

User's Guide

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Revision A
May 1996*

6300 SERIES Hand-Held Computer

P/N 961-028-083 Revision A



Intermec

A **UNOVA** Company

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FCC Computer Compliance

This equipment meets Class B digital device limits per Part 15 of FCC Rules. These limits protect against interference in a residential area. It emits, uses, and can radiate radio frequency energy. If you do not install and use the equipment according to its instructions, it may interfere with radio signals. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning our equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the radio or television receiving antenna.
- Increase the separation between the computer equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the radio or television receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

Canadian Computer Compliance

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada

Telephone Installation Warning Notices

The following notices apply to equipment that may be connected to telephone lines or systems. For your personal safety, and to protect this equipment from potential electrical or physical damage, do NOT connect equipment to telephone lines or data communication equipment unless the following warnings have been read, understood, and complied with.

- ▶ Never install telephone wiring during a lightning storm.
- ▶ Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- ▶ Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- ▶ Use caution when installing or modifying telephone lines.
- ▶ Avoid using telephone (other than cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
- ▶ Do not use the telephone to report a gas leak in the vicinity of the leak.

Installation du téléphone : avertissements

Les avertissements qui suivent s'appliquent à tout équipement qui peut être branché aux lignes ou systèmes téléphoniques. Pour votre sécurité personnelle et pour protéger l'équipement de tout dommage électrique ou physique potentiel, NE PAS brancher un ordinateur tablette électronique ou ses périphériques aux lignes téléphoniques ou équipements avant que les avertissements suivants aient été lus, compris et observés :

- ▶ Ne jamais installer de câblage téléphonique pendant un orage électrique.
- ▶ Ne jamais installer de prise téléphonique dans un endroit humide à moins que la prise ait été spécifiquement conçue pour être utilisée dans les endroits humides.
- ▶ Ne jamais toucher les fils de téléphone ou de l'équipement terminal non isolés à moins que la ligne téléphonique n'ait été débranchée de l'interface réseau.
- ▶ User de prudence lors de l'installation ou de la modification de lignes téléphoniques.
- ▶ Éviter d'utiliser un téléphone (autre qu'un appareil téléphonique sans fil) pendant un orage électrique. Il pourrait y avoir un faible risque d'électrocution par la foudre.
- ▶ Ne pas utiliser le téléphone afin de signaler une fuite de gaz à proximité de la fuite.

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Section 1

General Information



About this Manual

Organization

This manual is divided into four sections plus appendixes. Sections I, II, and III are for the end-user, and Section IV is intended for the vehicle installation technician. The main sections are:

- Section I General Information
- Section II Terminal Operation
- Section III Terminal Maintenance
- Section IV Vehicle Installation
- Appendixes

Summary of Sections

Section I General Information

Tells how this manual is organized, contains a summary of each section, and describes the terminal and available options.

Section II Terminal Operation

Tells how to prepare the terminal for operation.

Section III Terminal Maintenance

This section contains routine care and maintenance instructions, and a general troubleshooting guide.

Section IV Vehicle Installation

This section tells how to wire and install a vehicle mount.

Appendixes

These contain firmware and optional hardware information.

Terminal Description

Portable Terminals

Hand-Held Computers (also called “portable terminals,” or simply “terminals”) are used by mobile workers to quickly and accurately capture information, print reports, dispatch competitive analysis, and to support field maintenance and sales automation.

Technical advancements help make today’s hand-held computers suitable for many new uses.

These units are battery-operated, making them extremely portable and well-suited to route industries such as beverage, bakery, snack, and dairy distribution operations. Programs or data are loaded (“downloaded”) into the hand-held computer from a PC or mainframe. Depending upon the options built into the terminal, entries are made via screen contact, a keyboard or via scanner. The hand-held computer typically contains (or can access) a database with customer and product information. It performs calculations based on product movement, sends information to a printer, and often sends data to a host computer at the end of the work day.

6300 SERIES Computer

The 6300 SERIES computer is a versatile portable data collection device. It offers a large, easy-to-read display, both keyboard and display-direct inputs, and the computing power and speed of a 386 processor. With extensive memory options and MS-DOS compatibility, the 6300 Computer can be expanded to do many tasks beyond data collection.

Software Compatibility

Each 6300 SERIES terminal is loaded at the factory with software for battery charging, and for communicating to peripheral devices. The terminal also contains a software interface for display control when using windows-type programs. Both pen-based and touch-screen interfaces are provided when the terminal has those options.

Since the terminal contains an MS-DOS compatible processor, there are many general programs and publications available for the terminal. Programmers may be interested in commercial pen-based application development tool kits such as:

DOS-based applications

- ▶ Power Pen Pal*
- ▶ Professional Pen Pal
- ▶ PenRight! Pro* with Borland* or Microsoft C

Microsoft * Windows 3.1 and Windows for Pen Computing*

- ▶ Microsoft Visual Basic for Windows
- ▶ Borland C++

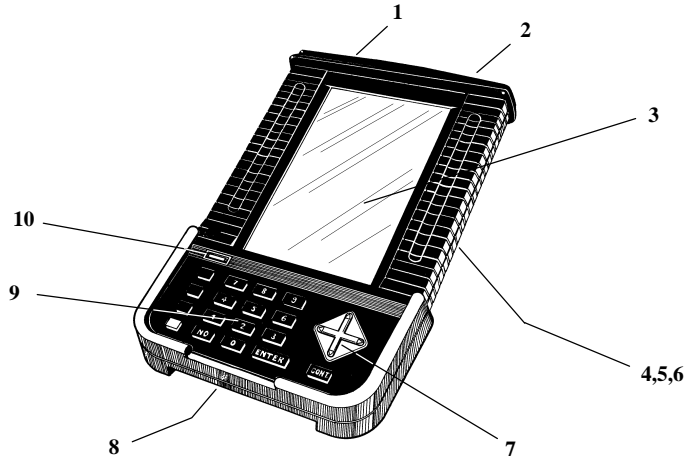
Terminal Description

The illustrations that follow will familiarize you with the external features of the model 6300 SERIES terminal.

At the beginning of each work day you should inspect the terminal and make sure that the following components are secure:

- ▶ Battery compartment door
- ▶ Memory card door
- ▶ Hand-hold or accessory pod
- ▶ handstrap
- ▶ External connectors

Correct any problems discovered during this inspection before using the terminal.



1. Battery compartment door
2. PC card door
3. Display
4. Pod (*on bottom*)
5. Handstrap (*on bottom*)
6. Surface connector (*on bottom*)
7. 4-way cursor key
8. 28-pin connector
9. Keypad
10. Suspend/Resume switch

Figure 1-1
The 6300 SERIES Terminal

Display

The display shows status messages, keyed-in entries, the most recent scan, customer or product lists, calculations, and prompts inviting a response from you.

You can use the keyboard, a scanner, or physically touch the display (use *only* your finger or the special stylus provided with the terminal) to make manual entries.

An adjustable backlight brightens the display in poor lighting conditions. Display contrast is adjustable for best viewing, and then automatically compensates for ambient temperature variations.

A special lens coating protects the display from scratches or other damage that could make the display difficult to read.

An audible buzzer warns of power problems, while the display shows power status messages, as shown below.

Displayed Message	Meaning Action
<p>Main Battery Low <i>(three "beeps")</i></p>	<p>First indication of a low main battery pack. Charge or replace fairly soon.</p>
<p>30 minutes of battery life left <i>(will change to 20, then 10 minutes, and finally 0 minutes).</i></p>	<p>Second or subsequent indication that less run time remains than before.</p>
<p>Power Failure <i>(one "beep")</i></p>	<p>Main Battery Pack severely depleted or missing entirely.</p>
<p>Backup Battery Low <i>(three "beeps")</i></p>	<p>Ensure switch is ON; if yes, then replace battery soon.</p>

Keyboard

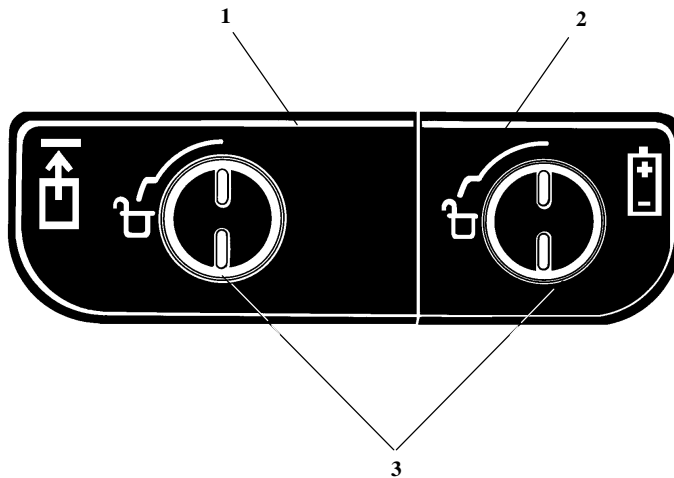
The keyboard has a four-corner cursor key (right/left/up/down), a YES/ENT ("enter") key, a NO ("skip") key, a SHIFT key, a DEL ("delete") key, a TAB key, an ESC ("escape") key, a NEXT (menu or screen) key, and numeric keys 0 thru 9. Custom keyboard overlays identify additional, software-controlled key functions.

Compartment doors

There are two compartment doors located on the display-end of the terminal. A battery compartment is located behind the narrow door, while two PC Card slots are located behind the wide door. Open doors by turning the latch knob a quarter turn (counterclockwise) toward the unlocked padlock symbol, then pulling the middle edge of the door outward. Certain PC Card options require a custom compartment door (not shown). Unscrew the two corner screws to open this door.

► **NOTE:**

Turn latch knobs 1/4-turn counterclockwise (toward the “unlock” icon) to open



1. PC Card door
2. Battery compartment door
3. Latch knobs

*Figure 1-2
Compartment Doors*

Options and Accessories

Personal Charger

A Personal Charger is available for recharging batteries out of the terminal. It is powered by a small power supply that plugs directly into a wall outlet. The Maintenance section of this manual tells you how to use the Personal Charger.

Accessory Pods

Accessory Pods may contain a radio, a modem interface, an integrated scanner, or combinations of these devices to greatly expand the terminal capabilities. Many accessory pods are still under development.

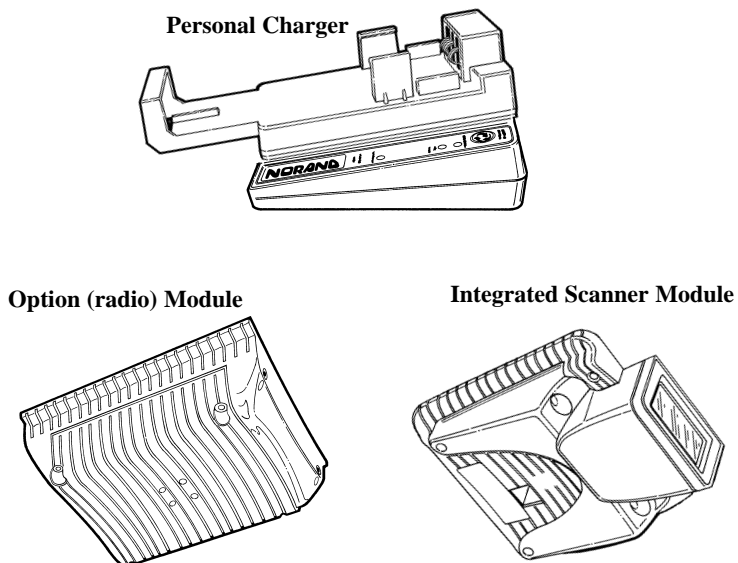


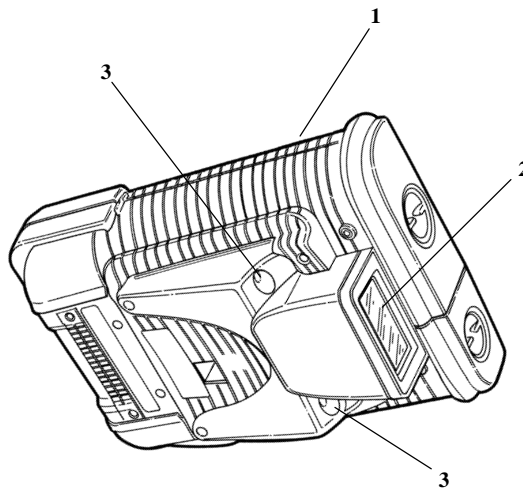
Figure 1-3
Options and Accessories

Integrated Scanner Pod

A removable pod on the bottom of the terminal provides a hand-hold for the terminal. The standard pod is easily removed when installing upgrades (an accessory pod) or when replacing the backup battery.

When a terminal has an accessory pod, the backup battery may be located in the pod. This makes that battery more accessible to you when it must be replaced.

A terminal with an integrated scanner is shown below.



1. 6300 SERIES Terminal
2. Scan window
3. Scan activate switch

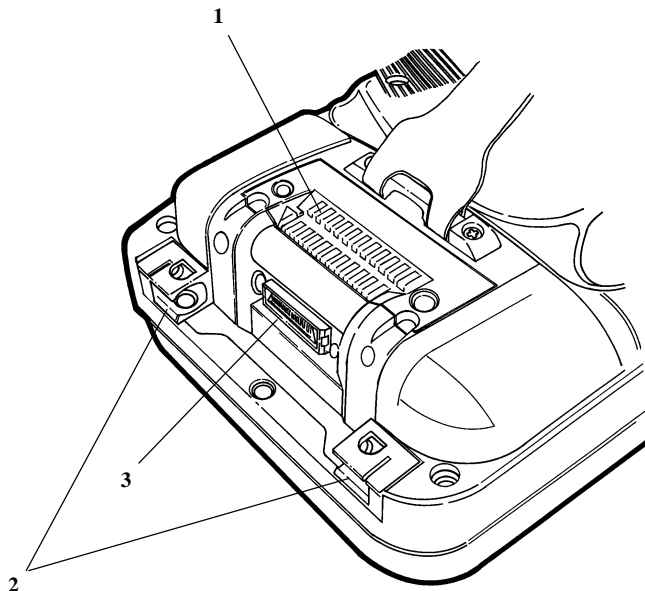
Figure 1-4
Terminal with Integrated Scanner

Connectors

Surface connectors on the back of the terminal make contact with the mating connector in docking devices.

A micro-miniature 28-pin connector on the bottom of the standard terminal connects to peripheral communication and charging cables when docking devices are not available. Some terminals may have an optional infrared communication interface instead of the 28-pin connector.

If the terminal contains an optional internal modem, an RJ-11 jack, located on the accessory pod, allows connection to the telephone line.



- 1. Surface connector contacts
- 2. Stylus storage
- 3. 28-pin Micro miniature connector
(or, optional infrared interface)

*Figure 1-5
Connectors
(terminal shown inverted)*

6300 SERIES Specifications

Physical

Size	8.75" x 5.5" x 2.0" (LWH)
Weight	32 oz. (without battery)

Environmental

Operating temp.	-4 to +122°F
Storage temp.	-22 to +158°F
Humidity	5 to 95% non-condensing

Electrical

Power Sources	1400 mAh nickel-cadmium pack (standard) 1800 mAh nickel metal hydride pack (<i>optional</i>) via external power sources (AC or DC)
----------------------	--

Charging	battery packs charge internally or externally (fully charged in 4 hours, or less)
-----------------	--

Communication	RS-232 and RS-485 interfaces External keyboard interface Ethernet interface RJ-11 jack (<i>with optional modem</i>)
----------------------	--

Standards	FCC Class B
------------------	-------------

Processor

Standard RAM	4MB
---------------------	-----

Optional RAM	2, 4, and 8MB expansion modules
---------------------	---------------------------------

Flash RAM	1Mb
------------------	-----

Card options	two PCMCIA type II slots, or one PCMCIA type III slot
---------------------	--

Display

Type	VGA (16 gray scales)
-------------	----------------------

Size	320 (width) X 480 (length) pixels
-------------	-----------------------------------

Features	temperature-compensated contrast touch-screen
-----------------	--

Section 2

Operation

General Information

The 6300 SERIES Hand-Held Computer is shipped with DOS and a basic input-output system (“BIOS” firmware) installed at the factory. You must do the following *before using the terminal for the first time*:

▼ **CAUTION:**

Fully charge the main battery before using the terminal away from an external power source.

