



# PDT 3100 Series



## Product Reference Guide





***PDT 3100 Series  
Product Reference Guide***

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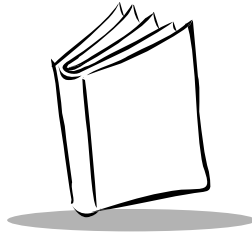
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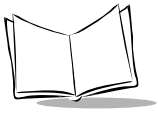
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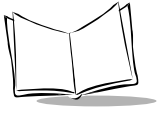
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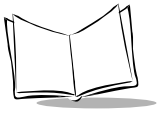
The *PDT 3100 Series Product Reference Guide* provides general instructions for setting up, initializing, operating, troubleshooting, and maintaining your terminal.

### Chapter Descriptions

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Topics covered in this guide are as follows:

- *Chapter 1, The PDT 3100 System*, describes your PDT 3100 terminal and provides parts diagrams and accessory information.
- *Chapter 2, Setting Up the Terminal*, describes how to set up your PDT 3100 hardware and initiate communication.
- *Chapter 3, Spectrum24 RF Setup*, explains how to set up your terminal for radio communication.
- *Chapter 4, Operating the PDT 3100*, explains how to turn on and boot the terminal, adjust the display, and how to use the keyboard and integrated scanner.
- *Chapter 5, Error Recovery and Troubleshooting*, provides error messages and troubleshooting information.
- *Chapter 6, Maintaining the PDT 3100*, provides information on batteries and cleaning.
- *Appendix A, Port Pinouts*, provides signal descriptions for the terminal and 3115 CCA cables.
- *Appendix B, Keyboard Layouts*, provides keyboard mappings for the various PDT 3100 keyboard configurations.
- *Appendix C, Communications Status Codes*, details communication error codes.
- *Appendix D, Specifications*, provides environmental and scanning specifications for the terminal.



## Notational Conventions

---

The following conventions are used in this document:

- *Italics* are used to highlight specific items in the general text, and to identify chapters and sections in this and related documents.
- Bullets (•) indicate:
  - action items
  - lists of alternatives
  - lists of required steps that are not necessarily sequential
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.

## Related Documents

---

- *PDT 3100 Quick Reference Guide*  
p/n 72-60523-XX
- *Series 3000 Application Programmer's Guide*  
p/n 70-16308-XX
- *Series 3000 Application Programmer's Reference Manual*  
p/n 70-16309-XX
- *Series 3000 System Software Manual*  
p/n 70-16310-XX
- *CRD3100-1000, 3100-4000 Quick Reference Guide*  
p/n 70-11313-XX
- *3115 Communications/Charger Adapter Inst. Instructions*  
p/n 70-11314-XX
- *Spectrum 24 Access Point User's Guide*  
p/n 70-12057-XX
- *Spectrum24 Flash Disk Addendum*  
p/n 70-31437-XX

## Service Information

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If you have a problem with your equipment, contact the [Symbol Support Center](#) for your region. See [page ix](#) for contact information. Before calling, have the model number, serial number, and several of your bar code symbols at hand.

Call the Support Center from a phone near the scanning equipment so that the service person can try to talk you through your problem. If the equipment is found to be working properly and the problem is symbol readability, the Support Center will request samples of your bar codes for analysis at our plant.

If your problem cannot be solved over the phone, you may need to return your equipment for servicing. If that is necessary, you will be given specific directions.

---

**Note:** *Symbol Technologies is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty.*

---

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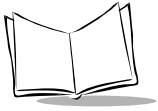
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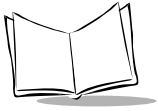
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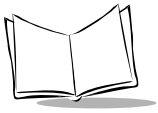
# Chapter 1

## *The PDT 3100 System*

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*PDT 3100 Series Product Reference Guide*



## **Introduction**

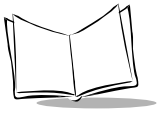
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The Series 3100 terminals are lightweight, battery powered, handheld portable data collection devices. Data is entered from the keyboard or an integrated laser scanner.

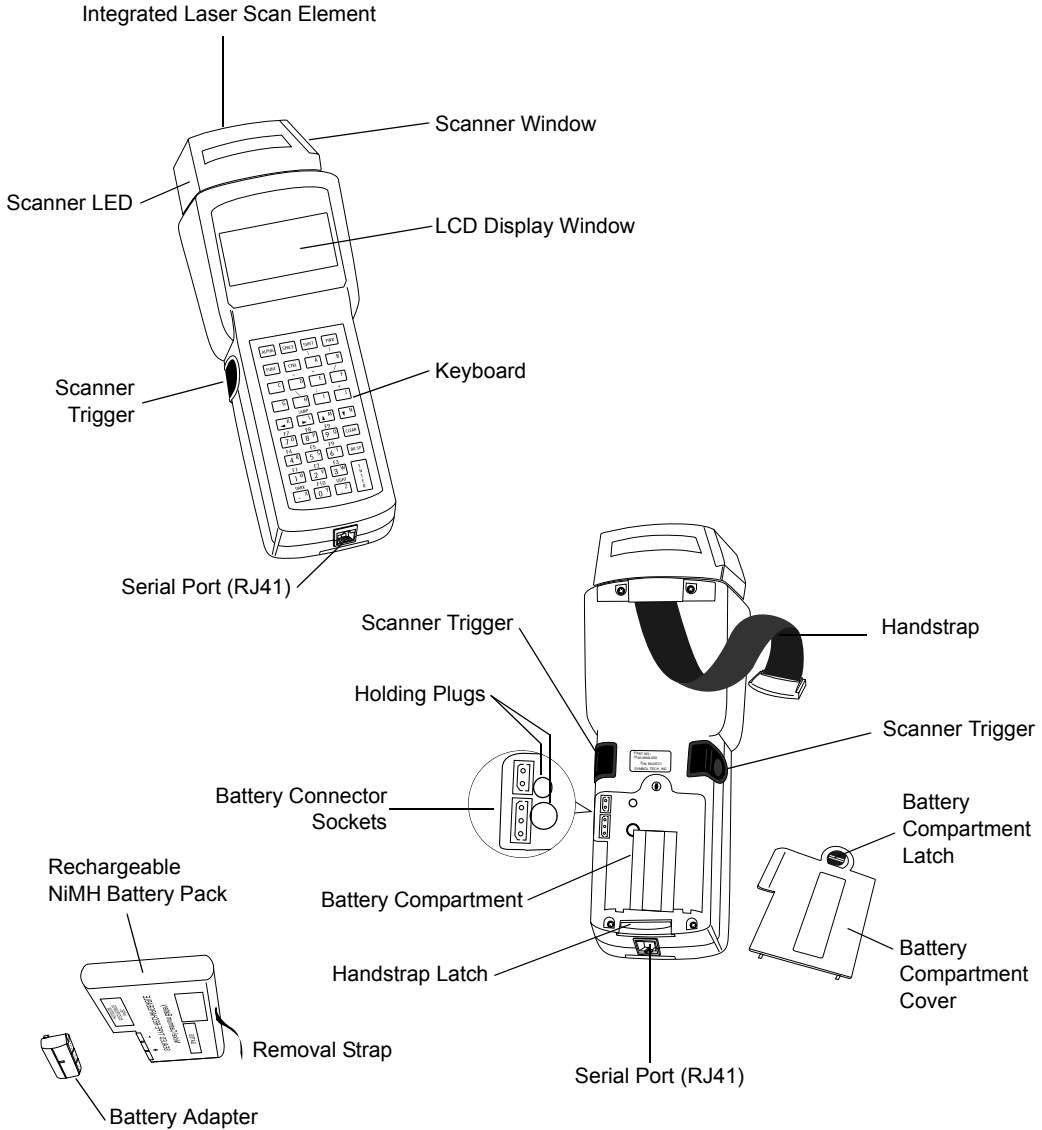
As remote terminals, the PDT 3100 collects and stores data that is later uploaded to a host computer. The PDT 3100 is a batch terminal (no radio). The PDT 3142 and 3146 are Spectrum24<sup>®</sup> radio terminals.

The operating system is DR-DOS. It is compatible with and extends the industry-standard IBM PC-DOS<sup>™</sup>. DR-DOS provides access to a number of commercially available programming tools. Additional programming tools are available from Symbol for easier system programming and access to special features.

Power saving features of the Series 3100 include auto-off and power save modes, which reduce power consumption until an operator provides input. These features conserve battery power, lengthening the time between charges or replacement.



# Parts of the Series 3100



## Accessories

---

The following accessories are available for Series 3100 terminals.

### **Battery Chargers**

- Alkaline batteries (PDT 3100 only)
- Rechargeable 600 Mah Nickel Metal Hydride (NiMH) battery packs (available from Symbol). NiMH batteries are charged using one of the charging accessories listed below.

**Table 1-1. Battery Charging Accessories**

<b>Accessory</b>	<b>Part Number</b>	<b>Batteries Charged</b>
Single-Slot Cradle	CRD3100-100U (US version) CRD3100-100I (International)	All
Four-Slot Cradle	CRD3100-400U (US version) CRD3100-400I (International)	All
Communications/Charger Adapter 15 Volt Adapter	3115-000 59915-00-00 (US version)	KT-12596-01
Universal Four-Slot Charger	3004-xxx	KT-12596-01 KT-12596-02
UBC 2000 Charger	UBC2000-xxxx	All

### **Scanners**

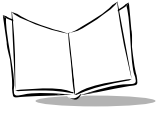
PDT 3100 terminals offer standard range 1D scanning.

### **Spectrum24 Network Option**

The PDT 3142 and 3146 include an internal radio frequency transmitter/receiver for use in a Symbol Spectrum24 network.

### **Flash Disk**

The PDT 314X optionally includes an additional 1 MB of non-volatile memory or “flash disk” which is compatible with a standard DOS disk.



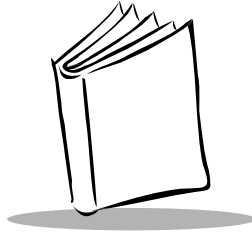
## ***Printers***

The following printers can be used with Series 3100 terminals:

- Paxar Renegade and SierraSport2 Series
- O'Neil MF2t and MF4t Series
- Zebra Encore, Cameo and QL320 Series.

## ***Miscellaneous Accessories***

Holsters are available for PDT 3100 terminals.



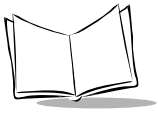
## *Chapter 2*

# *Setting Up the Terminal*

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## Introduction

---

Before using a Series 3100 terminal, perform the following procedures:

- install the battery (refer to Chapter 6)
- charge the battery, if using Nickel Metal Hydride (NiMH) rechargeable battery (refer to [Chapter 6, Maintaining the PDT 3100](#))
- Load the system files and application(s):
  - If the terminal is intended for use in batch applications (PDT 3100), refer to [Chapter 2, Setting Up the Terminal](#) for information on loading the software.
  - If the terminal is intended for use in a Spectrum24 network environment (PDT 3142/3146), refer to [Chapter 3, Spectrum24® RF Setup](#) for general information on Spectrum24 and software loading procedures.

Programs are stored in the terminal's nonvolatile memory (NVM), also called the application EEPROM.

## Hardware Requirements

---

The following hardware is required to initialize a batch terminal:

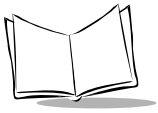
- Terminal
- 1- or 4-Slot Cradle, or 3115 Charging and Communications Adapter
- RS-232 Serial Null Modem Cable
- Power Supply
- Host PC

## Communications

For terminals used in a direct communications (batch) environment, applications are transferred from a host computer to the terminal:

- over a communications line using a null modem connected to the cradle  
OR
- through the communications/charger adapter.

The procedure uses the SENDHEX command on the host computer and the Program Loader function (from Command Mode) on the terminal.



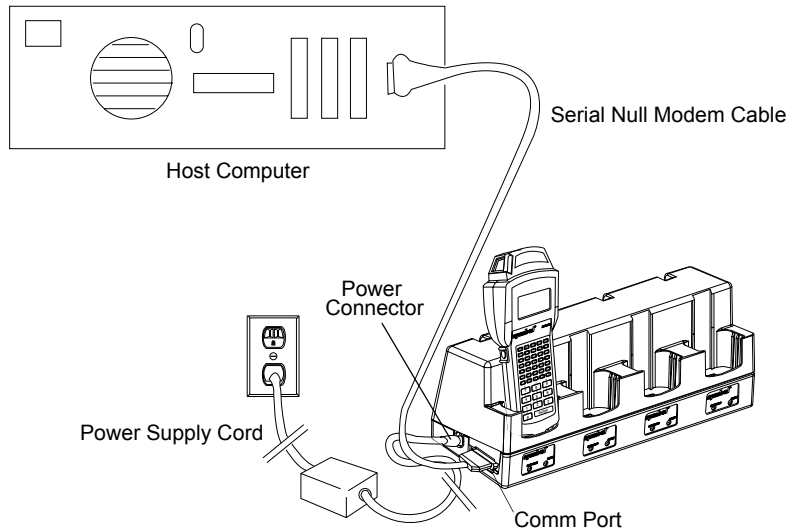
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**Note:** For details on the SENDHEX command, refer to the Series 3000 Application Programmer's Manual.

---

Other software may be used in place of SENDHEX.

## Connecting Host and Cradle



**Figure 2-1. Cradle Setup for 3100 Initialization**

---

**Note:** The procedure for connecting 1- and 4-slot cradles is the same.

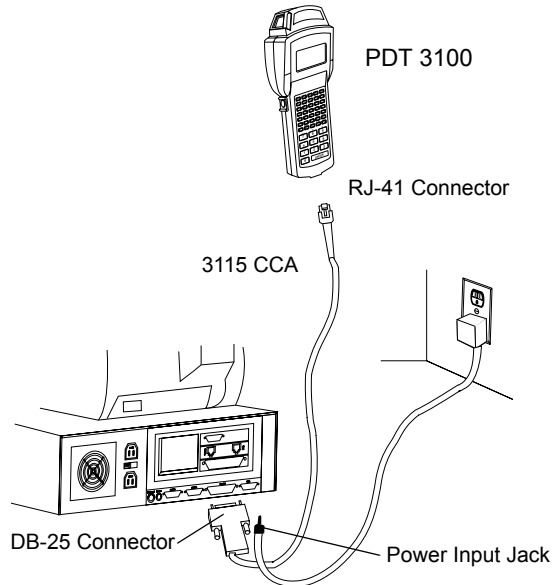
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1. Plug the RS-232 serial cable's connector into the cradle's communication port.
2. Connect the other connector to the host computer's serial (COM) port.
3. Connect the power supply cord's round plug to the power connector on the side of the cradle (3165: power supply p/n 59915-00-00 for domestic use, 60507-00-00 for international use; 3166: power supply p/n 60153-00-00 for domestic use and 60174-00-00 for international use).
4. Connect the power supply's AC plug to a standard electrical outlet.



5. The green and red indicators light for about 3 seconds, blink for 3 seconds, then go out.
6. Place the terminal in the cradle. Verify that the terminal is OFF.
7. Go to [Loading the Program](#) on page 2-6.

## Connecting to Host via 3115 CCA



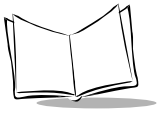
**Figure 2-2. 3115 CCA Setup for 3100 Initialization**

1. Verify the terminal is off.
2. Plug the CCA's 10-pin RJ-41 connector in the terminal base.
3. Plug the DB25 connector into the host's communications port.
4. Go to [Loading the Program](#) on page 2-6.

---

**Note:** *It is not necessary to connect to a power supply for communications.*

---



## Loading the Program

---

**Note:** To cancel communications at any time during the session, press **CLEAR** on the terminal.

---

To download the program, initiate the communications software on the host computer and terminal as described in the following sections.

---

**Note:** Communication parameters specified on the host and the terminal must match. These parameters typically are:

---

38400 bps  
7 bit data  
Odd parity  
Xon/Xoff flow control

---

**Note:** To program the EEPROM, the terminal must be connected to the host through a cradle or the 3115 CCA.

---

## Initiating Host Communications Software

1. Power on the host computer.
2. Start the communication program.
3. Enter the SENDHEX command.

```
sendhex pgmname 38400 com2
```

where:

SENDHEX is the command.

pgmname is the application being loaded (.hex extension is optional).

parameters are the communications parameters that follow the program name. Parameters include baud rate, communications port, data bits, parity, and flow control. To accept the default parameters, do not enter a value.

In the example, the baud rate is set to 38400 bps and the communications port to COM2. The default values are accepted for the remaining parameters.

---

**Note:** *Versions of SENDHEX earlier than 3.0 do not support flow control. If you use an earlier version and encounter communication errors, use a lower baud rate.*

---

- SENDHEX displays the prompt:  
Press <Enter> to begin communications.
- Do NOT press <ENTER> yet. Before starting communications (see [Starting Communications](#) on page 2-9), set up the terminal as directed in [Initiating Terminal Communications](#).

## Initiating Terminal Communications

- Boot the terminal to command mode. Refer to [Chapter 4, Operating the PDT 3100](#), for a list of the boot-to-command mode sequences. The terminal displays the following:  

```
COMMAND MODE

Select function
Self test
```
- Scroll through Command Mode options using <UpArrow> or <DownArrow> until *Program loader* appears. Press <ENTER>.
- The terminal displays:  

```
Program loader
WARNING: EEPROM
WILL BE ERASED
CONTINUE? <ENT>
```

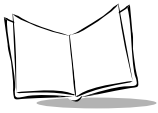
Before loading the new application, erase the NVM's original contents.

