Intermec
Technologies Corporation

6110 Hand-Held Computer

TECHNICAL REFERENCE

▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶

CONTENTS

▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶

SECTION 1

Introduction

SECTION 2

Windows 95 Toolkit

SECTION 3

Windows 95 Device Drivers

SECTION 4

DOS Device Drivers

SECTION 5

Application Conversion

SECTION 6

Communications

FIGURES

TABLES

INDEX

Section 1

Introduction

▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶

This publication contains information for developing applications for the
PEN*KEY® 6110 Hand-Held Computer from Intermec Technologies Corporation.

The majority of this book has been written for experienced application program-
mers. Developing applications for this computer should be similar to developing
applications for any standard PC with the same operating system.

If you need assistance in developing applications for your 6110 Computer, or
merely a better understanding of any feature, consider the available resources.

Section 1 — Introduction
Provides technical information about the 6110 Computer, related publications,
and customer service information.

Section 2 — Windows 95 Toolkit
Covers the contents of the Windows 95 Toolkit provided for 6110 Computers with
Windows 95 operating system.

Section 3 — Windows 95 Device Drivers
Contains installation and configuration of devices and peripherals, software utili-
ties, and suggestions about Windows 95 and the 6110 Computer.

Section 4 — DOS Device Drivers
Contains installation and configuration information for DOS device drivers, com-
munications device drivers, and DOS utilities.

Section 5 — Application Conversion
Details files converted from 4000 Series applications.

Section 6 — Communications
Contains information about communications, INTERLNK, INTERSVR, and
Norand® Utilities.

This section has references to viewing additional information. If you have a DOS
version of the 6110 Computer, you can use EDIT.COM or transfer the files to
your PC and use the available PC-based viewing or editing tools. However, for
Windows 95, there is additional documentation available on the 6110 Windows
95 Toolkit CD that can be viewed using the following methods:

▶**NOTE:**   *Do not double-click the CD-ROM drive icon, this activates the Installation program.*

- ▸ The **View Technical Documentation** feature of the 6110 Windows 95
  Installation program, described in Section 2, provides easy access to docu-
  mentation on the CD.
- ▸ From the Windows desktop, access the CD-ROM drive by either double-
  clicking in **Windows Explorer** or **My Computer**. Right-click the 6110
  Toolkit CD-ROM drive, then select **Open** from the popup menu for a list of
  folders. Double-click on the appropriate folder to find desired files.

6110 Computer

The 6110 Computer has a number of features that are useful in the mobile systems marketplace:

▶ Fast data processing

▶ Large data and program storage

▶ Signature capture

▶ Touchscreen display

▶ Backlit display and keys

Figure 1-1 identifies 6110 Computer components.
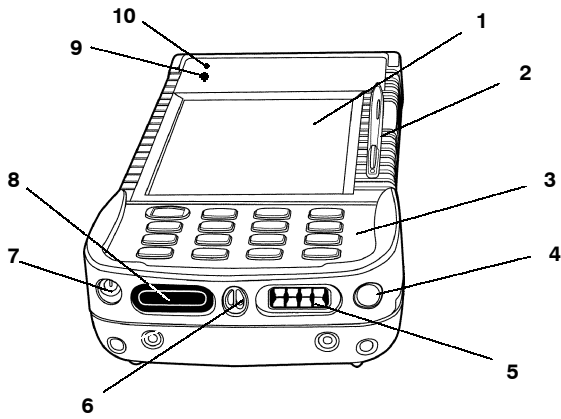
Front and Bottom

1. Touch screen
2. Pen
3. Keyboard
4. Optional external RF jack
5. Docking connector
6. Speaker slot
7. DC power jack
8. Infrared lens
9. Scanning status LED
10. Power status LED
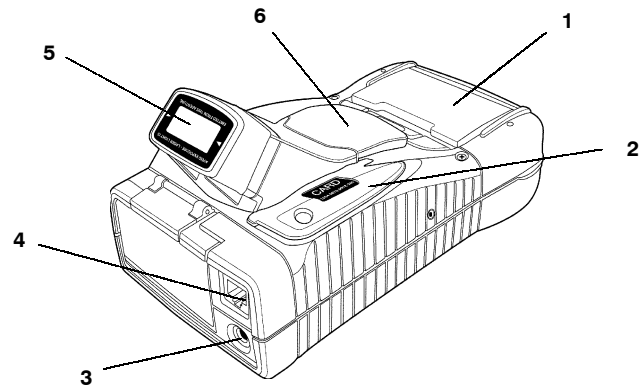
Rear and Top

1. Battery compartment
2. Magnetic stripe reader
3. External antenna or DEX connector
4. Modular connector: modem, serial, tethered scanner
5. Laser scanner lens
6. Internal scanner trigger

Figure 1-1
Computer Components

Batteries

▼**CAUTION:**   **This computer has ONE primary power source, the MAIN Battery. The Backup Battery maintains power to RAM while changing Main Batteries. At all times during operation and while stored (overnight, long periods of time, and during suspend), the unit must have its Main Battery installed.**

Battery status is reported by an LED indicator on the front of the unit as well as on the battery pack itself.

Main Battery

The main battery is a 1350 mAH lithium ion power pack, and has a useful life of 500 charge/discharge cycles. The battery pack contains a smart processor for the system software to report battery status.

In suspend mode, the main battery maintains RAM, RTC, and CMOS settings. When the computer is off charge, it supplies needed charge to the backup battery. Always have the main battery installed, except when replacing batteries.

Ensure the batteries are fully charged before leaving them off charge for long periods of time. A unit with fully charged main and backup batteries can be left off charge overnight or a weekend. However, if the 6110 Computer goes into shutdown mode, due to a low main battery, the backup battery does protect the data.

One method of checking battery capacity is to touch two contacts at the same time. Another method is to use a software fuel gauge based on the APM 1.1 specification.

Backup Battery

The backup battery is on trickle-charge when the unit is powered from the main battery or when connected to a charger. It is unable to maintain DRAM contents for an extended time, with the expectation of supporting the system without a main battery. If the main battery is drained completely or is not reinstalled, DRAM data is lost. The entire DRAM is protected against loss by two 3.0 volt vanadium-lithium "coin" cells, which can survive 2000 charge/discharge cycles.

The backup battery has a capacity of 100 mAH. When fully charged, it retains data in the 8 and 16 MB sizes of DRAM for approximately 24 hours; whereas the 32 MB of DRAM is rated for 16 hours.

▶**NOTE:**   *A discharged backup battery takes 24 to 50 hours to recharge. Afterwards, a backup battery takes 10 hours to charge. A discharged main battery takes two hours to recharge. When charging the batteries in the 6110 Computer, maintain the charge for a full 14 hours to ensure that both the backup battery and the main battery pack are fully charged.*

Chargers and Docks

To charge the batteries in your 6110 Computer, place the computer into a 6110 Dock or connect it to a charger. COM1 provides RS-232 and RS-485 communications to the dock. The RS-232 interface on the dock supports RXD, TXD, RTS, CTS, and GND signals.

▶ **NOTE:**   ***The DCD, DTR, DSR, and RI signals are not supported on COM1.***

RS-485 communication is enabled by hardware in the dock and a special cable attached to the dock, with a maximum speed of 115.2 KB.

On all docks, there is an indicator on the front of each dock or docking position that indicates the status of charge on the computer in the dock. This indicator does not turn on unless a computer is installed. There are several docks available for the 6110 Computer:

Single Dock
Integrated AC power supply, two RS-232 ports, cable options to enable one RS-485 output, charge indicator for quick status.

Multidock
Integrated AC power supply, holds up to eight 6110 Computers, wall or table mount, secure storage, status indicator.

Vehicle Dock
Two RS-232 ports, various mounting options.

Vehicle Docking Station
A vehicle dock, with stand and keyboard tray, as shown in Figure 1-2.

The 6110 dock interface has an eight-contact connector which provides main battery charging (+ power, – power, and two control signals) and COM A serial port signals (SIN, SOUT, RTS, CTS). The IR serial interface on the 6110 Computer can also be a "wireless" connection into any dock that contains an IrDA to RS-232 translation circuit, providing a half-duplex RS-232 serial port on the dock (with no control lines).

Connectors

The *top* of the 6110 Computer contains:

- ▶ A modular connector used for a tethered scanner, a modem, and a variety of serial devices.
- ▶ An external antenna or DEX connector

The *bottom* of the 6110 Computer contains:

- ▶ An ac power jack that powers the 6110 Computer from ac and charges batteries.
- ▶ A docking connector that mates up with a dock unit to charge or provide power for long periods of time and for serial communications.
- ▶ An optional external RF jack used for a radio antenna with PC Card radio.

The *port replicator* attachment contains:

- ▶ A DC power jack that plugs into a wall charger or cigarette lighter (with associated cable) and keeps the terminal powered over long periods of time.
- ▶ A 9-pin D-sub serial connector.
- ▶ An RF antenna connector for a radio antenna with PC Card radio.
- ▶ A keyboard connector for the external keyboard.

Display

The 6110 Computer features a backlight, touch-sensitive, liquid crystal display (LCD) with a resolution of 240 by 320 pixels. The default display mode is landscape, through system software it is rotated into portrait mode.

Use either a stylus or your finger on the touch screen. Application software receive touch inputs as standard mouse messages.

Backlight

The backlight is useful in darkened conditions. However, use the backlight only as needed, since it reduces the battery life.

The amount of time the backlight stays on before shutting off is controlled through the Configuration Program, SC400CFG.COM.

Touch Screen

This is an overlay resistive analog touch screen, and is controlled by a single chip touch screen controller. The touch screen controller provides x,y point information to the CPU whenever a touch is detected on the screen.

External Keyboard

When docked, you can attach a full keyboard to the 6110 Computer using an external tray.
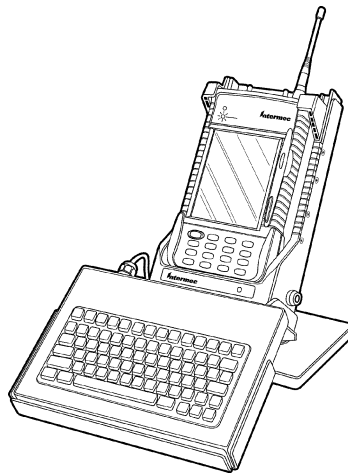
Figure 1-2

6110 Computer in Vehicle Docking Station *(with keyboard tray)*

Keypad

The 6110 Computer has a built-in 16-key backlit keypad with programmable ap-plication keycodes. Keycodes are generated by a PC compatible 8042 controller emulator and presented to application software via standard software interfaces.

Keypad Remapping

All keys can be remapped, including shifted and unshifted keys, with the excep-tion of the **[I/O]** key (suspend/resume) and the **[GOLD]** shift key. Use SC400CFG.COM to remap the keypad.

For examples of configuration setup, refer to the SC400CFG.INI file by viewing the 6110SC40.HTM file in the *Docs* folder on the Windows 95 Toolkit CD. A sample SC400CFG.INI file also resides in the *Config**Sc400cfg* folder, on the Windows 95 Toolkit CD.

Right Mouse Click

This standard PC function is also available on the 6110 Computer. Hold the **[GOLD]** shift key down while tapping the screen provides the same results as a right mouse click.

Reset Keys

Always shut down Windows before resetting the 6110 Computer. From the Win-dows desktop, select **Start → Shut Down** for the Shut Down Windows screen, select **Shut down the computer?**, then tap **Yes**.

Figure 1-3 shows the reset keys. To reset the terminal, hold down the **[GOLD]** shift key, press **[Esc]**, then **[0]**, so all three keys are pressed. Continue to hold them down until the Power Status LED illuminates, then release all three keys.
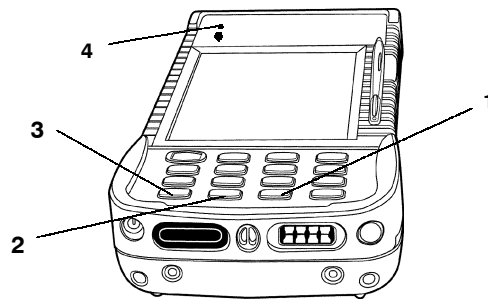
1. Zero key [0]
2. Escape key [Esc]
3. [GOLD] key
4. Power status LED

Figure 1-3
Reset Keys on Keypad

Suspend/Resume Key

To suspend the terminal, press and hold the suspend/resume [**I/O**] key for about three seconds. To resume operation, press and release the same key.

The 6110 Computer automatically suspends when there is no activity for a time, which conserves power, thereby protecting against loss of data while replacing the main battery or leaving the unit unattended. This time is determined by the configuration program.

Memory

PC Cards, system memory (DRAM), and flash ROM are types of memory that are available with the 6110 Computer.

PC Cards

▶ **NOTE:**   *Cards that conform to the PC Card interface standard (the new standard), or the PCMCIA interface standard (the old standard), are commonly referred to as: "PC Card", or "PC Card xxxxx" (where xxxxx consists of "modem," "drive," or other device type). This is because "PC Card" is the accepted industry term for a storage medium that conforms to these standards.*

Your computer is equipped with three PC card slots. Use these slots with memory cards for storing data, much like a hard drive on a PC. Memory cards are available in a variety of sizes and types. Modems, radios, spinning media, and other options are also supported as they become available. Check with your Intermec Account Representative for available options.

One ATA Card slot and two Type II Card slots are provided. The slot closest to the screen is reserved for the ATA card. All three card slots have guides, but the empty bay at the back does not. There is no blockage between any of the slots, so any pair of Type II bays can accommodate a Type III card.

▶ **NOTE:**   *Put an ATA card in PC Card slot C to boot the 6110 Computer.*

Figure 1-4 shows a top view of the 6110 Computer, with the display facing down. Note the available PC Card slots. The card should face away from the screen when inserted into the slot.
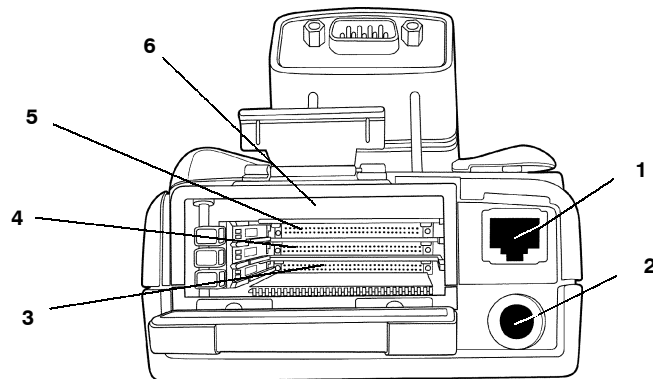
1. **Modular connector:** modem, serial, tethered scanner
2. **External antenna or DEX connector**
3. **Slot C, Type II bay,also called the ATA slot** (used by a PC Card)
4. **Slot B, Type II,** (typically for a modem card)
5. **Slot A, Type II,** (typically for a radio card)
6. **Empty Type II bay**

Figure 1-4
Location of PC Card Slots

System Memory (DRAM)

The 6110 Computer supports 8, 16 or 32 MB of DRAM memory. You can upgrade to a larger memory size by having your Customer Support Center install a new memory board. However, the 8 MB configuration cannot be ordered for a Windows 95 system.

Flash ROM

System BIOS is stored in the 512 KB of field-programmable flash memory, containing BIOS and BIOS extensions. There is no room for additional system software in flash memory. Use a removable ATA PC Card for additional software. This includes Windows 95 and any drivers needed for operating.

System BIOS is an implementation of the PC compatible BIOS with added features specific to Intermec® hand-held computers. The 6110 BIOS performs power-on tests, system configuration (including elements of Plug and Play), low-level power management, and run-time real-mode interrupt service handling.

During the power-on sequence, the 6110 BIOS performs a Power-On Self-Test (POST) that checks all system components and configures them in preparation for booting the operating system. The system then boots the operating system from an installed ATA card.

Open System Environment

You can acquire a variety of development equipment and software best suited to your needs from Intermec Technologies Corporation and other vendors. See *\Docs\6110DVTP.HTM* on the Windows 95 Toolkit CD for recommendations.

Ports

The 6110 Computer contains the following ports. See the 6110PORT.HTM file, in the *\Docs* folder on the Windows 95 Toolkit CD, for additional information.

- ▶ A serial port, connecting through the dock, using CMOS logic levels.
- ▶ A serial radio, dedicated for use with a card that is the same form factor as a PC Card but does not use the PC Card interface.
- ▶ An Infrared port for wireless communication with peripherals.

Port Replicator

The port replicator is an optional accessory. It plugs into the bottom of the 6110 Computer, adding functionality and providing easier application development. The Port Replicator attaches to the 6110 Computer to provide these connections:

Power jack
Allows connection of wall charger to power unit.

PS/2 keyboard connector
Standard connection for PS/2 style keyboard and PS/2 mouse.

DB-9 serial port
RS-232 port addressed as COM1, supporting the RXD, TXD, RTS, CTS, and GND signals; DTR is looped back to DSR and DCD; RI is not connected.

Wireless antenna connection
Standard TNC connector that connects a remote antenna to the integrated radio of the 6110 Computer.

Pass through Industry standard IrDA interface
Infrared signals are not obstructed; they pass through the port replicator.

1. RF Antenna connector
2. Serial port
3. External keyboard connector
4. Power jack
5. IrDA port
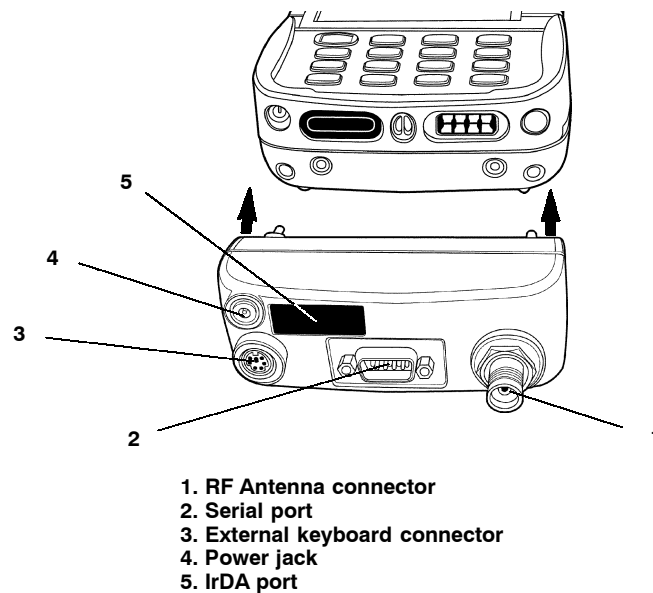
Figure 1-5
Port Replicator Sliding onto 6110 Computer

Power Management

Advanced Power Management (APM) software is implemented to coordinate power-saving operations between applications and the hardware. The APM code detects periods of inactivity and lowers power consumption by progressively reducing the clock speed of the processor, shutting down unused components, and finally suspending the unit. The APM software is responsible for handling suspend/resume requests by way of the I/O key and notifies the system software when suspend/resume events occur. The components automatically power-managed include the following:

- Processor
- LCD and Keypad Backlights
- LCD Screen
- Integrated and Tethered Scanners

- Magnetic Card Stripe Reader
- RS-485 and RS-232 Ports
- PC Cards

Device drivers and applications can dynamically modify APM behavior through APM function calls, or you can modify certain configuration files to establish default power management.

Printers

The 6110 Computer supports tethered and IrDA printing. Norand Portable Communications Protocol (NPCP) printing is supported only if you use the Intermec NPCP printing toolkit.

Processor

The 6110 Computer is based on the ÉlanSC400 Processor operating at a maximum speed of 99 MHz. This processor is modeled after the AMD Am486 CPU and contains an 8 KB write-back cache, integrated memory controller, PC/AT system logic, PC Card controller, LCD graphics controller, IrDA infrared port, and power management features in one integrated package. The integrated LCD controller is CGA register set compatible.

Scanners

The 6110 Computer supports a variety of optional scanning methods:

Internal Scanner

The 6110 Computer supports an optional internal laser scanner that uses a laser diode operating at nominal wavelength of 670 nm, resulting in a visible red beam to aid in aiming the unit.

The scanner's 16-bit microprocessor delivers quick decoding of the following symbologies:

- UPC/EAN
- Interleaved 2 of 5
- Discrete 2 of 5
- Codabar
- UCC/EAN 128
- TriOptic Code 39

- Code 39
- Code 93
- USS-128
- MSI
- ISBT-128

Intermec Technologies Corporation provides scanner device drivers for all supported operating systems.
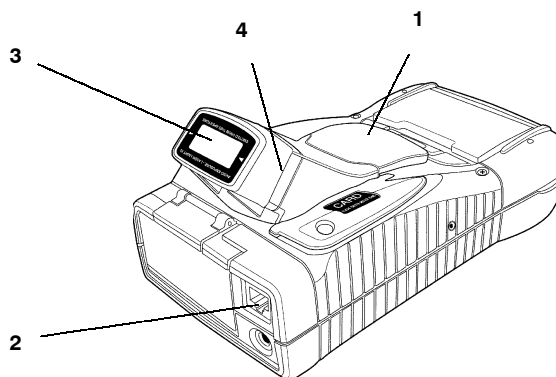
1. Scanner trigger
2. Modular connector
3. Laser scanner lens
4. Integrated laser scanner housing

Figure 1-6
Integrated Scanner Pod

Magnetic Stripe Reader

The Magnetic Stripe Reader (MSR) is an optional attachment for the 6110 Computer. MSR reads debit, credit, and airline formats, and supports bidirectional scanning on all three tracks, as defined by the ANSI standards, the American National Standards Institute x4.16-1983 specification and the International Standards Organization 7811/2-1985 specification.
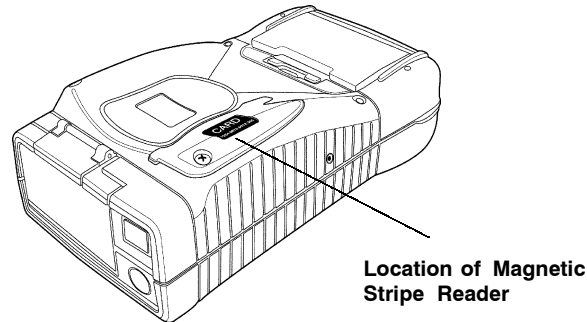
Figure 1-7
Magnetic Stripe Reader

Serial Pod

▼**CAUTION:**   **Pin 9 on the D-sub serial port connector is a power output pin from the 6110 Computer. Some devices may use pin 9 as a ring indicator signal and could be damaged by the power output on that pin. Before connecting to pin 9, make certain the device is modified appropriately to prevent damage to the device.**

The serial pod provides a standard 9-pin serial port on a standard D-sub PC style connector. As a software configuration option, +5 volts of power can be provided on pin 9 (the Ring Indicator pin). This option powers external devices. However, the tethered scanners connects into the modular connector.
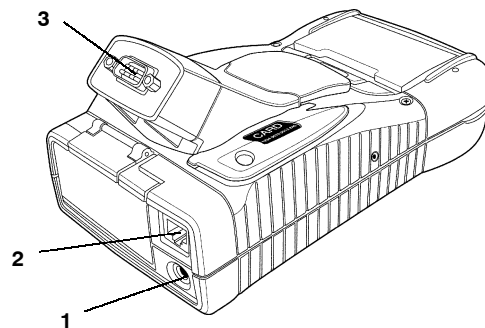
1. External antenna or DEX connector
2. Modular connector: modem, serial tethered scanning
3. 9-pin D-sub serial port connector

Figure 1-8
Serial Pod

Serial Drivers

The 6110 Computer has three serial drivers: SERIAL.VXD, PORT6110.VXD, and SCANPORT.VXD. Information about these drivers are in Section 3.

