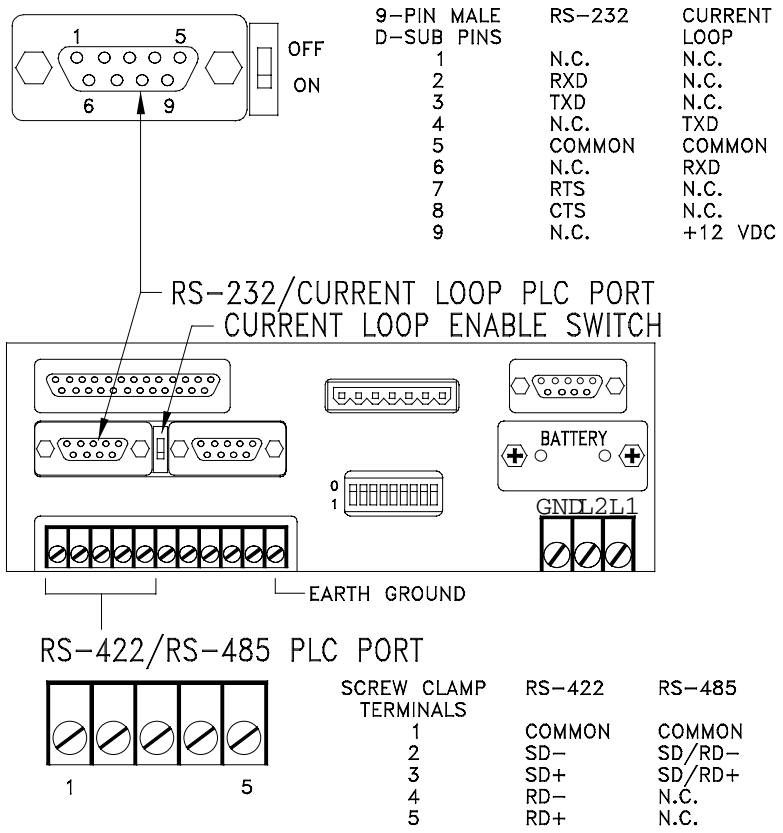
This port is to be used when programming, uploading, and downloading messages. An IBM or compatible, using 10F54 software, can be connected to the 9-pin D-sub (RS-232C) or to the computer interface terminal strip (RS-422A/RS-485).

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4 Back Panel Features and Controls

PLC INTERFACE

Reference figure 4-3. There are two PLC interface connectors. One is a 9-pin 'D'-type connector. This connector is used for either RS-232C or current loop communications. The other group consists of screw-clamp terminals. These terminals are used for either RS-422A or RS-485A communications. To use RS-485 communications to the PLC, the option board must be present. Remember that only one type of communication parameter can be used at any one time.



NOTE: TO ENABLE THE CURRENT LOOP FUNCTION, PUT THE SWITCH IN THE OFF POSITION

Figure 4-3

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SWITCHES

There is a single switch located between the 9-pin 'D' connectors for PLC and computer interface. (See figure 4-4.) This switch is used to enable and disable the 'current loop' interface mode of the PLC port.The second switch package consists of nine switches. This array of switches is used to set the PLC and computer interface terminal blocks for either RS-422A or RS-485A communication. When RS-485A is not being used, the switches ***must*** be set for RS-422A. The position 9 switch is used along with an internal jumper to enable/disable the Mode, Enter, and Restart buttons on the front of the unit.

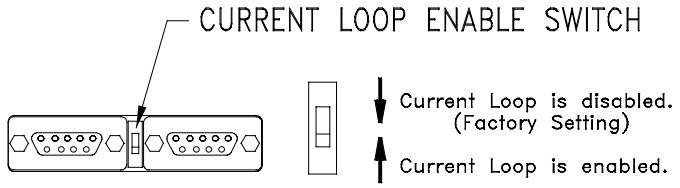
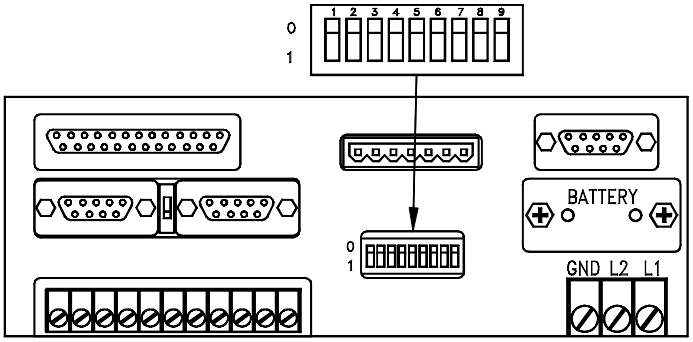


Figure 4-4



SWITCH POSITION	FUNCTION
SW1–1	Connects Comp. SD+ to Comp. RD+ (0 = connected RS–485 mode)
SW1–2	Connects Comp. SD– to Comp. RD– (0 = connected RS–485 mode)
SW1–3	PLC Port 150 ohm termination (0 = connected)
SW1–4	Computer Port 150 ohm termination (0 = connected)
SW1–5	Connects PLC SD+ to PLC RD+ (0 = connected RS–485 mode)
SW1–6	Connects PLC SD– to PLC RD– (0 = connected RS–485 mode)
SW1–7	Selects whether PLC driver is store in RAM or EEPROM memory*
SW1–8	Spare
SW1–9	Restart, Mode, and Enter key enable (0 = enabled)

Switch 1–	1	2	3	4	5	6	7	8	9
Set computer port for RS–422	1	1	–	1	–	–	–	–	–
Set computer port for RS–485	0	0	–	1	–	–	–	–	–
Set computer port for 150 ohm termination	0	0	–	0	–	–	–	–	–
Set PLC port for RS–422	–	–	1	–	1	1	–	–	–
Set PLC port for RS–485	–	–	0	–	0	0	–	–	–
Disable Mode, Enter, and Restart	–	–	–	–	–	–	–	–	1

Figure 4-5

The second switch package consists of nine switches. (See figure 4-5.) This array of switches is used to set the PLC and computer interface terminal blocks for either RS-422A or RS-485A communication. When RS-485A is not being used, the switches ***must*** be set for RS-422A. The position 7 switch allows you to store the PLC driver code in the EEPROM (see following page for specific instructions.) The position 9 switch is used along with an internal jumper to enable/disable the Mode, Enter, and Restart buttons on the front of the unit.

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4 Back Panel Features and Controls

SW1-7 Storing the PLC Driver in EEPROM

You must have Revision I of the PMD180 exec software (P/N 10C86) installed for this option. The PMD180 exec software is installed at the factory. All PMD 180s that are currently shipping have this revision of the exec. If you are using this manual to configure an older PMD180, it may not have revision I installed. (This exec revision number will be displayed briefly upon initial power-up of the PMD. Call technical support, if you're unsure or cannot find the exec revision number.)

Previous versions of PMD 180 exec software stored the PLC driver in the battery-backed RAM. If the battery failed, the driver was lost. The new software, revision I, allows you to store the PLC driver code in the EEPROM, thus retaining the code even if the battery fails. External DIP switch SW1-7, if set to position 0, indicates that the driver will automatically be saved to EEPROM when it is uploaded. Setting it to position 1 indicates the driver is only stored in RAM. Using this feature (save to EEPROM) requires a minimum of 32K of EEPROM memory. Only units with 32K, 64K or 128K of EEPROM can use this feature.

If the driver is stored in the EEPROM, it will be loaded from the EEPROM to RAM upon power-up. If a corrupted data log is detected during this process, the data log will be initialized.

CAUTION

DO NOT change SW1-7 while the unit is on. This will corrupt user memory and the driver. If SW1-7 is changed, YOU MUST repeat steps 1 though 5, below. Using this feature WILL result in a LOSS of 16K of user memory.

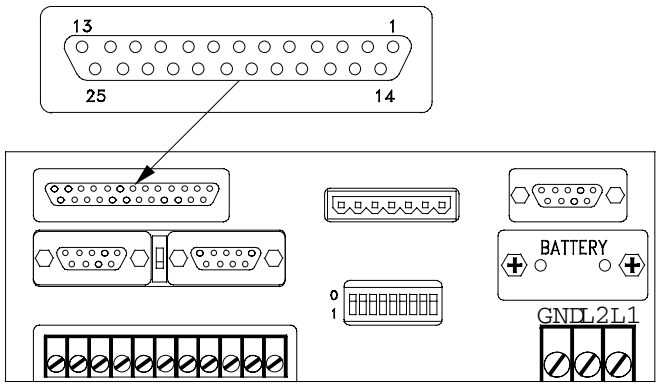
To enable/disable this feature, perform the following steps:

1. Turn PMD off.
2. Set SW1-7 to 0 to store the driver in EEPROM, or 1 to store in RAM.
3. Turn unit on.
4. Upload user file.
5. Upload PLC driver (if the random driver is uploaded with the user file, this step can be skipped.)

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PARALLEL PORT

Included on the option board is a parallel port connector (figure 4-6). This is a 25-pin 'D'-type connector. This port has 16 data bits and 4 control bits. Use discrete outputs from the PLC to trigger messages and display data set values. The 4 control bits can also be used to assign priority to a message.



Female D–Sub Pin Number	Description	Binary Value	BCD Value
1	Common	N/A	N/A
2	Message / $\overline{\text{Data}}$ (Data 17)	N/A	N/A
3	Data Select 1 (Data 18)	N/A	N/A
4	Data Select 2 (Data 19)	N/A	N/A
5	$\overline{\text{Data Hold}}$ (Data 20)	N/A	N/A
6	Data 1	1	1
7	Data 2	2	2
8	Data 3	4	4
9	Data 4	8	8
10	Data 5	16	10
11	Data 6	32	20
12	Data 7	64	40
13	Data 8	128	80
14	Common	N/A	N/A
15	N.C.	N/A	N/A
16	N.C.	N/A	N/A
17	N.C.	N/A	N/A
18	Data 9	256	100
19	Data 10	512	200
20	Data 11	1024	400
21	Data 12	2048	800
22	Data 13	4096	1000
23	Data 14	8192	2000
24	Data 15	16384	4000
25	Data 16	32768	8000

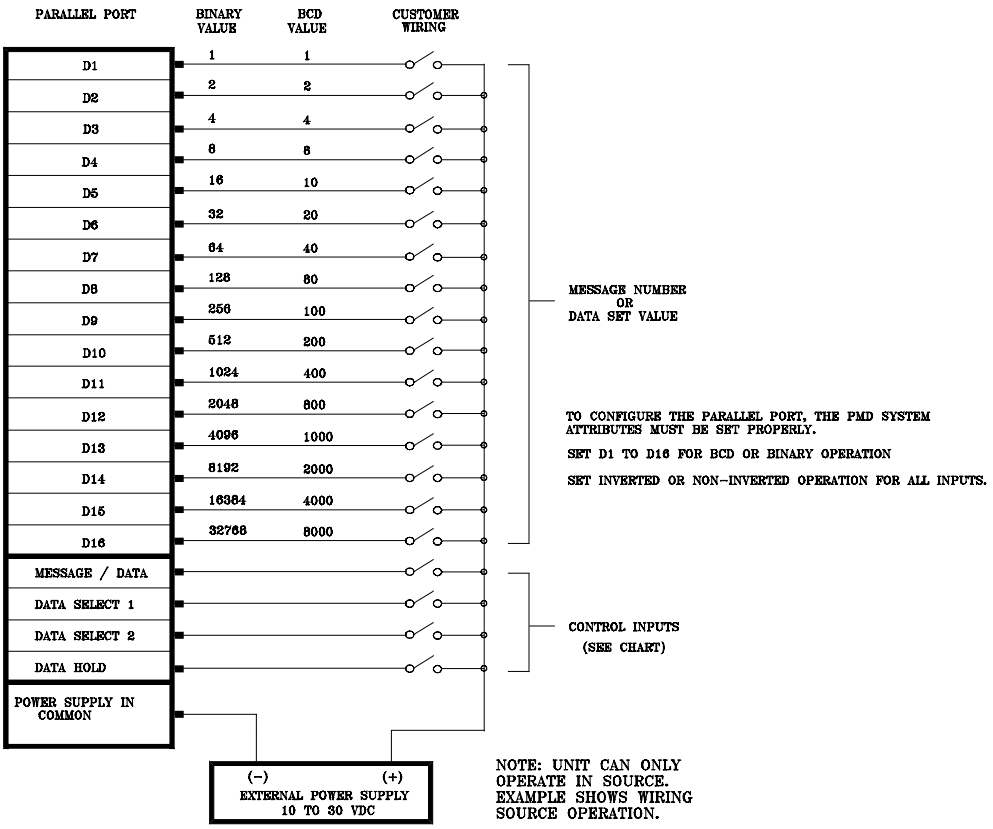
PARALLEL PORT OPERATES IN SOURCE MODE ONLY

Figure 4-6

This optional port lets messages and/or variable data be displayed. The connection is generally to an output module with a voltage range of 10–30 VDC. For more information on interfacing to the parallel port, see figure 4-7 on the next page.

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4 Back Panel Features and Controls



PARALLEL PORT CONTROL INPUTS	MESSAGE / DATA	DATA SELECT 1	DATA SELECT 2	DATA HOLD
SELECT 0 PRIORITY MESSAGE	ON	OFF	OFF	ON
SELECT 1 PRIORITY MESSAGE	ON	ON	OFF	ON
CLEAR MESSAGE FROM QUEUE	ON	OFF	ON	ON
CLEAR MESSAGE QUEUE	ON	ON	ON	ON
SELECT DATA SET 1	OFF	OFF	OFF	ON
SELECT DATA SET 2	OFF	ON	OFF	ON
SELECT DATA SET 3	OFF	OFF	ON	ON
SELECT DATA SET 4	OFF	ON	ON	ON
INHIBIT ANY SELECTION	N/A	N/A	N/A	OFF

NOTE:
OFF = SWITCH OPEN
ON = SWITCH CLOSED

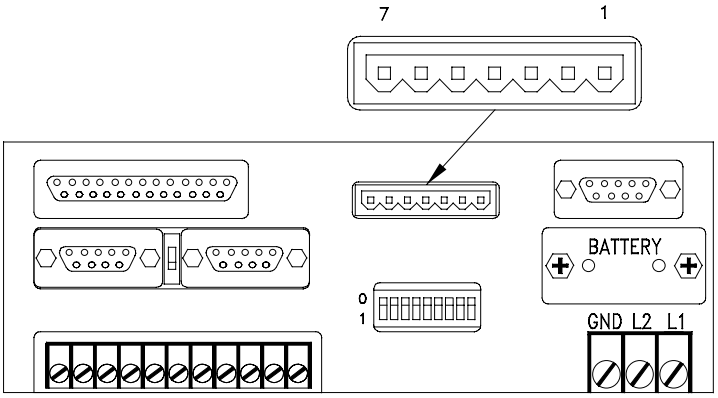
Figure 4-7

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SLAVE PORT

Note: *You cannot connect another PMD 180 to this port.*

Also included with the option board is a slave port (figure 4-8). This optional port allows remote displays to echo what the PMD 180 is displaying. Any of UTICOR's slave message displays can be controlled through this port.



SLAVE PORT TERMINAL	TERMINATION
1	RD+
2	RD–
3	SD+
4	SD–
5	COMMON
6	N.C.
7	EARTH GROUND

Figure 4-8

Below (figure 4-9) are some basic master/slave wiring configurations. The slave port operates at 9600 baud over an RS-422 link. Maximum cable length is 4000 feet (1220 meters). In a multi-drop configuration, up to nine slaves can be driven by one master without signal boost. The repeater ports on UTICOR's slave message displays provide signal boost. However, there is no provision for a signal boost on the reply.

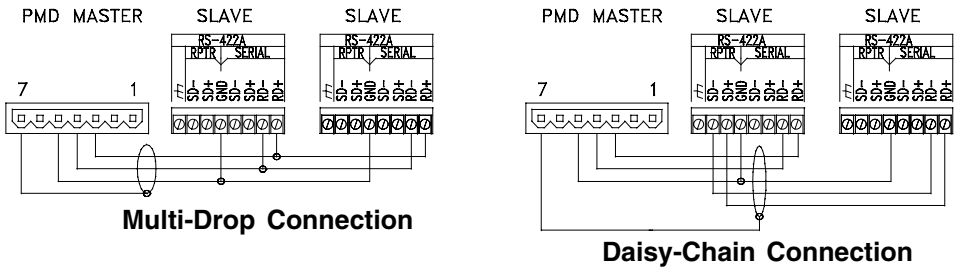


Figure 4-9

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4 Back Panel Features and Controls

Slave Port (Master/Slave Command Mode)

The master/slave command mode lets you use a master PMD 180 or PCI 185 as a slave to another master PMD 180 or PCI 185. The controlling unit is set up through the System Attributes menu while online or offline. Select the Slave Port Mode option. Normal mode lets you send messages to regular PMD slaves through the slave port. The Master CMD mode lets you send computer interface messages to other PMD 180s or PCI 185s out of the master's slave port. (See figure 4-10.)

The PMD 180s and PCI 185s receiving the computer interface commands can receive these commands either through their computer interface ports or their PLC interface ports. Use the PLC interface port if you need the computer interface port for other purposes. In order to use the PLC interface port, you must select the UTICOR Master Slave driver from the Upload PLC Code option in the PLC functions menu. Wiring to either port is made to the RS-422 portion of the respective port similar to that of a regular slave display in multi-drop fashion as shown on the previous page.

Here are the parameters for interfacing to the computer and PLC interface ports.

Computer interface		**PLC interface**	
Group #:	XX	Group # & Unit # is set through	
Unit #:	XXXX	computer interface setup using the front keypad	
Baud Rate:	9600	Baud Rate:	9600
Parity:	None	Parity:	None
Stop Bits:	1	Stop Bits:	1
Data Bits:8		Data Bits:	8
Checksum:	EOR		

Regardless of which port receives the computer interface message codes, regular PMD slave displays can be controlled through the slave ports of the master units configured as slaves.

To display a message on a master unit configured as a slave, a message must be called up on the controlling master and sent to that slave unit. The message that is called up must have the same message number as

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the message you would like to view on the slave. If there is variable data in the controlling unit's message, that data is used by all slave units on the network for their variable data sets.

Note: When a PCI 185 is used as a master slave unit, its function key data is not sent to the controlling PMD. Messages sent to a master slave unit have equal priority.

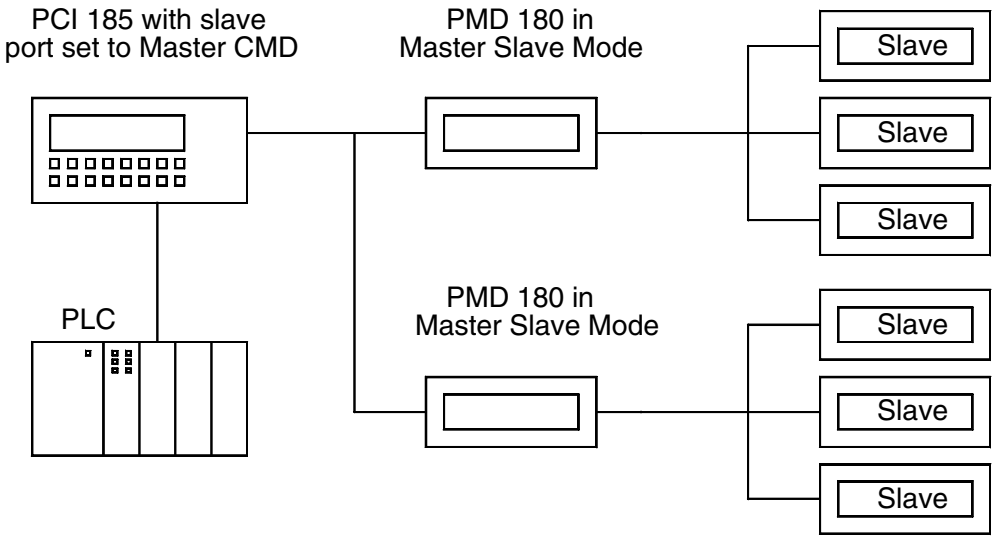


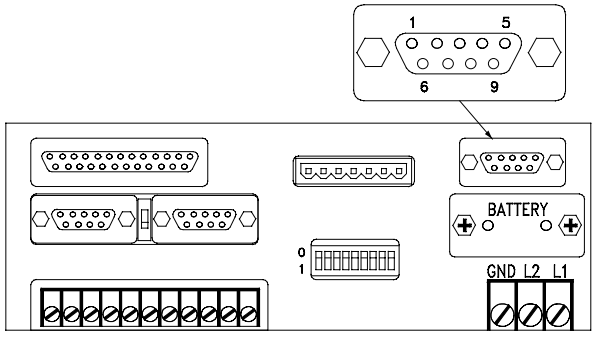
Figure 4-10

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4 Back Panel Features and Controls

PRINTER PORT

Also included on the option board is a serial printer port. This port allows you to have messages that are triggered on the PMD printed out on a serial printer. The serial ports pin assignments are provided below in figure 4-11.



Male D–SUB Pin Number	Description
1	N.C.
2	RXD
3	TXD
4	N.C.
5	COMMON
6	N.C.
7	RTS
8	CTS
9	N.C.
CASE	EARTH GROUND

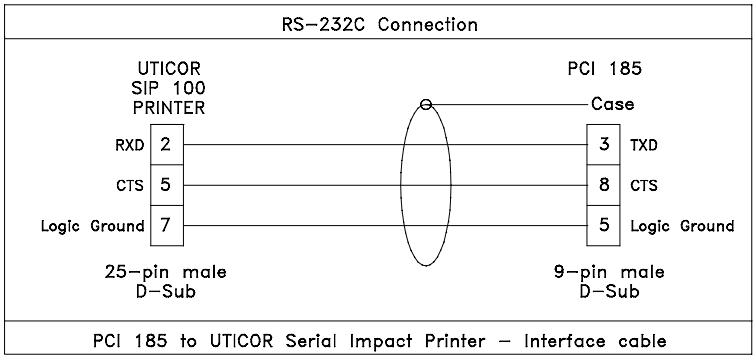


Figure 4-11

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5 Programming

PROGRAMMING THE PMD

You cannot run the 10F54 programming software from the floppy disk it was received on. It must be installed, through its install program, on a hard drive. When the DOS prompt is set to the drive and directory where the software is located, type in **P M D 1 8 0** and press **ENTER**. You will then see the main menu. Press F1 for context-sensitive HELP screens.

1	–	Offline Development
2	–	File Network
3	–	PLC Functions
4	–	Communications Setup
5*	–	Online Network
ESC	–	Exit to DOS

* EEPROM units will not perform any of the PMD180 programming software's Online Network functions that alter the user message program (except Clear Memory). RAM memory must be installed to use these functions.

OFFLINE DEVELOPMENT

The Offline Development menu performs all the offline programming. It is not necessary for a PMD 180 to be connected to use these selections.

1	–	Open Message File
2	–	Simulator
3	–	Compact Message File
4	–	Print Message File
5	–	System Attributes
6	–	Default Message Attributes
7	–	Set Attribute in Range
8	–	Find a String
9	–	File Merge Functions
E	–	Edit Message
C	–	Copy Messages
D	–	Delete Messages
F	–	Fill Messages
M	–	Move Messages
S	–	Program Status
ESC	–	Return to Main Menu

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5 Programming

1– Open Message File

The 'Open Message File' option lets a disk file be opened or created for editing. You must open a message file before you can access any other option. All the information stored in the message file will be available for editing. The highlighted filename indicates the currently selected file. Pressing the RETURN key opens the highlighted file. A new file can also be opened by simply typing a new name and pressing the RETURN key. As the filename is being entered, it is displayed to the right of the 'Select Filename:' prompt on the lower left portion of the screen.

Note: Factory default directory is C:\PMD180. If you installed the software in any other directory, you must change to that directory by pressing F3.

2–Simulator

The "Simulator" selection allows messages to be viewed as they would be on the PMD 180 or PMD 3000 slave when the 3000 simulator is selected from this option. For the PMD 3000 simulator, leading zeros will always be displayed for variable data.

3–Compact Message File

The 'Compact Message File' selection lets the message file be compacted on the disk. This should be used after a program has been developed to shrink the disk usage of the program.

4–Print Message File

The 'Print Message File' option allows a specified range of messages and attributes to be printed to the system printer.

5–System Attributes

Selecting the 'System Attributes' option will call up the operating parameters of the message display. These different parameters include the blink, scroll, print port, parallel port, and miscellaneous attributes. The F10 key saves the attributes as the defaults.

6–Default Message Attributes

The 'Default Message Attributes' selection allows the default values for the message attributes of unprogrammed messages to be set. The user can customize the default attributes for new messages to accommodate specific needs.

7–Set Attribute in Range

The 'Set Attribute in Range' selection allows the attribute values for a range of messages to be changed. All the messages in the range will adopt the new attributes as long as the message type is the same. If a message is a chain message and the attributes are for a non-chain message, then the chain message attributes will not be effected.

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8–Find a String The 'Find a String' selection allows the message text to be searched for a specified string of characters. All the message numbers with message text containing the string will be displayed. If the '..more..' prompt is displayed, any key pressed, other than the ESC key, will display more message numbers.

9–File Merge Functions The 'File Merge Functions' selection will bring up another menu. This menu has four options on it. They include: Open Secondary File which allows another disk file to be opened for transferring messages to and from; Fill Messages which lets a single message from one of the files to be copied to one or more messages in the other file; Copy Messages which lets a range of messages from one of the files to be copied to a range of messages in the other file; and the ESC selection which returns you to the 'Offline Development' menu.

E–Edit Message The 'Edit Message' selection allows messages in the open file to be added or edited. When the screen is entered, message #1 is displayed by default. To display a different message, enter digits followed by RETURN at the 'Message Number' prompt. If the message is programmed, the attributes and text for the message are displayed. Otherwise, the default attributes and empty text box are displayed.

C–Copy Messages The 'Copy Messages' option copies the source range of messages to the destination range. The source messages are not deleted.

D–Delete Messages The 'Delete Messages' selection allows a range of messages to be deleted.

