PDS

User Guide

Two Technologies, Inc.
Hand Held Terminals • Your Way • Since 1987

Document 15803(1.0.0.0)

PDS User Guide

Document Number: 15803(1.0.0.0)

Date of Last Revision: November 19, 2008

Printed in the United States of America

Copyrights and Trademarks

Reproduction Rights

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: customerservice@2T.com
- Technical Services: tech_services@2T.com
- Repair Services: repair_services@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 présent appareil numérique n'émet pas de bruits radioélectrique dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

Certifications

CENELEC

CE

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.

Battery Replacement

CAUTION! There is a risk of explosion if you replace the NiMH battery with an incorrect type. Only use the NiMH battery supplied with your unit or a replacement NiMH battery supplied, recommended, or approved by Two Technologies, Inc.

Battery Disposal

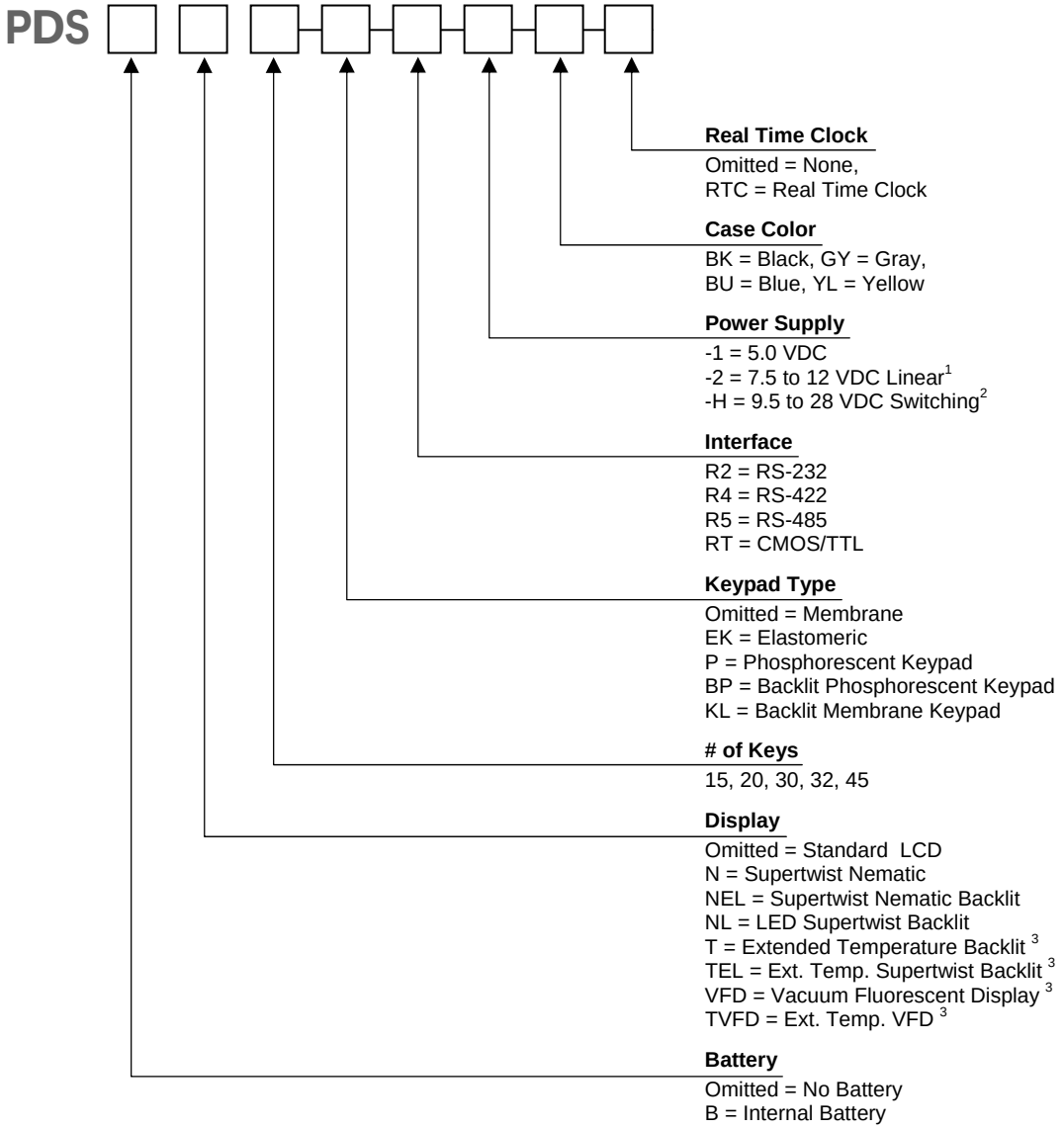
Dispose of batteries in a safe manner. The following are general guidelines for the safe use and disposal of NiMH batteries:

- Replace a defective NiMH battery immediately as it could damage the unit.
- Do not throw the NiMH battery it in trash that is disposed of in landfills as it contains heavy metals. Recycle or dispose the NiMH battery of it as required by local ordinances or regulations.
- Do not disassemble, incinerate, short-circuit the NiMH battery or throw it into a fire. It can explode and cause severe personal injury.
- Excessive discharge damages a NiMH battery. Recharge the NiMH battery when your unit indicates low battery power.