System BIOS

The 6110 BIOS implements the PC compatible BIOS with added features specific to Intermec hand-held computers. The BIOS performs Power-On Self-Tests (POSTs), system configurations (including elements of Plug and Play), low-level power management, and run-time real-mode interrupt service handling.

During the power-on sequence, the 6110 BIOS performs a POST, which checks all system components and configures them in preparation for booting the operating system. The system then boots from an installed ATA card.

System BIOS storage is provided by 512 KB of flash memory which is field programmable. This flash memory does not store other system software or application programs.

The BIOS may occasionally need updating. Use these methods for flash updates:

- ▸ PC Card memory (if installed). Place the 6110FLSH.EXE file on an ATA card and execute it from DOS.
- ▸ Serial interfaces (through dock or pod) RS-232, RS-485
- ▸ PC Card radio (if installed)

▶ **NOTE:**   *The 6110 Computer **must be on charge** for the reflash process to begin.*

When the BIOS version is displayed on boot up, it appears like the following:

```
AM486 SC400 Rev x.x
6110 PIC Micro Vxx
6110FLSH Vx.xx

Testing XMS Memory
31744 KB Extended
SC400 APM BIOS vx.xx
6110 PnP BIOS vx.xx
```

Refer to *\Docs\AUTOEXEC.TXT* on the Windows 95 Toolkit CD for additional information about BIOS and updating flash.

Related Publications

The publications listed below contain additional information relating to your 6110 Computer or publications that may be good references for application development. See your account representative about publications with Intermec part numbers.

▶ *6110 Hand-Held Computer User's Guide*, Intermec P/N: 961-028-102

▶ *6100 Series Docks Installation Instructions*, Intermec P/N: 962-020-003

▶ *6820 Printer User's Guide*; Intermec P/N: 961-019-013

▶ *6820 Printer Technical Reference*; Intermec P/N: 977-019-001

▶ *6920 Communications Client for Windows 95, 98, or NT User's Guide;* Intermec P/N: 961-055-002

▶ *SE1223 Integrated VLD Scanner User's Guide;* Intermec P/N: 961-032-042

▶ *Windows 95 and Windows CE Configuration Utilities Reference Manual;* Intermec P/N: 978-054-010

PDF versions of these publications can be accessed via the Intermec web site at: *http://www.intermec.com*

▶ *APM BIOS Interface Specification 1.1*
Intel Corporation
Literature Distribution Center
P.O. Box 7641
Mt. Prospect, IL 60056-7641
(800) 548-4725
Publication Order Number: 241704-001

▶ *Handwriter Recognition System for Windows User's Guide*
Communication Intelligence Corp. (CIC)
Intermec P/N: 961-054-001

▶ *Handwriter Recognition System for Windows Release Notes*
Communication Intelligence Corp. (CIC)
Intermec P/N: 961-054-002

▶ *Handwriting Recognition System, HR-1200, User Manual*
Synaptics
Intermec P/N: 961-054-007

Customer Support

Factory Service

If your unit is faulty, you can ship it to the nearest authorized Service Center for factory-quality service.

Customer Support Center

The Intermec Customer Support Center (technical support) telephone number is 800-755-5505 (U.S.A. or Canada) or 425-356-1799. The facsimile number is 425-356-1688. Email is *support@intermec.com* .

If you email or fax a problem or question include the following information in your message: your name, your company name and address, phone number and email to respond to, and problem description or question (the more specific, the better). If the equipment was purchased through a Value-Added Reseller please include that information.

Web Site

The Customer Support File Libraries, including Hot Tips and Product Awareness Bulletins, are available via the Intermec Product Support page at this URL: *http://norbbs.norand.com/index.htm* . New users can sign up for a new account on this page.

Visit our Web site at *http://www.intermec.com* to download many of our current manuals in PDF format. To order printed versions of the Intermec manuals, contact your local Intermec representative or distributor.

Bulletin Board Service

The Customer Support Bulletin Board (BBS), maintained by Intermec Technologies Corporation, provides software and documentation:

- ► **Phone number:** 319-369-3515 (14.4 kbps modem)
                          319-369-3516 (28.8 kbps modem)
- ► **Protocol:** Full duplex, ANSI or ANSI-BBS; 300 to 28,800 bps; v.32bis; 8 bits, no parity, 1 stop bit. *For high-speed modems, disable XON/XOFF and enable RTS/CTS.*

This is the same location available via the web site. If your web access uses high-speed phone lines, the web interface provides a faster response.

Windows 95 Toolkit

▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸

The Windows 95 Toolkit from Intermec Technologies Corporation supplies Windows 95 operating system components for use on 6110 Computers. The Toolkit, which is provided on a CD-ROM disk, provides a way to install a Windows 95 image onto a PC Card. The 6110 Computer will boot the image from this card if it is inserted in the unit and the unit is reset. Various Windows 95 images are provided by the Toolkit, allowing the use of different sized PC Cards. Larger images contain a greater number of Windows 95 components, whereas the smaller images contain only the core components. You may customize the image by adding or removing components before or during the installation of desired applications. The following is provided on the 6110 Windows 95 Toolkit CD-ROM:

▸ A selection of Windows 95 images for the 6110 Computer
▸ Intermec® product-specific device drivers for Windows 95
▸ Documentation for the 6110 Computer (including the *6110 Hand-Held Computer User's Guide*, this *Technical Reference*, and other documentation). To view this documentation, use either the "Viewing Technical Documentation" feature of the 6110 Windows 95 Installation program (page 2-28) or the Windows desktop to access the CD-ROM drive, as follows:

  1. Double-click **My Computer** or **Windows Explorer**.
  2. Right-click the 6110 Toolkit CD-ROM drive and select **Open** from the popup menu for a list of folders. (Note that a double-click on the CD-ROM drive icon activates the Installation program).
  3. Double-click the appropriate folder to find the desired file.

Requirements to Install Windows 95 onto Computer

You need a PC with one CD-ROM drive and one or more PC Card slots.

▸ If you *do not* need to use compression to install Windows 95 onto a PC Card, you can use any version of Windows 95 or Windows 98.
▸ To install onto a compressed PC Card, you need either: Windows 95 OSR1 (original OS, version 4.00.950a) and Microsoft Plus! or, Windows 95 OSR2, Version 4.00.950b, or later.

▸**NOTE:**   *Currently, the only operating system supported at the initial release is OSR2.*

The basic requirements for installing Windows 95 are as follows:

▸ At least one 6110 Computer.
▸ One PC Card (per computer) that holds the Windows 95 operating system, your application, and all other desired accessory files.
▸ One PC Card to hold the Windows 95 CAB files and all files used to install the application on the 6110 Computer.

Windows 95 Images

The Windows 95 Toolkit provides different images of the Windows 95 operating system and uses different sizes of Hard Disk Card and PC Card storage media. "Lite" images contain the same core components necessary to boot the operating system as the full image, but many of the optional utilities and drivers are removed to reduce storage space. When writing applications that use the optional components, you may need to add them to an image, thus increasing the required storage space. The application with a corresponding database, along with what is needed for running Windows 95, adds to the storage needed.

In some cases, the storage required exceeds the space available on the storage media. Rewrite the application to use space more efficiently and reduce database information. Applications may use code libraries or contain a large amount of graphics resulting in large file sizes. When programming for size, reduce the use of higher-level libraries, graphical controls, and redundant data records.

A full Windows 95 image takes about 120 MB of disk space. Hard Disk Cards greater than 240 MB are useful but may fail the rugged requirements of a portable hand-held computer. An alternative to the Hard Disk Card storage is the PC Card. If the required storage size is less than the required full image size, use uncompressed PC Cards available from Intermec. These cards hold almost twice the amount with little performance degradation. *Smaller PC Cards require Microsoft DriveSpace 3 disk compression to fit the image.*

The 6110 Windows 95 Toolkit installation provides several preconfigured Windows 95 images that can be transferred to PC Cards for the 6110 Computer. Or, preloaded media types can be purchased from Intermec Technologies Corporation containing preconfigured Windows 95 images.

Table 2-1 lists the Windows 95 images that can be transferred to PC Cards using the 6110 Windows 95 Toolkit. *Intermec Technologies Corporation reserves the right to add, remove, or modify the availability and contents of these items.*

Table 2-1
Toolkit Images for PC Cards

Windows 95 Image	20 MB	40 MB	48 MB	85 MB	96 MB	110 MB	175 MB	40–500 MB Nonstandard
Minimal	C or Ub	C or U	C or U	C or U	C or U	C or U	U	U
Lite	N/A	C	C	C or U	C or U	C or U	U	U
CAB Files	N/A	N/A	U	U	U	U	U	U
Full	N/A	N/A	N/A	N/A	N/A	C	U	U

Note: *"U" = Uncompressed; "C" = Compressed; N/A = Not Available; "b" = Baseload*

Table 2-2 lists the preloaded Windows 95 images available on PC Cards.

Table 2-2
Factory-Configured PC Card Images

Windows 95 Image	20 MB	48 MB	110 MB	175 MB
Lite I or Lite II	N/A	C	N/A	N/A
CAB Files	N/A	N/A	N/A	N/A
Full	N/A	N/A	N/A	U

Note: *"U" = Uncompressed; "C" = Compressed; N/A = Not Available*

Step-by-Step Installation

The following steps are required to install Windows 95 onto your 6110 Computer using the Windows 95 Toolkit. Additional details are provided later in this section.

1. Insert a PC Card into the PC Card drive on your PC (to become a 6110 boot card). Then insert the Windows 95 Toolkit CD into the first CD-ROM drive on your PC. The toolkit should autorun.

▶ **NOTE:**   *If your auto-install feature is not activated, double-click the 6110 Toolkit CD-ROM icon using* ***My Computer*** *or* ***Windows Explorer****, then double-click* **AUTORUN.EXE** *on the 6110 Toolkit CD-ROM drive.*

2. Install a preconfigured Windows 95 image to the PC Card, using the Windows 95 Toolkit.

3. Copy your application and all associated files to the PC Card.

4. If you chose a smaller than full load (which means you might need additional Windows 95 files), then copy the CAB files to your PC Card (or to another PC Card) using the toolkit. (Note: CAB files can be removed from the card after the installation.)

5. Remove both PC Cards from your PC and insert the 6110 boot card into the PC Card slot in your 6110 Computer.

▶ **NOTE:**   *Use a dock with a keyboard to navigate around the 6110 Computer.*

6. Reset the 6110 Computer to boot up to the Windows 95 PC Card and enter the Windows 95 license information. Begin installing your application using the setup instructions for your application.

7. Install any additional Windows 95 features such as: dial-up networking, using **Start → Settings → Control Panel → Add/Remove Programs**.

8. Insert any required PC Card devices such as a radio or a modem, then allow Windows 95 to auto-detect it and install the appropriate drivers.

9. Remove the PC Card containing the application setup files.

▶ **NOTE:**   *In the process of copying CAB files to a PC Card, the toolkit will remove any Windows 95 image that may exist on the PC Card. If necessary, copy the CAB files* ***manually*** *from the Toolkit CD onto an existing Windows 95 image.*

If you are using the CAB Card installation method, insert the CAB Card in the 6110 Computer *before* starting the installation. Listen for a beep to ensure that the 6110 Computer recognizes the CAB Card.

If you are installing two PC Card devices (such as a radio and GPS), you need a Lite or Full Windows 95 image and the CAB files on one PC Card.

▶ **NOTE:**   *To put a Windows 95 image and the CAB files (approximately 47 MB) on the same PC Card, first install the desired Windows 95 image, then manually copy the CAB files to your PC Card. Use* ***My Computer*** *or* ***Windows Explorer*** *to locate the CAB files in the* \Win95\cabs *folder on the Windows 95 CD-ROM drive.*

Windows 95 Installation Program

▶**NOTE:**   *If you have more than one CD ROM drive on your PC, please insert the Windows 95 Toolkit CD into the CD ROM drive that is alphabetically first, since the Windows 95 Installation program accesses files on the first CD ROM drive it finds.*

When you insert the Windows 95 Toolkit CD into your CD ROM drive, the Windows 95 Installation program should open with the following screen.

If not, then double-click the 6110 Toolkit CD-ROM icon using **My Computer** or **Windows Explorer**, then double-click **AUTORUN.EXE** on the 6110 Toolkit CD-ROM drive.

Position the cursor over these options to highlight each option, then:

▶**NOTE:**   *If you receive a message about DriveSpace not Found, go to page 2-21.*

▶ Click **Install Windows 95 onto PC Card** to start the installation program, which provides several Windows 95 images. Instructions begin on the next page.

▶ Click **View 6110 Technical Documentation** to view PDF and HTML documentation that support the 6110 Computer. Go to page 2-28 for details.

▶ Click **View Release Notes** to learn what changes were made to the toolkit since the last release. Information is on page 2-29.

▶ Click **Exit** to quit the Windows 95 Toolkit Installation.
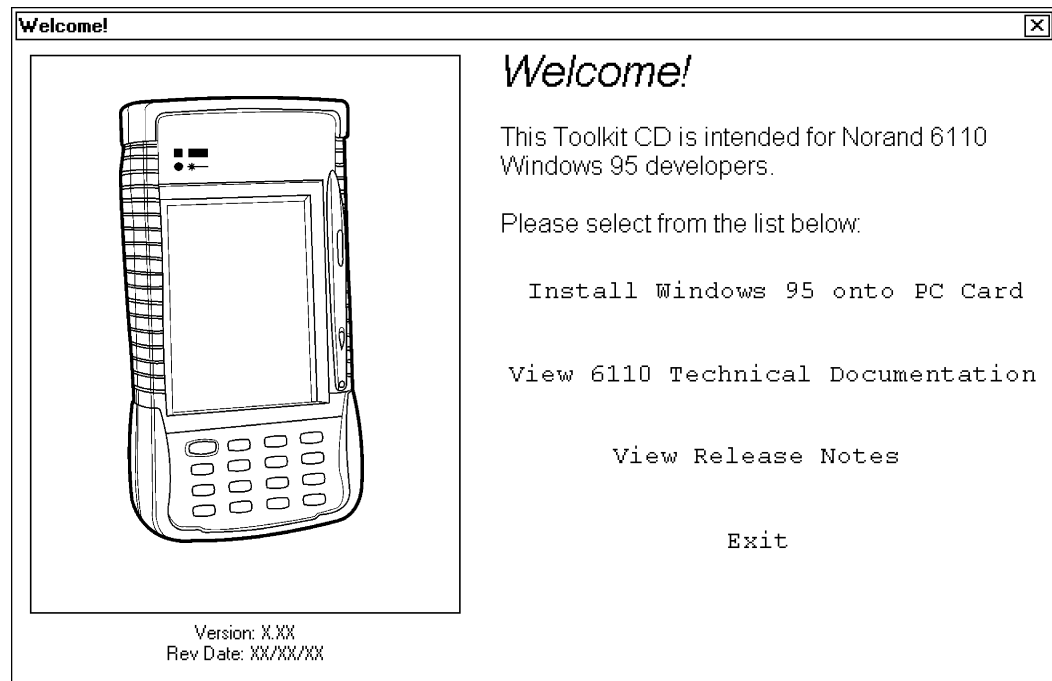
Set Up the PC

This Welcome screen instructs you on what to do for the PC for a successful load to the PC Card. Shut down all Windows programs as instructed, insert a PC Card in the PC Card drive in the PC, then click **Next**.

If a Hard Disk Card or a PC Card was inserted in the PC Card drive, go to page 2-6. Otherwise, a prompt appears to insert a card in the PC Card drive, as described below.
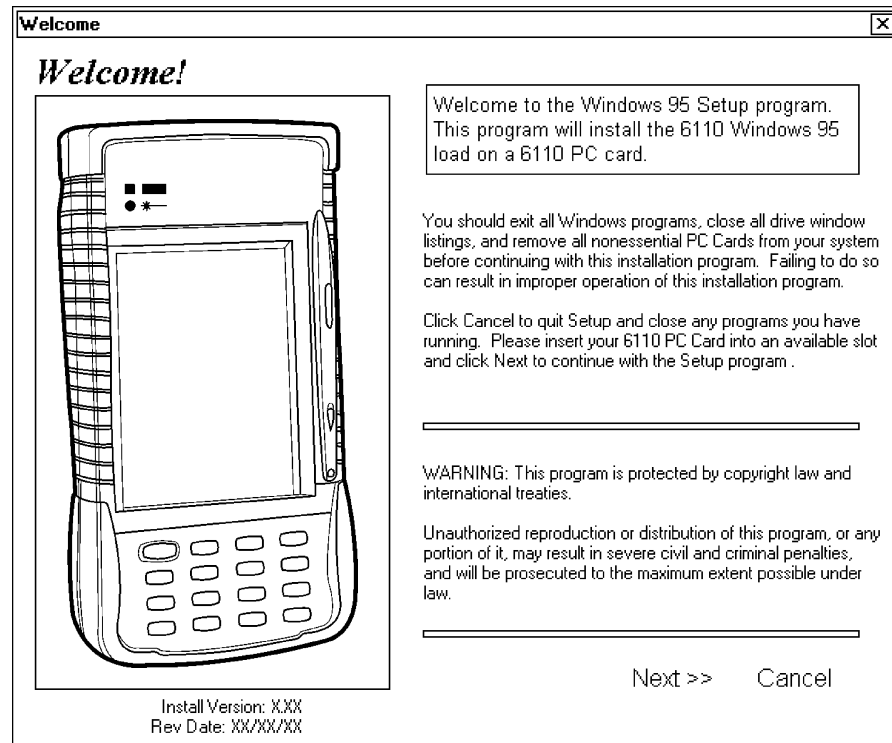
No PC Card or Hard Disk Card

The following prompt appears if the setup program does not identify a PC Card or a Hard Disk Card in the PC Card drive. Insert a card into the PC Card drive, or click **Browse** to select the appropriate drive, then listen for a beep. Once a PC Card icon appears in the desktop system tray, click **OK** and go to page 2-6.
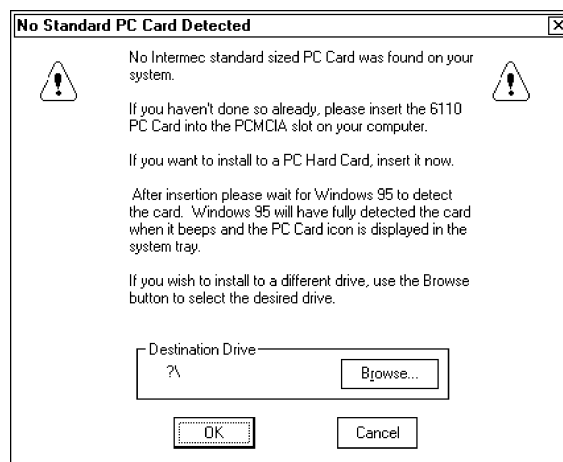
Set Up the Hard Disk Card

If using a Hard Disk Card in the PC Card drive, click **Yes** when prompted to use that card as the destination for the Windows 95 installation. If this is a new Windows 95 image, or the Hard Disk Card does not have a Windows 95 image, go to page 2-8 to create a new Windows 95 image.

If the system recognizes a Windows 95 image on the Hard Disk Card, either replace the entire image or copy portions of the image. Go to page 2-7.

```
┌─────────────────────────────────────────────┐
│ Hard Card Installation                  ⊠   │
├─────────────────────────────────────────────┤
│                                               │
│   A possible PC Hard Card was detected at     │
│   drive E which is 248 Megs in size.          │
│                                               │
│   Do you wish to use this drive as the        │
│   destination drive of the 6110 install?      │
│                                               │
│                                               │
│       ┌──────────┐        ┌──────────┐        │
│       │   Yes    │        │    No    │        │
│       └──────────┘        └──────────┘        │
│                                               │
└─────────────────────────────────────────────┘
```
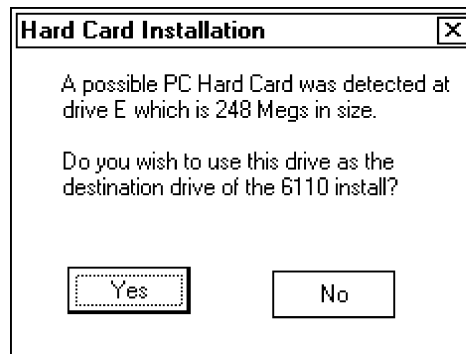
Set Up the PC Card

If a PC Card is inserted in the PC Card drive and the Windows 95 Installation program detects the card, information similar to the screen below is displayed. Click **Browse** to change the destination, if necessary. Click **OK** to continue.

If this is a new Windows 95 image, or the PC Card does not have a Windows 95 image, go to page 2-8 to create a new Windows 95 image for the card.

If the system recognizes a Windows 95 image on the PC Card, you will be prompted to either replace the entire image or copy portions of the image. Go to page 2-7 to continue.

```
┌─────────────────────────────────────────────┐
│ Standard PC Card Detected                ⊠  │
├─────────────────────────────────────────────┤
│   An Intermec standard 40 Meg PC Card has been│
│   detected on drive E:.                       │
│                                               │
│   If you wish to install to a different drive,│
│   select it by clicking on the Browse button  │
│   below.                                      │
│                                               │
│   ┌─ Destination Drive ──────────────────┐   │
│   │   E:\              ┌──────────┐       │   │
│   │                    │ Browse...  │     │   │
│   │                    └──────────┘       │   │
│   └──────────────────────────────────────┘   │
│                                               │
│       ┌──────────┐        ┌──────────┐        │
│       │   OK     │        │  Cancel  │        │
│       └──────────┘        └──────────┘        │
└─────────────────────────────────────────────┘
```
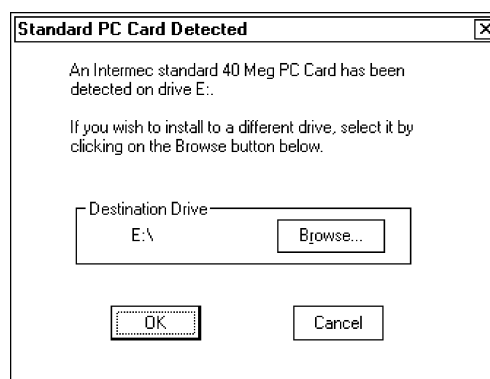
PC Card or Hard Disk Card Options

If the system recognizes a version of Windows 95 on the PC Card, the PC Card Options screen prompts you to indicate whether you are replacing the entire image on the PC Card (**Create new Windows . . .** , click **OK**, then go to page 2-8) or updating selected Windows 95 components on the card (click **Copy Selected Drivers . . .** , click **OK**, then go to page 2-10).