F–Fill Messages The 'Fill Message' selection copies a single message to a range of messages.

M–Move Messages The 'Move Messages' option allows a range of messages to be moved. The messages in the source range are deleted after the move.

S–Program Status The 'Program Status' screen displays information on the message file program. If the '..more..' prompt is displayed, any key pressed, other than ESC, will display more message numbers. Otherwise, any key pressed returns to the 'Offline Development' menu.

ESC–Return to Main Menu This selection takes you back to the 'Main Menu.'

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5 Programming

FILE NETWORK MENU

The File Network menu has options used to handle the uploading and downloading of files to the PMD 180.

1	–	Upload File to PMD
2	–	Download File to Disk
3	–	Verify a File
ESC	–	Return to Main Menu

1–Upload File to PMD

The 'Upload File to PMD' selection reads a file from disk and copies it into the PMD 180. All the information stored to the message file is now in the PMD. When using a random message file, this option lets the user upload more than the message if desired. It will also let the user upload the PLC driver code and the random PLC attributes. You are prompted for the part(s) of the file to be loaded.

2–Download File

The 'Download File to Disk' option duplicates a program from the PMD 180 into a file on disk. The program information stored to that message file is available offline. If the file already exists, it is overwritten.

Note: *With standard files, neither Option #1 nor Option #2 include the PLC settings. They must be loaded separately.*

3–Verify a File

The 'Verify a File' option compares the program in the PMD 180 with a file on disk. A file can also be verified by typing the name then pressing the ENTER key. As the filename is being entered, it is displayed to the right of the 'Select Filename:' on the lower left portion of the screen.

ESC–Return to Main Menu

Pressing the ESC key returns you to the Main Menu.

PLC FUNCTION MENU

The PLC Function menu contains the options used to handle the PLC setup.

1	–	Upload PLC Code
2	–	Edit Attributes in PMD
3	–	Edit PLC File Defaults
4	–	Remove PLC Code
ESC	–	Return to Main Menu

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5 Programming

1–Upload PLC Code The 'Upload PLC Code' selection brings up a menu of the PLC drivers that are supported. Selecting one of the menu items loads the driver for that PLC into the PMD 180. Use your arrow keys and Enter to choose the PLC you are connecting to.

2–Edit PLC Attributes in PMD This option lets you change the attributes of the loaded PLC code without downloading a new PLC driver.

3–Edit PLC File Defaults The 'Edit PLC File Defaults' selection allows you to change the PLC default values of any particular PLC driver prior to sending the driver to the PMD. The defaults are used as a template when the file is uploaded.

4–Remove PLC Code The 'Remove PLC Code' selection loads a NULL driver into the PMD 180 so that the unit may operate without a PLC connected.

ESC–Return to Main Menu This selection takes you back to the 'Main Menu.'

COMMUNICATIONS SETUP The Communications Setup option lets you set the communication parameters of the computer to accommodate those of the PMD 180 and attached printer. This setup is vital to ensure proper exchange of data between the computer and the PMD.

COMP. INT PRINTER

Group Number:	1	
Unit Number:	1	
Port:	COM1	LPT1
BAUD Rate:	9600	9600
Parity:	NONE	NONE
Data Bits:	EIGHT	EIGHT
Stop Bits:	ONE	ONE
Require CTS:	NO	NO
Control RTS:	NO	
Checksum:	CRC	

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5 Programming

Group/Unit Number

The group and unit number selections are used to specify which PMD 180 the computer is going to communicate with. Group numbers can range from 0 to 15 and unit numbers can range from 0 to 4095. The default values of these settings are group 1, unit 1.

Port

This option allows the user to designate which port on the computer is going to be used to interface to the PMD and which port will send data to the printer.

The PMD can be interfaced to COM1, COM2, COM3, or COM4. The default setting is COM1.

The printer port can be set as LPT1, LPT2, or any of the COM ports. The default port is LPT1.

Baud Rate

This selection is used to set the speed that the above selected ports will operate. The default setting is 9600 baud for both ports. However, if the LPT1 or LPT2 port is selected for the printer port, the baud rate setting will have no effect.

Parity

This selection allows the user to use a parity bit to ensure the integrity of the communications between the computer and either the PMD 180 or the printer. Available settings are even, odd, or none. The default setting for both ports is NONE (no parity).

Data Bits

This option lets the user select the number of data bits that will be used for communications between the computer and the printer. The selections available are 7 or 8. The default value is 8 data bits. The PMD's communication protocol requires 8 data bits.

Stop Bits

This option lets the user choose one or two stop bits to indicate the end of transmission between the computer and either the PMD or the printer. The default selection is one stop bit.

Require CTS

This selection can be enabled or disabled depending on whether or not a Clear to Send handshaking signal is required or desired. The default value is No (disabled).

Control RTS

If using either a UTICOR bidirectional adapter or some other adapter to convert to RS-485, this selection should say YES to accommodate the RS-485 requirements. The default setting is NO.

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Checksum

This selection allows the user to choose the type of checksum that is to be used by the computer when communicating with the PMD 180. The different types of checksum available are CRC, XOR, or None. The default setting is CRC. If ASCII protocol is to be used to control the PMD, the CRC checksum should be used. Otherwise communications may not be as reliable between the two units.

ONLINE NETWORK MENU

The Online Network option lets you change the PMD setup without going offline.

1	–	Display Programmed Message
2	–	Display Packet Message
3	–	Clear Memory
4	–	System Attributes
5	–	Default Message Attributes
6	–	Set Attribute in Range
7	–	Clear Queue
8	–	Data Log
9	–	Test Memory
E	–	Edit Message
C	–	Copy Messages
D	–	Delete Messages
F	–	Fill Messages
M	–	Move Messages
S	–	Status ID
T	–	Time and Date
V	–	Variable Data
L	–	LED/Function Key Data
ESC	–	Return to Main Menu

1–Display Programmed Message

The 'Display Programmed Message' selection allows a programmed message in the PMD to be triggered onto the PMD 180 display.

2–Display Packet Message

The Packet Message' selection displays a message on the PMD 180 without storing the message in the PMD 180 memory.

3–Clear Memory

The 'Clear Memory' option clears and initializes the PMD 180. A confirmation prompt is given to allow the operation to be aborted. This command **will not** clear the data log or the PLC driver. You must use the Data Log (option 8) option to clear the data log and the PLC Functions (under the Main Menu) to clear the PLC driver.

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5 Programming

4–System Attributes The 'System Attributes' screen gives you a listing of the Blink, Scroll, Print Port, Parallel Port, and Miscellaneous Attributes. Multiple screens are used to set the attributes. Any parameters not altered retain their previous value. Saving stores all attributes. Likewise, aborting results in all the attributes being restored to their previous values.

5–Default Message Attributes The 'Default Message Attributes' option changes the default attributes for messages not programmed yet. This allows the user to customize the default message attributes for their specific application.

6–Set Attribute in Range The 'Set Attribute in Range' selection allows the attribute values for a range of messages to be changed. All the messages in the range will adopt the new attributes as long as the message type is the same. If a message is a chain message and the attributes are for a non-chain message, then the chain message attributes will not be effected.

7–Clear Queue The 'Clear Queue' option allows the message queue to be partially or completely cleared. The queue size is sixteen messages.

8–Data Log The 'Data Log' selection lets the data log entries, from the PMD 180, be viewed, cleared and printed. The data log size is about 700 entries. This value varies with the different PLC drivers that are loaded. For an exact value of data log entries, do a 'Status ID' command after the PLC driver has been loaded.

9–Test Memory This command allows the user to test the integrity of the user memory. When selected, the programming terminal will show an estimate of how long the test will take.

Note: *User memory will be cleared when this test is executed.*

E–Edit Message The 'Edit Message' selection allows messages to be added or edited. When the screen is entered, message #1 is displayed by default. To display a different message, enter digits followed by RETURN at the 'Message Number' prompt. If the message is programmed, the attributes and text for the message are displayed. Otherwise, the default attributes and empty text box are displayed.

C–Copy Messages The 'Copy Messages' option copies the source range of messages to the destination range. The source messages are not deleted. Use the F10 key to copy the source range to the destination range.

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D–Delete Messages The 'Delete Messages' selection lets you delete a single message or a range of messages.

F–Fill Messages The 'Fill Message' selection copies a single message to a range of messages.

M–Move Messages The 'Move Messages' option allows a range of messages to be moved from the source range to the range starting at the target start message. The messages in the source range are deleted after the move.

S–Status ID The 'Status ID' selection will show you information about the PMD 180. Information will include software and hardware revisions, memory available, and PLC selection. Any key pressed returns to the 'Online Network' menu.

T–Time and Date The 'Time and Date' selection reads the time and date from the PMD 180 and computer. The PMD's time can be changed through this selection.

V–Variable Data The 'Variable Data' option allows the data sets to be viewed or edited.

L–LED/Function Key Data The 'LED/Function Key Data' is not available on the PMD 180.

ESC–Return to Main Menu This selection takes you back to the 'Main Menu.'

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5 Programming

FILTERING SLAVE ADDRESSES

This feature was added to the PMD180 Software (P/N 10C86, Revision "J" or later, ONLY). This feature allows a PMD180 Master to filter out messages to specific slaves. Up to 8 separate slave addresses can be filtered out. When a slave's address is being filtered only packet messages received via the computer interface port are sent to the slave. Any other messages are blocked. This effectively passes control of the slave from the PMD180 master to the PC connected to the PMD180 master's computer interface port. When the slave's address is removed from the filter list control is returned to the PMD180 master.

You can implement filtering by using two new computer interface commands: **Modify Filter List (code 86)** and **Read Filter List (code 87)**. These commands allow the user to add or remove addresses from the filter list. These commands are described below.

PROGRAMMING NOTES: Messages sent to multiple slaves (Group 0/Unit 0 or Group x/Unit 0) cannot be filtered on an individual slave basis. If the multiple slave address is in the filter list, the message is not sent to any slaves. If the address is not in the list, the message is sent to all slaves. For example, if Group 0/Unit 0 is in the filter list, then messages addressed to Group 0/Unit 0 will not be sent to any slaves. If it is not in the filter list, messages addressed to Group 0/Unit 0 will be sent to all slaves. Filtering messages to Group 0/Unit 0 only filters messages addressed to Group 0/Unit 0, it will not filter messages to individual slaves. You will have to decide which option best suits your application. On power-up the PMD180 master clears the filter list.

COMPUTER INTERFACE COMMANDS

MODIFY FILTER LIST

COMMAND

Byte	Value
1	HEX AA Start of Message Byte
2	8+N*2 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	86 = Command Code
6	Control Byte 0 = add addresses to filter list 1 = remove addresses from filter list 2 = remove all addresses from filter list
7	N = number of addresses in command
8	addresses (2 bytes each, MSB, LSB)
8+N*2	Checksum LSB
9+N*2	Checksum MSB

REPLY = Standard Reply

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This command allows you to add or remove addresses to filter, or to completely erase the filter list from the master. The number of slaves to add or remove from the filter list is indicated by byte 7, the number of addresses in command. The next 2 to 16 bytes are addresses for up to 8 slaves affected by the command. Two bytes are needed for each slave's 16-bit Group/Unit Address. If the Control Byte is set to 2, the number of addresses and addresses themselves, are not required.

If the Filter List in the PMD180 is full (already has 8 addresses) an *insufficient memory error* (dec. 6) is returned in the reply. If the Control Byte is a value other than 0-2, an *invalid data byte error* is returned (dec. 24). If an attempt is made to remove non-existent addresses from the list, no error is returned.

READ FILTER LIST

COMMAND

Byte	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	87 = Message Code
6	Checksum LSB
7	Checksum MSB

REPLY

Byte	Value
1	HEX AA Start of Message Byte
2	23 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	87 = Command code
6	Number of addresses in the filter list
7-22	Addresses (2 bytes each, MSB, LSB)
23	Checksum LSB
24	Checksum MSB

This command returns the filter list. If there are less than 8 addresses in the list then 0/0 is returned for the remaining addresses.

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5 Programming

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CHAIN MESSAGE

[Y] A chain message will automatically display a group of other messages. The chained message contains a list of message numbers to be displayed. No message text is entered, only message numbers.

Example: Message 2 is a chained message

1> 25
2> 125
3> 34
4> 9

When message 2 is selected, then messages 25, 125, 34 and 9 will automatically be displayed for a predetermined time. Each message in the chain will be displayed for the same amount of time. Refer to "System Attributes Section" for setting the chain time. All chain messages will use this time setting. The maximum number of messages in a chain is 115.

Repeat Chain

[Y] Will cause the list of chain messages to repeat until a new message is selected.

[N] Will display the list of chain messages once.

SCROLL UPWARDS

[Y] Message lines will scroll up from a lower line of the display to next line up of the display. The maximum number of characters in a scroll up message is 235.

Bottom Line/Top Line

The message will scroll from the selected bottom line to the selected top line. The bottom line value must equal to or greater than that of the top line.

Repeat

[Y] The scroll up message will keep repeating until a new message is selected.

[N] The scroll up message will be displayed once.

Scroll Rate

Determines the rate this particular message will scroll up. The range for scroll rate is 0.1 to 9.9 seconds. A value of 0.0 causes the PMD to use the value found in the system attributes.

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6 Message Attributes

SCROLL LEFT

[Y] The message will scroll from right to left on any one line of the display. The maximum number of characters in a scroll message is 230.

Scroll Line

Select which line of the display the message will scroll on.

Repeat

[Y] The scroll left message will keep repeating until a new message is selected.

[N] The scroll left message will be displayed once.

Scroll Rate

Determines the rate this particular message will scroll across the display. The range for scroll rate is 0.1 to 9.9 seconds.

PRINT MESSAGE

[Y] The message text, when selected will be sent to the optional RS-232 serial printer port of the display. This allows messages to be printed when they are selected to be displayed.

On 1 Line

[Y] The message text will be printed on 1 line of the printer. Line wrap is dependent on the printer being used.

[N] Message text will be printed in same manner as shown on the display.

<CR><LF>

[Y] A carriage return and line feed will be sent to the printer after the message text is printed.

[N] The next message will start printing where the last message stopped printing.

Note: If the message to be printed contains variable data, then these data sets must to be updated before the message text will be printed.

CLEAR DISPLAY

[Y] Will cause the previous message to be erased from the display and will cause all 4 data sets to be reset to zero when the System Attributes' "Clear Data Sets" selection is enabled.

[N] Previously displayed characters will remain on the display where this message does not overlay them. Data sets remain unchanged.

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Example:

	Previous Message	New Message	Result
[Y]	**1234567890 2ND LINE**	**ABC**	**ABC**
[N]	**1234567890 2ND LINE**	**ABC**	**ABC4567890 2ND LINE**

CENTER MESSAGE

[Y] Will cause message text to be centered on all lines of the display. All data sets will be reset to zero when a centered message is selected, and the System Attribute 'Clear Data Sets' is enabled.

[N] Text will be displayed as entered in the message. Data sets are not effected.

Non-Centered

```
MESSAGE
NEXT LINE
```

Centered

```
   MESSAGE
  NEXT LINE
```

BLINK MESSAGE

[Y] The entire message (including time, date and variable data) will blink on and off when displayed. Characters that remain on the display from previous messages will also blink.

Refer to "System Attributes Section" to set blink on and blink off times.

SEND TO SLAVE*

[Y] Will send the selected message to one or more slave displays connected to the RS-422 slave port.

** Only valid when the option board is present*

All Slaves

[Y] Will send the message to all slaves connected to the RS-422 slave port. This function sets the group number to 0 and the unit number to 0.

[N] Allows the group and unit number to be individually set.

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6 Message Attributes

Group/Unit Number The group and unit number allows a message to be sent to a group of slave displays or a single slave display within a group. Valid group numbers = 0 to 15. Valid unit numbers = 0 to 4095

3000 Top Stick This command is used to indicate to the PMD what stick of the unit is to be used as the top stick of the PMD 3000 slave display on which the message will be displayed.*

3000 Bottom Stick This command is used to indicate the bottom stick of the PMD 3000 on which the message will be displayed.*

* *A stick is the part of the display where twenty, 2-inch characters can be displayed. A PMD 3000N1W4H has a total of four sticks within it, with the top stick being stick #1 and the bottom stick being stick #4.*

INVISIBLE MESSAGE **[Y]** The message will not be displayed on the master display, but can be sent to slaves, printed or logged.

[N] The message will be displayed as normal.

LOG MESSAGE **[Y]** When the message is selected, the message number will be stored in the internal data log along with the time and date. If there is variable data in the message, their values will also be stored in the data log.

[N] The message will not be logged.

Note: The data log must be enabled. Refer to "System Attributes".

DISPLAY HEIGHT/WIDTH Use this option to select the proper size of the display that is being used.

DATASET DISABLED **[N]** The data set value can be changed with the numeric keypad on the front of the display (PCI 185 only).

[Y] The data set value cannot be changed with the numeric keypad on the front of the display (PCI 185 only).

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6 Message Attributes

MESSAGE EXAMPLES

Following are some message examples demonstrating some of the special features that are available on the PMD 180.

Example #1

This example will show how to program a stationary 2-line message that is centered and has the top line blinking.

From the Edit Messages selection in either the Online Network or Offline Development menus, enter a message number. Make sure that Center Message has been selected and that the display size matches that of the display that the message will appear on. Then, press F6 to edit the message text. Press F8 to toggle Blink on. Type in "**CAUTION!**" and press Enter. Then, type in "**TABLE NOT IN PLACE**." Press F10 to save the editing session.

Example #2

This example will show how to program a single-line message that includes variable data. The variable data will be the three least significant digits from data set #3 that will represent temperature. The message will also scroll left on the top line of the display.

From the Edit Message selection, enter the message number and choose the Scroll Left option. Select line one and toggle the repeat option to 'Y.' Press F6 to edit the message text. Type in "**The current oven temperature is AltF4AltF5AltF6 degrees Fahrenheit**." Press F10 to save the message.

Example #3

When an informational message as that shown in example #2 is being shown, on the top line of the display, another message can be overlaid on the second line to give instructions without disturbing the first message. This is done by choosing N for the Clears Display option when programming the message and not putting any text on line one.

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6 Message Attributes

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7 System Attributes

The system attributes selection lets the user change the unit's system default settings. The PMD 180's system attributes can be set in both the Offline Development or Online Network options in the 10F54 programming software. In either case, the options and methods are identical.

BLINK ATTRIBUTES

The blink attributes determine the interval that a blinking message or character will be on and off. The on and off time ranges are in tenths of a second from 0 to 99. The default setting is 5/10 of a second.

SCROLL ATTRIBUTES

The scroll attributes determine the rate a scrolling message will move up or left. Scroll UP time is the period that the message will be displayed on each line in tenths of a second. The default value is 5/10 of a second. The Scroll LEFT time is the period that a character will be displayed in each column in tenths of a second. The default value is 5/10 of a second.

MISCELLANEOUS ATTRIBUTES

The miscellaneous attributes pertain to many of the special characteristics and features that UTICOR has included in the PMD 180.

Display Saver

The display saver option will turn the display off after a message has been shown for a predetermined period to prolong the clarity of the vacuum fluorescent tube. The values are in hours. The selectable range is from 1 to 23 hours and a zero value disables the display saver. The default value is zero (disabled).

Chain Message

There are two selections that pertain to chain messages. The first selection is for how long each static message within the chain will be displayed in tenths of a second. The default value is 100 (10 seconds). The second selection determines how many times a scrolling message within a chain message will be repeated before advancing to the next message in the chain. The range for repeating is from 0 to 255 and the default value is zero.

Message Queue

There are three selections pertaining to the message queue in the PMD. The first selection determines whether the queue advances automatically, is advanced manually, or is disabled. The default setting of this selection disables the queue. The second selection is for when the queue is advanced automatically. The selection determines how long each static message will be displayed before the queue is advanced to the next message in the circular queue. The range for this value is in tenths of a second from 0 to 255. The default setting is 100 (10 seconds). The

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7 System Attributes

third selection determines how many times a scrolling message within the queue will be repeated before the queue is advanced. The repeat range is from 0 to 255 times with a default of 0.

Data Log Enable This selection allows you to enable and disable the data log. When enabled, messages triggered that are to be logged, will be put in the data log. The default for this selection disables the data log.

Clear Data Sets When enabled, the clear data sets selection will clear the data sets' data to zero from the PMD when any message is called up with the "Clear Data Set" or "Center Message" attribute set. The default setting will clear the data set data.

LED Control The LED has a default that has the PLC controlling the LEDs rather than the PMD under System Attributes.

Character Sets This selection allows the user to choose which one of eight character sets will be used. The different character sets available are American, Cyrillic, French, German, English, Danish, Swedish, and Kana. A listing of the different characters available in each set is shown in Appendix E. The default setting for this option is American.

Send PLC Time Registers This selection lets you choose whether or not to send real-time clock data from the PMD to the PLC. The default setting does not send the data.

Data Sets Use Leading Zeroes This selection lets you have leading zeros to indicate that a data set value belongs in the particular field of the message. When using leading zeros, a data set value would look like this: 0003. When not using this option, the same variable data would look like this: 3. The default for this option enables the leading zeros.

Slave Port Mode

Normal: In this mode any slave display can be connected to the PMD 180's slave port to display messages.

Master CMD: In this mode the master PMD 180 slave port will be connected to another PMD 180 master PLC port and will send to it commands to display the same message number as the master. The slave master unit will need to have the UTICOR master slave PLC driver installed.

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SPECIAL FUNCTION MESSAGES

Commands can be assigned to different messages that will make a particular message perform a specific function. Functions include low battery detection, enabling, disabling and clearing the data log, and incrementing and decrementing the real-time clock.

Low Battery

Note: If another message is called up by the PLC, this message will be cleared and only displayed again upon power up or Restart.

When the battery used to back up the real-time clock, data log, and RAM memory gets below the level where it can perform its job, the PMD senses this. A message can be assigned to be triggered when this happens. The valid range is from 0 to 65535 and the default value is 65535 (non-active).

Enable Data Log

The data log can be enabled by triggering a message that has that command assigned to it. However, the message does not have to exist. The valid number range is from 0 to 65535 and the default value is 65535 (non-active).

Disable Data Log

The data log can be disabled by triggering a message that has that command assigned to it. However, the message does not have to exist. The valid number range is from 0 to 65535 and the default value is 65535 (non-active).

Clear Data Log

The data log can be cleared by triggering a message that has that command assigned to it. However, the message does not have to exist. The valid number range is from 0 to 65535 and the default value is 65535 (non-active).

Print Data Log

The data log can be printed by triggering a message that has that particular command assigned to it. However, the message does not have to exist. The valid message number range is from 0 to 65535 and the default value is 65535 (non-active).

Increment Clock

A message can be assigned a command that will cause the real-time clock in the PMD to be incremented one hour when it is triggered. The message does not have to exist. The valid message number range is from 0 to 65535 and the default value is 65535 (non-active).

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Decrement Clock — A message can be assigned a command that will cause the real-time clock in the PMD to be decremented one hour when it is triggered. The message does not have to exist. The valid message number range is from 0 to 65535 and the default value is 65535 (non-active).

PRINT PORT ATTRIBUTES — The optional printer port can be customized to accommodate the parameters of most serial printers. This allows you to print messages as they are triggered and print the data log.

- **Baud Rate** — The printer port will send data at 300, 600, 1200, 2400, 4800, or 9600 baud. The default setting is 1200 baud.
- **Parity** — The printer port will operate with odd, even, or no parity. The default parity setting is none.
- **Stop Bits** — The printer port supports communication with one or two stop bits. Its default value is one stop bit.
- **Print Time/Date** — If desired, the PMD will send the current time and date to the printer when it sends other information to be printed. The default setting does not send the time and date data.

PARALLEL PORT ATTRIBUTES — The optional parallel port can be set up to accommodate several different types of discrete I/O modules from the PLC. Among the attributes that can be changed are an inverted/non-inverted flag, the data format, and the debounce time.

- **Inverted\Non-Inverted Flags** — This option lets the PMD read the information from the PLC's discrete I/O either logically inverted or non-inverted.
- **Data Format** — This attribute is used to select binary or BCD for the format that the optional parallel port will be read.
- **Debounce Time** — This option is used to select the time needed for the input lines to the PMD to stabilize. The valid range is 0 to 99 milliseconds. The default value is 5 msec.

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8 PLC Data

INTRODUCTION TO THE PLC DRIVERS

All PLC drivers are designed to use a common, but flexible, interface to the main software of the 180 series product. The main code needs the information on the serial connection. This information is the baud rate, parity, stop bits, data bits and whether or not the RS-485 is used. Some PLCs may not support all of the options that the 180 series PLC driver offers. For this reason flexible PLC attribute screens have been created for each PLC driver.

Having flexible PLC attribute screens allows for each PLC driver to have individual information that it needs to communicate and exchange data with the 180 series unit. This can be information such as unit identification, register type or location, or starting register number.

The attributes are set when loading the driver with the programming software package. Each PLC will have its own explanation of the attributes as they will be seen when loading the driver or editing the attributes. Both of these functions can be found in the "PLC Functions" menu off the "Main" menu of the programming software package.

Please NOTE — *Where possible, default values for a PLC are noted in* **BOLD UNDERLINE** *within this section.*

> ***IMPORTANT:*** **32 (2 groups of 16 contiguous) registers must be set aside in the PLC for the 180 series product to properly communicate (true for standard only).**

NOTES

If PLC attributes are changed while communications between the 180 series product and the PLC are active, an error may occur and be displayed from starting communications over.

Since the unit is communicating with the PLC via the serial link, the poll time can affect the scan time of both the unit and the PLC. Similarily, the more the 180 series product is performing, the more time it takes. For example, if data is to be sent to the PLC continuously, the communications time can be doubled, or more, depending upon the PLC make and model. With the PLC constant polling may slow its scan time due to communications processing.

The 180 series documentation uses bit 0 to indicate the least significant bit of a word and bit 15 to indicate the most significant.

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8 PLC Data

PLC DATA

PLC data consists of a group of 16 PLC registers used to hold the output values to the PCI/PMD and a group of 16 registers used to hold the input values from the unit. Communications with the PLC will be via a serial link to the PLC's serial port. Following, is a list of the output registers from the PLC and a list of the input registers from the 180 series unit. The poll time in the PLC driver defines how often the unit reads the PLC output registers.