Product Configuration Guide

The PDS is a rugged, full featured programmable 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 PDS 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:



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.
3. Not available on battery units

Example

The configuration number for a PDS with a vacuum flourescent display, a 45-key elastomeric keypad, a RS-232 interface, a 7.5 to 12 VDc linear power suppy in a black case would be:

PDSVFD45EKR2-2-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 PDS 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***
PDS45R2	Base Unit with 45-key Keypad & RS-232	55 mA
PDS45R2	Base Unit with 45-key Keypad & 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—PDSNELR2:

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

   Example 2—PDSNLKLR2:

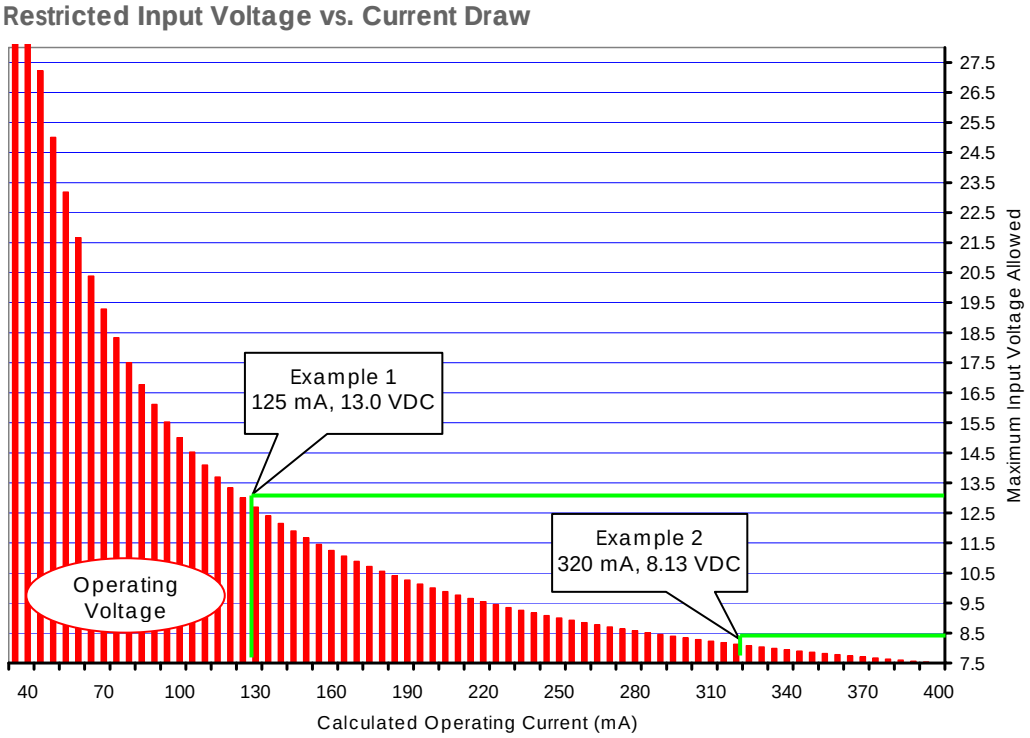
RS-232 Option	55 mA
Supertwist LED Backlit Display	185 mA
Backlit Keypad	80 mA
Calculated Total Current	320 mA

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.



Using Example 1 and the chart above, the 125 mA drawn by the PDSNELR2 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 PDSNLKLR2 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 PDSNELR2 (Example 1), but not for the PDSNLKLR2 (Example 2). Applying 12 VDC to the PDSNLKLR2 (Example 2) will **damage** it.

Contents

Chapter 1. OVERVIEW 1
About this Manual 1
About Two Technologies 2
About the PDS 2
PDS Features 2

Chapter 2. COMPONENTS AND INDICATORS 5
Controls and Indicators 5
Cable and Power Connections 6
Modular Interface Connector 6
Terminals with Optional E-Stops 7
Standard Accessory Cables 7
PCAT Wired Adapter 8
Connecting the Terminal 8

Chapter 3. OPERATION 9
Power 9
Line-Powered Units 9
Battery-Powered Units 10
Keypad Operation 12
Display Operation 12
Cursor Position 12
E-Stop Operation 13
The Default Program 14
Default Settings 14
Loading Default Settings 16

Chapter 4. HOST COMMANDS 19
Introduction 19
Cursor Commands 19
Erasure Commands 22
Character Attribute Commands 22
Sound Commands 23
Key Attribute Commands 23
Return Commands 24
Host Command Summary 24
Control Codes 25

Appendix A. SPECIFICATIONS 27

Appendix B. ASCII CHARACTER SET 31

INDEX 35

List of Figures

Figure 2-1: Controls and Indicators 5
Figure 2-2: Modular Interface Connector 6
Figure 2-3: DB-25 Interface Connector 7
Figure 2-4: 1210 Series Modular Cable 7
Figure 2-5: PCAT Modular Connector 8
Figure 3-1: Cable Connections 9
Figure 3-2: Battery Replacement 11
Figure 3-3: Standard Keypads 12
Figure 3-4: E-Stop Operation 13
Figure 3-5: E-Stop Switch Wiring 13
Figure 3-6: Parity Error Symbol 14
Figure 4-1: Case Dimensions 29

List of Tables

Table 2-1: Controls and Indicators 5
Table 2-2: Modular Interface Connector Signal and Pin Assignments 6
Table 2-3: DB-25 Interface Connector Signal and Pin Assignments 7
Table 3-1: Default Terminal Program Settings 16
Table 4-1: Private Mode Host Command Summary 24
Table 4-2: Control Codes 25
Table B-1: ASCII Character Set and Conversion Codes 32

CHAPTER 1

OVERVIEW

About this Manual

Intended for authorized developers with prior knowledge of hand held PC application development, this manual describes the advanced features, operations and interface capabilities of Two Technologies' PDS 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 45-key keypad.

