PSMT
User's Manual

www.2T.com

PSMT User's Manual

Document Number: MAN0345, REV. B

Date of Initial Release: July 15th, 2008

Copyright © 1998 – 2008, Two Technologies, Inc. ®

All rights reserved.

Printed in the United States of America

Copyrights and Trademarks

Two Technologies logo is a registered trademark of Two Technologies, Inc. All rights reserved.

Other products or company names mentioned herein may be the trademarks or registered trademarks of their respective companies.

Reproduction Rights

This manual contains proprietary information. Permission to reproduce or otherwise use portions of the material presented herein is explicitly given to Two Technologies OEMs incorporating the PSMT into their products. Please note that this publication contains material that may not be appropriate for disclosure to some end users and that Two Technologies assumes no responsibility for technical support burdens incurred, or any other consequences of OEM documentation decisions.

Changes and Addendum

Since Two Technologies is continuously improving the functionality and quality of its products, certain information may not be included in this manual at its time of release. As a result, Two Technologies may provide changed material as separate sheets included with this manual or separately in the form of a change package, as it deems necessary.

Contact Information

Two Technologies, Inc. ®
419 Sargon Way
Horsham, PA 19044
Phone: 215 441-5305
Fax: 215 441-0423
www.2T.com

To contact Two Technologies by e-mail:

- Sales: real.rugged@2T.com

- Customer Service: customersupport@2T.com

- Technical Support: techsupport@2T.com

- Repairs: customercare@2T.com

Warranty Information

Warranty details for all Two Technologies Inc. ® products can be found within the Terms and Conditions of Sale which accompanied your original product sales quotation. You can also obtain the warranty details by contacting your sales representative.

Product Returns

If, after inspection, you note any product damage or discrepancies, please contact us promptly within five days of receipt. If the exterior of the package shows obvious signs of damage, please contact the carrier who delivered the package right away.

All items returned to Two Technologies Inc. require a Return Material Authorization number (RMA). To obtain a RMA number, please visit our eRMA website: http://www.frontlines247.com/twotech.htm. If you are a GEM partner and have not yet received a login to the above site; you can request one by simply clicking the e-mail link for customercare@2T.com.

Regulatory Notices

FCC Compliance

This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his or her own expense.

Canadian Compliance

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications

Le present appareil numerique n.emet pas de bruits radioelectrique depassant les limites applicables aux appareils numeriques de la class A prescrites dans le Reglement sur ie broullage radioelectrique edicte par le ministere des Communications du Canada.

Certifications

CENELEC

EMI Standards:

- EN55022 1998 (CISPR22, Class A) Information Technology

EMC Standards:

- EN50082-1 1997, General Immunity Part 1

Safety Standards:

- EN60950 2000 Safety of Information Technology Equipment

Warnings

Changes or modifications to this unit, which are not expressly approved by the party responsible for regulatory compliance, could void the user's authority to operate the equipment.
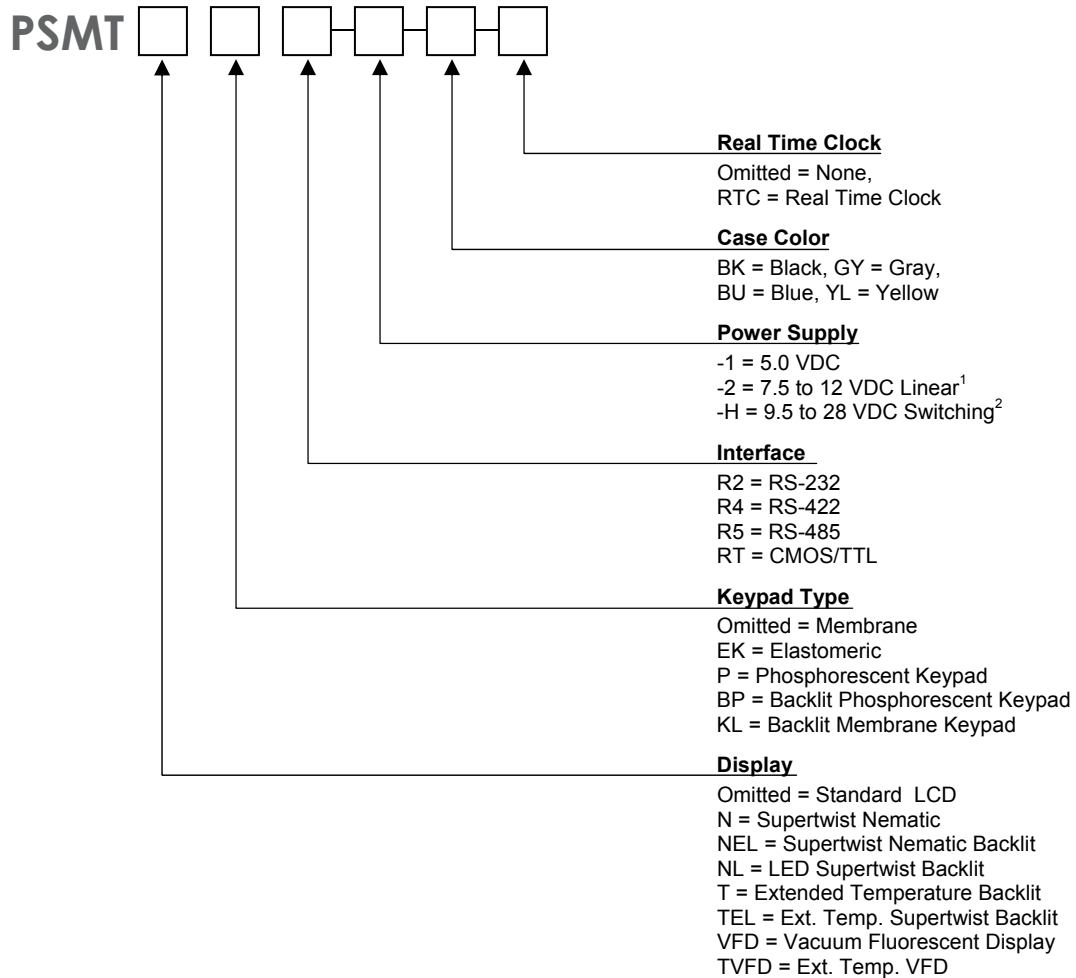
Electrostatic Discharge (ESD)

Electrostatic discharge (static electricity) can have unpredictable adverse effects on any electronic device. Although the design of this product incorporates extensive ESD-related precautions, ESD can still cause problems. It is good practice to discharge static by touching a grounded metal object before inserting cards or connecting devices.

Product Configuration Guide

The PSMT is a rugged, full featured programmable panel mount terminal that is ideally suited to a variety of applications where a level of complexity above that found in simple ASCII terminals is required.

The PSMT is available in a number of different configurations. You can determine the configuration of a particular unit by identifying the suffixes applied to the model number as follows:

PSMT ☐ ☐ ☐ – ☐ ☐ ☐

Real Time Clock

Omitted = None,
RTC = Real Time Clock

Case Color

BK = Black, GY = Gray,
BU = Blue, YL = Yellow

Power Supply

-1 = 5.0 VDC
-2 = 7.5 to 12 VDC Linear[1]
-H = 9.5 to 28 VDC Switching[2]

Interface

R2 = RS-232
R4 = RS-422
R5 = RS-485
RT = CMOS/TTL

Keypad Type

Omitted = Membrane
EK = Elastomeric
P = Phosphorescent Keypad
BP = Backlit Phosphorescent Keypad
KL = Backlit Membrane Keypad

Display

Omitted = Standard LCD
N = Supertwist Nematic
NEL = Supertwist Nematic Backlit
NL = LED Supertwist Backlit
T = Extended Temperature Backlit
TEL = Ext. Temp. Supertwist Backlit
VFD = Vacuum Fluorescent Display
TVFD = Ext. Temp. VFD

1. A linear regulator (7805A) with a minimum input of 7.5 V and a maximum voltage of 28.0 V that dissipates one watt of power thereby limiting maximum permissible input voltage according to current draw of terminal.

2. A switching type voltage regulator with a minimum input of 9.5 V and a maximum voltage of 28.0 V. Since input voltage is not dependent on the terminal's current draw, it is suitable for all options.

Example

The configuration number for a PSMT with a vacuum flourescent display, an elastomeric keypad, a RS-232 interface, a 7.5 to 12 VDc linear power suppy in a black case would be:

PSMTVFDEKR2-2-BK

Power Requirements

Power Supply Options

Depending on the current draw requirements, the terminal may require the use of different power supplies. Use the configuration number listed below (see previous page) to determine the correct power supply:

- "**-1**"—requires connection to a 5-volt ± 5% regulated power source.

- "**-2**"—requires connection to a power source between 7.5 and 12 VDC that can source adequate current. However, depending on a unit's total current draw, an input of up to 28 VDC may be applied. See chart on next page.

- "**-H**"—requires connection to a power source between 9.5 and 28 VDC that can source adequate current. However, input voltage is not dependent on a terminal's current draw and may be used with all terminal options.

Calculating Total Current Draw

The table below summarizes the current draw requirements for PSMT terminals in various configurations (measured at its interface connector). Values listed are approximate due to variations in individual components—actual values may vary.