PLC Output Register #	Description		
1	Flags	bit 0 = message number valid	0 = valid, 1 = invalid
		bit 1 = data sets valid	0 = valid, 1 = invalid
		bit 2 = clear queue valid	0 = valid, 1 = invalid
PCI 185 only		bit 3 = LEDs valid	0 = valid, 1 = invalid
PCI 185 only		bit 4 = data set 1 key enable	0 = enable, 1 = disable
PCI 185 only		bit 5 = data set 2 key enable	0 = enable, 1 = disable
PCI 185 only		bit 6 = data set 3 key enable	0 = enable, 1 = disable
PCI 185 only		bit 7 = data set 4 key enable	0 = enable, 1 = disable
		bits 8–12, not used	
		bit 13 = slave/group/unit #	0 = valid, 1 = invalid
		bits 14–15, not used	
2	Message number to display		
3	Message priority (the higher the number, the higher the priority)		
4	Data set #1		
5	Data set #2		
6	Data set #3		
7	Data set #4		
8	Message number to clear from the queue (65535 = all messages)		
9 PCI 185	LEDs 1–16 (bit 0 = LED 1, bit 15 = LED 16) (0 = LED off, 1 = LED on)		
10–11	Reserved		
12 PCI 185	Function keys 1–16 enable (0 = enable, 1 = disable)		
13–14	Reserved		
15	Data sets slave group and unit number		
16	Reserved		

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Example:

Register	Data (HEX)	Explanation
1	0000	Everything is valid and enabled
2	0100	Display message number 256
3	0010	Priority is sixteen
4	0123	291 is the value in data set #1
5	4567	17767 is the value in data set #2
6	89AB	35243 is the value in data set #3
7	CDEF	52719 is the value in data set #4
8	004F	Clear message 79 from the queue
9	8821	Turn on LEDs 16, 12, 6, and 1
10	0000	Reserved
11	0000	Reserved
12	0000	Enable function keys 1–16
13–14	0000	Reserved
15	1001	Data set slave group and unit*
16	0000	Reserved

*Using word 15 you can direct data set information to a specific slave by placing its group and unit number in this register. Bits 0–11 are used for the unit number, while bits 12-15 are used for the group number.

Flag Bits of Output Register #1

Bit 0 — This bit is used to verify that the data in register #2 is valid or invalid. If this bit is a logic one, the PCI/PMD will ignore that data. When this bit is set low, the current message number is triggered and the data in the variable registers is read in once regardless of the setting of flag bit #1.

Bit 1 — This bit is used to confirm the validity of the data in registers #4-7. If this bit is a logic one, the PCI/PMD will ignore the variable data registers. However, when a message is triggered, the variable data registers will be read regardless of the state of this flag bit.

Bit 2 — This bit is used to verify that the message number in register #8 is the one that should be cleared from the message queue.

Bit 3 — This bit is used to signal whether the LED information in register #9 is valid to be sent to the PCI. If this bit is at a logic one, the PCI will ignore that register.

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8 PLC Data

Bit 4 — This bit is used to enable or disable the Data Set 1 key on the front of the PCI. If this bit is set to a logic one, the operator cannot change the variable data in that data set using the numeric keypad.

Bit 5 — This bit is used to enable or disable the Data Set 2 key on the front of the PCI. If this bit is set to a logic one, the operator cannot change the variable data in that data set using the numeric keypad.

Bit 6 — This bit is used to enable or disable the Data Set 3 key on the front of the PCI. If this bit is set to a logic one, the operator cannot change the variable data in that data set using the numeric keypad.

Bit 7 — This bit is used to enable or disable the Data Set 4 key on the front of the PCI. If this bit is set to a logic one, the operator cannot change the variable data in that data set using the numeric keypad.

After the message in the previous example is received by the PCI, it sends a reply to the PLC's input registers. The PCI updates the PLC input registers whenever any of the register values change. The input format is as follows in the table below.

Bit 8 — This bit is used to enable or disable the circular message queue if the queue status in the system attributes is in either auto or manual mode.

Bit 13 — This bit is used to enable or disable the data set slave group and unit number. If enabled, the data sets will be sent to the slave(s) specified in the data sets slave group and unit register.

PLC Input Register #	Description	
1	Flags	
	bit 0 = message number valid	0 = valid, 1 = invalid
	bit 1 = data sets valid	0 = valid, 1 = invalid
	bit 2 = clear queue valid	0 = valid, 1 = invalid
PCI 185 only	bit 3 = LEDs valid	0 = valid, 1 = invalid
PCI 185 only	bit 4 = operator entering data set 1	0 = no, 1 = yes
PCI 185 only	bit 5 = operator entering data set 2	0 = no, 1 = yes
PCI 185 only	bit 6 = operator entering data set 3	0 = no, 1 = yes
PCI 185 only	bit 7 = operator entering data set 4	0 = no, 1 = yes
PCI 185 only	bit 8 = operator changed data set 1	0 = no, 1 = yes
PCI 185 only	bit 9 = operator changed data set 2	0 = no, 1 = yes
PCI 185 only	bit 10 = operator changed data set 3	0 = no, 1 = yes
PCI 185 only	bit 11 = operator changed data set 4	0 = no, 1 = yes
	bit 12 = full message queue	0 = no, 1 = yes
	bit 13 = slave/group/unit #	0 = valid, 1 = invalid
	bits 14–15 not used	

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8 PLC Data

PLC Input Register #	Description	
2	Data Set #1	
3	Data Set #2	
4	Data Set #3	
5	Data Set #4	
6 PCI 185	Function Keys 1–16 (bit 0 = F1, bit 15 = F16) (0 = not pressed, 1 = pressed)	
7	Reserved	
8	Reserved	
9	Year (0-99)*	
10	Month (1-12)*	
11	Day (1-31)*	
12	Hour (1-12) or (0-23)*	
13	Minute (0-59)*	*Clock information can be read by
14	Second (0-59)*	the PLC if selected in the System
15–16	Reserved	Attributes Menu

Example:

Register	Data (HEX)	Explanation
1	0000	Everything is valid, data sets are not being altered and have not been changed, message queue is not full
2	0123	291 is the value in data set #1
3	4567	17767 is the value in data set #2
4	98AB	35243 is the value in data set #3
5	CDEF	52719 is the value in data set #4
6	1032	Function keys 13, 6, 5, and 2 were pressed
7	0000	Reserved
8	0000	Reserved
9	005D	1993 is the year
10	000A	October is the month
11	000F	It is the fifteenth day of the month
12	0010	The hour is 4 PM
13	0025	The minute is 37
14	002F	The second is 47
15–16	0000	Reserved

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8 PLC Data

Flag Bits of Input Register #1

Bits 0 through 3	These bits echo bits zero through three of the first output register from the PLC and can be used for handshaking.
Bits 4 through 7	When the Data Set 1 through 4 key is pressed on the PCI, the respective bit is set to a logic one and remains there until the "Enter Data" key is pressed.
Bits 8 through 11	These bits remain at logic zero unless the front-panel keypad is used to change variable data values in input registers #2 through #5 (data sets #1 - #4 respectively). The bit is set to a one after the "Enter Data" key is pressed and remain there until another message is triggered or a data set key is pressed.
Bit 12	For all PLC driver communications, bit 12 of input register 1 is used to indicate whether the message queue is full or not. If the bit is set to a logic 1, the queue is full. A logic 0 indicates the message queue is not full.
Bit 13	Slave Group/Unit # Valid 0 = Valid, 1 = Invalid

Random Access Drivers

Random access drivers must be used in a PMD180 configured as random, and standard drivers in a PMD 180 configured as standard. The random access feature lets the user define non-continguous blocks of data in the I/O to be used for interfacing between the PLC and the display unit.

Along with this, the random access drivers let you use four global and four message data sets. The four global data sets are defined when the PLC attributes are edited and are the default data sets. The four message data sets are defined by pressing F7 when editing your message and entering the location to be polled for the value. The defined location remains where the display looks for that data set unless the next message triggered either clears the display or defines a new location. When using the random access feature, the user can define up to forty discrete PLC outputs that will trigger a message.

Note: *If the user configures the unit for random access and is using an older message file, they* ***must*** *open the file offline and select the specific random PLC driver before uploading that message file or it will not work.*

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Output Words (to PMD)	Flags	bit 0 = message number valid	0 = valid, 1 = invalid
		bit 1 = data sets valid	0 = valid, 1 = invalid
		bit 2 = clear queue valid	0 = valid, 1 = invalid
		bit 3 = LEDs valid	0 = valid, 1 = invalid
	PCI 185 only	bit 4 = data set 1 key enable	0 = enable, 1 = disable
	PCI 185 only	bit 5 = data set 2 key enable	0 = enable, 1 = disable
	PCI 185 only	bit 6 = data set 3 key enable	0 = enable, 1 = disable
	PCI 185 only	bit 7 = data set 4 key enable	0 = enable, 1 = disable
		bit 8 = circular message queue enable	0 = enable, 1 = disable
		bit 9 = not used	
		bit 10 = not used	
		bit 11 = not used	
		bit 12 = not used	
		bit 13 = slave group/unit valid	0 = valid, 1 = invalid
		bit 14 = not used	
		bit 15 = not used	
	Message number		
	Message priority		
	Global data set #1		
	Global data set #2		
	Global data set #3		
	Global data set #4		
	Message number to clear from queue		
PCI 185 only	LEDs 1–16	bit 0 = LED 1	0 = LED Off, 1 = LED On
		bit 15 = LED 16	0 = LED Off, 1 = LED On
	LEDs 17–32	future use only	
	LEDs 33–48	future use only	
PCI 185 only	Function keys 1–16 enable		
		bit 0 = F key 1	0 = enabled, 1 = disabled
		bit 15 = F key 16	0 = enabled, 1 = disabled
	Function keys 17–32 enable	future use only	
	Function keys 33–48 enable	future use only	
	Data set slave group and unit		

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8 PLC Data

Input Words (from PMD)

Global data set #1	value of default data set 1
Global data set #2	value of default data set 2
Global data set #3	value of default data set 3
Global data set #4	value of default data set 4
Function keys 1–16 pressed	
bit 0 = F1	0 = not pressed, 1 = pressed
bits 15 = F16	0 = not pressed, 1 = pressed
Function keys 17–32 pressed	future use only
Function keys 33–48 pressed	future use only
Flags bit 0 = message # valid	0 = valid, 1 = invalid
bit 1 = data sets valid	0 = valid, 1 = invalid
bit 2 = clear queue valid	0 = valid, 1 = invalid
bit 3 = LEDs valid	0 = valid, 1 = invalid
bit 4 = operator enter data set 1	0 = no, 1 = yes
bit 5 = operator enter data set 2	0 = no, 1 = yes
bit 6 = operator enter data set 3	0 = no, 1 = yes
bit 7 = operator enter data set 4	0 = no, 1 = yes
bit 8 = operator alter data set 1	0 = no, 1 = yes
bit 9 = operator alter data set 2	0 = no, 1 = yes
bit 10 = operator alter data set 3	0 = no, 1 = yes
bit 11 = operator alter data set 4	0 = no, 1 = yes
bit 12 = full message queue	0 = no, 1 = yes
bit 13 = slave group/unit # valid	0 = valid, 1 = invalid
bit 14 = not used	
bit 15 = not used	
Year	
Month	
Day	
Hours	
Minutes	
Seconds	

Discrete Triggers

This is an added feature for the random access PMD. It allows for a list of discretes to be monitored that can trigger a message number associated with it. These will be checked with the PLC data, after the message number data is checked and in the order entered in the list.

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The PMD will trigger the message when the bit goes from cleared to set. The priority of the message will be that of the message priority data from the PLC.

PLC SYSTEM ATTRIBUTES		PLC CODE REVISION	
MSG #	DISCRETE TRIGGER	MSG #	DISCRETE TRIGGER
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	
65535		65535	

PLC System Attributes

When the random access driver is selected, the user defines each address to be used for interfacing along with the communication parameters. This is done by selecting A — Edit PLC Attributes from the offline menu.

The first screen that appears defines the communication parameters. The items included are the baud rate, parity, stop bits, data bits, etc. More screens are reached using the Page Up and Page Down keys on the programming terminal.

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8 PLC Data

The second screen has the user define the PLC output words used to send data to the display. The third screen has the user define the PLC input words that the message display writes to, and the fourth screen asks the user to define discrete triggers to display specific messages.

Message Queue

The 180 series offers the use of a 16-message circular message queue. The queue can be enabled or disabled through the System Attributes option in either the Offline Development or Online Network menus. As each message is triggered, it will be placed in the queue. The user has the option of disabling the queue using automatic advancement or manual advancement.

Note: *When the queue is enabled, chain messages that repeat use the queue repeat count from the system attributes. Also note that when the queue is enabled, the operator cannot enter variable data with the keypad on the PCI units.*

Message Priority

When the queue is being used, messages can be given a priority when triggered. The priority is used to relay the urgency that the message needs to be handled with. If higher priority messages have entered the queue, no lower priority messages will be displayed until there are no more high priority messages in the queue. The priority of the message is set in register #3 of the output block. The higher the message's priority number, the higher the message's priority. If there are two messages in the queue with an equal priority and that priority is the highest in the queue, then those messages will share time being displayed until one or both messages are cleared from the queue or a message with a higher priority is sent to the queue. Zero is the lowest priority number.

If messages are being triggered through the optional parallel port, D17 and D20 must be equal to a 1 to trigger a message. D18 and D19 will be used to control the message queue as shown below.

D18	D19	Definition
0	0	Message is priority 0
1	0	Message is priority 1
0	1	Remove the selected message from queue
1	1	Remove all messages from queue

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8 PLC Data

For all PLC drivers, the 180 series product can only communicate to one PLC. In most of the drivers, the 180 product and the PLC have to be connected directly together with no other 180 unit or PLC connected to the communication cable between them. Following is a table that lists the lowest revisions of the different components useable for each PLC driver available for the PMD 180 and PCI 185 products.

PLC Driver	Hardware Revision	Firmware Revision	10F54 Revision	Driver Revision
AEG	A	E	E.1	B
A-B SLC 500 & 1747 AIC Module (Random Driver)	B	E	G.1	E
A-B SLC 500 DF1	A	E	G.1	B
A-B PLC5 DF1	A	D	G.1	A
ASCII	A	D	D.1	A
GE 90-30 & 90-70	A	A	B.1	B
IDEC FA-2, FA-2J, FA-3S, & FA2-5M	A	E	E.2	B
Klockner Moeller PS 306 & PS 316	A	E	E.1	B
Mitsubishi FX Series	A	C	C.1	A
Mitsubishi Melsec-A	A	D	E.1	A
Modicon Modbus (Random Driver)	A	H	G.1	C
Omron Host Link Unit	A	C	C.1	A
Reliance Shark XL II	A	D	D.1	A
Reliance Automate	A	E	E.1	A
Siemens 100 Series, 115 CPU	A	B	B.1	B
Square D SY/MAX	A	E	E.2	D
Texas Instruments 405 Series	A	B	B.1	B
Texas Instruments 505 Series	A	E	E.1	A
Toshiba EX100/250/20 OB	A	B	B.1	B
UTICOR Director 4001	A	A	F.2	A
UTICOR Master Slave	A	H	G.1	A

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8 PLC Data

AEG PLC DRIVER ATTRIBUTES

(See figure 8-1)

This PLC driver is designed to use marker words in the AEG PLC. The driver needs to know which marker words.

The PLC driver for the AEG unit uses declaration lists 17 and 18. If anything other than the 180 series product is connected to the PLC that uses these declaration lists, their definitions for those lists will be lost when the unit is connected to the PLC.

Baud Rate The baud rate for the AEG is fixed at **9600** baud. The 180 unit and PLC must be set the same.

Parity The parity for the AEG is fixed at **odd** parity.

Stop Bits The AEG is fixed at **one** stop bit.

Data Bits Data bits for the AEG are fixed at **eight**.

Select RS-485 The PLC uses RS-232 communications. This does not need to be selected unless using an RS-232/RS-485 converter.

Poll Time This is the time between polls of the PLC by the 180 unit in tenths of a second. For constant polling, set this to **zero**.

Output register type The output registers used by the 180 series unit are marker words.

Output starting word This is the starting marker word that the 180 series unit is to read. Sixteen consecutive words from the starting word must be available in the PLC. The valid range is 1 to 1970. The starting word corresponds to the 180 unit's first word and all others follow consecutively.

Input register type The 180 series unit can only write to marker words.

Input starting word This is the starting marker word that the 180 series unit will write to. Sixteen consecutive words from the starting register must be available in the range. The range is then 1 to 1970. The starting word corresponds to the 180 unit's first word and all others follow consecutively.

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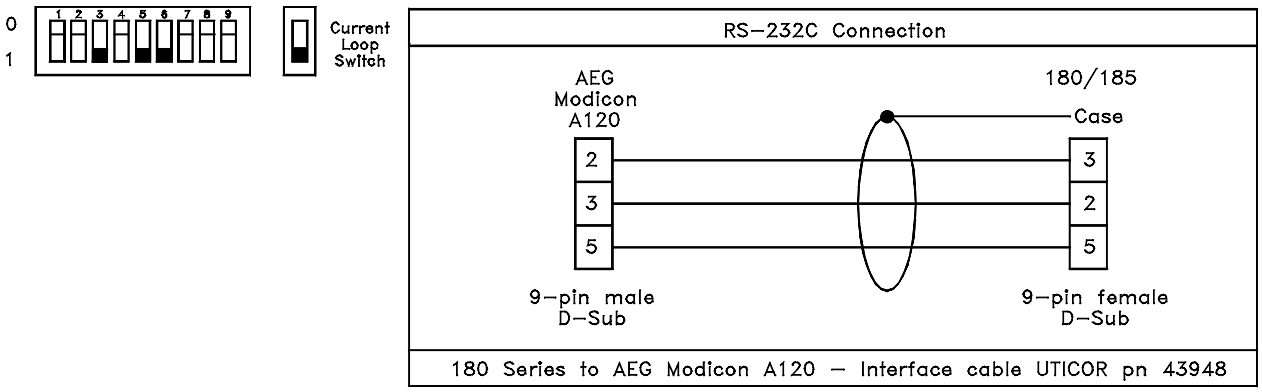


Figure 8-1

ALLEN-BRADLEY SLC 500 PLC AND 1747 AIC MODULE DRIVER ATTRIBUTES

(See figure 8-2)

This PLC driver/connection is for the random driver only and it cannot be loaded into a standard PMD 180. The random driver is for DH-485 only. The display unit interfaces to either the PLC's programming port or it uses the 1747-AIC DH485 link coupler to communicate with the PLC. *Note that the 1747-PIC personal computer interface converter cannot be used to interface a PMD to a SLC series PLC. Also note that the PMD must have revision "B" hardware and the option board must be present.*

This driver is designed to use S, B, T, C, R, or N files to exhange data with the PLC. The particular file entries and serial port settings must be defined for the driver. The driver uses an ASCII communication protocol and exchanges data with the PLC.

In order for the 180 series unit to be directly connected to the SLC 500 or the 1747-AIC module, the optional slave, printer, and parallel port board must be present. Also, to use the unit with the 1747-AIC network interface module, the 180 product needs to have the LE terminal on the RS-485 terminal block. If this terminal is not present, the unit will need to be returned to the factory for rework.

The serial port on the PLC supports baud rates of 9600 and 19200 baud. The other port settings are fixed at even parity, 8 data bits, and 1 stop bit.

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8 PLC Data

Displayed Errors If an illegal file number or register number is stored in the PLC driver attributes, a **PLC MSG BAD REGISTER** error will be displayed.

Baud Rate: The baud rate options supported by the SLC 500's port are 9600 and **19200**.

Parity The SLC 500's port is fixed at **even** parity.

Stop Bits The SLC 500's port is fixed at **1** stop bit.

Data Bits The SLC 500's port is fixed at **8** data bits.

Select RS-485 This is fixed at **Yes** selecting RS-485.

Poll Time This is the frequency of polling of the PLC by the message display in tenths of a second. The valid range for this is from 0 to 255. For constant polling, set this to **zero**. Some SLC 500 processors cannot handle constant polling when two or more devices are trying to communicate with it. Increasing the poll time may help to avoid communication problelms.

PMD Address This is the address on the network where the 180 unit resides. The address range is 0-31. This address must be a unique address on the network.

PLC Address This is the address on the network at which the PLC resides. The address range is 0-31. This address must be a unique address on the network.

Max Node Address This is the maximum number of nodes on the network. Set this to the PLC with the highest address to make the network as small as possible. The range is 0-31.

Output N-file The 180 series unit reads from N-files. Therefore, either use file number 7 or a file in the range from 9 to 255.

Output starting word This is the starting N-file word that the 180 series unit is to read. Sixteen consecutive words from the starting word must be available in the N-file. Since the N-file is not a fixed size, the user is responsible for

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ensuring that sixteen consecutive words from the starting word are available. The default range is 0 to 240. The starting word corresponds to the 180 unit's first input word and all others follow consecutively.

Input N-file number The 180 series unit writes to N-files. Therefore, either use file number 7 or one in the range from 9 to 255.

Input starting word This is the starting N-file word that the 180 series unit is to write to. Sixteen consecutive words from the starting word must be available in the N-file. Since the N-file is not a fixed size, the user is responsible to make sure sixteen consecutive words from the starting word are available. The default range is 0 to 240. The starting word corresponds to the 180 unit's first output word and all others follow consecutively.

Note: *We have found that since a SLC 5/01 only handles one message at a time, there will be communication difficulties when three or more devices on the network are trying to communicate.*

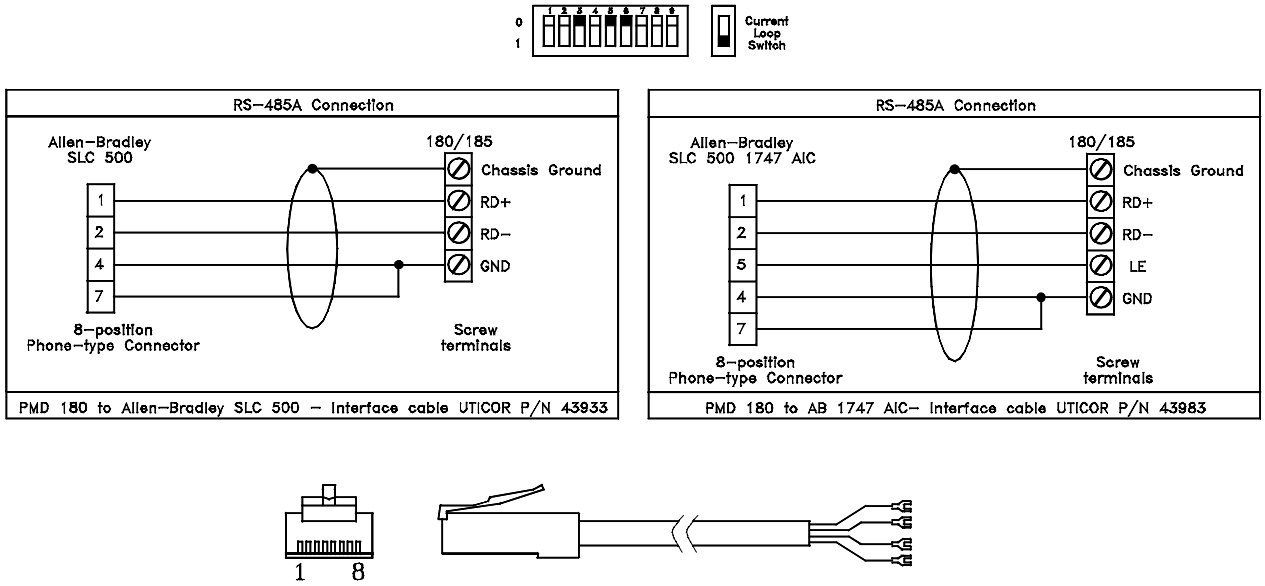


Figure 8-2

ALLEN-BRADLEY SLC 500 DF1 MODULE DRIVER ATTRIBUTES(STANDARD DRIVER)

(See figure 8-3)

The Standard Driver is for DF1 communication protocol only. This driver uses integer N-file entries in the Allen-Bradley SLC 500 PLC. The driver must know which integer file entries and the serial port settings.

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8 PLC Data

The interface driver uses a Data-Highway communication protocol and exchanges data with the PLC using N-file words. Port settings can be set to any options available on both the PMD and the PLC.

Note: The module must be configured with the following settings: Half-duplex mode in the DF1 Protocol Menu; Local mode in the DF1 Protocol Menu; BCC checksum in the DF1 Protocol Menu; and the jumper for the DF1 port must be configured for RS-232.

Baud Rate The baud rate options supported by the SLC 500's port are 300, 600, 1200, 2400, 9600, and **19200**.

Parity The interface module port is adjustable to even, odd, or **no parity**.

Stop Bits The interface module can have **1** or 2 stop bits.

Data Bits The DF1 module's port must be set to **8** data bits.

Select RS-485 The interface module uses either RS-485 or RS-232/422. Set this option to YES if the module is configured to use RS-485, otherwise, set it to **NO**. **The option board must be present if using RS-485.**

Poll Time This is the time between polls of the PLC by the 180 series product in tenths of a second. For constant polling set this to zero.

PMD Address This is the address on the network at which the PMD resides. The address range is 0–254. This address must be the same as the master station address configured in the Interface Module's DF1 Protocol Menu.

PLC Address This is the address on the network at which the PLC resides. The address range is 0–31. This must be a unique address on the DH-485 network.

Interface Address This is the address for the interface module on the network. The address range is 0 - 254. The address must be the same as the slave address configured in the Interface Module's DF1 protocol menu.

Message Timeout This is the time for the interface module to wait for a response from the PLC. The range is 100 to 12750 mS. The message timeout is configured under the DH-485 Port Menu. The 180 series unit and the interface module must have the same message timeout value in order to communicate.

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Output N-file

The 180 series product reads from N-files. Therefore, either use file number 7 or a file in the range from 9 to 255.