- ▶ Install memory card(s).
- ▶ Install any other PCMCIA option.
- ▶ Install the main battery.
- ▶ Switch backup battery ON.
- ▶ Connect terminal to a charging source
(*or, make sure the battery was previously charged*).
- ▶ Connect any peripheral devices (e.g., printer) that will be used right away.
- ▶ Load additional operating software.
- ▶ Load application software
- ▶ Load data files.

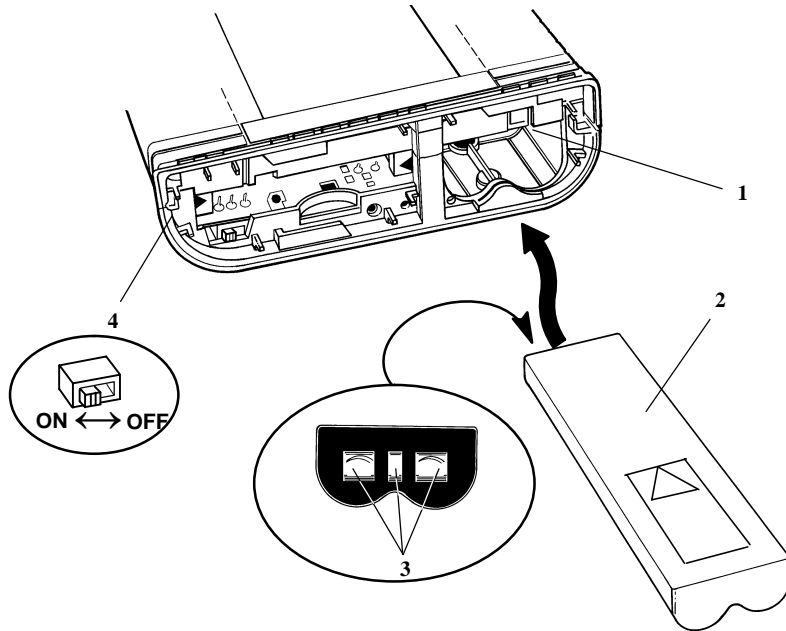
▼ **CAUTION:**

To prevent scratches or damage to the display, do NOT use a ballpoint pen or a sharp object to make entries directly on the display. Use ONLY your finger or the stylus provided to make display-direct entries.

Batteries

Main Battery Installation

Open the battery compartment door by turning the latch knob 1/4-turn counterclockwise. Use a coin or flatblade screwdriver. Then, with the battery pack contacts facing into the terminal and with the flat and curved portions aligned with the battery compartment opening, slide the battery pack into the compartment. Reinstall the door. Turn the latch knob 1/4-turn clockwise to secure it.



1. Battery compartment
2. Battery
3. Battery contacts
4. Backup battery switch

Figure 2-1
Install Main Battery

Charging

A depleted (but *not* “dead”) battery pack normally recharges in 4 hours or less. If you intend to use the terminal by itself and not connected to a peripheral device, *charge the battery before you begin operation*.

If you operate the terminal while connected to a charging/power source, the battery pack recharges as you work. The diagrams below show various methods for charging and for operating the terminal.

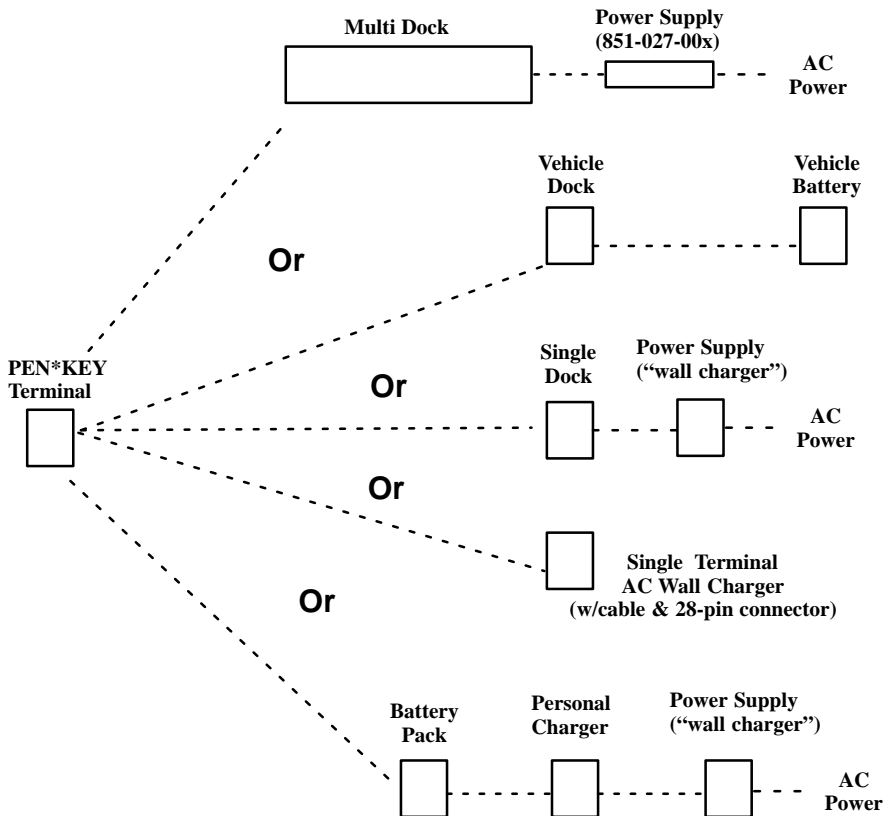


Figure 2-2
Charging Configurations

PCMCIA cards

General Information

There are two PCMCIA (“memory card”) slots located behind the memory card compartment door at the display-end of the terminal. Each slot can accept one PCMCIA type II card, or the lower slot can accept a type III card. *When a type III card is in place, the upper card slot is not usable.*

▼ CAUTION:

Some of the PC Card devices, particularly S-RAM cards, require their own internal battery. The terminal tells you if the PC Card battery is low.

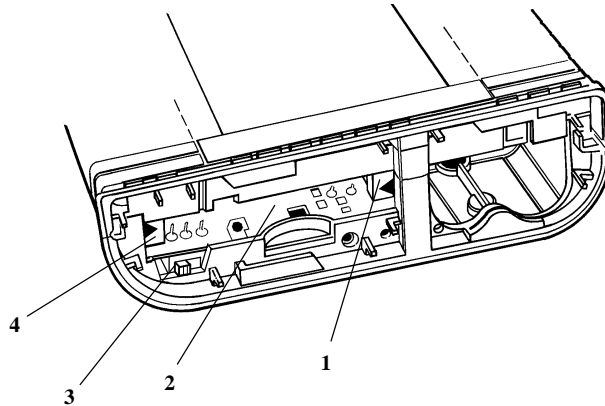
The battery may have to be installed in such cards prior to use.

Refer to the card manufacturer’s literature for battery installation instructions and the recommended replacement intervals.

Installing PC Cards

The *lower* card slot is designated “drive **A:**” while the *upper* slot (the one closest to the display) is designated “drive **B:**.” Your startup (“boot”) card must be installed in drive **A:**. If it is not, when you attempt to start the unit, the display will read: “Fail. Retry?” Cards containing application programs or data should be installed in drive **B:**.

Open the memory card compartment door by turning the latch knob 1/4-turn counterclockwise. Use a coin or flatblade screwdriver, if necessary. Then, slide the memory card connector-end first, into a slot. If you feel resistance, remove the card, flip it over and try again. Reinstall the door and turn the latch knob 1/4-turn clockwise to secure it.



1. Card ejector (*lower slot*)
2. Upper/Lower card slots
3. Backup battery switch
4. Card ejector (*upper slot*)

Figure 2-3
Memory Card Slots

Removing PC Cards

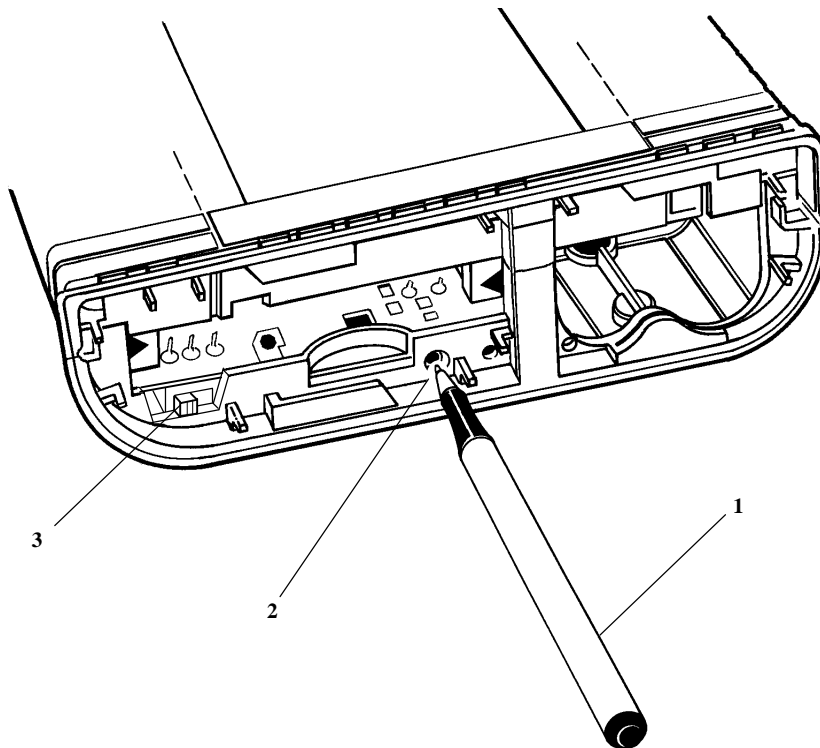
Each slot has a card ejector device which you can reach by removing the memory card compartment door. The ejectors are located on either side of the PC Card slot assembly. Each ejector button has an arrow pointing to the slot it affects. Press in on the ejector button to release and partially eject the associated PC Card.

Reset Switch

All computers can lock-up occasionally, which is why many offer a convenient “reset” switch. Lockups occur when too many operations are going on at once, or when there is a conflict between hardware and software timing or instructions. The reset switch is near the center of the unit just below the PC Card slots. Open the memory card door, then use a ballpoint pen to reset the terminal. Push the pen through the hole, then press gently on the switch. Within a few seconds, the terminal will reset.

▼ **CAUTION:**

Do NOT use a lead pencil to reset the unit.



- 1. Ballpoint pen
- 2. Access to reset switch
- 3. Backup battery switch

Figure 2-4
Reset Switch

Terminal Startup

General Information

When you startup the terminal for the first time, or any time after all power has been removed, you are “cold starting” the computer. A startup disk should be placed in the *lower card slot*, which is designated “drive **A:**,” *before* the main battery pack is installed. If a startup card is not in place when you attempt to start the unit, the display will read: “Fail. Retry?” . Once the startup card is installed in the **A:** drive, press the reset button to perform a cold start.

The upper slot (the one closest to the display) is designated “drive **B:**.” If the startup card is in this drive, the terminal will not startup. Also, if a memory card containing only application programs or data is installed in the **A:** drive, the terminal will not start up.

Startup Procedures

Follow the steps below to perform a cold startup:

1. Remove both compartment doors.
2. Insert a startup card, connector-end first, in the *lower* PCMCIA slot (this is “drive **A:**”).
3. Install a memory card containing application programs or data in the upper PCMCIA slot (this is “drive **B:**”).
4. Install the main battery pack, contact-end first.
5. Reinstall the battery compartment door and lock it.
6. Move the backup battery switch to the ON position.
7. Press the SUSPEND/RESUME key at the upper left of the keyboard.
8. Reinstall the memory card compartment door and begin normal operation.

▼ **CAUTION:**

Never use a ballpoint pen or a sharp object to make entries on the display.

9. Make entries using the keyboard, a scanner, or by touching the display either with your finger or with the special stylus.

Section 3

Maintenance



Introduction

This section contains maintenance procedures for the 6300 SERIES Hand-Held Computer. Terminal startup procedures, such as installing the main battery pack, are described in Section Two (Terminal Operation) and will not be repeated in this section.

Although these terminals are designed to withstand normal use in your environment, occasional maintenance is required to ensure trouble-free operation. The procedures in this section should help you keep your terminal in good working order.

Maintenance procedures include instructions on charging the main battery pack, replacing the backup battery and handstrap, and on cleaning the terminal.

Maintenance Procedures

Main Battery Pack

The 6300 SERIES Hand-Held Computer contains a rechargeable (main) battery pack. A fully depleted (but *not* totally “dead”) battery pack will recharge inside the terminal within 4 hours after connecting the terminal to a charging source.

If you recharge the battery pack in a Personal Charger, expect a depleted (but *not* totally “dead”) battery pack to recharge within 4 hours.

Low Battery Indications

The display will tell you when the main battery pack becomes low. Often, there will be several (graduated) warnings such as “MAIN BATT LOW ” and an indication, such as “30 Minutes Remaining” (changing to 20 minutes, then 10 minutes, etc.), to give you an idea of the relative useful battery run-time remaining. When you notice the *first* low battery warning, it is time to plan to either recharge the terminal or replace the battery pack soon.

If you turn the terminal “ON” and not much happens, this could be a low battery warning in itself. Try turning the terminal OFF, then ON again: listen for a series of three “beeps.” This signals that the main battery is too low to operate the unit. A single “beep” indicates the battery is dead or missing entirely. Just to be sure, though, connect the terminal to a charging source such as a printer, a vehicle dock, or a multi dock: turn the terminal ON again. If everything seems normal, the main battery pack *must* be recharged or replaced.

Charging the Main Battery (inside the terminal)

The main battery pack is normally recharged whenever the terminal is properly inserted in a single dock, vehicle dock, or in a multidock. These are referred to as “charging sources.”

Connect the terminal to a charging source whenever possible. This is especially important when the terminal is equipped with a scanner or radio device, since these accessories use more battery power than the standard terminal.

Charging the Main Battery (out of the terminal)

The main battery pack can be charged outside of the terminal. Use *only* the Personal Charger or other chargers approved by Intermec Technologies Corporation.

► **NOTE:**

Make sure the terminal is in the suspend mode before removing or replacing the main battery pack.

▼ **CAUTION:** *If you charge the main battery pack outside of the terminal, be sure to install a fresh battery pack in the terminal or insert the terminal in a powered dock. Either of these actions will conserve the backup battery.*

▼ **CAUTION:** *Do NOT use unapproved chargers. These will damage the battery pack.*

The Personal Charger

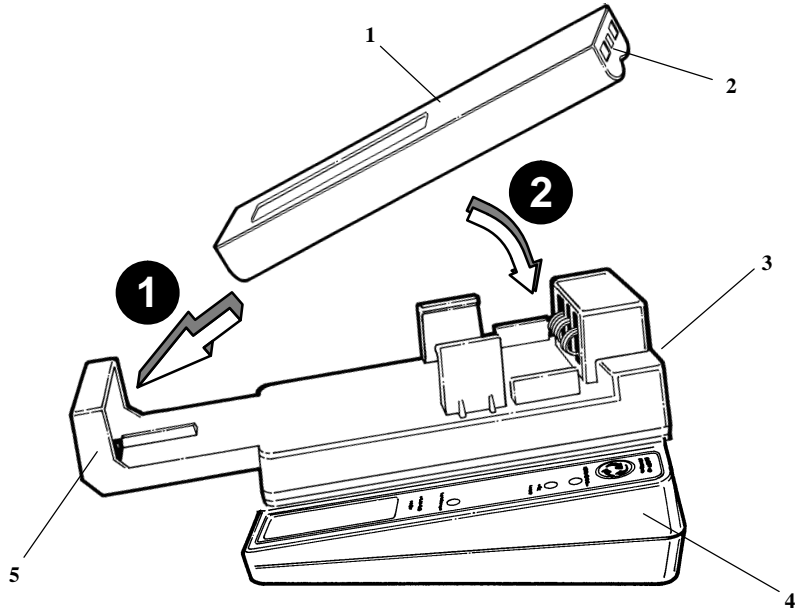
The Personal Charger is more sophisticated than a simple charging source. It senses the battery pack temperature and voltage, and then adjusts the charge rate accordingly. The Personal Charger can also perform a conditioning type of charge cycle. This should be performed approximately once every two months, or any time the battery pack has not been charged or used during the past 30 days.