Current Draw for Basic Configuration		
Configuration	*Description*	*Draw*
PSMT45R2	Base Unit with RS-232	55 mA
PSMT45R2	Base Unit with RS-422	65 mA
Current Draw for Options		
N	Supertwist Display	Add 10 mA
NL	Supertwist LED Backlight	Add 185 mA
NEL/TEL	Supertwist Backlit Display	Add 70 mA
VFD/TVFD	Vacuum Fluorescent Display	Add 300 mA
KL	Backlit Keypad	Add 80 mA

To calculate the total current draw for your terminal configuration:

1. Read the model number on the back of your terminal.

2. Using the model number and the table above, add the current draw for each option to that of the base unit.

   Example 1—PSMTNELR2:

RS-232 Option	55 mA
Supertwist Backlit Display	70 mA
Calculated Total Current	125 mA

   Example 2—PSMTNLKLR2:

 | | |
   |---|---|
   | RS-232 Option | 55 mA |
   | Supertwist LED Backlit Display | 185 mA |
   | Backlit Keypad | 80 mA |
   | Calculated Total Current | 320 mA |

Determining the Maximum Input Voltage Allowed

The maximum input voltage allowed is based on a unit's current draw.

To determine the maximum input voltage allowed based on current:

1. Calculate the maximum current draw using the table on the previous page.

2. On the following chart, locate the Calculated Total Current on the **Calculated Operating Current** axis of the chart, and then move to the top of **Operating Voltage** range.

3. Look at the corresponding **Maximum Input Voltage Allowed** where the intersection occurs to find the maximum useable voltage for your terminal configuration.

Restricted Input Voltage vs. Current Draw
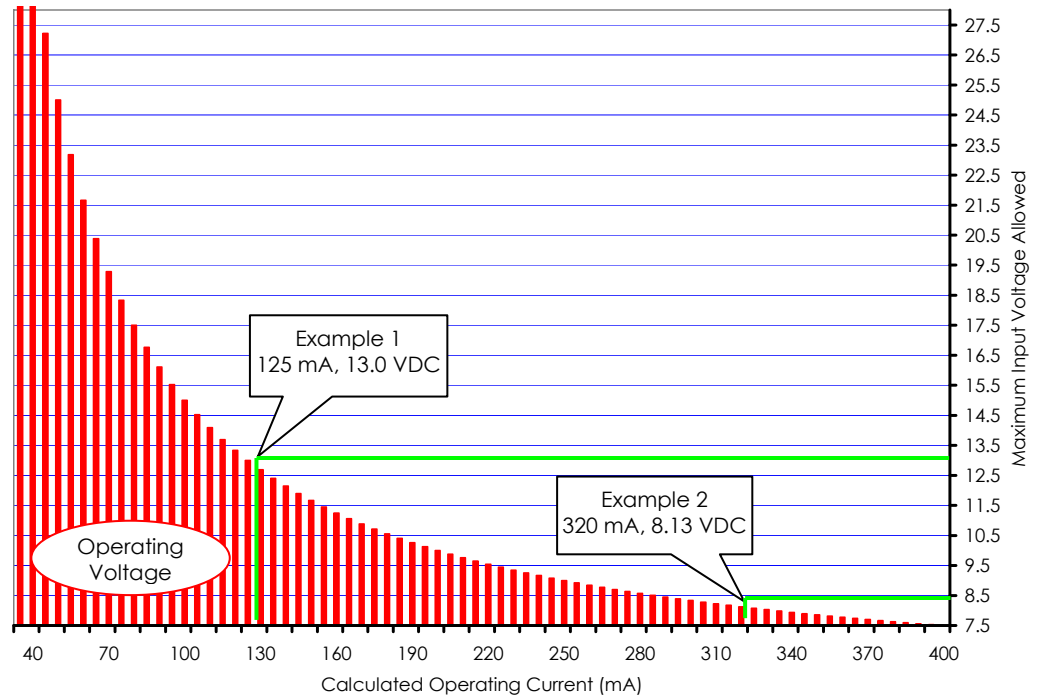
Using Example 1 and the chart above, the 125 mA drawn by the PSMTNELR2 intersects with 13 volts. If the maximum supply voltage to the terminal is greater than 13 VDC, it requires a -H power supply configuration.

Using Example 2 and the chart above, the 320 mA drawn by the PSMTNLKLR2 intersects with 8.13 volts. If the maximum supply voltage to the terminal is greater than 8.13 VDC, it requires a -H power supply configuration.

To clarify, if your system is supplying 12 VDC, the power is acceptable for the PSMTNELR2 (Example 1), but not for the PSMTNLKLR2 (Example 2). Applying 12 VDC to the PSMTNLKLR2 (Example 2) will **damage** it.

Contents

List of Figures

List of Tables

Chapter 1: **Overview**

About this Manual

Intended for authorized developers with prior knowledge of PC application development, this manual describes the advanced features, operations and interface capabilities of Two Technologies' PSMT Series terminals. It is not for use by end-users.

Unless otherwise stated, the operational characteristics described herein correspond to factory default configurations and settings as shipped from Two Technologies with a standard keypad.

Because PSMT terminals are highly customizable products with several optional configurations and special keypad layouts, this manual only describes standard features and operation. For custom configurations and special options, consult the appropriate supplemental manual or addendum.

It is beyond the scope of this manual to provide operating system tutorials or information about commercial or customized PSMT terminal application programs and connected equipment. This information should be available in the manuals that accompany those products.

Wherever used herein, the term "PSMT" applies to all models (except as noted).

Related Documents

- 2BASIC Reference Manual for PSMT/PSMT Terminals, MAN0040

- C Run-Time Library Reference Manual for PSMT/PSMT Terminals, MAN0026

- PSMT/PSMT Programmer's Reference Manual, MAN0346

Symbols and Conventions

Unless otherwise noted, this manual uses the following format conventions to distinguish elements of text:

- New terms used in this manual initially appear in Italics, for example: *host*.

- Names of keys as shown on a keypad appear in bold type, for example: **CTRL**.

- Names of parameter values appear in uppercase letters, for example: ENABLE.

- Esc represents the ASCII escape character used in Escape commands, for example: Esc [4n.

- A lowercase "h" appearing after a number denotes a hexadecimal value, for example: 1Bh.

About Two Technologies

Two Technologies Inc. ® has been producing rugged hand held and panel mount terminals and computers for over fifteen years. By implementing state of the art design and manufacturing techniques, we revolutionized hand held terminals and computers inside and out. Today, Two Technologies offers over a dozen cost-effective solutions serving virtually every market.

About the PSMT

The PSMT is a rugged, full featured programmable panel mount terminal that is ideally suited to a variety of applications where a level of complexity above that found in simple ASCII terminals is required.

You can program the PSMT using Assembly, C or 2BASIC programming languages. With its comprehensive Applications Program Interface (API), you can access a variety of services provided by the operating system, from simple display manipulation to high-level operations.

PSMT Features

Two Technologies offers PSMT terminals with the following features. You can find additional information regarding specifications in Appendix A.

Power

The PSMT is available as a line-powered or battery-powered unit. Line-powered units use a 7.5-12 VDC linear regulator. If needed (depending on current draw), a 5 VDC (±5%) transformer and optional 9.5-28 VDC switching regulator are also available.

Memory

The PSMT features 448 K-bytes of Flash EEPROM, 512 K-bytes of battery-backed static RAM

Display

PSMT terminals come with a standard 80-character monochrome liquid crystal display that features the standard U. S. ASCII character set as dark characters on a light background. Cursor and view angle settings for the display can be menu or host-controlled. Backlit, extended temperature and vacuum fluorescent displays, as well as optional character sets, such as Latin 1 or European are also available.

Display

PSMT terminals come with a standard 80-character monochrome liquid crystal display that features the standard U. S. ASCII character set as dark characters on a light background and a viewing angle of approximately 45 degrees. The operating temperature range for the display is between 0° and 50°C and it can be stores at temperatures between -20° and 70°C.

Keypad

Securely framed and clamped into place, the keypad surface provides excellent splash resistance and prevents curling or peeling of the keypad overlay. The 20 (4 rows x 5 columns) standard keypad is available with standard or custom graphics. Keypads can be made from your choice of elastomeric or membrane material.

Interface Options

Interface options for PSMT terminals include RS-232, RS-422 or CMOS/TTL protocols. Communication (up to 19,200 bps) with a host device is through a modular 6-pin connector.

Durability

Like all Two Technologies' products, the PSMT is remarkably rugged. The case consists of Valox 420 one of the most durable, chemical-resistant materials available on the market today.

Chapter 2: **Operation**

Controls and Indicators

Table 2-1 describes the components and indicators found on the front of the PSMT terminal as shown in Figure 2-1.