---

**Note:** *To cancel this operation, press <CLEAR>.*

---

- Press <ENTER> to erase the EEPROM. When complete, the program prompts for the communications parameters.



5. **Baud Rate.** The terminal displays:

Comm Parameters

Baud  
4 9600

Scroll through the list using **<UpArrow>** or **<DownArrow>**. When the correct rate is displayed (38400 is recommended), press **<ENTER>**.

6. **Data Bits.** The terminal displays:

Comm Parameters

Data Bits  
7

Press **<7>** (recommended) or **<8>** to specify data bits, or scroll through the list using **<UpArrow>** and **<DownArrow>** and press **<ENTER>** when the correct value is displayed.

---

**Note:** *If 8 data bits is selected, the program selects No parity and skips the next step.*

---

7. **Parity.** If you select 7 data bits, the terminal displays:

Comm Parameters

Parity  
Odd

Press the first letter of a parity option (**E**ven, **O**dd, **N**one, **S**pace, or **M**ark), or scroll using **<UpArrow>** and **<DownArrow>** and press **<ENTER>** when the correct value is displayed.

8. **Flow Control.** The terminal displays:

Comm Parameters

Flow Control  
None

Press the first letter of a flow control option (**None**, **Xon/Xoff**, or **RTS/CTS**), or scroll using **<UpArrow>** or **<DownArrow>** and press **<ENTER>** when the correct value is displayed.

9. The terminal is ready to receive the program.

## Starting Communications

1. The terminal displays:

Comm Parameters

Start? <ENT>

2. Press **<ENT>** on the terminal.
3. Press **<ENTER>** on the host computer. **SENDHEX** begins transmitting the program image. When communications are established, the terminal displays:

Program loader

Receiving: XXXX

During program loading, the display shows the program segment address being transferred (XXXX).

4. When the transmission is complete, the terminal displays:

Program loader

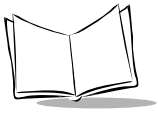
Status 0000

A status of 0000 (all zeros) indicates a successful transfer. Other status values indicate an error. These values are provided in [Appendix C, Communications Status Codes](#).

If you received an error, press **<Clear>** on the terminal to return to the Command Mode main menu.

## Ending Communications

1. Press **<Clear>** on the terminal.
2. Power down the terminal.
3. Detach any cables connected to the terminal.
4. Reboot the terminal using the appropriate cold boot sequence described in [Booting a Terminal](#) on page 4-5.



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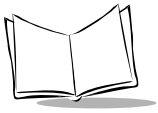
# Chapter 3

## *Spectrum24® RF Setup*

### **Chapter Contents**

---

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## Spectrum24 Terminals

---

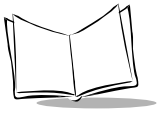
Spectrum24 terminals use standard communications protocols to accomplish wireless connectivity. These protocols are generalized and take up considerably more space in the terminal's NVM. With less space available in NVM for application files, Spectrum24 terminals operate as diskless computing workstations. The terminal's NVM contains system files required to connect to and download the application files from a network server and to provide network diagnostics and configuration. The application files are downloaded each time the terminal is booted.

### ***Optional Flash Disk***

Spectrum24 terminals can optionally contain an additional megabyte of non-volatile memory or flash. This extra memory reduces the time and resources required to load applications into the terminal and offers the ability to run multiple applications from the same terminal.

The flash disk is accessed via a driver, FLASHDSK.SYS, which makes the flash disk appear to a program as another disk drive (E:). The drive reads data quickly but writes slowly (e.g., for even the smallest files, the write process takes 3-4 seconds).

If your Spectrum24 terminal includes a flash disk, you may set the IP address and download software not available on standard Spectrum24 terminals. For more information, refer to the *Spectrum24 Flash Disk Addendum*.



## Standard Spectrum24 Installation

---

A standard Spectrum24 installation consists of LSL, an ODI driver, TCP/IP, and NET.CFG, and requires a BIOS version of 1.09 or later.

The system software is factory-loaded in the terminals. The default files cover most typical scenarios with minor changes, as detailed in this chapter. If your requirements are more sophisticated, refer to the *Spectrum24 Network Development Kit* documentation for more information on the Spectrum24 RF network, the Symbol-provided ODI driver, and the configuration file setups required for various platforms.

---

**Note:** *Installation for Spectrum24 terminals with flash disk differs from a standard installation in how the configuration file is set up, addresses are obtained, and software is downloaded. For more information, refer to the Spectrum24 Flash Disk Addendum.*

---

## Internet Addressing

---

Each terminal requires a unique internet address, or IP address, allowing messages it sends and receives to be correctly routed over networks conforming to the TCP/IP protocol standards. These addresses can be administered and entered manually, or administered and allocated by a server on the network. Two protocols are defined for the IP address allocation on the network, BOOTP and DHCP. BOOTP is commonly used in UNIX and OS/2; DHCP is the protocol for Windows NT servers.

By default, Symbol's Series 3000 Spectrum24 terminals expect IP addresses to be entered manually. To use the DHCP or BOOTP protocol, you must change the .boot. parameter in the [**Spectrum24 Control**] section of the NET.CFG file loaded on the terminal. The format of the entries to NET.CFG is discussed in the next section.

## Editing NET.CFG

---

The terminal is controlled by entries in the NET.CFG file. After you decide how to allocate IP addresses, edit NET.CFG to include the **[Spectrum24 Control]** section necessary to set the IP addressing mode.

If you intend to make any changes to the terminal's out-of-box default setup, you must add the **[Spectrum24 Control]** section, which specifies parameters that apply to all Spectrum24 uses, to NET.CFG.

### **[Spectrum24 Control]**

This section includes the parameters for indicating the preferred method of obtaining the IP address, as defined in [Table 3-1](#).

**Table 3-1. Parameters in [Spectrum24 Control] Section**

Parameter	Description
bootp	If bootp is selected, the terminal issues a BOOTP request on startup.
noboot (default)	The terminal does not issue a BOOTP request. The terminal IP address must be entered in the [TCPIP] section of NET.CFG or manually using CFG24. If no Spectrum24 Control Section appears in NET.CFG, NOBOOT is assumed.
dhcp	For a Windows NT environment, the terminal uses DHCP protocol to access the network.

*Note: The DHCP, BOOT, and NOBOOT modes are mutually exclusive.*

### Examples

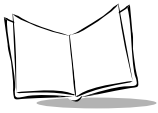
Entries to a NET.CFG setup:

```
Spectrum24 control
DHCP
```

OR

```
Spectrum24 control
Noboot
```

If you change NET.CFG, you must rebuild the default HEX image.



## Downloading Application Files to the Terminal

---

To download application files you must have a Trivial File Transfer Protocol (TFTP) server on the network. If your site has more than 3 or 4 terminals, running a TFTP server on a DOS-based machine is impractical because the operating system restricts you to downloading to one terminal at a time. More sophisticated operating systems, e.g., UNIX, OS/2, or Windows NT, allow downloads to multiple terminals simultaneously. The server is needed infrequently to load new applications or update existing applications.

Downloading wirelessly can only be done *after* the Internet IP address is determined and any required edits to NET.CFG are entered.

### ***Hardware Required for Download***

- Terminal
- Spectrum24 RF Network Boot Server
- Spectrum24 Ethernet Access Point

---

**Note:** *No hardware connections (cradle or CCA) are required to load the software over the Spectrum24 network. The terminal must be within the coverage area of a Spectrum24 Ethernet Access Point linked to a host computer. The initialization software is factory installed.*

---

### ***Hardware Setup***

Refer to the Spectrum24 documentation listed in [Related Documents](#) on page viii for information on the Spectrum24 network and equipment.

### ***Application Files***

The application files to be downloaded to the terminal must be installed on a network host before you initiate the network connection. For more information on setting up the files on a host, refer to the Spectrum24 documentation listed in [Related Documents](#) on page viii.

## Downloading Over the Network: BOOTP (Default)

---

### Initiating Network Connection

1. Cold boot the terminal.

---

**Note:** Verify that terminal is OFF before cold booting.

---

- a. Press and hold <A+B+D>.
- b. Press and release <PWR>.
- c. Release <A+B+D>.

The terminal boots DR-DOS and loads the radio driver while displaying a series of boot messages.

2. Enter a new ESS Id, obtained from the Network Administrator, in the Configurator.

---

**Note:** This process is only required on the first-time, out-of-box network connection.

---

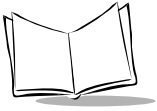
On first boot, the Configurator screen appears:

```

CONFIGURATOR X.XX
View Config Parameters
ESS ID
Boot Mode
.
.
.
↑↓ , Clear, Enter

```

3. Enter the new ESS Id:
  - a. Use the <UpArrow> and <DownArrow> to cursor to ESS Id.
  - b. The default ESS Id appears in ASCII format. Backspace over the existing value, type a new value, and press <ENTER>.
  - c. If you are using a BOOTP or DHCP server, cold boot the terminal and proceed to [Unsuccessful Association with AP](#) on page 3-8.



4. If you are not using a BOOTP or DHCP server, use the **<UpArrow>** and **<DownArrow>** to cursor to Boot Mode, then enter the following parameters:
  - Subnet Mask
  - Default Router
  - Terminal IP Addressand press **<ENTER>** after each entry.
5. Press the **<clr>** key to return to the main menu.
6. Select *Exit* from the Configurator Menu and press **<ENTER>** to exit the Configurator and continue the connection process.

---

**Note:** *Your changes are saved in the nonvolatile area on the radio card.  
The values just entered are not lost if you reboot the terminal.*

---

The terminal attempts to associate with an Access Point (AP) using the default ESS Id.

### **Unsuccessful Association with AP**

If the terminal is unable to associate with the AP (the ESS Id is wrong or forgotten), it displays the message:

```
CFGXX Ver X.XX  
NOT Associated
```

for a few seconds. A second message follows:

```
Terminal cannot associate with AP. You're  
out of range or not configured. Ctrl+C to end  
or other key to retry. Strike any key when ready.....
```

The terminal continues trying to connect until the attempt is cancelled.

To cancel and set up a new ESS Id (obtained from the Network Administrator):

1. Press **<Ctrl+C>** to end the attempt. The terminal displays the message:  
Halt Batch process Y/N?
2. Type **Y** to exit to the DOS prompt (D:).
3. At the DOS prompt, type **CFG24** on the PDT 3142, or **CFG11** on the PDT 3146, and press **<ENTER>** to initiate the Configurator:

```
CONFIGURATOR X.XX
View Config Parameters
ESS ID
Boot Mode
.
.
.
↑, Clear, Enter
```

4. Use the **<UpArrow>** and **<DownArrow>** to cursor to ESS Id.
5. The current ESS Id appears in hex format. Backspace over the existing value, type a new value in and press **<ENTER>**.
6. Power the terminal off.
7. Cold boot again.
8. The terminal attempts to associate with an AP.

## Successful Association

If the association is successful, the terminal obtains an IP address and bootfile name, displays the message:

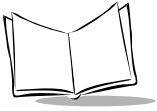
```
BOOTP X.XX
```

and begins downloading files from the server. During download, the terminal displays a series of application-defined messages. If the download is successful, the terminal displays messages indicating success and the application logon screen. Begin operating the terminal application.

---

**Note:** *For flash disk terminals, if the terminal is not downloading files wirelessly, the files are extracted from flash disk and executed.*

---



## Successful Association, Download Fails

The download may fail for one of the following reasons:

**Terminal Cannot Find BOOTP Server.** If the terminal cannot find the BOOTP or DHCP Server for download, it displays the message:

Cannot find Boot Server, time out

You have no boot server or it has problems

and returns to the DOS prompt. Contact the Symbol Support Center for assistance.

**File Transfer Fails.** If the file transfer fails, the terminal displays the message:

TFTP retry counter exceeded, Receive timeout.

Error <filename>

Ctrl-C to end or other key to retry.

where **<filename>** is the file that was not fully downloaded. The terminal may be out of range of the AP and cannot find the files to transfer.

Press **<Ctrl+C>** to exit and request help from the Symbol Support Center, or press a key to retry the file transfer.

If the file transfer retry is successful, the terminal displays messages indicating success and the application logon screen. Begin operating the terminal application. If not, contact the Symbol Support Center for assistance.



## **Downloading Over the Network: DHCP**

To use the DHCP protocol, you must edit NET.CFG and rebuild the HEX file before initiating the network connection.

1. Edit NET.CFG (see [Editing NET.CFG](#) on page 3-5). Add the section header and DHCP parameter line:

```
Spectrum24 Control
DHCP
```

2. Save the new NET.CFG on the network host in the `\LWPnnn\KIT` directory.
3. Working from the `\LWPnnn\KIT` directory, rebuild the HEX file. Use the command:

```
USRCFG @LWPNFL
```

which builds a LWPNFL.HEX file in the KIT subdirectory.

4. Download the new HEX file. Refer to the *Series 3000 ADK*.
5. Proceed with the network connection as described in [Initiating Network Connection](#) on page 3-7.

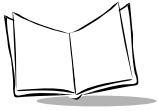
## **Downloading Over the Network: Neither BOOTP or DHCP**

If a BOOTP or DHCP server is not used, the information these servers provide must be obtained in other ways (e.g., you must enter the IP address manually using CFG24).

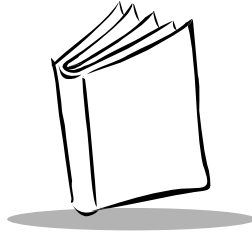
1. Edit NET.CFG (refer to [Editing NET.CFG](#) on page 3-5). Add a control section and noboot parameter:

```
Spectrum24 control
Noboot
```

2. Save the NET.CFG file, build and download a new HEX file, and connect to the network as described in [Downloading Over the Network: DHCP](#) on page 3-11.



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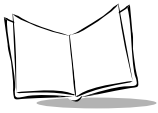
# Chapter 4

## Operating the PDT 3100

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---

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*PDT 3100 Series Product Reference Guide*

## Introduction

---

This chapter describes how to operate a Series 3100 terminal, including:

- Powering the terminal on/off
- Booting the terminal
- Adjusting the display
- Using the keyboard
- Entering data via the integrated scanner
- Communicating with other devices using one of the following options:
  - Connecting the terminal to a PC, printer, or modem using the 3115 Communication/Charging Adapter
  - Connecting the terminal to a printer using the passive cable.

## Powering a Terminal On and Off

---

Because the terminal is battery powered, it is important to save power whenever possible. To minimize power loss and increase battery life, turn the terminal off when data is not being entered.

While the terminal's processing and display are off, programs or data in the system's memory are retained. Before the terminal powers up, it checks the batteries for enough power to ensure reliable operation and data storage. Power-up restores the display, and processing continues from where it was before power-down.

Powering the terminal on does not boot the system or initialize either the program or data. For more information on initialization, refer to [Chapter 2, Setting Up the Terminal](#).

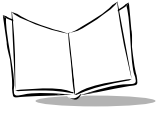
### **Normal Power**

---

**Note:** *If the terminal uses a NiMH battery for power, charge the battery before use!*

---

To power the terminal on or off, press <PWR>.



## **Automatic Power**

Depending on the application, other events, discussed below, may turn a terminal on or off.

### **Power On**

- The system powers on when a key other than **<PWR>** is pressed.
- The system powers on when a scanner trigger is pressed.
- The program powers on the system at a preset time to perform unattended operations, such as an overnight communications session.
- The program powers on the system in response to a modem ring or an RS-232 device connected to the RJ connector.

### **Power Off**

If not used for a period of time determined by the application, the system powers off automatically to conserve power.

### **Forcing Power Off**

If a terminal freezes in the middle of operation, pressing **<PWR>** does not power it off. You can force the system to power off, which reduces the drain on the batteries until you can download any collected data to the host system.

To force the system to power off, press and hold **<PWR>** for 15 seconds.

Since the terminal is still frozen at this time, turning the power back on does not solve the problem. To recover the data held in memory, perform a warm boot (refer to [Booting a Terminal](#) on page 4-5).

### **Restarting After a Forced Power Off**

If you must power down a terminal because of defective software, the System Administrator should restart the system using the warm or cold boot procedures in the following section.

---

**Note:** *Do not use the power key to restart if the terminal was forced off due to defective system or application program software in NVM. Pressing **<PWR>** only causes the program to resume where it left off, trying to perform the same unsuccessful operation.*

---

## Booting a Terminal

---

Powering the terminal on does not boot the system or initialize the program or data. To initialize the terminal, perform either a warm or cold boot.

### ***Warm Boot***

A warm boot resets the operating system while preserving the program and data on the RAM disk. This process is similar to pressing the <Ctrl+Alt+Del> keys on a PC, except that it does not clear the system's memory. To perform a warm boot:

### **21-Key Terminal**

1. Power off the terminal.
2. Press and hold <DownArrow> and <.>.
3. Press and release <I/O>.
4. Release <DownArrow> and <.>.

### **35-Key Terminal**

1. Power off the terminal.
2. Press and hold </> and <+>.
3. Press and release <PWR>.
4. Release </> and <+>.

### **46-Key Terminal**

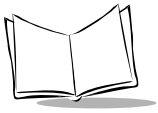
1. Power off the terminal.
2. Press and hold <4> and <5>.
3. Press and release <PWR>.
4. Release <4> and <5>.

The terminal displays a copyright message, RAM size, expanded memory RAM size, etc., depending on the system's configuration.