Normal Charge

To perform a normal out-of-terminal charge, place the battery pack into the holder on the Personal Charger. If the battery temperature and voltage are within limits, the CHARGE light-emitting diode (LED) becomes solid red to indicate a fast charge rate.

If the CHARGE indicator blinks, this normally means the battery pack voltage is too low or its temperature is too high. The blinking will continue while the Personal Charger delivers a trickle (slow) charge to the battery pack. When the battery voltage and temperature reach safe limits, the Personal Charger changes over to provide a faster charge rate until the battery pack is fully charged. *It is normal for the CHARGE indicator to blink during a conditioning charge cycle.*

When lighted, the READY indicator (green LED) tells you the battery pack is fully charged and ready for use.



1. Battery pack
2. Contact-end of battery pack
3. Battery holder
4. Charger base
5. HOOD (of battery holder)

*Figure 3-1
Out-of-Terminal Charge*

Personal Charger Use

1. Lower the battery pack into the **HOOD** of the battery holder, as shown in Figure 3-1.
2. *Then*, lower the contact-end of the battery pack into the spring contacts on the battery holder.
3. To remove the battery pack from the holder, lift the contact-end of the battery pack *first*.

“Conditioning” Charge Cycle

With the battery pack inserted in the charger, press the CONDITION button on the Personal Charger to begin a *modified* “conditioning” charge cycle on the battery pack. This cycle discharges the battery pack, then recharges it. During the discharge phase, the CHARGE indicator will blink while the charge/discharge LED will be brightly lit. During the charge phase, the CHARGE indicator is on full-time and does not blink.

Charging Recommendations

You *will* lose data if both the main and backup batteries become critically low, or if both batteries are removed from the terminal at the same time. Be alert to battery status messages that appear on your display. The following information and recommendations will help you guard against loss of data.

- Avoid installing a low, or unknown, main battery pack into a terminal when the terminal contains data.
- A replacement main battery pack should be at the same temperature as the terminal it goes into.
- Keep a main battery pack in the terminal to conserve the backup battery.
- Make sure the backup battery switch is ON when using the terminal regularly.
- Heed the “BACKUP BATTERY LOW!” warning. Check that the backup battery switch is ON. If it is not, move it to ON. If the message continues to display, replace the backup battery immediately.

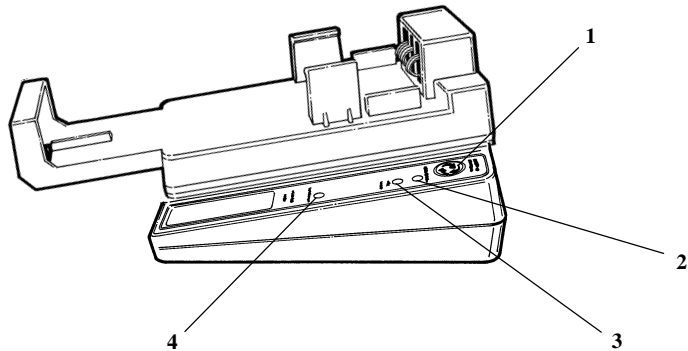
► **NOTE:**

Make sure the main battery pack is in place before replacing the backup battery.

Personal Charger LED Status Indicators

The table below shows the condition of each LED on the Personal Charger, and the meaning of each combination.

Charge LED	Condition LED	Ready LED	Meaning
ON	OFF	OFF	Normal
BLINK	OFF	OFF	Low Voltage (or) High/Low Temp
BLINK	ON	OFF	Discharging
ON	ON	OFF	Charging
OFF	OFF	ON	Charge Complete
OFF	OFF	OFF	Battery missing



1. Conditioning switch
2. Condition LED (amber)
3. Ready LED (green)
4. Charge LED (red)

Figure 3-2
Personal Charger Status Indicators (LEDs)

Disassembly Information

Limitations

Do not disassemble the hand-held computer unless directed to do so by authorized Intermec Technologies Corporation personnel.

Users *must* limit any disassembly and subsequent maintenance to the following:

- Handstrap replacement.
- Backup Battery replacement.
- Accessory Pod removal/installation.
- Main Battery Pack removal/replacement.
Make sure the terminal is in the suspend mode.
- Memory Card removal/installation.
- Modem Card removal/installation.

Precautions

If possible, use a properly grounded anti-static mat and wrist strap whenever a pod is removed or installed. This will help prevent electro static discharge (ESD) damage to exposed electronic components.

Since your hand-held computer is effectively shielded in its assembled state, it is possible to do the tasks above even when the proper anti-static equipment is not available. When you first grasp the unit, you become discharged and can safely perform the tasks listed above *if you follow the guidelines below* to guard against electro static (ESD) damage to components:

- Place the unit on a work surface
(Do not open unit while walking around).
- Do all tasks at the same time when you open the unit.
- Reassemble and close the unit *before* departing the work area.
- Do NOT move around with an open unit.

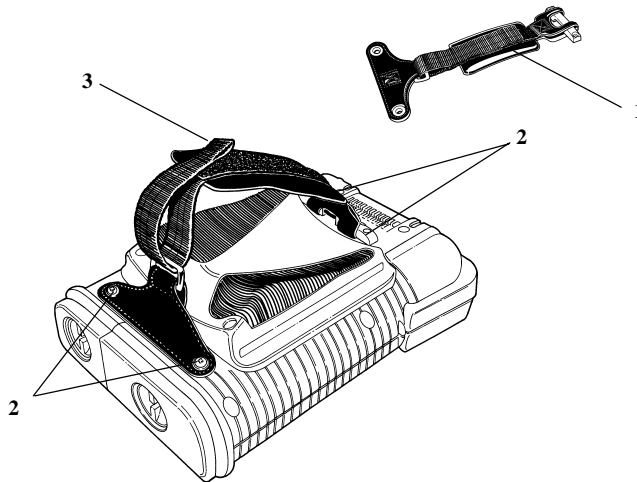
Handstrap

Adjust Handstrap

You can adjust the handstrap by grasping the terminal firmly at the base of the pod. Loosen the free end of the adjustable closure, pull the strap snugly against your hand, then refasten the loose end.

Replace Handstrap

If the handstrap breaks, or if it shows obvious signs of wear, it should be replaced. Remove the four retaining screws and discard the old handstrap. Align the new handstrap to the attachment holes on the terminal and re-install the four screws. Be sure those are snug, but also take care not to over-tighten them.



1. Standard Handstrap
2. Retaining Screws
3. Adjustable closure

*Figure 3-3
Replacing the Handstrap*

Backup Battery Information

General

Although the backup battery is installed at the factory, it is disabled by a small slide switch located behind the PCMCIA compartment door. Open the door and move the slide switch to the ON (marked “1”) position to enable the backup battery. It then provides energy to the terminal *anytime the main battery pack is removed from the terminal or becomes severely depleted*. A depleted main battery (not totally dead) suspends unit operation but can, in combination with a good backup battery, maintain data and the real-time clock for approximately 8 days.

Backup Battery Life

A frequently depleted main battery pack will reduce backup battery life and you will have to replace it more often. When the terminal tells you the backup battery is low, it should be replaced immediately.

Dead Backup Battery

Normally, if the backup battery is dead (not just low) it is because the main battery pack became too weak to operate the terminal. You will have to reload your application program if *both* the main battery pack and the backup battery become fully depleted. Replace the backup battery and either recharge or replace the main battery pack *before* reloading application software. In some cases, you may have to temporarily (15-20 seconds) remove *all power* before the terminal will reset.

Backup Battery Type

Use only 9-volt *alkaline* (NEDA type 1604A) or *lithium* (NEDA type 1604LC) batteries when replacing the backup battery. Nickel-cadmium “9-volt” batteries are specifically *not recommended* for this application.

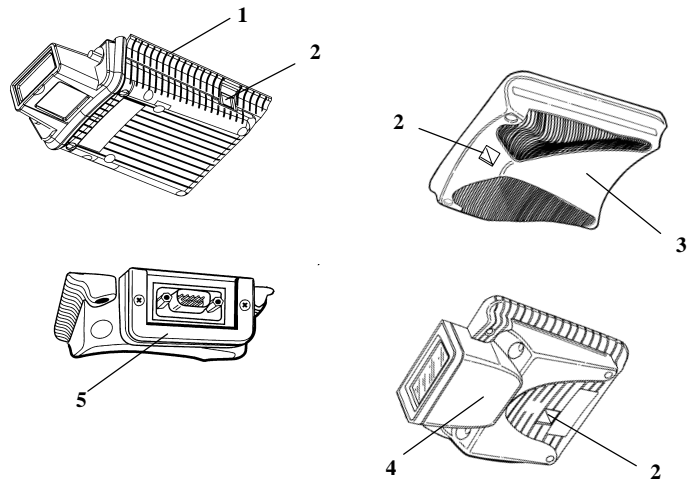
Backup Battery Location

The backup battery is located inside the pod on the underside of the terminal.

Backup Battery Replacement

Identify Pod

Identify your pod type and read through all of these instructions *before replacing the backup battery*. The standard pod covers the opening in the bottom of the unit and provides a place for you to grasp the unit. *Accessory* pods may contain a scanner, a modem, or both. The backup battery can be located within accessory pods. Identify your pod type, then proceed to the correct instructions (following pages) for replacing the backup battery.



1. Universal pod
2. RJ-11 jack (optional)
3. Standard pod
4. Integrated scanner pod
5. Serial pod (connector view)

*Figure 3-4
Pod Identification*

Standard Pod

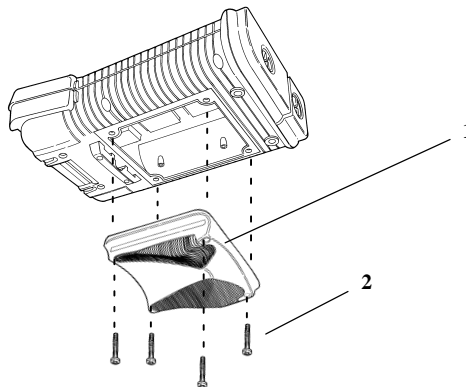
Remove the pod to access the backup battery. Do not disconnect any cables unless absolutely necessary: if you must, *suspend* unit operation and remove the main battery pack first. Removing the main battery pack will cause all data and application programs to be lost. Those will then have to be reloaded into your terminal. Follow the instructions below to remove the standard pod:

1. Place the terminal on a flat work surface, using a soft cloth or mat to prevent scratches to the terminal.

▼ **CAUTION:**

Suspend unit operation and remove the main battery pack at this time if you will be disconnecting any internal cables or connectors.

2. Open the handstrap and move the ends out of your way.
3. Remove the four pod retaining screws.
4. Carefully separate the pod from the terminal.
5. If replacing the pod, carefully disconnect any cables that connect between the pod and the terminal.
6. When done, reconnect all cables or connectors and align the pod to the terminal. Re-install the four screws.
7. Fasten the handstrap ends back together.



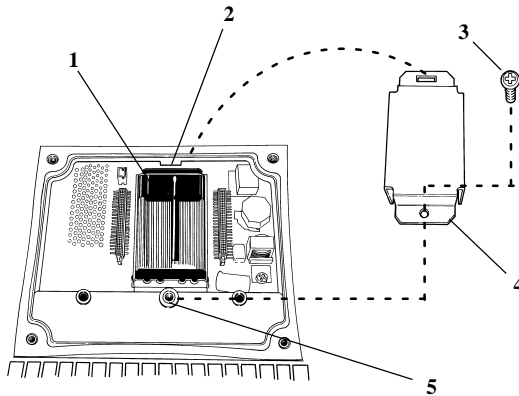
1. Pod
2. Retaining screws

*Figure 3-5
Standard Pod*

Replacing the Backup Battery (standard pod)

Remove the standard pod from the terminal and follow the instructions below to replace the backup battery:

1. Remove the retaining screw on the battery holder.
2. Remove the battery holder, and lift the battery out.
3. Remove the connector from the old backup battery.
4. Snap the connector onto the new battery.
5. Place the new battery in the holder inside the terminal.
6. Hook the battery holder onto the tab and reinstall the retaining screw into the threaded insert.
7. Position and reinstall the pod.



1. Backup battery (9-volt)
2. Tab
3. Retaining screw
4. Battery holder
5. Threaded insert

Figure 3-6
Backup Battery in Terminal

Replacing the Backup Battery (accessory pods)

Make sure you have correctly identified your pod type, then follow the appropriate instructions below to replace the backup battery. The first four instructions (under the heading : ***First***) are common to all pod types, while remaining instructions for each pod type vary slightly.

First

1. Open the handstrap. Use a Phillips screwdriver to remove the U-shape portion of the handstrap.
2. Remove the four screws at the corners of the pod.

▼ CAUTION:

In step #3, below, excess force or extension can break small cables.

3. Move the pod slightly away from the terminal.
4. Determine type of pod (see illustrations) *before* proceeding.

Universal Pod

1. The backup battery resides in a cavity built into this pod. Replacement is easy. Perform steps #1 thru 4 under the previous heading "***First***," then follow the steps below:
2. Slide the battery out of its cavity in the pod.
3. Disconnect the battery cable from the battery.
4. Connect the cable to a new battery.
5. Slide the new battery into the cavity in the pod.
6. Align the pod to the terminal, and reinstall the four pod retaining screws.
7. Use a Phillips screwdriver to reinstall the U-shaped portion of the handstrap.
8. Adjust and close the free handstrap ends.

Scanner Pod

You can replace the backup battery in this pod without disconnecting the small ribbon cables. (See *Scanner and Serial Pods* for alternate instructions.) Ribbon cables *will break* if you stretch them too tight when tilting the pod. Perform steps #1 thru 4 under the previous heading “**First,**” then follow the steps below:

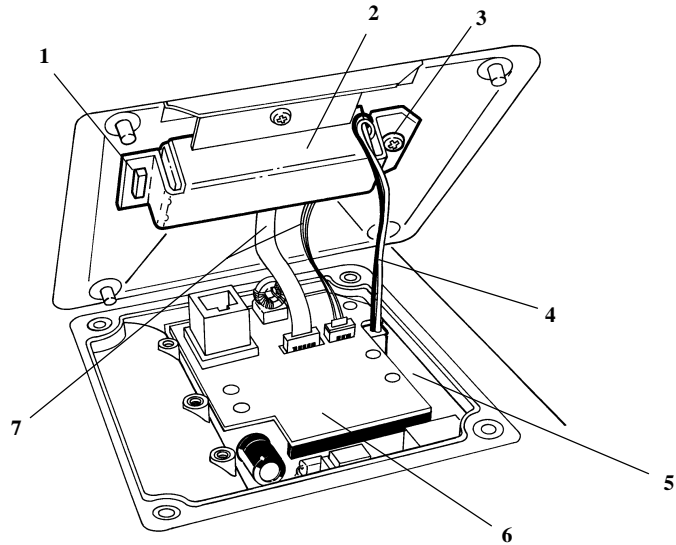
Replace the Backup Battery

1. Disconnect the battery cable (red & black wires) from the printed circuit board.
2. Tilt the pod far enough to access the battery holder.
3. Remove the battery holder retaining screw.
4. Pull the battery out of the holder; disconnect the cable.
5. Connect the cable to the new backup battery.
6. Place the battery and battery cable in the holder *exactly* as shown in Figure 3-7. Be sure to position ribbon cables under the battery.
7. Reinstall the battery holder and retaining screw.

▼ **CAUTION:** *Do not pinch any cables between board and battery holder.*

Reassemble the Terminal

1. Reconnect the battery cable to the printed circuit board (the connectors are keyed to each other).
2. Align the pod to the terminal, and reinstall the four pod retaining screws.
3. Use a Phillips screwdriver to reinstall the U-shaped portion of the handstrap.
4. Adjust and close the free handstrap ends.