If the system does not recognize any version of Windows 95 on the PC Card, go to the next paragraph.

```
┌─────────────────────────────────────────────────────────┐
│ PC Card Options                                      [X]  │
├─────────────────────────────────────────────────────────┤
│  A version of Windows 95 is already on the PC Card.       │
│                                                            │
│  You may:                                                  │
│                                                            │
│                                                            │
│   ⊙ │Create new Windows 95 Image on PC Card│               │
│                                                            │
│                                                            │
│   ○  Copy Selected Drivers / Utilities from the CD to the PC Card │
│                                                            │
│                                                            │
│                        ┌──────────┐                        │
│                        │    OK    │                        │
│                        └──────────┘                        │
└─────────────────────────────────────────────────────────┘
```
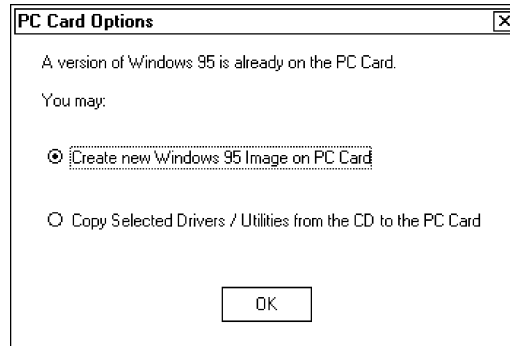
Network Drive Mapping Warning

If your PC has a networked drive letter mapped alphabetically before the PC Card drive, a warning prompt appears to note that formatting will not be done via a DOS window. Click **OK** to continue to the locations described in the previous paragraph.

```
┌─────────────────────────────────────────────────────────┐
│ Network Drive Mapping Warning                        [X]  │
├─────────────────────────────────────────────────────────┤
│   ⚠   A network drive E: was mapped on this PC            │
│       before PC Card F:.                                  │
│                                                            │
│       The Windows mapping of network drives               │
│       before the mapping of PC Card drive letters         │
│       can cause problems with the formatting of PC        │
│       Card drives.                                        │
│                                                            │
│       There is a bug in Windows 95, where network         │
│       mapped drives can prevent  PC Card drives           │
│       from being formatted through a DOS window.          │
│                                                            │
│       Therefore, this program will format the PC Card     │
│       media using the Windows (not the DOS)               │
│       interface.  This method will require more steps     │
│       by the user.                                        │
│                                                            │
│      ┌────────────┐      ┌────────────┐                   │
│      │     OK     │      │   Cancel   │                   │
│      └────────────┘      └────────────┘                   │
└─────────────────────────────────────────────────────────┘
```

Create a New Windows 95 Image

After electing to create a new Windows 95 image on the PC Card, the Prepare PC Card for Installation screen appears with information about the drive specified. The "Xs" represent the PC Card drive letter, PC Card size, and type of Windows 95 image on the PC Card, if any. If any information is incorrect, click **Cancel** to return to the Welcome screen (page 2-4). Click **Next** to continue.

▶ If DriveSpace Volume is detected on the PC Card, go to page 2-22.

▶ If there is no DriveSpace Volume on the PC Card, go to the next paragraph.

Ready to Prepare PC Card for Installation   ☒

Setup will now format the drive specified.

WARNING: All the data on the drive you have selected will be destroyed! Be sure you have selected the correct drive.

You can choose not to install the Windows 95 load by clicking Cancel to exit Setup.

> Disk Letter: X :
> Disk Size: XXX
> Disk Label: XXXX

Next >>   Cancel
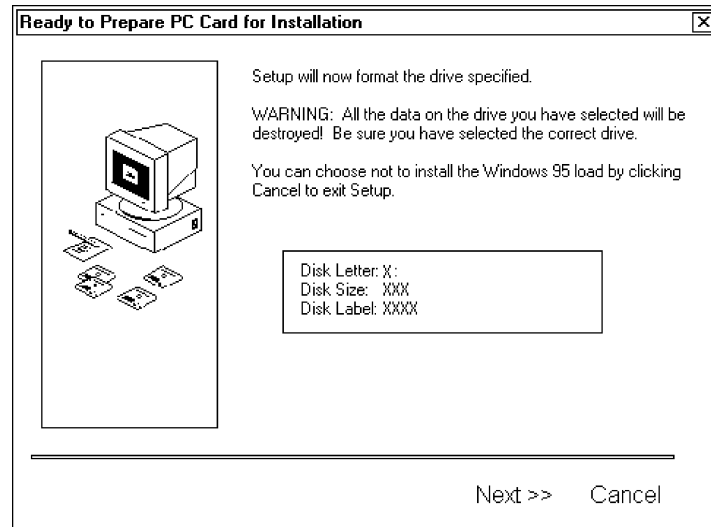
PC Card or Hard Disk Card Format

If a network drive is alphabetically mapped before the PC Card drive, a message box may be displayed informing you that:

▶ There was a network drive detected. The Windows mapping of PC Card drive letters and network drive letters can cause problems with the Windows 95 Installation program.

▶ There is a bug in Windows 95 where network mapped drives can prevent the PC Card drives from being formatted through a DOS window.

1. A Format screen appears to format the PC Card, instead of the standard DOS window. Click **Start** to begin.

```
┌─────────────────────────────────────────────┐
│ Format - Cab_card (E:)              [?][X]   │
│ Capacity:                                     │
│ ┌───────────────────────────┐▼  ┌─────────┐  │
│ │81.1 Mb                    │   │  Start  │  │
│ └───────────────────────────┘   └─────────┘  │
│ ┌─Format type──────────────┐    ┌─────────┐  │
│ │ ⦿ Quick (erase)          │    │  Close  │  │
│ │ ○ Full                   │    └─────────┘  │
│ │ ○ Copy system files only │                 │
│ └──────────────────────────┘                 │
│ ┌─Other options────────────┐                 │
│ │ Label:                    │                 │
│ │ ┌──────────────────────┐  │                 │
│ │ │CAB_CARD              │  │                 │
│ │ └──────────────────────┘  │                 │
│ │ ☐ No label                │                 │
│ │ ☑ Display summary when finished│            │
│ │ ☐ Copy system files       │                 │
│ └──────────────────────────┘                 │
│ ┌──────────────────────────────────────┐     │
│ └──────────────────────────────────────┘     │
└─────────────────────────────────────────────┘
```
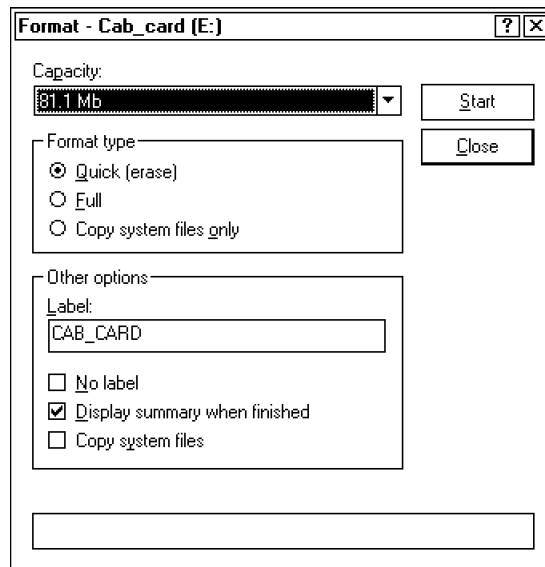
2. A warning message appears, click **OK** to continue.

```
┌─────────────────────────────────────────────────────────────┐
│ Format - Cab_card (E:)                                  [X]  │
│  ⊗   This drive is either a hard disk or a large removable   │
│      disk. Formatting it will destroy all files currently    │
│      on the drive. Are you sure you want to format this      │
│      drive?                                                  │
│              ┌────────┐   ┌────────┐                         │
│              │   OK   │   │ Cancel │                         │
│              └────────┘   └────────┘                         │
└─────────────────────────────────────────────────────────────┘
```
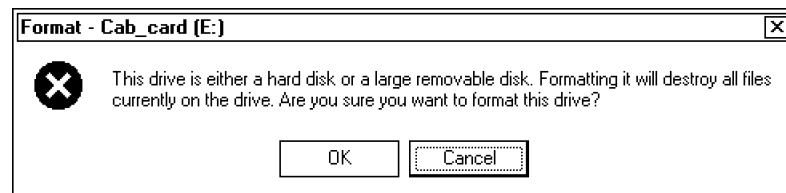
3. When the formatting is complete, click **Close** to exit the results, then click **Close** again to go to the 6110 Windows Toolkit Images screen (page 2-12).

```
┌─────────────────────────────────────────────┐
│ Format Results - Cab_card (E:)        [X]    │
│                                               │
│     84,865,024 bytes total disk space         │
│          0 bytes used by system files         │
│          0 bytes in bad sectors               │
│     84,865,024 bytes available on disk        │
│                                               │
│       2,048 bytes in each allocation unit     │
│      41,438 total allocation units on disk    │
│                                               │
│     14F3-1C47 serial number                   │
│              ┌────────┐                       │
│              │  Close │                       │
│              └────────┘                       │
└─────────────────────────────────────────────┘
```
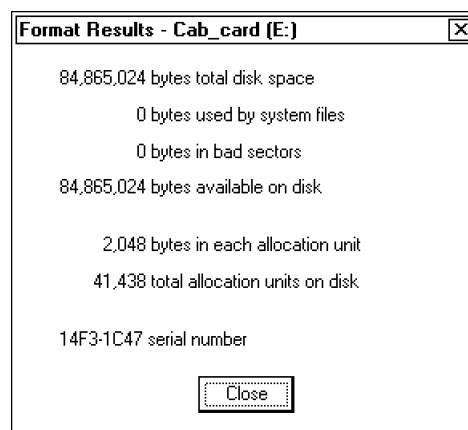
Select Drivers and Utilities to Copy

1. Select each component listed in the Select Components to Copy screen to be installed on the PC Card. **Disk Space Remaining** provides advance notice of the space available on the PC Card after the selected files are copied. This is updated with each selected component. Click **Next** to continue.

```
┌─────────────────────────────────────────────────────────────────────┐
│ Select Components to Copy                                        [X]  │
├─────────────────────────────────────────────────────────────────────┤
│ ┌─────────────────┐   Below are a list of drivers,  install, and     │
│ │                 │   configuration programs that can be copied to    │
│ │                 │   your Windows 95 image.  The options listed below│
│ │     [monitor]   │   will be copied to the c:\6110 directory of your │
│ │                 │   PC Card.  Once copied to the PC Card, you will  │
│ │                 │   need to remove the card and boot it in the 6110 │
│ │                 │   unit and then install or run the selected       │
│ │                 │   option.  Please read accompanying documents for │
│ │                 │   how to install the specific driver onto your    │
│ │                 │   Windows 95 load.                                │
│ │                 │                                                    │
│ │                 │   ☑ Intermec Configuration Utility (Install / Remove)   638 k │
│ │                 │                                                    │
│ │                 │   ☐ 16-Bit Internal Scanner Driver              30 k │
│ │                 │                                                    │
│ └─────────────────┘   ☐ 16-Bit External Scanner Driver              32 k │
│                       ☐ 32-Bit Internal Scanner Driver              85 k │
│                       ☐ Intermec NPCP Printer Installation Program  223 k │
│                       ☐ Intermec 6804 / 6805 Printer Driver         415 k │
│                       ☐ Intermec IrDA Driver Installation          1131 k │
│                       ☐ Magnetic Stripe Reader Driver               79 k │
│                       ☐ Proxim RangeLAN Radio Driver               262 k │
│                                                                       │
│                       ┌──────────────────────────────────────────┐  │
│                       │ Disk Space Remaining:          118058 k   │  │
│                       └──────────────────────────────────────────┘  │
│   ─────────────────────────────────────────────────────────────────  │
│                                          Next >>     Cancel          │
└─────────────────────────────────────────────────────────────────────┘
```

2. The Start Installation screen acknowledges that the driver files are ready to be copied. Click **Next** to load the files.

```
┌─────────────────────────────────────────────────────────────────────┐
│ Start Installation                                               [X]  │
├─────────────────────────────────────────────────────────────────────┤
│ ┌─────────────────┐   You are now ready to copy the driver files you │
│ │                 │   have selected..                                 │
│ │                 │                                                    │
│ │     [monitor]   │   Press the Next button to begin the copying      │
│ │                 │   process or the Back button to change the        │
│ │                 │   installation information.                       │
│ │                 │                                                    │
│ │                 │                                                    │
│ │                 │                                                    │
│ │                 │                                                    │
│ │                 │                                                    │
│ └─────────────────┘                                                   │
│   ─────────────────────────────────────────────────────────────────  │
│                            << Back    Next >>    Cancel              │
└─────────────────────────────────────────────────────────────────────┘
```
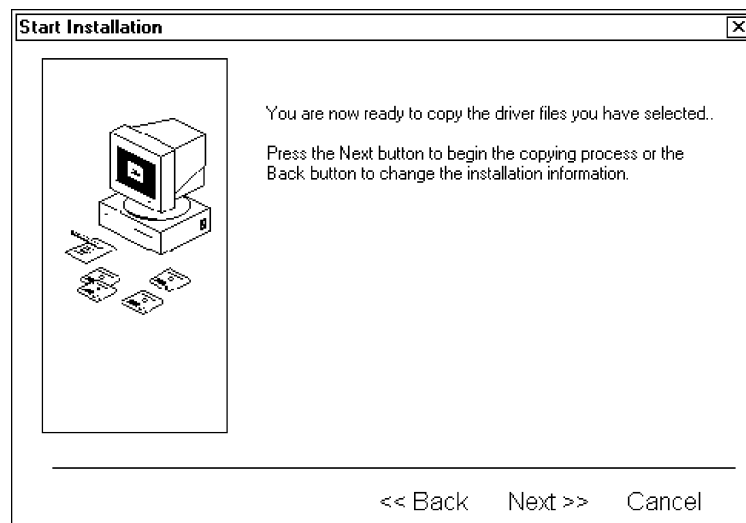
3. When the installation is complete, you will be prompted to read the text file for driver information. Click **OK** to continue.
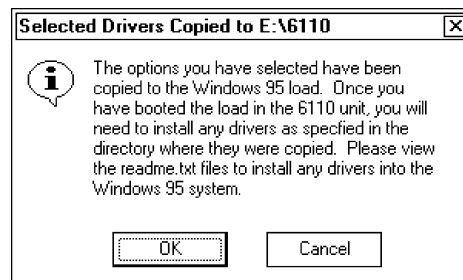
```
┌─────────────────────────────────────────────────┐
│ Selected Drivers Copied to E:\6110          [×]  │
├─────────────────────────────────────────────────┤
│          The options you have selected have been  │
│   (i)    copied to the Windows 95 load.  Once you │
│          have booted the load in the 6110 unit, you will │
│          need to install any drivers as specfied in the │
│          directory where they were copied.  Please view │
│          the readme.txt files to install any drivers into the │
│          Windows 95 system.                       │
│                                                   │
│           ┌──────────┐      ┌──────────┐          │
│           │    OK    │      │  Cancel  │          │
│           └──────────┘      └──────────┘          │
└─────────────────────────────────────────────────┘
```

4. When the installation is complete, the Set Video Panning Mode screen (page 2-11) prompts to either enable or disable the video panning mode. Click **OK** to finish the installation.

5. A Driver/Utility Installation Complete screen will close for this installation. Follow the instructions on stopping the card (page 2-19), then click **OK** to return to the Welcome screen (page 2-4).

```
┌─────────────────────────────────────────────────┐
│ Driver / Utility Installation Complete      [×]  │
├─────────────────────────────────────────────────┤
│          The drivers / utilities selected have been │
│   (i)    copied onto the PC Card at E:.           │
│                                                   │
│          You can now stop the drive by clicking once │
│          on the PC Card icon in the system tray below │
│          and issuing the stop command.  You may then │
│          remove the PC Card once Windows indicates it │
│          is safe to do so.                        │
│                                                   │
│                  ┌──────────────┐                 │
│                  │      OK      │                 │
│                  └──────────────┘                 │
└─────────────────────────────────────────────────┘
```

Video Panning Mode

The following self-explanatory Set Video Panning Mode screen prompts you to either enable or disable the video panning mode. Click **OK** to finish.

```
┌─────────────────────────────────────────────────┐
│ Set Video Panning Mode                      [×]  │
├─────────────────────────────────────────────────┤
│  The video panning mode allows the 6110 user to pan the 240 x 320 │
│  LCD screen window within a larger 640 x 480 Windows desktop. │
│  Panning is accomplished by placing the stylus in the center of the LCD │
│  screen and dragging it to the edge in the direction you wish to pan. │
│                                                   │
│  Panning is typically enabled for setup and system configuration, but then │
│  disabled after the custom 240 x 320 Windows 95 application has been │
│  developed.                                       │
│                                                   │
│     ⊙ Disable Panning - fixed 240 x 320 Windows desktop │
│                                                   │
│     ○ Enable Panning - virtual 640 x 480 Windows desktop │
│                                                   │
│                  ┌──────────────┐                 │
│                  │      OK      │                 │
│                  └──────────────┘                 │
└─────────────────────────────────────────────────┘
```

Windows Toolkit Images

When the Windows 95 Installation program completes the PC Card preparation, you are presented with a choice of Windows 95 images, as shown below.

The following choices are provided for this toolkit, but not necessarily available. If your PC Card is too small for certain images, the buttons for those images will be inactive or grayed-out. For example, with a 40 MB card, the full load at 120 MB and the cabinet files are too large, thus **Full** and **Cabinet** are grayed-out.

Click an active button to create an image, then go to the page listed with that image for continuing instructions.

- ► **Full** (page 2-13)
  Full Windows 95 Installation (approximately 120 MB)
- ► **Lite** (page 2-14)
  Lite Windows 95 Installation (approximately 60 MB)
- ► **Minimal** (page 2-16)
  Minimal Windows 95 Installation (approximately 24 MB)
- ► **Cabinet** (page 2-18)
  Windows 95 Cabinet Files card Installation
- ► **Cancel**
  Exits the installation to return to the Welcome screen (page 2-4).

► **NOTE:**   *Click respective **Details** buttons for additional information about each image, then click **OK** to return to this screen.*
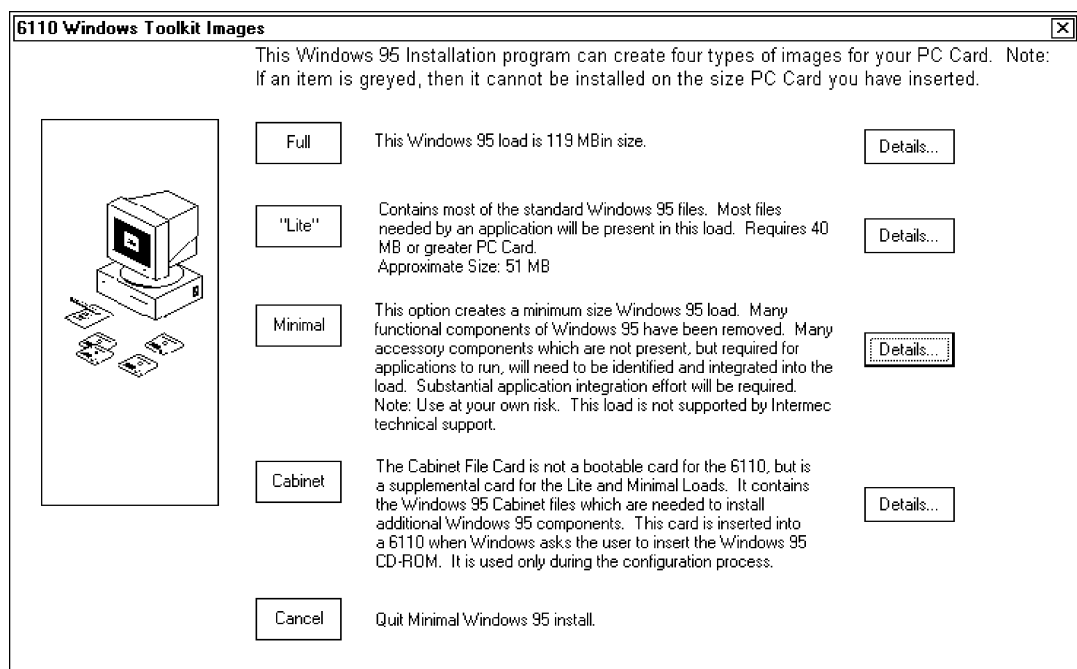
"Full" Windows 95 Image

This is everything Microsoft intended in a Windows 95 image. When you install a full Windows 95 image, use a formatted storage card greater than 130 MB, since the full installation requires at least 120 MB of space. The full Windows 95 image contains all the CAB files, so that additional components can be added without the Windows 95 CD. The CAB files are located in the *\Win95\6110\Images\Full\Win95* folder on the Windows 95 Toolkit CD, and use more than 40 MB of drive space. Once the system is configured and the application is running, these files can be deleted. However if deleted, they may need to be reinstalled for any future modification of your Windows 95 image.

1. The first screen verifies the PC Card drive letter. If necessary, click **Browse** to change the destination. Click **Next** to start the installation.
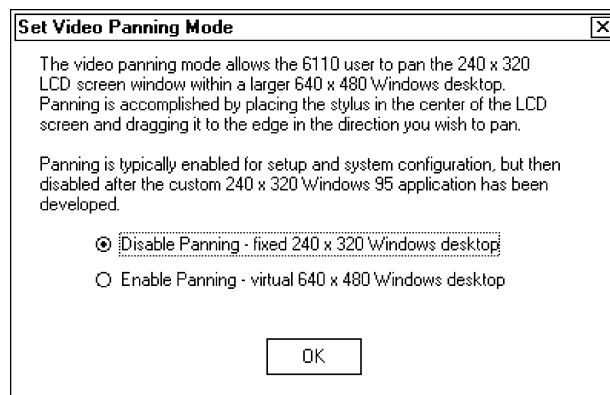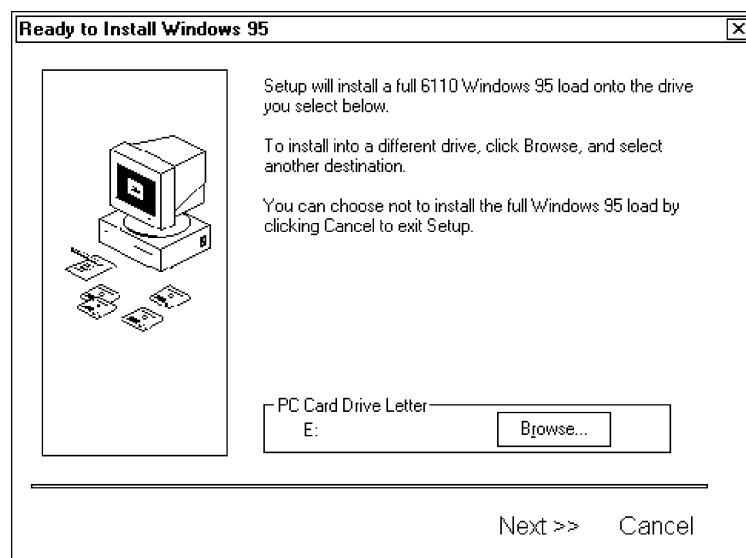

2. When the installation is complete, the Set Video Panning Mode screen (page 2-11) prompts you to either enable or disable the video panning mode. Click **OK** to finish the installation.