---

**Note:** *If the batteries are replaced and the supercap is discharged, the terminal cold boots.*

---



## **Cold Boot**

A cold boot fully resets the system and clears memory, including the RAM disk. Any programs and data stored in memory or on the RAM disk are deleted. Nonvolatile memory (NVM, the Application EEPROM) is not affected.

### **Caution**

This procedure erases all data and programs residing in dynamic memory and RAM Disk. All contents of the RAM disk are lost.

To perform a cold boot:

### **21-Key Terminal**

1. Power off the terminal.
2. Press and hold **<UpArrow>**, **<4>**, and **<ENTER>**.
3. Press and release **<I/O>**.
4. Release **<UpArrow>**, **<4>**, and **<ENTER>**.

### **35-Key Terminal**

1. Power off the terminal.
2. Press and hold **<Space>**, **<Func>**, and **<UpArrow>**.
3. Press and release **<PWR>**.
4. Release **<Space>**, **<Func>**, and **<UpArrow>**.

### **46-Key Terminal**

1. Power off the terminal.
2. Press and hold **<A>**, **<B>**, and **<D>**.
3. Press and release **<PWR>**.
4. Release **<A>**, **<B>**, and **<D>**.

The terminal displays a copyright message, amount of RAM, and expanded memory. Other messages are displayed as well, depending on the system configuration.



## Cold Boot Failure

During a cold boot, the system briefly displays a status line for each driver as it loads in the format:

```
0: Driver  ###
```

The line shows a status value, usually 0, followed by the name and version number of the driver. If the system halts at one of these lines and displays a status value other than 0, the displayed device driver failed to load properly.

If such a failure occurs cold boot the terminal. If this does not solve the problem, call Symbol Support Center. More troubleshooting information is found in the publications listed at the beginning of this manual.

## Boot to Command Mode

Command Mode provides functions for:

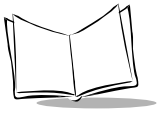
- Running the self-test program to verify that the hardware is operating properly (refer to [Chapter 5, Error Recovery and Troubleshooting](#))
- Performing a memory transfer to upload data from a terminal to the host system (refer to [Chapter 5, Error Recovery and Troubleshooting](#))
- Performing a program download to transfer an application program from the host system to a terminal (refer to [Loading the Program](#) on page 2-6).

## 21-Key Terminal

1. Power the terminal off.
2. Press and hold **<send>** and **<9>**.
3. Press and release **<I/O>**.
4. Release **<send>** and **<9>**.

## 35-Key Terminal

1. Power the terminal off.
2. Press and hold **<BackSpace>** and **<Shift>**.
3. Press and release **<PWR>**.
4. Release **<BackSpace>** and **<Shift>**.



## 46-Key Terminal

1. Power the terminal off
2. Press and hold <F> and <I>.
3. Press and release <PWR>.
4. Release <F> and <I>.

## Using the Backlight

---

The terminal's backlight illuminates the display in dimly lit areas.

---

**Note:** *Using the backlight can significantly reduce battery life.*

---

To turn the backlight on or off, press the following keys in sequence:

### 21-Key Keyboard

<Func> then <RightArrow>

### 35-Key Keyboard

<Func> then <RightArrow>

### 46-Key Keyboard

<Func> then <L>

The backlight also turns off when a terminal is powered off or when a timeout set by the application occurs.

## Adjusting the Display

---

The LCD display contrast is adjustable, making the display more readable in different lighting conditions, at various temperatures, with different attachments, and at other viewing angles.

To increase contrast (darken) by one step, press the following keys in sequence:

### **21-Key Keyboard**

<Fn> then <DownArrow>

### **35-Key Keyboard**

<Func> then <X>

### **46-Key Keyboard**

<Func> then <X>

To decrease contrast (lighten) by one step, press:

### **21-Key Keyboard**

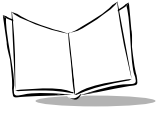
<Fn> then <UpArrow>

### **35-Key Keyboard**

<Func> then <Z>

### **46-Key Keyboard**

<Func> then <Y>



## The Series 3100 Keyboard

---

The keyboard is used to enter data and issue commands to the terminal. [Figure 4-1](#) illustrates the standard 35-key keyboard. For the other Series 3100 keyboards, refer to [Appendix B, Keyboard Layouts](#).

The keys on the keyboard are distinguished as modifier keys and character keys. Because terminal keyboards have fewer keys than PC keyboards, each character key can produce more than the usual one or two characters. The four modifier keys, **Shift**, **Alpha**, **Ctrl**, and **Func**, used individually or in combination, determine which character or special function the character keys produce.

### ***Using the Keyboard***

Except for during boot operations, the terminal expects the operator to press keys one at a time. If ERR3000 is loaded, and if two or more keys are pressed simultaneously, the system indicates a Double Key error.

The keyboard also has an optionally configurable auto-repeat function. If the application allows, a character repeats as long as the key is held down. If the key is pressed immediately following a modifier key, the modifier sequence affects only the first occurrence of the character key.

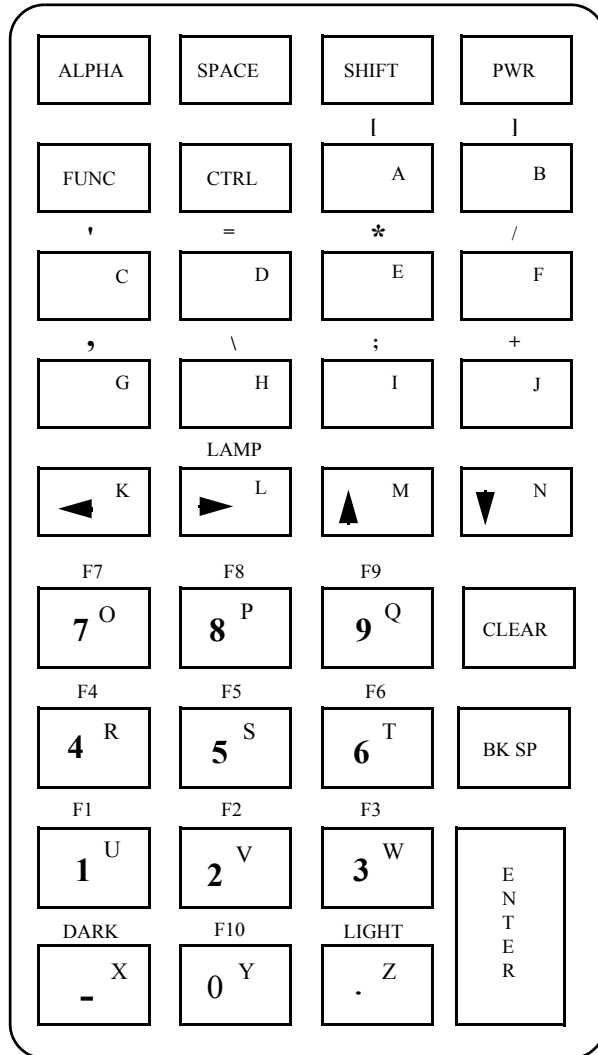
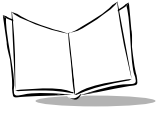


Figure 4-1. Series 3100 Standard 35-Key Keyboard



## Modifier Keys

The **<Shift>**, **<Alpha>**, **<Func>**, and **<Ctrl>** keys are modifier keys. When pressed individually or in certain combinations, these keys change the keyboard state and possibly the character produced by the character key subsequently pressed.

For example:

- Pressing **<Alpha>** causes the numeric keys to produce letters. (Lower case letters are not available on the 35-key terminal, but they are available on the 46-key terminal.)
- Pressing **<Func>** followed by **<Ctrl>** produces Alt characters, with the same effect as pressing the Alt key on a PC.
- Pressing **<Func>** and a scanner trigger enables that trigger for scanning (see [Integrated Laser Scanner](#) on page 4-14).
- The opposite trigger is another Alpha key (Alpha Shift), producing capital letters. It is active only when held down.
- The **<Alpha>** key on the keyboard affects all succeeding character keys until **<Alpha>** is pressed again. Other modifier keys affect only the next character key.

Refer to [Appendix B, Keyboard Layouts](#) for the characters and operations produced by pressing a sequence of modifier keys on the standard terminal keyboards. These key assignments can be changed by an application. Refer to your application documentation for any special key assignments.

## Cancelling a Modifier Key

To cancel the effect of a modifier key, press it again.

## Keyboard State

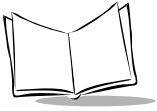
The cursor's shape indicates the current keyboard state, unless changed by the application. The standard cursor shapes are shown in [Table 6-2 on page 6-4](#).

## Key Descriptions

Most of the keys are self-explanatory. Letter keys produce letters, number keys produce numbers. Keys that perform special functions are described in [Table 4-1 on page 4-13](#).

**Table 4-1. Special Keys**

Key Name	Description
<b>Shift</b>	Changes letter and number keys to punctuation marks and symbols (e.g., pressing < <b>Shift</b> + 5> on a 35-key keyboard produces a % sign).
<b>Alpha</b>	Shifts the keyboard to produce alphabetic characters. Uppercase only on 35-key; upper and lowercase available on the 46-key terminal.
<b>Alpha Shift (trigger key)</b>	Shifts the keyboard to produce alphabetic characters when held down continuously. Selectable by the operator. The corresponding key on the other side key becomes the active scanner trigger.
<b>Func</b>	Function key. Invokes special keyboard functions.
<b>Ctrl</b>	Control key. Generates control characters.
<b>Enter</b>	Usually pressed after typing data or a command.
<b>Lamp</b>	Turns on the backlight
<b>Clear (Escape)</b>	Depending on the application, completely or partially escapes from an application level or screen, or clears data entered in a field.
<b>Dark</b>	Following <b>Func</b> , darkens the display (increases contrast).
<b>Light</b>	Following <b>Func</b> , lightens the display (reduces contrast).
<b>Trigger keys</b>	Activates the scanner. Selectable by the operator. The corresponding key on the other side key becomes the Alpha Shift.



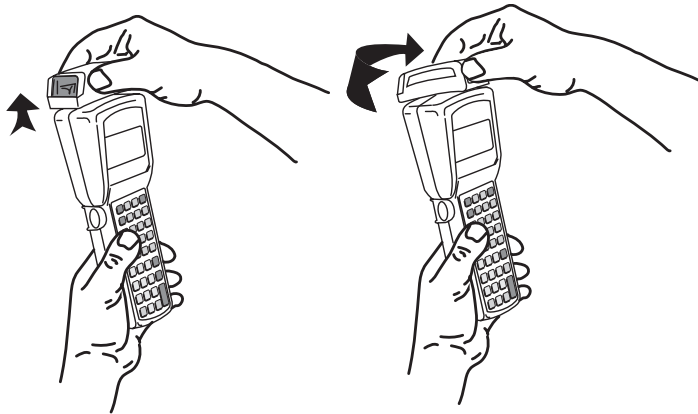
## Integrated Laser Scanner

---

### Setting the Trigger

To configure the integrated scanner:

1. Power on the system and scanner by pressing **<PWR>** or the scanner trigger.
2. Lift up and turn the the scan element on the top of the terminal to the preferred orientation for scanning. The scan head turns only toward the back of the terminal.



**Figure 4-2. Positioning the Scanner**

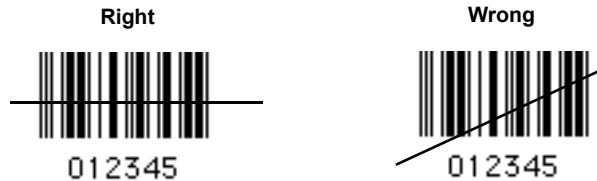
3. Lock the scan head in position, facing the side of the terminal.
4. To select the trigger, press the **<FUNC>** key and the trigger you are most comfortable using. The other trigger defaults to an ALPHA shift key. Depending on the application, the terminal may beep to indicate a trigger is selected.



## Scanning 1D Bar Codes

To use the integrated scanner:

1. Aim the scanning element at the bar code and press the selected trigger.
2. Adjust the aim so that the thin, red laser beam covers the entire length of the bar code.



Optimal scanning distance varies with bar code density and scanner optics, but most combinations work within 4 to 10 inches. Generally:

- The larger the symbol, the farther away you should hold the scanner.
- Move the scanner closer for symbols with bars that are close together.

Simple practice quickly shows what distances to work within.

3. If the decode is successful, the screen displays the code and the green LED flashes. The terminal may also beep.

---

**Note:** *The procedure for your scanner may differ depending on the application.*

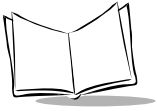
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## Scanning Considerations

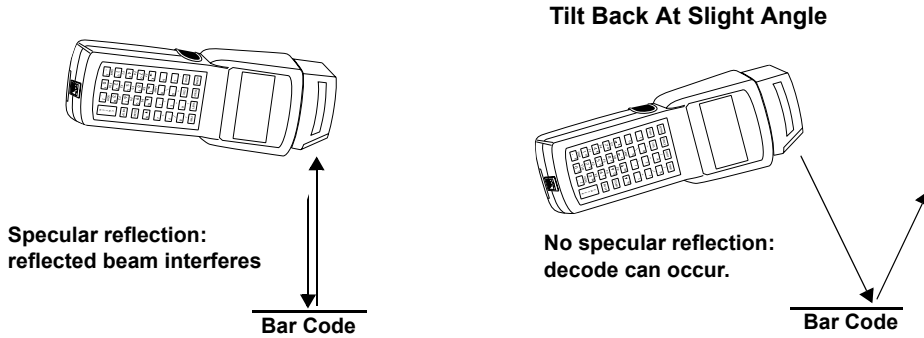
Usually, scanning is a simple matter of aim, scan, and decode, and a few quick trial efforts master it simply and intuitively. However, two important considerations can optimize any scanning technique — angle and range.

### Angle

Scanning angle is important for promoting quick decodes. When laser beams reflect *directly* back into the scanner from the bar code, this specular reflection can actually “blind” the scanner.



To avoid this, scan the bar code so that the beam does not bounce *directly* back. But don't scan at too oblique an angle; the scanner needs to collect scattered reflections from the scan for a successful decode. *Practice quickly* shows what tolerances to work within.



**Figure 4-3. Scanning Angle and Specular Reflection**

## Range

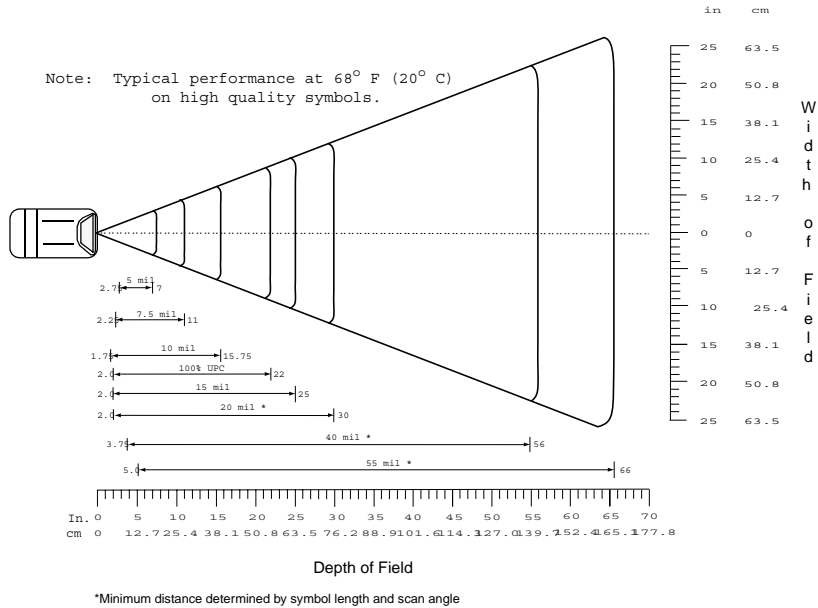
Any scanning device decodes well over a particular working range — minimum and maximum distances from the bar code. This range varies according to bar code density and scanning device optics.

Scanning within range brings quick and constant decodes; scanning too close or too far away prevents decodes. You need to find the right working range for the bar codes you are scanning. The best general advice is:

- The larger the symbol, the farther away you should hold the scanner.
- Move the scanner closer for symbols with bars that are close together.
- Start scanning *at a distance* from the bar code — not from direct contact. If the bar code does not readily decode, move the scanner in closer.

The best way to specify appropriate working range per bar code density is through a chart called a decode zone, which plots working range as a function of minimum element widths of bar code symbols.

## PDT 3100 Decode Zone



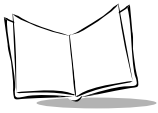
**Figure 4-4. Decode Zone: Standard Range**

### Note on IEC825/EN60825 Class 1

IEC825/EN60825 Class 1 is an international laser safety standard that limits the amount of energy emitted by the laser over a period of time. IEC825/EN60825 Class 1 limits the duration of laser scanner on-time, using an emission accumulator mechanism.

To conform to IEC825/EN60825 Class 1 standards, the laser cannot be on for more than 60 seconds in a 1000-second time period. The terminal accumulates scan time while it is scanning bar codes, up to the maximum 60 seconds.

When it runs out of available scan time, the terminal emits a long, low-tone beep. When 2 seconds of scan time become available, the system emits another long, high-frequency beep. Refer to the *Series 3000 Application Programmer's Guide* for more information.



## Communications

---

### Communicating with a Host PC

#### 3115 Communications/Charger Adapter

An optional communications/charger adapter (CCA) is available for communicating with a host PC when a cradle is not available.