Output starting word

This is the starting N-file word that the 180 series product is to read. Sixteen consecutive words from the starting word must be available in the N-file. Since the N-file is not a fixed size, the user is responsible to make sure sixteen consecutive words from the starting word are available. The range is 0 to 240. The starting word corresponds to the 180 unit's first input word and all others follow consecutively.

Input N-file number

The 180 series product writes to N-files. Therefore, either use file number 7 or one in the range from 9 to 255.

Input starting word

This is the starting N-file word that the 180 series unit is to write to. Sixteen consecutive words from the starting word must be available in the N-file. Since the N-file is not a fixed size, the user is responsible to make sure sixteen consecutive words from the starting word are available. The range is 0 to 240. The starting word corresponds to the 180 unit's first output word and all others follow consecutively.

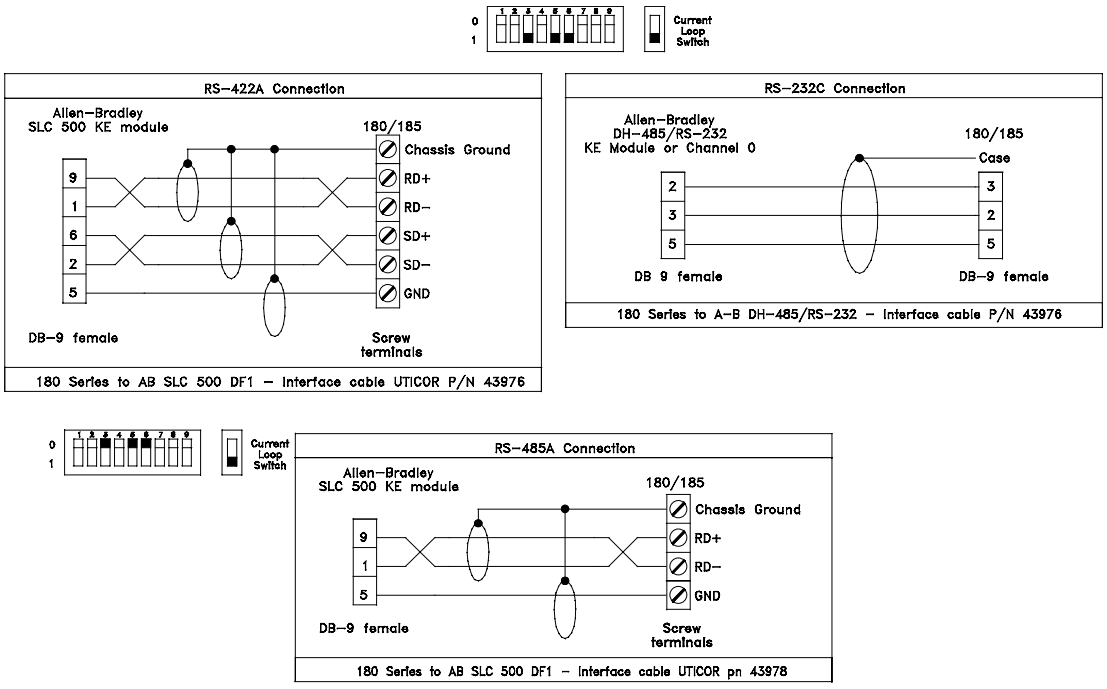


Figure 8-3

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8 PLC Data

ALLEN-BRADLEY PLC5 SERIES PLC DRIVER ATTRIBUTES

(See figure 8-4)

This driver is designed to use integer N-file entries in the Allen-Bradley PLC5. The driver needs to know which integer file entries to use and the serial port settings. The 180 Series product uses Data-Highway communication protocol to exchange data with the PLC.

Channel 0 on the PLC5 module must be configured with the following settings:

Channel 0:	DF1 (point to point)
Control line:	No handshaking
Error detection:	BCC

Baud rate The baud rate options supported by 180 Series for the channel 0 port of the PLC5 are 300, 600, 1200, 2400, 4800, **9600**, and 19200.

Parity The channel 0 port supports even or **no parity**.

Stop bits The PLC5's channel 0 port supports **1** or 2 stop bits.

Data bits The PLC's channel 0 port must be set to **8** data bits.

Select RS-485 The channel 0 port only supports RS-232 serial protocol.

Poll time This is the time between polls of the PLC5 by the 180 product in tenths of a second. For constant polling set this to zero.

Output N-file number The 180 products read from N-files. The valid range is from 10 to 999.

Output starting word This is the starting N-file word the 180 product is to read. Sixteen consecutive words from the starting word must be available in the N-file. Since the N-file is not a fixed size, the user is responsible to make sure sixteen consecutive words from the starting word are available. The range is from 0 to 984. The starting word corresponds to the 180 product's first output word and all others follow consecutively.

Input N-file number The 180 products write to N-files. The valid range is from 10 to 999.

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Input starting word

This is the starting N-file word the 180 product will write to. Sixteen consecutive words from the starting word must be available in the N-file. since the N-file is not a fixed size, the user is responsible to make sure sixteen consecutive words from the starting word are available. The range is from 0 to 984. The starting word corresponds to the 180 product's first input word and all others follow consecutively.

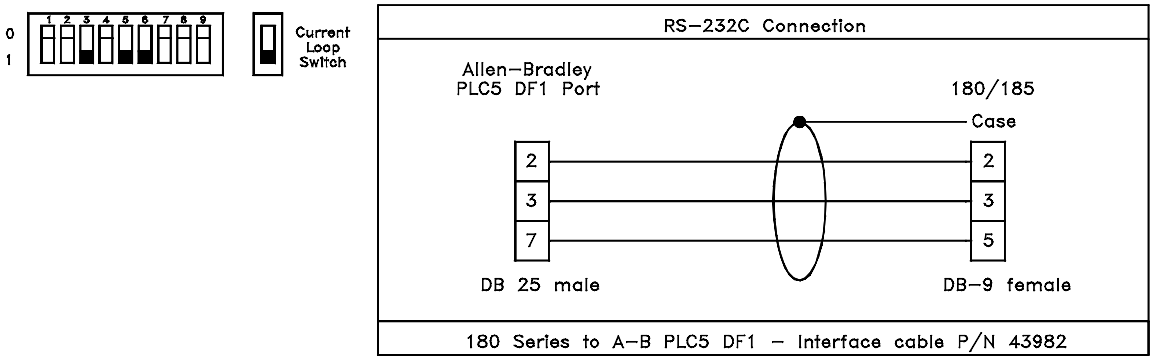


Figure 8-4

GE 90-30/90-70 PLC DRIVER ATTRIBUTES

(See figure 8-5)

This 180 series PLC driver is designed to use %R registers in the GE 90-30/90-70 series PLC. The driver needs to know which registers to use and the serial port settings, and other individual controller attributes.

This driver uses 8 data bits. This is the only serial port parameter the PLC restricts. All other port settings can be set to any options available on both the 180 series unit and the PLC. This includes the controllers defaults of 19200 Baud, ODD parity, 1 stop bit.

Baud rate

The baud rate options for the both the GE 90-30/90-70 and 180 series unit are 300, 600, 1200, 2400, 4800, 9600, and **19200**. The PLC and 180 series must have the same baud rates to communicate.

Parity

Both the 180 series unit and GE 90-30/90-70 have the options of NONE, **ODD** or EVEN parity. The two units must have the same parity to communicate.

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8 PLC Data

Stop Bits Both the 180 series unit and GE 90-30/90-70 have the options of **1** or 2 stop bits. Both units must have the same number of stop bits to communicate.

Data Bits The 180 series unit restricts this to **8** data bits for the GE PLC.

Select RS-485 The GE 90-30/90-70 interface does not support RS-485.

Poll time This is the time between polls of the PLC by the 180 unit in tenths of a second. For constant polling set this to zero.

PLC CPU ID This is the CPU ID of the controller. It must match that of the PLC that the 180 unit is to exchange data with. If the field is completely blank (deleted characters, not spaces) it will try to attach to the first controller possible. This is case sensitive, and must match uppercase and lowercase letters with that of the CPU ID.

Output register type The 180 series units can only read %R registers, no other selection is possible.

Output starting register This is the starting register the 180 series unit is to read. Sixteen consecutive words from the starting register must be available in the %R register range. The range is then 0001 to 16369. The starting register corresponds to the 180 unit's first output word and all others follow consecutively.

Input register type The 180 units can only write to %R registers, no other selection is possible.

Input starting register This is the starting register that the 180 unit writes to. Sixteen consecutive words from the starting register must be available in the %R register range. The range is then 0001 to 16369. The starting register corresponds to the 180 unit's first input word and all others follow consecutively.

Level 2 Password This is the password for privilege level 2. If there is no password for level 2 this field must be completely blank (deleted characters, not spaces). This is case sensitive, and must match uppercase and lowercase letters with that of the CPU level 2 password.

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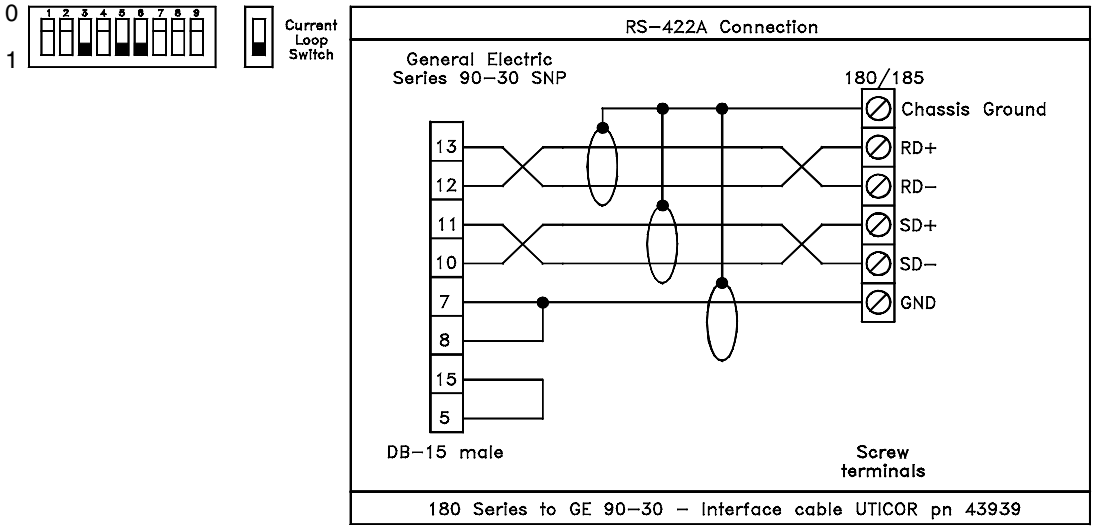


Figure 8-5

IDEC FA-2/FA-2J/FA-3S/FA2-5M PLC DRIVER ATTRIBUTES

(See figure 8-6)

The IDEC part number PF2-CLA link adapter must be used to connect the 180 series product and the host unit.

This driver uses data registers in the IDEC series PLC. The driver needs to know which data registers and which PLC series are being used.

Baud Rate The baud rate allowed by the PLC is **9600**.

Parity The parity can only be **even**.

Stop Bits The number of stop bits is fixed at **1** for the IDEC series PLC.

Data Bits The number of data bits is fixed at **8** for the IDEC series PLC.

Select RS-485 The IDEC series PLC uses RS-232 serial protocol. Select this only if using an RS-485/RS-232 converter.

Poll Time This is the time between polls of the PLC by the 180 series unit in tenths of a second. For constant polling, set this to **zero**.

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8 PLC Data

PLC Series The 180 series products work with the following PLCs: FA-2/FA-2J, **FA-3S/FA2-5m**.

Output Register Type The 180 series products can only read data registers (D).

Output Starting Register This is the starting data register the 180 series product is to read. Sixteen consecutive words from the starting data register must be available in the register range. The range is D0–D984. The starting data register corresponds to the 180 series product's first word and all others follow consecutively.

Input Register Type The 180 series products can only write to data registers (D).

Input Starting Register This is the starting data register the 180 series product will write to. Sixteen consecutive words from the starting data register must be available in the register range. The range is D0–D984. The starting data register corresponds to the first word and all others follow consecutively.

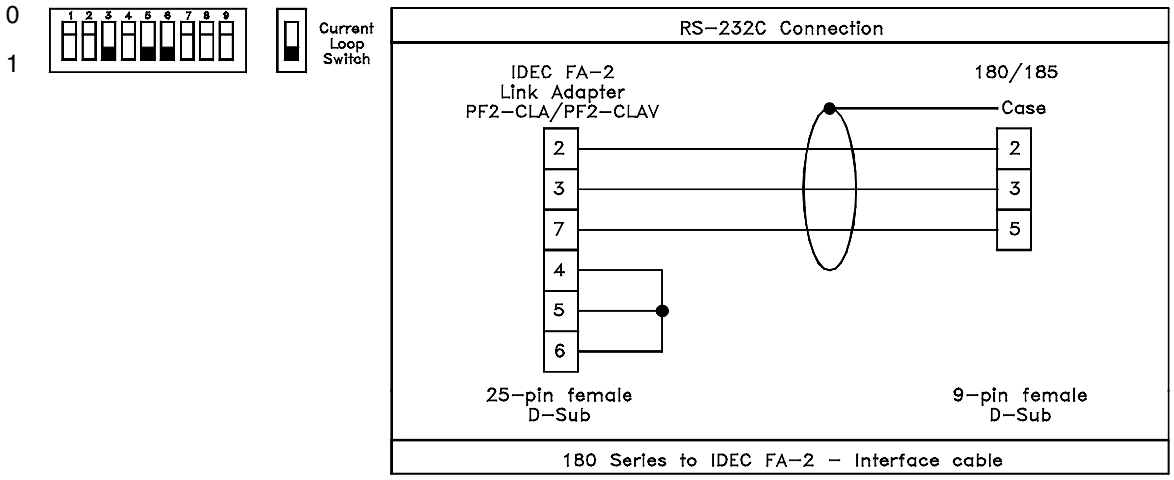


Figure 8-6

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KLOCKNER MOELLER PS 306/316 PLC DRIVER ATTRIBUTES

(See figure 8-7) The PLC driver for the PS 306/316 series controller is designed to use the PLC's Marker words (MW memory). The driver needs to know which marker words to use.

Baud Rate The baud rate for the PS 306/316 is fixed at **9600** baud. The 180 unit and PLC must be set the same.

Parity The parity for the PS 306/316 is fixed at **no** parity.

Stop Bits The PS 306/316 is fixed at **two** stop bits.

Data Bits Data bits for the PS 306/316 are fixed at **eight**.

Select RS-485 The PLC uses RS-485 communications and must be selected if the 180 series unit is to be connected directly to the PLC. This does not need to be selected if using an RS-485/RS-232 converter.

Poll Time This is the time between polls of the PLC by the 180 unit in tenths of a second. For constant polling, set this to **zero**.

Output register type The output registers used by the 180 unit are in the marker words (MW).

Output starting register This is the starting register that the 180 series unit is to read. Sixteen consecutive words from the starting register must be available in the register type range. The valid range is 0000 to 2157. The starting register corresponds to the 180 unit's first word and all others follow consecutively.

Input register type The 180 unit can only write to registers in the marker words (MW).

Input starting register This is the starting register that the 180 series unit will write to. Sixteen consecutive words from the starting register must be available in the range. The range is then 0000 to 2157. The starting register corresponds to the 180 unit's first word and all others follow consecutively.

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8 PLC Data

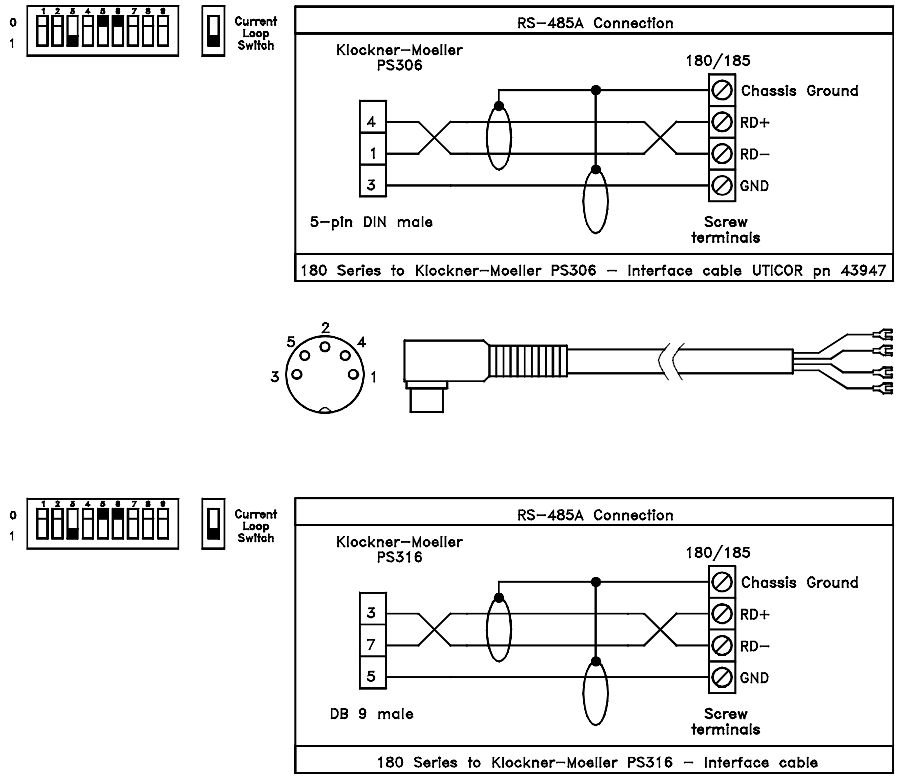


Figure 8-7

MITSUBISHI FX SERIES PLC DRIVER ATTRIBUTES

(See figure 8-8)

The Mitsubishi part number PCX-KIT-1 must be used to connect the 180 unit and host link unit. The CTS signal supplied by the RS-422 to RS-232 converter in that kit, is needed for the 180 and host link unit to communicate.

The FX series PLC driver uses data registers in the PLC. However, the 180 unit needs to know which registers. The FX series has fixed serial port settings of 9600 baud, even parity, 1 stop bit, and 7 data bits.

Baud Rate

The baud rate for the Mitsubishi FX is fixed at **9600** baud. The 180 unit and PLC must be set the same.

Parity

The parity for the Mitsubishi FX is fixed at **even** parity.

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Stop Bits The Mitsubishi FX series is fixed at **one** stop bit.

Data Bits Data bits for the Mitsubishi FX are fixed at **seven**.

Select RS-485 The PLC does not use RS-485 communications. An RS-485 converter must be used for this type of communications.

Poll Time This is the time between polls of the PLC by the 180 unit in tenths of a second. For constant polling, set this to **zero**.

Output register type The 180 series unit can only read data registers (D).

Output starting register This is the starting register the 180 series unit reads. Sixteen consecutive words from the starting register must be available in the register type range. The range is 0 to 496. The starting register conforms to the 180's first word and all others follow consecutively.

Input register type The 180 series unit can only write to data registers (D).

Input starting register This is the starting register the 180 series unit will write to. Sixteen consecutive words from the starting register must be available in the range. The range is 0 to 496. The starting register conforms to the 180's first word and all others follow consecutively.

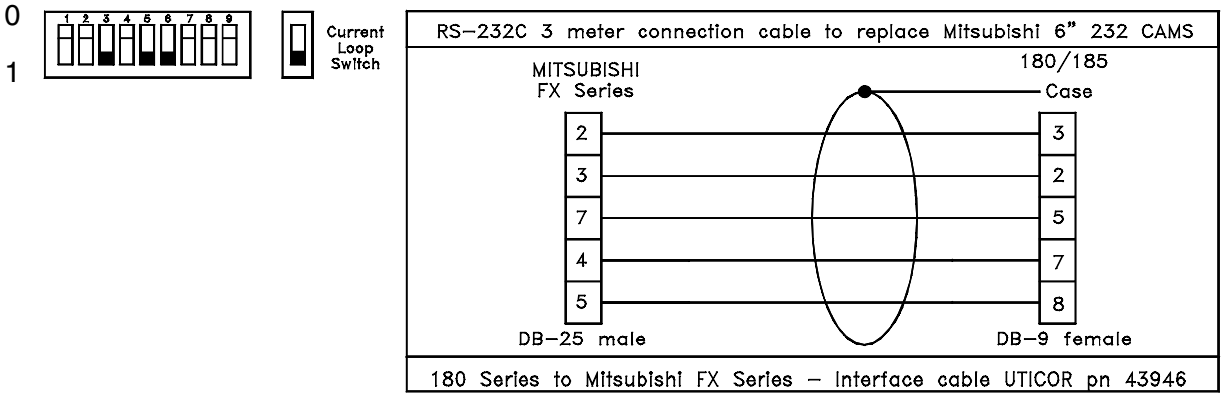


Figure 8-8

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8 PLC Data

MITSUBISHI MELSEC-A SERIES PLC DRIVER ATTRIBUTES

(See figure 8-9)

The AJ71C24-S6 computer link module must have the following settings in order to communicate with the 180 series product. The mode setting switch must be set for format'A.' This is the only format the software driver is set to handle. Switch #21 must be in the ON position enabling the checksum for the message. Switch #22 must be set in the ON position to allow writing to the CPU while in RUN mode. Switch #11 toggles between RS-232 and RS-422, When the switch is ON it is set up for RS-422. Full duplex transmission is the only type supported by the software driver.

This driver is to use data registers in the AJ71C24 Computer Link Module. The driver needs to know which registers are to be used.

Baud Rate The baud rate can be 300, 600, 1200, 2400, 4800, **9600**, or 19200 baud.

Parity The parity can be **enabled** or disabled. If it is enabled, then **odd** or even parity can be selected.

Stop Bits The number of stop bits is adjustable from **1** to 2.

Data Bits The number of data bits is adjustable from 7 to **8**.

Select RS-485 The AJ71C24 module does not support RS-485 serial communications.

Poll Time This is the time between polls of the AJ71C24 by the 180 series product in tenths of a second. For constant polling set this to zero.

Output Register Type The 180 series products can only read data registers (D).

Output Starting Register This is the starting register the 180 series product will read from. Sixteen consecutive words from the starting register must be available in the register range. The range is then 0000 to 6128. The starting register corresponds to the first word and all others follow consecutively.

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8 PLC Data

Input Register Type The 180 series products can only write to the data registers (D).

Input Starting Register This is the starting register that the 180 series product writes to. Sixteen consecutive words from the starting register must be available in the range. The range is 0000 to 6128. The starting register corresponds to the 180 series product's first word and all others follow consecutively.

Station Number This is the station number that is set on the AJ71C24-S6 by two switches. The range is 0–31.

PLC-Series This is the series of PLC that is being used. It can be either AnCPU or AnACPU where n = 1, 2, or 3.

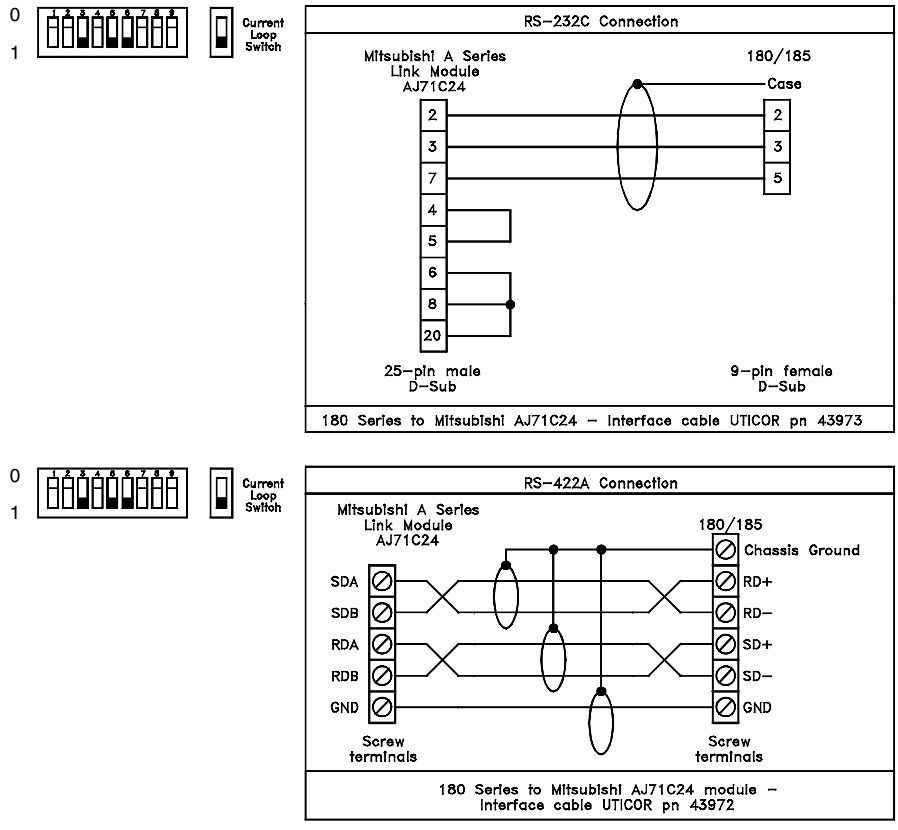


Figure 8-9

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8 PLC Data

MODICON MODBUS PLC DRIVER ATTRIBUTES

(See figure 8-10)

This 180 series PLC driver is a random access driver and cannot be loaded into a PMD 180 configured as standard. It is designed to use registers in the Modicon PLC. The driver needs to know which registers to use and the Modbus serial port settings.

The 180 series Modicon Modbus PLC driver uses the RTU (Remote Terminal Unit) mode. This is the only serial port parameter the 180 unit restricts. **The controller must be set to RTU mode.** All other port settings can be set to any options available on both the 180 unit and the PLC. This includes the controllers defaults of RTU mode, EVEN parity, 1 stop bit, address 1 and 9600 baud.

Baud rate — The Baud rate options for the 180 series unit are 300, 600, 1200, 2400, 4800, **9600**, and 19200. The PLC and 180 unit must have the same Baud rates to communicate.