3. Per the following screen, stop the PC Card (page 2-19), then click **OK** to return to the Welcome screen (page 2-4).

After installing the Full Windows 95 image onto the PC Card, use the CD flash to reflash the 6110 Computer. See page 3-36 for instructions.

"Lite" Windows 95 Image

Two "lite" load options are available. **Lite I** includes dial-up networking, TCP/IP, and Microsoft Client. **Lite II** includes **Lite I** plus RS-485 networking.

These load options are stripped down versions of the full load, but provide the accessory components needed to install and run applications, without substantial application integration effort.

The Windows 95 CAB files are eliminated from the Lite images. Installing other Windows 95 components temporarily requires an additional PC Card containing the CAB files to be inserted into the 6110 Computer. You can create the Cabinet Files card, using the toolkit as described on page 2-18.

A Lite configuration requires a PC Card with at least 50 MB formatted, or about half with DriveSpace 3 compression. A Hard Disk Card can also be used.

1. Click the appropriate **Lite** button to continue.

```
Select Lite Load Option                                              [X]

          Lite I      Lite Load with Dial-up Networking, TCP/IP, and Microsoft Client


          Lite II     Lite Load with Dial-up Networking, TCP/IP, Microsoft Client, and
                      RS-485 Networking
```

2. Click **Next** to continue and go to step 3. If PC Card space needs to be compressed, click **Use DriveSpace 3 Compression**, then click **Next** to continue. Instructions for compressing the PC Card start on page 2-24. When done, return to this page to step 3.

```
Ready to Install "Lite" Windows 95                                   [X]

          Setup will install a "Lite" 6110 Windows 95 load onto the drive
          you select below.

          To install into a different drive, click Browse, and select
          another destination.

          You can choose not to install the Windows 95 load by clicking
          Cancel to exit Setup.



                    [ ] Use Drivespace 3 Compression

          ┌ PC Card Drive Letter ─────────────────┐
               E:                   Browse...

                                        Next >>    Cancel
```
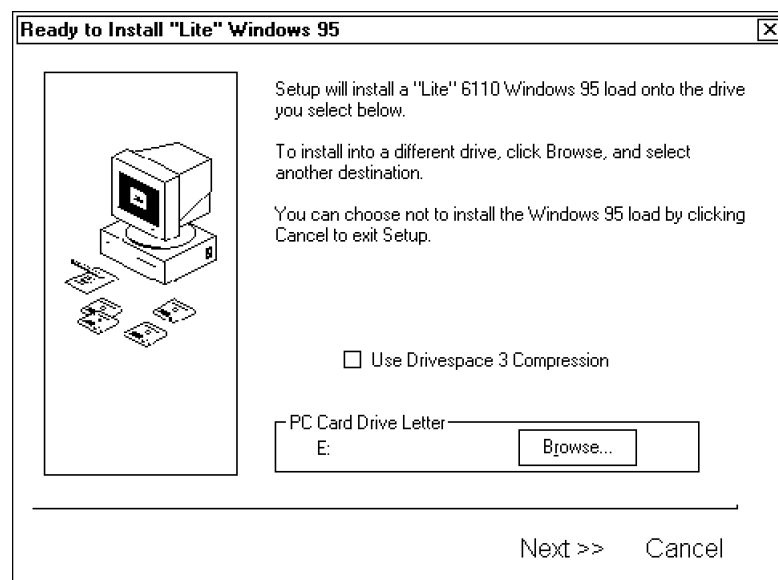
If the size of your PC Card is too small (such as 40 MB) to install this image uncompressed, you are prompted to compressed the drive. Click **OK** and follow the instructions starting on page 2-24. When done, return to this page to step 3.

```
┌────────────────────────────────────────────────────┐
│ Drivespace Compression Required               [X]   │
├────────────────────────────────────────────────────┤
│                                                      │
│   ╭───╮    To fit on a 40 Meg PC Card, the image will│
│   │ i │    need to be compressed.                    │
│   ╰───╯                                              │
│            A Drivespace 3 compressed volume will now │
│            be installed on the PC Card.              │
│                                                      │
│            Warning: All Data on the card will be     │
│            destroyed.                                │
│                                                      │
│         ┌──────────────┐     ┌──────────────┐        │
│         │     OK        │     │    Cancel     │       │
│         └──────────────┘     └──────────────┘        │
└────────────────────────────────────────────────────┘
```
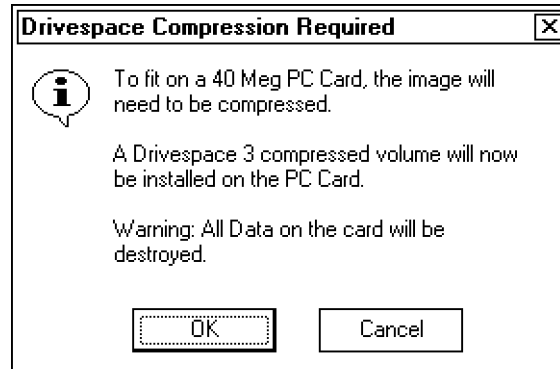
3. Select each component to be installed on the PC Card in the Select Components to Copy screen (page 2-10). **Disk Space Remaining** provides advance notice of the space available on the PC Card after the selected files are copied. Click **Next** to continue.

4. The Start Installation screen (page 2-10) acknowledges the driver files are ready to be copied. Click **Next** to load the files.

5. When the installation is complete, the Selected Drivers Copied screen (page 2-11) prompts to view the README.TXT file for driver installation information. Click **OK** to continue.

6. When the installation is complete, the Set Video Panning Mode screen (page 2-11) prompts to either enable or disable the video panning mode. Click **OK** to finish the installation.

7. Per the following screen, stop the PC Card (page 2-19), then click **OK** to return to the Welcome screen (page 2-4).

```
┌────────────────────────────────────────────────────┐
│ Lite Windows 95 Installation Complete          [X]  │
├────────────────────────────────────────────────────┤
│                                                      │
│   ╭───╮    The "Lite" 6110 Windows 95 load has been  │
│   │ i │    installed onto the destination drive      │
│   ╰───╯    specified.                                │
│                                                      │
│            You can now stop the drive by clicking    │
│            once on the PC Card icon in the system    │
│            tray below and issuing the stop command.  │
│            You may then remove the PC Card once      │
│            Windows indicates it is safe to do so.    │
│                                                      │
│              ┌──────────────┐                        │
│              │      OK       │                       │
│              └──────────────┘                        │
└────────────────────────────────────────────────────┘
```
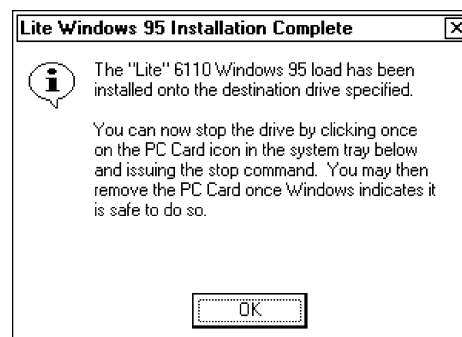
After installing the "Lite" Windows 95 image onto the PC Card, use the CD flash to reflash the 6110 Computer. See page 3-36 for instructions.

Minimal Windows 95 Image

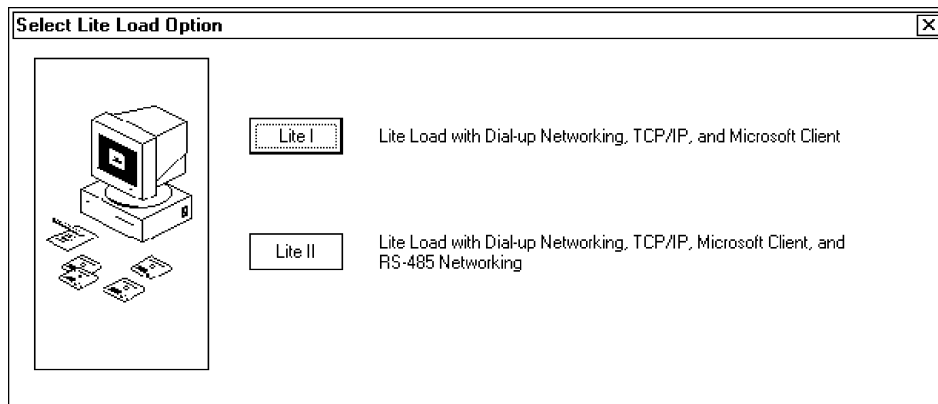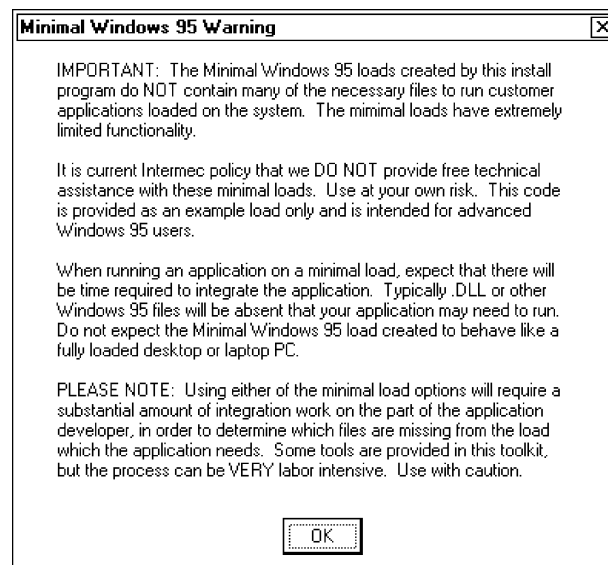▶**NOTE:** *None of the Minimal loads are supported by Intermec Technologies Corporation. They are supplied as example code only. Use these instructions and utilities only if you are highly skilled in configuring Windows 95 systems.*

The Minimal Windows 95 images are smaller because certain optional Windows 95 components are removed. Be aware that if you choose these smaller images, you do not have all the features and software configurations that a standard PC provides. Therefore, it may be necessary to add additional Windows 95 functionality to the Minimal or Lite load.

Windows is a fairly complex and intertwined operating system compared to DOS. Reducing its size below 80 MB and making it scalable at that level is an operation that Microsoft never intended. It is expected that if you install an application into a smaller than normal Windows 95 image, you will most likely see error messages issued, or your application does not run, all because of missing files. A Minimal Standard load is approximately 24 MB. After removing the INF and networking files, the Minimal Basic Load is reduced to approximately 14 MB. However, you should consider the Lite load, since it is only slightly larger and provides you with a more practical image (see page 2-14 for information about the "Lite" image).

Utilities are provided in the Windows 95 Toolkit to assist you with the integration of custom applications into the Minimal Windows 95 image. These utilities monitor file accesses while the application is running, then generate lists of files that may be needed from the full Windows 95 installation, for an application to run successfully. Any files found to be missing can then copied into your Minimal image from the CAB Files found in the Cabinet Files card.

1. The Minimal image opens with a warning message. Click **OK** to continue.

```
┌─ Minimal Windows 95 Warning ─────────────────────[X]─┐
│                                                      │
│  IMPORTANT:  The Minimal Windows 95 loads created by this install  │
│  program do NOT contain many of the necessary files to run customer │
│  applications loaded on the system.  The mimimal loads have extremely │
│  limited functionality.                              │
│                                                      │
│  It is current Intermec policy that we DO NOT provide free technical │
│  assistance with these minimal loads.  Use at your own risk.  This code │
│  is provided as an example load only and is intended for advanced  │
│  Windows 95 users.                                   │
│                                                      │
│  When running an application on a minimal load, expect that there will │
│  be time required to integrate the application.  Typically .DLL or other │
│  Windows 95 files will be absent that your application may need to run. │
│  Do not expect the Minimal Windows 95 load created to behave like a │
│  fully loaded desktop or laptop PC.                  │
│                                                      │
│  PLEASE NOTE:  Using either of the minimal load options will require a │
│  substantial amount of integration work on the part of the application │
│  developer, in order to determine which files are missing from the load │
│  which the application needs.  Some tools are provided in this toolkit, │
│  but the process can be VERY labor intensive.  Use with caution. │
│                                                      │
│                      ┌──────────┐                    │
│                      │    OK    │                    │
│                      └──────────┘                    │
└──────────────────────────────────────────────────────┘
```

2. Position the cursor over **Standard Minimal Load** or **Basic Minimal Load** to select that load. **Cancel Install** quits the installation and goes to the Welcome screen (page 2-4). Click **Details** for information about either minimal load, then click **OK** to return to this screen.

▶ **Standard Minimal Load**
Creates a standard Minimal Windows 95 image on a PC Card. This image is approximately 24 MB.

▶ **Basic Minimal Load**
Takes approximately 13.5 MB to create the smallest Windows 95 load. It does not contain any INF files, typical applets, networking dial-up components, or standard issue DLLs.
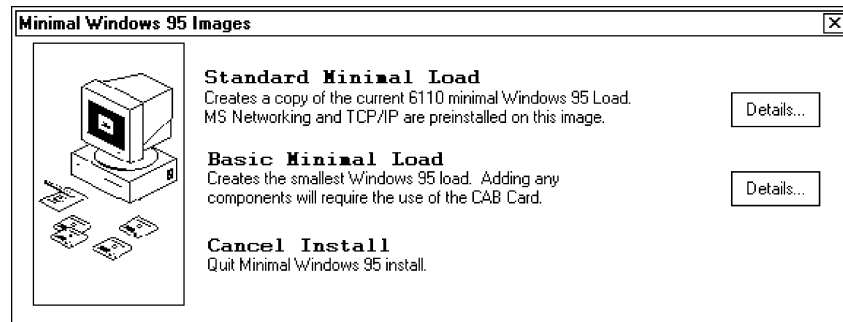
3. The Ready to Install screen (similar to page 2-14) appears with the PC Card drive used in this load. Click **Use DriveSpace 3 Compression** to compress PC Card space, if necessary, then click **Next** to continue.

   If the PC Card size is too small (such as 40 MB), the Drivespace Compression Required screen (page 2-15) prompts to compress the drive. Click **OK**.

   Instructions for compressing the PC Card start on page 2-24. When done, return to this page to step 4.

4. Select each component to be installed on the PC Card from the Select Component to Copy screen (page 2-10). **Disk Space Remaining** provides advance notice of the space available on the PC Card after the selected files are copied. Click **Next** to continue.

5. The Start Installation screen (page 2-10) acknowledges the driver files are ready to be copied. Click **Next** to load.

6. The Selected Drivers Copied screen (page 2-11) prompts you to read the text file for driver installation information. Click **OK** to continue.

7. The self-explanatory Set Video Panning Mode screen (page 2-11) prompts to enable or disable the video panning mode. Click **OK** to continue.

8. Per the following screen, stop the PC Card (page 2-19), then click **OK** to return to the Welcome screen (page 2-4).
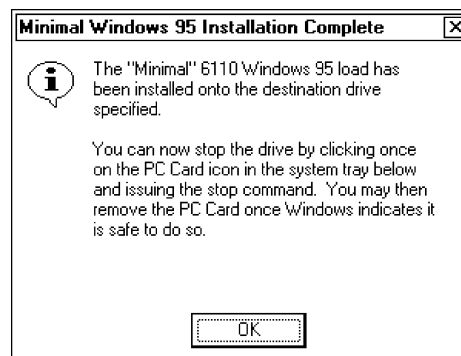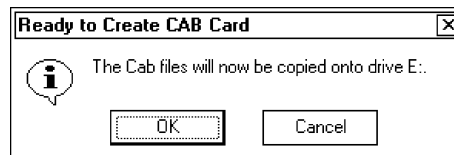
Windows 95 Cabinet Files Card

►**NOTE:**   *Insert a 48 MB or larger CAB Card in the PC Card slot **before** installing additional Windows 95 components, otherwise Windows does **not** recognize the CAB Card in the PC Card slot.*
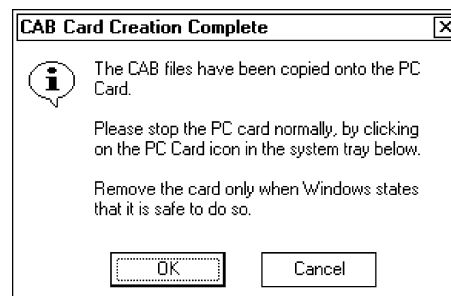
The Cabinet (CAB) Files card is not a bootable card, but is a supplemental card for the "Lite" and "Minimal" images. It has about 30 compressed CAB files required to install additional Windows 95 components. When these components are needed (such as dial-up networking), the files are extracted from the appropriate CAB files. Once the features are installed, remove the CAB Files card from the unit.

►**NOTE:**   *If CAB files are not found, a prompt to Insert Windows 95 CD-ROM appears. Quit the installation, install the CAB Files card in the 6110 Computer, then start the installation.*

1. The following screen indicates the CAB files are ready to be copied to the PC Card. Click **OK** to begin the installation.

```
┌─────────────────────────────────────────────┐
│ Ready to Create CAB Card                  [×] │
├─────────────────────────────────────────────┤
│   ┌─┐                                         │
│   │i│  The Cab files will now be copied onto  │
│   └─┘  drive E:.                              │
│                                               │
│        ┌──────────┐    ┌──────────┐           │
│        │    OK    │    │  Cancel  │           │
│        └──────────┘    └──────────┘           │
└─────────────────────────────────────────────┘
```

2. When done, the Cab Card Creation Complete screen appears. Stop the PC Card (page 2-19), then click **OK** for to the Welcome screen (page 2-4).

```
┌─────────────────────────────────────────────┐
│ CAB Card Creation Complete                [×] │
├─────────────────────────────────────────────┤
│   ┌─┐                                         │
│   │i│  The CAB files have been copied onto    │
│   └─┘  the PC Card.                           │
│                                               │
│        Please stop the PC card normally, by   │
│        clicking on the PC Card icon in the    │
│        system tray below.                     │
│                                               │
│        Remove the card only when Windows      │
│        states that it is safe to do so.       │
│                                               │
│        ┌──────────┐    ┌──────────┐           │
│        │    OK    │    │  Cancel  │           │
│        └──────────┘    └──────────┘           │
└─────────────────────────────────────────────┘
```

Exit the Setup

To exit the installation early, click **Cancel** or the close box in any of the screens. A prompt will appear to verify the early exit. Click **Resume** if to continue the installation, or click **Exit Setup** to return to the Welcome screen (page 2-4).

```
┌─────────────────────────────────────────────┐
│ Install                                   [×] │
├─────────────────────────────────────────────┤
│   ┌─┐                                         │
│   │?│  Setup is not complete. If you quit the │
│   └─┘  setup program now, the program will    │
│        not be installed.                      │
│                                               │
│        You may run the setup program at a     │
│        later time to complete the installation.│
│                                               │
│        To continue installing, click Resume.  │
│        To quit the Setup program, click Exit  │
│        Setup.                                 │
│                                               │
│        ┌──────────┐    ┌──────────┐           │
│        │  Resume  │    │ Exit Setup│          │
│        └──────────┘    └──────────┘           │
└─────────────────────────────────────────────┘
```
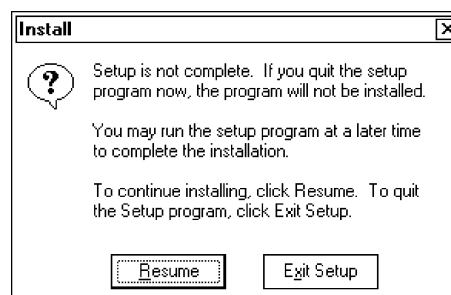
Stop the PC Card or Hard Disk Card

When requested to Stop the PC Card, follow these instructions carefully when stopping either the PC Card or the hard disk card.

1. Click the small **PC Card** icon located in the Windows desktop system tray, then click the message that pops up near that icon, like the following:

   | Stop SunDisk ATA FlashDisk | 🪪 | 2:58 PM |

2. Wait until a message box appears, similar to the following, then click **OK**.

   SunDisk ATA FlashDisk [X]
   ⓘ You may safely remove this device.
   [OK]

3. When the **PC Card** icon disappears from the Windows desktop system tray, remove the PC Card from the PC Card drive.

If the PC Card is to be ejected without being stopped first, the Windows desktop system will display an Unexpected PC Card Removal message. Double-click the PC Card icon in the system tray, then remove the check mark from the **Display warning . . .** box to delete this message. Click **OK** to exit.

DriveSpace 3 Volume

▶**NOTE:** *DriveSpace 3 compression applies to the PC Card "Lite" or "Minimal" Loads.*

Install DriveSpace 3 on Your PC

Once DriveSpace 3 is installed on the desktop, this application cannot be removed. Select **Start → Programs → Accessories → System Tools → DriveSpace** to access the DriveSpace 3 screen from the Windows desktop.