Figure 2-1: PSMT Controls and Indicators

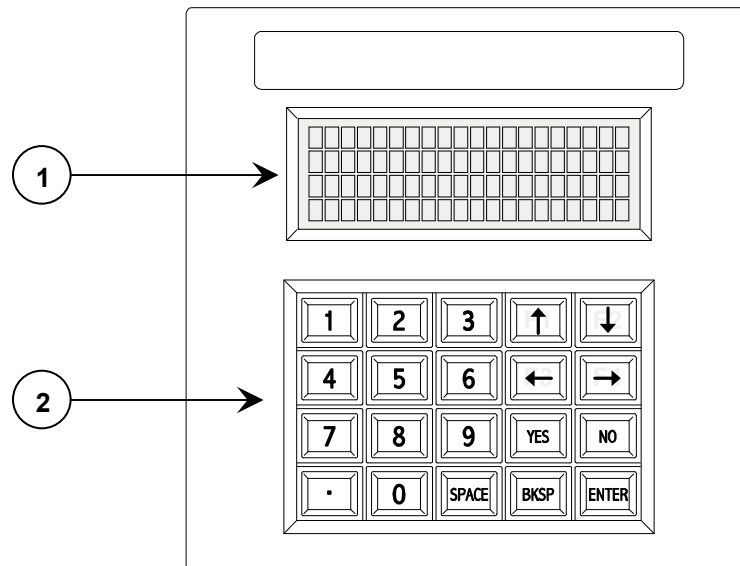**Table 2-1: PSMT Controls and Indicators**

Item	Control/Feature	Description
1	Display	192 x 128 pixel supertwist nematic LCD (standard)
2	Keypad	20-key keypad (membrane or elastomeric)

Modular Interface Connector

Figure 2-2 depicts the standard six-pin modular interface connector found on the PSMT terminal. Table 2-2 describes its signal and pin assignments.

> **Warning**: *Use the six-pin modular receptacle for compatible serial devices only. Despite its physical similarity to modular telephone connectors, it is not compatible with telephone lines or signals. Connecting the terminal to a telephone line will damage it and void the warranty.*

Figure 2-2: Modular Interface Connector

Viewed facing connector

6 5 4 3 2 1
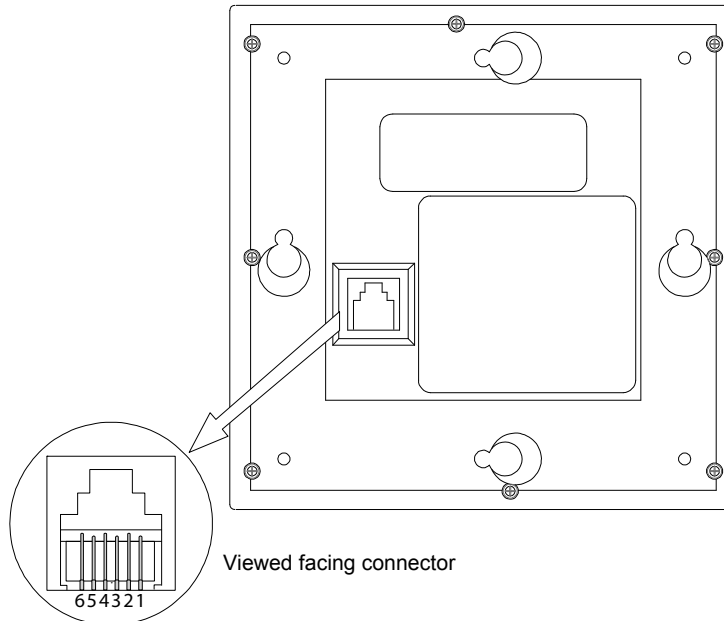
Table 2-2: Modular Interface Connector Signal and Pin Assignments

Pin	RS-232	CMOS\TTL	RS-422	RS-485
1	+ Supply in	+ Supply in	+ Supply in	+ Supply in
2	Handshake In	Handshake In (CTS)	+ Data In	N/A
3	Handshake Out	Handshake Out (RTS)	+ Data Out	+TX/RX (half duplex)
4	Data In	Data In	- Data In	N/A
5	Data Out	Data Out	- Data Out	-RCV/TX (half duplex)
6	Common	Common	Common	Common

Standard Accessory Cables

Standard modular cables (1210-7 and 1210-15) that mate with the terminal's modular interface connector and Two Technologies' PCAT wired adapter are available as optional accessories. These cables will reverse the signal output from the terminal (see illustration below). Non-reversing modular cables (1210-7-NR and 1210-15-NR) are also available.
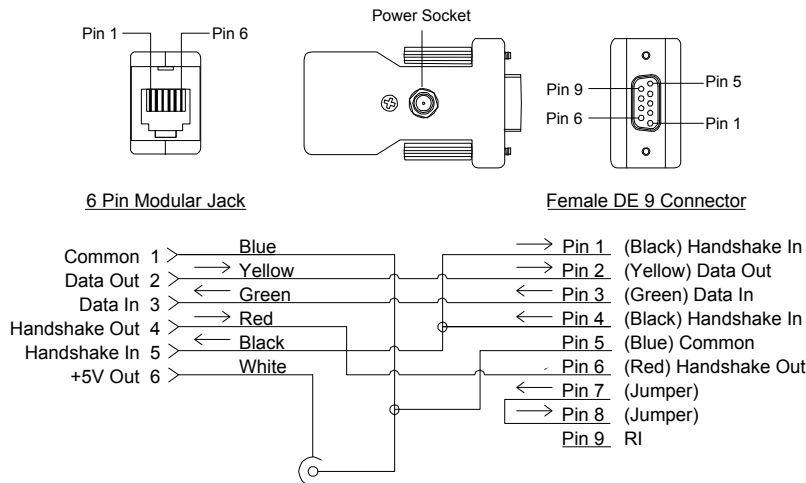
Figure 2-3: 1210 Series Modular Cable

Green
Yellow
Blue

Red
Black
White

Blue
Yellow
Green

White
Black
Red

1 (White)	1 (Blue)
2 (Red)	2 (Yellow)
3 (Black)	3 (Green)
4 (Green)	4 (Black)
5 (Yellow)	5 (Red)
6 (Blue)	6 (White)
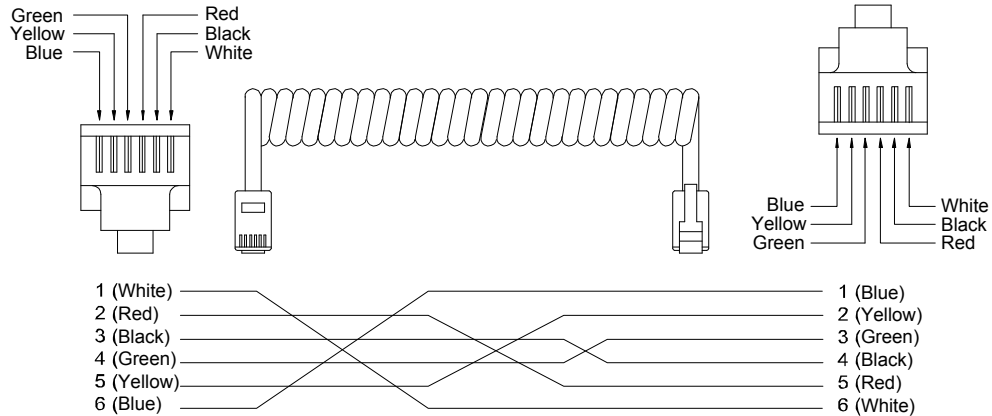
PCAT Wired Adapter

The PCAT modular connector enables connection to a host device as well as supplying a connection for a power supply.

Figure 2-4: PCAT Modular Connector

Pin 1 — Pin 6

Power Socket

Pin 9
Pin 6
Pin 5
Pin 1

6 Pin Modular Jack

Female DE 9 Connector

Common	1	Blue	Pin 1	(Black) Handshake In
Data Out	2	Yellow	Pin 2	(Yellow) Data Out
Data In	3	Green	Pin 3	(Green) Data In
Handshake Out	4	Red	Pin 4	(Black) Handshake In
Handshake In	5	Black	Pin 5	(Blue) Common
+5V Out	6	White	Pin 6	(Red) Handshake Out
			Pin 7	(Jumper)
			Pin 8	(Jumper)
			Pin 9	RI

Note: Pin descriptions assume connection through a Two Technologies' 1210 series modular cable to the terminal's modular connector.

Connecting the Terminal

To connect the terminal to a host device using Two Technologies parts:

1. Plug one end of a 1210 modular cable into the modular connector on the bottom of the terminal. Plug the other end into the PCAT adaptor.
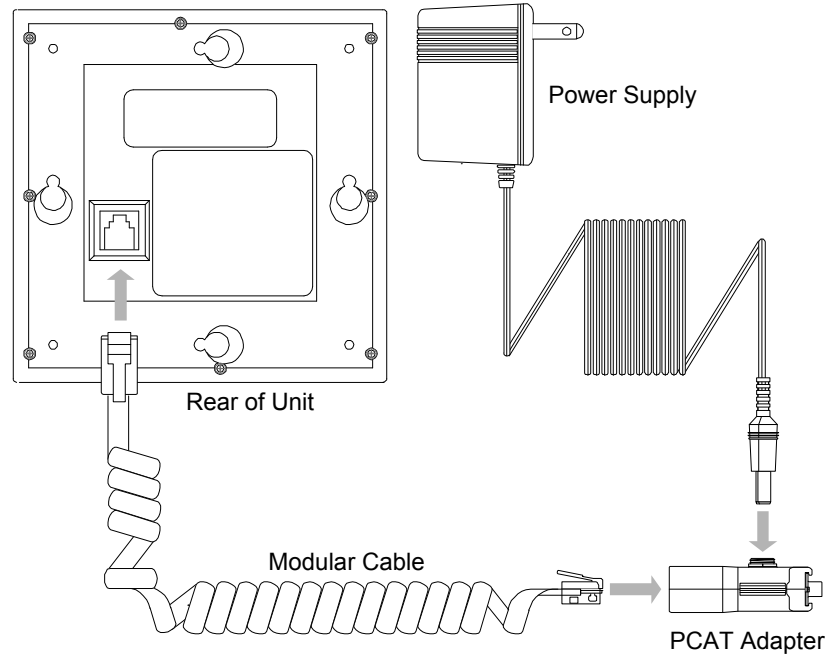
2. Plug the PCAT adapter into the host device.