1. Tab
2. Battery holder
3. Retaining screw
4. Battery cable
(red/black wires)
5. "Recess" – guide battery cable here
6. Modem board (optional)
7. Ribbon cables

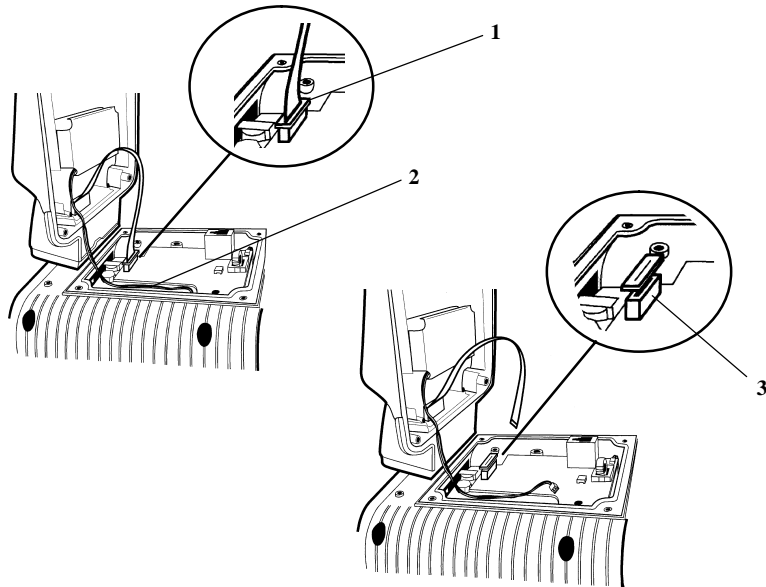
Figure 3-7
Backup Battery in Scanner Pod

▼ **CAUTION:** *In the following procedures, a static-safe work station is required to prevent damage to sensitive components.*

Scanner and Serial Pods

With care, you can tilt the pod away from the terminal to replace the backup battery as described in the preceding instructions. *If a static-safe work station is available*, the following procedures simplify battery replacement and reduce the stress on the ribbon cables.

Ribbon cables are held captive in a special locking connector. You must unlock the connector to release and disconnect the ribbon cable when removing the pod. During reassembly, the ribbon cable must be fully inserted in the connector and the connector must then be locked.



1. Cable lock (pull UP to release)
2. Guide battery wires into recess
3. Connector, shown fully released

Figure 3-8
Serial Pod Cable Detail

Perform steps #1 thru 4 under the previous heading “**First,**” then follow the steps below. It is NOT necessary to remove the modem board when replacing the backup battery in the Serial Pod.

▼ **CAUTION:** *In step #2, below, excess force or extension can break small cables.*

Disconnect Modem Board

1. Place the terminal display-side down on a clean surface.
2. Raise the pod just enough to access the modem board.
3. Disconnect the battery wires (red/black) from the large board.
4. Gently pry the small modem board from the large board.

Replace the Backup Battery

1. Position the pod/modem assembly to access the battery.
2. Remove the battery holder retaining screw.
3. Pull the battery out of the holder; disconnect the cable.
4. Connect the cable to the new backup battery.
5. Place the battery in the holder *exactly* as shown in Figure 3-7.
6. Reinstall the battery holder and its retaining screw.

Reassemble the Terminal

1. Align the modem board connector to the connector on the large board and press them firmly together.
2. Reconnect the battery cable to the printed circuit board (the connectors are keyed to each other).

▼ **CAUTION:** *Carefully guide the battery cable into the recess next to the modem board to avoid pinching the cable between the battery holder and the board.*

3. Align the pod to the terminal.
4. Reinstall the pod retaining screws.
5. Reinstall the handstrap, adjust and close.

Serial Pod Interrupt Selection

Default Setting

The serial pod serves as a COM5-type port to adapt a variety of possible peripheral devices to your computer through a 9-pin, d-subminiature serial cable. In most cases, both the hardware and software for such devices expect to use IRQ5 (a hardware interrupt signal/path) to communicate with the computer. When terminals are equipped with a serial pod, IRQ5 is designated as the “default” at the time the unit is assembled at the factory.

Optional Setting

There may be instances when your particular hardware and software will not work with the default setting. When this happens, you can change the setting to IRQ11 by moving one jumper and changing the system files. This setting should work with serial devices that do not work with the default setting.

Refer to Figure 3-5, its accompanying instructions and the instructions below to change the interrupt setting.

► **NOTE:**

Do NOT disconnect cables inside the pod for this procedure.

Change the Jumper

1. “Suspend” computer operation.
2. Separate the serial pod from the computer (see Figure 3-5).
3. Tilt the pod enough to access the jumper shown in Figure 3-9.
4. Verify that the jumper is in place in the IRQ5 setting.
5. Slide the jumper free of the IRQ5 setting.
6. Slide the jumper onto the two pins for the IRQ11 setting.
7. Reattach the serial pod to the computer.
8. “Resume” computer operation.

Change File Settings

The system files must be altered if the hardware interrupt jumper has been changed from IRQ5 to IRQ11. In certain cases, this is accomplished automatically when supporting application software is installed, or it may be necessary to manually change the system files. Contact your system administrator for detailed instructions.

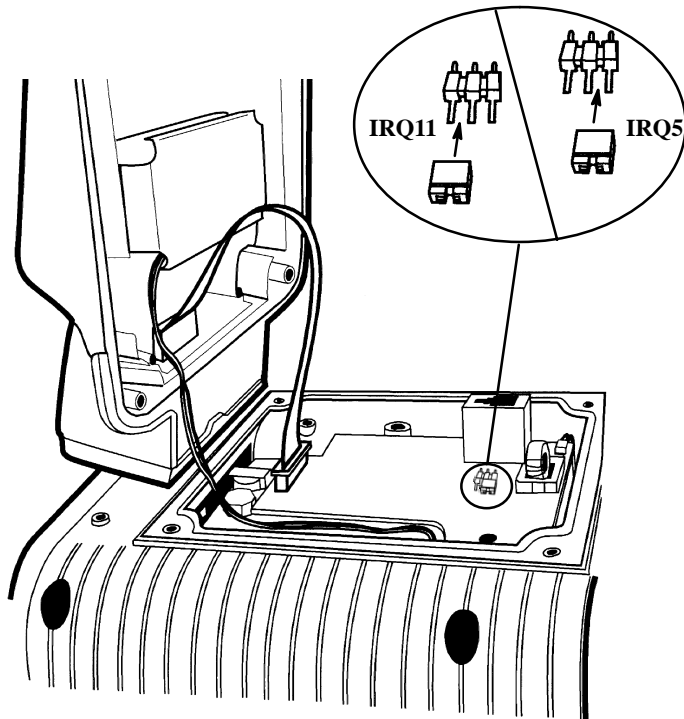


Figure 3-9
Serial Pod Jumper Settings

Cleaning Instructions

- ▼ **CAUTION:** *Do not use abrasives or solvents (or any product containing these substances) to clean any part of the unit. Permanent damage to the display cover or the terminal will occur if such substances are used.*
- ▼ **CAUTION:** *Never use ketonic solvents (acetone or ketone) or aromatic solvents (toluene or xylene) to clean any part of the terminal. Doing this can damage it.*
- ▼ **CAUTION:** *Do not pour cleaners directly on the display or the terminal case.*

Case and Display

Never apply any liquid cleaner directly on the display or the terminal case. Instead, dampen a soft, lint-free cloth with the cleaner and gently wipe exterior surfaces with this cloth.

MICRO-CLEAN II, manufactured by Foresight International, Inc., Omaha, Nebraska 68127-0205 (telephone: 1-800-637-1344), is the only cleaner specifically recommended for this purpose. Use of other cleaners can result in damage to the case or the display, and may smudge printing on keyboard keys or on the keyboard overlay.

Keyboard

If necessary, use a toothbrush to dislodge accumulated dust or grime around the keyboard keys.

Surface Connectors

If surface connectors become dirty or tarnished, clean them with a cotton swab dipped in alcohol. It may also be necessary to lightly burnish them with a pencil eraser.

Factory Service

If the unit is faulty, you can ship it to your designated Service Center for factory-quality repair service. Their address and telephone number can be found on the Product Service Information Card which is packaged with every product as part of the Warranty Card. Contact your designated Service Center, or telephone 1-800-755-5505 for assistance and instructions *before* shipping a product for repairs.

If a product must be shipped for repair:

- Package in the original shipping carton if possible.
- Fill out a Product Service Information card and include this card with the product.

If the original shipping container is not available, appropriate packaging materials can be substituted. **If in doubt, phone 1-800-755-5505 for assistance and instructions.**

Product Service Information Card

This card is packaged with every product as part of the Warranty Card. Detach this card at the perforations when needed. Be sure to include a brief description of the problem(s) if you return the product for repair.

Section 4

Vehicle Installation



Vehicle Dock Installation

The vehicle dock and associated electrical wiring should be installed under the supervision of properly trained and qualified personnel. Follow these installation instructions closely to ensure safe, reliable performance of the computer and any peripheral devices (such as a printer) that may also be installed in the vehicle.

The vehicle electrical system must be in excellent condition. This means the charging circuit must work properly and vehicle-generated electrical “noise” must be minimized and within specifications.

The charging circuit must neither undercharge nor overcharge the vehicle battery. Either fault condition in the vehicle electrical system can cause a no-charge condition in the terminal battery, and printer battery too, if one is installed in the vehicle. In general, the vehicle battery voltage should read approximately 13.0 V dc with the engine *off*, and should rise slightly with the motor running.

Excess electrical noise can be severe enough to defeat the electrical filtering that is built into printers and terminals made by Intermec Technologies Corporation. Defective ignition wiring, damaged insulation, or a faulty vehicle electrical component can cause electrical noise. When this happens, computers and printers can behave unpredictably.

The gray battery cable (P/N: 206-953-009 or 216-964-009) must be connected in strict accordance with the instructions in this manual.

Tools Required

- Wire Crimping and stripping tool
- Electric drill, drill bits (3/16" and 9/16")
- Common hand tools

Installation Procedures

1. Electrical installation (battery cable)
2. Mechanical installation (terminal, peripherals)
3. Final assembly and cable connection

Parts and Accessory List, kits: 203-344-001/002

Kit #	Description	P/N	Qty
-001	dc power cable (6 ft.)	206-951-001	1
-002	"Y" power cable	216-817-001	1
-001	battery cable	206-953-009	1
-002	battery cable (with filter)	216-964-009	1
-001/-002	fuse link	216-657-001	1
-001/-002	bolt, 3/8" X 1-1/2"	800-099-001	2
-001/-002	washer, 3/8"	803-099-001	4
-001/-002	nut, 3/8"	802-099-001	4
-001/-002	adjustable clamp	808-011-001	8
-001/-002	self-tap screw #6 X 5/8"	800-008-001	8
-001/-002	3/8" terminal ring	809-165-001	1
-001/-002	self-tap screw #8 X 5/8"	800-012-000	1
-001/-002	#8 flat washer	803-084-000	1
-001/-002	snap-in bushing	807-065-003	1
-001/-002	remote terminal cable (6')	216-588-001	ref.*

**Reference items not included in kit. Order separately.*

Introduction to Vehicle Installation

The vehicle installation kit allows you to wire the vehicle dock in a delivery vehicle. Optional cables are available to mount the dock *and* a printer nearby in the same vehicle. When the installation is complete, you will have a secure place to store the terminal between stops. In addition, the vehicle electrical system provides power to recharge the computer and to operate a printer if one is installed.

During this installation, the power cable is wired directly to the vehicle battery. This direct connection reduces the chance of installation problems. It also takes advantage of the natural filtering and regulating characteristics of the vehicle battery.

Since each situation or equipment type may pose unique requirements, mounting hardware selection and mechanical installation shall be the responsibility of the installer. Use nuts, bolts, and lockwashers for installing the mount (adjustable swivel or fixed) for the dock: the mount is predrilled with 3/16-inch holes.

This kit contains nuts, bolts, washers, a terminal ring, and a fuse link for connecting the battery cable *directly* to the vehicle battery. It also contains adjustable wire clamps to secure the cable in place. A dock mounting bracket may be part of this kit, or it may be a separate assembly, depending on your company's requirements.

Your tasks are to:

- route and install the battery cable
- mechanically install the mount
- connect short cable(s)

Decide where you will mount the vehicle dock, then proceed with the following instructions.

Power Cable Routing

Cable Length

Remember that a shorter dc power cable connects the vehicle dock to the battery cable. This extends the overall cable length and must be considered as you begin the installation.

When Installing a Printer

If you are installing a printer at the same time, a special “Y” (power) cable *and* a remote terminal cable are required. These cables allow you to locate the printer and the vehicle dock up to six feet apart. The battery cable for printers contains a built-in filter assembly.

Cable installation

Follow the guidelines (below) and other instructions closely when installing the battery cable.

Guidelines

- ▶ Completely install the battery cable *before* connecting the dock.
- ▶ Route the battery cable *from* the general area where the unit(s) will be mounted. Work *toward* the vehicle battery.
- ▶ Use a snap-in bushing (requires 9/16” hole) if the battery cable passes through the firewall or other sheet-metal.
- ▶ Make sure that cable routing does not interfere with other equipment or vehicle controls.
- ▶ Make sure that cable routing does not invite damage to the cable itself.
- ▶ Secure the battery cable at least every 18 inches throughout the cable run: use adjustable clamps (provided) or wire-tie to existing vehicle cable runs.

Battery Cable Connections

Battery Cable Completion

You must cut the cable to length, cut off a portion of the outer cable jacket and strip the individual wire ends of the cable. (Note: you may end up shortening, and restripping, the red wire when attaching the fuse link). Then, you must install a preassembled in-line fuse link in series with the red wire and install a terminal ring on the black wire. Finally, you must complete the connections to the vehicle battery.

Cut and Strip the Battery Cable

1. Cut the gray battery cable near the battery.
2. Strip the cable jacket back 12–14 inches.
3. Strip 1/4" of insulation from the black wire.

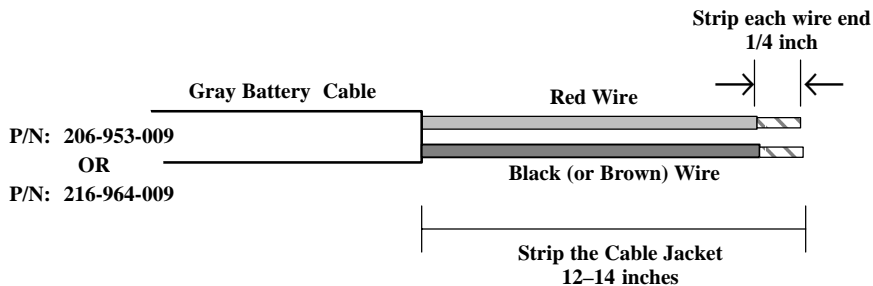


Figure 4-1
Strip the Battery Cable

Prepare the Cable Ends

1. Strip the black wire.
2. Crimp the 3/8" terminal ring (1) onto the black wire.
3. Locate the fuse link (2): it attaches to the red wire.
4. Shorten the red wire if desired.
5. Then, strip 1/4" of insulation from the red wire.
6. Securely crimp the fuse link splice (3) onto the red wire.