1. Select **Start → Settings → Control Panel**, then double-click **Add/Remove Programs** to access the Add/Remove Programs Properties. Click the **Windows Setup** tab, select **Disk Tools** from the list of components, then click **Details**.
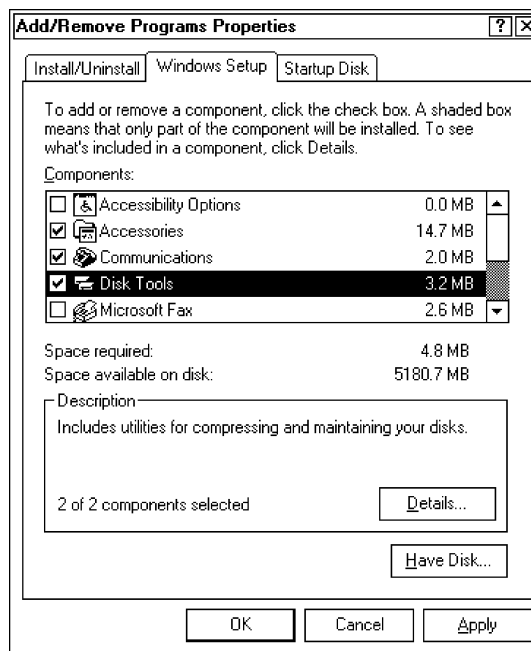
2. Select **Disk Compression Tools** and click **Apply**. Click **OK** to return to the Add/Remove Programs Properties. Click **OK** again to quit.

```
Disk Tools                                              [X]

To add or remove a component, click the check box. A shaded
box means that only part of the component will be installed. To see
what's included in a component, click Details.
Components:
 ☑ 🖳 Backup                                    1.2 MB  ▲
 ☑ 🖳 Disk compression tools                    2.0 MB

                                                         ▼
Space required:                                 4.8 MB
Space available on disk:                     5180.2 MB
┌ Description ──────────────────────────────────────┐
│ Utilities that will allow you to install disk compression after │
│ Windows is installed                              │
│                                      [ Details... ] │
└───────────────────────────────────────────────────┘
                              [   OK   ]  [ Cancel ]
```

DriveSpace 3 Not Found

Once DriveSpace 3 is installed on the desktop, these screens will no longer appear during an installation. If the following window appears, then you need to install DriveSpace 3 on your PC. Note that once installed on the Windows desktop, this application cannot be removed. Click **OK** to continue.

```
Drivespace 3 not found                    [X]

Drvspace 3 was not found in the Windows
directory of this PC.

Please install Drvspace 3  from the Control
Panel at Add/Remove Programs.  Select the
Windows Setup tab.

Drivespace 3 can also be installed from the
Microsoft Plus! pack.

            [      OK      ]
```

After an analysis, a DriveSpace 3 Version Warning screen advises you of the version level needed for the DriveSpace 3 installation. Take note of the version number, then click **OK** to continue on to the set up program.

```
Drivepace 3 Version Warning             [X]

If you are going to be using compressed
images on your 6110 device, then Drivespace
3 needs to be installed on this PC.  Please
install version 4.40.1111 or greater, if you wish
to create compressed images.

        [    OK    ]  [ Cancel ]
```
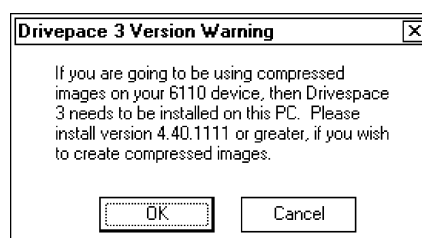
Remove the DriveSpace Volume

If DriveSpace Volume is detected on your PC Card, this has to be removed to make room for the image.

1. Click **OK** to continue with the removal.

```
┌─────────────────────────────────────────────┐
│ Drivespace Volume Found              [X]     │
├─────────────────────────────────────────────┤
│                                               │
│      The Drive selected contains a drivespace │
│      volume.  The volume will be removed during│
│      the install process.                     │
│                                               │
│              ┌──────────────┐                 │
│              │      OK       │                 │
│              └──────────────┘                 │
└─────────────────────────────────────────────┘
```
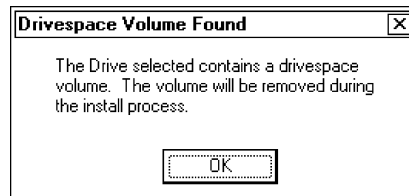
2. After the DriveSpace volume is removed, eject and reinsert the PC Card.

```
┌─────────────────────────────────────────────┐
│ Minimal Win95 Setup Program                   │
├─────────────────────────────────────────────┤
│                                               │
│     ⚠      Please eject the PC Card from your computer│
│                                               │
│                                               │
└─────────────────────────────────────────────┘
```
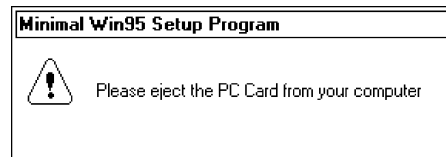
3. If an Unexpected PC Card Removal message appears, disregard this message and click **OK** to close the message. See page 2-19 to disable the Unexpected PC Card Removal message.

```
┌─────────────────────────────────────────────┐
│ Unexpected PC Card Removal            [X]     │
├─────────────────────────────────────────────┤
│ You should use the PC card icon on the taskbar to stop│
│ PC cards before removing them.  Removing cards│
│ without warning the system can cause unexpected│
│ problems.                                     │
│                                               │
│ ☐ Don't display this warning again.           │
│                                               │
│                         ┌──────────────┐      │
│                         │      OK       │      │
│                         └──────────────┘      │
└─────────────────────────────────────────────┘
```
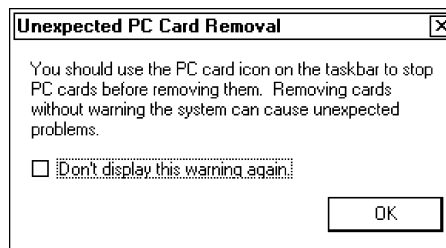
4. Wait for the prompt, then insert the PC Card in the PC Card drive.

```
┌─────────────────────────────────────────────┐
│ Minimal Win95 Setup Program                   │
├─────────────────────────────────────────────┤
│                                               │
│     ⚠      Please insert the PC Card into your computer.│
│                                               │
│            If it is already inserted, eject it and re-insert it.│
│                                               │
└─────────────────────────────────────────────┘
```
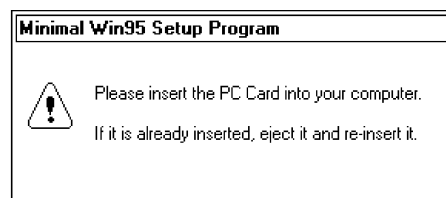
5. If the PC Card can be formatted, go to page 2-8. If the PC Card cannot be formatted, the following prompt appears. Click **OK** to continue.

```
┌─────────────────────────────────┐
│ Format                      [×]  │
├─────────────────────────────────┤
│   ⓘ   This drive cannot be       │
│        formatted.                │
│                                  │
│          ┌──────────┐            │
│          │    OK    │            │
│          └──────────┘            │
└─────────────────────────────────┘
```
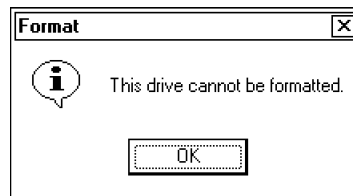
6. Click **OK** at the next prompt which states the format was not completed.

```
┌─────────────────────────────────┐
│ FORMATR                     [×]  │
├─────────────────────────────────┤
│   ⚠   Format Error - Format not  │
│        completed                 │
│                                  │
│          ┌──────────┐            │
│          │    OK    │            │
│          └──────────┘            │
└─────────────────────────────────┘
```

7. The last prompt appears to say the PC Card could not be formatted. You will have to redo the installation with another PC Card. Click **OK** to return to the Welcome screen on page 2-4.

```
┌─────────────────────────────────┐
│ Format Error                [×]  │
├─────────────────────────────────┤
│   Disk format did not occur.  The install │
│   program will now exit.  Please restart this │
│   program and insert the PC Card on which │
│   you wish to install the Windows 95 load. │
│                                  │
│                                  │
│          ┌──────────┐            │
│          │    OK    │            │
│          └──────────┘            │
└─────────────────────────────────┘
```
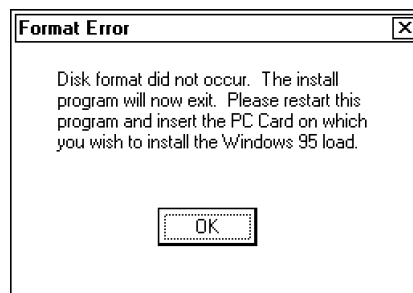
Mount the New Compressed Drive

▼CAUTION: **Do NOT click *Next* in the Mount the New Compressed Drive screen until all steps listed are complete and the system recognizes the PC Card was reinserted (listen for the second double-beep).**

1. As instructed, stop, remove and reinsert the PC Card, then click **Next**.

```
┌─────────────────────────────────────────────────────────┐
│ Mount the New Compressed Drive                       [X] │
├─────────────────────────────────────────────────────────┤
│  Windows now needs to mount the new compressed drive     │
│  installed.  To do this properly, the PC Card needs to   │
│  be stopped, ejected, and reinserted.                    │
│                                                          │
│  Please perform the following steps to properly mount    │
│  the new compressed drive:                               │
│                                                          │
│  1.  Stop the PC Card by clicking on the PC Card icon    │
│  in the System Tray below, then select the stop option.  │
│                                                          │
│  2.  Wait for Windows to put up the dialog which states  │
│  that it is safe to remove the card.  (Click OK.)        │
│                                                          │
│  3.  Remove and re-insert the PC Card and wait for       │
│  Windows to recognize it.  Windows will beep and the PC  │
│  Card icon will reappear in the System Tray.             │
│                                                          │
│  4.  Click on the "Next>>" button below.                 │
│                                                          │
│  Important:  It is important not to rush this process.   │
│  Please wait for the beeps and for the "wait" cursor to  │
│  be gone from the screen.  Failure to wait can cause     │
│  the compressed drive not to be properly detected.       │
│                                                          │
│             Next>>            Cancel                     │
└─────────────────────────────────────────────────────────┘
```

2. If the compressed drive was mounted properly, go to step 8 on page 2-26.

    If the compressed drive was not mounted on your PC, as in the Compressed Drive Not Found screen, click **OK** then wait for the DriveSpace 3 screen to appear.

```
┌─────────────────────────────────────────────────────────┐
│ Compressed Drive Not Found                           [X] │
├─────────────────────────────────────────────────────────┤
│  It would appear the the compressed drive was not        │
│  mounted by your system .                                │
│                                                          │
│  Some Windows 95 systems do not automatically mount      │
│  compressed drives.  This is a known Windows 95 problem. │
│  (Please see Article ID: Q130110 in the Microsoft        │
│  support database.)  This install program will now start │
│  the Drivespace 3 utility in your Windows directory.     │
│                                                          │
│  Please manually mount the compressed volume on drive E: │
│  using the Drivespace 3 utility.  To do this click on    │
│  E:, select the "Advanced" Menu item, then select        │
│  "Mount."                                                │
│                                                          │
│  IMPORTANT: If the host drive is listed as hidden,       │
│  please "unhide" it by REMOVING the check in the "Hide   │
│  Host Drive" box.  To find the check box just double     │
│  click on the E: drive letter while in Drivespace 3 and  │
│  a dialog will appear.                                   │
│                                                          │
│  Once the compressed drive has been mounted, please exit │
│  the Drivespace 3 utility to return to this install      │
│  program.                                                │
│                                                          │
│                      [  OK  ]                            │
└─────────────────────────────────────────────────────────┘
```

3. Select to highlight the physical drive, in this example drive E:, then from the toolbar, select **Advanced → Mount**.

```
DriveSpace 3                                              _ □ ✕
 Drive  Advanced  Help

  Drives on this computer:

  💾 3½ Floppy (A:)          3.5" Floppy drive
  ⊐  (C:)                   Physical drive
  ▬  Min95 (E:)             Physical drive
          ▸
```
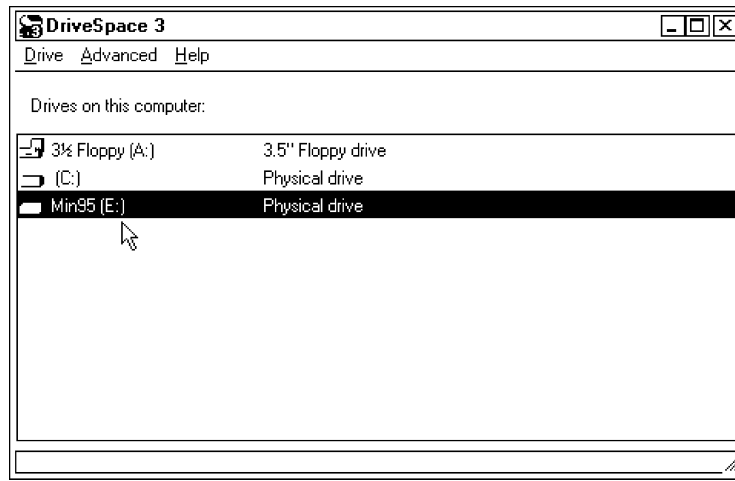
4. The Mount Drive screen confirms the new compressed drive, usually the next consecutive letter. Change this drive letter, if necessary. Click **OK** to return to the DriveSpace 3 screen with the new drive.

```
Mount Drive                                      ? ✕

  Select the volume file you want to mount.

  Volume file  E:\DRVSPACE.000     ▼          [   OK   ]

  When mounting a compressed drive, you need to    [ Cancel ]
  assign a drive letter to the compressed volume file.

  What drive letter do you want to use?  F  ▼
```
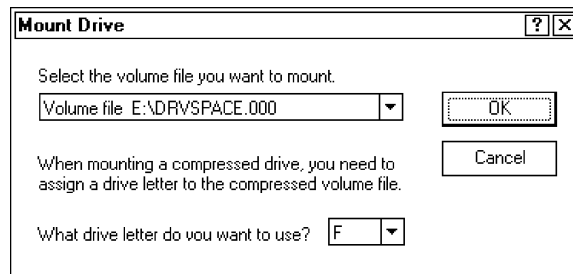
5. If the physical drive was successfully mounted, the following screen appears. Click **OK** to return to the DriveSpace 3 screen.

```
DriveSpace Operation Complete                         ✕

   (i)      Drive E has been mounted.

                                      [   OK   ]
```
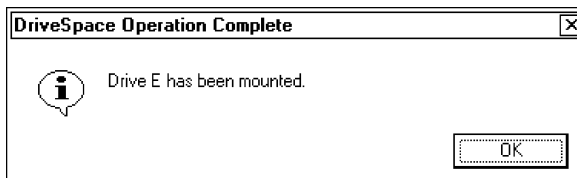
6. Note that the new host drive for the compressed drive, drive F: in this example, is a hidden drive. To make this drive visible, highlight the new drive, then from the toolbar, select **Drive → Properties**.
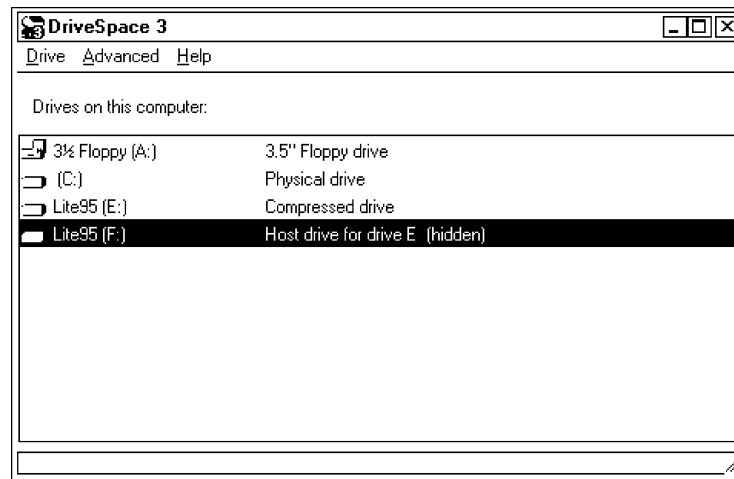
7. Remove the check mark from **Hide this host drive** in the Compression Properties, then click **OK** to return to the DriveSpace 3 screen. With the newly created host drive now visible, the word "(hidden)" removed, close the DriveSpace 3 screen and return to the installation.
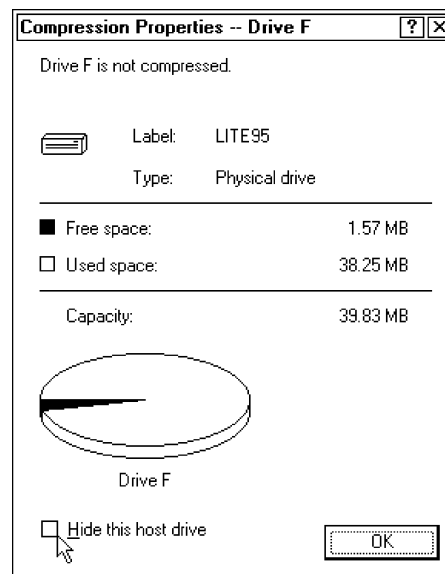
8. The Compressed Drive Created screen lists the assigned virtual host drive and physical drive. Click **OK** to continue.
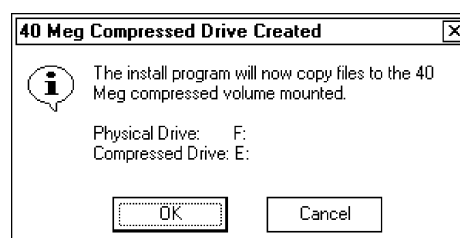
Hard Disk Cleanup

At some point during a "Lite" or "Minimal" load, you may be prompted to "clean up" or purge old or unnecessary files from your PC Card to make room for the load. Click **Disk Cleanup** to continue.
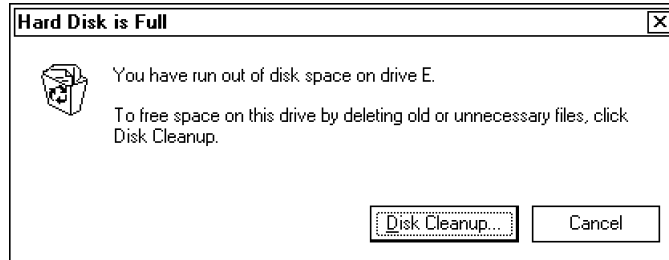
You will be given a choice to completely delete the old files from the PC Card, or elect to move the files to the desktop Recycle Bin so that you can review the files before deleting them completely. Click **OK** to purge the PC Card, then return to the installation.
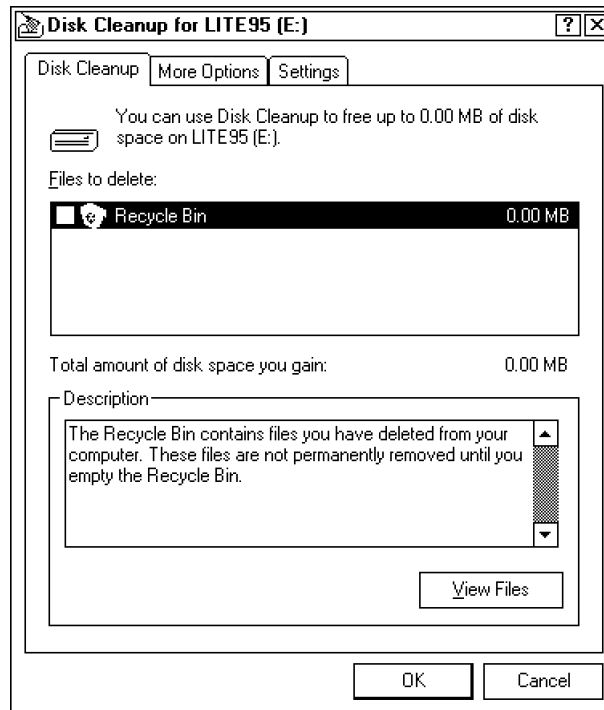
View 6110 Technical Documentation

Choosing this option brings up your Internet browser and displays a default page with links to documentation on the Windows 95 Toolkit CD. After the default page is displayed, you can view the *6110 Hand-Held Computer User' Guide*, this technical reference, and the following *Developer Notes* by clicking hot links on that page. Links to the following documents are also on this page:

  ▶ **Drivers/utilities**
    Descriptions of drivers and utilities.

  ▶ **Ports**
    6110 COM port descriptions.

  ▶ **Development tips**
    Development tips, including what is recommended for development panning (how to use, enable, or disable panning) and TCOM (why you might want to reset after TCOM).

  ▶ **DOS: Porting from a 6100**
    Porting application from a 6100 Hand-Held Computer.

  ▶ **Frequently Asked Questions**
    A collection of frequently asked questions.

  ▶ **Known Issues**
    Outstanding issues for the 6110 Computer.

  ▶ **Troubleshooting**
    A set of helpful troubleshooting hints.

  ▶ **Links**
    A set of links to more useful information, such as these and others:

      ▶ Intermec web site: http://www.intermec.com
      ▶ Intermec Bulletin Board: http://norbbs.norand.com/index.htm
      ▶ Microsoft web site: http://www.microsoft.com

View Release Notes

Choose this option to generate a text box with the latest updates for the 6110 Computer Windows 95 Toolkit since this publication was created. Click **OK** to return to the Welcome screen (page 2-4), or click **Cancel** to quit the installation.

```
RELNOTES.TXT                                          [X]

PEN*KEY 6110 Win95 Toolkit VX.XX                        ▲
RELEASE NOTES
XX-XX-XX

This document contains confidential information
and is proprietary to Intermec Technologies Corporation.
It is being supplied to you with the express understanding
that the information contained herein be held in
confidence by you.  This document is not to be copied,
distributed, or displayed to third parties without the
express consent of Intermec Technologies Corporation, and
shell be returned to Intermec Technologies Corporation
upon written request.                                   ▼

          Release notes for 6110 Win95 Toolkit VX.XX

        OK                              Cancel
```

Windows 95 Device Drivers

▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶   ▶

▶**NOTE:**   *Tool icons are shown to the left of related menu options.*

This section contains installation and configuration of devices and peripherals, software utilities, and suggestions about Windows 95 and your 6110 Computer.

Display Panning

The display software comes preinstalled as part of the Windows 95 images. No modifications should be necessary for normal operation. However, as an aid to developers, the following capabilities are provided:

User-definable display orientation
Includes two portrait and two landscape orientations.

User-definable "virtual" screen resolutions
Although the physical display is limited to 320 x 240, the virtual screen can be much larger (such as 640 x 480). When this occurs, the physical display acts as a viewport into the virtual screen.

Display panning allows you to view different areas of a virtual screen. Panning can be either application-based or display-based (with appropriate pen driver). See *Docs\6110DVTP.HTM* on the Windows 95 Toolkit CD for more information.

Auto Panning

Auto Panning mode causes the display driver to automatically pan, so the active window remains displayed inside the viewport. This is useful, for example, when dialogs or error messages pop up outside the current viewing area. This is enabled or disabled using the Pan Track option.

Pan Border

This invisible border extends inward a specific distance from the edges of the physical display. Panning occurs when the pen is placed outside of the pan border and then dragged into the border. Drag panning enables working inside the pan border without accidentally causing the display to pan.

Panning

Panning is a mechanism, by which you can move the information around within the physical display to view the entire virtual display area. When Windows starts up, the physical display provides visibility into the area located at the upper-left corner of the virtual screen. Pan to the right or downward, or both to see other parts of the virtual display. Pan to the left or upward to get back.

FTP Server

FTPDWIN.EXE is the Windows version of the Intermec File Transfer Protocol (FTP) Server.

FTPDWINNW.EXE is the Non-Windows version of the Intermec FTP Server.