Chapter 3: **Operation**

Power

To supply power to a PSMT terminal:

1. Plug one end of a 1210 modular cable into the modular connector on the bottom of the terminal. Plug the other end into the PCAT adaptor.

Figure 3-1: Cable Connections

Power Supply

Rear of Unit

Modular Cable

PCAT Adapter

2. Using a Two Technologies' power supply (such as a Two Technologies 1226-1 linear power supply for units with a -2 power supply configuration), plug the power supply connector into the PCAT adapter and then plug the power supply into a 120 VAC 60 Hz power outlet.

3. The terminal should turn on and a blinking cursor should appear on the display.

Keypad Operation

The standard 20-position keypad consist of the digits 0 through 9, functions keys and keys for Yes (**YES**), No (**NO**), Backspace (**BKSP**), Space (**SPACE**) and Enter (**ENTER**).

Figure 3-2: Standard 20-Position Keypad
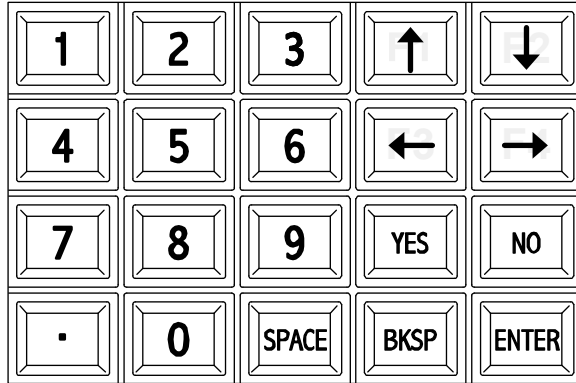
Display Operation

Standard PSMT terminals display the U.S. ASCII 96 character set. However, other character sets, such as such as Latin 1 or European, are also available as an option. Characters appear on the display at the current cursor location.

Cursor Position

Typically, unless altered by host commands, received characters appear in the display at the cursor location and move left to right.

By default, when a character appears in Position 80 (lower right corner) the display will not scroll up one line and the cursor will no longer appear (it is actually hidden in Position 81). When the terminal receives the next displayable character, the cursor will reappear in the second leftmost column of the last row.

The Default Program

In absence of a downloaded application, the terminal's default program will automatically start when you power on the terminal. This default program simply sends and receives keystrokes.

Default Settings

This section describes the default program's initial communication, keypad and display characteristics (default settings). To change these default settings to other allowable values, you will need to create and download an application. You can find information about creating and downloading applications by reading the manuals referred to in the Related Documents section.

Baud Rate

The default baud rate is 9600. Other allowable speeds range from 300 to 115200 baud.

Data Bits

The default number of data bits transmitted in each character of the communication string is 8. The other allowable value is 7.

Stop Bits

The default number of stop bits between each character transmission is 1. The other allowable value is 2.

Parity

The default parity setting is EVEN. Other settings include ODD, MARK, SPACE, IGNORE and NONE.

When set to EVEN, ODD, MARK or SPACE, the terminal will add and send the corresponding parity bit for error checking. When set to IGNORE, the terminal will still add and send a parity bit, but the value is indeterminate. When set to NONE, the terminal will not send a parity bit.

Display PE

By default, the terminal will display a special character (Figure 3-3) when using EVEN, ODD, MARK or SPACE parity checking and a parity error occurs.

Figure 3-3: Parity Error Symbol

Repeat

By default, the terminal will repeat a keypad press approximately 18 characters per second after a short delay between the initial character and the start of the repeat.

Key Click

By default, the terminal will emit an audible click each time a key is pressed, and for each repeated character.

Scroll on 81

By default, when a character appears in Position 80 (lower right corner) the display will not scroll up one line and the cursor will no longer appear (it is actually hidden in Position 81). When the terminal receives the next displayable character, the cursor will reappear in the second leftmost column of the last row.

When programmed, the display can also scroll up one line when a character appears in Position 80 and the cursor will appear in the lower left corner of the last row.

Echo

By default, the terminal will not display (echo) keypad entries on the screen. The default value is DISABLED.

Handshaking

By default, the terminal makes use of hardware handshaking (DTR-DSR or RTS-CTS) for terminals equipped with an RS-232 interface.

XON/XOFF

By default, the terminal does not control data flow with XON/XOFF protocol.

Echo 485

By default, terminals equipped with an RS-485 interface do not enable the receiver during the transmission of characters to avoid receiving echoes common in two-wire RS-485 networks.

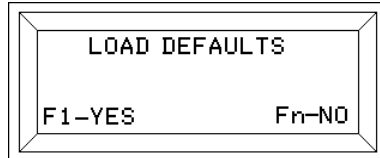### Default Terminal Program Settings Summary

Table 3-1: Default Terminal Program Settings

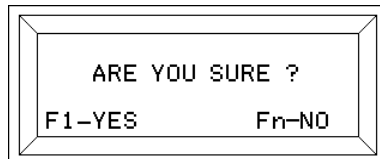| Parameter	Default Settings
Baud Rate	9600
Data Bits	8
Stop Bits	1
Parity	EVEN
Display PE	ENABLED
Repeat	ENABLED
Key Click	ENABLED
Scroll on Position 81	ENABLED
Echo	DISABLED
Handshaking	ENABLED
XON/XOFF	DISABLED
Echo 485	DISABLED

Loading Default Communications Settings

To load the default communications settings:

1. Remove power from the terminal.

2. For 45 or 30-key terminals, simultaneously hold **CTRL**, **SHIFT** and **F1,** and reapply power.

   For 20-key terminals, simultaneously hold **BKSP**, **ENTER** and **F1,** and reapply power.

3. After the terminal sounds an alert and displays the "LOAD DEFAULTS?" message, release the keys.

   ```
    _____
   |  _____  |
   |                               |
   |      LOAD DEFAULTS            |
   |                               |
   |  F1-YES          Fn-NO        |
   |  _____  |
    _____
   ```
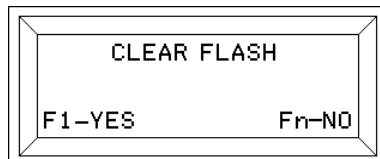
4. Press **F1** to continue. Press any other key to exit the menu without changing the values. If you pressed **F1**, the terminal will prompt you to confirm your selection.

   ```
    _____
   |  _____  |
   |                               |
   |      ARE YOU SURE ?          |
   |                               |
   |  F1-YES          Fn-NO        |
   |  _____  |
    _____
   ```
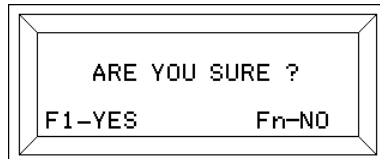
5. Press **F1** to load the defaults. Press any other key to exit the menu without loading the default values. If you pressed **F1**, the terminal will prompt you to clear flash memory.

6. Clearing flash will set an internal bit that prevents the currently loaded program from starting and enable you to download a new program.

   For information on how to download programs, refer to any of the following manuals: 2BASIC Reference Manual, C Run-Time Library Reference Manual or PSMT/PSMT Programmer's Reference Manual.
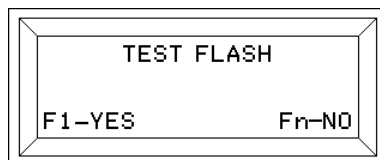
   Repeating this procedure and clearing the flash again will reset the bit and allow the program to start.

   ```
    _____
   |  _____  |
   |                               |
   |      CLEAR FLASH             |
   |                               |
   |  F1-YES          Fn-NO        |
   |  _____  |
    _____
   ```

7. Press **F1** to continue. Press any other key to exit the menu without clearing flash. If you pressed **F1**, the terminal will prompt you to confirm your selection.

   ```
    _____
   |  _____  |
   |                               |
   |      ARE YOU SURE ?          |
   |                               |
   |  F1-YES          Fn-NO        |
   |  _____  |
    _____
   ```

8. Press **F1** to clear flash memory. Press any other function key to exit the menu without clearing flash memory. If you pressed **F1**, the terminal will prompt you to test flash memory. However, only authorized service personnel can test flash memory.

   ```
    _____
   |  _____  |
   |                               |
   |      TEST FLASH             |
   |                               |
   |  F1-YES          Fn-NO        |
   |  _____  |
    _____
   ```

9. Press any key to exit the menu.

Chapter 4: **Host Commands**

Introduction

By design, the PSMT allows a connecting device (or "*host*") to control some of its functions by transmitting a string of special characters.

Referred to as "*Escape commands*" (because each character string begins with the ASCII escape character), these character strings enable the host to perform a variety of task including controlling the terminal's cursor position, erasing the display lines and sounding beeps.