Parity — Both the 180 series unit and Modicon PLC have the options of NONE, ODD or **EVEN** parity. The PLC and 180 unit must have the same parity to communicate.

Stop Bits — Both the 180 series unit and Modicon PLC have the options of **1** or 2 stop bits. The PLC and 180 unit must have the same number of stop bits to communicate.

Data Bits — The 180 series unit restricts this to **8** data bits for the Modicon PLC because the 180 unit uses RTU mode which is 8 data bits.

Select RS-485 — The Modicon PLC uses a RS-232 (RTU) serial communication protocol. Only use this if using a RS-485/RS-232 converter between the 180 unit and the Modicon PLC.

Poll time — This is the time between polls of the PLC by the 180 series unit in tenths of a second. For constant polling set this to zero.

Address — This is the address of the controller. The range of the address is **1** to 247 depending on the controller model. Set this to the controllers address setting.

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Output register type The 180 series unit can read either the 3xxxx or 4xxxx register range. This attribute tells the 180 unit which type the output starting register is.

Output starting register This is the starting register the 180 series unit is to read from. Sixteen consecutive words from the starting register must be available in the output register type range. The range is then 0001 to 9984. The starting register corresponds to the 180 unit's first output word and all others follow consecutively.

Input register type The 180 series unit can only write to the 4xxxx register range so this is fixed for the Modicon PLC.

Input starting register This is the starting register that the 180 series unit writes to. The 180 unit can only write to 4xxxx register. Sixteen consecutive words from the starting register must be available in the 4xxxx range. The range is then 0001 to 9984 and will be a 4xxxx register. The starting register corresponds to the 180 unit's first input word and all others follow consecutively.

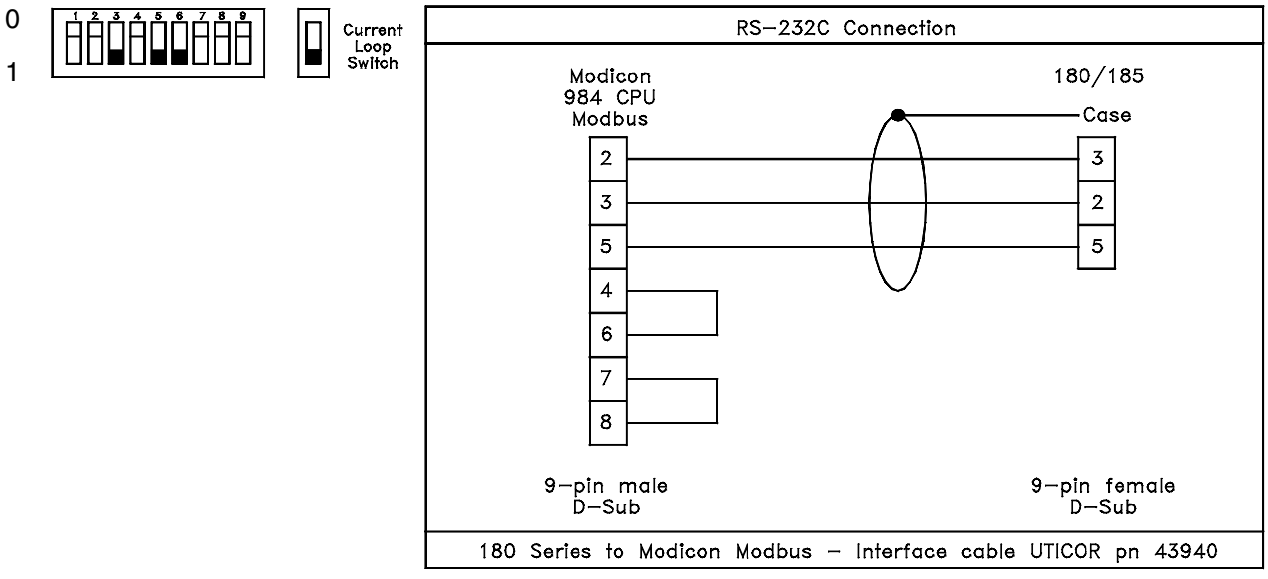


Figure 8-10

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8 PLC Data

OMRON HOST LINK UNIT PLC DRIVER ATTRIBUTES

(See figure 8-11)

The PLC driver for the OMRON Host Link is designed to use data memory registers (DM) in the OMRON PLC. It allows for both the single and multiple link protocol so the Host Link Unit need not be changed.

Note: *The 180 series unit must be connected directly to a Host Link Unit. The driver does not support the link adapter.*

The driver needs to know which registers to use and the settings of the Host Link Unit.

Port settings can be set to any options available on both the 180 series unit and the PLC.

Baud rate The baud rate options supported by the OMRON Host Link Unit are 300, 600, 1200, 2400, 4800, **9600**, and 19,200 baud. The Host Link Unit and 180 unit must be set to the same baud rate to communicate.

Parity Even or **odd** parity can be used by the Host Link Unit. The Host Link Unit and 180 series unit must be set to the same parity to communicate.

Stop Bits The Host Link Unit supports **one** or two stop bits. The Host Link Unit and 180 unit must be set to the same number of stop bits to communicate.

Data Bits The Omron Host Link Unit supports settings of 7 or **8** data bits. Set the number of data bits the same for the 180 unit and Host Link Unit to communicate.

Note: *The option board must be present on the unit to use RS-485 communications on the PLC port.*

Select RS-485 If using RS-485 or using a converter that allows data sent by the 180 series unit to be echoed back to the 180 series unit on the same line, this must be set to YES. Otherwise, it can be set to **NO**.

Poll time This is the time between polls of the PLC by the 180 unit in tenths of a second. For constant polling, set this to **zero**.

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8 PLC Data

Output register type The 180 series unit will only read the data memory (DM) register range.

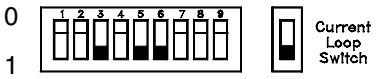
Starting output register This is the starting output register the 180 series unit is to read. Sixteen consecutive words from the starting register must be available in the DM register range. The range is then 0000 to 6640. The starting register corresponds to the 180 unit's first word and all others follow consecutively.

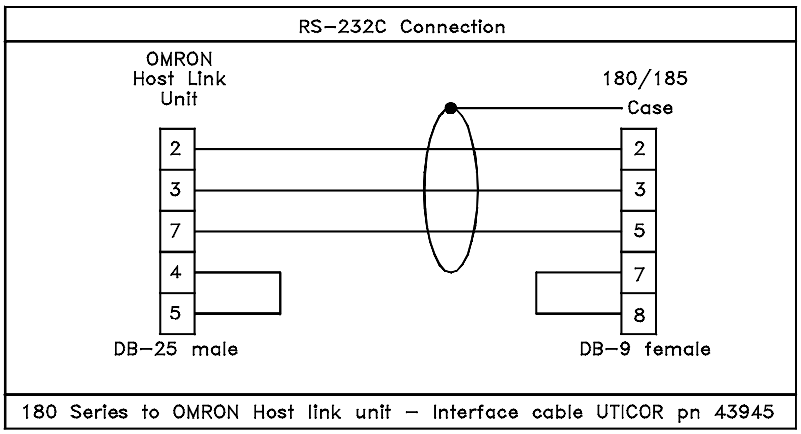
Input register type The 180 series unit will only write to the data memory (DM) register range.

Starting input register This is the starting register that the 180 series unit will write to. The 180 unit only writes to DM registers. Sixteen consecutive words from the starting register must be available in the DM range. The range is from 0 to 6640. The starting register corresponds to the 180 unit's first word and all others follow consecutively.

Single/Multiple Link This needs to be set the same as the setting of the single/multiple link selector switch of the Host Link Unit in order for the two to communicate.

Unit Number When the multiple link is used, the 180 series unit needs the Host Link Unit number address to communicate. If the single link is used, this field has no meaning.





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8 PLC Data

RELIANCE XL II PLC DRIVER ATTRIBUTES

(See figure 8-12)

This 180 series PLC driver is designed to be used only with the XL II series from Reliance. No other Reliance PLC is supported by this driver. The switch on the top of the communication interface must be selecting 'COM2.'

This driver is designed to use internal outputs (M) in the Reliance XL II series PLC. The driver needs to know which registers to use and the settings of the PLC. Port settings can be set to any options available on both the 180 unit and the PLC.

Baud rate The baud rate options supported are 300, 600, 1200, 2400, 4800, **9600**, and 19200. The PLC and the 180 unit baud rates must be the same to communicate.

Parity The 180 unit supports **even**, odd, or no parity. The PLC and 180 unit parity settings must be the same in order to communicate.

Stop bits The 180 unit supports **one** or two stop bits. The PLC and 180 unit stop bit settings must be the same in order to communicate.

Data bits The driver is fixed at **seven** data bits.

Select RS-485 If using RS-485 or using a converter that allows data sent by the 180 series unit to be echoed back on the same line, this option must be set to yes. Otherwise set this to no.

Poll time This is the time between polls of the PLC by the 180 unit in tenths of a second. For constant polling, set this to **zero**.

Output register type The 180 series unit will only read the internal output (M) register range.

Output starting register This is the starting register that the 180 series unit is to read. Sixteen consecutive words from the starting register must be available in the M register range. (Two registers per word, or a total of 32 internal outputs) The starting range is then 400 to 640 or 700 to 940. The starting register corresponds to the 180 unit's first input word and all others follow consecutively.

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Input register type The 180 series unit will only write to the data memory (M) register range.

Input starting register This is the starting register that the 180 series unit writes to. The 180 unit only writes to M registers. Sixteen consecutive words from the starting register must be available in the M range. (Two registers per word, or a total of 32 internal outputs) The range is then 400 to 640 or 700 to 940. The starting register corresponds to the 180 unit's first output word and all others follow consecutively.

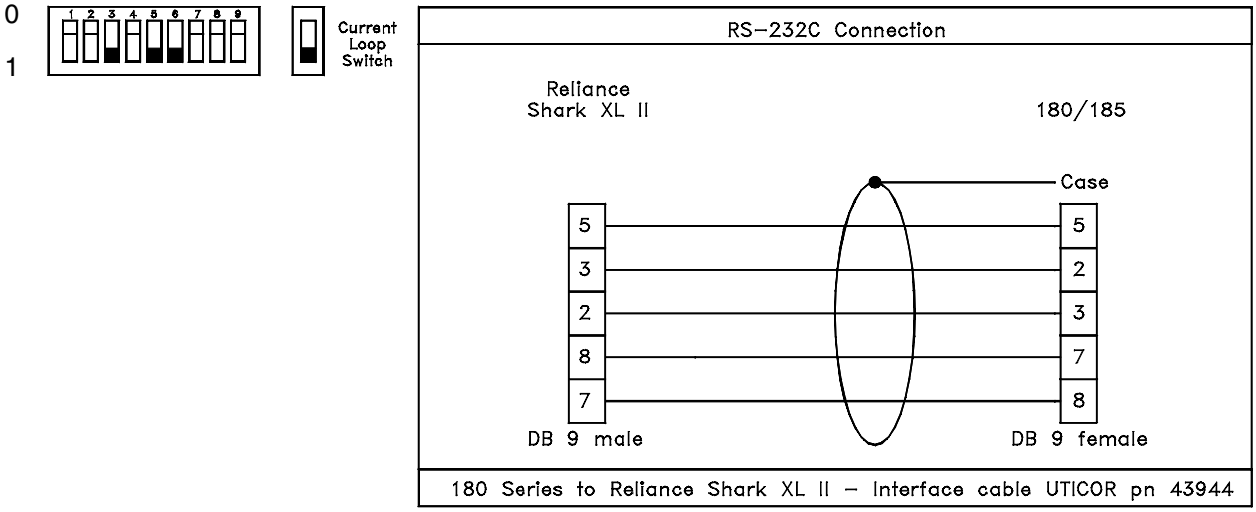


Figure 8-12

RELIANCE AUTOMATE PLC DRIVER ATTRIBUTES

(See figure 8-12) This 180 series PLC driver is designed to use registers in the Automate series PLCs. The registers to be used must be defined for the driver. Note, do not use I/O or system registers as these are critical registers and unexpected results may be produced.

Baud Rate The baud rates allowed are 300, 600, 1200, 2400, 4800, **9600**, and 19200. The one selected depends on the PLC port used. The PLC and 180 unit must have the same baud rates to communicate.

Parity The parity can be **none**, odd, or even and depends on the port selected.

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8 PLC Data

Stop Bits The number of stop bits is fixed at **1** for the Automate series PLC.

Data Bits: The number of data bits is fixed at **8** for the Automate series PLC.

Select RS-485 The Automate series PLC uses a n RS-232C serial protocol. Use this if using an RS-485/RS-232 converter.

Poll Time This is the time between polls of the PLC by the 180 series unit in tenths of a second. For constant polling, set this at **zero**.

Origin Node This is the node that the 180 unit is addressed at. The range is 0 to 250. This must be entered as a decimal number.

Origin Slot This is the slot that the 180 unit is addressed at. The range is 0 to 15. This must be entered as a decimal number.

Destination Node This is the node address of the PLC that the message is supposed to go to. The range is 0 to 250. This must be entered as a decimal number.

Destination Slot This is the slot address of the PLC that the message is supposed to go to. The range is 0 to 15. This must be entered as a decimal number.

Input Starting Register This is the starting register that the 180 series unit writes to. Sixteen consecutive words from the starting register must be available in the range. The range is then 0 to 57326. The starting register corresponds to the 180 unit's first output word and all others follow consecutively. This must be entered as a decimal number.

Output Starting Register This is the starting register the 180 series unit is to read. Sixteen consecutive words from the starting register must be available in the register type range. The range is then 0 to 57326. The starting register corresponds to the 180 unit's first input word and all others follow consecutively. This must be entered as a decimal number.

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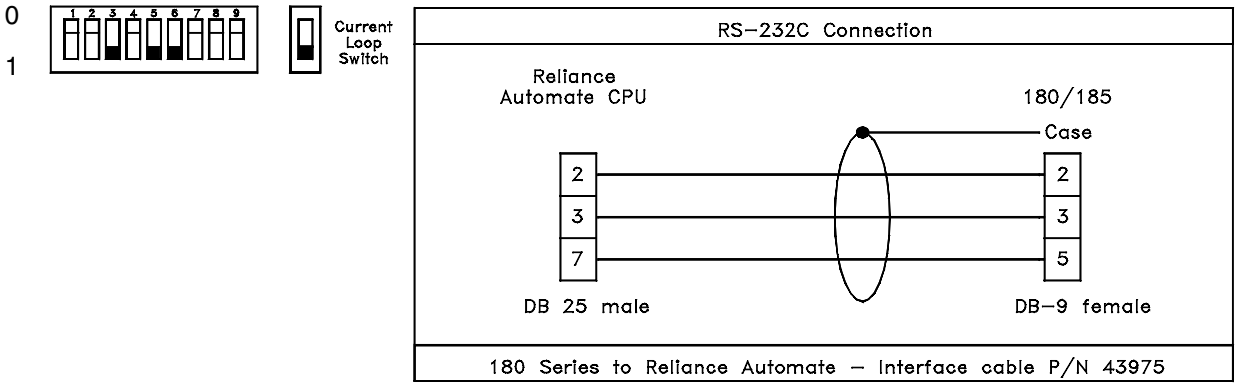


Figure 8-13

SIEMENS 100 SERIES, 115 CPU PLC DRIVER ATTRIBUTES

(See figure 8-14)

The 180 series PLC driver for Siemens controller is designed to use the controllers data blocks. The driver needs to know which data blocks and the data words in the data blocks to use.

The Siemens driver reads the complete data block, so keeping the data block larger than needed can slow the scan of the outputs (to 180 unit).

The driver also sets one register at a time, so changing multiple registers constantly can slow the scan of the outputs (to 180 unit) also.

Baud rate The Baud rate for the S5-100U is fixed at **9600** Baud.

Parity The parity for the S5-100U is fixed at an **EVEN** parity.

Stop Bits The number of stop bits is fixed at **1**.

Data Bits The number of data bits per byte is fixed at **8** bits.

Select RS-485 The Siemens PLC uses a current loop or an RS-232/current loop convert for serial communication protocol. RS-485 can not be used.

Poll time This is the time between polls of the PLC by the 180 series unit in tenths of a second. For constant polling set this to zero.

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8 PLC Data

Output data block This is the data block (DB) number that the 180 series unit is to read. This can be any data block that can be used by the user program. The limits are between data blocks 2 through 255.

Output starting word This is the starting word in the output data block for the 180 unit to read. It can be any legal data word in the data block. For the starting data word to be legal in the 180 series unit, sixteen consecutive words from the starting data word must be defined. The starting word corresponds to the 180 unit's first output word and all others follow consecutively. The limits are data word 0 to data word 240.

Input data block This is the data block (DB) number that the 180 unit writes to. This can be any data block that can be used by the user program, including the output data block as long as the starting data words are set to at least sixteen words apart. The limits are data blocks 2 to data block 255.

Input starting word This is the starting word in the input data block that the 180 series unit writes to. It can be any legal data word in the data block. For the starting data word to be legal in the 180 unit, sixteen consecutive words from the starting data word must be defined. The starting word corresponds to the 180 unit's first input word and all others follow consecutively. The limits are data word 0 to data word 240.

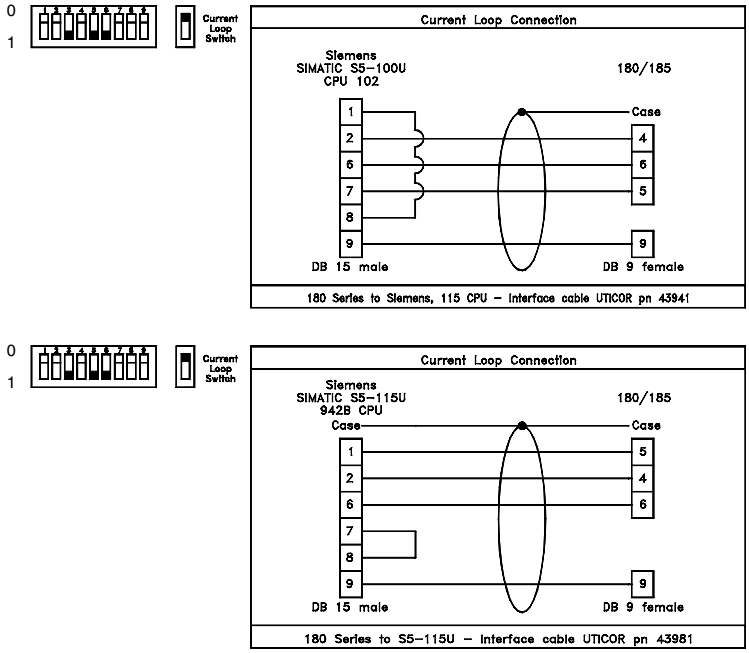


Figure 8-14

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SQUARE D SY/MAX PLC DRIVER ATTRIBUTES

(See figure 8-15)

This driver allows the 180 series unit to be connected to the NIM module and processor port. The driver is designed to use register entries in the Square D SY/MAX PLC. The driver needs to know which registers to use and the serial port settings.

The 180 series SY/MAX PLC driver uses an ASCII communication protocol and uses register words to exchange data with the PLC. Port settings can be set to any options available on both the 180 unit and the PLC. The serial port on the PLC supports baud rates of 300, 600, 1200, 4800, 9600, and 19200 baud. The other port settings are fixed at even parity , 8 data bits, and 1 stop bit.

Displayed Errors — If only one drop address is given, a **PLC MSG BAD REGISTER** error is displayed.

Baud rate — The baud rate options supported by the SY/MAX's port are 300, 600, 1200, 4800, **9600**, and 19200 baud. The PLC and 180 unit must be set to the same baud rates to communicate.

Parity — The SY/MAX's port is fixed at **even** parity.

Stop Bits — The SY/MAX's port is fixed at **1** stop bit.

Data Bits — The SY/MAX's port is fixed at **8** data bits.

Select RS-485 — The SY/MAX's port does not support RS-485.

Poll time — This is the time between polls of the PLC by the 180 series unit in tenths of a second. For constant polling, set this to **zero**.

Output starting register — This is the starting register the 180 series unit is to read. Sixteen consecutive registers from the starting register must be available in the PLC. The valid starting register range is 1 to 8177. The starting register corresponds to the 180 unit's first input word and all others follow consecutively.

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8 PLC Data

Input starting register This is the starting register the 180 series unit is to write to. Sixteen consecutive registers from the starting register must be available in the PLC. The valid starting register range is 1 to 7985. The starting register corresponds to the 180 unit's first output word and all others follow consecutively.

Route value #1 This is the first route value (in decimal). The legal address range is 0 to 199. A route value of 0 indicates there are no more drops from this level on. If route value #1 is defined, then route value #2 must be defined.

Route value #2 This is the second route value (in decimal). The legal address range is 0 to 199. A route value of 0 indicates there are no more drops from this level on. If route value #1 is defined, then route value #2 must also be defined, otherwise an error will result.

Route value #3 This is the third route value (in decimal). The legal address range is 0 to 199. A route value of 0 indicates there are no more drops from this level on. If a previous route value is defined as 0, then this level will not be checked.

Route value #4 This is the fourth route value (in decimal). The legal address range is 0 to 199. A route value of 0 indicates there are no more drops from this level on. If a previous route value is defined as 0, then this level will not be checked.

Route value #5 This is the fifth route value (in decimal). The legal address range is 0 to 199. A route value of 0 indicates there are no more drops from this level on. If a previous route value is defined as 0, then this level will not be checked.

Route value #6 This is the sixth route value (in decimal). The legal address range is 0 to 199. If a previous route value is defined as 0, then this level will not be checked.

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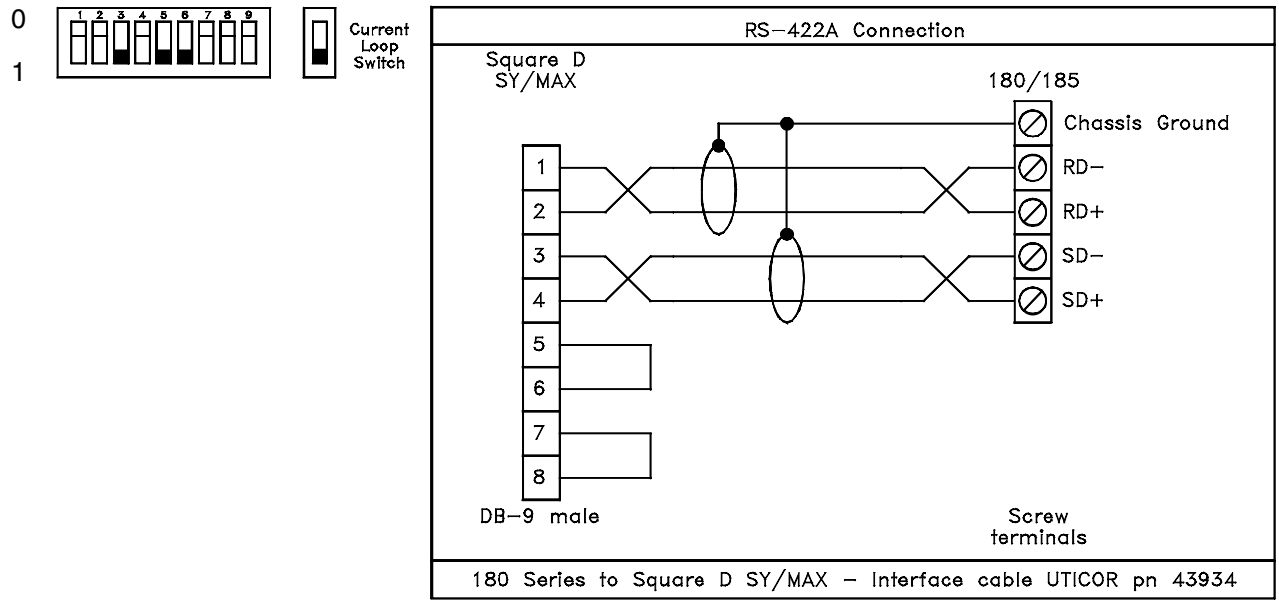


Figure 8-15

TEXAS INSTRUMENTS 405 SERIES PLC DRIVER ATTRIBUTES

(See figure 8-16)

The 180 series PLC driver for Texas Instruments 405 series controller is designed to use the PLCs' user data V memory. The driver needs to know which data words to use.

The key switch on the TI 405 series PLC must be in the term position in order to operate with the software driver. It will not work with the switch in the run position.

Baud rate The Baud rate for the 405 series is fixed at **9600** Baud.

Parity The parity for the 405 series is fixed at an **ODD** parity.

Stop Bits The number of stop bits is fixed at **1** for the 405 series.

Data Bits The number of data bits per byte is fixed at 8 bits for the 405 series.

Select RS-485 The Texas Instruments 405 series PLC uses an RS-232 serial protocol. Use this if using an RS-485/RS-232 converter.

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8 PLC Data

Poll time This is the time between polls of the PLC by the 180 series unit in tenths of a second. For constant polling set this to zero.

Output register type The output registers used by the 180 series unit are in the user data (V memory). So the type is fixed as Vxxxxx.

Output starting register This is the starting register the 180 series unit is to read. Sixteen consecutive words from the starting register must be available in user data V memory. The user data range is octal V01400 - V07377. The range for this attribute is then 768 to 3824 decimal and **must be entered as a decimal number**. The starting register corresponds to the 180 unit's first output word and all others follow consecutively.

Input register type The input registers used by the 180 series unit are also in the user data (V memory). So the type is fixed as Vxxxxx.

Input starting register This is the starting register that the 180 series unit writes to. Sixteen consecutive words from the starting register must be available in the user data V memory. The user data range is octal V01400 - V07377. The range for this attribute is then 768 to 3824 decimal and **must be entered as a decimal number**. The starting register corresponds to the 180 unit's first input word and all others follow consecutively.