FTPDWIN and FTPDWINNW are the Intermec Internet FTP server processes found in the *\Drivers\Rs-485\ftp* folder on the Toolkit CD. These are part of the Intermec communication package which includes NRINET and WINCFG.

Besides servicing FTP client requests, the FTP server also sends discovery packets or "heartbeats" to notify prospective clients of FTP server availability. The server can be invoked from an application or command line using this format:

```
ftpd [–hseconds] [–pport]
```

–*hseconds*

> Sets the interval between heartbeats in seconds. A value of zero turns the heartbeat off. *Default is 30 seconds.*

–*pport*

> Sets the User Datagram Protocol (UDP) port that the heartbeat will be sent on. *Default port is "52401."*

Command Line Options:

/?   Help Screen dialog is displayed.

–*H*   Sets the interval between heartbeats in seconds. A value of zero (0) turns the heartbeat off. *Default is 30 seconds.*

–*L*   Sets the logging on or off. *Default is off.*

–*P*   Sets the UDP port to which the heartbeat will be sent. *Default port is "52401."*

–*Q*   Sets the port to which the FTP server will listen for connections. *Default is 21.*

–*R*   Sets the FTP mount point to this directory. *Default is the root directory of the drive from which the FTP program was executed.*

The FTP server currently supports the following FTP requests:

> **ACCT**
> Specifies account (this is ignored).
>
> **CDUP**
> Changes to the parent folder of the current working folder.
>
> **CWD**
> Changes the working folder.
>
> **DELE**
> Deletes a file.
>
> **HELP**
> Gives help information.
>
> **LIST**
> Gives list files in a folder *(same as the **ls –lgA** command).*
>
> **MKD**
> Makes a folder.
>
> **MODE**
> Specifies the data transfer mode *(always use binary).*

NLST
Gives a name list of files in the folder *(same as the **ls** command)*.

NOOP
Does nothing.

PASS
Specifies a password.

PORT
Specifies a data connection port.

PWD
Prints the current working directory or folder.

QUIT
Terminates a session.

RETR
Retrieves a file.

RMD
Removes a directory or folder.

RNFR
Specifies rename-from file name.

RNTO
Specifies rename-to file name.

SITE
The following nonstandard or operating system-specific commands are supported by this request. Those using Microsoft FTP clients, precede site commands with "quote," for example: "quote site status."

TIMEOUT
Toggles the idle timeout between 120 and 1200 seconds. Default is 120 seconds. If the timer expires with no activity between the client and server, the client connection is disconnected (SITE TIMEOUT).

BOOT
Reboots the server operating system. This causes the server system to reboot. The FTP server will shut down before the reboot occurs and all client connections will be terminated (SITE BOOT).

EXIT
Exits the FTP server. This shuts down the FTP server causing all client connections to be terminated (SITE EXIT).

STATUS
Returns the current settings of the FTP server. MAC, serial number, model, IP address, heartbeat, and operating system memory usage information are returned.

HELP
Gives site command help information (SITE HELP).

STOR
Stores a file.

SYST
Shows the type of server operating system.

TYPE
Specifies the data transfer type *(binary transfers only)*.

USER
Specifies the user name.

▶ **NOTE:** *The following "X" commands are normally not used.*

> **XCUP**
> Changes the parent directory of the current working directory.
>
> **XCWD**
> Changes the current directory.
>
> **XMKD**
> Creates a directory.
>
> **XPWD**
> Prints the current working directory.
>
> **XRMD**
> Removes a directory.

The remaining FTP requests specified in RFC 959 are recognized, but not implemented.

The banner returned by IN.FTPD in the parenthetical portion of its greeting shows the FTP server version number as well as the MAC, serial number, and operating system of the machine hosting the server.

Modem Support

There are currently three modem toolkits included on the 95 Toolkit CD. These modem toolkits are located in the *\Drivers\Modems* folder on the Windows 95 Toolkit CD.

- ▶ TDK Global Class 2814 (DF2814)
- ▶ TDK CyberExpress 5600 (DF5600)
- ▶ TDK Global Freedom 5660 (DF5660)

Release notes include:

- ▶ QuickLink III Install patch
- ▶ Online Help
- ▶ Notes for DOS and INSTALL.EXE
- ▶ UltraPort ™

Pen Alignment

The PenAlign application, PENALIGN.EXE, calibrates the pen for a specific hardware unit. This calibration gives the pen driver the information it needs, so that a position on the touch panel corresponds properly with that position on the display. In simple terms, this means the Windows cursor and the tip of the pen are aligned to the same location on the screen.

When the pen alignment process is complete, the calibration values are stored permanently with the hardware unit. Pen alignment should be necessary only once. On any subsequent use of the pointing device, the stored pen calibration values are used.

1. From the Windows desktop, select **Start** → **Program** → **Pen Align** from the list of programs. It is only necessary to run PenAlign the first time. A target (or crosshair) is displayed on the upper-left corner of the screen.

```
┌─────────────────────────────────┐
│ Pen Alignment Utility - v1.15  ⊠│
│ ⊕─────                           │
│ │                               │
│                                 │
│                                 │
│                                 │
│                                 │
│                                 │
│                                 │
│          29 seconds left        │
│                                 │
└─────────────────────────────────┘
```
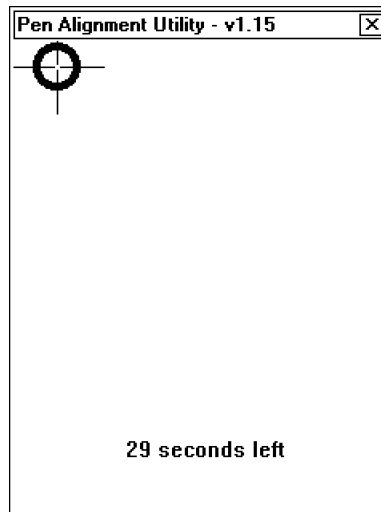
2. Tap the pen firmly at the center of this target. You should hear a click and see two sets of x,y coordinate values display on the screen. Tap two more times in this same way at the center of this target.

3. After three taps on the target, the crosshair moves to the upper-right corner of the screen. Repeat the three taps as described above. Continue this process for the lower-left and lower-right corners of the screen.

4. After all four targets have been tapped three times, the Fine-tune Calibration screen appears to verify the alignment, and if necessary, to fine-tune the calibration. Press the pen on an open area of the screen to determine how the Windows cursor matches the location of the pen tip.

```
┌─────────────────────────────────┐
│ Fine-tune Calibration          ⊠│
│           28 seconds left        │
│ ▣                            ▣  │
│  ┌─ Cursor Offset ─┐             │
│  │      ┌────┐     │  ┌──────┐   │
│  │      │ Up │     │  │ Save │   │
│  │      └────┘     │  └──────┘   │
│  │ ┌────┐ ┌─────┐  │  ┌──────┐   │
│  │ │Left│ │Right│  │  │Cancel│   │
│  │ └────┘ └─────┘  │  └──────┘   │
│  │     ┌──────┐    │  ┌──────┐   │
│  │     │ Down │    │  │ View │   │
│  │     └──────┘    │  └──────┘   │
│  ┌─ Relative Cursor Speed ─┐     │
│  │     ┌──────────┐        │     │
│  │     │Slower Vert│       │     │
│  │     └──────────┘        │     │
│  │ ┌──────────┐┌──────────┐│     │
│  │ │Faster Horz││Slower Horz││   │
│  │ └──────────┘└──────────┘│     │
│  │     ┌──────────┐        │     │
│  │     │Faster Vert│       │     │
│  │     └──────────┘        │     │
│  ┌──────────────────────┐       │
│  │     Recalibrate      │       │
│  └──────────────────────┘       │
│ ▣                            ▣  │
└─────────────────────────────────┘
```
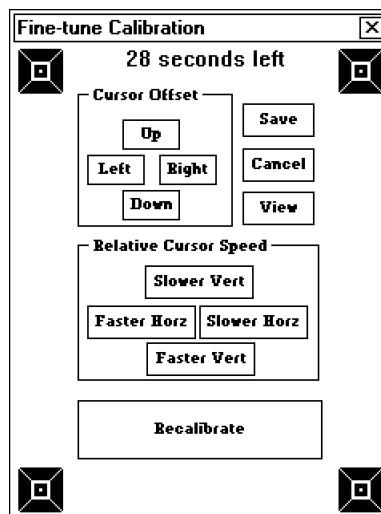
Left
Move the cursor to the left with respect to the tip of the pen.

Right
Move the cursor to the right with respect to the tip of the pen.

Up
Move the cursor up with respect to the tip of the pen.

Down
Move the cursor down with respect to the tip of the pen.

SlowerVert
Move the cursor more slowly in the vertical direction with respect to the tip of the pen. Use this when the cursor matches well on the top of the screen, but is lower then the pen tip at the bottom of the screen.

FasterVert
Move the cursor more quickly in the vertical direction with respect to the tip of the pen. Use this when the cursor matches well at the top of the screen, but is higher than the pen tip towards the bottom of the screen.

SlowerHorz
Works similar to SlowerVert, except the movement is in the horizontal direction.

FasterHorz
Works similar to FasterVert, except the movement is in the horizontal direction.

When finished with the fine-tuning, click **Save** to permanently save the new calibration values or click **Cancel** to ignore the new values and continue using the old calibration.

Printer Installation

There are several printers supported for your 6110 Computer. Follow the instructions below to install the appropriate printer.

▶ **NOTE:**   *Before starting this installation, determine the drive letter for your CD-ROM drive.*

By default the 6110 Computer monitors video activity. Installing IrDA will create a changing desktop icon in the Windows desktop system tray. This will keep the 6110 Computer from executing a timeout suspend. To avoid this power management issue, use the SC400CFG.COM configuration utility to disable monitoring of video activity. Instructions for installing and running the SC400CFG.COM configuration utility can be found in Section 4 on page 4-3.

Install IrDA Printer

If you added IrDA printing, go to the next set of steps to install IrDA onto the 6110 Computer. If not, do the following to add the necessary IrDA files onto a PC Card.
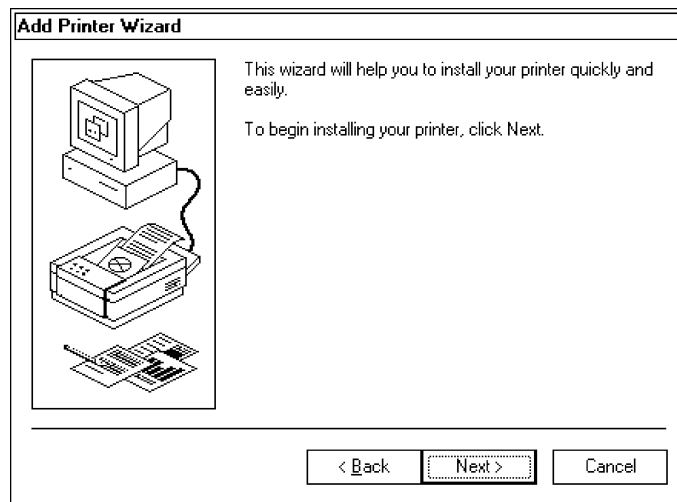
1. To add these files, insert a PC Card in the PC Card drive of the computer and start up the Toolkit CD. Do the steps as described in Section 2 to the PC Card Options screen (page 2-7).

2. Click **Copy Selected Drivers . . .** , then click **OK**.

3. Select the **Intermec IrDA Driver Installation** option from the Select Components to Copy screen (page 2-10) and click **Next** to continue.

Follow the remaining screens to finish loading IrDA files onto the PC Card. When loaded on the PC Card, stop the card then remove it from the computer.

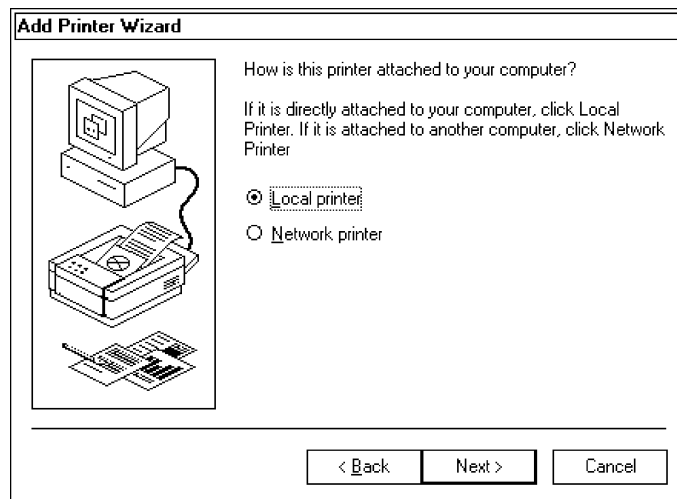1. Place the PC Card (with the new IrDA files) in the 6110 Computer and press **[I/O]** to boot up.

2. After Windows 95 comes up, double-tap the **My Computer** desktop icon, the **6110** folder, then the **IrDA** folder.

3. Double-tap **setup.exe** to run the Setup executable. When prompted to install Microsoft Infrared Support, tap **Yes** to access the Add Infrared Device Wizard.
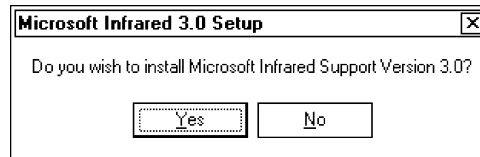
4. The first Add Infrared Device Wizard screen lists features that are enabled once Microsoft Infrared Support is installed. Tap **Next** to continue.
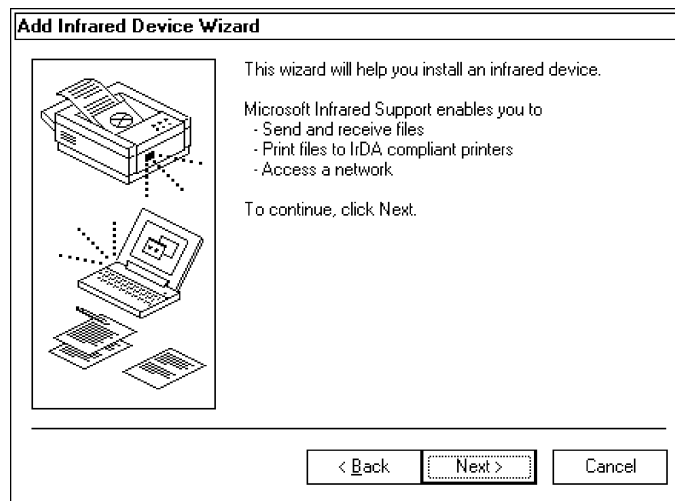
5. Select **Intermec** from the **Manufacturers** list, then select the **Norand 6110 IrDA Port** infrared device. Tap **OK** to continue.
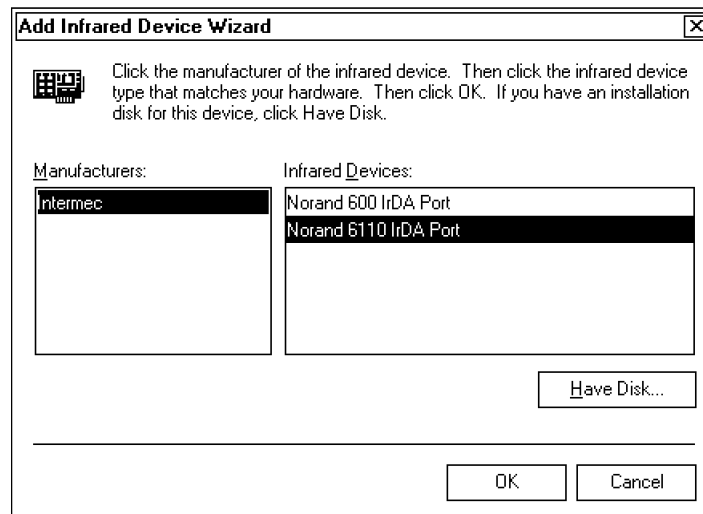
6. You may be prompted to insert the Windows 95 Toolkit CD to locate any files not readily found by the system. Enter the correct path in **Copy files from**, then click **OK** to copy the files from their correct locations.

    If you are prompted for a file that is not listed here, select **Start** → **Find** → **Files or Folders** and use the Find: All Files application to locate the correct path for each file on the Windows 95 Toolkit CD.

    ▶ SECUR32.DLL   *\Win95\6110\Images\Full\Windows\System*
    ▶ NDISHLP.SYS   *\Win95\6110\Images\Full\Windows*
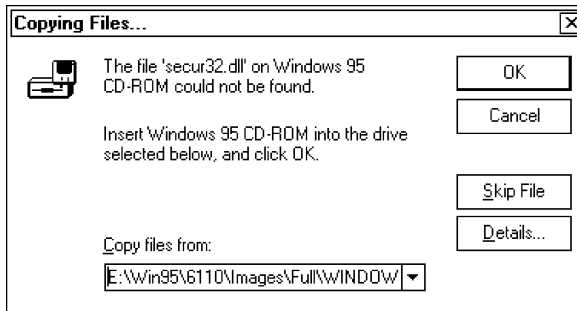
7. The next screen allows you to either use the defaults or change the settings. Tap **Next** to continue with the recommended default settings.
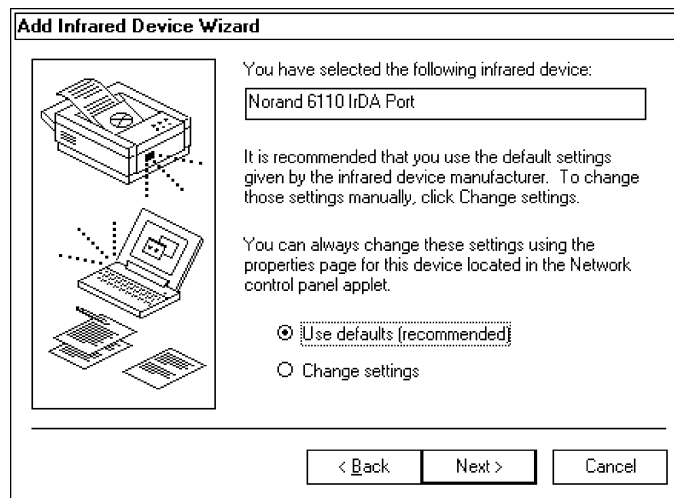
8.   Tap **Finish** to complete installing the Norand® 6110 IrDA Port device.
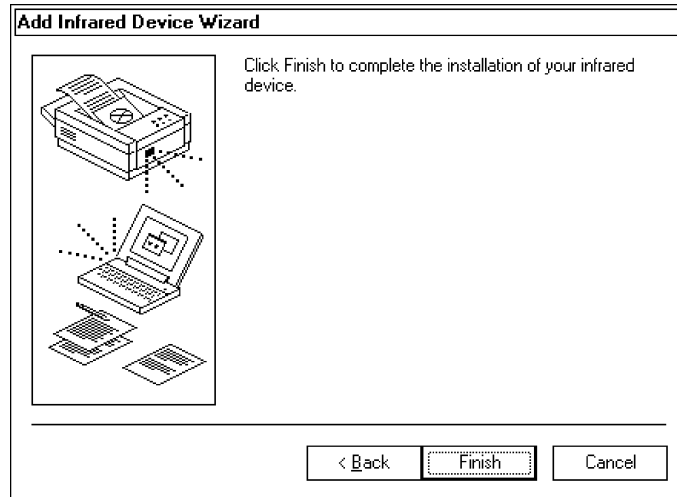
The Systems Settings Change screen informs you that the setup will now reboot the computer. Tap **OK** and wait for the system to reboot. After Windows 95 comes up again, close the remaining desktop applications.
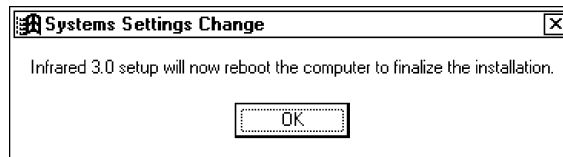
▶**NOTE:**   *There may be a conflict issue with Dial-Up Networking. If the IrDA desktop icon does not appear on the screen after the reboot, select **Start** → **Settings** → **Control Panel**, then double-click the **Network** desktop icon. Select to highlight "Dialup Networking Adapter," then click **Properties**. Click the **Bindings** tab and remove the check mark from **Fast Infrared Protocol**. Click **OK** to exit, then click **Yes** to reboot the computer. "Fast Infrared Protocol" can only be bound by one adapter; for IrDA to work on the 6110 Computer, the Norand IrDA Adapter must be used.*

Install Generic (Text-only) IrDA Printer

If you want to install a generic printer (without a printer-specific driver), with the "Lite" and "Minimal" images, this requires a slightly different installation than the printers described above. You need both a 6110 boot card with a Windows 95 image and a cabinet files (CAB) card installed from the toolkit CD-ROM. Insert both cards into PC Card slots on your 6110 Computer, and wait for it to boot to the desktop.