Because PDS 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 PDS terminal application programs and connected equipment. This information should be available in the manuals that accompany those products.

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

Related Documents

- 2BASIC Reference Manual for PDS/PSMT Terminals, MAN0040
- C Run-Time Library Reference Manual for PDS/PSMT Terminals, MAN0026
- PDS/PSMT Programmer's Reference Manual, MAN0346
- PDS RF Module Command Reference Manual, MAN0347

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 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 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 PDS

The PDS is a rugged, full featured programmable hand held 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 PDS 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.

PDS Features

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

Power

The PDS 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.

Battery-powered PDS terminals come equipped with a rechargeable Nickel Metal Hydride (NiMH) battery that has exceptional charge life without the “charge memory” characteristic of conventional nickel cadmium batteries. . Battery-powered terminals can also operate on six AA alkaline batteries.

Memory

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

Display

PDS 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.

Keypad

Securely framed and clamped into place, the keypad surface provides excellent splash resistance and prevents curling or peeling of the keypad overlay. Keypad layouts include 45, 30, and 20 keys available with standard or custom graphics and 32 and 15 keys available with custom graphics. Keypads can be made from your choice of elastomeric or membrane material.

Interface Options

Interface options for PDS 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.

Emergency Stop Switch

An emergency stop switch is optionally available. The stop switch has a push-off, turn-reset motion. A fully depressed E-Stop opens all the circuits and can bring the machinery to a complete halt.

Wireless Radio

With the optional RF Module, you can transfer a standard asynchronous serial data stream over-the-air between devices. No configuration is required. It uses standard AT commands for changing parameters. Simply output serial data from the RS-232 port into the RF module to send FCC & ETSI approved, frequency hopping spread spectrum data.

Durability

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

CHAPTER 2

COMPONENTS AND INDICATORS

Controls and Indicators

Figure 2-1 describes the possible components and indicators found on the front of a PDS terminal as shown in Table 2-1 (Optional E-Stop not shown)

Figure 2-1: Controls and Indicators

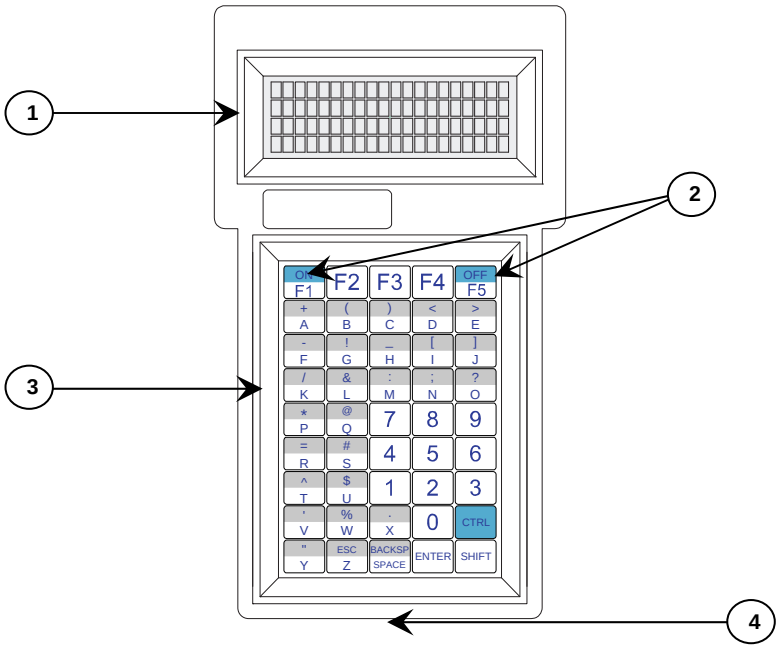


Table 2-1: Controls and Indicators

Item	*Control/Feature*	*Description*
1	Display	192 x 128 pixel supertwist nematic LCD (standard)
2	On & Off Switches	Battery-powered units only
3	Keypad	45-key keypad (standard)
4	Modular Interface Connector	Supplies communication and power

Cable and Power Connections

Modular Interface Connector

Figure 2-2 depicts the standard six-pin modular interface connector found on the PDS 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

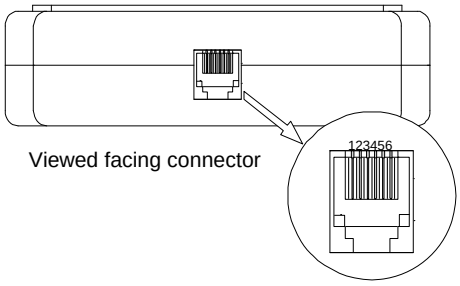


Table 2-2: Modular Interface Connector Signal and Pin Assignments

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

Terminals with Optional E-Stops

PDS terminals equipped with an optional E-Stop connect to host equipment via a non-detachable permanent wire cable that ends with a DB-25 male connector (Figure 2-3). Table 2-2 describes its signal and pin assignments.