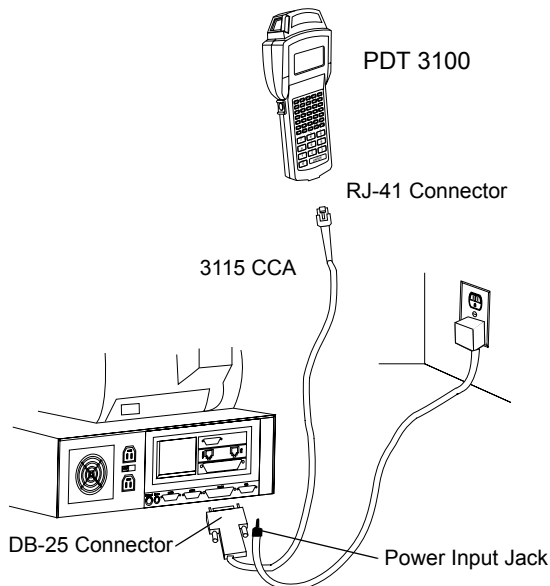
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**Note:** *It is not necessary to connect the terminal to a power source for communications.*

---

To connect the PDT 3100 to a PC using the 3115 CCA:

1. Plug the CCA's 10-pin RJ-41 connector into the base of a Series 3100 terminal (refer to [Figure 4-5](#)).
2. Plug the DB-25 connector into the host's communications port.
3. Start the communications program.



**Figure 4-5. Connecting the 3115 CCA for Communications**

## Communicating with a Printer

The terminal has two accessories which provide communications with a printer, the 3115 CCA and the passive cable.

### Using the 3115 CCA

To connect the PDT 3100 to a printer using the 3115 CCA:

1. Plug the CCA's 10-pin RJ-41 connector into the base of a Series 3100 terminal.
2. Plug the DB-25 connector into the printer's communications port.
3. Start the communications program.

---

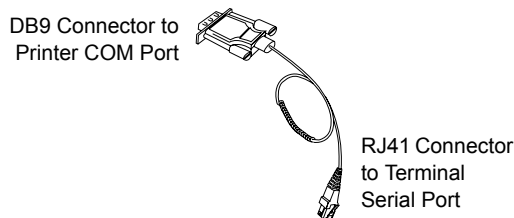
**Note:** *The CCA is shipped set for RS-232 communications with a PC. You may need to change the internal communications settings to use the CCA with a printer. Refer to the Installation Instructions (p/n 70-11314-XX).*

---

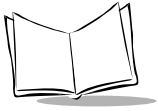
### Using a Passive Cable

An optional cable is available for connecting the terminal to a printer:

- For Encore, Cameo and QL Series printers: p/n BL12093-1 and BL12093-2
- For Paxar's 9460 SierraSport printer: p/n 12029316
- For O'Neil MF2t and MF4t Series printers: 210164-003

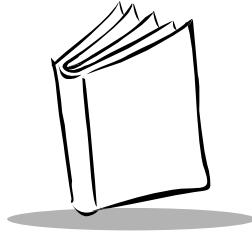


**Figure 4-6. Passive Cable Connectors**



To connect the terminal to a printer:

1. Plug the passive cable's 10-pin RJ-41 connector into the base of the Series 3100 terminal.
2. Plug the DB-9 connector into the communications port on the printer.
3. Start the communications program.



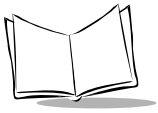
# Chapter 5

## *Error Recovery and Troubleshooting*

### **Chapter Contents**

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*PDT 3100 Series Product Reference Guide*

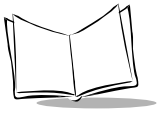


## **Introduction**

---

This chapter provides information to assist in problem analysis and correction, including:

- Error messages
- Troubleshooting start-up failures
- Troubleshooting Spectrum24 terminals
- Running the self test function
- Self test summaries
- Keyboard test
- Running memory transfer
- Scanning problems.



## Error Messages

---

### ***PDT 3100***

If ERR3000 is loaded in the system configuration, the terminal displays the following messages to indicate error conditions that affect system performance. A message is usually accompanied by one or more beeps, after which the system returns to its previous status.

The application can change the wording of the messages or disable messages. The messages listed in [Table 5-1](#) are representative. Refer to the application's documentation for further information.

**Table 5-1. Error Messages**

<b>Message</b>	<b>Explanation</b>
Double Key Error	Two or more keys were pressed at the same time. This does not include boot sequences (refer to <a href="#">Chapter 4, Operating the PDT 3100</a> , for boot sequences).
Low Battery	Replace or recharge the battery pack as soon as possible.
Replace Battery	Replace or recharge the battery pack immediately. After this message is displayed, the system shuts off. You may not be able to power it on again until the battery pack is charged.
Power Fault	The last power off was caused by a power failure. This occurs, for example, if the battery pack is removed while the terminal is on or the batteries fail suddenly.

# Troubleshooting

---

## ***Start-up Failure: PDT 3100***

Problems are most frequently start-up failures. If cold booting the terminal does not start the application successfully, either the application, the system software, or the system is malfunctioning. If you can boot the system to command mode, try the following:

- Use Program Loader to download a new version of the software to NVM. See [Chapter 2, \*Setting Up the Terminal\*](#) for instructions.
- Use the Self Test to check whether system hardware is operational. The Self Test procedure is described later in this chapter. After downloading new software, warm boot the terminal as described in [Booting a Terminal](#) on page 4-5.

## ***Boot Failure Messages***

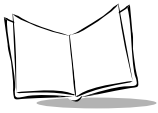
During a cold boot, the system briefly displays a status line for each driver as it loads, in the format:

```
0:Driver ###
```

The line shows a status value, usually 0, followed by the name and version number of the driver. If the system halts at one of these lines and displays a status value other than 0, the displayed device driver did not load properly.

If such a failure occurs, cold boot the terminal again. If this does not solve the problem, call Symbol Customer Support.

More troubleshooting information is found in the documentation listed in the [Related Documents](#).



## Spectrum24 Terminals (PDT 3142/3146)

The command mode troubleshooting procedures are not available to terminals operating in a Spectrum24 network environment. Typical initialization and operating problems and solutions for Spectrum24 terminals are listed in [Table 5-2](#).

**Table 5-2. Troubleshooting Spectrum24 Terminals**

Problem	Explanation	Action
Boot process fails	Terminal is out of the AP's range.	If you move the terminal during the boot process, it may be out range of the AP and unable to complete the process. Move back in range and repeat the boot process.
	Boot server doesn't exist.	Verify that boot server is operating.
	Boot server not configured for this terminal.	Refer to the Spectrum24 NDK documentation for more information.
File transfer process failed	Terminal is out of the AP's range.	If you move the terminal during download, it may be out range of the AP and unable to complete the download. Move back in range and continue the download process.
	File transfer host is not set up with the boot file information or host is not available.	Verify that all required files are available on the file transfer host.
	Segments missing from file transfer directory.	Check directory for all required files.
Low Battery Message	Battery is running low.	Place the terminal in a cradle and recharge battery.
		Connect terminal to charger and recharge battery.
		Power terminal off and replace battery.
Battery is dead	Battery was not replaced after receiving low battery message or terminal was left on for more than 24 hours.	Replace the battery. <i>Note:</i> The terminal loses software when power is lost. To reload software, cold boot terminal and enter ESS Id manually. Associate with AP and re-acquire boot files as described in <a href="#">Initiating Network Connection</a> on page 3-7.

**Table 5-2. Troubleshooting Spectrum24 Terminals (continued)**

<b>Problem</b>	<b>Explanation</b>	<b>Action</b>
Application does not respond to interactive operations.	Terminal disassociated from Access Point.	Applications using internal batch mode continue to function until required to transmit via radio, then fail to work. No message displayed.

## Self Test Function

---

Series 3100 terminals include a series of self tests which verify that terminal hardware components are operating properly. Run a self test if you suspect a problem with the hardware. Except for keyboard testing, no operator input is necessary after selecting a test screen.

### *Running the Self Test*

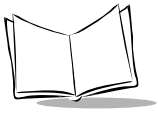
Access the Self Test function from the Command Mode menu:

1. Boot to command mode (refer to [Chapter 4, Operating the PDT 3100](#) for boot sequences).
2. On the *Command Mode* screen, use the <UpArrow> or <DownArrow> to scroll through the options.
3. Highlight *Screen Test* and press <Enter>.

### *Self Test Summaries*

The Self Test is divided into five functions or screens:

- **Config Screen 1** - Reports the terminal type and version, time, date, main battery status, current power source, and status of the serial ports when a loopback connector is used.
- **Config Screen 2** - Reports information on the keyboard and display. If a laser scanner is attached, the test reports if the trigger is pulled or not. If a wand scanner is attached, the test reports whether the wand is scanning black or white.
- **Memory Screen** - Tests ROM, RAM, and EMS (Expanded) memory, and reports the amount of RAM and EMS.
- **Fill Screen** - Fills the entire screen with a test pattern to verify that the entire screen displays.
- **Set RTC Screen** - Sets the time and date settings of the real-time clock.



## Keyboard Test

Keyboard testing can be performed while the terminal displays Config Screen 1 results.

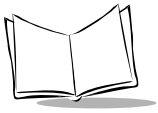
Test any keys except **Clear** and **PWR**. When you press a key, the corresponding key code is displayed on the top row to the right of the test name. [Table 5-3](#) lists the codes for each key on the 21-key keyboard; subsequent tables list those for other keyboards.

**Table 5-3. 21-Key Keyboard Test Codes**

Key	Test Code	Key	Test Code
Left Arrow	00	6	14
Right Arrow	01	5	13
Up Arrow	03	4	12
Down Arrow	04	3	17
Func	05	2	16
Send	06	1	15
-	07	0	19
9	11	.	18
8	10	Enter	20
7	09		

**Table 5-4. 35-Key Keyboard Test Codes**

Key	Test Code	Key	Test Code
Alpha	0	M	18
Space	1	N	19
Shift	2	9	22
Func	4	8	21
Ctrl	5	7	20
A	6	6	26
B	7	5	25
C	8	4	24
D	9	3	30
E	10	2	29
F	11	1	28
G	12	0	32
H	13	Backspace	27
I	14	X	31
J	15	Z	33
K	16	Enter	34
L	17		



**Table 5-5. 46-Key Keyboard Test Codes**

<b>Key</b>	<b>Test Code</b>	<b>Key</b>	<b>Test Code</b>
Control	3	V	26
Shift	2	W	27
A	5	X	28
B	6	Y	29
C	7	Z	30
D	8	Up Arrow	33
E	9	Down Arrow	34
F	10	0	44
G	11	1	41
H	12	2	42
I	13	3	43
J	14	4	38
K	15	5	39
L	16	6	40
M	17	7	35
N	18	8	36
O	19	9	37
P	20	Backspace	31
Q	21	Space (47-Key Only)	47
R	22	Func	1
S	23	.	32
T	24	Enter	45
U	25		



## **Exiting Self Test**

The test loop continues updating the time and battery status and processing keystrokes.

To end the test, press <Clear>. The display returns to the *Command Mode* menu.

## **Memory Transfer Program**

---

Command Mode includes a memory transfer utility that transfers data from a terminal to a host PC for program troubleshooting. Programmers can analyze an application using tools provided in the Series 3000 Application Development Kit and described in the *Series 3000 Application Programmer's Reference Manual*.

## **Hardware Setup**

1. Turn off the terminal and host PC. Disconnect or unplug the cradle, if used.

### **Caution**

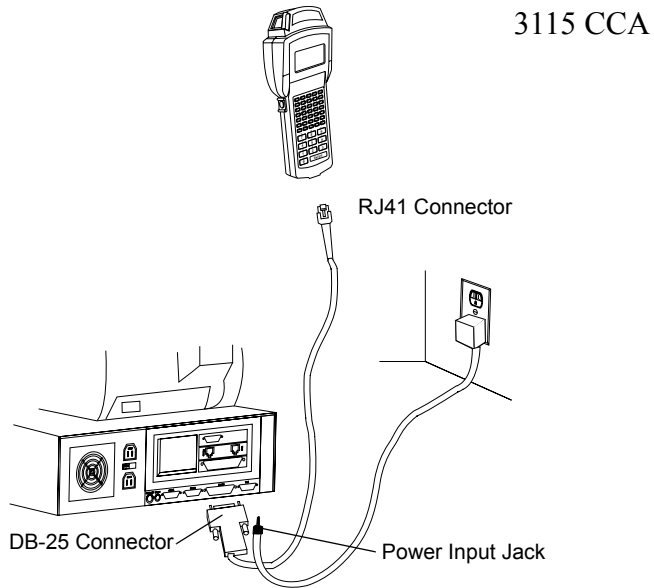
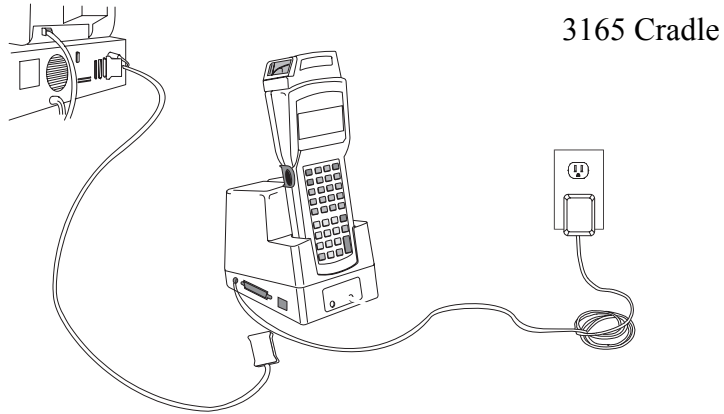
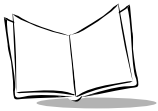
Always turn off the terminal before attaching or removing cables or adapters.

2. Connect the terminal and host PC using the 3115 communications/charger adapter. Plug the CCA's RJ41 connector in the terminal's base, and the DB25 connector in the host PC's communications port.

### **OR**

Connect the host to a one- or four-slot cradle:

- a. Plug the null modem's connector in the cradle's communications port.
  - b. Plug the other connector in the host's communications port.
  - c. Place the terminal in the cradle.
3. Power on the host PC.
  4. Plug in the cradle, if used.



**Figure 5-1. Connecting the 3100 Terminal for Memory Transfer**

## Setting Communications Parameters

### Host

1. Start the Communications program on the host PC.
2. Set up the host communication parameters (these parameters must match the terminal's parameters). At the DOS prompt on the host, enter:

```
RCVHEX <filename.hex>  
<baud rate> <comport#>
```

Typical parameters are:

```
38400 bps  
7 bit data  
Odd parity  
Xon/Xoff flow control
```

### Terminal

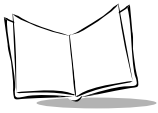
1. Boot the terminal to Command Mode (refer to [Chapter 4, Operating the PDT 3100](#) for the appropriate key sequence).
2. Select the Memory Transfer function from the *Command Mode* menu. Use **<UpArrow>** or **<DownArrow>** to scroll through the command mode options until Memory Transfer is displayed, and press **<Enter>**.
3. Select the range of memory to transfer by pressing the first letter of the desired range (**All**, **Range**, or **None**), or use the **<UpArrow>** or **<DownArrow>** and press **<Enter>**.

If you select **All**, the program skips to the range verification screen (step 7).

If you select **Range**, the screen displays:

```
RAM  
Use Arrow Keys  
Start   End  
00000  9FFFF
```

4. Specify a range of RAM by setting the Start and End addresses.
  - Use **<RightArrow>** and **<LeftArrow>** to move the cursor to the digit to be changed
  - Use **<UpArrow>** and **<DownArrow>** to change the values.



Type a range and press **<Enter>**.

5. Specify a range of NVM to transfer. Choose All or None.
6. If the system has EMS installed, it prompts for the range to transfer (otherwise, the program skips this screen):

EMS

Use arrow keys

Start    End

The range is specified in page numbers (16 KB per page). Use **<RightArrow>** and **<LeftArrow>** to move between the Start and End values. Use **<UpArrow>** and **<DownArrow>** to change the page number value.

Set the range and press **<Enter>**.

7. The terminal displays a range verification screen. For example:

```
RAM 0000 3FFF
NVM C839 DFFF
EMS None
Correct?
```

If the values are correct, press **<Enter>**. If the values are not correct, press **<Clear>** to clear the fields and select new values.

8. Specify the baud rate. Use the **<UpArrow>** and **<DownArrow>** to scroll through the list of baud rates until the correct rate is displayed, and press **<Enter>**. (Flow control may be necessary at 38400 bps and higher.)
9. Specify the data bits. Press **<7>** or **<8>**, or use **<UpArrow>** and **<DownArrow>** to display 7 or 8, and press **<Enter>**.

---

**Note:** *If you select 8 data bits, the program selects No parity and skips the next screen.*

---

10. Specify parity type. Use **<UpArrow>** and **<DownArrow>** to display a parity option, or press the first letter of a parity option (**E**ven, **O**dd, **N**one, **S**pace, or **M**ark) and press **<Enter>**.
11. Set flow control. Use **<UpArrow>** and **<DownArrow>** to display the flow control options, or press the first letter of an option (**N**one, **X**on/Xoff, or **R**TS/**C**TS) and press **<Enter>**.

## **Starting Communications**

1. The terminal is ready to send the data to the host PC and displays:

Comm Parameters

Start? <ENT>

2. Verify that the host is ready to receive data.
3. Press **<Enter>** on the terminal.

While data is being transferred, the terminal displays a report of the 1 KB range being transferred:

Memory Transfer

Sending: XXXX

The display is updated for every 1024 bytes (1 KB) of memory.