1. If you have not done so at a previously time, enter serial numbers and calibrate the pen.

2. Double-tap the **My Computer** desktop icon, tap the **Printers** folder, then tap **Add Printer** to access the Add Printer Wizard. Tap **Next** to continue.
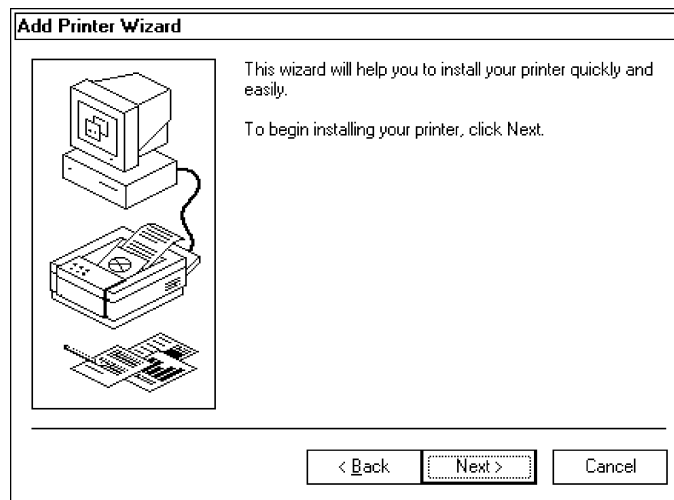
My Computer

3. Select **Local printer** when asked how the printer is attached to the computer, then tap **Next** to continue.
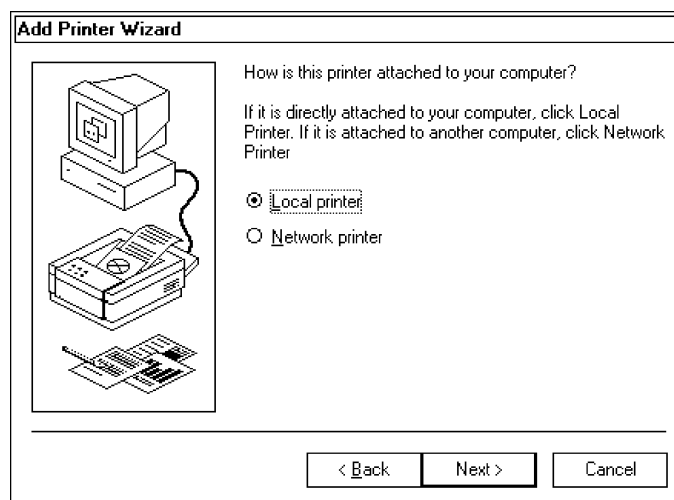
4. Select **Generic** from the **Manufacturers** list, then select
    Generic / Text Only from the **Printers** list, then tap **Next** to continue.

```
┌─────────────────────────────────────────────────────────────┐
│ Add Printer Wizard                                            │
│                                                               │
│   ┌───┐   Click the manufacturer and model of your printer. If your printer came with an │
│   │ 🖨 │   installation disk, click Have Disk. If your printer is not listed, consult your printer │
│   └───┘   documentation for a compatible printer.            │
│                                                               │
│                                                               │
│   Manufacturers:              Printers:                       │
│   ┌──────────────────┐  ┌──┐  ┌──────────────────────────┐   │
│   │ Epson            │▲ │  │  │ Generic / Text Only      │   │
│   │ Fujitsu          │  │  │  │                          │   │
│   │ Generic          │  │  │  │                          │   │
│   │ Hermes           │  │  │  │                          │   │
│   │ Hewlett-Packard  │  │  │  │                          │   │
│   │ HP               │  │  │  │                          │   │
│   │ IBM/Lexmark      │▼ └──┘  └──────────────────────────┘   │
│   └──────────────────┘                                        │
│                                          ┌──────────────┐     │
│                                          │  Have Disk...│     │
│                                          └──────────────┘     │
│   ──────────────────────────────────────────────────────     │
│                                                               │
│            ┌──────────┐ ┌──────────┐ ┌──────────┐            │
│            │ < Back   │ │  Next >  │ │  Cancel  │            │
│            └──────────┘ └──────────┘ └──────────┘            │
└─────────────────────────────────────────────────────────────┘
```
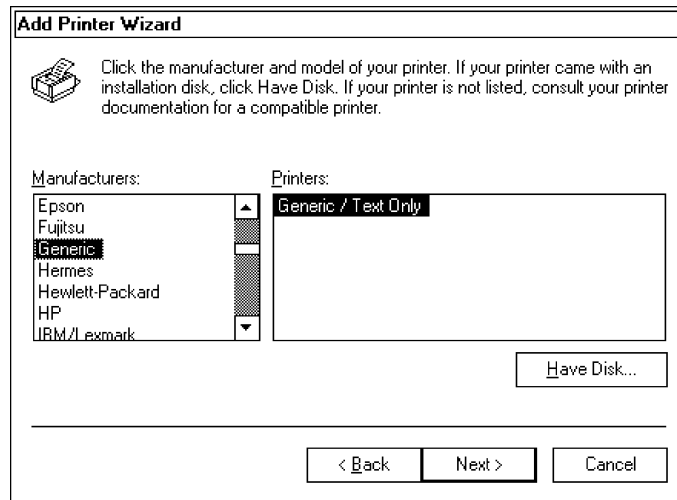
5. Select **InfraRed Printing (LPT) Port** from the **Available ports** list,
    then tap **Next**.

```
┌─────────────────────────────────────────────────────────────┐
│ Add Printer Wizard                                            │
│                                                               │
│  ┌───────────────┐   Click the port you want to use with this printer, and then │
│  │     ┌─────┐   │   click Next.                             │
│  │     │ ▢   │   │                                           │
│  │     └─────┘   │   Available ports:                        │
│  │    ┌──────┐   │  ┌──────────────────────────────────┐    │
│  │    │      │   │  │ COM2:   Communications Port     │▲   │
│  │    └──────┘   │  │ COM3:   Communications Port     │    │
│  │  ┌─────────┐  │  │ COM4:   Infrared Serial (COM) Port│   │
│  │  │ 📄      │  │  │ FILE:   Creates a file on disk  │    │
│  │  └─────────┘  │  │ GENI:   Unknown local port      │    │
│  │   ┌────┐      │  │ LPT1:   ECP Printer Port        │    │
│  │   │    │      │  │ LPT3:   Infrared Printing (LPT) Port│ │
│  └───────────────┘  │ RO:     ReachOut Port           │▼   │
│                      └──────────────────────────────────┘    │
│                                         ┌──────────────┐     │
│                                         │Configure Port...│   │
│                                         └──────────────┘     │
│   ──────────────────────────────────────────────────────     │
│                                                               │
│            ┌──────────┐ ┌──────────┐ ┌──────────┐            │
│            │ < Back   │ │  Next >  │ │  Cancel  │            │
│            └──────────┘ └──────────┘ └──────────┘            │
└─────────────────────────────────────────────────────────────┘
```
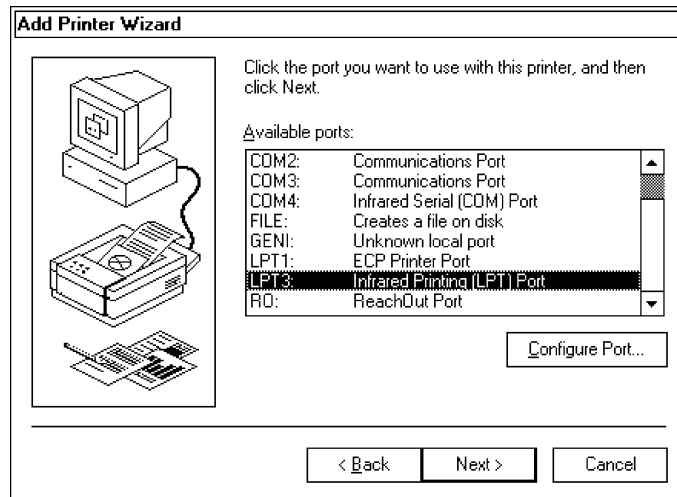
6. Alter the **Printer name** field as desired. If you do not want a printer test, select **No**. Tap **Next** to continue.
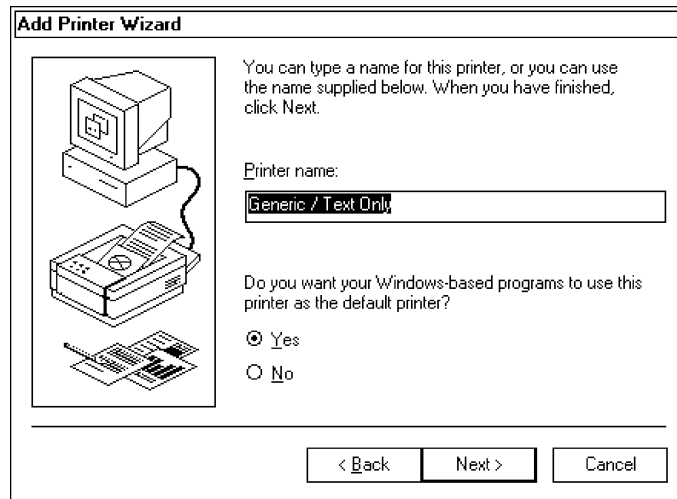
7. Aim the IR port (located at the end of the unit nearest the keypad) at the printer you are installing. Make sure the printer is turned on and its battery is fully charged. Tap **Yes** to print a test page, then tap **Finish**.
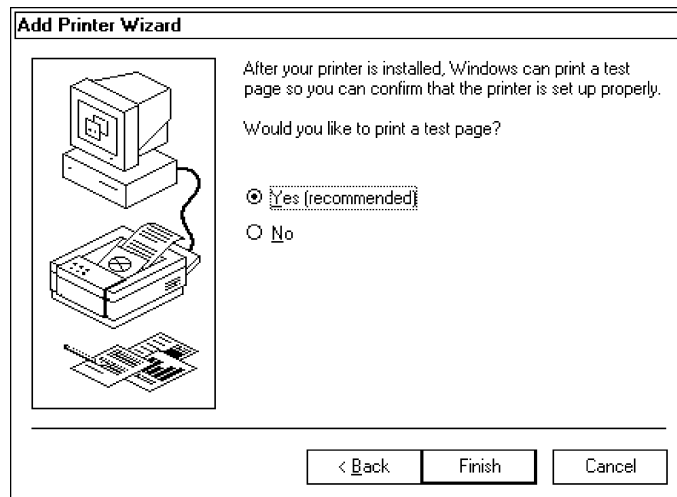
If you enabled a printer test, the following confirmation screen appears. Tap either **Yes** or **No** depending on the results of the test.
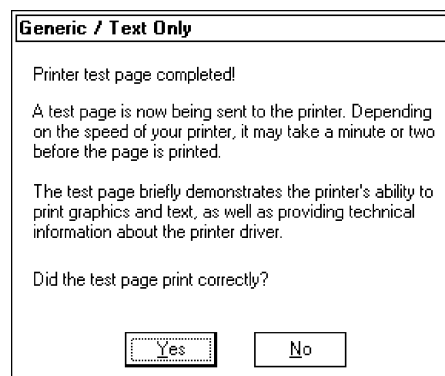
Install NPCP Printer

Printing with the Norand Portable Communications Protocol (NPCP) is only supported if you use the Intermec NPCP Printing Toolkit. The self-extracting TK68201.EXE file that creates the *Toolkit* directory and contents is located in the *Drivers**Printing**Toolkit**Disk1* folder on the Windows 95 CD.

From the desktop, select **Start → MS-DOS Prompt** to run this self-extracting file in a DOS box. If you attempt to do this file in Windows, the file will install onto the CD-ROM instead of the PC Card.

1. Place the Windows 95 Toolkit CD and the 6110 PC Card in the PC and note their drive letters. *For this example, drive D: has the Windows 95 Toolkit CD and drive E: has the 6110 PC Card.*

2. Open a DOS box and establish the 6110 boot PC Card drive as the current drive, such as E:

   Create a *Printing* directory on the PC Card, if it does not already exist.
   ```
   md \Printing
   ```

   Create a directory on your PC Card for your 6820 printer toolkit.
   ```
   md \Printing\6820
   ```

   Establish the *Printing**6820* directory as the current directory by changing to that directory, as follows:
   ```
   cd \Printing\6820
   ```

3. Run the TK68201.EXE self-extracting file to create a *Toolkit* directory off the current directory on the boot PC Card. The file then extracts the 6820 toolkit files into the *Drivers**Printing**Toolkit* directory and associated subdirectories created by the self-extracting file.
   ```
   D:\Drivers\Printing\Disk1\TK68201
   ```

▶ **NOTE:**   *Do not use the other two self-extracting files, TK68202.EXE and TK68203.EXE in the* \Disk2 *and* \Disk3 *folders as these contain out-of-date PDF files.*

6820 Configuration Utility

With the 6820 Printer Toolkit installed on the PC, there should be a configuration utility in the *Printing**6820**Toolkit* directory on the boot PC Card. This configures your Norand 6820 printer and includes these files:

RPGPCONF.EXE
The executable file, which runs on either Windows 3.1 or Windows 95.

NPCONFIG.DLL
Windows dynamic link library.

RPGPCONF.INI
Program configuration settings.

README.TXT
A description of the files listed here and how to use them.

The following files are in the *Printing**6820**Toolkit**PCFS* folder:

DEFAULT.PCF
The default printer configuration.

DEFAULT.CFG
The parameters settings associated with the default configuration.

There are detailed instructions on the use of the 6820 configuration program in the 6820 Printer Technical Reference.

6820 Documentation Files

Information on the use, maintenance, and programming of your 6820 Printer is included in the *6820 Printer User's Guide* and the *6820 Printer Technical Reference*. The most recent information about the 6820 Printer is available on the corporate web site: http://www.intermec.com

Other Files

► Font files are located in the *\Printing\6820\Toolkit\6820sys* and the *\Printing\6820\Toolkit\Fonts* directories (on your 6110 boot PC Card). See instructions in the *6820 Printer Technical Reference* to install fonts.

► DOS printer drivers:
PC4800.SYS
Located in the *\Printing\Toolkit\Dos* directory (on 6110 boot PC Card)

NOR4800.DRV
In the *\Drivers\Printing\Toolkit\Win95\16bit* directory (on Windows 95 Installation CD)

► The *\Printing\Toolkit\Win95\Win32* directory (on 6110 boot PC Card) contains files that illustrate the use of character sets. Instructions are included in each sample C program.

Install 680x Printers

Two sets of drivers are supplied for the 680x Printers, Intermec and O'Neil. NOR6805.DRV, *the recommended* Intermec 680x Printers driver, is text-based and faster than the four O'Neil OEM drivers (W313842T.DRV, W31384CN.DRV, W31576CN.DRV, W31832CN.DRV) that send scanned characters as graphics.

NOR6805.DRV is in the *\Drivers\Printing\680x\Intermec* folder and the four O'Neil OEM drivers are in the *\Drivers\Printing\680x\OneilOEM* directory.

To add a 6805, 6805a, or 6806 Printer to the 6110 Computer, insert a 6110 boot card into the PC Card slot in the PC Card slot. This card should have one of the Windows 95 images (installed from the toolkit CD-ROM).

1. To add these files, insert a PC Card in the PC Card drive of the computer and start up the Toolkit CD. Do the steps described in the PC Card Options screen (page 2-7).

2. Click **Copy Selected Drivers . . .** , then click **OK**.

3. Select the **Intermec 6804** / **6805 Printer Driver** option from the Select Components to Copy screen (page 2-10) and click **Next**.

Follow the rest of the screens to finish loading the 680x files onto the PC Card. When loaded on the PC Card, stop the card then remove it from the computer.

Place the 6110 boot card into the 6110 Computer and boot from it. Wait until it boots up to the desktop. If you have not already done, enter serial numbers and calibrate the pen.

My Computer

1. Double-tap the **My Computer** desktop icon, tap the **Printers** folder, then tap **Add Printer** to access the Add Printer Wizard. Tap **Next** to continue.

```
Add Printer Wizard
  ┌──────────────┐   This wizard will help you to install your printer quickly and
  │              │   easily.
  │              │
  │              │   To begin installing your printer, click Next.
  │              │
  │              │
  │              │
  │              │
  │              │
  └──────────────┘
                             [ < Back ]  [ Next > ]  [ Cancel ]
```

2. Select **Local printer** when asked how the printer is attached to the computer, then tap **Next** to continue.

```
Add Printer Wizard
  ┌──────────────┐   How is this printer attached to your computer?
  │              │
  │              │   If it is directly attached to your computer, click Local
  │              │   Printer. If it is attached to another computer, click Network
  │              │   Printer
  │              │
  │              │   ⊙ Local printer
  │              │   ○ Network printer
  │              │
  │              │
  └──────────────┘
                             [ < Back ]  [ Next > ]  [ Cancel ]
```

3. Tap **Have Disk** to access the Install from Disk screen.
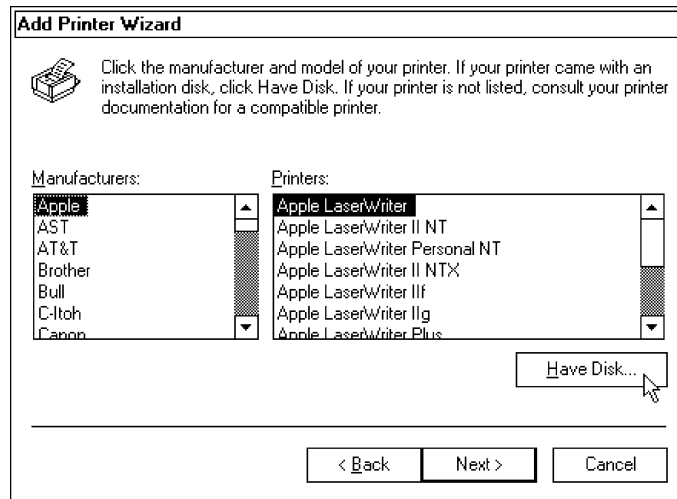
▶ **NOTE:**   *This example uses the Intermec 680x Printer.*

4. When the Install From Disk screen appears, select **Browse** to locate the
    OEMSETUP.INF file. Tap **OK** to return to the Install From Disk screen.
    ▶ Intermec 680x Printer   *\drivers\printing\680x\intermec*
    ▶ O'Neil OEM Printers   *\drivers\printing\680x\oneiloem*
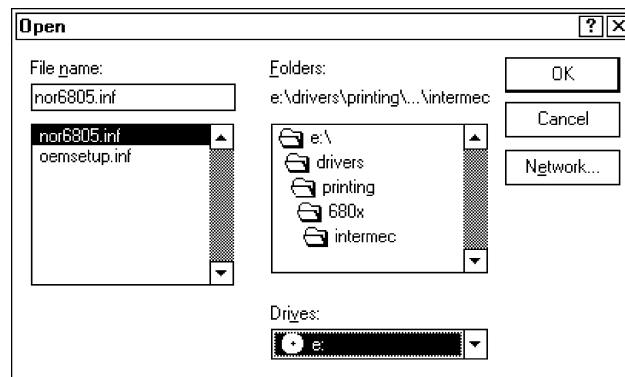
5. Tap **OK** again to return to the Add Printer Wizard screen.
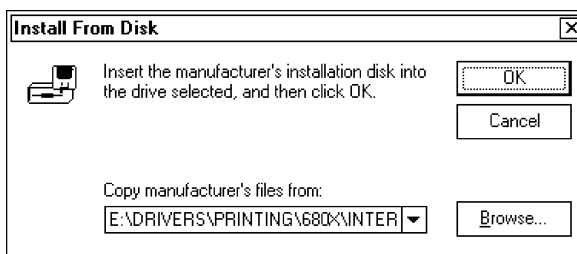
6.   Select a driver, then tap **Next** to continue.

Below is a list of recommended drivers for each 680x Printer. Once the printer is installed, the printer folder can be removed.

▶ Norand 6805 Driver (NOR6805.DRV)
   6804 2" Thermal Printer
   6804t 2" Thermal Printer
   6804dm 2" Dot Matrix
   6805 2" Thermal Printer

▶ MicroFlash 3 (ONeilOEM directory)
   6806 3" Thermal Printer

▶ MicroFlash 4 (ONeilOEM directory)
   6808 4" Thermal Printer
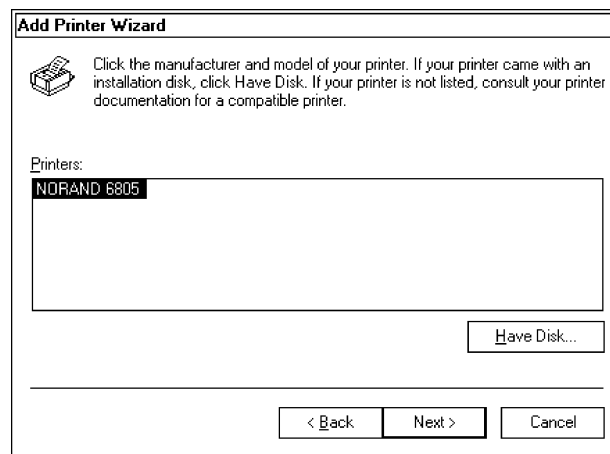
7.   Select **Infrared Serial (COM) Port** when prompted for the printer port, then tap **Next**.
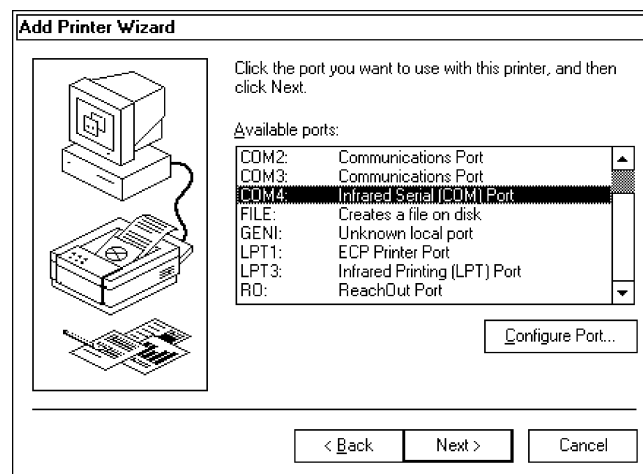
8. Use this screen to rename the printer as something other than
    "Norand 6805," or to set this printer as the default. Select **Yes**, then **Next**.
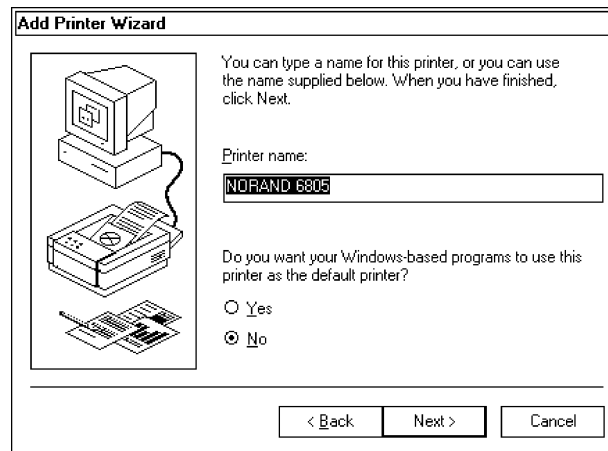
When prompted to print a test page, tap **Yes**. Ensure the printer is powered on
and lined up with the infrared port at the bottom of the 6110 Computer, then tap
Finish to send the data to the printer.
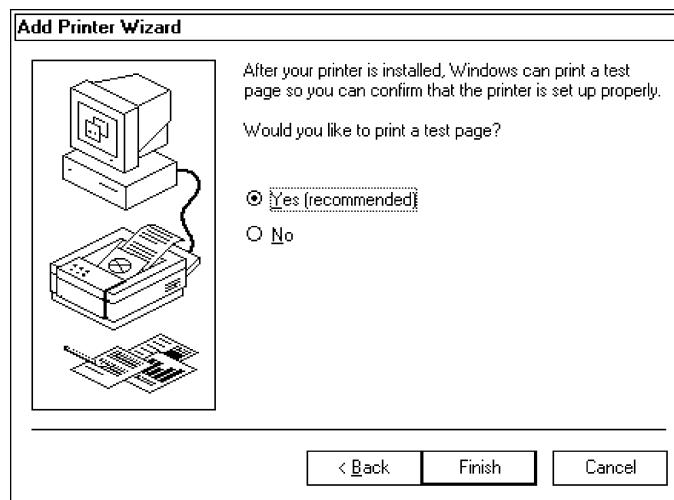
The following confirmation screen appears after the printing is complete. Tap
either **Yes** or **No** depending on the results of the test.
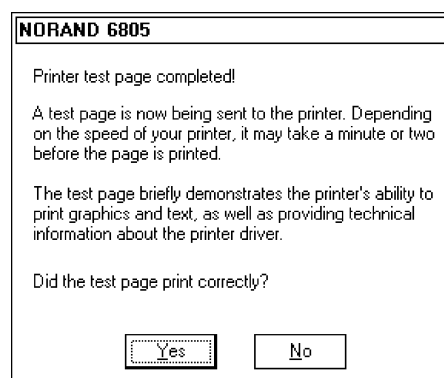
Radio Drivers

RangeLAN2 7400 PC Card Adapter

To install the Proxim RangeLAN2 7400 PC Card Adapter drivers on the 6110 Computer, follow this procedure carefully, observing the following caution.