Figure 2-3: DB-25 Interface Connector

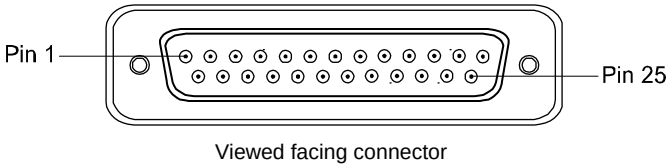


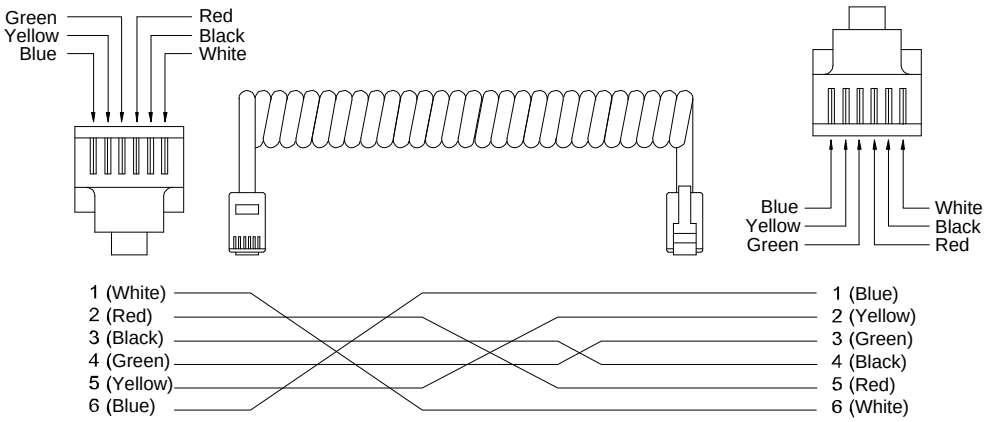
Table 2-3: DB-25 Interface Connector Signal and Pin Assignments

Pin	Color	Signal	Pin	Color	Signal
2	Yellow	Data-Out to terminal	13	Violet	E-Stop 1 (common)
3	Green	Data-In to terminal	14	Orange	E-Stop 1 (normally closed)
4	Red	Handshake-Out from terminal (RTS)	15	White	E-Stop 2 (common)
5	Black	Handshake-In to terminal (CTS)	16	Brown	E-Stop 2 (normally closed)
6	Red	Pin 20 (Jumpered)	20	Red	Pin 6 (Jumpered)
7	Blue	Common	25	Gray	+ Supply to terminal

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.

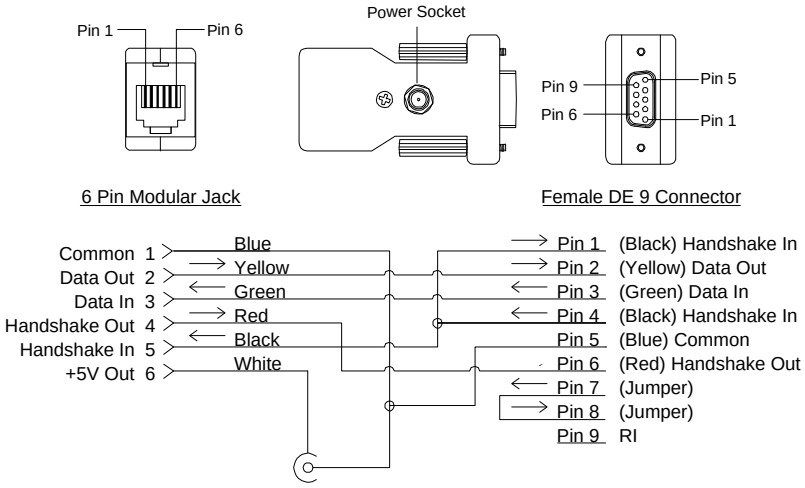
Figure 2-4: 1210 Series Modular Cable



PCAT Wired Adapter

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

Figure 2-5: PCAT Modular Connector



***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

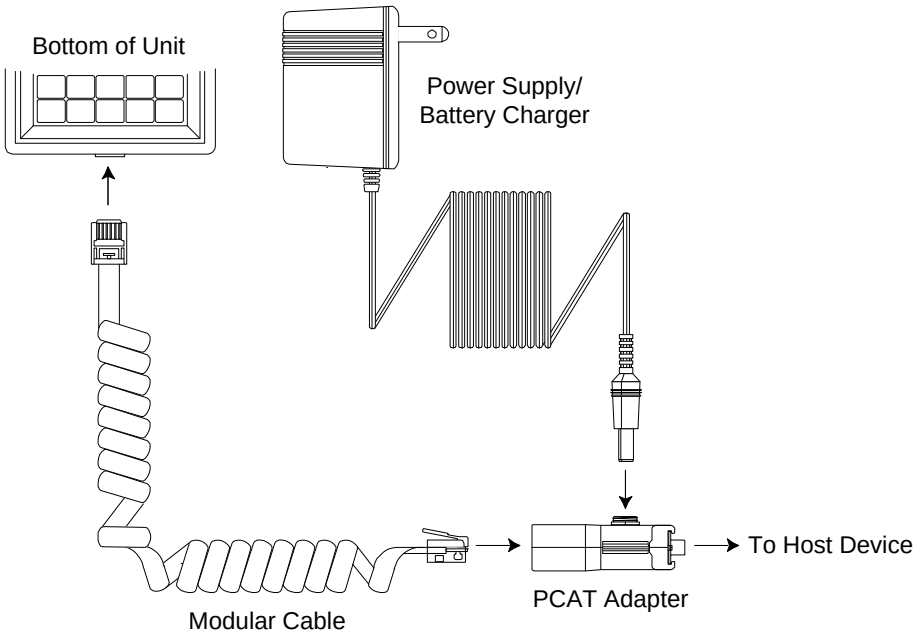
Power

Line-Powered Units

To supply power to a line-powered PDS 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



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.