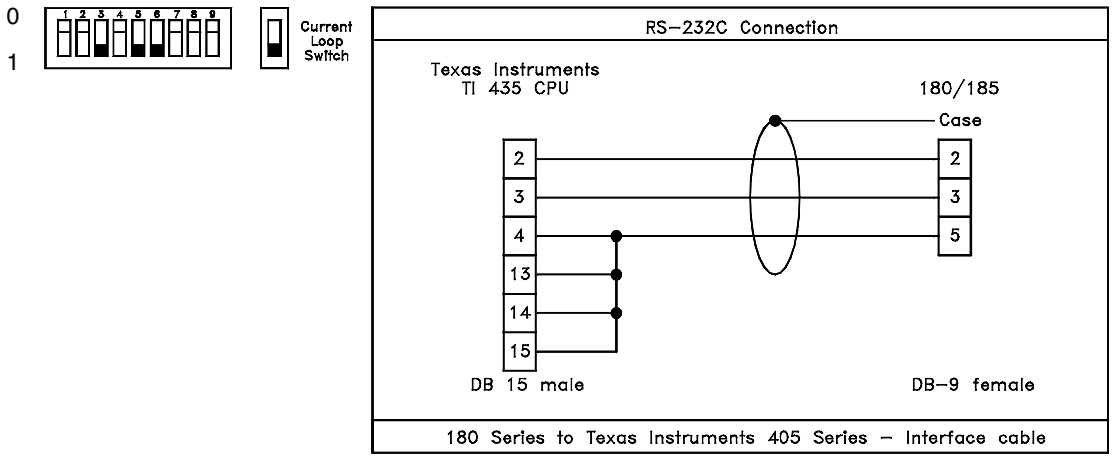


Figure 8-16

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TEXAS INSTRUMENTS 505 SERIES PLC DRIVER ATTRIBUTES

(See figure 8-17) The PMD 180 series PLC driver for the Texas Instruments 505 series controller is designed to use the PLC's user data V memory. The driver needs to know which data words to use.

Baud rate The baud rate for the 505 series is adjustable. The available settings are 300, 600, 1200, 2400, 4800, 9600, and **19200** baud

Parity The parity for the 50 series is fixed at **no** parity.

Stop bits The number of stop bits is fixed at **1** for the 505 series.

Data bits The number of data bits per byte is fixed at **8** bits for the 505 series.

Select RS-485 The Texas Instruments 505 series PLC uses an RS-232C serial protocol.

Poll time This is the time between polls of the PLC by the 180 unit in tenths of a second. For constant polling set this to 0.

Output register type The output registers used by the 180 series unit are in the user data (V memory). Therefore the type is fixed as Vxxxxx.

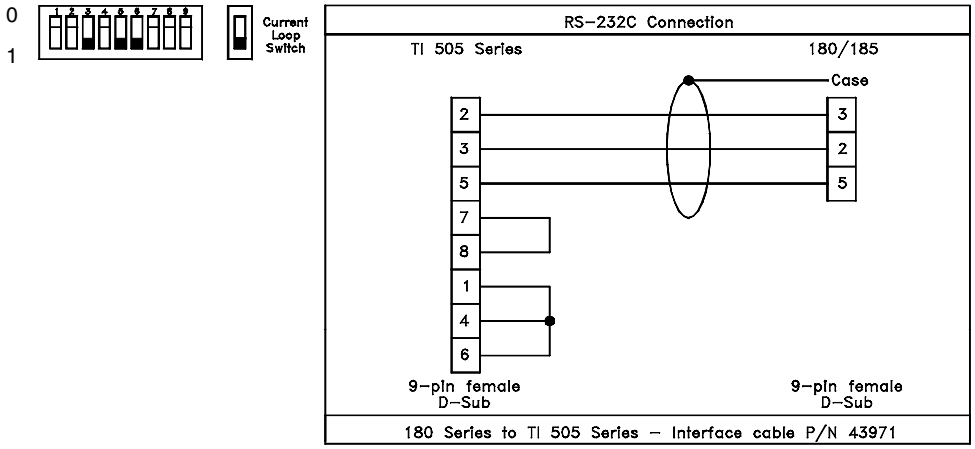
Output starting register This is the starting register the 180 unit is to read. Sixteen consecutive words from the starting register must be available in user data V memory. The user data range is from 1 to 65520 and must be entered as a decimal. The starting register corresponds to the 180 unit's first input word and all others follow consecutively.

Input register type The input registers used by the 180 series are also in the user data (V memory). Therefore the type is fixed as Vxxxxx.

Input starting register This is the starting register that the 180 series writes to. Sixteen consecutive words from the starting register must be available in the user data V memory. The range for this attribute is from 1 to 65520. The starting register corresponds to the 180 unit's first output word and all others follow consecutively.

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8 PLC Data



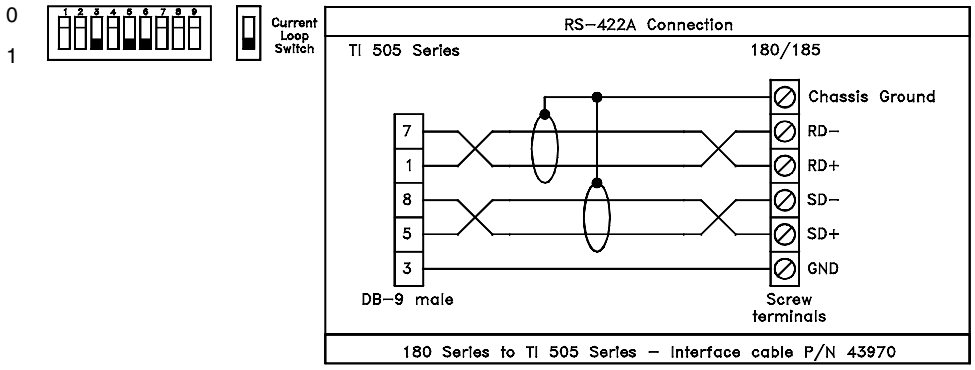


Figure 8-17

TOSHIBA EX100/250/500/200B PLC DRIVER ATTRIBUTES

(See figure 8-18)

This 180 series PLC driver is designed to use registers in the Toshiba PLC. The driver needs to know which registers to use and the serial port settings.

The 180 series' Toshiba PLC driver uses the binary communication protocol. This is the only serial protocol the 180 series unit supports. Port settings can be set to any options available on both the 180 unit and the PLC. For the PLCs' programmer port the serial ports parameters are set at 4800 Baud, EVEN parity, 8 data bits, and 1 stop bit. The computer link port on the PLC or module supports Baud rates of 300, 600, 1200, 2400, 4800, and 9600 Baud; and parity selections of NONE, ODD, or EVEN.

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Baud rate The Baud rate for the Toshiba PLCs' programmer port is fixed at 4800 Baud. The Baud rate options supported by the Toshiba PLCs' computer link port are 300, 600, 1200, 2400, **4800**, and 9600. Not all these Baud rates are available on all computer links. The PLC and 180 unit must be set to the same Baud rates to communicate.

Parity The Toshiba PLCs' programmer port is fixed at **EVEN** parity. The Toshiba PLCs' computer link port supports settings of NONE, **EVEN** or ODD parity. The PLC and 180 unit must be set to the same parity to communicate.

Stop Bits Both Toshiba PLC ports are fixed at **1** stop bit. The PLC and 180 unit must be set to **1** stop bit to communicate.

Data Bits Both Toshiba PLC ports are fixed at **8** data bits. The PLC and 180 unit must be set to **8** data bits to communicate.

Select RS-485 If using RS-485 or using a converter that allows data sent by the 180 series unit to be echoed back to the 180 unit on the same line this must be set to YES. Otherwise, it can be set to NO, if the 180 unit RD and SD are connected somewhere on the line.

Poll time This is the time between polls of the PLC by the 180 unit in tenths of a second. For constant polling set this to **zero**.

Station (Computer link only) When the computer link is used the 180 unit needs the computer link station address. If the programmer link is used, this field has no meaning.

Output register type The 180 series unit only reads the D register range, so this is fixed for the Toshiba PLC.

Output starting register This is the starting register the 180 series unit is to read. Sixteen consecutive words from the starting register must be available in the D register type range. The range is then 0000 to 1520. The starting register corresponds to the 180 unit's first output word and all others follow consecutively.

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8 PLC Data

Input register type The 180 series unit only writes to the D register range, so this is fixed for the Toshiba PLC.

Input starting register This is the starting register that the 180 series unit writes to. The 180 unit only writes to D registers. Sixteen consecutive words from the starting register must be available in the D range. The range is then 0000 to 1520. The starting register corresponds to the 180 unit's first input word and all others follow consecutively.

PLC Port This needs to be set to the correct port depending on how the PLC is to be connected to the 180 series unit. The 180 unit needs to know which port, so it can or cannot use the station address. An invalid setting will cause communication errors.

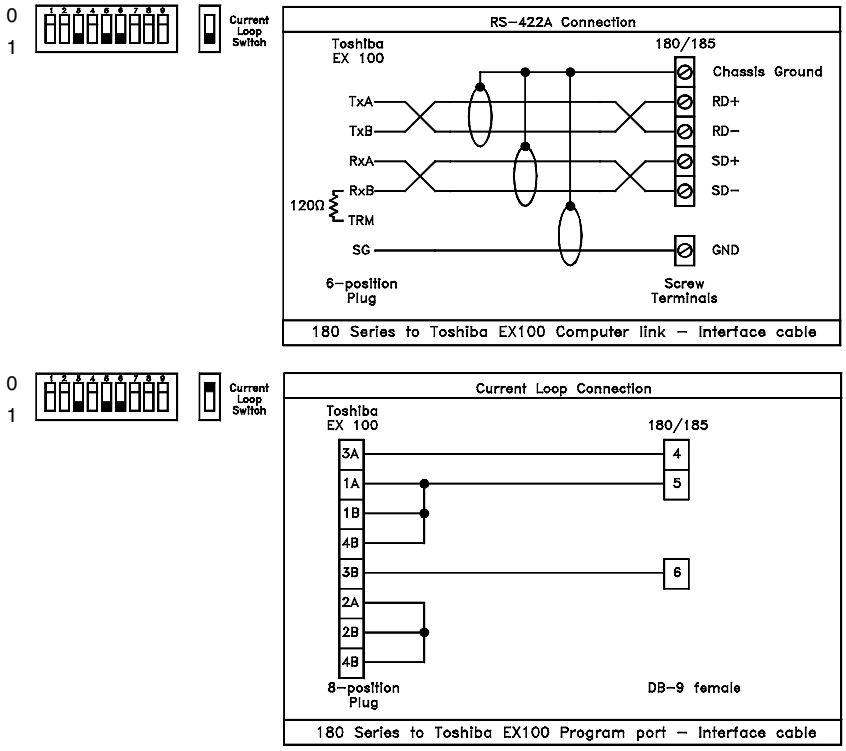


Figure 8-18

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9 ASCII PROTOCOL

ASCII PROTOCOL FOR COMPUTER/PLC INTERFACE

Note: *Only one port (computer or PLC) can operate with ASCII protocol at a time. To control the LEDs with the ASCII driver on the PLC port, set the system attribute 'LED control' to computer interface.*

The Computer Interface can operate with either normal PMD protocol or ASCII protocol. When the Computer Interface has been programmed for ASCII protocol, the display will act like an ASCII terminal. Likewise, the PLC Interface can operate with a name-brand driver or with ASCII protocol. When using ASCII protocol for computer interface, select CRC checksum so that the 10F54 programming can also be used.

Note: *The ^ is an ASCII circumflex (94_{10}, $5E_{16}$, or Shift+6) and not a control command. Only printable characters will be processed. The ASCII circumflex (^) will not be printed since it is used for the control functions that can be used to control the way that text is displayed.*

After the unit has been set up in ASCII protocol, the unit can be put back into Display mode which is the normal operating mode of the Operator Interface. After the unit receives a **^A** command to select it, all text is displayed as it is received. Some exceptional formatting can be accomplished with the special functions provided. Additionally, the user can send packets that define messages to take advantage of the PCI's display and message control capabilities. Note that the ASCII mode is compatible with the current ASCII slave products with a few exceptions. The **^B** command for select blink mode is not supported. The **^P** command allows you to scroll messages.

ASCII FUNCTIONS

When the Operator Interface is receiving commands in ASCII mode, it must receive the correct number of characters before it will perform the specified command. Each time a **^** is received, it is assumed to be the beginning of a new command with the exception of **^Qnn** commands which must be received as part of a **^P** or **^O** command. When a **^** is received, the unit will start a new current command and throw out any part of a command it may have been in the process of receiving. Note that a unit must be selected with the **^Agguuuu** command before it will process any other characters or commands. If it is not selected, it will not process any input.

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9 ASCII PROTOCOL

The following is a list of the different commands and their general meanings.

Note: *Commands are case sensitive.*

^Agguuuu	=	Select Unit
^bxxxxx	=	Clear Message Queue
^cx	=	Enable/Disable Message Queue
^Cn	=	Select Center Mode
^En	=	Reset Display
^Frr	=	Select Scroll Rate
^Gbbcc	=	Select On/Off Rate
^Hrrcc	=	Position Cursor
^In	=	Select New Line
^Jn	=	Select Wrap
^Knnnnn	=	Trigger Programmed Message
^Msnnnnn	=	New Variable Data
^Nnnnnn	=	Delete Message
^Onnnnn	=	Program Message
^P	=	Display Text
^Qnn	=	Message Attributes (Note that this command can only be used inside ^Onnnnn or ^P commands)
^r	=	Read current function key status
^Un	=	Read Data Set(s)
^Vxyabcd=	Set LED on/off	
^Xn	=	Blink Delimiters on/off
^Z	=	End of Text or Message

A more detailed description of each of these commands and the definition of its variables follows —

^Agguuuu SELECT UNIT

This command selects which unit(s) will process the ASCII commands that are sent out. It will allow multiple units to be connected together and addressed. These units can be addressed as a whole, as a subset, or as individual units. Only units that have been selected will process commands.

gg = a 2-digit group number
uuuu = a 4-digit unit number

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In both cases, the number must be padded with zeros (i.e. for unit 45, the number would be 0045).

All units will always process all **^A** commands to see if they have been selected or deselected. A unit is deselected by not being selected in a **^A** command.

There are three basic rules for selecting units.

1. Group x and Unit x selects only the unit with matching numbers.
2. Group x and Unit 0 selects all units in group x.
3. Group 0 and Unit 0 selects all units.

^bxxxxx CLEAR MESSAGE QUEUE

This command allows the user to clear one or all messages from the queue. To clear a specific message from the queue, fill the variable xxxxx with a particular message number. To clear all messages from the queue, use the number 65535 for the variable. No reply is sent back to the ASCII controller.

^cx ENABLE/DISABLE MESSAGE QUEUE

This command allows the user to either enable or disable the message queue. The default setting is disabled. No reply is sent back to the ASCII controller

x = 0 = queue enabled
x = 1 = queue disabled

^Cn SELECT CENTER MODE

This command allows the user to center text on the display.

n = 0 = turn centering off
n = 1 = turn centering on

^En RESET DISPLAY

This command performs clear and/or reset of the selected unit. The user can specify which level of reset to perform.

n = 0 = clear the display and home the cursor
n = 1 = clear the display and reset all parameters modified by ASCII protocol
n = 2 = clear the display and leave the cursor at its current position

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^Frr SELECT SCROLL RATE

This command selects the rate at which the unit will scroll text from right to left.

rr = 01 to 99
01 = .1 second
99 = 9.9 seconds

The number selected must be between 1 and 99. Values less than 10 must be padded with zeros.

^Gbbcc SELECT ON/OFF RATE

The user selects the rate at which the display will blink on and off. The valid range is between 1 and 99. Values less than 10 must be padded with zeros.

bb = 01 - 99 blink on interval
cc = 01 - 99 blink off interval
01 = .1 second
99 = 9.9 seconds

^Hrrcc POSITION CURSOR

This command lets the user position the cursor anywhere on the display. The row and column values must be within the range for the display being used.

rr = 01 - 04 row...valid range for 185 displays
cc = 01 - 40 column...valid range for 185 displays

^In SELECT NEW LINE

This command controls how a carriage return sent to the display will effect the cursor. If new line is on, then a carriage return will cause the cursor to be advanced to the beginning of the next line. If new line is off, then a carriage return will cause the cursor to be advanced to the beginning of the line that it is currently on. The default value for New Line is ON.

n = 0 = New Line is off
n = 1 = New Line is on

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^Jn SELECT WRAP

This command controls how the cursor advances past the end of a display line. When wrap is on, the cursor advances to the beginning of the next line. When wrap is off, the cursor remains at the end of the line the cursor is currently on.

n = 0 = wrap is off
n = 1 = wrap is on

^Knnnnn TRIGGER PROGRAMMED MESSAGE

This command lets the user make a previously programmed message in the unit be displayed. The message number must be the number of an existing message. If the message does not exist, nothing will be displayed. Message number must be padded with zeros for any message less than 10,000.

nnnnn = 5 - digit message number

^Msnnnnn NEW VARIABLE DATA

This command lets the user send new variable data to the unit. The user must define which data set and the new data to be used when sending to the PCI.

s = 1 - 4 data set number
nnnnn = 5 - digit data set value

^Nnnnnn DELETE MESSAGE (RAM Units only)

This command lets the user delete a message in the PCI. The user must specify a 5 -digit message number to be deleted.

nnnnn = 5 - digit message number

^Onnnnn PROGRAM MESSAGE (RAM Units only)

Messages are programmed with this command. The message number selected must be unique to the other messages in the PCI. The text must be followed by a ^Z or the message will be ignored. The maximum length of text including carriage returns is 223 characters.[1]

nnnnn = 5 - digit message number

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9 ASCII PROTOCOL

^P DISPLAY TEXT

This command allows the user to display text using the attributes of the PCI 400 that are not available through the other ASCII commands. This command works the same as the **^Onnnnn** command except the message is displayed right away and not programmed into the unit. The maximum length of text including carriage returns is 225 characters.[1]

^Qnn MESSAGE ATTRIBUTES

This command is only usable with **^Onnnnn** and **^P** commands. It allows you to add attributes to the display text, some of which are not available through other ASCII protocol commands.

^Q01	= Blink Entire Message
^Q02	= Center Message
^Q03	= Not Valid
^Q04	= Log Message
^Q05r	= Chain Message r = repeat (0 = no, 1 = yes)
^Q06gguuuu	= Send to Slave Group and Unit
^Q07n	= Data Set n goes Here (All 5 digits of the indicated will be displayed or inserted into the message being programmed)
^Q08	= Insert Time Here
^Q09	= Insert Date Here
^Q10btr	= Scroll Up b = bottom row (1-4), t = top row (1-4), repeat (0 = no, 1 = yes)
^Q11lr	= Scroll left l = line # (1-4), r = repeat (0 = no, 1 = yes)

^r READ CURRENT FUNCTION KEY STATUS

This command will cause the PCI to send back the current status of the function keys. The PCI will return a bitmap of the function keys' status.

The standard reply format from the PCI, when a bitmap representation is selected, will be in this form:

^rabcd^Z

a = Function Keys 16 - 13
b = Function Keys 12 - 9
c = Function Keys 8 - 5
d = Function Keys 4 - 1

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^Un READ DATA SETS

This command will cause the PCI to return the current value of the variable data sets. The user can specify that either one or all data sets be returned.

n = 0 = send all data sets
n = 1 - 4 = send only the data set specified by n.

The standard reply format will vary depending on whether all or only one of the data sets were selected. The format for one will be **^Uxaaaaa^Z.** The format for all of the data sets is **^Uxaaaaa,bbbbb,ccccc,ddddd^Z.**

x	= 0 = all data is ready
x	= 1 = data set 1 is not ready
x	= 2 = data set 2 is not ready
x	= 3 = data set 3 is not ready
x	= 4 = data set 4 is not ready
aaaaa	= data set 1, or specified data set for single data set selection
bbbbb	= data set 2
ccccc	= data set 3
ddddd	= data set 4

^Vxyabcd SET LED ON/OFF

This command is used to turn the status LEDs of the operator interface on and off. The LEDs on or off depending on the bitmap sent. LEDs that are not specified in the bitmap will not be effected by this command. The definitions of the variables in this command are as follows:

x = 0 = Turn LEDs off
x = 1 = Turn LEDs on
y = 1 = LED group #1 (1 - 16)
y = 2 = LED group #2 (17 - 32)
y = 3 = LED group #3 (33 - 48)
a = LEDs 16 - 13 of this group
b = LEDs 12 - 9 of this group
c = LEDs 8 - 5 of this group
d = LEDs 4 - 1 of this group

The command **^V113A04** will turn on LEDs 14, 13, 12, 10, and 3 on the PCI 185 front panel.

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9 ASCII PROTOCOL

^Xn BLINK DELIMITERS

This command is used when you want only part of the message to blink. After the 'blink on' command is received, all following characters will blink until a 'blink off' command is received. The variable functions as follows:

n = 0 = blink is off
n = 1 = blink is on

^Z END OF TEXT OR MESSAGE

This command must follow all **^O** and **^P** commands for the message to be valid. It will also be the last element in all replies given by the PCI.

Message numbers for a chain message are to be entered on one line with no carriage return between the individual message numbers. Each message number requires 5 digits. If a message number has less than 5 digits, it must be padded with zeros.

EXAMPLES

In this portion we provide some illustrations on how messages are programmed. The first illustration will be for displaying text on a single unit.

This first example is to be sent to unit 124, group 3.

^A030124Testing ASCII Mode

This will cause the text "Testing ASCII Mode" to be displayed at the current cursor position on a PCI set up as group 3 unit 124. All other PCIs on the same line will ignore this text. Any further commands or text would only be processed or displayed by this unit until another **^A** command is issued to select a different PCI. All units will monitor all commands listening for a ^A command whether they are selected or not. Only selected units will display text or process commands.

The second illustration will trigger message # 439 to be displayed by the currently selected PCI.

^K00439

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The third illustration will program message # 228 with Center and Log Message.

^O00228^Q02^Q04Message text for msg. 228^Z

CONCLUSION

The ASCII protocol allows the PCI to act like an ASCII terminal. Using the selected interface port, the user can program messages, trigger messages, and take advantage of many of the other features and advantages of the PCI 185 Operator Interfaces.

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9 ASCII PROTOCOL

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10 General Specifications

NEMA Ratings: **Message Display Only**	NEMA 12 (NEMA 4X Optional)
Electrical Interference Tolerance:	NEMA ICS 2-230 Showering Arc Test ANSI C37.90a-1974 (SWC) Surge Withstand Capability Test
Power Requirements:	AC Displays: 115/230 VAC (102-132/194-250), 47-63 Hz, 11 VA DC Displays: 24 VDC (20-32), 11 VA AC Controllers: 115/230 VAC (102-132/194-250), 47-63 Hz, 8 VA DC Controllers: 24 VDC (20-32), 8 VA
Fuse Type:	115 VAC Unit: .25 Amp @ 250 VAC, 2 AG, Sub-Miniature, Slo-Blo 230 VAC Unit: .25 Amp @ 250 VAC, 2 AG, Sub-Miniature, Slo-Blo 24 VDC Unit: .5 Amp @ 250 VAC, 2 AG, Sub-Miniature, Slo-Blo
Operating Temperature:	0 to +60 °C Ambient
Storage Temperature:	-40 to +95 °C Ambient
Humidity:	10–95% Relative Humidity Non-Condensing
Battery:	.5AA Lithium 3.6 V
Battery Life:	Typically 5 years (Minimum 1.5 years when OFF continuously)
Clock Accuracy:	1 Minute per month error (Maximum)
Message Memory Type:	EEPROM: 8K, 32K, 64K, or 128K RAM: 32K or 128K
Memory Life:	EEPROM: Min. 10,000 changes to a given location RAM: Unlimited changes (Theoretically)
Memory Usage:	Approximately 175 80-character messages/16Kbytes of memory
Display Configuration:	2 Lines of 40 characters vacuum fluorescent (Blue) 4 Lines of 20 characters vacuum fluorescent (Blue) 2 Lines of 20 characters vacuum fluorescent (Blue)
Display Type:	5 x 7 Dot matrix
Character Height:	4.65 mm high characters (2 Lines of 40 characters) 5.0 mm high characters (4 Lines of 20 characters) 5.05 mm high characters (2 Lines of 20 characters)
Viewing Distance:	10 feet (3 meters) approximately

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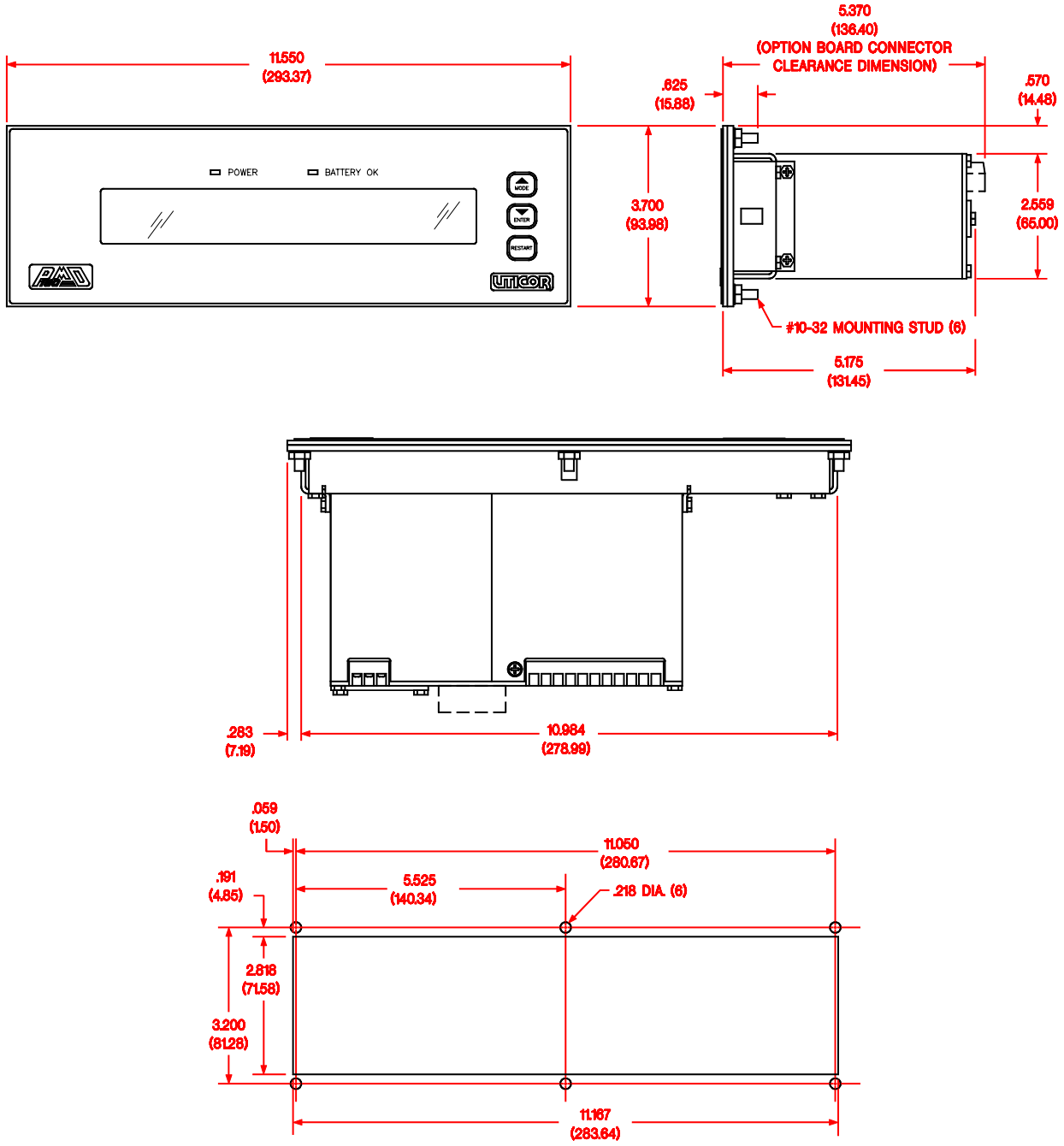
10 General Specifications