4. When the transmission completes or aborts, the terminal displays the transmission status screen:

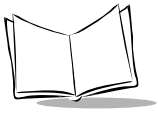
Memory Transfer

Status 0000

A status of 0000 (all zeros) indicates that the transfer was successful. Any other status indicates failure. Refer to Appendix C for communications status codes which indicate the source of the error.

## **Ending Communications**

To return to the Command Mode main menu, press **<Clear>**. Then take the necessary corrective action and reboot the terminal.



## Scanning Problems

---

### ***What If ...***

#### **Nothing happens when you follow the operating instructions?**

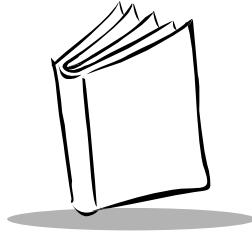
- Check the system power.
- Make sure the scanner is programmed to read the symbology you are trying to read.
- Check the bar code to make sure it is not defaced.
- Check to see if you are scanning from the proper distance.
- Try scanning a test symbol of the symbology you are trying to read.

#### **Your terminal operates but scanned data is not displayed correctly?**

- Check the system power.
- Check that the communication parameters (baud rate, parity, stop bits, etc.) are set properly for the receiving device.

#### **The laser does not activate?**

- You may have exceeded the allowable amount of scanning activity within the limits of your laser class of operation; in this case, wait for a short interval until scanning can resume.
- You may be scanning in an inappropriately hot environment. If so, remove the equipment from that environment, or allow the laser to cool down.



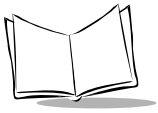
## Chapter 6

# *Maintaining the PDT 3100*

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# Batteries

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The Series 3100 terminal's primary power is provided by a 9-Volt alkaline battery or a nickel metal hydride (NiMH) battery pack.

## Battery Life

Many factors affect battery pack life, including temperature, battery age, and data collection method. Uses and operating conditions which affect battery life are:

- scanning
- radio communications
- very high operating temperatures
- "power save" mode
- backlighting use
- very low operating temperatures

The approximate battery life between charges (NiMH) or replacement (alkaline) is summarized in [Table 6-1](#) and [Table 6-2](#). Note that these values vary with the application. Applications involving wireless communications shorten these times.

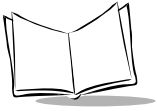
**Table 6-1. PDT 3100 Series Battery Life**

Battery Type	Input Method	Approx. Operating Time: PDT 3100	Approx. Operating Time: PDT 314X
9V Alkaline	Keyboard	30 hours	N/A
	Laser Scanner	4500 + scans	N/A
600 MaH NiMH	Keyboard	50 hours	45 hours
	Laser Scanner	6400 + scans	6100 + scans
Note: Power consumption is highly application-dependent. The figures above represent battery life of typical applications. However, battery life with individual applications vary.			

---

**Note:** *Alkaline batteries are NOT recommended for use with the PDT 3142 or 3146.*

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## When to Replace or Recharge Batteries

The Series 3100 provides two types of indicators to notify you when battery power is running low: warning messages and modified cursors. These indicators may be changed or disabled by an application program.

- **LOW POWER** — When the battery is low, the cursor changes as shown in [Table 6-2](#). If ERR3000 is loaded, the message LOW BATTERY also appears. At this level, the terminal continues to operate, but there is probably less than 1 hour of usable power left.
- **VERY LOW** — When the power is very low, the REPLACE BATTERY message appears and the system powers off. Replace or recharge the battery before attempting to use the terminal. If the battery is not immediately recharged or replaced, data may be lost.

Battery life varies between 500 - 1000 charge / recharge cycles. This variation depends on the depth of discharge. In general, replace batteries which exhibit less than 80% of their total rated capacity.

**Table 6-2. Cursor Indicators**

Keyboard State	Cursor Character	Low Battery
Unshifted	∨	▼
Shifted	∧	▲
Momentary Shifted	↑	⬆
Momentary Unshifted	↓	⬆
Control	ⓐ	ⓐ
Alt	ⓑ	ⓑ
Function	ⓕ	ⓕ

## **Supercap Power Backup**

To prevent data loss during battery replacement, the terminals have a supercap power backup. The supercap backup provides sufficient power to preserve memory contents for approximately 5 minutes while batteries are replaced. The supercap does **not** provide enough power to operate the terminal. On receiving a low battery message, replace or recharge the primary batteries immediately.

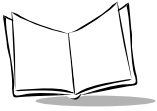
## ***Replacement Batteries***

Rechargeable battery packs are available from Symbol Technologies:

- NiMH battery pack — 600 MaH — KT-12596-04

9-Volt alkaline batteries vary slightly in size and some may not make good electrical contact. The following batteries are known to be the proper size and are assured to work:

- Eveready #522
- Duracell #MN1604 and #MN1604-AS, or equivalent.



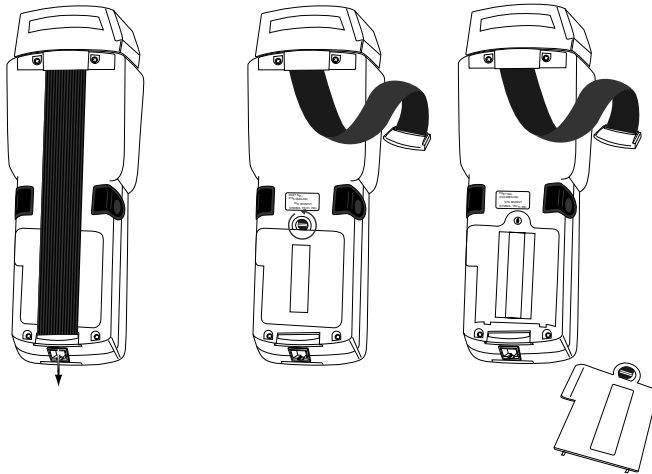
## Replacing Batteries

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### *Replacing Alkaline Batteries*

To replace the 9V alkaline battery:

1. Turn the terminal off.
2. Release the handstrap.
3. Unlock and remove the battery compartment door.



**Figure 6-1. Opening the PDT 3100 Battery Compartment**

4. Detach the battery from the 9V connector, and remove it from the compartment.

### **Caution**

Dispose of dead batteries in accordance with battery label instructions.

5. Snap the replacement 9V alkaline battery to the connector and place it in the battery compartment.
6. Replace the battery compartment cover and reattach the hand strap.

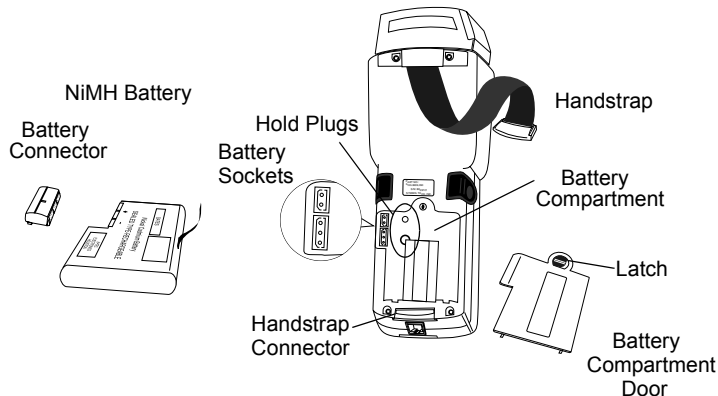
To replace a NiMH battery with a 9V alkaline battery:

1. Perform steps 1-3 of [Replacing Alkaline Batteries](#).
2. Remove the NiMH battery and battery connector.
3. Plug the 9V connector in the 9V socket (refer to [Figure 6-2](#)).
4. Perform steps 5-6 of [Replacing Alkaline Batteries](#).

## Replacing NiMH Batteries

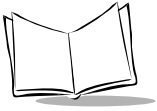
To replace an alkaline battery with a rechargeable NiMH battery pack, or to replace a NiMH battery pack:

1. Power the terminal off.
2. Release the handstrap.
3. Unlock and remove the battery compartment door.
4. If the previous battery was an alkaline, gently remove the 9V connector from the 9V socket. Do NOT tug on connector wires. Store the connector.
5. Plug the battery connector in the rechargeable battery socket immediately below the 9V socket (refer to [Figure 6-2](#)).
6. Fit the NiMH battery pack in the compartment next to the adapter.
7. Verify that the battery and connector are properly seated.



**Figure 6-2. PDT 3100 Battery Replacement**

8. Replace and lock the battery compartment cover.
9. Reattach the handstrap.



10. Recharge the battery pack (refer to [Charging the NiMH Battery](#) on page 6-8).

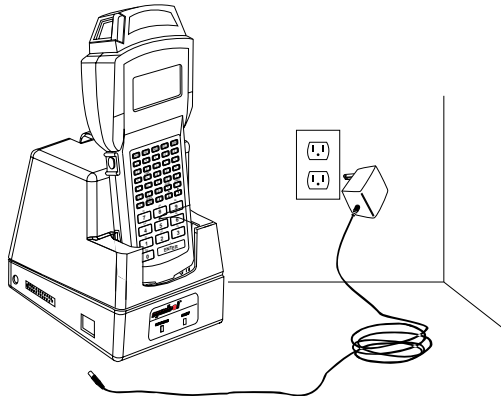
## Charging the NiMH Battery

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### ***Charging in the Cradle***

To charge a NiMH battery using the one- or four-slot cradle:

1. Plug power connector in cradle's power socket.
2. Plug the wall cube into a wall socket.
3. Place the terminal in the cradle.
4. If the battery power is very low, press <PWR> to initiate charging. Depending on the type, the battery pack fully charges in approximately 1.5 to 2 hours.



**Figure 6-3. Charging in the One-Slot Cradle**

### ***Battery Charging Tips***

For maximum capacity and battery life:

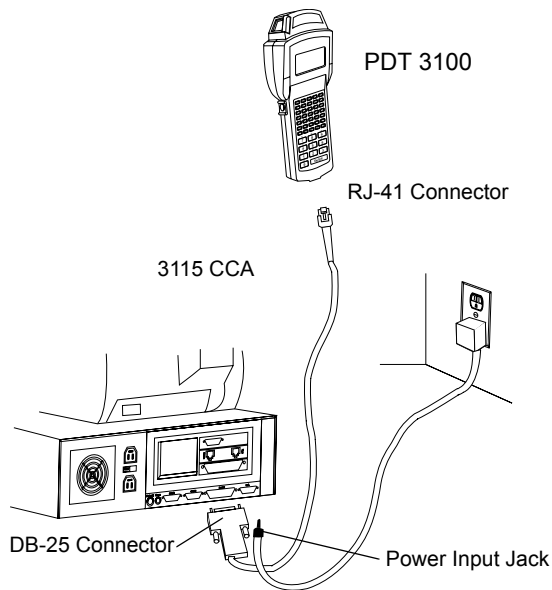
- Charge at temperatures between 0°C and 45°C (32°F and 113°F). Optimum charging occurs at room temperature (about 20°C to 25°C). Above or below that range, batteries may not charge to rated capacity.
- Recharge as soon as you see the *Low Battery* message.
- Charge NiMH batteries after storage.

## **Charging using the 3115 CCA (KT-12596-04 Only)**

The optional 3115 Communications/Charger Adapter (CCA) provides power from a wall-mounted power supply for recharging the NiMH battery while the terminal is in use.

To charge the terminal using the 3115 CCA:

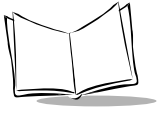
1. Plug the 10-pin RJ41 connector in the terminal base.
2. Plug the connector from the 15V power supply, P/N 59915-00-00 (US, 115V) or 60507-00-00 (International, 230V) in the CCA's power input jack.
3. Plug the power supply in a wall socket.



**Figure 6-4. Connections for Charging with the 3115 CCA**

## **Other Charging Options**

Note that you can charge the KT-12596-04 battery pack using the Universal Four-Slot Charger (3004-xxx) or the UBC 2000 Charger. Use the UBC 2000 Charger to charge the KT-12596-04 battery pack.



## Storage

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If the terminal is not used for more than a week, store it in a cool, dry place, away from dust. Remove the battery and repack the terminal in its original shipping container.

For a storage period of a few days, the batteries can remain in the terminal. If the batteries are left in the terminal for an extended period of time, data stored in the terminal may be lost.

## Cleaning

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Series 3100 terminals require minimum maintenance. However, keep the terminal clean to avoid problems and prolong the terminal's life.

To clean a terminal, use a clean, soft cloth dampened with a mild cleaner such as soap and water. Do not use abrasive paper, cloth, or abrasive/corrosive cleaners.

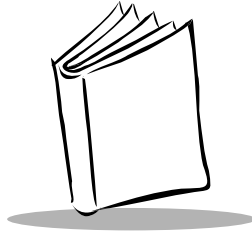
Wipe the entire terminal, except for the scanner window, with the damp cloth. Clean the keypad and scanner triggers.

Wipe the scanner window periodically with a lens tissue or other material suitable for cleaning optical material such as eyeglasses.

### ***Caution***

Do not pour, spray, or spill any liquid onto any part of the terminals, particularly the scanner or scan element components.





## *Appendix A*

### *Port Pinouts*

This appendix provides reference information for Series 3100 ports and mappings for a null modem cable.

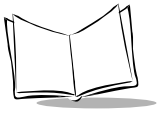
### **Pinouts for PDT 3100**

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The PDT 3100 terminal's RJ41 connector is located in the base of the terminal.

**Table A-1. RJ-45 Connector**

<b>Pin#</b>	<b>Signal</b>	<b>Description</b>
1	DSR	Data Set Ready input
2	DCD	Data Carrier Detect input
3	RXD	Received Data input
4	RTS	Request to Send output
5	TXD	Transmit Data output
6		Power (+12VDC)
7	RING	Ring input
8	GND	Ground
9	CTS	Clear to Send input
10	DTR	Data Terminal ready output

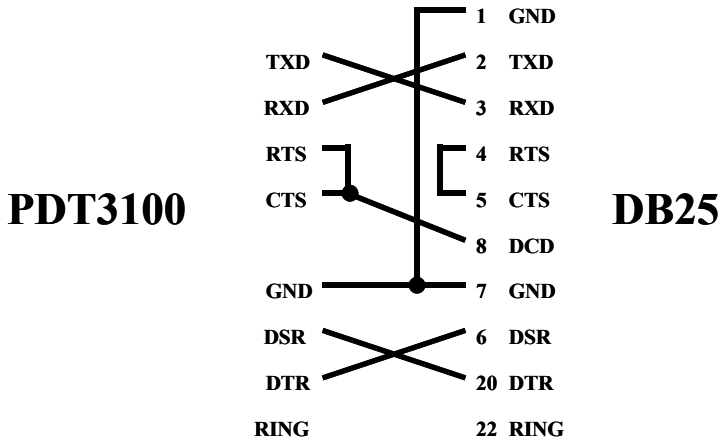


**3115 Communications/Charger Adapter - Straight through. DTE device with a female DB25 connector**

**Table A-2. 3115 CCA**

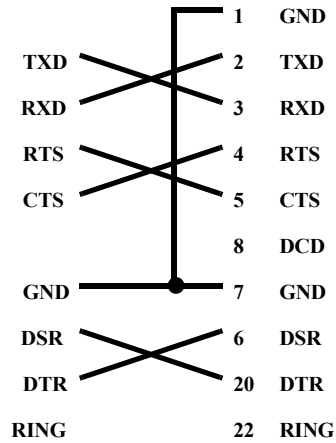
Pin#	Signal	Description
2	TXD*	Transmit Data output
3	RXD*	Received Data input
4	RTS	Request To Send output
5	CTS	Clear To Send input
6	DSR	Data Set Ready input
1,7	GND	Power and signal ground
20	DTR	Data Terminal Ready output
22	RING	Ring input
25	PWROUT	Optional regulated 5V output. Only active during communications, and only if enabled by adding a jumper inside the housing. Use with caution.

**3115 Communications/Charger Adapter - Full Duplex Null Modem Female DB25 connector**

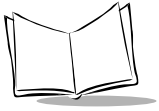


**3115 Communications/Charger Adapter - RTS/CTS Null Modem Female DB25 connector**

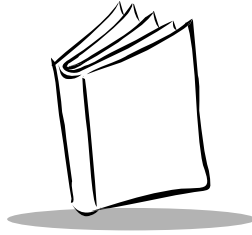
**PDT 3100**



**DB25**



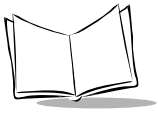
*PDT 3100 Series Product Reference Guide*



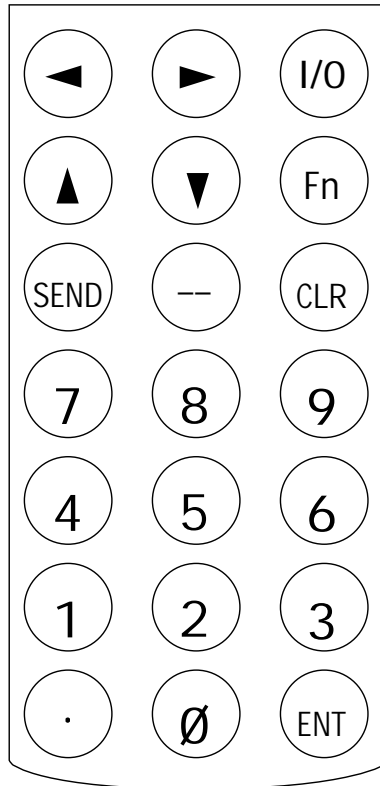
## *Appendix B*

# *Keyboard Layouts*

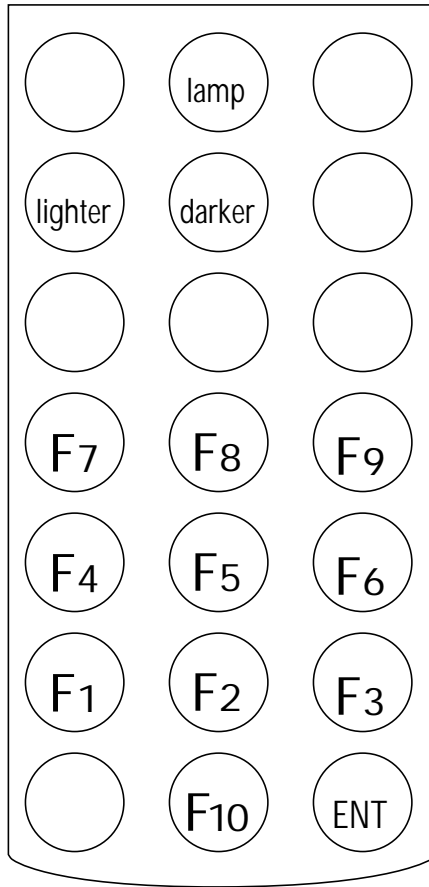
The following pages show the characters and character sequences produced by the keyboards using the default translation tables.