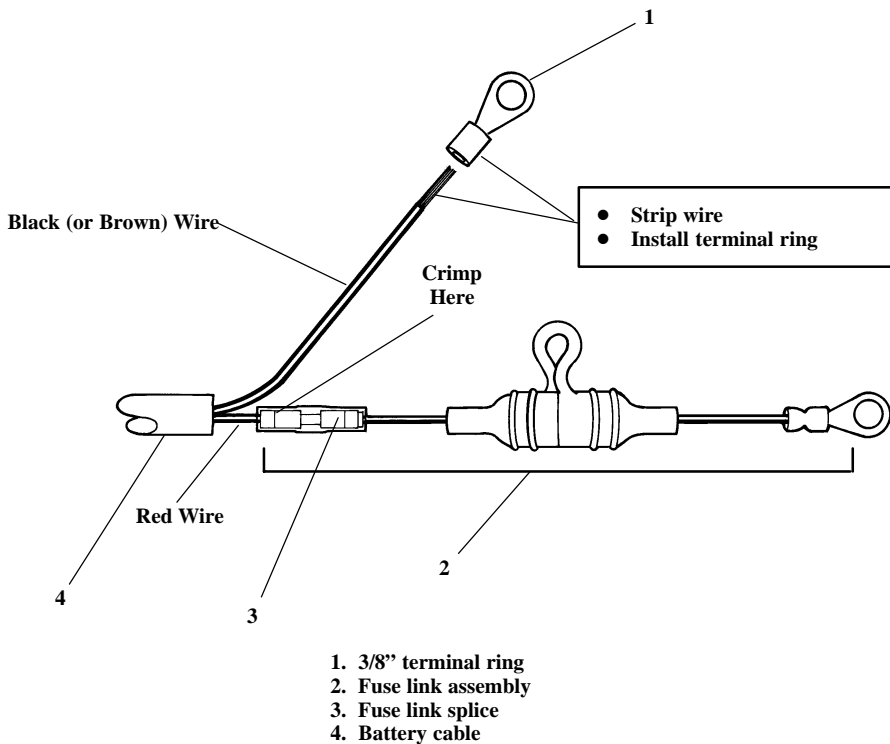
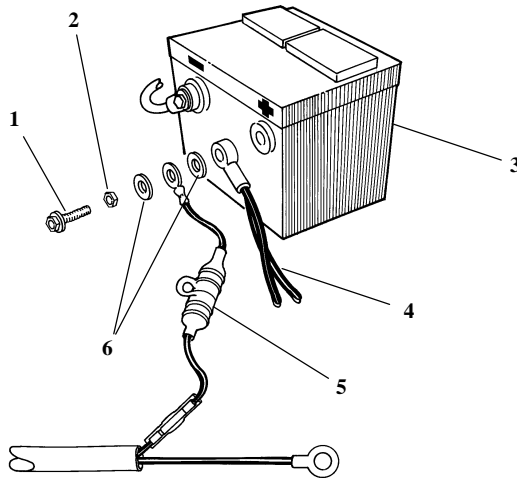


Figure 4-2
Prepare Cable Ends

Connection to Side-mounted Terminals

1. Remove both battery terminal screws from the vehicle battery.
2. Screw a 3/8" nut (2) as far as it will go onto a 3/8" X 1-1/2" bolt (1) furnished in kit.
3. Slip a 3/8" washer (6) onto the bolt.
4. Slide the *positive* (red wire with fuse link (5)) terminal ring from the battery cable onto the positive (+) battery terminal bolt.
5. Slip a second 3/8" washer (6) onto the bolt.
6. Slide the vehicle *positive* battery cable (4) onto the bolt.
7. Thread the bolt assembly (steps 1–6, above) into the positive battery terminal. Tighten the bolt securely.
8. Tighten the nut (2) installed in step #2 to secure washers (6) and cables firmly in place.

Repeat steps #2 thru #8 for the negative wire (black or brown) from the battery cable, hooking up the negative cables to the negative (-) battery terminal.



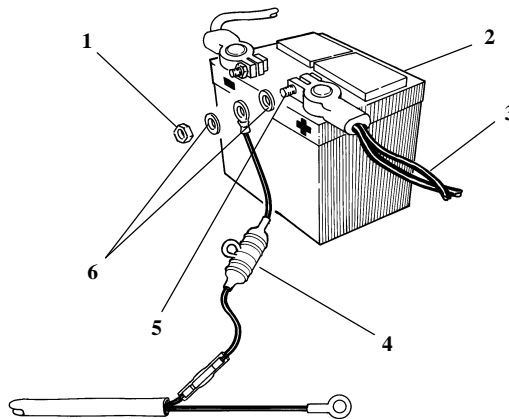
1. Bolt
2. Nut
3. Vehicle battery
4. Vehicle battery cable
5. Fuse link
6. Washers

Figure 4-3
Side-mount Battery Terminals

Connection to Top-mounted Terminals

1. Remove the bolts from the vehicle battery terminals.
2. Replace the bolts removed in step #1 with 3/8" X 1-1/2" bolts (5) and nuts (1) furnished in the installation kit. Tighten nuts securely.
3. Slip a 3/8" washer (6) onto the extended end of each bolt.
4. Slide the *positive* (fuse link with red wire (4)) terminal ring from the battery cable onto the positive (+) battery bolt (5).
5. Slip a second 3/8" washer (6) onto that bolt (5).
6. Thread a second 3/8" nut (1) onto that bolt (5). Tighten the nut.

Repeat steps #3 thru #6 for the negative wire (black or brown) from the Norand battery cable, connecting the wire to the negative (-) battery terminal.



1. 3/8" nut
2. Vehicle battery
3. Vehicle battery cable
4. Fuse link
5. 3/8" X 1-1/2" bolt
6. 3/8" washers

Figure 4-4
Top-mount Battery Terminals

Secure the Power Cable

Secure the battery cable every 18 inches with adjustable cable clamps. Work from the battery, toward the mounting area for the dock. Remove the paper backing from a clamp and stick the clamp in place while drilling a pilot hole with a #26 drill bit. Use #6 sheet-metal screws to permanently hold clamps in place.

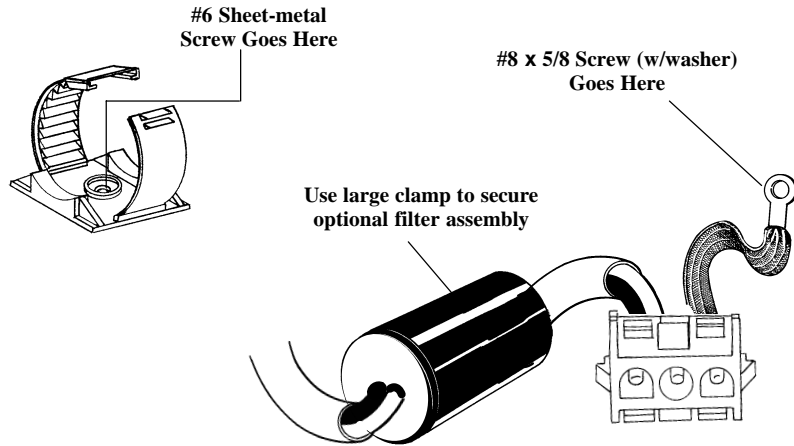


Figure 4-5
Secure Cable

Fasten Ground Cable

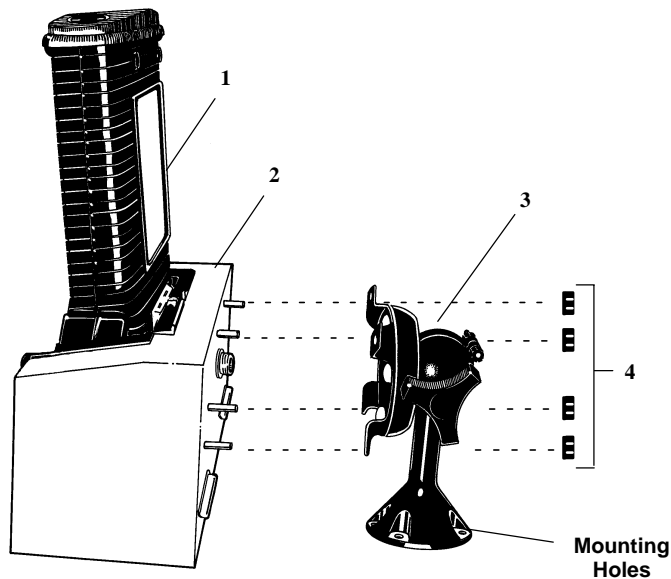
The power cable connector has a ground strap (or wire) that must be fastened to vehicle sheet-metal to ensure proper cable shielding. Follow the steps below to fasten this ground strap:

1. Drill a small hole where you intend to fasten the ground strap.
2. Use a punch to dimple and enlarge the hole.
(Do not make hole too big for the screw.)
3. Scrape a small circle of paint from around the hole.
4. Use a #8 X 5/8" screw and flat washer to secure the strap.

Mechanical Installation

Be sure to allow clearance for the combined terminal, dock and mounting assembly before proceeding. The terminal protrudes above the dock, requiring vertical clearance. Additional clearance is required for inserting or removing the terminal from the dock.

Use the base of the mount as a template and mark the hole locations on the sheet-metal where you are installing the dock. Use a 3/16-inch drill bit to make the holes. Secure the mount with nuts, bolts, and lockwashers. *This hardware is not furnished in the installation kit and must be purchased locally.* Use four #8 self-locking nuts (which *are* furnished) to fasten the Vehicle Dock to the mount.



1. 6300 SERIES terminal
2. Vehicle Dock
3. Adjustable Swivel Mount
4. #8 self-locking nuts

Figure 4-6
Adjustable Mount and Dock

Final Connections

Vehicle Dock Alone

If you are installing the Vehicle Dock by itself, you must connect one end of the dc Power Cable (P/N: 206-951-001) to the Vehicle Dock: the other end plugs into the battery cable which you installed in the preceding steps.

Vehicle Dock and Printer

If you are installing a printer in the vehicle, you must install a “Y” cable (P/N: 216-817-001) to supply power to both the Vehicle Dock and to the printer. Plug one end of this cable into the printer, the other into the Vehicle Dock. The rectangular connector plugs into the battery cable.

You must also connect a “Remote Terminal Cable” between the Vehicle Dock and the printer: this cable allows the terminal to “talk” to the printer. Plug the appropriate end of this cable into the Vehicle Dock and the other end into the printer.

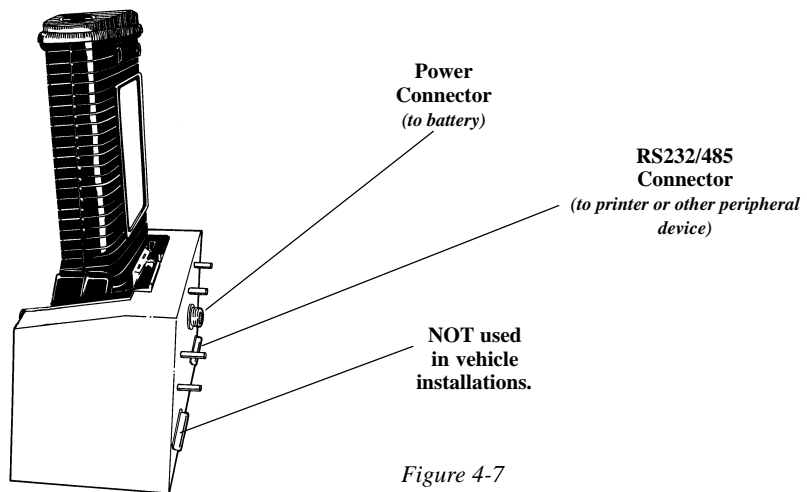
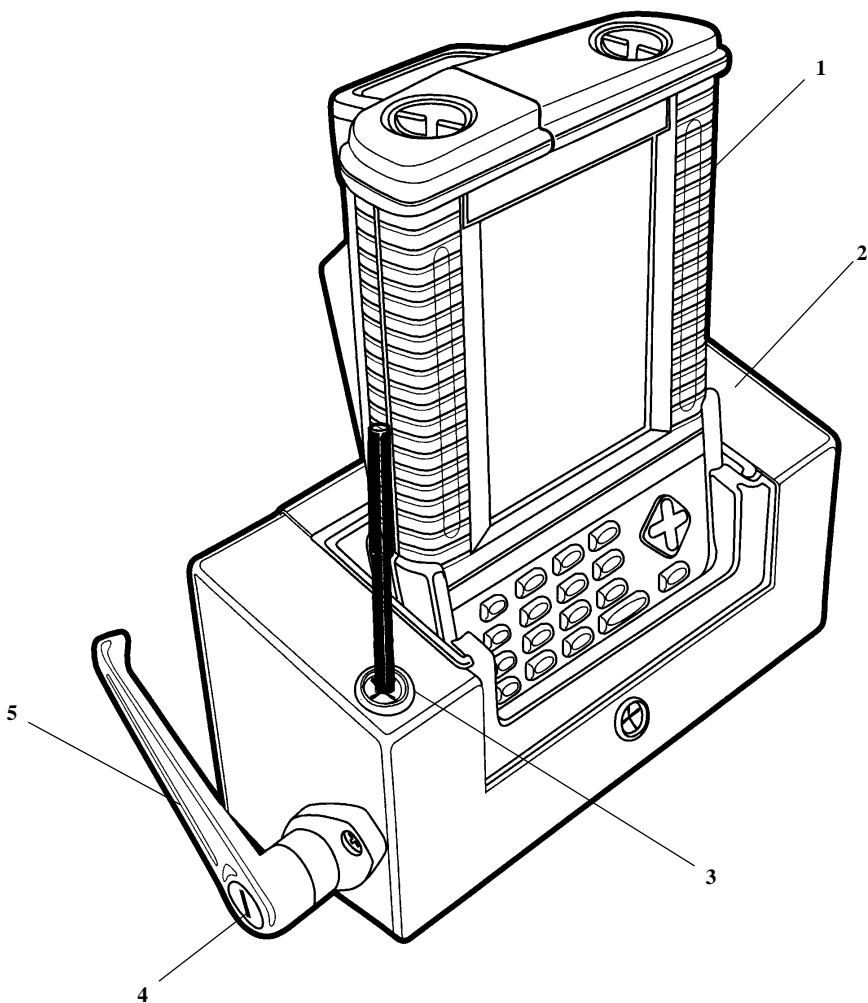


Figure 4-7
Dock Connections



1. Model 6300 SERIES Hand-Held Computer
2. Dock
3. Pen holder
4. Key lock
5. Latching lever

Figure 4-8
Terminal in Vehicle Dock

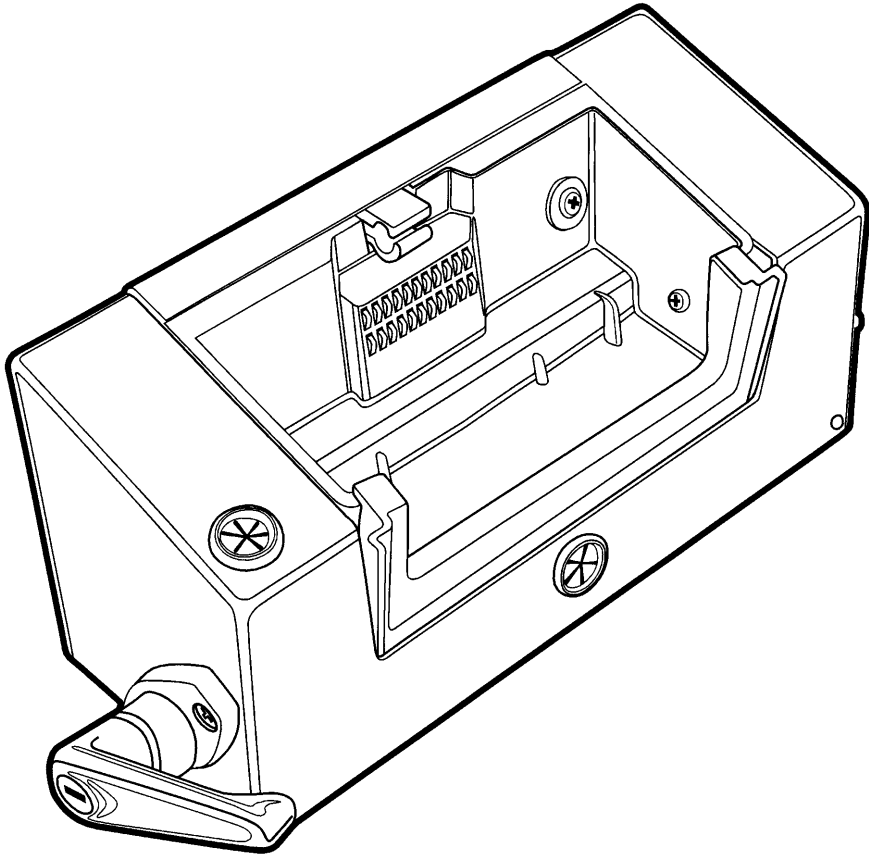


Figure 4-9
Vehicle Dock
(handle shown in released position)

Appendix A

NORAND[®] Utilities Program



Introduction

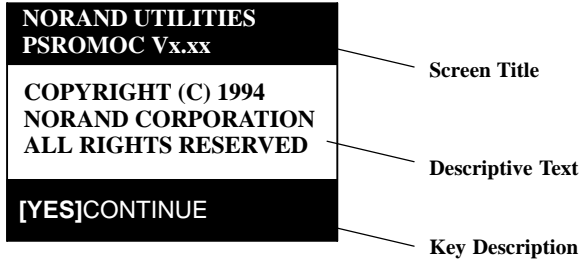
The NORAND Utilities Program provides the basic functions required to prepare the 6300 SERIES Hand-Held Computer for use. When you enter the Norand Utilities Program, an active keyboard is displayed. Use the special pen to make selections and entries on the display.