Battery-Powered Units

Battery-powered PDS terminals come equipped with a rechargeable Nickel Metal Hydride (NiMH) battery that has exceptional charge life without the "charge memory" characteristic of conventional nickel cadmium batteries. Depending on configuration and use, operating time on a full charge can last up to 24 hours. Battery-powered terminals can also operate on six AA alkaline batteries

.To turn on a battery-powered unit, press any function key. The terminal should turn on and a blinking cursor should appear on the display.

To turn off the unit, press the **CTRL** and **F5** keys.

Power Saver

To conserve power, a built-in power saver will turn off the terminal after ten minutes of inactivity. After eight minutes, the terminal will emit short warning beeps spaced twenty seconds apart. Twenty seconds after the fifth beep, the terminal will shut down. Any key press or character received by the terminal will reset the power-saver timer.

Recharging the Unit

By default, when the battery power level is low, the message "LOW BATTERY" will flash on the last line of the display approximately every seven seconds. The message remains displayed for one second, and then restores to its previous condition.

The recharging time required for a full charge depends on the initial state of the battery. With the terminal off, this time should not exceed eight hours. Partially discharged batteries or extended periods with the charger left connected will not adversely affect battery life or performance.

Because the internal battery charger senses several conditions, including temperature, you should charge the unit away from any known or potential heat sources. Units exposed to temperatures in excess of 90 degrees Fahrenheit during the charge cycle may experience incomplete charging and reduced operating time per charge.

To recharge the Nickel Metal Hydride (NiMH) battery pack, plug the Two Technologies' power supply/battery charger (Part # 13779) into the PCAT adapter and then plug the power supply/battery charger into a 120 VAC 60 Hz power outlet.

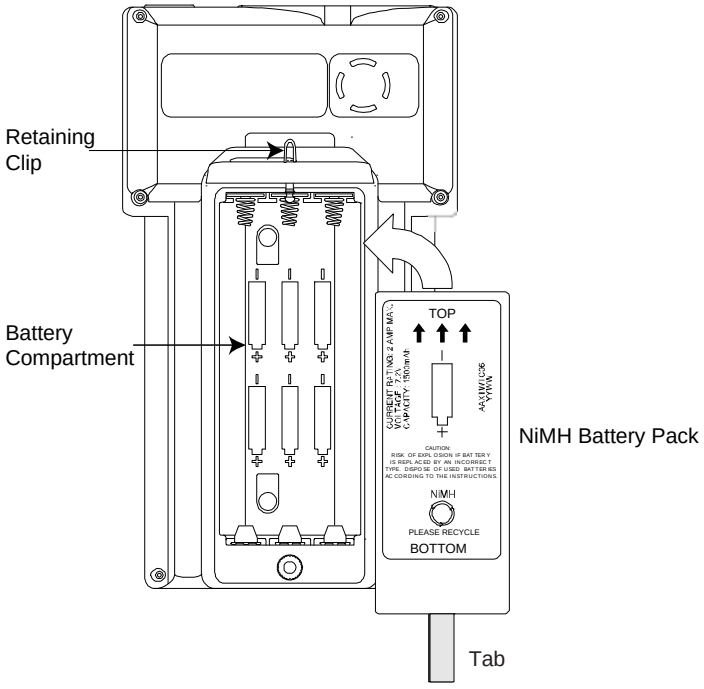
Battery Replacement

CAUTION! *There is a risk of explosion if you replace the NiMH battery with an incorrect type. Only use the NiMH battery supplied with your unit or a replacement NiMH battery supplied, recommended, or approved by Two Technologies, Inc.*

To change the NiMH rechargeable battery or replace AA batteries:

1. Turn the power off.
2. With the unit face down, pull the battery cover retaining clip up from its recessed slot and turn the clip in a counter clockwise motion. See Figure 3-2.
3. Lift the cover up and either use the tab to lift the battery pack up and out, or remove the AA batteries.
4. Insert the new battery pack/batteries into the unit using the orientation shown below
5. Close the battery cover and turn the battery cover retaining clip clockwise to lock the cover.

Figure 3-2: Battery Replacement

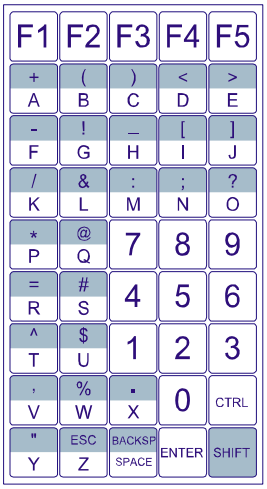


Keypad Operation

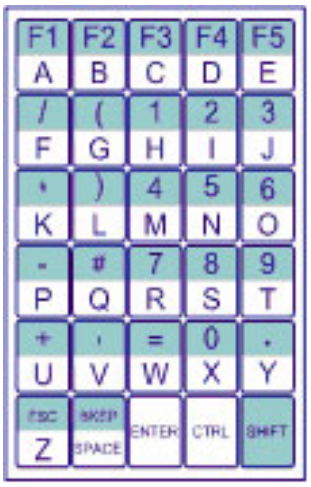
The standard 30 position and 45 position keypads consist of uppercase letters, digits 0 through 9, punctuation marks, symbols, function keys and keys for Escape (**ESC**), Space (**SPACE**), Backspace (**BACKSP**/**BKSP**), Control (**CTRL**), Shift (**SHIFT**) and Enter (**ENTER**).