For example, sending an ASCII Esc[H or the hex equivalent: 1Bh 5Bh 48h will move the cursor to the home position (upper right corner). A summary of these commands appears at the end of this section.

Note: *Do not use spaces between characters in Escape commands. Any spacing shown for Escape commands in this chapter is for clarity only, unless otherwise noted.*

Cursor Commands

Cursor Up

Syntax   Esc A

Notes   This command moves the cursor up one position. The cursor will not move beyond the start or end of a line, nor will it scroll the display.

Cursor Down

Syntax   Esc B

Notes   This command moves the cursor down one position. The cursor will not move beyond the start or end of a line, nor will it scroll the display.

Cursor Right

Syntax   Esc C

Notes   This command moves the cursor one position to the right. The cursor will not move beyond the start or end of a line, nor will it scroll the display.

Cursor Left

Syntax   Esc D

Notes   This command moves the cursor one position to the right. The cursor will not move beyond the start or end of a line, nor will it scroll the display.

Cursor Home & Clear Display

Syntax   Esc E

Enable Cursor
Syntax Esc F

Disable Cursor
Syntax Esc G

Cursor Home
Syntax Esc H

Enable Blinking Cursor
Syntax Esc R

Disable Blinking Cursor
Syntax Esc S

Cursor Position
Syntax Esc Y *Pr Pc*

Notes This command moves the cursor to a specified location where *Pr* is the ASCII equivalent of the row number (1-4) and *Pc* is the ASCII equivalent of the column numbers (1-20) plus 1Fh. The following chart lists the calculated ASCII and Hex values for the row and column numbers.

Row #	ASCII	Hex
1	SP	20
2	!	21
3	"	22
4	#	23

Column #	ASCII	Hex	Column #	ASCII	Hex
1	SP	20	11	*	2A
2	!	21	12	+	2B
3	"	22	13	,	2C
4	#	23	14	-	2D
5	$	24	15	.	2E
6	%	25	16	/	2F
7	&	26	17	0	30
8	'	27	18	1	31
9	(	28	19	2	32
10	)	29	20	3	33

Examples Send the cursor to Row 2, Column 10

ASCII: Esc Y !)

Hex: 1B 59 21 29

Erasure Commands

Erase Cursor to End of Line

Syntax   Esc K

Notes   Includes the character at the cursor location and does not alter the cursor position

Erase Cursor to End of Display

Syntax   Esc J

Notes   Includes the character at the cursor location and does not alter the cursor position

Erase Entire Line

Syntax   Esc M

Notes   Includes the character at the cursor location and does not alter the cursor position

Erase Display and Home Cursor

Syntax   Esc E

Character Attribute Commands

Set Blink Attribute

Syntax   Esc W

Notes   Characters written subsequent to the setting or clearing of attributes will assume the new attribute characteristics.

Clear Blink Attribute

Syntax   Esc X

Notes   Characters written subsequent to the setting or clearing of attributes will assume the new attribute characteristics.

Sound Commands

Note: You cannot buffer sound commands. To produce properly spaced chain sounds, the host must delay a short time between issuing sound commands.

Short Bell

Syntax   Esc T

Long Bell

Syntax   Esc L

Alert

Syntax   Esc Q

Key Attribute Commands

Enable Key Click

Syntax   Esc U

Disable Key Click

Syntax   Esc V

Enable KNP Function

Syntax   Esc N

Disable KNP Function

Syntax   Esc O

Return Commands

Return Terminal Identifier String

Syntax   Esc Z

Notes   This commands sends the following identifier string to the host:

   PSMT.*nnnn*.ffff.cccc

For example: PSMT.6963.7F83.87FF

Where PSMT indicates the terminal type, *nnnn* is the firmware checksum, *ffff* is the application code memory checksum, and *cccc* is the hex number equivalent of the display attributes and the page mode.

When using this command to identify the terminal type, do not include the checksums as they may change.

Host Command Summary

The following table is a summary of the available Private mode host commands.

Table 4-1: Private Mode Host Command Summary

Type	Command	Syntax
Cursor	Cursor Up	Esc A
	Cursor Down	Esc B
	Cursor Right	Esc C
	Cursor Left	Esc D
	Cursor Home & Clear Display	Esc E
	Enable Cursor	Esc F
	Disable Cursor	Esc G
	Cursor Home	Esc H
	Enable Blinking Cursor	Esc R
	Disable Blinking Cursor	Esc S
	Cursor Position	Esc Y Pr Pc
Erasure	Erase Cursor to End of Line	Esc K
	Erase Cursor to End of Display	Esc J
	Erase Entire Line	Esc M
	Erase Display and Home Cursor	Esc E
Key Attributes	Enable Key Click	Esc U
	Disable Key Click	Esc V
Sound	Short Bell	Esc T
	Long Bell	Esc L
	Alert	Esc Q
Return	Return Terminal Identifier String	Esc Z

Control Codes

In addition to the escape commands, the terminal will also respond to the following control codes:

Table 4-2: Control Codes

Code	Hex	Dec.	ASCII	Function
Ctrl G	07	7	BEL	Sounds Bell
Ctrl H	08	8	BKSP	Back Space Cursor
Ctrl J	0A	10	LF	Line Feed
Ctrl K	0B	11	VT	Cursor Down
Ctrl M	0D	13	CR	Cursor Left to Column 1
DEL	7F	127	DEL	Delete Character at Cursor

Chapter 5: **Mounting the PSMT**

Introduction

You can mount the PSMT permanently or as a detachable unit.

Mounting Configurations

Permanent Mounting

- **Closed Back Flush**—this method enables you to mount the face of the PSMT in the front of a panel with the rear cover attached behind the panel. For panel thicknesses between 0.062 and 0.125 inches. For thicker panel walls, contact Two Technologies.

- **Permanent Open Back Flush**—this method enables you to mount the face of the PSMT in the front of a panel with out the rear cover attached behind the panel. For panel thicknesses up to 0.062 inches only. For thicker panel walls, contact Two Technologies. Requires Two Technologies #12285 mounting clamps (provided with unit).

Detachable Mounting

- **Detachable**—this method enables you to attach the unit horizontally or vertically to a panel with the ability to lift up or slide out the unit from the panel to use as a hand-held terminal.

Permanent Mounting

Mounting Kit

Each PSMT shipped from Two Technologies includes a mounting kit (Figure 5-1). This mounting kit includes the following hardware:

Table 5-1: Mounting Kit

Item #	Part Number	Description	Quantity
1	12288	Gasket	1
2	12285	Mounting Clamps (Plastic)	8
3	12311	Screws, Plastite - #1-32 X 1/2" Long (Gold)	8
4	12269	Screws, Plastite - #1-32 X 3/8" Long (Silver)	8

Figure 5-1: PSMT Mounting Kit
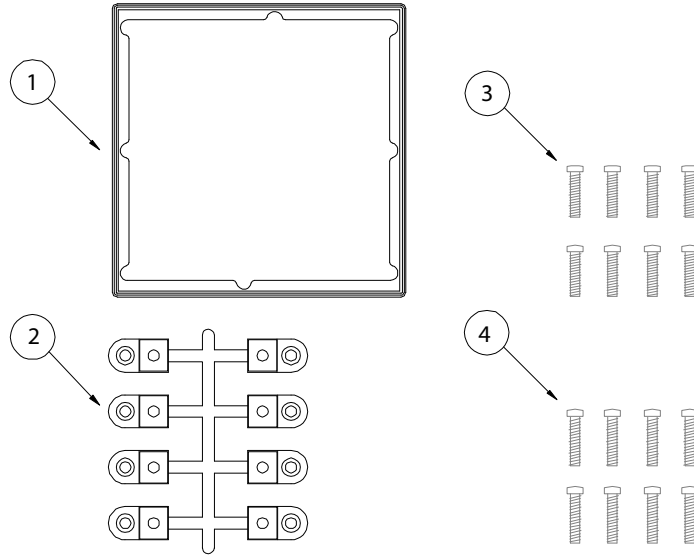
Mounting Template

Each PSMT shipped from Two Technologies also includes a mounting template (Part Number 12555) as shown below:

**Figure 5-2: PSMT ANSI Series Terminal Permanent Mount Template**
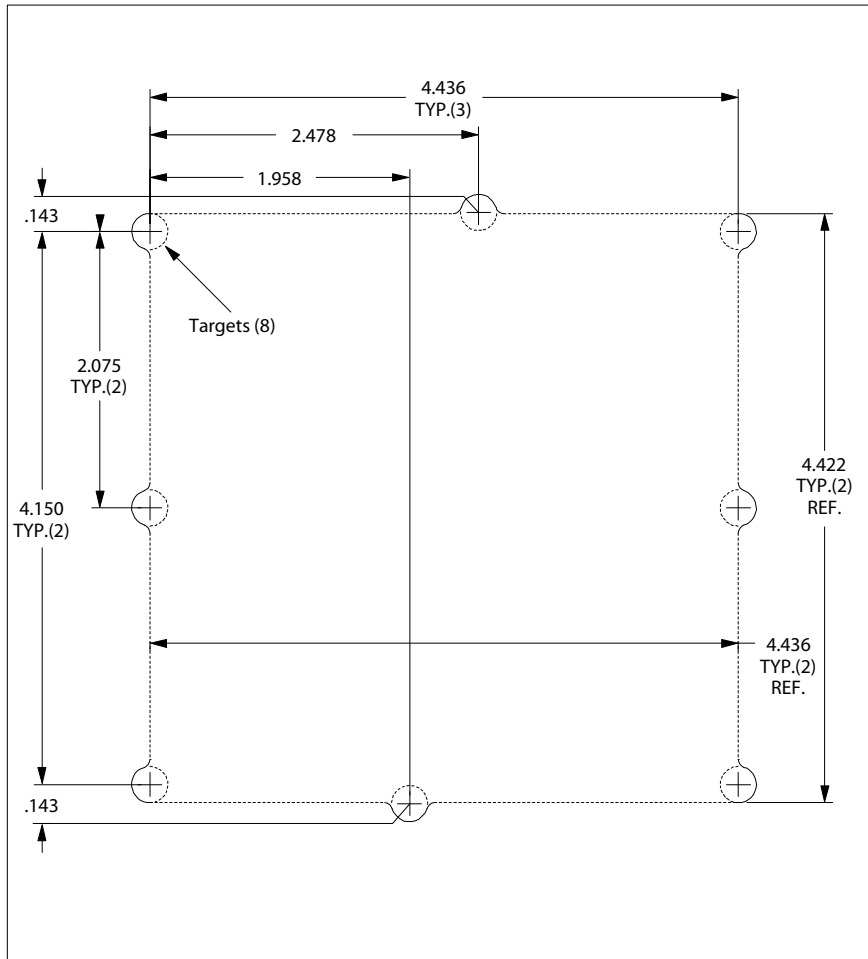
Permanent Closed Back Flush Mounting

Only use this method and the parts listed below for panel thicknesses between 0.062 and 0.125 inches only. For thicker panel walls, contact Two Technologies.

To mount the face of the PSMT in the front of a panel with the rear cover attached behind the panel.

1. Remove the template from its cardboard holder (Figure 5-2) and affix it to the front of the panel.

2. Using a center punch, punch out the targets, and then using a letter I drill bit (0.272-inch diameter), drill out the targets.

3. Cut the panel out along the dotted lines of the template.

4. File all corners to 1/16 inch radius.

5. Remove the eight screws from the back of the unit and slowly remove the back case.

6. Disconnect the serial interface connector cable from the main board. Do not remove any components from the front cover assembly.

7. Place the gasket onto the front cover. See Figure 5-3.

8. Insert the front cover assembly into the panel cutout and carefully reconnect the serial interface connector cable to the main board as shown in **Error! Reference source not found.**.

9. .Secure the front assembly and then attach the rear cover using the eight #1-32 X 1/2 inch screws (gold) included in the PSMT Mounting kit.

Figure 5-3: Flush Mount, Closed Back Mounting
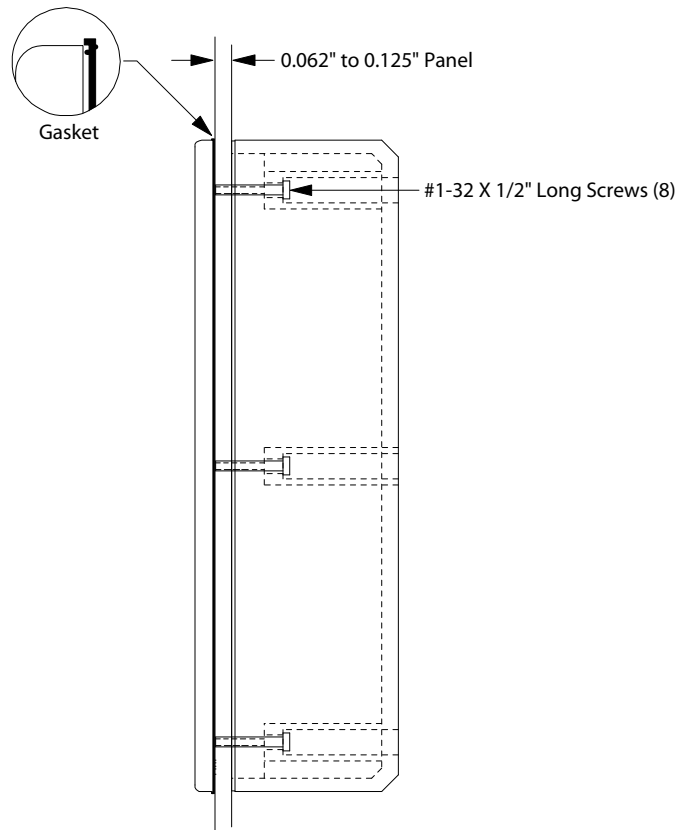
Permanent Open Back Flush Mounting

Only use this method and the parts listed below for panel thicknesses up to 0.062 inches only. For thicker panel walls, contact Two Technologies.

To mount the face of the PSMT in the front of a panel with out the rear cover attached behind the panel.

1. Remove the template from its cardboard holder (Figure 5-2) and affix it to the front of the panel.

2. Using a center punch, punch out the targets, and then using a letter I drill bit (0.272-inch diameter), drill out the targets.

3. Cut the panel out along the dotted lines of the template.

4. File all corners to 1/16 inch radius.

5. Remove the eight screws from the back of the unit and slowly remove the back case.

6. Disconnect the serial interface connector cable from the main board. Do not remove any components from the front cover assembly.

7. Place the gasket onto the front cover and insert the front cover assembly into the panel cutout. See Figure 5-4.

8. Insert the #1-32 X 3/8" silver screws into the mounting clamps (both are included in the PSMT Mounting kit) and attach to back of the front cover panel as shown below.

9. Carefully connect your serial interface cable to the main board as shown in **Error! Reference source not found.**.

Figure 5-4: Flush Mount, Closed Back Mounting
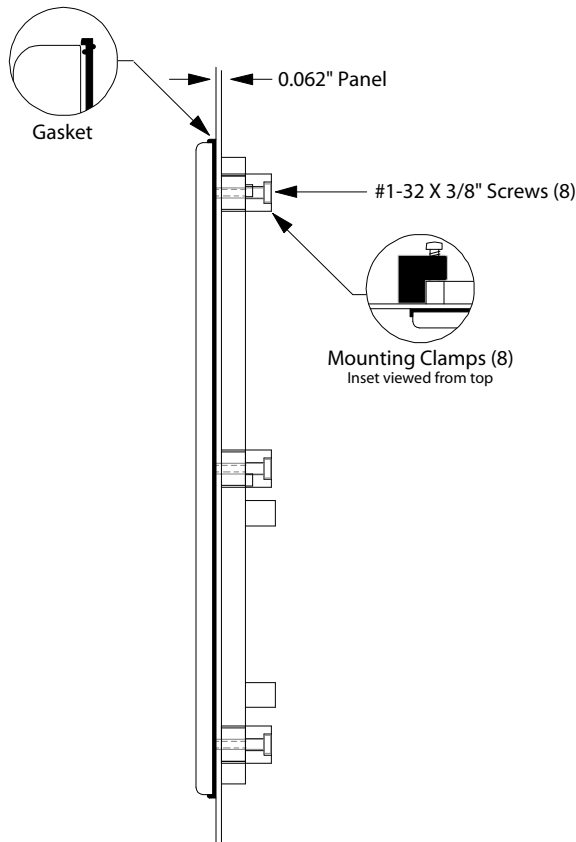
Mounting the PSMT

Detachable Mounting

This method enables you to attach the unit horizontally or vertically to a panel with the ability to lift up or slide out the unit from the panel to use as a hand-held terminal. Detachable mounting requires additional hardware not included with the unit.

Horizontal Mounting

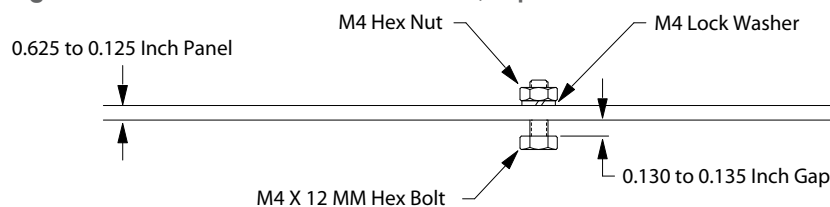To attach the PSMT to a panel so that it also slides out to the right and detaches:

1. Drill and tap two threaded holes as shown in Figure 5-5.

2. Cut out panel for serial interface connector as indicated.

Figure 5-5: Horizontal Detachable Mounting Template
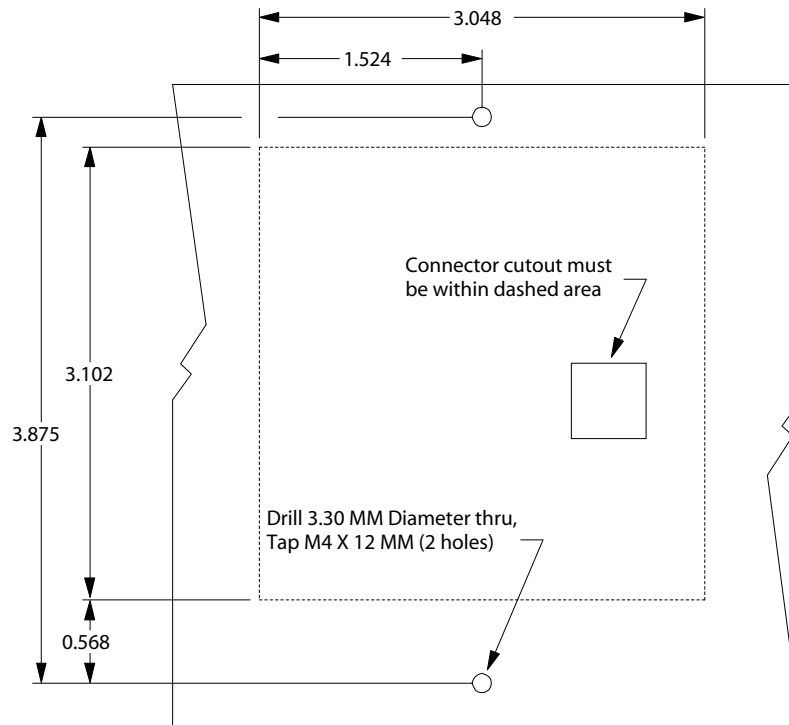
3. Facing the front of the panel, screw two M4 x 12MM hex bolts (Two Technologies Part Number 12341, McMaster Carr Part Number 91280A134) into the M4 threaded holes. See Figure 5-6. There should be a 0.125 inch gap between the bolt head and the panel

4. Place a M4 lock washer (Two Technologies Part Number 12342, McMaster Carr Part Number 91169A160) on each bolt and secure with M4 hex nut (Two Technologies Part Number 12343, McMaster Carr Part Number 90591A141).

Figure 5-6: Horizontal Detachable Mount, Top View

5. Connect the interface cable to the serial interface connector.

6. Place the unit onto the mounting bolts and then slide the unit left to secure. See Figure 5-7.
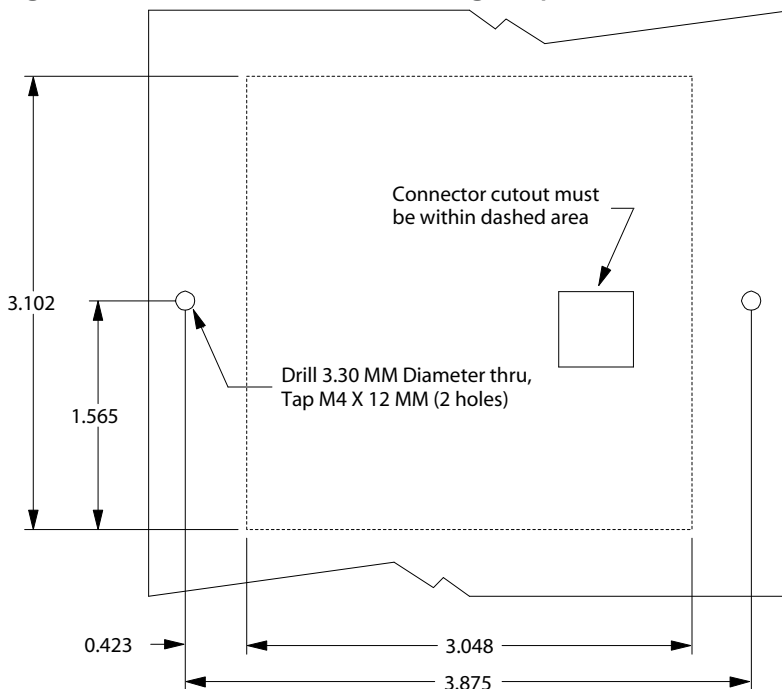
Figure 5-7: Horizontal Detachable Mount, Front View
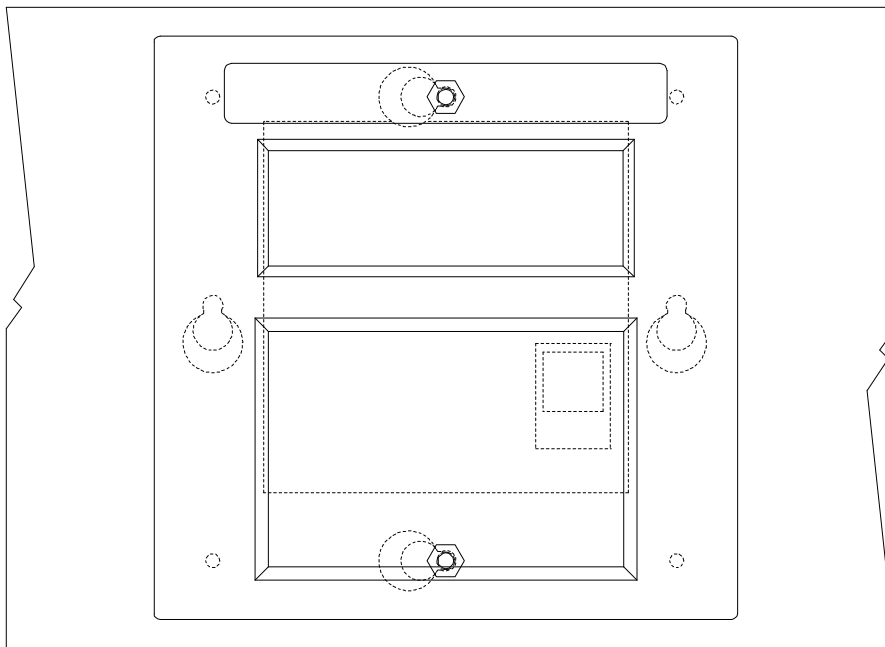
Vertical Mounting

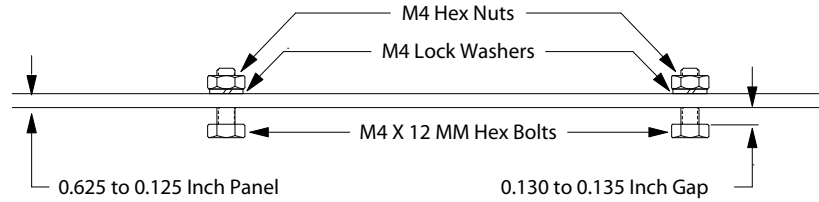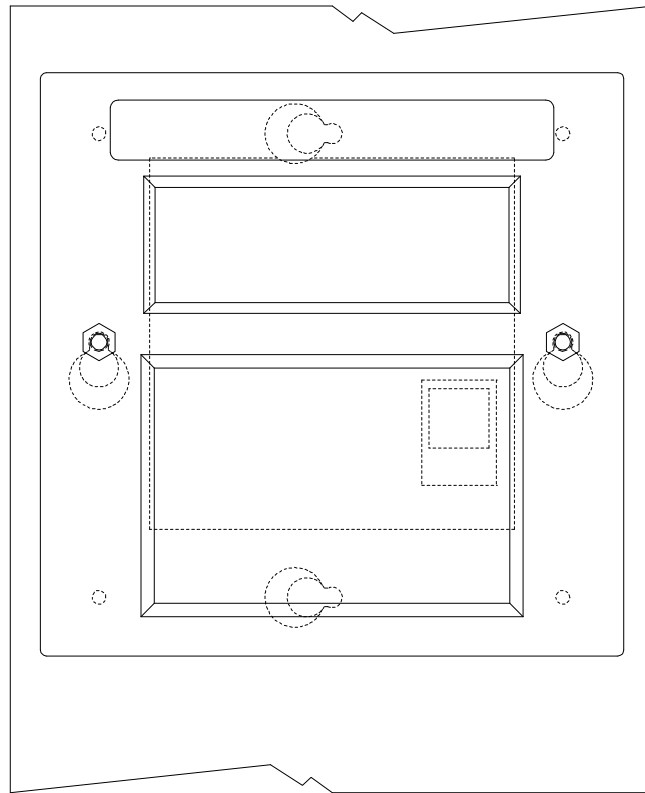To attach the PSMT to a panel so that it also lifts up and detaches:

1. Drill and tap two threaded holes as shown in Figure 5-8.

2. Cut out panel for serial interface connector as indicated.

Figure 5-8: Vertical Detachable Mounting Template

Connector cutout must be within dashed area

Drill 3.30 MM Diameter thru, Tap M4 X 12 MM (2 holes)

3.102

1.565

0.423

3.048

3.875

Mounting the PSMT

3. Facing the front of the panel, screw two M4 x 12MM hex bolts (Two Technologies Part Number 12341, McMaster Carr Part Number 91280A134) into the M4 threaded holes. See Figure 5-9. There should be a 0.125-inch gap between the bolt head and the panel.

4. Place a M4 lock washer (Two Technologies Part Number 12342, McMaster Carr Part Number 91169A160) on each bolt and secure with M4 hex nut (Two Technologies Part Number 12343, McMaster Carr Part Number 90591A141).