These key definitions can be changed by the application program. The captions indicate what sequence of modifier keys produce the keyboard.



**Figure B-1. 21-Key Unmodified PDT 3100 Keyboard**



**Figure B-2. 21-Key Function-Modified PDT 3100 Keyboard**

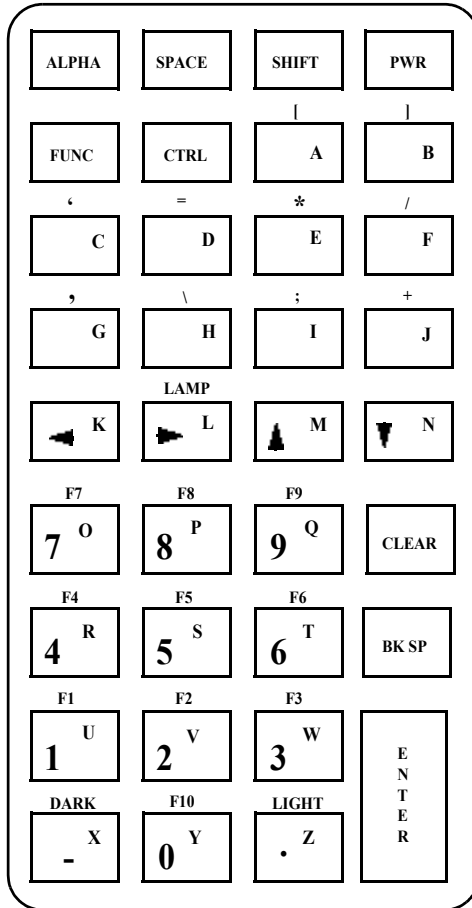
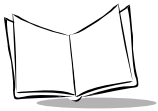


Figure B-3. 35-Key PDT 3100 Keyboard



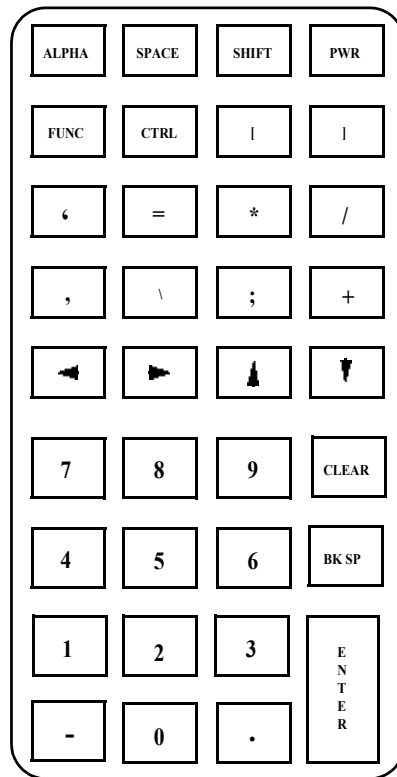


Figure B-4. 35-Key Unmodified PDT 3100 Keyboard

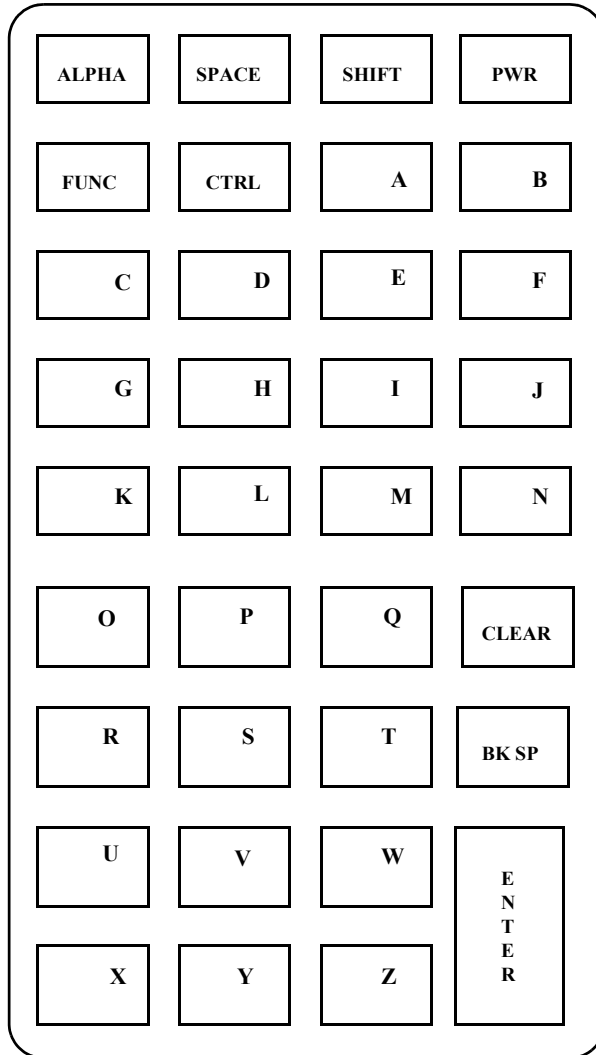
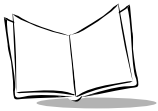


Figure B-5. 35-Key Alpha Key Modified PDT 3100 Keyboard

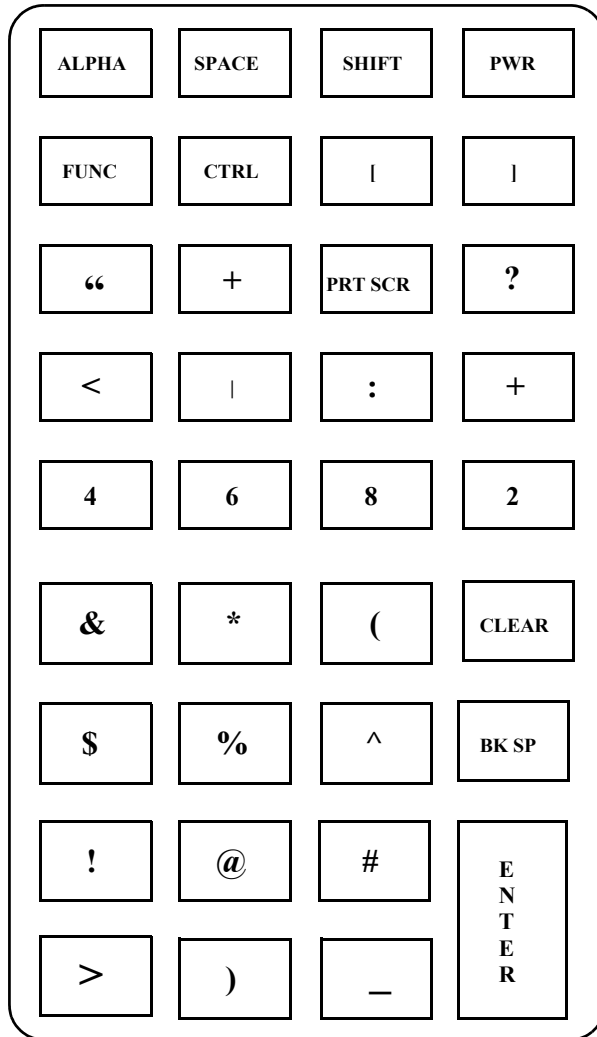


Figure B-6. 35-Key Shift Key Modified PDT 3100 Keyboard

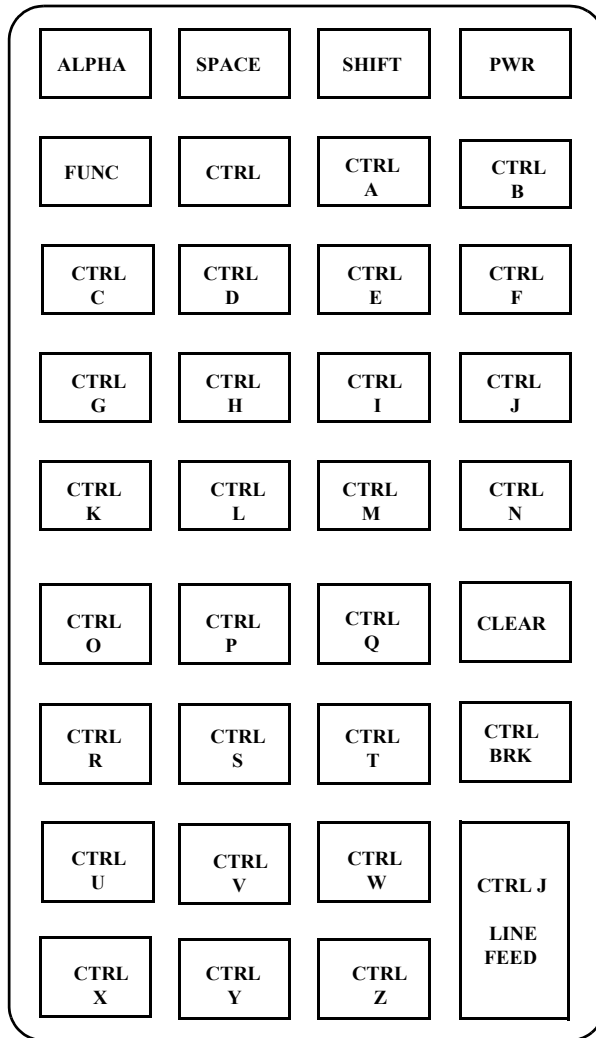
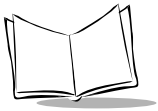


Figure B-7. 35-Key Control Key Modified PDT 3100 Keyboard

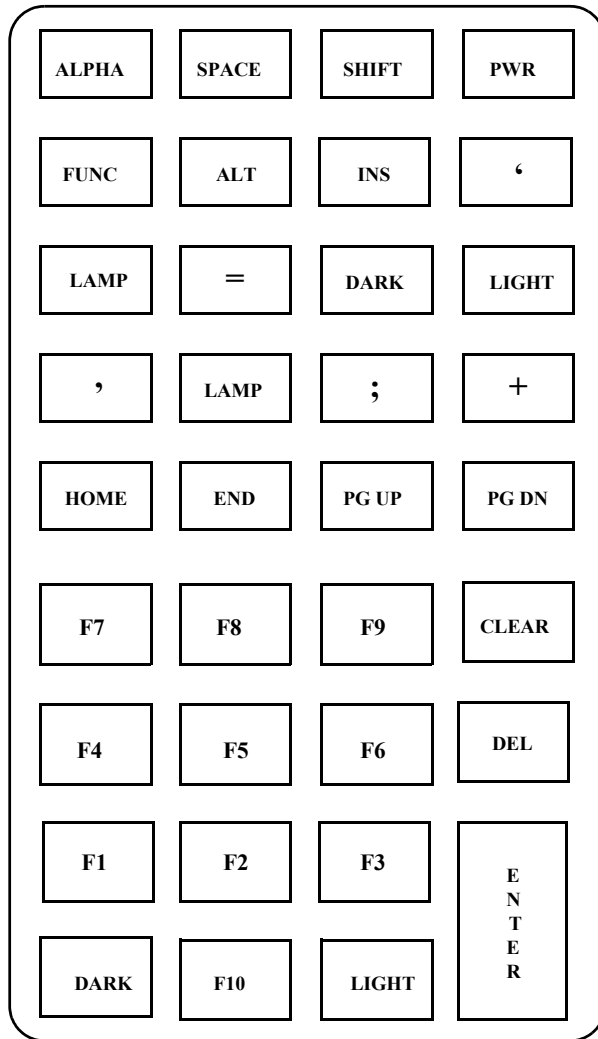


Figure B-8. 35-Key Function Key Modified PDT 3100 Keyboard

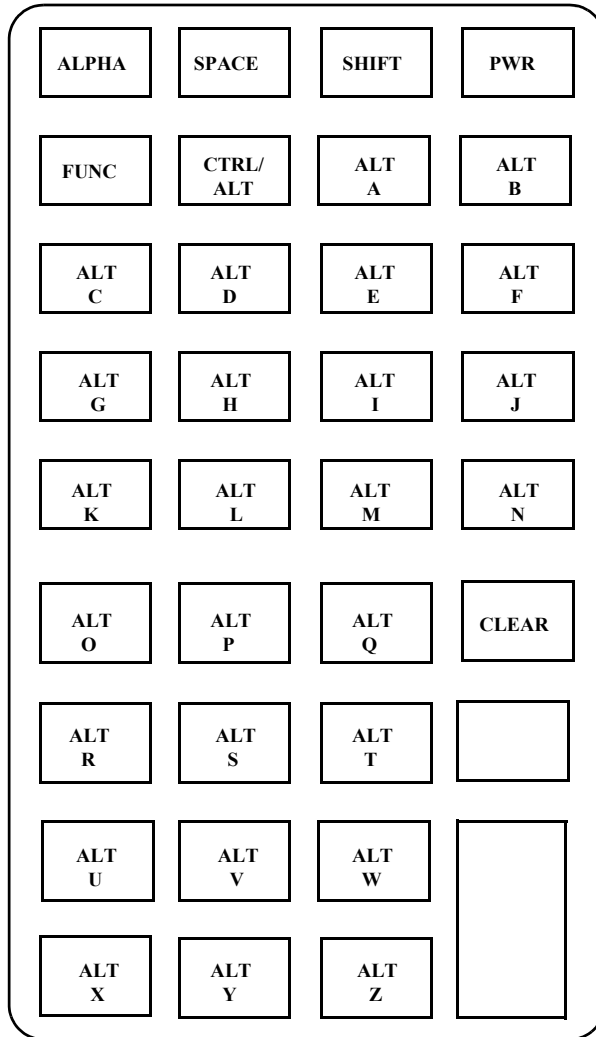
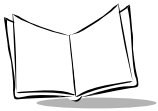
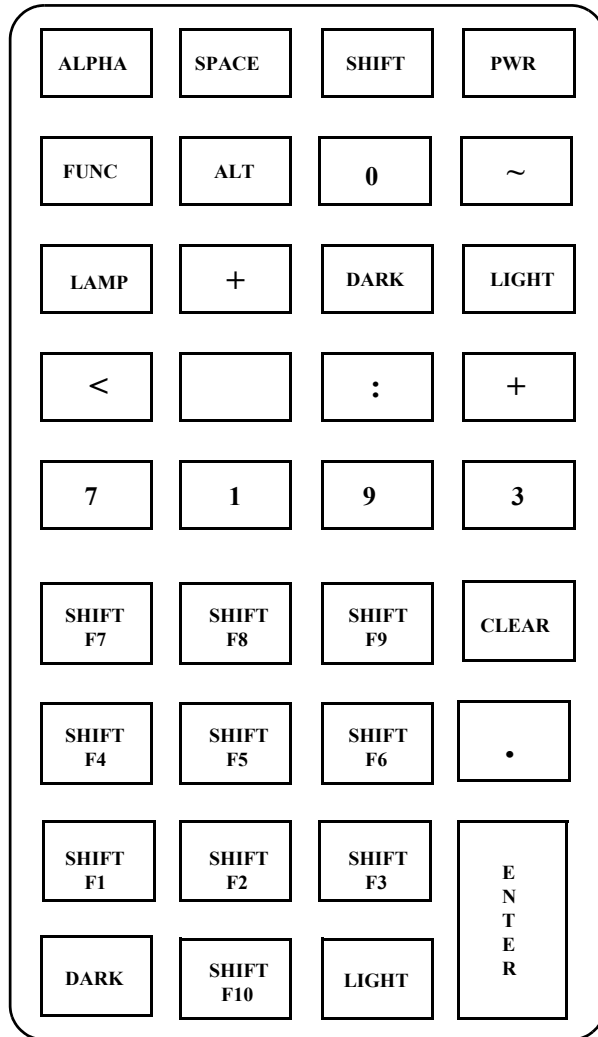