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

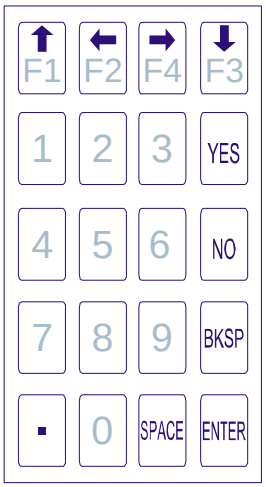
Figure 3-3: Standard Keypads



45 Position Keypad



30 Position Keypad



20 Position Keypad

Note: *Standard keypads for battery-powered terminals may vary slightly in appearance from the keypads depicted above.*

Display Operation

Standard PDS 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.

E-Stop Operation

The optional E-Stop switch consists of two normally closed switches. Pressing the switch opens both sets of contacts. Lamp connections are available only on optional illuminated switches.

Figure 3-4: E-Stop Operation

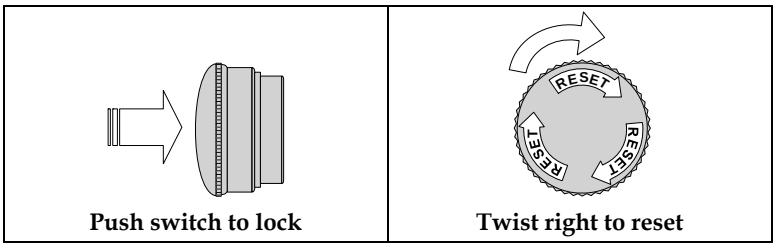
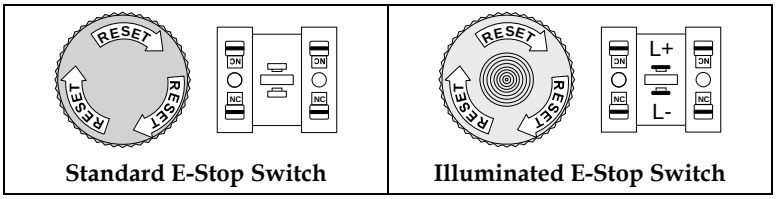


Figure 3-5: E-Stop Switch Wiring



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 3-6) when using EVEN, ODD, MARK or SPACE parity checking and a parity error occurs.

Figure 3-6: 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.

Display Low Battery

By default, battery-powered PDS terminals will flash a “LOW BATTERY” message on the last line of the display approximately every seven seconds when the battery power level is low on.

Power Saver

By default, battery-powered PDS terminals will turn off it not receiving a character or detecting a key press after approximately ten minutes.

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
Display Low Battery *	ENABLED
Power Saver*	ENABLED

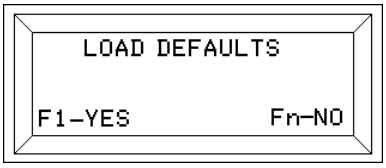
* Battery-powered PDS terminals only

Loading Default Settings

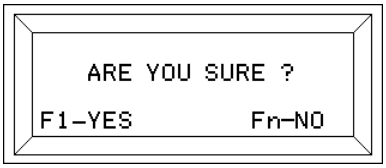
To load the default settings:

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.



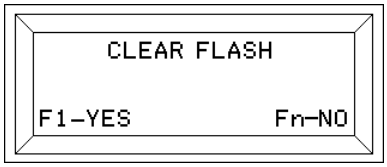
4. Press **F1** to continue. Press any other key to exit the menu without changing the values. If you pressed **F1**, the terminal will prompt you to confirm your selection.



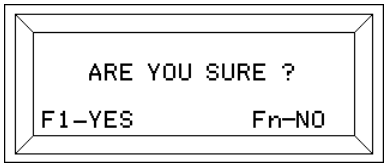
5. Press **F1** to load the defaults. Press any other key to exit the menu without loading the default values. If you pressed **F1**, the terminal will prompt you to clear flash memory.
6. Clearing flash will set an internal bit that prevents the currently loaded program from starting and enable you to download a new program.

   You can find information about downloading applications by reading the manuals referred to in the Related Documents section.

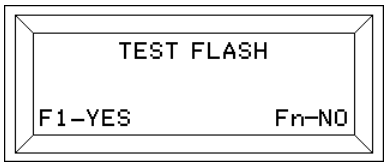
   Repeating this procedure and clearing the flash again will reset the bit and allow the program to start.



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.



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.