Character sets:	U.S., Cyrillic, German, English, Danish, Swedish, French, and Japanese Kana
Space Requirements:	13.375 Wide x 5.370 High x 5.175 Deep (NEMA 12, 2x40 Model) 13.875 Wide x 5.870 High x 5.175 Deep (NEMA 4X, 2x40 Model) 11.338 Wide x 5.669 High x 5.175 Deep (NEMA 12, 4x20 Model) 11.838 Wide x 6.169 High x 5.175 Deep (NEMA 4X, 4x20 Model) 8.650 Wide x 3.700 High x 5.175 Deep (NEMA 12, 2x20 Model) 9.150 Wide x 4.200 High x 5.175 Deep (NEMA 4X, 2x20 Model) 12.500 Wide x 3.559 High x 4.860 Deep (Message Controller)
Weight:	4.5 pounds (Message Display) 3.8 pounds (Message Controller)
Mounting:	Panel mount with built-in mounting studs (Message Display) Panel mount with pre-cut keyways for ¼-20 bolts (Message Controllers)
Terminal Blocks:	Wire-Clamp terminal blocks for 18-22 AWG

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11 Unit Cutout and Dimensions

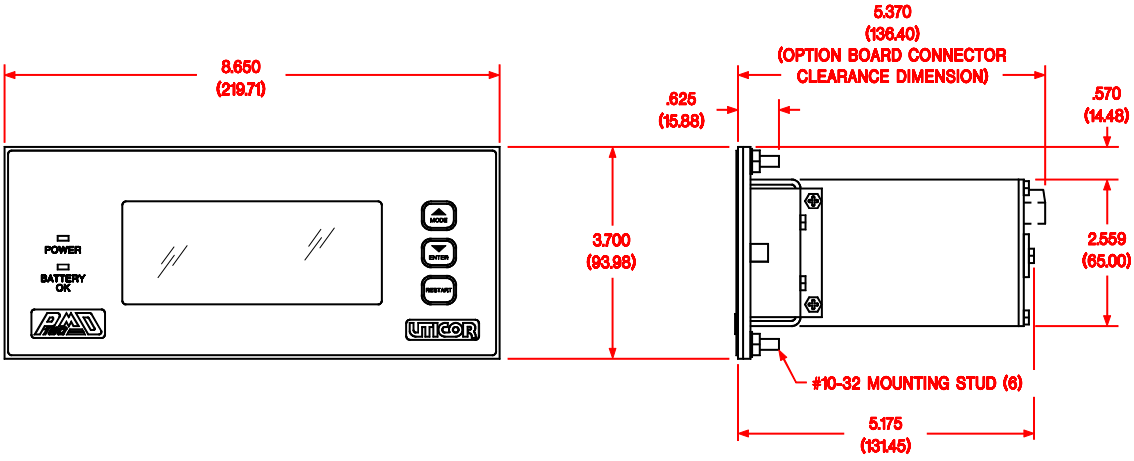
Shown below are the cutout and mounting dimensions of the **Standard NEMA 12, PMD 180 that has two lines of forty characters.**

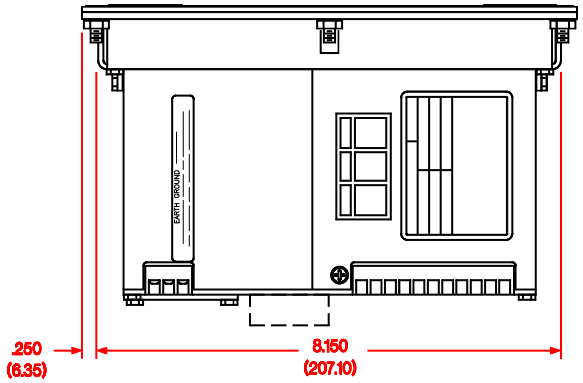


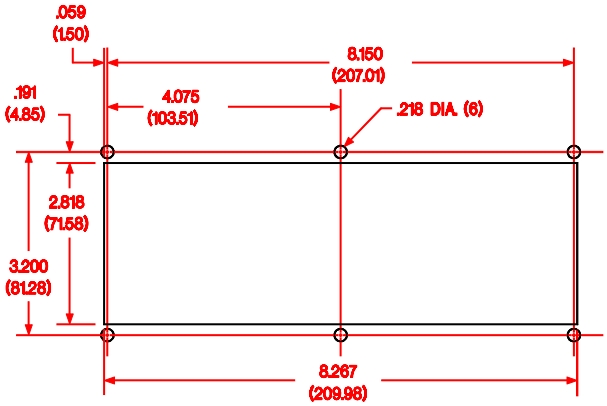
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11 Unit Cutout and Dimensions

Shown below are the cutout and mounting dimensions of the **Standard NEMA 12, PMD 180 that has four lines of twenty characters.**



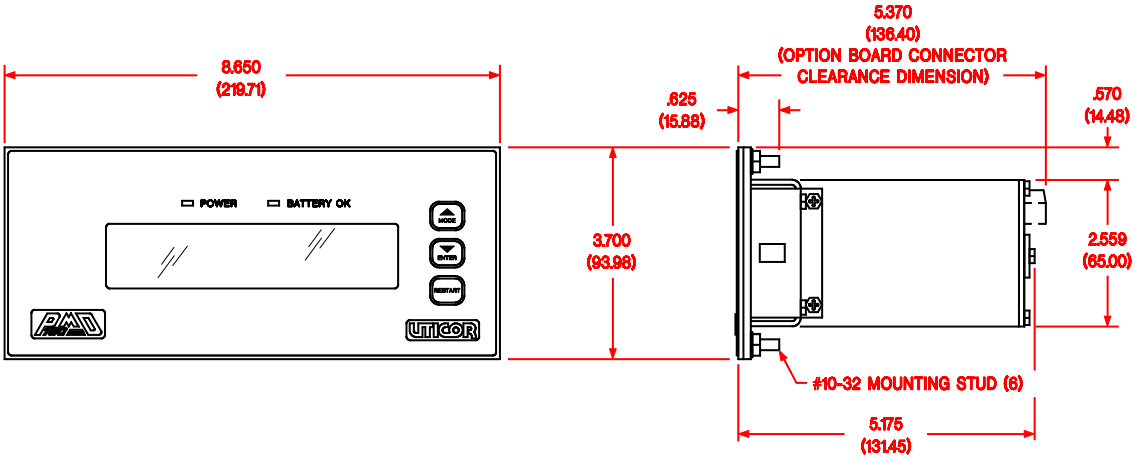


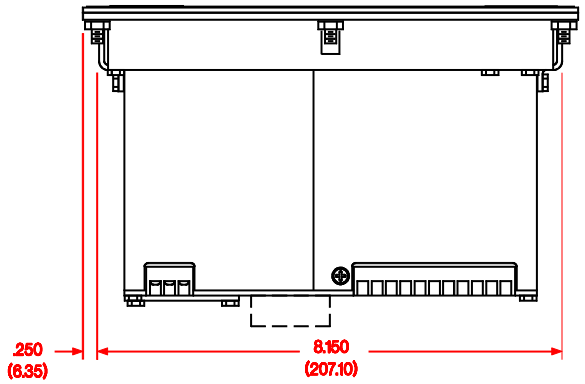


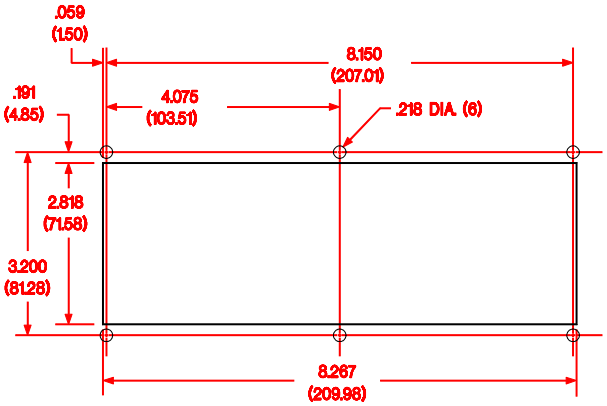
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11 Unit Cutout and Dimensions

Shown below are the cutout and mounting dimensions of the **Standard NEMA 12, PMD 180 that has two lines of twenty characters.**



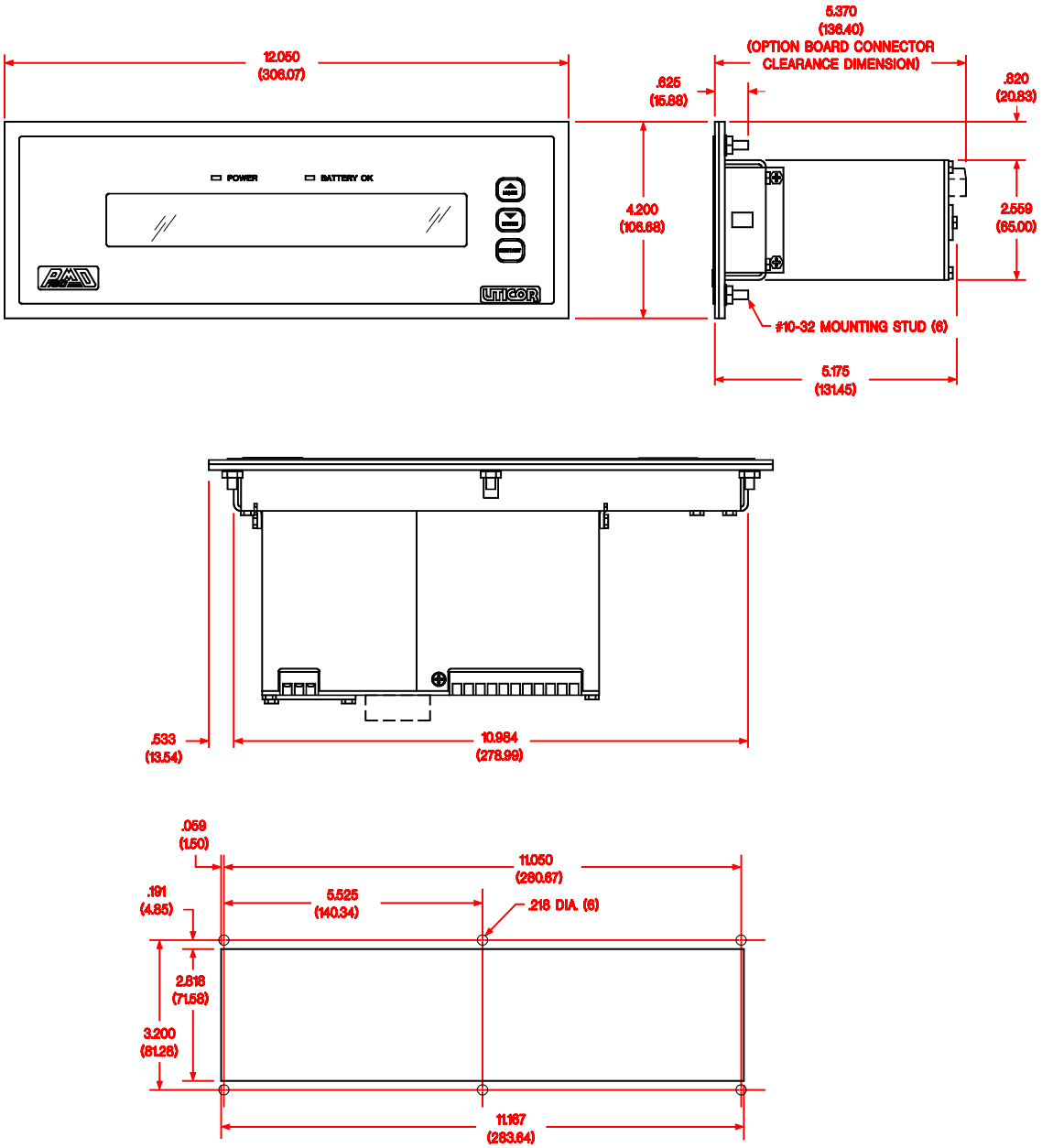




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11 Unit Cutout and Dimensions

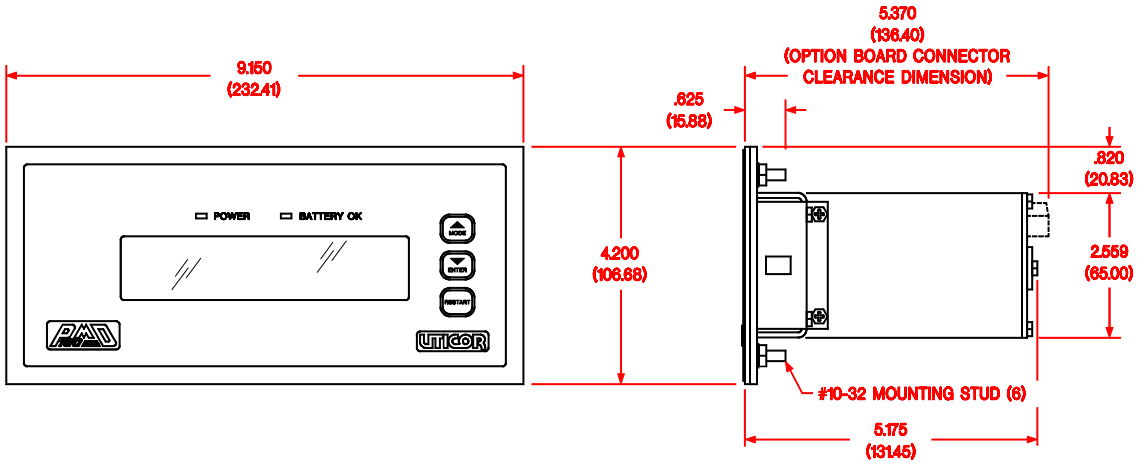
Shown below are the cutout and mounting dimensions of the **Stainless Steel, NEMA 4X PMD 180 that has two lines of forty characters.**

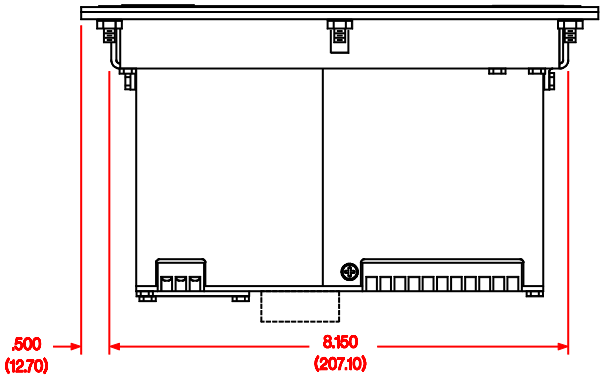


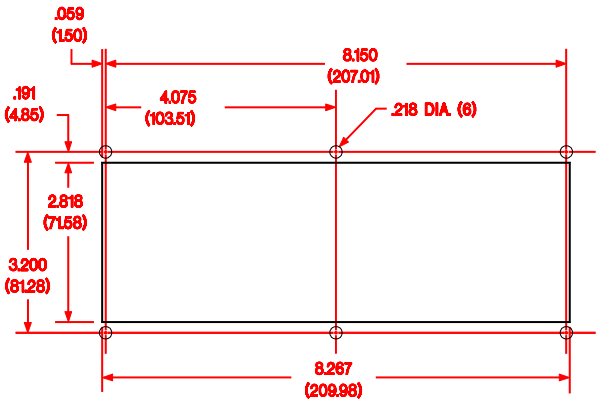
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11 Unit Cutout and Dimensions

Shown below are the cutout and mounting dimensions of the **Stainless Steel, NEMA 4X PMD 180 that has four lines of twenty characters.**



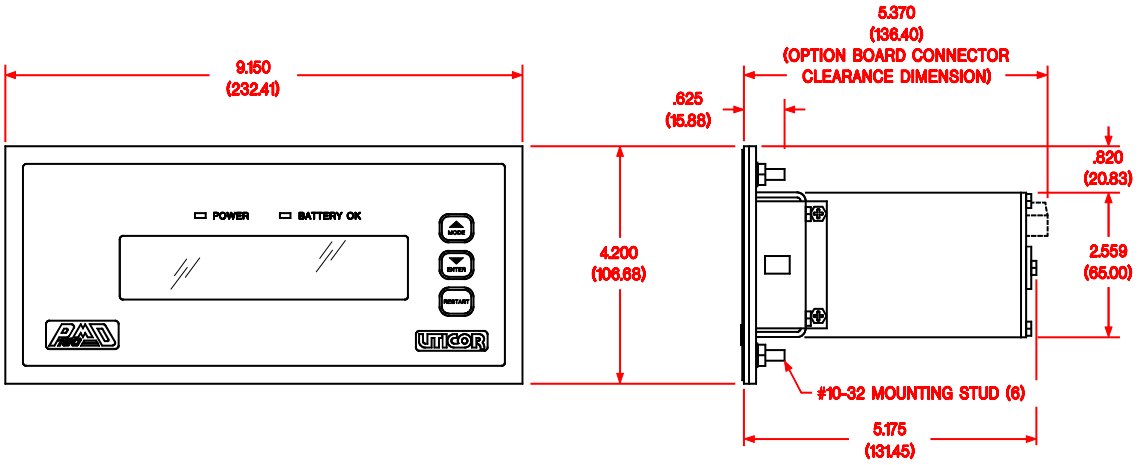


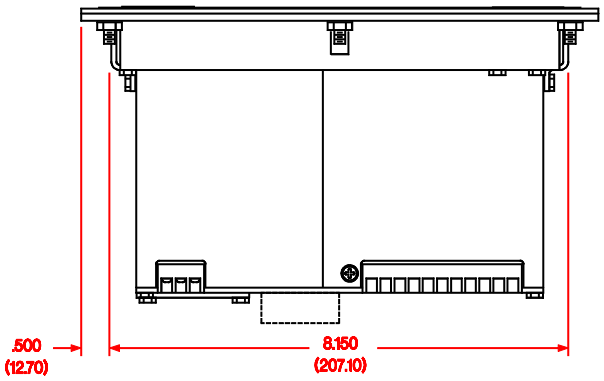


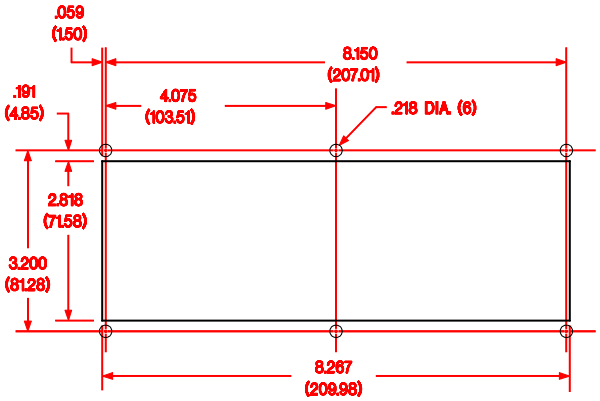
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11 Unit Cutout and Dimensions

Shown below are the cutout and mounting dimensions of the **Stainless Steel, NEMA 4X PMD 180 that has two lines of twenty characters.**



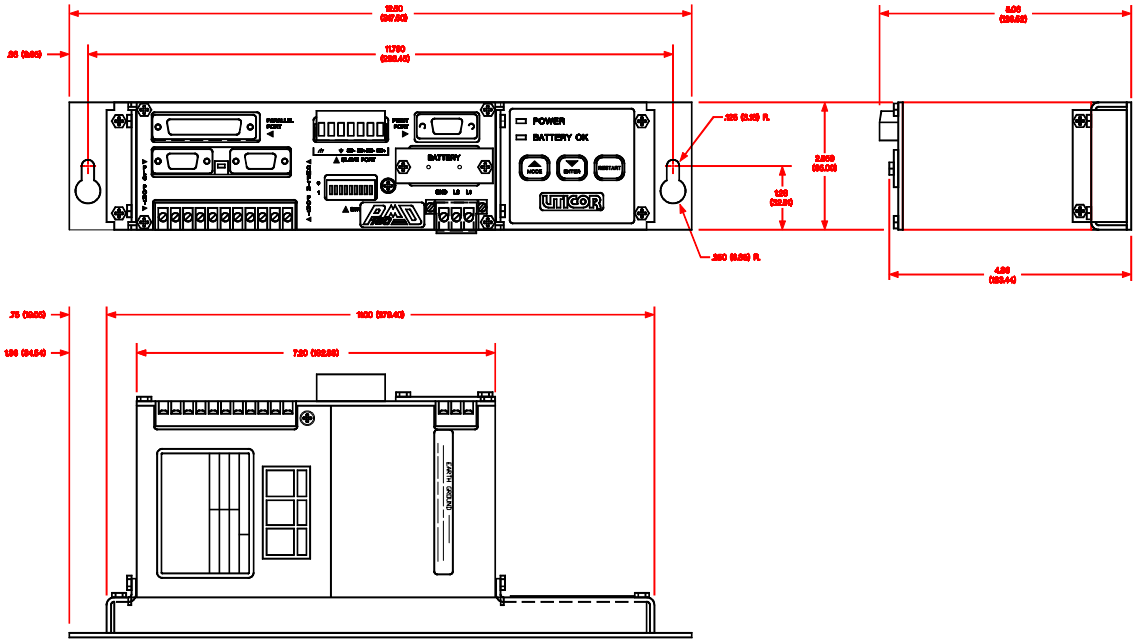




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11 Unit Cutout and Dimensions

Shown below are the outline and mounting dimensions of the **PMD 180 Message Controller.**

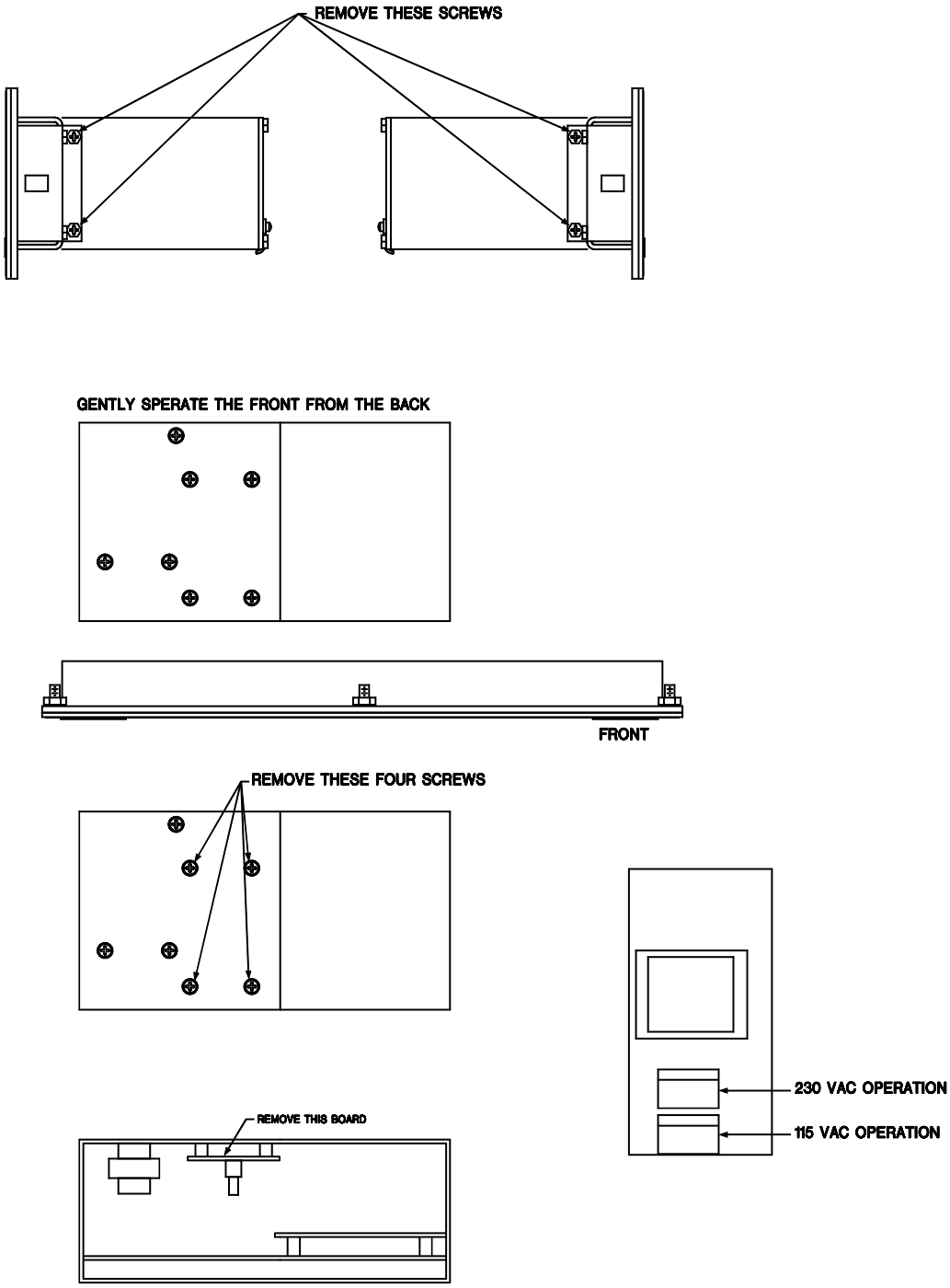


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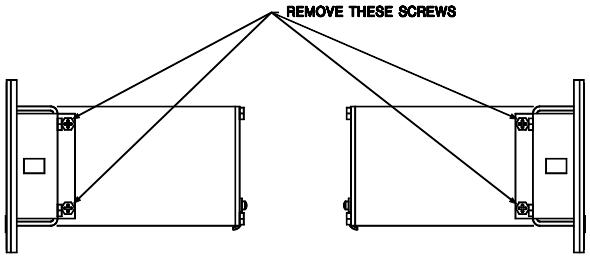
If you are powering the **PMD 180 with 230 VAC**, it is necessary to move an internal jumper. The drawing below shows the procedure used to move this jumper.