This program may contain up to 10 languages for use in various countries throughout the world. If your application does not require languages other than English, the program will bypass this option.

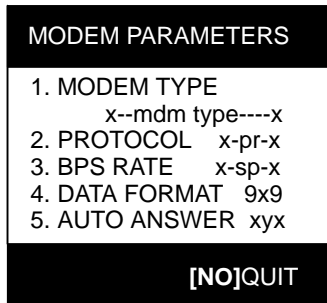
Program Conventions

The display screen consists of a screen title, main screen, pop-up menus, drop-down lists, descriptive text, and keyboard key definitions. Depending on your application needs, you may not see some of these elements. An example of what some of these screens might look as follows.

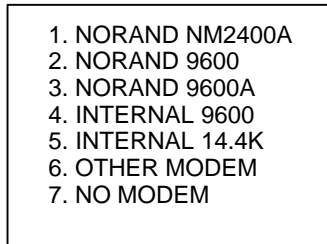
Entry Point



Pop-Up A



Drop Down A1



The keys you are instructed to use are shown in square brackets, e.g. **[YES]**, in both the screen diagrams and descriptive text.

Fixed fields are represented by all uppercase letters on screen diagrams and in text, **MODEM PARAMETERS**.

Variable fields are represented by at least one lowercase character, using “x” and “-” characters as required to show the full size of the field. In descriptive text, the “x-.-x” portion of the literal is not referenced. Variable literal values are defined in the descriptive text.

Fields that require you to supply information are represented by combinations of the characters, X, Y, and 9. “X” implies alphanumeric input, “9” implies numeric input, and “Z” indicates an optional character in conjunction with either X or 9.

In this User’s Guide, main screens and pop-up screens use white characters on a black background to represent reverse video, just as they appear in your application. Screen diagrams may not always be shown at their full height or width in this manual.

Main Screens

The top two lines of the main screen contain the name of the application (“NORAND Utilities”), and the name of the specific screen (e.g., Main Menu). This information is displayed in reverse video.

The bottom lines of the main screen contain fields defining “action” keys that are enabled. This information is displayed in reverse video. Keys used to move within the screen, e.g. arrow keys, are not shown. When the following keys are present, they are displayed in the indicated positions:

- [NO] QUIT: last line, right justified
- [YES] literal: last line, left justified, or second to the last line, if too long to fit on the same line with [NO] QUIT.

The second and third lines from the bottom are used to define key actions specific to each screen. These lines are not used on all screens.

Pop-Up Menus

Pop-Up menus are displayed above or below the menu option that invokes them, where possible. Pop-up menus *not invoked* via a menu option are located near the vertical center of the display.

Drop Down Lists

Drop-down lists are used under main screen and pop-up menus to further define requests for information. The arrow keys move the highlight on the drop down list; [YES] selects the highlighted option, or the number of an option may be entered to select it. You select only one option from a drop down list. [NO] clears the list and does not update the current selection.

Keyboard Standards

[YES] CONTINUE, [YES] BEGIN, and [YES] OK mean the next logical step in a process will be executed. [YES] UPDATE writes the new value of one or more fields on the current screen to memory. In addition, the updated screen is cleared, and control moves to the location indicated. [YES] inputs the value entered in a user input field.

[NO] QUIT cancels an operation, returning control to the prior logical step, thereby skipping the current operation.

[DEL] deletes the character to the left of the cursor in fields you enter.

[F4] HOW ARE FUNCTIONS SELECTED W/O A KEYBOARD?

Screen Diagrams

Main Menu Entry Point



Press [YES] to continue.

Language Selection Menu

The NORAND Utilities program checks files to determine available language options. English is the first option, followed by up to nine additional choices. If no resource files on language exist, this menu will not display.

NORAND UTILITIES LANGUAGE SELECTION	
1.	ENGLISH
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
0.	
[NO] QUIT	

Select the appropriate language by pressing the number associated with your choice, or press **[NO]** to quit and go to the Main Menu.

Program Load/Main Menu

```
NORAND UTILITIES
LOAD PROGRAMS/DATA

1. BEGIN COMM SESSION
2. COM x-comm set -- x
3. UNIT ID          ZZZZZZX
4. X -- mdm type -- x
   xprotx  sbpsx   xfx
5. PHONE NUMBER
   ZZZZZZZZZZZZX

9. ADVANCED UTILITIES

[NO]QUIT
```

- ▶ Menu options 4–5 visible only if comm set = MODEM
- ▶ comm set = value from Drop Down B
Default = NPCP NETWORK
- ▶ mdm type, prot, bps, f = value from Modem Parameters, Drop Down A1 – A4
- ▶ Unit ID defaults to serial ID field unless modified by previously loaded application.

Pop-Up A

LD FROM HAND HELD	
MAKE CONNECTION BETWEEN HAND HELD COMPUTERS	
[YES]OK	[NO]QUIT

Pop-Up C

CHANGE UNIT ID	
XZZZZZZ	
[F4] RESET FACTORY	
[YES]OK	[NO]QUIT

Pop-Up D

PHONE NUMBER	
XXXXXXXXXXXXXXXXXX	
[.] DIALING PAUSE	
[YES]OK	[NO]QUIT

Pop-Up E

COMM SETTINGS HAVE BEEN CHANGED.	

[YES] SAVE SETTINGS	
[NO] DO NOT SAVE	

Pop-Up A

- [YES] Go to Communications Status.
- [NO] Return to main screen.

Drop

Down B

- | |
|---|
| <ol style="list-style-type: none"> 1. NPCP NETWORK 2. MODEM 3. ACCESSORY CARD 4. NOVELL 5. TCP/IP BOOTP 6. INTERSVR 7. HAND HELD |
|---|

Pop-Up C & D

First alphanumeric character input character clears current field contents. [DEL] deletes right-most character of current field contents.

- [F4] (Pop-Up C) Restore field value to EEPROM serial identification number.
Note: [Gold 4] = [F4]
- [.] (period) (Pop-Up D) inserts pause character into dialing string.
- [YES] Update field; return to main screen.
- [NO] Do not update; return to main screen.

Pop-Up E

- [YES] Update comm settings; go to Program Load
- [NO] Do not update comm settings; go to Program Load.

Modem Parameters

Pop-Up A

MODEM PARAMETERS	
1. MODEM TYPE	x -- mdm type -- x
2. PROTOCOL	x-pr-x
3. BPS RATE	xsp-x
4. DATA FORMAT	9x9
[NO]QUIT	

Pop-Up A

User selects parameters [1] – [4] from corresponding drop-down boxes. In drop-down boxes, [↑/↓] highlight option and [YES] selects, or user can select option by number.

Drop Down A1

- | |
|-------------------|
| 1. NORAND NM2400A |
| 2. NORAND 9600 |
| 3. NORAND 9600A |
| 4. INTERNAL 9600 |
| 5. INTERNAL 14.4K |
| 6. OTHER MODEM |
| 7. NO MODEM |

[6] To Pop-up A16

Pop-Up A16

MODEM INIT STRING	
XZZZZZZZZZZZZZZZZ	
XZZZZZZZZZZZZZZZZ	
XZZZ	
[F2] TEST STRING	
[YES]OK	[NO]QUIT

Pop-Up A16

- [F2]** Display “PLEASE WAIT. . .” on blank line and send modem string. Upon modem response, display “RESULT: 99” on blank line, where 99 = modem response code.
- [YES]** Update modem initialization string; Pop-Up A note: string will **not** be saved if blank.
- [NO]** Do not modify initialization string; return to Pop-Up A.

Drop Down A2

- | |
|-----------|
| 1. ACN |
| 2. TTY |
| 3. YMODEM |

Drop Down A3

- | |
|----------|
| 1. 1200 |
| 2. 2400 |
| 3. 4800 |
| 4. 9600 |
| 5. 19200 |
| 6. 38400 |
| 7. 57600 |

Drop Down A4

- | |
|--------|
| 1. 8N1 |
| 2. 7E1 |

Communication Status

```

NORAND UTILITIES
COMMUNICATIONS

COMM SETTINGS:
x--comm settings---x
  xprotx  xbpsx  xfx
PHONE NUMBER:
      ZZZZZZZZZX
UNIT ID:      ZZZZX
x  ----  status  ----  x
x-   filename   -x
BYTES:        ZZZZZ9
ERRORS:       ZZZ9

[NO]STOP COMM
    
```

Pop-Up A

```

ARE YOU SURE YOU
WANT TO STOP
COMMUNICATIONS NOW

[YES] STOP
[NO]RESUME
    
```

Comm Settings Menu

comm settings = Program Load, comm set field.
 If comm set = Modem, then
 Program Load, mdm type appended
 to comm settings.
 mdm type, prot, bps, f = Program Load,
 menu option 4
 Above line and phone number fields visible only
 if comm set = MODEM.

Status field displays current status of session:

```

CONFIGURING
DIALING
SIGNING ON
    
```

```

SENDING
x-filename-x
    
```

```

LOADING
x-filename-x
    
```

```

SIGNING OFF
    
```

Filename field displays name of the file being processed when SENDING or LOADING. Byte count applicable to current file only. Error count is the total number of protocol errors in the current comm session.

[YES] CONTINUE replaces [F4] STOP COMM at completion of communications session.

- [NO] Pop-Up A
- [YES] Go to Program Load

Pop-Up A

- [YES] Go to Program Load
- [NO] Return to main screen

Advanced Utilities Menu

NORAND UTILITIES ADVANCED UTILITIES	
1. SET DATE/TIME	
2.	
3.	
4. FORMAT RAM CARD	
5.	
[NO]QUIT	

Option [4] appears only if FORMAT.COM found in path.

- [1]** Pop-Up A
- [3]**
- [4]** Pop-Up D1
- [5]**

[NO] Go to Main Menu

Pop-Up A

SET DATE/TIME	
DATE:	99/99/99
TIME:	99:99:99
[YES] OK	[NO]QUIT

Pop-Up A

Date and time are not modified unless new values are entered, i.e. changing the date does not affect the current time. Date format is MM/DD/YY; year is assumed 1980-2079. Time format is HH:MM:SS; based on 24-hour clock. Maximum entry is 23:59:59. Punctuation is supplied by application and is not entered.

[YES] Update system clock with date and time entries; return to Main Screen.

[NO] Return to Main Screen.

Pop-Up D1

FORMAT RAM CARD	
1. A:	
2. B:	
[YES] OK	[NO]QUIT

Pop-Up D1

- [#]** Pop-Up 2
- [NO]** Return to Advanced Utilities Menu

Appendix B

Bar Code Symbologies



Introduction

This appendix briefly describes each bar code symbology that can be decoded by the terminal. It explains some of the general characteristics of each bar code type, and where they are generally used.

The bar code symbologies you want the terminal to decode must be enabled (turned on). Bar code symbologies can be enabled through the terminal parameter menus, or from your host computer. Once the terminal correctly decodes a bar code, the terminal encodes data with descriptive information about the symbol.

Each bar code symbology you enable uses a certain amount of the terminal ROM. As more bar codes are enabled, you may notice an increase in the terminal response time (the amount of time terminal takes to process data). To ensure the fastest response time possible, only enable the bar code symbologies you intend to scan.

Table B-1 shows the bar code string formats.

Table B-1
Bar Code Data String Formats

TYPE CODE	DATA BAR CODE TYPE	**DATA FORMAT	*DATA LENGTH
0	UPC short	ndddddc	8
1	EAN short	fnddddc	8
2	UPC long	nddddddddd	12
3	EAN long	fnddddddddd	13
4	UPC short add-on 2	nddddddcaa	10
5	EAN short add-on 2	fnddddcaa	10
6	UPC long add-on 2	ndddddddddcaa	14
7	EAN long add-on 2	fndddddddddcaa	15
8	UPC short add-on 5	nddddddcaaaaa	13
9	EAN short add-on 5	fnddddcaaaaa	13
:	UPC long add-on 5	ndddddddddcaaaaa	17
;	EAN long add-on 5	fndddddddddcaaaaa	18
<	Interleaved 2 of 5	d.....d	1 to 200
=	Straight 2 of 5	d.....d	1 to 200
Z	Computer Identics 2 of 5	d.....d	1 to 200
>	Plessey	d.....dc	2 to 200
@	CODABAR	sd....ds	3 to 200
A	ABC CODABAR	sd....ds	6 to 200
S	Code 11	d.....d	1 to 200
P	Code 39	d.....d	1 to 200
Q	Extended Code 39	d.....d	1 to 200
R	Code 93	d.....d	1 to 200
J	Code 128	d.....d	1 to 200
]C1	Code 128 UCC/EAN	d.....d	1 to 200

If MOD 10 or MOD 11 check digits are enabled, the digit falls at the end of a bar code data string. Each check digit enabled extends the length of the bar code data string by one character.

Bar code data definitions in Table B-1:

- ▶ n = number system digits
- ▶ d = bar code digits
- ▶ c = check digits
- ▶ f = EAN flag 1 characters
- ▶ a = add-on code digits
- ▶ s = start and stop digits

Bar Code Symbology

Most bar code symbologies were developed to serve a specific industry (e.g.; food or beverage industries) or data collection and tracking systems. No two products have the exact same bar code.

Industries that use a particular type of bar code symbology form committees, or are members of national institutes, that issue (to a particular product), regulate, and track the bar codes of that symbology. This ensures that each organization using that bar code symbology conforms to its standards. The bar code symbologies that (when enabled) can be decoded by your terminal include:

- ▶ UPC (Universal Product Code) with or without add-ons
- ▶ EAN (European Article Numbering Code)
- ▶ Codabar
- ▶ C11 (Code 11)
- ▶ C39 (Code 39)
- ▶ C93 (Code 93)
- ▶ C128 (Code 128)
- ▶ 2 of 5 (Straight 2 of 5)
- ▶ CI 2 of 5 (Computer Identics 2 of 5 Code)
- ▶ I 2 of 5 (Interleaved 2 of 5 Code)
- ▶ Plessey

The following paragraphs briefly describe each of these symbolologies.

UPC

The UPC (Universal Product Code) symbology is used in grocery and retail industries. It identifies both the product and its producer.

The UPC symbol is 12 characters long. The first character of the UPC symbol is a number system character, such as 0 for grocery items and 3 for drug and health-related items.

UPC symbology is intended for use only in these retail environments:

- Grocery stores
- Convenience stores
- General merchandise stores

Some retail items are so small that the standard bar code cannot fit on the package. When this occurs, a shorter version of the UPC symbology is permitted. This is called UPC-E, which is six characters long (eight with number system and check digit). It is about one-half the size of a standard UPC bar code.

EAN

EAN (European Article Numbering Code) is similar to the UPC symbology. The only difference is that EAN has 13 characters, using the first two as a country identifier. The is symbology is used throughout most of Europe in the retail environment. Although similar to UPC symbology, the two are not interchangeable.

Codabar

Codabar was developed for retail price-labeling systems. Today it is widely accepted by:

- Libraries
- Medical industries
- Photo finishing services

Codabar is a discrete, self-checking code with each character represented by a stand-alone group of four bars and three spaces. Four different start or stop characters are defined and designated a, b, c, and d. These characters are constructed with one wide bar and two wide spaces. A Codabar symbol begins with a start or stop character followed by data characters and ending in a start or stop character.