9. Press any key to exit the menu.

CHAPTER 4

HOST COMMANDS

Introduction

By design, the PDS 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:

NNBPDSX nnnn.ffff.cccc

For example: 45BPDS.6963.7F83.87FF

Where *NN* is the keypad type (20, 30 or 45) B indicates battery-powered, PDS 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

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 (non-battery units only)
• Extended Temperature Backlit Display
• Extended Temperature VFD (non-battery units only)
Keys & Switches
• Type: Membrane or Elastomeric
• Keypad Configuration: 45-key (9 x 5), 32-key [1] (8 x 4), 30-key (6 x 5), 20-key (5 x 4), 15-key [1] (5 x 3)
• E-Stop Switch: Optional
• Feedback: Tactile and Audible
• Function Keys: 5 Programmable
Power
Line Power:
• Voltage: 5 VDC ± 5%, 7.5 to 12 VDC Linear Regulator [2] or 9.5 to 28 VDC Regulator
• Typical Current Draw with Linear Regulator[3]: 26 - 55 mA
Battery Power (Optional) :
• Type: NiMH Rechargeable or 6 AA Alkaline batteries[4]
• Battery Run Time: 12 hours, no backlight
• Charger Requirements: 12 Volt Unregulated @ 500 mA.

1. Requires custom overlay
2. Maximum voltage depends on current draw
3. Some options require additional current (e.g., Backlight adds 50 mA)
4. Not shipped with unit

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: 3
- Connectors: 6-pin female modular RJ-11 socket standard,
  Optional permanent or custom cable configurations also available

Physical

- Height: 7.15.inches (181.6mm)
- Width: 4.10 inches (104.1 mm)
- Depth: 1.00 inch (25.4 mm)
- Depth with Battery Option: 1.59 inch (25.4 mm)
- Weight: 11.6 ounces (328 grams)
- Weight with Battery Option & NiMH pack: 17.5 ounces (496 grams)
- Case: General Electric Cycolac ABS with retractable hanger

Environmental

Storage Temperature Range:

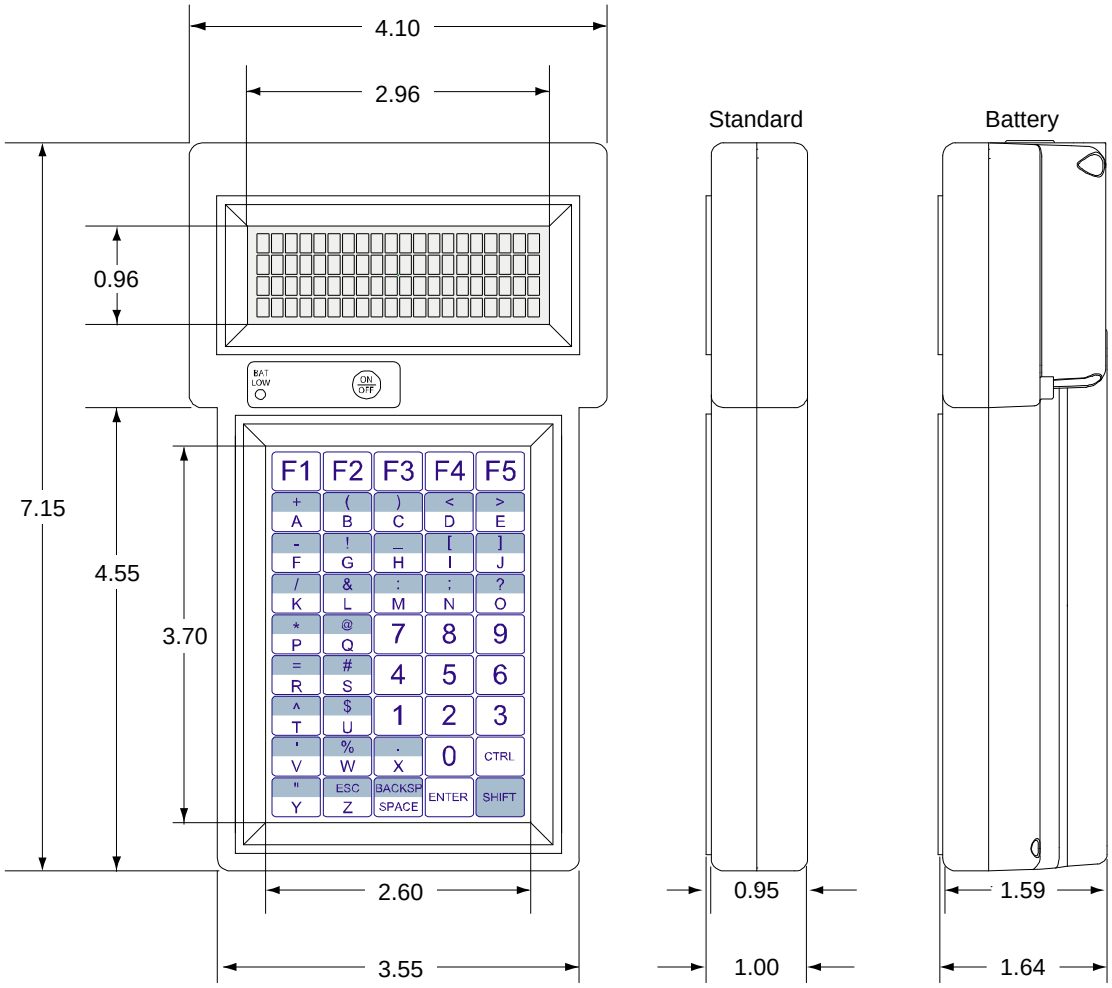
- Standard Display: -20^0 to + 70^0C
- Extended Temperature Display: -30^0 to + 70^0C

Operating Temperature Range:

- Standard Display: -0^0 to + 50^0C
- Extended Temperature Display: -20^0 to + 70^0C

Humidity: 90% (non-condensing)