Figure B-9. 35-Key Alt Key Modified PDT 3100 Keyboard



**Figure B-10. 35-Key Shift + Func Modified PDT 3100 Keyboard**

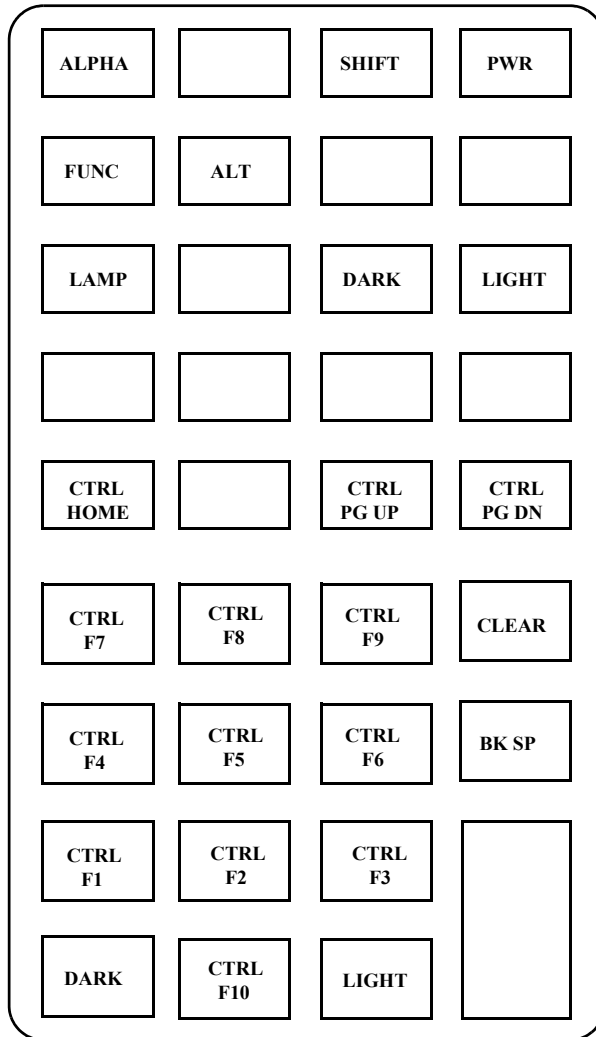
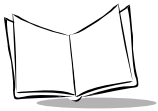


Figure B-11. 35-Key Ctrl + Func Modified PDT 3100 Keyboard



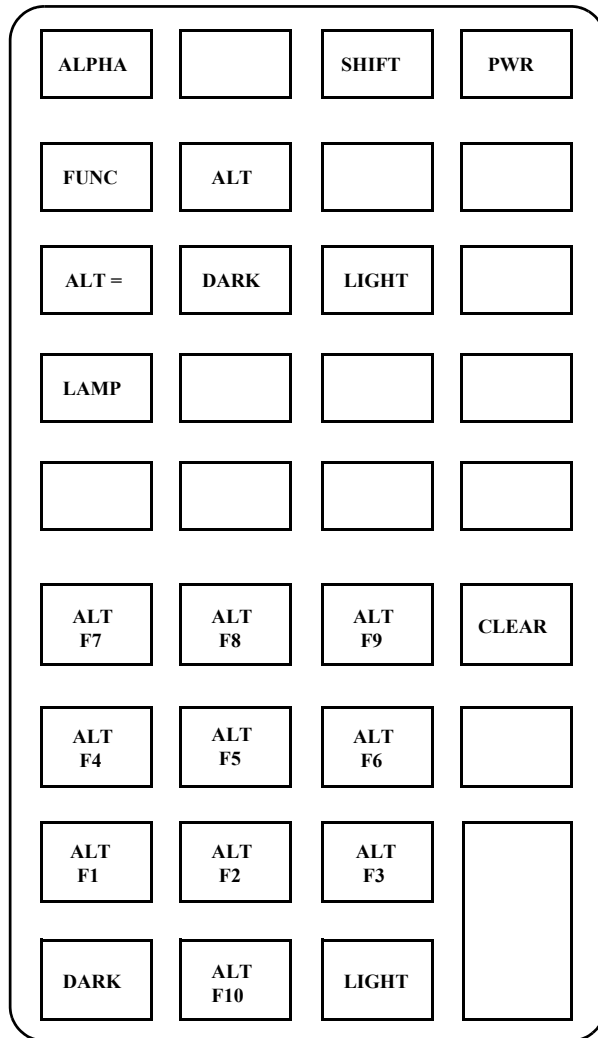
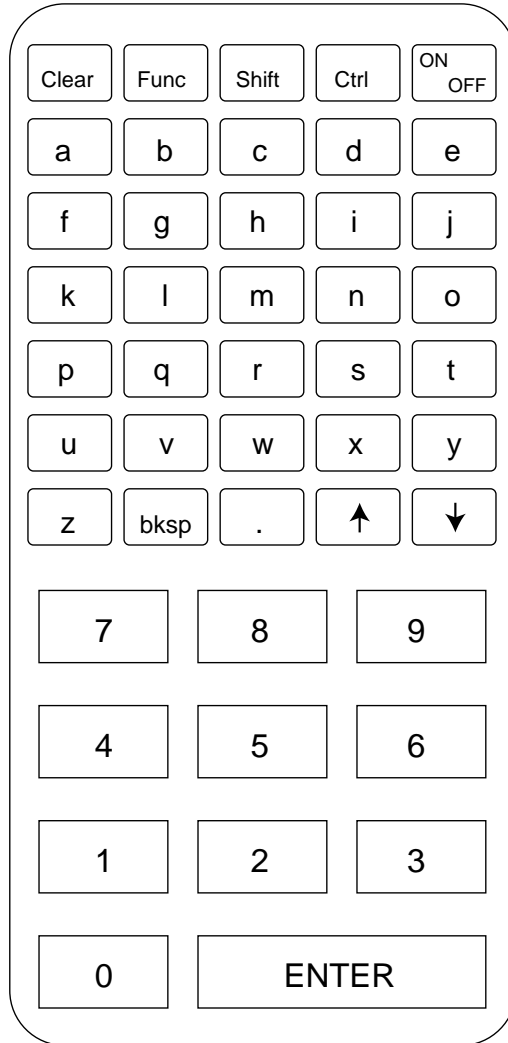
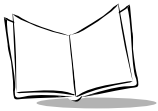


Figure B-12. 35-Key Alt + Func PDT 3100 Keyboard



**Figure B-13. Series 3100 46-Key Unmodified PDT 3100 Keyboard**

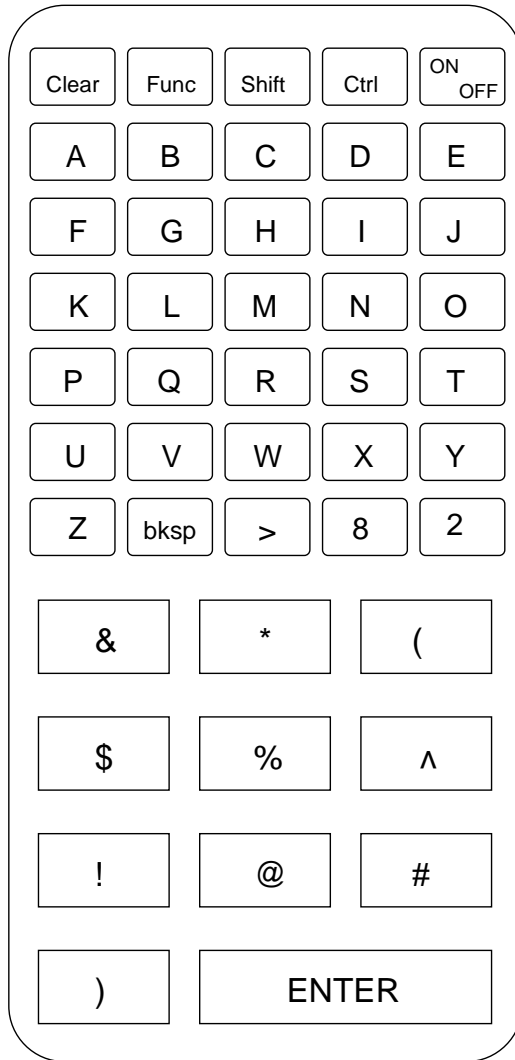
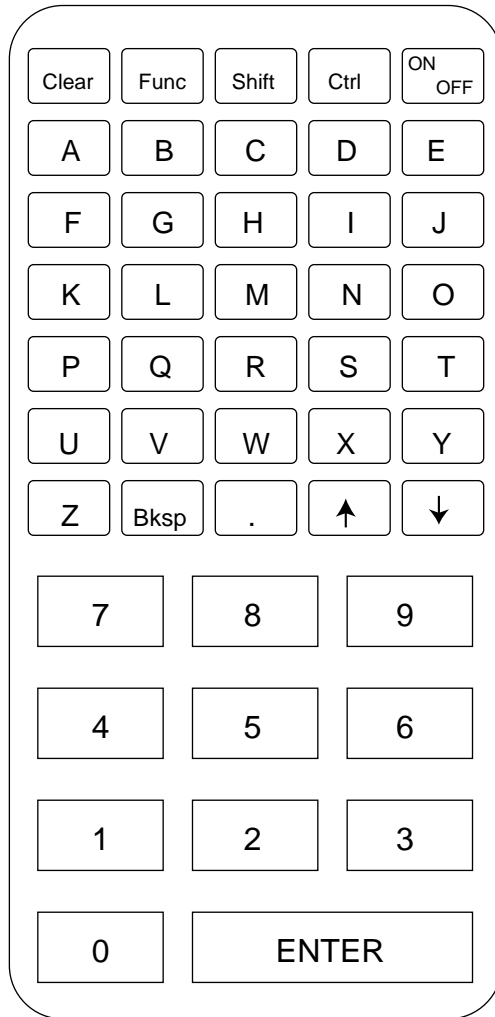
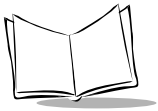
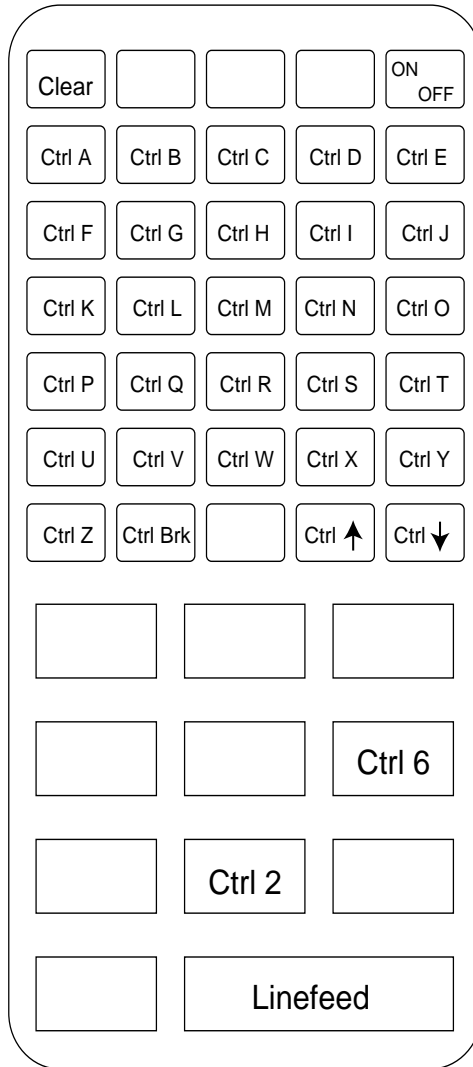


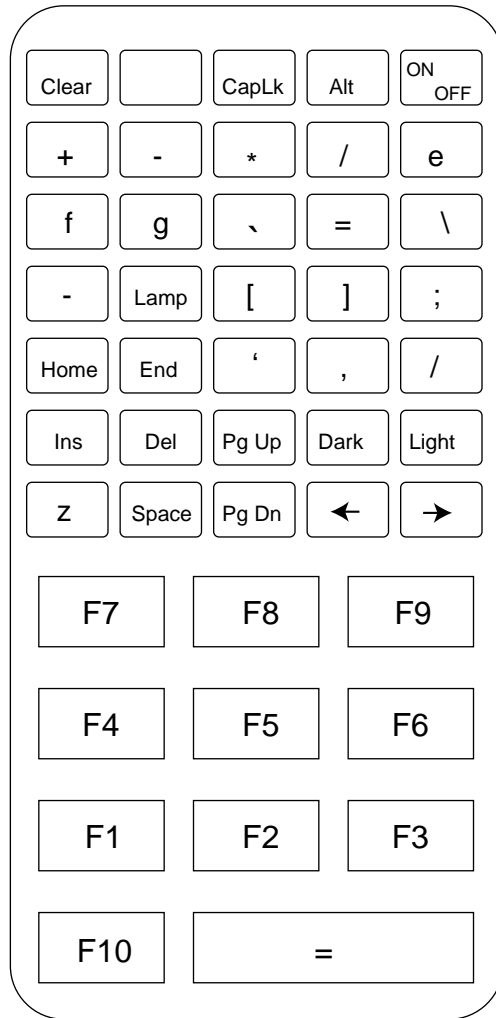
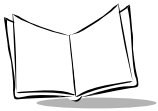
Figure B-14. 46-Key Shift Modified PDT 3100 Keyboard



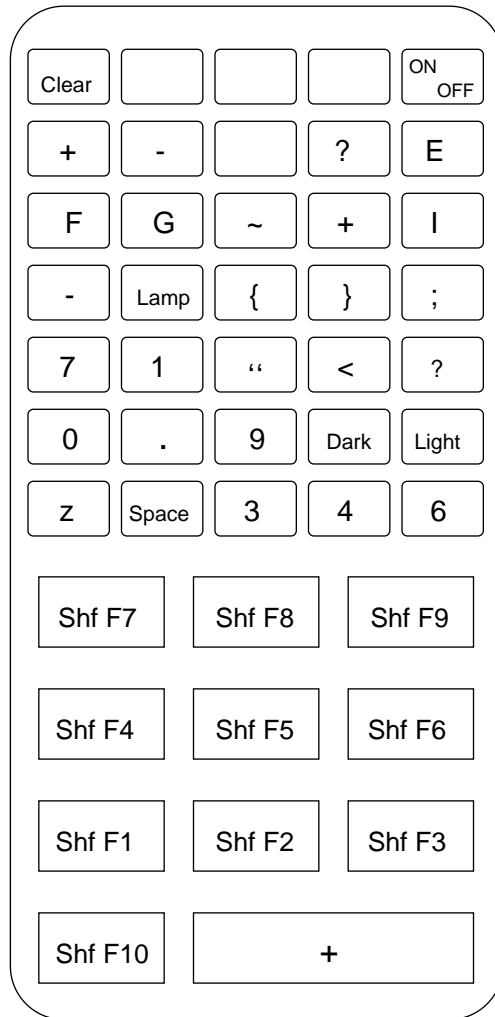
**Figure B-15. 46-Key Caplock Modified PDT 3100 Keyboard**



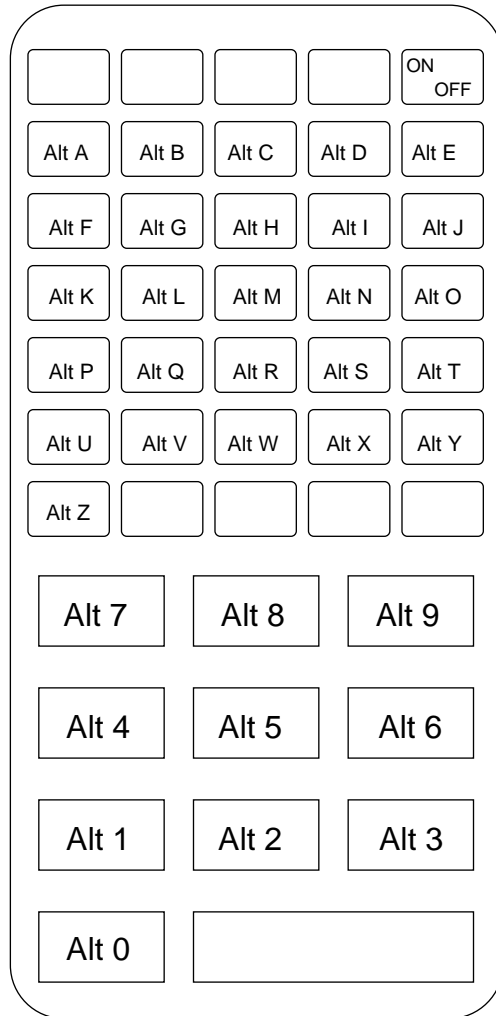
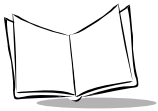
**Figure B-16. 46-Key Control Modified PDT 3100 Keyboard**