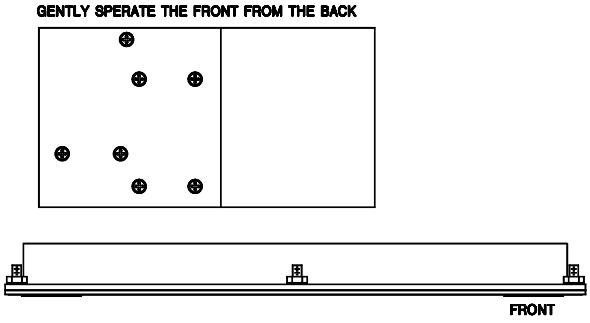


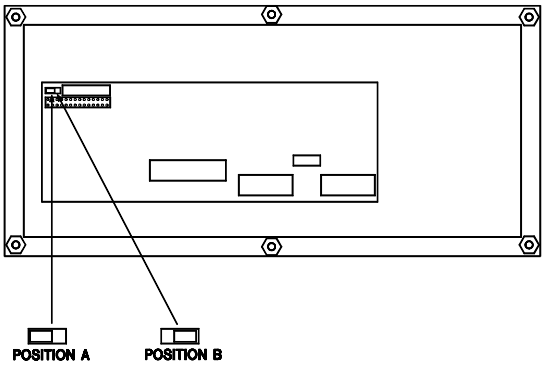
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12 Internal Adjustments

The **front panel pushbuttons can be disabled** by the dip switches on the back of the unit. However, by moving an internal jumper, the **Mode and Enter kekys can be re-enabled.** This allows the user to **manually increment and decrement the message queue**. Access to this jumper can be acquired by separting the back part of the unit from the front as shown below. When the jumper is in the "A" position, dip switch nine will completely disable the front panel pushbuttons. Position "B" allows Mode and Enter to still be used for manipulating the message queue.







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13 System Attribute Default Settings

The PMD 180's default system attributes are listed below. These different settings can be changed either online or offline. Numeric values are changed with the number keys on the computer. Other values are changed with the space bar.

Blink Attributes:

Blink ON time = 0.5 seconds
Blink OFF time = 0.5 seconds

Scroll Attributes:

Scroll UP time = 0.5 seconds per line
Scroll LEFT time = 0.2 seconds per column

Miscellaneous Attributes:

Display Saver Timeout = Disabled
Chain message time = 10 seconds per message within the chain
Chain message, repeat scrolling message = no repeat
Queue status = Disabled
Queue message time = 10 seconds per message within the queue
Queue message, repeat scrolling message = no repeat
Data Log enable = data log is disabled
Clear data sets = yes
Character set = American
Send PLC time registers = no
Data sets use leading zeros = no

Special Function Messages:

Low battery message number = none selected
Enable data log message number = none selected
Disable data log message number = none selected
Clear data log message number = none selected
Increment clock 1 hour message number = none selected
Decrement clock 1 hour message number = none selected

Print Port Attributes:

Baud rate = 1200 baud
Parity = none
Stop bits = one
Print Time/Date = no

Parallel Port Attributes:

Inverted Flag = port is being read logically inverted (Inverted)
Data format = BCD
Debounce time = 5 milliseconds

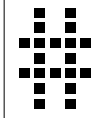
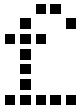
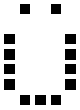
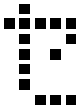
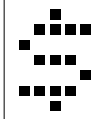
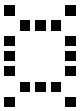
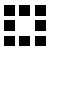
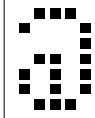
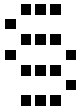
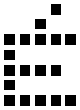
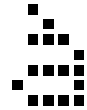
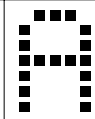
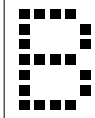
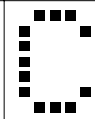
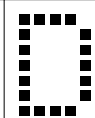
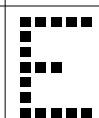
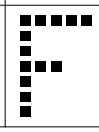
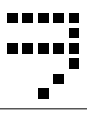
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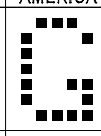
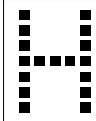
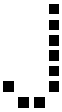
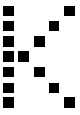
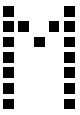
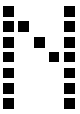
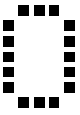
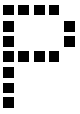
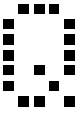
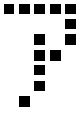
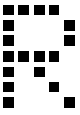
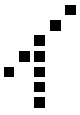
14 International Character Sets

The PMD 180 can use one of eight international character sets when displaying messages. The different character sets are U.S., Cyrillic, Germany, England, Denmark, Sweden, France, and Kana. These character sets are selected through the System Attributes option in either the Offline Development or Online Network menus in the programming software. The different characters than can be displayed are shown in the following chart. When a space is left blank on the chart, the character in the U.S. column will be displayed.

	AMERICA	CYRILLIC	GERMANY	ENGLAND	DENMARK	SWEDEN	FRANCE	KANA
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$ 36								
@ 64								<SPACE>
A 65								
B 66								
C 67								
D 68								
E 69								
F 70								

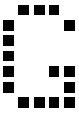
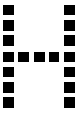
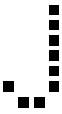
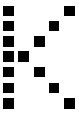
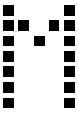
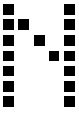
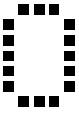
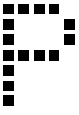
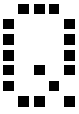
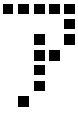
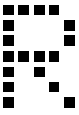
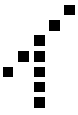
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14 International Character Sets

	AMERICA	CYRILLIC	GERMANY	ENGLAND	DENMARK	SWEDEN	FRANCE	KANA
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H 72								
I 73								
J 74								
K 75								
L 76								
M 77								
N 78								
O 79								
P 80								
Q 81								
R 82								

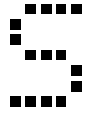
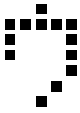
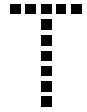
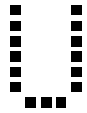
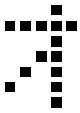
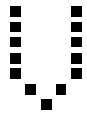
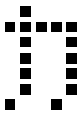
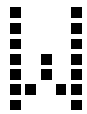
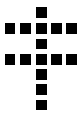
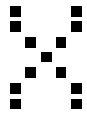
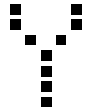
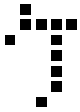
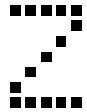
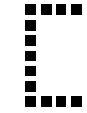
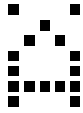
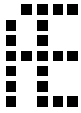
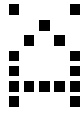
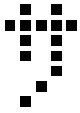
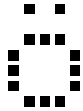
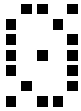
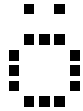
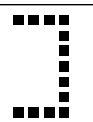
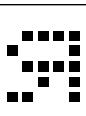
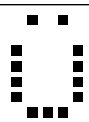
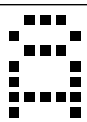
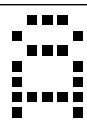
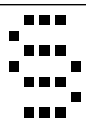
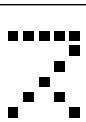
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14 International Character Sets

	AMERICA	CYRILLIC	GERMANY	ENGLAND	DENMARK	SWEDEN	FRANCE	KANA
G 71								
H 72								
I 73								
J 74								
K 75								
L 76								
M 77								
N 78								
O 79								
P 80								
Q 81								
R 82								

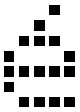
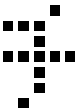
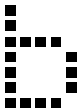
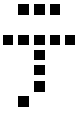
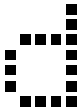
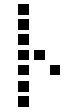
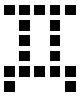
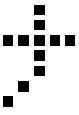
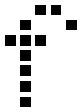
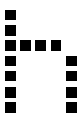
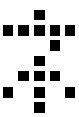
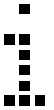
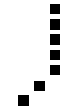
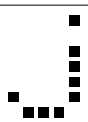
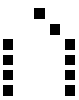
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14 International Character Sets

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S 83								
T 84								
U 85								
V 86								
W 87								
X 88								
Y 89								
Z 90								
[91								
\ 92								
] 93								
^ 94								

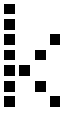
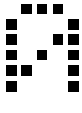
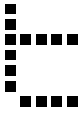
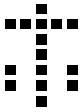
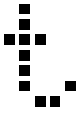
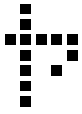
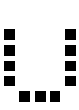
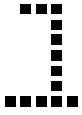
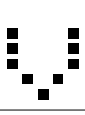
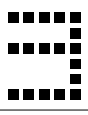
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14 International Character Sets

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_ 95								
` 96								
a 97								
b 98								
c 99								
d 100								
e 101								
f 102								
g 103								
h 104								
i 105								
j 106								

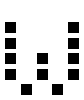
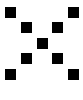
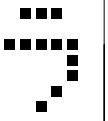
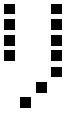
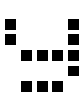
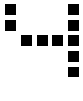
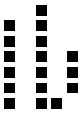
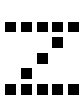
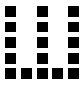
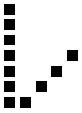
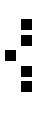
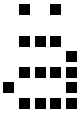
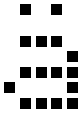
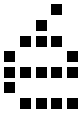
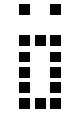
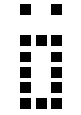
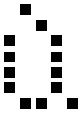
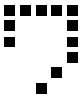
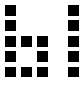
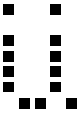
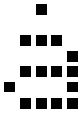
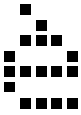
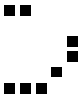
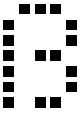
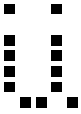
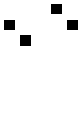
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14 International Character Sets

	AMERICA	CYRILLIC	GERMANY	ENGLAND	DENMARK	SWEDEN	FRANCE	KANA
k 107								
l 108								
m 109								
n 110								
o 111								
p 112								
q 113								
r 114								
s 115								
t 116								
u 117								
v 118								

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14 International Character Sets

	AMERICA	CYRILLIC	GERMANY	ENGLAND	DENMARK	SWEDEN	FRANCE	KANA
w 119								
x 120								
y 121								
z 122								
{ 123								
| 124								
} 125								
~ 126								

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15 Control Codes and Special Characters

Control Codes

The following control codes can be programmed into the message to perform special functions. The control codes will not be displayed on the PMD. The codes are entered by pressing the Control key and the indicated character.

ASCII	Character	Control Code
000	NUL	^@
001	SOH	^A
002	STX	^B
003	ETX	^C
004	EOT	^D
005	ENO	^E
006	ACK	^F
007	BEL	^G
008	BS	^H
009	JT	^I
010	LF	^J
011	VT	^K
012	FF	^L
013	CR	^M
014	SO	^N
015	SI	^O
016	DLE	^P
017	DC1	^Q
018	DC2	^R
019	DC3	^S
020	DC4	^T
021	NAK	^U
022	SYN	^V
023	ETB	^W
024	CAN	^X
025	EM	^Y
026	SUB	^Z
027	ESC	^[
028	FS	^\
029	GS	^]
030	RS	^^
031	US	^_

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15 Control Codes and Special Characters

Special Characters

When programming a message, there are keys that can be pressed to add features to the message. They are as follows.

Insert Time

By pressing the F7 key the time (as found in the real-time clock of the PMD) will be added to the message starting at the current cursor position. The way it is inserted is HH:MM:SS.

Insert Date

By pressing ShiftF7, the date (as found in the real-time clock of the PMD) will be added to the message starting at the current cursor position. The way it is inserted is DD:MMM:YY.

Toggle Blink

If only individual characters or a group of the total characters in the message are to blink within the message, use the F8 key to toggle blink on and off. The blink rate is determined in the System Attributes selection of the Offline Development and Online Network menus in the 10F54 programming software.

Inserting Data Sets

Either the entirety or any part of any of the variable data from the four data sets can be inserted in any message. The way in which this is accomplished, is as follows. The variable data value range is from 0 to 65535.

	Ten Thousands	Thousands	Hundreds	Tens	Units
Data Set 1	F2	F3	F4	F5	F6
Data Set 2	Shift F2	Shift F3	Shift F4	Shift F5	Shift F6
Data Set 3	Alt F2	Alt F3	Alt F4	Alt F5	Alt F6
Data Set 4	Ctrl F2	Ctrl F3	Ctrl F4	Ctrl F5	Ctrl F6

Typeover/Insert

When entering text into a message, the option is available to either type over existing text or insert text at the current cursor position. This option is toggled by pressing the Insert key.

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15 Control Codes and Special Characters

Null Characters

Null characters can be placed into message text by using either the right arrow key or Ctrl 2.

Character Size

When using a PMD 3000 slave display with the PMD 180, the size of the characters on the PMD 3000 can vary within a message. This is achieved with key strokes while entering the message. Character heights that can be used (depending on the PMD 3000 display size) are 2", 4", 6", 8" narrow (same width as 4"), and 8". The different key strokes for selecting them are as follows.

2"	=	Alt 2	4"	=	Alt 4
6"	=	Alt 6	8"N	=	Alt 7
8"	=	Alt 8			

After a character size is entered, the proceeding characters will be that size until changed again or the end of the message. The graphic screen used when programming messages that will be sent to a PMD 3000 will reflect the character size. The control codes used to change the character size will be displayed on the PMD 180. To avoid this, make the message an invisible one.

Clear a Line

Clear a line of text when editing a message by pressing Shift F9.

Insert a Blank Line

Insert a blank line when editing a message by pressing Shift F10.

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16 Displayed Errors

BAD COMP INTERFACE

The computer interface port settings (baud rate, parity, stop bits) are invalid.

BAD PRINTER SETTINGS

The printer port settings (baud rate, parity, stop bits) are invalid.

BAD SLAVE SETTINGS

The slave port settings (baud rate, parity, stop bits) are invalid.

INCOMPATIBLE DRIVER

The revision of the executive chip is not compatible with the revision of the downloaded PLC driver code.

PLC MSG BAD REGISTER

The user has specified an illegal or invalid register number or type.

PLC MSG ERROR

There was an error communication with the PLC.

PLC MSG TIMEOUT

The PLC did not reply to the PMD.

PLC PORT NOT SET UP

The PLC port settings (baud rate, parity, stop bits) are invalid.

PROM FAILURE

The PROM's checksum did not match what was programmed. The program in the PROM is invalid.

NO PLC DRIVER

No PLC driver code has been downloaded to the unit.

RAM FAILURE

The RAM in the unit has failed.

Note: *If the unit has an error (i.e., a message timeout), an error message is displayed. When the error is rectified, if the message number valid, the message will be redisplayed.*

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Symptom *Cannot communicate from the computer to the PMD.*

Possible Solutions

1. Make sure the PMD and the computer are both setup for the same communication parameters.
2. Check to see if the computer is connected to one of the computer interface ports on the back of the PMD.
3. Verify that the dip switches are set correctly for the type of communication standard that you are using to communicate with the computer. i.e. RS-232, RS-422, or RS-485.
4. If you are using the RS-485 standard, make sure you have the option board that allows you to communicate RS-485.
5. If you are using the RS-232 standard, make sure the cable only has three conductors between the computer and the PMD. Other wise, handshaking signals might be introduced and cause problems with the communications.
6. Make sure the PMD is in the Display Mode. All communications between the computer and the PMD are accomplished through the Display Mode.

Symptom: *Cannot get the PLC to initiate a message.*

Possible Solutions:

1. Check to see if the correct PLC Driver is loaded into the PMD.
2. Make sure the setup of the PLC Driver matches the communication setup of the PLC port that the PMD is connected to.
3. See if the first output word is set up to allow a message number to be accepted by the PMD.
4. Make sure the message word is being placed into the second output word by the PLC.

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17 Troubleshooting

5. Check to see if the PLC is connected to one of the PLC Ports on the back of the PMD.

6. Be sure you are dedicating 16 input and 16 output words in the PLC to the PMD only so that they are not being used by anything else in the PLC.

7. Make sure the Dip Switches are set to the correct communication standard. i.e. RS-232, current loop, RS-422, or RS-485

8. If you are using the RS-485 standard, make sure you have the option board that allows you to communicate RS 485.

Symptom: *Cannot get Variable Data into the message.*

Possible Solutions:

1. Make sure the message is programmed to contain variable data areas. This is accomplished by using the F2-F6 keys when editing the message text. F2-F6 for Data Set 1, Shift F2-F6 for Data Set 2, Alt F2-F6 for Data Set 3, and Ctrl F2-F6 for Data Set 4. F2 is the Most Significant Digit and F6 is the Least Significant Digit.

2. See if the first output word is set up to allow the entering of variable data.

3. Make sure you are placing the Variable Data in the correct PLC output words, words 4-7, that corresponds to the Data Set Number that you programmed into the message.

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Glossary

AC	Abbreviation for alternating current
ASCII	Abbreviation for American Standard Code for Information Interchange. It represents a code for defining alphanumeric characters.
Adapter	An intermediate device that permits attachment of special accessories or provides special means for mounting
Alphanumeric	Pertaining to a character set that contains both letters and numerals and usually other characters
Amps	Abbreviation for ampere; A unit of electrical current or rate of flow of electrons. One volt across 1 ohm of resistance causes a current flow of 1 ampere.
BCD	Binary Coded Decimal; a system of number representation where each digit of a decimal number is represented by a binary number
Baud rate	The speed at which serial data is transmitted and received. Rated at bits per second.
Bidirectional	Descriptive of a device that can transmit and receive data
Binary	A numbering system in which each digit can take on values from 0 to 1; the base 2 numbering system
Bit	An acronym for Binary digit; the smallest unit of information in the binary numbering system. Represented by the digits 0 and 1
Buffer	An isolating circuit used in an electronic device to avoid reaction of a driven circuit on the corresponding driver circuit
Byte	A single group of bits processed together (in parallel). It can consist of a variable number of bits
Byte Diagram	Illustration that defines how bytes are utilized in message memory
Checksum	A calculation of all data bits being transmitted, used by the receiving device for data integrity

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Glossary

Chain Message	A message which links up to 115 individual messages together and displays at a user-defined rate
Computer Interface	Peripheral equipment for attaching computer to other devices
Control Characters	ASCII codes used to make the display perform special tasks
Controller Terminal	These terminals interface to the programmable controller or other device that operates the PMD; terminals used by the controller are the parallel port, the message control terminal and VDC In and Out terminals
Daisy Chain	A serial wiring method where the cable goes from unit to unit
Data Hold	Allows data present on the parallel port to be accepted by the PMD
Data Log	An area of memory set aside for a time and date stamped historical record of events in the PMD
Data Select	Two control inputs on the parallel port used to select the data set number
DC	Abbreviation for direct current
Debounce Time	A period allowed for contacts to stabilize
Decrement	Subtract one
Default	The initial state of attributes
Delimiter	A character that distinguishes a string of characters and therefore cannot be a member of the string: e.g. Blink delimiter
DIN	Deutsche Industrie Normenausschuss; German association that determines the standards for electrical and other equipment in that country; European standard which gives very precise cut-out mounting dimensions
Dip Switch	A mechanical switch housed in a dual inline pack

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Glossary

Display Mode — The operating mode; when in this mode, the PMD is controlled by a programmable controller or other intelligent device; the PMD can also be interfaced to a printer, alarm device, slave message units, or computer

Dump — Sending of all or part of the unit memory contents through a serial port

EEPROM — Electronically Erasable Programmable Read Only Memory; this type of read only memory can be altered with commands of the programming terminal

EPROM — Electronically Programmable Read Only Memory; a read-only memory in which stored data can be erased by ultraviolet light or other means and re-programmed bit by bit with appropriate voltage pulses

FIFO — First-in, First-out; a list in memory where the first item received is the first item retrieved

Group Number — A four-bit binary number used as part of the unit identifier

HEX — See hexadecimal

Hexadecimal — Base sixteen numbering system with digits 0 through F where F equals 15_{10}

Handshaking — The establishment of synchronization between sending and receiving equipment by means of exchange of specific character configurations

IEEE — Institute of Electrical and Electronics Engineers

Increment — Add one

Input Devices — Devices such as limit switches, pressure switches, push buttons, etc. that supply data to a controller. These discrete inputs are two types: those with common return, and those with individual returns (referred to as isolated inputs). Other inputs include analog devices and digital encoders

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Glossary

Interfacing Interconnecting a controller with its application devices, and data terminals through various modules and cables. Interface modules convert controller logic levels into external signal levels and vice versa

Invisible Messages Messages sent to printer or slave but not the master display

Isolated Bidirectional Adapter Provides two-way interface between devices using RS-232C and RS-422A/RS-485A communication standards

LED Light-Emitting Diode—a pn junction that emits light when forward biased

Message Attributes The specific codes and commands of a PMD message

NEMA Standards Consensus standards for electrical equipment approved by the majority of the members of the National Electrical Manufacturers Association (NEMA)

NEMA 4X National Electrical Manufacturers Association; 4X enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose-directed water; and to be undamaged by the formation of ice on the enclosure. They shall meet hosedown, external icing, and corrosion-resistance design tests. UTICOR uses #316 grade stainless steel

NEMA 12 National Electrical Manufacturers Association; 12 enclosures are intended for indoor and outdoor use primarily to provide a degree of protection against dust, falling dirt, and dripping noncorrosive liquids. They meet drip, dust, and rust-resistance design tests.

Noise Immunity The ability of an electronic device to reject interfering noise signals

Null Character An ASCII character that is neither a displayed character or a command but can be defined by the user. In UTICOR displays, the null character is used as placeholder in the current message when overlaying it on an existing message and will not effect that previous message where there are null characters.

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Glossary

Offline Programming — Message programs are developed with UTICOR software and stored to disk. The message file can then be up loaded to the PMD display. The computer does not need to be connected to the PMD to program messages.

Online Programming — The PMD master display is programmed directly from the computer. The PMD must be connected to the programming computer.

PCI — Programmable Communications Interface; allows two-way communication between operator and machine. Through a series of function keys and LEDs, an operator can determine and respond to operation status

PMD — Stands for Programmable Message Display and is Copyrighted by UTICOR Technology, Inc.

Parallel Port — 16-input port through which message numbers and data information from a controller or other device is entered into the PMD when in the Display mode

Parameter — A constant or element, the value of which characterizes the behavior of one or more variables associated with a given system

Parity — A method of testing the accuracy of binary numbers used in recorded, transmitted, or received data: for even parity, the sum of the ones is an even number; for odd parity, the sum of the ones is an odd number

Parity bit — An additional bit added to a binary word to make the sum of the number of "1s" always even or odd

Peripheral Equipment — In a data processing system, any unit of equipment, distinct from the central processing unit, which may provide the system with outside communication

Printer Port — The place of access on a PMD that allows for communication between the message display and specified printer

Protocol — A formal set of rules governing the format and timing of data between two communicating devices. Some PMD products can use either UTICOR protocol or ASCII protocol.

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Glossary

RAM Memory	Acronym for Random Access Memory; RAM is a type of memory that can be accessed (read from) or loaded (written into) depending on the particular addressing and operation codes generated internally in the controller; requires a battery.
ROM	Acronym for Read Only Memory; a ROM is a solid-state storage memory whose contents cannot be altered by the controller
RS-232	Electrical characteristics of a single-ended digital interface circuits
RS-422	Electrical characteristics of balanced-voltage digital interface circuits
Real-time Clock	A clock that indicates the passage of actual time during which physical events take place
Scrolling Message	A message that contains up to 235 characters and scrolls upward or from right to left.
Sink	When using the parallel port with a sinking module, the positive side of the source is used for reference and the negative voltage is equal to a logic one.
Sllave Port	The place of access on a PMD master for serial connection to a slave display
Slo Blo	A type of fuse that will withstand short current surges
Source	When using the parallel port, this term refers to using the negative side of the voltage supply for reference and the positive side for logic one levels
Stop Bit	The last one or two bits sent in a synchronous data transmission to indicate the end of the message
Unit Address	Two bytes that contain the two identifiers (Group and Unit number) that distinguish one message display from another; present in each message to specify which PMD should respond
Unit Number	A twelve-bit binary number used to identify which member of its group it is

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Glossary

VAC	Voltage alternating current
VDC	Voltage direct current
Variable Data	Fields within a message that allow the real-time display of values that are entered either from the keypad or controlling device
Vacuum Fluorescent	An evacuated display tube in which the anodes are coated with a phosphor that glows when electrons from the cathode strike it, to create a display

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