Figure 4-1: Case Dimensions



APPENDIX B

ASCII Character Set

Introduction

Table B-1 contains the PDS 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	Space	32	20	00100000	Space
SOH	1	01	00000001	CTRL A	!	33	21	00100001	!
STX	2	02	00000010	CTRL B	“	34	22	00100010	“
ETX	3	03	00000011	CTRL C	#	35	23	00100011	#
EOT	4	04	00000100	CTRL D	$	36	24	00100100	$
ENQ	5	05	00000101	CTRL E	%	37	25	00100101	%
ACK	6	06	00000110	CTRL F	&	38	26	00100110	&
BEL	7	07	00000111	CTRL G	'	39	27	00100111	'
BS	8	08	00001000	CTRL H	(	40	28	00101000	(
HT	9	09	00001001	CTRL I	)	41	29	00101001	)
LF	10	0A	00001010	CTRL J	*	42	2A	00101010	*
VT	11	0B	00001011	CTRL K	+	43	2B	00101011	+
FF	12	0C	00001100	CTRL L	,	44	2C	00101100	,
CR	13	0D	00001101	CTRL M	-	45	2D	00101101	-
SO	14	0E	00001110	CTRL N	.	46	2E	00101110	.
SI	15	0F	00001111	CTRL O	/	47	2F	00101111	/
DLE	16	10	00010000	CTRL P	0	48	30	00110000	0
DC1	17	11	00010001	CTRL Q	1	49	31	00110001	1
DC2	18	12	00010010	CTRL R	2	50	32	00110010	2
DC3	19	13	00010011	CTRL S	3	51	33	00110011	3
DC4	20	14	00010100	CTRL T	4	52	34	00110100	4
NAK	21	15	00010101	CTRL U	5	53	35	00110101	5
SYNC	22	16	00010110	CTRL V	6	54	36	00110110	6
ETB	23	17	00010111	CTRL W	7	55	37	00110111	7
CAN	24	18	00011000	CTRL X	8	56	38	00111000	8
EM	25	19	00011001	CTRL Y	9	57	39	00111001	9
SUB	26	1A	00011010	CTRL Z	:	58	3A	00111010	:
ESC	27	1B	00011011	ESC	;	59	3B	00111011	;
FS	28	1C	00011100	CTRL<	<	60	3C	00111100	<
GS	29	1D	00011101	CTRL	=	61	3D	00111101	=
RS	30	1E	00011110	CTRL =	>	62	3E	00111110	>
US	31	1F	00011111	CTRL -	?	63	3F	00111111	?

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

Index

1

1210 Series Modular Cable....7

A

About the PDS....2
About this Manual....1
About Two Technologies....2
Alert....23
ASCII Character Set....31

B

Battery Disposal....v
Battery Replacement....v, 11
Battery-Powered Units....10
Baud Rate....14

C

Cable and Power Connections....6
Cable Connections....9
Calculating Total Current Draw....vii
Case Dimensions....29
Certifications....iv
Character Attribute Commands....22
Clear Blink Attribute....22
Components and Indicators....5
Connecting the Terminal....8
Control Codes....25
Controls and Indicators....5
CPU....28
Cursor Commands....19
Cursor Down....19
Cursor Home....20
Cursor Home & Clear Display....20
Cursor Left....20
Cursor Position....12, 21
Cursor Right....19
Cursor Up....19

D

Data Bits....14
DB-25 Interface Connector....7
Default Program....14
Default Settings....14
Default Terminal Program Settings Summary....16
Disable Blinking Cursor....20
Disable Cursor....20
Disable Key Click....23
Disable KNP Function....23
Display....2, 5, 27
Display Low Battery....15
Display Operation....12
Display PE....14
Durability....3

E

Echo....15
Echo 485....15
Electrostatic Discharge....v
Emergency Stop Switch....3
Enable Blinking Cursor....20
Enable Cursor....20
Enable Key Click....23
Enable KNP Function....23
Environmental Specifications....28
Erase Cursor to End of Display....22
Erase Cursor to End of Line....22
Erase Display and Home Cursor....22
Erase Entire Line....22
Erasure Commands....22
E-Stop Operation....13
E-Stop Switch Wiring....13

H

Handshake 15
Host Command Summary 24
Host Commands 19

I

Interface 28
Interface Options 3

K

Key Attribute Commands 23
Key Click 15
Keypad 3, 5, 12, 27
Keypad Operation 12
Keys & Switches 27

L

Line-Powered Units 9
Loading Default Communications Settings 16
Long Bell 23

M

Maximum Input Voltage viii
Memory 2
Memory and Mass Storage 28
Modular Interface Connector 5, 6

O

On & Off Switches 5
Operation 9
Overview 1

P

Parity 14
Parity Error 14
PCAT Wired Adapter 8
PDS Features 2
Physical Specifications 28
Power 2, 9, 27
Power Requirements vii
Power Saver 10, 15
Power Supply Options vii
Product Configuration vi

R

Recharging the Unit 10
Regulatory Notices iv
Repeat 15
Return Commands 24
Return Terminal Identifier String 24

S

Scroll on 81 15
Set Blink Attribute 22
Short Bell 23
Signal and Pin Assignments 6
Sound Commands 23
Specifications 27
Standard Accessory Cables 7
Stop Bits 14

T

Terminals with Optional E-Stops 7

W

Wireless Radio 3

X

XON/XOFF 15