Figure 5-9: Vertical Detachable Mount, Top View

M4 Hex Nuts

M4 Lock Washers

M4 X 12 MM Hex Bolts

0.625 to 0.125 Inch Panel   0.130 to 0.135 Inch Gap

5. Connect the interface cable to the serial interface connector.

6. Place the unit onto the mounting bolts and then slide the unit down to secure. See Figure 5-10.

Figure 5-10: Vertical Detachable Mount, Front View

Appendix A: **Specifications**

Display

Standard Features:

▸ Reflective/Transreflective LCD

▸ 4 Rows of 20 characters of text (5 X 7)

▸ Dark Characters on Light Background (except VFD)

▸ U.S. ASCII Character Set

Optional:

▸ Supertwist Nematic

▸ Backlit Supertwist Nematic

▸ LED Backlit Display

▸ Vacuum Fluorescent Display

▸ Extended Temperature Backlit Display

▸ Extended Temperature VFD

Keys & Switches

▸ Type: Membrane or Elastomeric

▸ Feedback: Tactile and Audible

▸ Standard Layouts: 20-key

▸ Optional Backlit and Backlit Phosphorescent Keypads available

---

Power

▸ Voltage: 5 VDC +/- 5%, 7.5-12 VDC* Linear Regulator or 9.5-28 VDC Switching Regulator

▸ Current: 55 mA typical (some options will require additional current)

*Maximum voltage depends on current draw.

CPU

▸ Type: Atmel AT89C51

▸ Speed: 11.059/22.118 MHz

▸ Options: Real Time Clock

Memory and Mass Storage

▸ Flash EEPROM: 448K

▸ Battery-backed SRAM

Interface
‣ Types: RS-232, RS-422, RS485 or CMOS/LSTTL level
‣ Handshake: 2 Lines (CMOS/LSTTL, RS-232)
‣ Data Rates: 300 to 115.2 Kbps
‣ Parity Selections: Even, Odd, Mark, Space, Ignore, None
‣ Control Bits: 1 Start, 1 Stop
‣ Digital I/O Lines: 5

Physical
‣ Height: 4.9.inches (124 mm)
‣ Width: 4.9.inches (124 mm)
‣ Depth w/cover: 1.3 inches (33 mm)
‣ Depth w/o cover: 1.1 inches (28 mm)
‣ Weight: 12 ounces (340 grams)
‣ Case: Valox 420
‣ NEMA 4/12 (panel mounted, using supplied hardware)

Environmental

Storage Temperature Range:

‣ Standard Display: -20^0 to $+70^0C$

‣ Extended Temperature Display: -30^0 to $+70^0C$

Operating Temperature Range:

‣ Standard Display: -0^0 to $+50^0C$

‣ Extended Temperature Display: -20^0 to $+70^0C$

Humidity: 90% (non-condensing)

Specifications are subject to change without notice

Figure 5-11: Case Dimensions
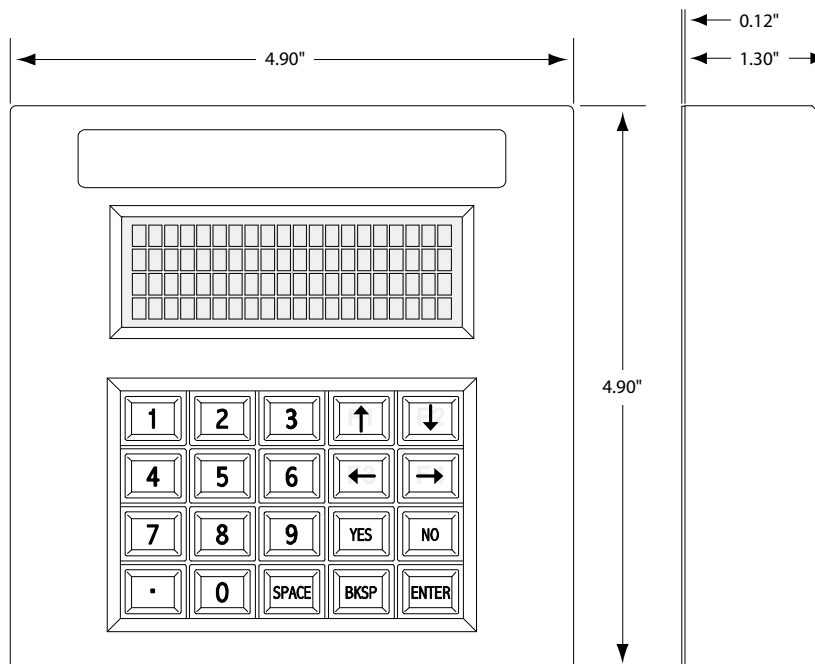
Appendix B: **ASCII Character Set**

Introduction

The following table contains the PSMT ASCII character set and corresponding Decimal, Hex and Binary conversion codes as well as the keystroke entry for QWERTY style PC keyboards:

Table B-1: ASCII Character Set and Conversion Codes

ASCII	Decimal	HEX	Binary	PC Key	ASCII	Decimal	HEX	Binary	PC Key
NUL	0	00	00000000	CTRL 1	RS	30	1E	00011110	CTRL =
SOH	1	01	00000001	CTRL A	US	31	1F	00011111	CTRL -
STX	2	02	00000010	CTRL B	Space	32	20	00100000	Space
ETX	3	03	00000011	CTRL C	!	33	21	00100001	!
EOT	4	04	00000100	CTRL D	"	34	22	00100010	"
ENQ	5	05	00000101	CTRL E	#	35	23	00100011	#
ACK	6	06	00000110	CTRL F	$	36	24	00100100	$
BEL	7	07	00000111	CTRL G	%	37	25	00100101	%
BS	8	08	00001000	CTRL H	&	38	26	00100110	&
HT	9	09	00001001	CTRL I	'	39	27	00100111	'
LF	10	0A	00001010	CTRL J	(	40	28	00101000	(
VT	11	0B	00001011	CTRL K	)	41	29	00101001	)
FF	12	0C	00001100	CTRL L	*	42	2A	00101010	*
CR	13	0D	00001101	CTRL M	+	43	2B	00101011	+
SO	14	0E	00001110	CTRL N	,	44	2C	00101100	,
SI	15	0F	00001111	CTRL O	-	45	2D	00101101	-
DLE	16	10	00010000	CTRL P	.	46	2E	00101110	.
DC1	17	11	00010001	CTRL Q	/	47	2F	00101111	/
DC2	18	12	00010010	CTRL R	0	48	30	00110000	0
DC3	19	13	00010011	CTRL S	1	49	31	00110001	1
DC4	20	14	00010100	CTRL T	2	50	32	00110010	2
NAK	21	15	00010101	CTRL U	3	51	33	00110011	3
SYNC	22	16	00010110	CTRL V	4	52	34	00110100	4
ETB	23	17	00010111	CTRL W	5	53	35	00110101	5
CAN	24	18	00011000	CTRL X	6	54	36	00110110	6
EM	25	19	00011001	CTRL Y	7	55	37	00110111	7
SUB	26	1A	00011010	CTRL Z	8	56	38	00111000	8
ESC	27	1B	00011011	ESC	9	57	39	00111001	9
FS	28	1C	00011100	CTRL<	:	58	3A	00111010	:
GS	29	1D	00011101	CTRL	;	59	3B	00111011	;

ASCII	Decimal	HEX	Binary	PC Key	ASCII	Decimal	HEX	Binary	PC Key
<	60	3C	00111100	<	W	87	57	01010111	W
=	61	3D	00111101	=	X	88	58	01011000	X
@	64	40	01000000	@	Y	89	59	01011001	Y
A	65	41	01000001	A	Z	90	5A	01011010	Z
B	66	42	01000010	B	[	91	5B	01011011	[
C	67	43	01000011	C	\	92	5C	01011100	\
D	68	44	01000100	D	]	93	5D	01011101	]
E	69	45	01000101	E	^	94	5E	01011110	^
F	70	46	01000110	F	_	95	5F	01011111	_
G	71	47	01000111	G	`	96	60	01100000	`
H	72	48	01001000	H	a	97	61	01100001	a
I	73	49	01001001	I	b	98	62	01100010	b
J	74	4A	01001010	J	c	99	63	01100011	c
K	75	4B	01001011	K	d	100	64	01100100	d
L	76	4C	01001100	L	e	101	65	01100101	e
M	77	4D	01001101	M	f	102	66	01100110	f
N	78	4E	01001110	N	g	103	67	01100111	g
O	79	4F	01001111	O	h	104	68	01101000	h
P	80	50	01010000	P	i	105	69	01101001	i
A	65	41	01000001	A	j	106	6A	01101010	j
B	66	42	01000010	B	k	107	6B	01101011	k
C	67	43	01000011	C	l	108	6C	01101100	l
D	68	44	01000100	D	m	109	6D	01101101	m
E	69	45	01000101	E	n	110	6E	01101110	n
F	70	46	01000110	F	o	111	6F	01101111	o
G	71	47	01000111	G	p	112	70	01110000	p
H	72	48	01001000	H	q	113	71	01110001	q
I	73	49	01001001	I	r	114	72	01110010	r
J	74	4A	01001010	J	s	115	73	01110011	s
K	75	4B	01001011	K	t	116	74	01110100	t
L	76	4C	01001100	L	u	117	75	01110101	u
M	77	4D	01001101	M	v	118	76	01110110	v
N	78	4E	01001110	N	w	119	77	01110111	w
O	79	4F	01001111	O	x	120	78	01111000	x
P	80	50	01010000	P	y	121	79	01111001	y
Q	81	51	01010001	Q	z	122	7A	01111010	z
R	82	52	01010010	R	{	123	7B	01111011	{
S	83	53	01010011	S	|	124	7C	01111100	|
T	84	54	01010100	T	}	125	7D	01111101	}
U	85	55	01010101	U	→	126	7E	01111110	
V	86	56	01010110	V	Delete	127	7F	01111111	

Index