Any start or stop character may be used on either end of the symbol. It is possible, then, to use the 16 unique start or stop combinations to identify label type or other information.

Since Codabar is variable length, discrete, and self-checking, it is a versatile symbology. The width of space between characters is not critical and may vary significantly within the same symbol. The character set consists of 0 through 9, -, \$, :, /, ., and +.

The specific dimensions for bars and spaces in Codabar optimize performance of certain early printing and reading equipment. Codabar has 18 different dimensions for bar and space widths. So many different dimensions often result in labels printed out of specification and cause Codabar printing equipment to be more expensive.

C11 (Code 11)

Code 11 satisfies the requirements for a high density, discrete numeric bar code. The name Code 11 derives from 11 different data characters that can be represented, in addition to a start or stop character.

The character set includes the 10 digits and the dash symbol. Each character is represented by a stand-alone group of three bars and two spaces. Although Code 11 is discrete, it is not self-checking. A single printing defect can transpose one character into another valid character. One or two check digits help maintain data integrity.

C39

C39 (Code 39) is the most widely used symbology among the industrial bar codes. Many major companies, trade associations, and the federal government use this code. Its main feature is the ability to encode messages using the full alphanumeric character set, seven special characters, and ASCII characters.

Programming for this symbology can be for any length that the application requires. The application program for the terminal handles symbology that is at least 1 character but no more than 32 characters in length.

When programming the terminal for Code 39, it is important to set the symbology limits as close as possible to the minimum and maximum bar code lengths being scanned. This saves processing time and conserves battery power.

Extended Code 39 (Concatenation)

This bar code symbology allows multiple scans to accumulate as a continuous data string. It can be used to streamline data communication. If the first data character of a symbol is a space, the reader may be programmed to append the information contained in the remainder of the symbol to a storage buffer. This operation continues for all successive symbols that contain a leading space, with messages being added to the end of previously stored ones. When a message is read which does not contain a leading space, the contents are appended to the buffer, the entire buffer is transmitted, and the buffer is cleared.

Encoded Code 39 (Full ASCII)

If the bar code reader is programmed for the task, it is possible to encode the entire ASCII character set (128 characters) by using two character sequences made up of one of the symbols (\$, ., %, /) followed by one of the 26 letters.

C93

The introduction of Code 93 provided a higher density alphanumeric symbology designed to supplement Code 39. The Code 93 data characters are identical to Code 39. Each character consists of nine modules arranged into three bars and three spaces.

Code 93 uses 48 of the 56 possible combinations. One of these characters, represented by a square, is reserved for a start or stop character, four are used for control characters, and the remaining 43 data characters coincide

with the Code 39 character set. An additional single module termination bar after the stop character concludes the final space.

Code 93 is a variable length, continuous code that is not self-checking. Bar and space widths may be one, two, three, or four modules wide. Its structure uses edge-to-similar-edge decoding. This makes the bar code immune to uniform ink spread, which allows liberal bar width tolerances.

Code 93 uses two check characters. Its supporters believe this makes it the highest density alphanumeric bar code. The dual check digit scheme provides for high data integrity. All substitution errors in a single character are detected for any message length.

C128

C128 (Code 128) is one of the newest symbolologies used by the retail and manufacturing industries. It was designed in response to the need for a compact alphanumeric bar code symbol that could encode complex product identification.

The fundamental requirement called for a symbology capable of being printed by existing data processing printers (primarily dot-matrix printers) that produce daily, work-in-progress, job, and product traceability documents. The ability to print identification messages between 10 and 32 characters long on existing forms and labels was deemed an important requirement.

Code 128 uniquely addresses this need as the most compact, complete, alphanumeric symbology available.

Additionally, the Code 128 design with geometric features, improves scanner read performance, does self-checking, and provides data message management function codes.

Code 128 encodes the complete set of 128 ASCII characters without adding extra symbol elements. Code 128 contains a variable length symbology and the ability to link one message to another for composite message transmission. Code 128, being a double-density field, provides two numeric values in a single character.

Code 128 follows the general bar code format of quiet zone, start code, data, check digit, stop code, and quiet zone. An absolute minimum bar or space

dimension of nine mils must be maintained (0.010 inch minimum nominal \pm 0.001 inch tolerance).

UCC/EAN-128 Shipping Container Labeling is a versatile tool that can be used to ease movement of products and information. The Shipping Container Labeling bar code can take any form and usually has meaning only within the company or facility where it is applied.

Because this random data may be mistaken later for an industry standard code format, the UCC and EAN chose a symbology which can be uniquely identified from these other bar codes. This standard is designed for maximum flexibility, to cost-effectively handle the diversity of distribution in global markets.

The UCC/EAN-128 Container Labeling specification calls for a FUNC1 to immediately follow the bar code's start character. FUNC1 also follows any variable length application field. The specification also calls for the terminal to send "JCI" for the first FUNC1. The specification requires that the terminal send a "<GS>" (hex 1D) for subsequent FUNC1 codes in the bar code.

Because "<GS>" is not compatible with terminal emulation data streams, the Uniform Code Council has been asked that the specification change be made to send the same three character sequence "JCI" to identify the embedded FUNC1 codes.

This implementation should provide for clean application coding by identifying the same sequences for the same scanned codes. If you enable the communication of NORAND[®] bar code types, the Shipping Container Label codes will be preceded with a "J". These strings will be displayed on your terminal display. Your application may have to allow for strings longer than 48 characters (maximum length indicated in the specification). Actual length variance depends on the number of variable length data fields. Allowing for 60 characters should be sufficient. Within the Code 128 specification, bar codes can be automatically linked together by your terminal. If you anticipate this occurring, you should allow for more characters (the terminal limit is 100 characters).

The Application Identifier Standard that is part of the UCC/EAN Shipping Label concept, is designed to complement, rather than replace, other UCC/

EAN standards. Most UCC/EAN standards are designed primarily for identification of products.

Several industries expressed the need to standardize more than product identification. The UCC/EAN Code 128 Application Identifier Standard adds versatility for inter-enterprise exchanges of perishability dating, lot & batch identification, specific container identification, units of use measure, location codes, and other information attributes.

For more detailed information on the Code 128 UCC/EAN Shipping Label bar code and Application Identifier Standard, refer to the UCC/EAN-128 APPLICATION IDENTIFIER STANDARD specification.

2 of 5 (Straight 2 of 5)

The code 2 of 5 (Straight 2 of 5 Code) is designed primarily for:

- ▶ Warehouse inventory handling
- ▶ Identification of photo finishing envelopes
- ▶ Airline tickets
- ▶ Baggage and cargo handling

Code 2 of 5 is simple and straightforward. All information is contained in the widths of the bars. The spaces only separate the individual bars.

Bars can be wide or narrow; wide bars are usually three times wider than the narrow bars. Spaces may be any reasonable width but are typically equal to the narrow bars. Narrow bars are identified as zero bits and wide bars as one bits.

Remember the code structure by associating the bar positions from left to right with weighting factors 1, 2, 4, 7, and parity. Exceptions to this rule are zero, start, and stop. This is a discrete code since the white spaces between the characters are not part of the code. Because the white spaces carry no information, their dimensions are not critical.

This code is self-checking, meaning a scanner passing through a printing void would detect the proper ratio of wide bars to total bars. When the scanner spots an error, a non-read will occur.

I 2 of 5

I 2 of 5 (Interleaved 2 of 5 Code) is an all numeric symbology, widely used for warehouse and heavy industrial applications. It is often used in the automobile industry. You can place the I 2 of 5 code on smaller labels than standard UPC symbology requires.

I 2 of 5 also provides more flexibility on the type of material it can printed on. Interleaved 2 of 5 Code gets its name because of the way the bar code is configured.

I 2 of 5 is the same as 2 of 5 code with one exception: bars and spaces both carry information. Bars represent the odd number position digits, while spaces represent the even number position digits. The two characters are interleaved as one. Messages encoded with this symbology must use an even number of characters since two numeric characters are always interleaved together.

When programming the terminal for I 2 of 5 symbology, the length of the symbology used in your application must be programmed at the menu setup prompt. Keep in mind that the bar code length must be an even number and no longer than 32 characters. The terminal allows four I 2 of 5 lengths to be programmed into it at the same time.

CI 2 of 5

Computer Identics designed this bar code symbology. The purpose was to provide for higher information density with the 2 of 5 family while encoding information in both the black bars and the white spaces. Such an encoding technique eliminates the inter-element spaces.

Comparing it to the I 2 of 5, this eliminates four modules per character, resulting in a 28-33% information density improvement. Each character in this symbology implements this improved efficiency. Each character includes three black bars and two white spaces, plus one intercharacter space. The use of the inter-character space classifies this code as a discrete type.

Plessey

Plessey finds its origin in the pulse width modulated (PWM) code developed in England. It is widely used for shelf markings in grocery stores.

Pulse width modulated codes represent each bit of information by a bar and space pair. A zero bit consists of a narrow bar followed by a wide space, while a one bit consists of a wide bar followed by a narrow space. It is mainly a numeric symbology (0-9) with six extra characters available for assigning any symbol or letter desired.

Plessey codes are not self-checking and employ a variety of check characters. This symbology is very limited about what information can be encoded. It is not considered for new applications.

Appendix C

Integrated Scanner Information



Introduction

The 6300 SERIES Computer may have a laser scanner integrated into a pod on the bottom of the unit. These are decoded-type scanners, available in either standard or long-range versions. In most cases, any required programming will be done by a specialist.

The standard scanner is effective at distances up to 24 inches. The long-range scanner is effective up to five feet-five inches (65 inches).

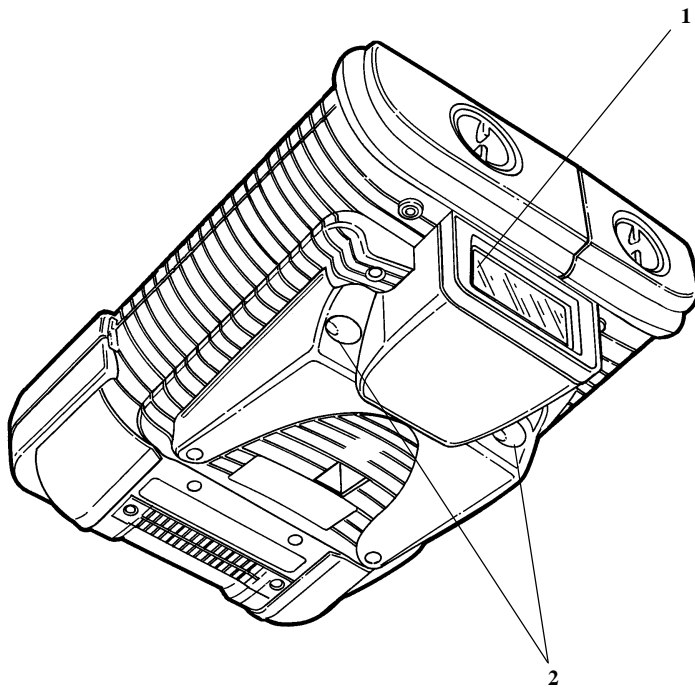
Operator Instructions

Operation of these scanners is easy: aim the scanner window in the general direction of the bar code you wish to read. Then, press either scan button (see illustration) to activate the scanner. The terminal will “beep” when a good scan is obtained.

To obtain a good scan, make sure that:

- The laser beam spans the entire bar code information
- The bar code is complete and free of dirt or smudges
- You are using the right type* of scanner
- The scan window on the terminal is clean

**Standard, or long-range.*



- 1. Scanner window
- 2. Scan (activate) buttons

Figure C-1
Integrated Scanner

Appendix D

Radio Terminal Information



Introduction

Your hand-held computer may contain a radio transceiver for two-way communication on either a local area network (LAN) or a wireless wide area network (WWAN). These radio devices, available from Norand Corporation, communicate on radio networks operated by commercial service providers.

Norand-produced radios are usually installed at the factory and are designed to operate with other Norand-produced radio communication devices. In some cases, Norand Corporation will install and set up radio devices produced by others. Your company must make arrangements with the commercial vendor for service and possibly for telephone and base station equipment.

This appendix contains general radio data network information, some do's and don'ts to help ensure reliable communication, and illustrations to identify current PEN*KEY® Model 6300 Radio Data Terminals.

Radio Data Network Information

A radio transceiver installed in your hand-held computer will generally fall into one of three basic categories:

- ▶ Local network
- ▶ Wide area network
- ▶ Radio/telephone network

Local Area Network

A local area network (LAN) normally consists of a computer connected through a multiplexor or communication controller to a base radio device ("Access Point"). The base radio communicates to one or more hand-held (portable) or vehicle-mounted (mobile) computers.

All of these devices are usually located on the same property and are not dependent upon outside equipment or services. If necessary, data can be transmitted via telephone lines. These, however, are not an integral part of the local area network.

Wide Area Network

The wide (or wireless wide) area network (WAN/WWAN) greatly expands the geographical operating area of your hand-held computer. Successful communications can take place between city and rural areas, city to city, or state-to-state, depending upon the radio network services available to you. This expanded coverage involves additional equipment that is not likely to be under your company's control or on its premises.

In a wide area system, the base station radio, communication control devices, and any associated computer(s) are likely to be remotely located. In fact, such base and retransmission facilities may be owned and operated by an independent service provider. In addition, the base radio equipment may be connected to telephone lines or to entirely different radio communication equipment for long distance coverage.

Radio/Telephone Network

In a radio/telephone network, your portable or mobile computer uses radio transmission for communication to either a cellular phone network or to other equipment that can connect directly to a commercial telephone system. As with the wide area network, you enjoy much broader geographical coverage, while a service provider owns and operates the network services and equipment.

Reliable Communication

Reliable wireless communication depends upon many factors. Some are beyond your control, yet there are others that you can affect. This section describes some of those factors and offers suggestions that can help ensure reliable communication.

Interference

The three primary sources of radio communication interference are:

- ▶ Weather-related interference
- ▶ Environmental interference, and
- ▶ Man-made electrical interference

Weather-related Interference

Weather-related interference is, of course, beyond your control. You need to be aware, though, that lightning storms, snow or snow cover, low clouds, high or low pressure areas, or any other major change in the weather can cause interference. These types of interference can impair radio communication by decreasing range, adding electrical noise into the radio signal, and in some rare cases ***increases*** range so that distant radios interfere with each other. This latter phenomena, called “ducting” (aka: “skip”), occurs when a radio signal bounces back and forth between weather layers over long distances before returning to earth.

Environmental Interference

If you've driven through a city with large buildings and had your radio station fade in and out, you'll understand one of many environmental hazards to reliable radio communication. The following paragraphs describe how radio waves travel, and some of the environmental hazards that can affect radio communication.

In general, your portable or mobile computer sends and receives radio waves that normally travel in a line-of-sight manner. Theoretically, the higher one or both antennas are, the farther the radios can communicate with each other. ***If*** the signals contain sufficient power, and ***if*** the signals are unobstructed.

You cannot do anything about the power in the signal because this is determined by the radio design and the condition of the battery or other power source. If you are aware of obstructions and their possible effects, there ***are*** things that can be done to help ensure reliable radio communication.

Typical obstructions might be steel-reinforced concrete buildings, water towers, farm silos, large manufacturing equipment or inventory, chemical or petroleum storage facilities, large bodies of water, mountainous terrain, or flying aircraft. The effects of such obstacles range from bending or reflecting radio signals to completely obscuring them. In most cases, it is not possible to relocate a major obstacle. Instead, one or more components of the radio network should be looked at for a possible solution: Are there locations or positions where your portable terminal is more reliable? Can the base station antenna be modified or relocated? Would repeater stations help? If problems persist, it may be necessary to change to radios that operate in a different mode or even in a different frequency range.

Your radio service provider is the most knowledgeable source for solving these problems.

Man-Made Electrical Interference

This type of interference can come from almost any electrical or electronic equipment, particularly if it is defective in some way. Power line distribution equipment, fans, motors, controllers, relays, and a host of other common devices can - in very rare instances - cause problems that will interfere with radio communication.