**Figure B-17. 46-Key Func Modified PDT 3100 Keyboard**

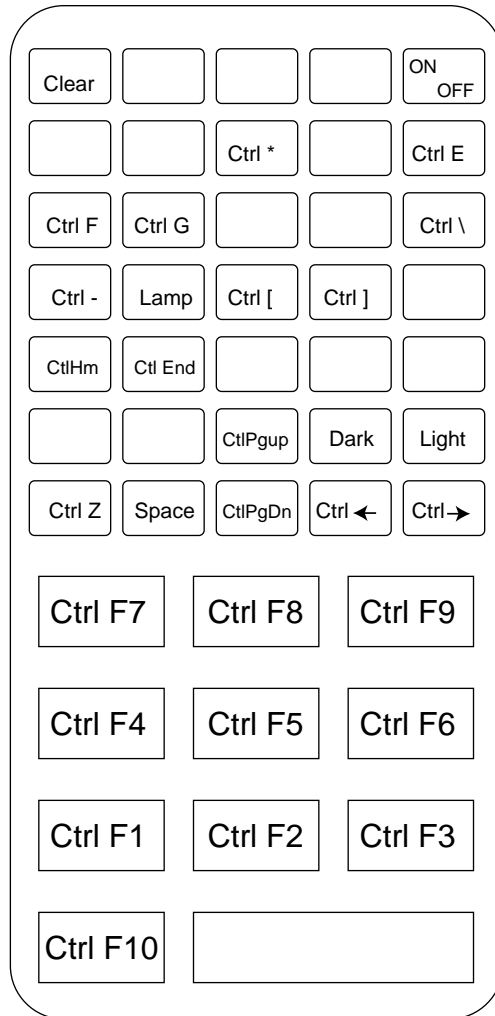


**Figure B-18. 46-Key Shift + Func Modified PDT 3100 Keyboard**

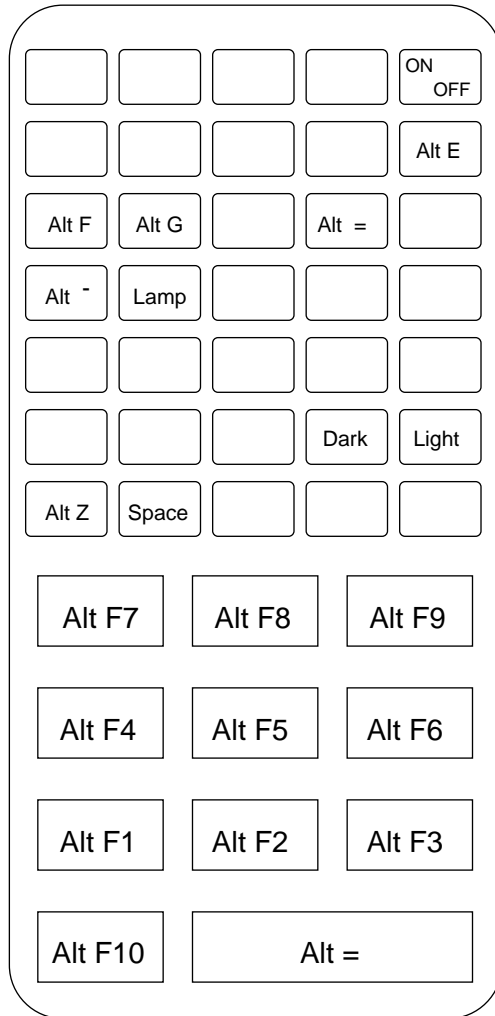
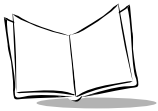


**Figure B-19. 46-Key ALT (Func + Control)  
Modified PDT 3100 Keyboard**

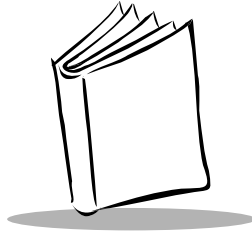




**Figure B-20. 46-Key Control + Func Modified PDT 3100 Keyboard**



**Figure B-21. 46-Key ALT + Func Modified PDT 3100 Keyboard**



## *Appendix C*

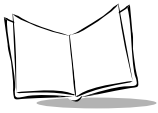
# *Communications Status Codes*

The program loader status code consists of four hexadecimal digits which indicate whether or not the transfer was successful, and if not, the source of the communications error. A status code of 0000 indicates success; any other code indicates failure.

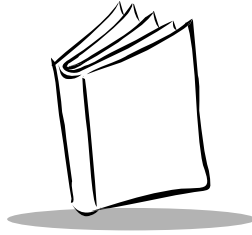
Table C-1 lists the failures associated with the status codes. The values are additive.

**Table C-1. Communications Status Codes**

<b>Status Code</b>	<b>Meaning</b>
0002	Receive overrun error
0004	Receive parity error
0008	Receive framing error
0010	Programming voltage not present
0020	Data Set Ready or Carrier Detect not detected on open
0080	ABORT key hit during comm
0100	Insufficient NVM for image
0200	Illegal Intel hexadecimal record
0400	Unsupported Intel record
0600	NVM EEPROM failed to erase
0800	Receive time-out error
1000	Control start character time-out
2000	Clear To Send inactive time-out error
4000	Receive buffer full



*PDT 3100 Series Product Reference Guide*



## Appendix D Specifications

### Environment

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The terminal's operating conditions are listed in [Table D-1](#).

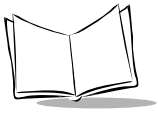
**Table D-1. Environmental Specifications**

Condition	Range
Operating Temperature	0° C to 40° C
Storage Temperature	-20° C to 60° C
Humidity (Operating)	0 to 95% (noncondensing)
Altitude	Up to 10,000 feet

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**Note:** *Batteries lose power faster at extremely high and low temperatures, and at temperatures below 0° C, the LCD operates slowly.*

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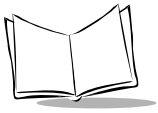
# Scanning

**Table 4-2. Standard 1D Scanning Specifications @ 23°C**

Item	Description
<b>Power Requirements</b>	
<b>Input Voltage</b>	3.0 - 5.5 VDC
<b>Scanning Current</b>	65 mA typical; 100 mA maximum
<b>Standby Current</b>	50 $\mu$ A max.
<b>Surge Current</b>	160 mA max.
<b>V<sub>CC</sub> Noise Level</b>	200 mV p to p max., 75% of specified working range will be maintained.
<b>Scan Repetition Rate</b>	35 ( $\pm$ 5) scans/sec (bidirectional)
<b>Laser Power</b>	0.8 mW $\pm$ 0.05 mW, $\lambda$ = 650 nm nominal
<b>Print Contrast</b>	minimum 20% absolute dark/light reflectance measured at 650 nm.
<b>Scan Angle</b>	42° $\pm$ 2°
<b>Skew Tolerance</b>	$\pm$ 60° from normal
<b>Pitch Angle</b>	$\pm$ 65° from normal
<b>Roll</b>	$\pm$ 30° from vertical
<b>Decode Depth of Field</b>	See <a href="#">Figure 4-4 on page 4-17</a> .
<b>Ambient Light Immunity</b>	
<b>Sunlight</b>	10,000 ft. candles (107,640 lux)
<b>Artificial Light</b>	450 ft. candles (4,844 lux)
<b>Shock</b>	2000 G applied via any mounting surface @ 23°C (for 0.25 msec)
<b>Vibration</b>	Unpowered engine withstands a random vibration along each of the X, Y and Z axes for a period of one hour per axis, defined as follows: 20 to 80 Hz      Ramp up to 0.04 G <sup>2</sup> /Hz at the rate of 3dB/octave. 80 to 350 Hz      0.04 G <sup>2</sup> /Hz 350 to 2000 Hz      Ramp down at the rate of 3 dB/octave.
Note: Environmental and/or Tolerance Parameters are not cumulative.	

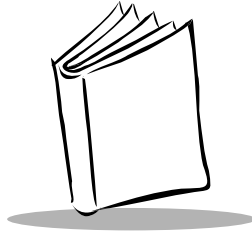
**Table 4-2. Standard 1D Scanning Specifications @ 23°C (continued)**

Item	Description
<b>Laser Class</b>	The scan engine, by itself, is an unclassified component. It is intended for use in CDRH Class II/IEC Class 2 devices with proper housing, labeling, and instructions to comply with federal and/or international standards.
<b>Operating Temperature</b>	-22° to 140°F (-30° to 60°C)
<b>Storage Temperature</b>	-40° to 140°F (-40° to 60°C)
<b>Humidity</b>	5% to 95% non-condensing
<b>Height</b>	0.76 in. max. (1.93 cm max.)
<b>Width</b>	1.51 in. max. (3.84 cm max.)
<b>Depth</b>	1.0 in. max. (2.54 cm max.)
<b>Weight</b>	1.19 oz. max. (34.0 gm max.)
Note: Environmental and/or Tolerance Parameters are not cumulative.	



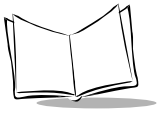
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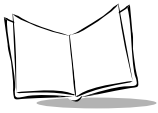
# Glossary

<b>Access Point</b>	A device that provides transparent access between Ethernet wired networks and IEEE 802.11 interoperable radio-equipped mobile units (MUs) like Symbol's hand-held computers or other devices equipped with a PCMCIA slot. The mobile unit may roam among the APs in the same subnet while maintaining a continuous, seamless connection to the wired network. Refer to <b>Subnet</b> .
<b>ADK</b>	Refer to <b>Application Development Kit</b> .
<b>Application Development Kit (ADK)</b>	A kit for use with Series 3000 terminals that provides various libraries, examples, utilities, and drivers. Use to enable program segments and build program images for execution on a Series 3100 terminal.
<b>AP</b>	See <b>Access Point</b> .
<b>Application Programming Interface (API)</b>	An interface by means of which one software component communicates with or controls another. Usually used to refer to services provided by one software component to another, usually via software interrupts or function calls
<b>ASCII</b>	American Standard Code for Information Interchange. A 7 bit code representing 128 letters, numerals, punctuation marks, and control characters. It is a standard data transmission code in the U.S.
<b>Bar Code</b>	A pattern of variable-width bars and spaces which represents numeric or alphanumeric data in machine-readable form. The general format of a bar code symbol consists of a leading margin, start character, data or message character, check character (if any), stop character, and trailing margin. Within this framework, each recognizable symbology uses its own unique format. See <b>Symbology</b> .



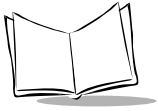
<b>BIOS</b>	Basic Input Output System. A collection of ROM-based code with a standard API used to interface with standard PC hardware.
<b>Bit</b>	Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.
<b>Bits per Second (bps)</b>	Bits transmitted or received.
<b>BOOTP</b>	Bootstrap protocol.
<b>Byte</b>	On an addressable boundary, eight adjacent binary digits (0 and 1) combined in a pattern to represent a specific character or numeric value. Bits are numbered from the right, 0 through 7, with bit 0 the low-order bit. One byte in memory can be used to store one ASCII character.
<b>Codabar</b>	A discrete self-checking code with a character set consisting of digits 0 to 9 and six additional characters: (- \$ : / , +).
<b>Code 128</b>	A high density symbology which allows the controller to encode all 128 ASCII characters without adding extra symbol elements.
<b>Code 3 of 9 (Code 39)</b>	A versatile and widely used alphanumeric bar code symbology with a set of 43 character types, including all uppercase letters, numerals from 0 to 9, and 7 special characters (- . / + % \$ and space). The code name is derived from the fact that 3 of 9 elements representing a character are wide, while the remaining 6 are narrow.
<b>Code 93</b>	An industrial symbology compatible with Code 39 but offering a full character ASCII set and a higher coding density than Code 39.
<b>Cradle</b>	A cradle is used for charging the terminal battery and for communicating with a host computer, and provides a storage place for the terminal when not in use.
<b>Data Communications Equipment (DCE)</b>	A device (such as a modem) which is designed to attach directly to a DTE (Data Terminal Equipment) device.
<b>Data Terminal Equipment (DTE)</b>	A device (such as a terminal or printer) which is designed to attach directly to a DCE (Data Communications Equipment) device.
<b>DCE</b>	Refer to <b>Data Communications Equipment</b> .

<b>Decode</b>	To recognize a bar code symbology (e.g., Codabar, Code 128, Code 3 of 9, UPC/EAN, etc.) and analyze the content of the bar code scanned.
<b>Development Kits</b>	A set of software tools provided to customers to help them create applications for their terminals. See <b>ADK</b> .
<b>Discrete 2 of 5</b>	A binary bar code symbology representing each character by a group of five bars, two of which are wide. The location of wide bars in the group determines which character is encoded; spaces are insignificant. Only numeric characters (0 to 9) and START/STOP characters may be encoded.
<b>DTE</b>	Refer to <b>Data Terminal Equipment</b> .
<b>EAN</b>	European Article Number. This European/International version of the UPC provides its own coding format and symbology standards. Element dimensions are specified metrically. EAN is used primarily in retail.
<b>Flash Disk</b>	An additional megabyte of non-volatile memory for storing application and configuration files.
<b>File Transfer Protocol (FTP)</b>	A TCP/IP application protocol governing file transfer via network or telephone lines. Refer to <b>TCP/IP</b> .
<b>Frequency Hopping</b>	The use of a random sequence of frequency channels to achieve spread spectrum compliance. Stations that use frequency hopping change their communications frequency at regular intervals. A <b>hopping sequence</b> determines the pattern at which frequencies are changed. Messages take place within a hop. Refer to <b>Hopping Sequence</b> and <b>Spread Spectrum</b> .
<b>FTP</b>	See <b>File Transfer Protocol</b> .
<b>Hopping Sequence</b>	A set of random frequencies designed to minimize interference with other sets of random frequencies. A hopping sequence determines the pattern with which a station that uses frequency hopping changes its communications frequency. Refer to <b>Frequency Hopping</b> .
<b>Host</b>	A computer that serves other terminals in a network, providing services such as network control, data base access, special programs, supervisory programs, or programming languages.

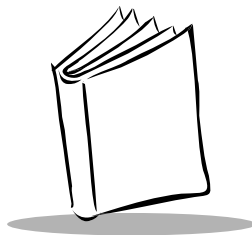


<b>Interleaved 2 of 5</b>	A binary bar code symbology representing character pairs in groups of five bars and five interleaved spaces. Interleaving provides for greater information density. The location of wide elements (bar/spaces) within each group determines which characters are encoded. This continuous code type uses no intercharacter spaces. Only numeric (0 to 9) and START/STOP characters may be encoded.
<b>IOCTL</b>	Input/Output Control.
<b>IP</b>	Internet Protocol.
<b>Klasse Eins</b>	European laser safety standard. Relates to energy expended over time.
<b>LAN</b>	Local Area Network.
<b>LCD</b>	Refer to <b>Liquid Crystal Display</b> .
<b>LED</b>	Refer to <b>Light Emitting Diode</b> .
<b>Light Emitting Diode (LED)</b>	A low power electronic light source commonly used as an indicator light. Uses less power than incandescent light bulb but more than a Liquid Crystal Display (LCD).
<b>Liquid Crystal Display (LCD)</b>	A display that uses liquid crystal sealed between two glass plates. The crystals are excited by precise electrical charges, causing them to reflect light outside according to their bias. They use little electricity and react relatively quickly. They require external light to reflect their information to the user.
<b>MU</b>	Mobile Unit.
<b>NCU</b>	Network Control Unit.
<b>Null Modem</b>	A special cable that allows direct connection of two DTE (Data Terminal Equipment) devices by making each perceive the other as a DCE (Data Communications Equipment) device.
<b>NVM</b>	Non-Volatile Memory.
<b>ODI</b>	Refer to <b>Open Data-Link Interface</b> .

<b>Open Data-Link Interface (ODI)</b>	Novell's driver specification for an interface between network hardware and higher-level protocols. It supports multiple protocols on a single NIC (Network Interface Controller). It is capable of understanding and translating any network information or request sent by any other ODI-compatible protocol into something a NetWare client can understand and process.
<b>PDT</b>	Portable Data Terminal.
<b>RAM</b>	Random Access Memory.
<b>RF</b>	Radio Frequency.
<b>Router</b>	A device that connects networks and supports the required protocols for packet filtering. Routers are typically used to extend the range of cabling and to organize the topology of a network into subnets. Refer to <b>Subnet</b> .
<b>Scanner</b>	An electronic device used to scan bar code symbols and produce a digitized pattern that corresponds to the bars and spaces of the symbol.
<b>SDK</b>	Software Development Kit.
<b>SE 1200</b>	Symbol's laser scan modules that can be integrated into portable computing devices.
<b>SHIP</b>	Symbol Host Interface Program.
<b>Spectrum24</b>	Symbol's frequency-hopping, spread spectrum cellular network.
<b>STEP</b>	Symbol Terminal Enabler Program.
<b>Subnet</b>	A subset of nodes on a network that are serviced by the same router. Refer to <b>Router</b> .
<b>SVTP</b>	Symbol Virtual Terminal Program.
<b>Symbology</b>	The set of structural rules and conventions used to represent data within a particular bar code (e.g., UPC/EAN, Code 39, etc.).
<b>TCP/IP</b>	Refer to <b>Transmission Control Protocol/Internet Protocol</b> .
<b>Terminal</b>	A Symbol portable computer product.



<b>Terminate and Stay Resident (TSR)</b>	A program under DOS that ends its foreground execution to remain resident in memory to service hardware/software interrupts, providing background operation. It remains in memory and may provide services on behalf of other DOS programs.
<b>Transmission Control Protocol/Internet Protocol (TCP/IP)</b>	A suite of the standard network protocols that were originally used in UNIX environments but are now used in many others. The TCP governs sequenced data; the IP governs packet forwarding. TCP/IP is the primary protocol that defines the Internet.
<b>TFTP</b>	Trivial File Transfer Protocol
<b>TSR</b>	Refer to <b>Terminate and Stay Resident</b> .
<b>UPC</b>	Universal Product Code. A relatively complex numeric symbology. Each character consists of two bars and two spaces, each of which can be any of four widths. The standard symbology for retail food packages in the United States.
<b>WLAN</b>	Wireless Local Area Network.



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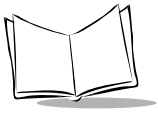
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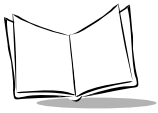
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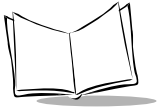
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What topics need to be added to the index, if applicable?

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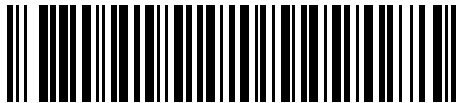
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