More common sources of man-made electrical interference are the many wireless devices now available for use in the unlicensed radio bands. As the cost goes down and the use of these devices increases, use of many different device types in a single location will increase. The opportunity for these devices to interfere with each other is high when they are used in the same location. The end result is users of these devices must manage the use of their wireless bandwidth. Wireless bandwidth should be treated as a non-reusable resource. It makes sense to use it first for high payback, high productivity uses.

There are many different wireless devices for a wide range of uses today. Some are:

- ▶ Mobile data collection devices (RF terminals)
- ▶ Remote telephones
- ▶ Wireless PBXs
- ▶ Wireless sound systems
- ▶ Wireless video camera security systems
- ▶ Anti-theft tags on retail goods
- ▶ RF ID tags for mfr. process control/tracking

Some of the factors that strongly affect how these devices interact with each other are:

- ▶ Transmitter power
- ▶ Duty cycle*
- ▶ Proximity of devices
- ▶ Stationary vs Mobile devices
- ▶ Amount of bandwidth used

****Duty cycle is the percentage of time a device is busy transmitting wireless information.***

RF (radio frequency) terminals typically have a very low duty cycle (less than 5% of the time) and are mobile. Such terminals are designed to operate with each other and thus do not interfere with each other. Also, RF terminals from various vendors, because of the short duty cycle, operate well in the same area. RF terminals balance performance, amount of bandwidth used, and resistance to noise.

Noise resistant, high capacity RF terminal systems use more bandwidth and are, therefore, more vulnerable to interference. In general, though, RF terminals have a very small impact on the operation of other wireless devices.

Remote phones have a lengthy duty cycle (20 - 100%), low to moderate power (1 - 100 milliwatts) and are mobile. Remote phones that use spread spectrum modulation techniques use more power and require more bandwidth than the narrow-band digital systems. The lengthy duty cycle and the high mobility of remote (cordless) phones can result in interference and even total blockage, in other wireless devices. A car radio's reception is subject to interference when it drives near a radio station. Similarly, RF devices can have diminished performance when a remote (cordless) phone moves nearby.

Other wireless devices also cause various amounts of interference to each other. Wireless music systems in shopping malls have 100% duty cycle, are high power, and use a large bandwidth. As a result, they interfere with many other wireless devices.

What does all this mean? It means the use of unlicensed bands brings many wireless devices to support a wide range of functions. Unlicensed means the customer, not the FCC (Federal Communication Commission), must manage the use of their wireless bandwidth.

Some general rules are:

- ▶ Short duty cycle devices such as RF terminals generally co-exist very peacefully.
- ▶ Long duty cycle devices such as remote (cordless) phones will almost always have some impact on other wireless devices:
 - *reduced range
 - *possible interference with successful operation
- ▶ The greater the distance between dissimilar wireless devices, the less likely they will interfere with each other.

Norand recommends:

- ▶ If it can be avoided, do not use dissimilar wireless devices within 150 feet of each other.
- ▶ Always test dissimilar wireless devices for peaceful co-existence with each other before committing to their use.

Radio Reliability

The radio devices used in portable or mobile terminals are designed to help ensure reliable communication. This can be accomplished with hardware (electronic devices) design features, with special software (computer programs), or with combinations of these.

Hardware features include the frequency band being used, the type of radio frequency (RF) modulation employed, output power of the transmitter, sensitivity and selectivity of the receiver, types of antennas, and immunity from outside interference.

Many different software approaches can be used to ensure reliable radio communication. A common practice is to design a system of “error checking” into the communication software. When data is successfully transmitted and received, the receiving device detects and reports this good news to the transmitting device. If transmission is incomplete or otherwise unsuccessful, an error message may be sent to the transmitting device. It, in turn, may be programmed to automatically repeat data transmissions until no more error messages are received.

Both local area and wide area networks may employ several base radios in different locations. In many of these systems the hardware and software work together to “hand-off” the portable or mobile computers to the base unit with the most reliable communication at any given time.

Your radio data network service provider is the best source of information about the reliability features built into the equipment and system you are using.

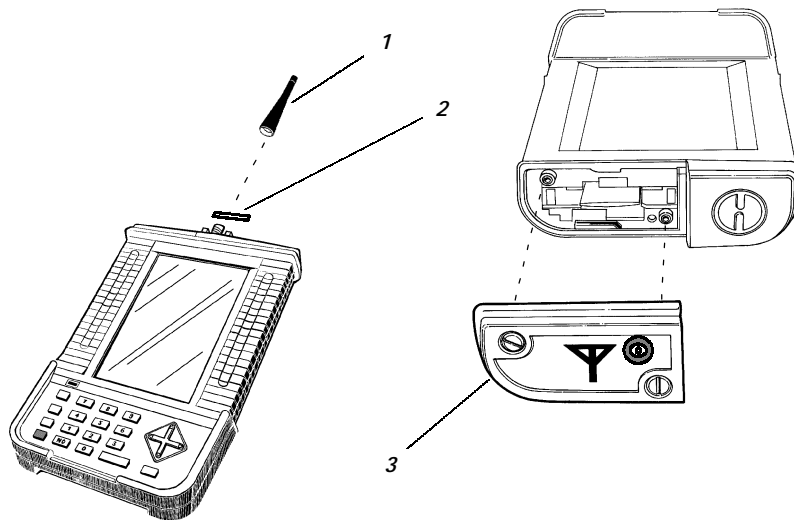
Installed Radio Products

The following pages contain illustrations of current radio-containing modules designed for the PEN*KEY Model 6300. Included are brief descriptions of the radio devices each particular module might contain. A listing at the end of this appendix provides names, addresses, and phone numbers for major radio data network service providers.

PCMCIA Radio or Radio Modem

If your PEN*KEY Model 6300 contains a PCMCIA radio or radio modem, the terminal and the cover for the PCMCIA compartment will be as shown below. The cover may or may not have an antenna jack, depending upon the the radio device installed in the PCMCIA drive(s). Note that this cover is secured to the terminal with two captive screws.

The antenna jack, antenna protector, and the required antenna for the modem used in the RAM Radio Data Network are shown. Use **only** Norand-approved antennas: **never make unauthorized substitutions**. Make sure the external antenna is screwed securely onto the jack before operating the unit.



1. External Antenna
2. Antenna jack, protectors
3. Special PCMCIA Cover

Figure D-1
PCMCIA Radio or Radio Modem

Maintenance Instructions

(for Ericsson Radio-Modem-Equipped Terminals)

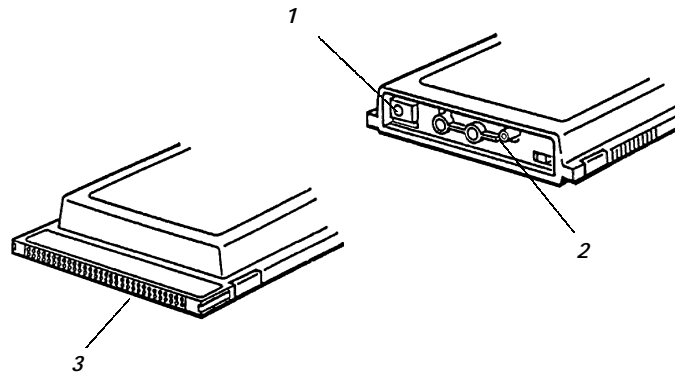
If your terminal has the Ericsson modem card, follow the instructions below when you remove or install this PCMCIA type III card. When removing the Ericsson card, follow the steps below, in the order given, to prevent damage to the card or to the cables connected to it:

1. Use a flatblade screwdriver to open the PCMCIA door.

▼ **CAUTION:**

Do not pull the door too far from the terminal before disconnecting cables.

2. Pull the PC Card door away from the terminal to expose connectors on that end of the PC Card.
3. Pull the power cable free from the PC Card.
4. Press the lower (drive A:) ejector to dislodge the card.
5. Grasp the edge of the card in one hand; use your other hand to pull the antenna cable free from the card.
6. Place the door and cable assembly out of your way.
7. Pull the card out of the terminal.



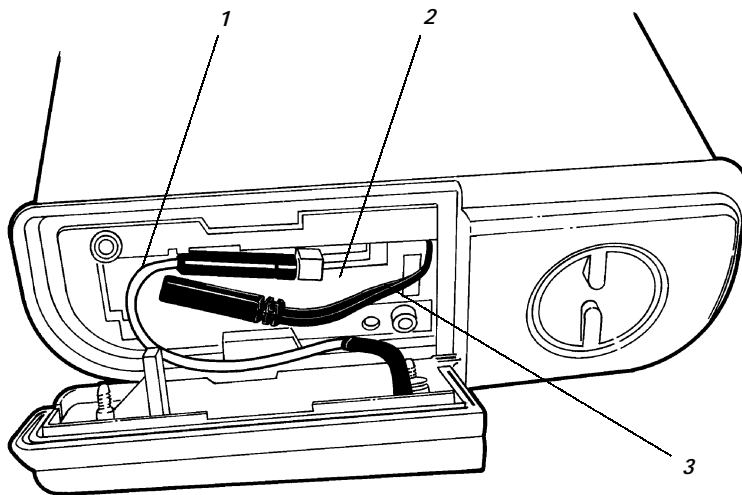
1. Power jack
2. Antenna jack
3. PCMCIA 68-pin connector

Figure D-2
Ericsson Modem PCMCIA Card

Ericsson Card Installation

Follow the steps below, in the order given, to safely reinstall the Ericsson PCMCIA type III card:

1. Use a flatblade screwdriver to open the PCMCIA door.
2. Eject and remove any PCMCIA card(s) in the terminal.
3. Align the Ericsson card with the lower PCMCIA slot. Press the card firmly into place.
4. Push the power cable completely into the power jack (**left**) on the Ericsson card.
5. Push the antenna cable completely into the antenna jack on the Ericsson card.
6. Reinstall and secure the PCMCIA compartment door.



1. Antenna Cable
2. Ericsson Card
3. Power Cable

Figure D-3
Ericsson Card Installation

Transmit Battery Maintenance

(for Ericsson Radio-Modem-Equipped Terminals)

Terminals equipped with the Ericsson card option will have a rechargeable nickel-cadmium transmit battery located inside the pod. The transmit battery pack is shown below so that you can recognize it. This battery pack powers the Ericsson card when it is transmitting.

The transmit battery is automatically recharged and normally does not require any special maintenance on your part. This battery can, after a period of time, reach a point when it no longer accepts a charge. If that happens you may notice unreliable radio transmission, especially in fringe areas. In that case you should replace the transmit battery.

To access the transmit battery follow the instructions in Section Three to remove the pod. The transmit battery rests in the pod, and its cable plugs into the loose end of the Ericsson card power cable. Use only Norand Part Number: 317-092-001 when replacing this battery.

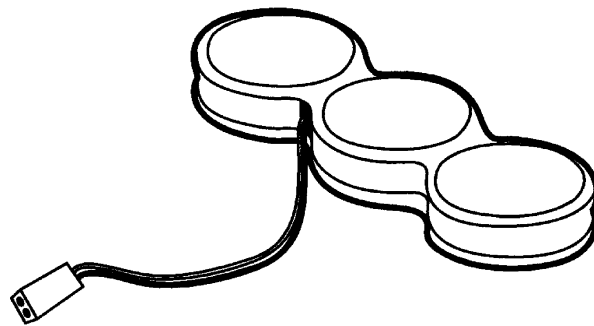


Figure D-4
Transmit Battery
(for Ericsson Card)

See the ***Cellular Travel Guide***, for names and addresses of cellular telephone service providers:

Telecom Publishing
www.TelecomPublishing.com
(360)-754-9800

Appendix E

Infrared Interface Information



Introduction

An infrared (IR) interface (also called an “IR link”) option allows the 6300 SERIES terminal to communicate with compatible IR-equipped peripheral devices. The IR interface is located on the bottom end of the terminal, in place of the 28-pin microminiature connector found on standard units.

This option provides short distance (one meter, or less) wireless two-way communication between the terminal and a belt-mounted printer. An invisible light beam is transmitted from one device to the other to accomplish this communication. Perfect aiming of the devices at each other *is not critical* since these light beams are very wide and because they travel only a short distance.

See the separate printer users guide for operating and maintenance instructions for the printer itself.

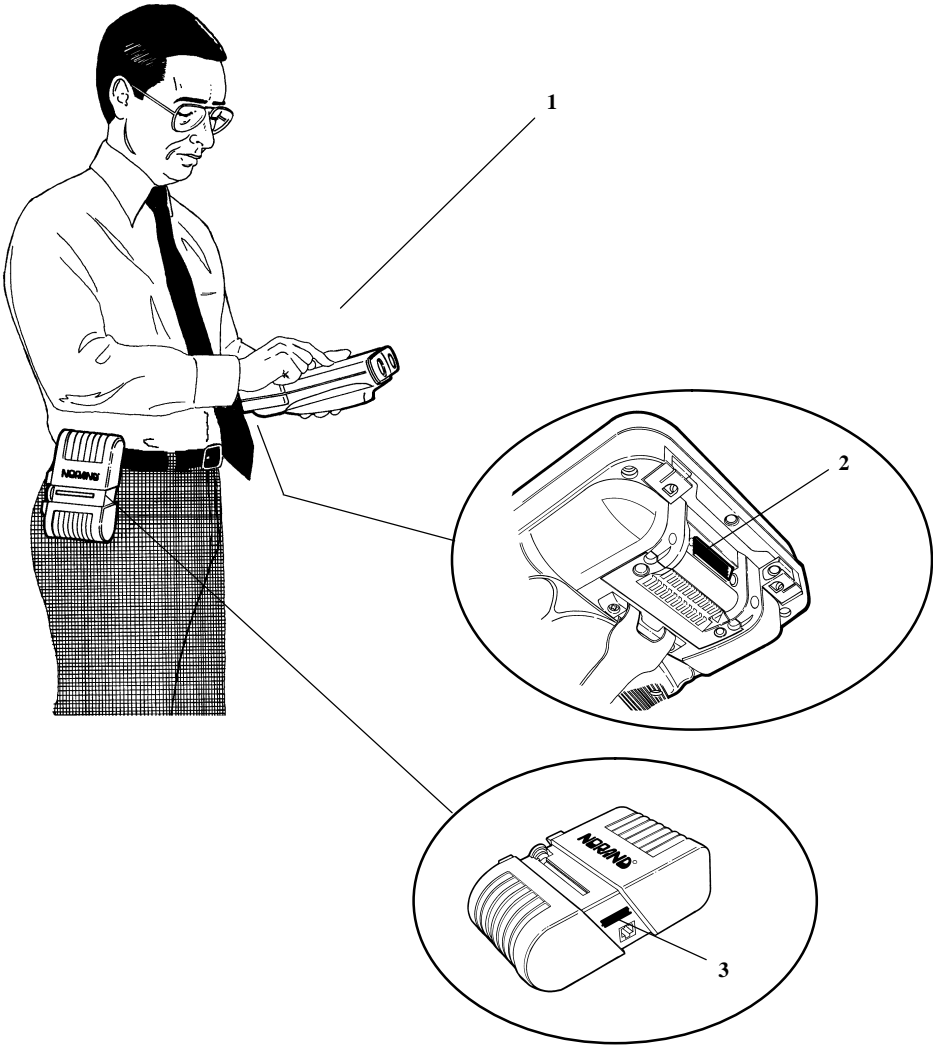
Operation

Illustrations on the following page show (1) normal use of these IR-equipped devices, and (2) the location of the infrared window on each. These windows must be kept clean to ensure proper operation.

Mount the printer so that the infrared interface is aimed more or less in front of you. Simply locate the printer in the vicinity of the right hip, suspended from your belt or waistband. With the terminal held slightly in front of the user, in either the right or left hand, the light beam is broad enough to ensure reliable communication.

Make sure there are no obstructions between the terminal and the printer: a pager, flashlight or other belt-mounted device can block the light beam if located near the printer's infrared window. Also, keep *both* (terminal *and* printer) infrared windows clean and free of dirt, smudges, or food particles by periodically using a soft cloth dampened with an approved cleaner (see **Section Three**, *Cleaning Instructions*).

Do not spray or pour liquid cleaner directly on the infrared windows or on the device itself.



- 1. Normal Use
- 2. IR Window, terminal
- 3. IR Window, printer

Figure E-1
Infrared Printer Use