▼**CAUTION:** **To properly install the Proxim RangeLAN2 7400 PC Card Adapter drivers on the system, DO NOT insert the Proxim RangeLAN PC Card into the 6110 Computer until directed to do so. If you do, you will need to remove, then reinstall default drivers.**

Remove Old RangeLAN2 7400 PC Card Adapter

If you accidentally installed the default RangeLAN drivers on your system because you inserted the RangeLAN card before the Windows 95 drivers were properly installed, then uninstall the default drivers as follows:

1. Remove the Proxim card from the 6110 Computer.

2. From the Windows desktop, select **Start → Settings → Control Panel** for the Control Panel.

3. Double-tap the **System** desktop icon, then tap the **Device Manager** tab to access the computer hierarchical structure.

4. Select **Computer → Network adapters → Proxim RangeLAN2 7400 PC Card Adapter** from the structure, then tap **Remove**.

   If you cannot see the buttons at the bottom of this screen, select the **RangeLAN2 7400** network adapter, press **[Tab]** three times, then press **[Enter]**. This will remove the 7400 node from the device tree.
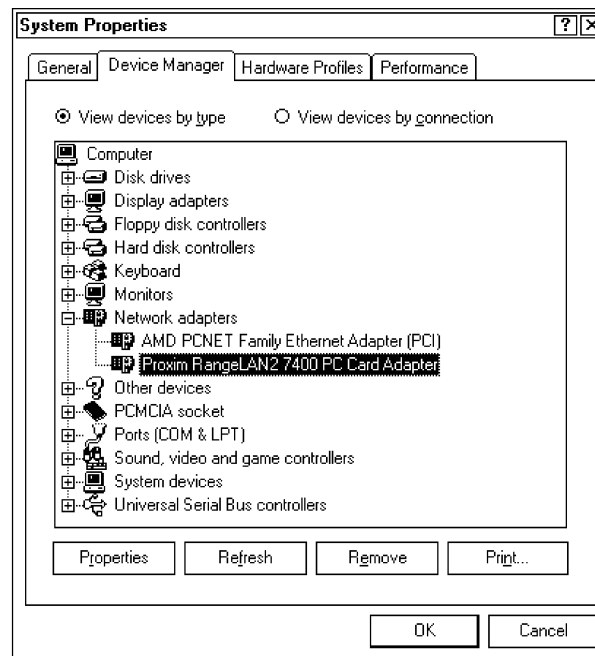
5. The following Confirm Device Removal screen appears for the Proxim RangeLAN2 7400 PC Card Adapter. Either remove all configurations *(default)* or elect to either remove the original configuration or just the undocked configuration. Tap **OK** to remove the adapter.

```
┌─────────────────────────────────────────────────────┐
│ Confirm Device Removal                      [?][X]    │
├─────────────────────────────────────────────────────┤
│  ▦     Proxim RangeLAN2 7400 PC Card Adapter          │
│                                                       │
│  Warning: You are about to remove this device from    │
│  your system.                                         │
│                                                       │
│                                                       │
│   ⦿ Remove from all configurations.                   │
│   ○ Remove from specific configuration.               │
│     Configuration:                                    │
│     ┌──────────────────────────────────┐ ▼           │
│     │ Undocked                         │             │
│     └──────────────────────────────────┘             │
│                                                       │
│                        ┌────────┐  ┌────────┐         │
│                        │   OK   │  │ Cancel │         │
│                        └────────┘  └────────┘         │
└─────────────────────────────────────────────────────┘
```
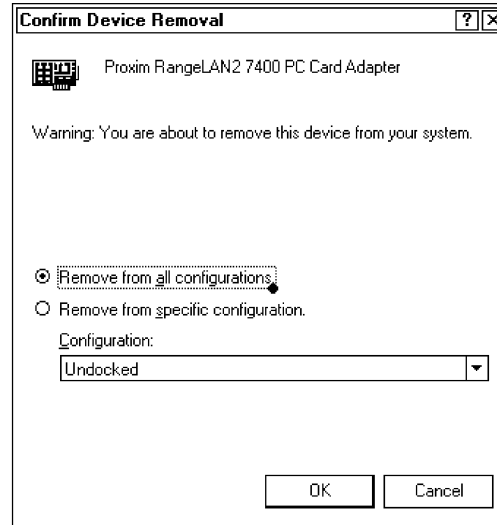
6. A prompt to restart the computer to finish removing the Proxim RangeLAN2 Network Adapter appears. Tap **Yes** to initiate the reboot.

```
┌─────────────────────────────────────────────────────┐
│ System Settings Change                         [X]    │
├─────────────────────────────────────────────────────┤
│  ⦿?   To finish removing your hardware, you must      │
│       restart your computer.                          │
│                                                       │
│       Do you want to restart your computer now?       │
│                                                       │
│           ┌──────────┐    ┌──────────┐                │
│           │   Yes    │    │   No     │                │
│           └──────────┘    └──────────┘                │
└─────────────────────────────────────────────────────┘
```
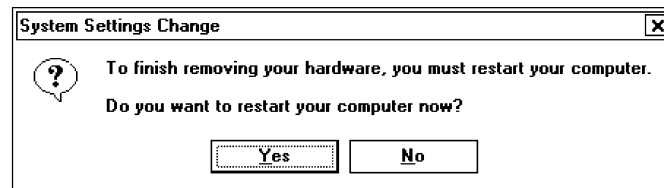
Verify RangeLAN2 PC Card Adapter Removal

Reboot the computer, if not already done, then do these steps to verify the removal of the RangeLAN2 device:

1. From the Windows Control Panel, double-tap the **Network** desktop icon.
2. Make sure there is no "Proxim RangeLAN2 7400 PC Card Adapter" device in the list of components.
   ▶ If RangeLAN2 is still listed, redo the steps starting on page 3-19.
   ▶ If no RangeLAN2 device is listed, go to the next page.

```
┌─────────────────────────────────────────────────┐
│ Network                                  [?][X]   │
├───────────────────────────────────────────────── │
│ ┌Configuration┐ Identification │ Access Control   │
│                                                   │
│  The following network components are installed:  │
│  ┌─────────────────────────────────────────────┐ │
│  │ 🖳 Client for Microsoft Networks            │ │
│  │ 🖳 AMD PCNET Family Ethernet Adapter (PCI-ISA)│ │
│  │ ▼ IPX/SPX-compatible Protocol               │ │
│  │ ▼ NetBEUI                                   │ │
│  │ ▼ TCP/IP                                    │ │
│  │ 🖳 File and printer sharing for Microsoft Networks│ │
│  └─────────────────────────────────────────────┘ │
│     ┌─ Add... ─┐  ┌─ Remove ─┐  ┌─ Properties ─┐  │
│                                                   │
│  Primary Network Logon:                           │
│  ┌────────────────────────────────────────┐[▼]   │
│  │ Client for Microsoft Networks          │      │
│  └────────────────────────────────────────┘      │
│     ┌─ File and Print Sharing... ─┐               │
│  ┌─Description───────────────────────────────────┐│
│  │                                               ││
│  │                                               ││
│  │                                               ││
│  └───────────────────────────────────────────────┘│
│                          ┌─ OK ─┐  ┌─ Cancel ─┐   │
└─────────────────────────────────────────────────┘
```

Installation and Configuration

The RangeLAN drivers must be loaded onto a freshly created Windows 95 load for the 6110 Computer. See the README.PROXIM.TXT in the *\Drivers\Radios\Proxim* folder on the Toolkit CD for additional information.

▶ **NOTE:**   *REMOVE THE PROXIM RANGELAN PC CARD BEFORE BOOTING THE NEW LOAD.*

1. If your 6110 Computer does not have a factory-installed Windows 95 load, create a Windows 95 image for the 6110 Computer using the Toolkit CD.
2. Copy the PROXIM.EXE file from the *\Drivers\Radios\Proxim* folder on the Toolkit CD to the 6110 Windows 95 load. This is automatic if you checked the **Proxim RangeLAN Radio Driver** option during the Windows 95 Installation procedure (page 2-10).
   ▶ *If creating a new load*
      and the Windows 95 load was automatically copied (via installation) then copy or move the load from the *C:\6110\Proxim* folder to the *C:\Windows\Desktop* folder to appear on the 6110 Windows 95 desktop after booting.
   ▶ *If a Windows 95 Load already exists on a PC Card*,
      without RangeLAN, then copy the file from the *\Drivers\Radios\Proxim* folder on the Windows Installation CD to a folder on the 6110 boot PC Card, such as: *C:\Windows\Desktop*. This automatically appears on the Windows 95 desktop of the 6110 Computer after it has booted.

3. Insert the Windows 95 boot PC Card into the 6110 Computer and reset the unit. If this is a new Windows 95 load, enter the registration information.

4. Double-click *Drivers\Radio\Proxim\PROXIM.EXE* to copy the necessary files to the 6110 Computer. A WinZip Self Extractor screen appears. By default, it will unpack the files to the *C:\Proxim* directory. Use **Browse** to change this location. Click **Unzip** to extract the files.
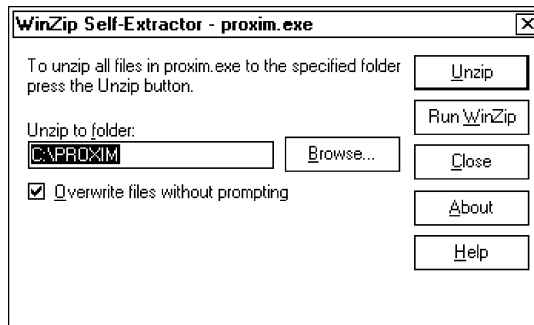
5. If all twelve files are extracted successfully, click **OK** from the confirmation screen, then click **Close** to exit the WinZip Self-Extractor screen.

6. Insert the Proxim RangeLAN2 card in the PC Card slot of the computer. The New Hardware Found application detects the card and runs through the driver installation.

7. Momentarily, an Insert Disk screen appears with a message that signifies the need for driver files, tap **OK** to continue.
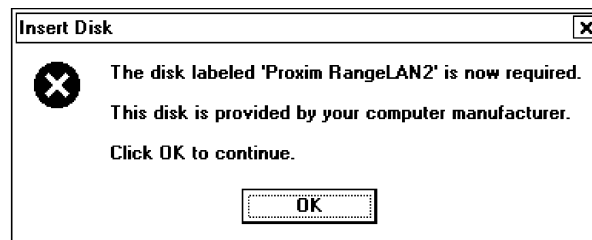
8. When prompted for the location of the driver, specify the "C:\Proxim" directory or the directory you had the files extracted to, then tap **OK**.

```
New Hardware Found                              [×]

       The file 'netproxm.inf' on Proxim RangeLAN2      [  OK  ]
       cannot be found.
                                                        [ Cancel ]
       Insert Proxim RangeLAN2 in the selected
       drive, and click OK.                             [ Skip File ]

                                                        [ Details... ]
       Copy files from:
       [A C:\Proxim                          ] [▼]      [ Browse... ]
```
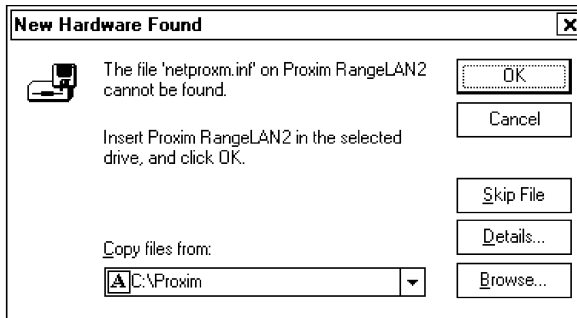
Domain and Security ID Settings

Ensure that the domain and security ID settings match those of your system. Set these settings through a Configurations program.

1. From the desktop, select **Start → Programs → Rl2 → pnetcon** to access the Site Survey & Configuration Tool. When this is opened, the unit is reinitialized, then the status of this unit is displayed.

```
[I] RangeLAN2 Site Survey & Configuration Tool    [_][□][×]

   Checking for RangeLAN2 driver...

   RangeLAN2 driver version V1.4-B0 accessed successfully.

   Node address:  0020a6356513  ROM version:  V1.8E1/0+

   Could not find a Master to synchronize with.  Verify that your Domain and
   Security ID match those of a Master.




   [ Masters... ]        [ Snoop... ]          [ Help ]

   [ Site Survey... ]    [ Configuration... ]  [ Exit ]
```
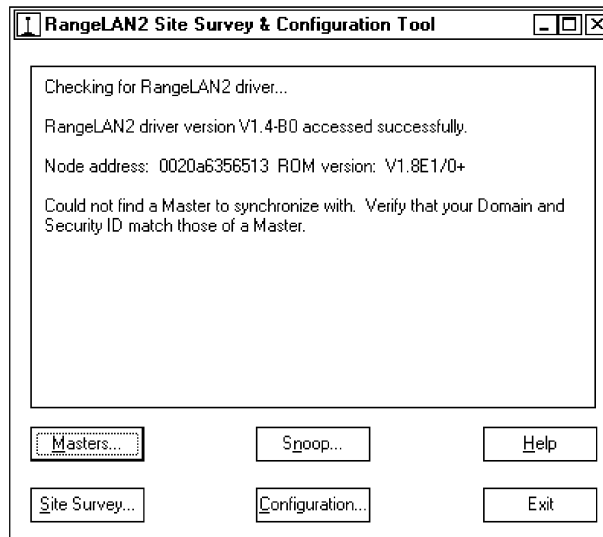
2. Press the **Configuration** button to access the Configuration screen. Tap **Use Defaults** to revert the unit to its default settings. Use the online help to define the functions.

```
┌─ Configuration ──────────────────────────────────────────── ⊠ ─┐
│                                                                  │
│  Station Type:   [Station        ▼]   MAC Optimize:  [Normal ▼]  │
│                                                                  │
│  Master Name:    [MASTER         ]    Roam Config:   [Normal ▼]  │
│                                                                  │
│  Channel:        [1        ▼]         Inactivity Seconds: [30 ▼] │
│                                                                  │
│  Subchannel:     [1        ▼]         Inactivity Minutes: [0  ▼] │
│                                                                  │
│  Network Domain: [0        ▼]                                    │
│                                                                  │
│                          □ Peer To Peer                          │
│                                                                  │
│  [ Get Settings... ]    [ Set Security ID... ]   [ Use Defaults ]│
│                                                                  │
│  [     OK     ]         [     Cancel     ]       [    Help     ]  │
└──────────────────────────────────────────────────────────────────┘
```

As an added security measure, a security ID can be set for every RangeLAN2 card installed on the network. ***All cards must have the same security ID in order to communicate.***

1. Tap **Set Security ID** to access the Security ID screen and enter your network security ID. A warning prompt appears cautioning the use of your RangeLAN2 radio with other RangeLAN2 radios.

```
┌─ RangeLAN2 Setup ──────────────────────────────────────────── ⊠ ─┐
│                                                                   │
│    Warning:  RangeLAN2 cards communicate only with other RangeLAN2│
│    cards with the same Security ID.                               │
│                                                                   │
│    Be sure to set the Security ID on all                          │
│    RangeLAN2 cards in the same sub-network to the same value.     │
│                                                                   │
│                                                                   │
│                     [ Continue ]   [ Abort ]                      │
└───────────────────────────────────────────────────────────────────┘
```

2. Tap **Continue** to continue. Enter up to 20 alphanumeric characters for the ID. Tap **OK** to exit this window with the new security ID. "NULL" is the default. Tap **OK** to return to the Configuration screen. Tap **OK** to return to the Site Survey & Configuration Tool. Tap **Exit** to quit the Site Survey & Configuration Tool.

```
┌─ Security ID ──────────────────────── ⊠ ─┐
│                                           │
│    Enter your new Security ID (up to 20 characters) │
│                                           │
│            [                    ]         │
│                                           │
│            [ OK ]      [ Cancel ]         │
└───────────────────────────────────────────┘
```

Install TCP/IP

To install TCP/IP, follow these steps:

1. Select **Start → Settings → Control Panel**, then double-tap the **Network** desktop icon. Tap **Add** to access the Select Network Component Type.
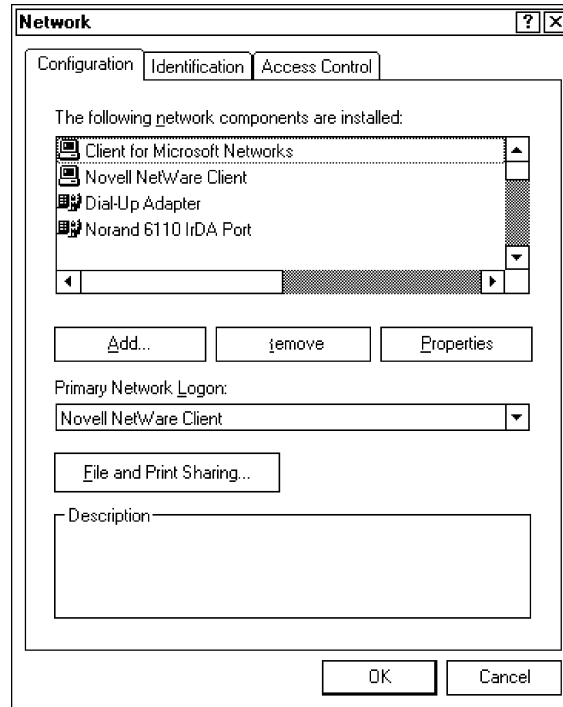
2. Select **Protocol**, then tap **Add** for the Select Network Protocol screen
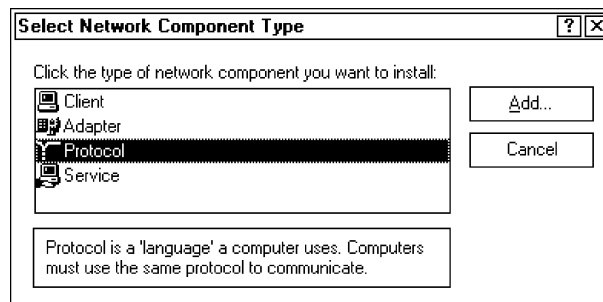
3. Select "Microsoft" from the **Manufacturers** list, select "TCP/IP" from the **Network Protocols** list, then tap **OK** to exit.
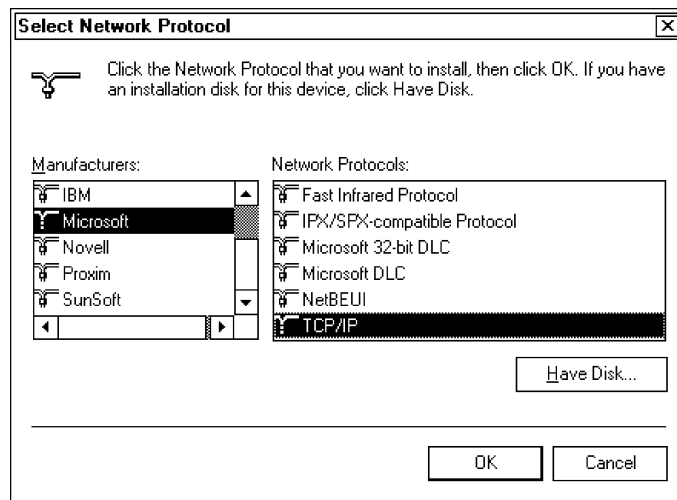
4. Tap **OK** again. If a network adapter has not been installed, you will be prompted to install one from the Select Network adapters screen. Select "Microsoft" from the **Manufacturers** list, select "Dial-Up Adapter" from the **Network Adapters** list, then tap **OK**.
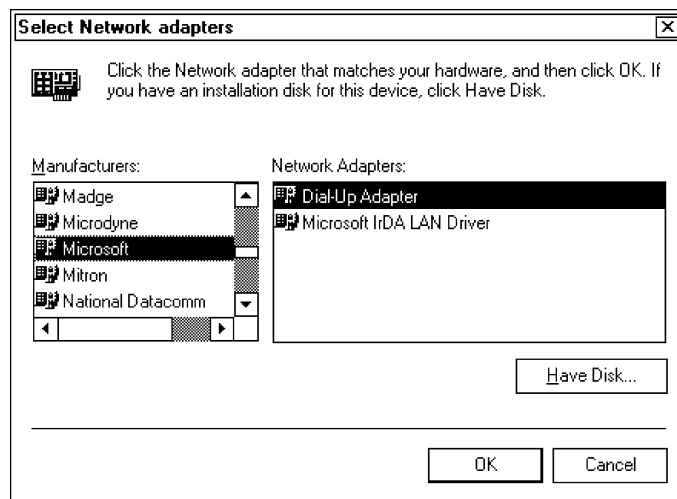
After Microsoft TCP/IP is installed, you are prompted to restart your computer. Select **NOW** to restart now, or continue with installing NetBIOS over TCP/IP (as described on the next page).

Install NetBIOS Over TCP/IP

For the RangeLAN2 PC Card to function correctly with Suspend/Resume and Removal/Insertion events, perform these steps to enable NetBIOS over TCP/IP.

1. Select **Start** → **Settings** → **Control Panel**, then double-tap the **Network** desktop icon. Select the "TCP/IP" component for the Proxim RangeLAN2 adapter, then tap **Properties** to access the TCP/IP Properties.

Network   [?][X]

Configuration | Identification | Access Control

The following network components are installed:

NetBEUI -> Proxim RangeLAN2 7400 PC Card Adapter
Proxim RangeLAN2 Driver API -> Proxim RangeLAN2 740
TCP/IP -> 3Com Fast EtherLink XL 10/100Mb TX Etherne
TCP/IP -> Proxim RangeLAN2 7400 PC Card Adapter
ARCserve Agent

[Add...]   [Remove]   [Properties]

Primary Network Logon:

[Novell NetWare Client]

[File and Print Sharing...]

Description
TCP/IP is the protocol you use to connect to the Internet and
wide-area networks.

[OK]   [Cancel]

2. Tap the **NetBIOS** tab, then tap **I want to enable NetBIOS over TCP/IP** to add a checkmark. *This ensure proper power management functionality.* Tap **OK** to quit.

TCP/IP Properties   [?][X]

DNS Configuration | Gateway | WINS Configuration | IP Address
Bindings | Advanced | NetBIOS

NetBIOS support allows you to run NetBIOS applications over
the TCP/IP protocol.

☑ I want to enable NetBIOS over TCP/IP

[OK]   [Cancel]
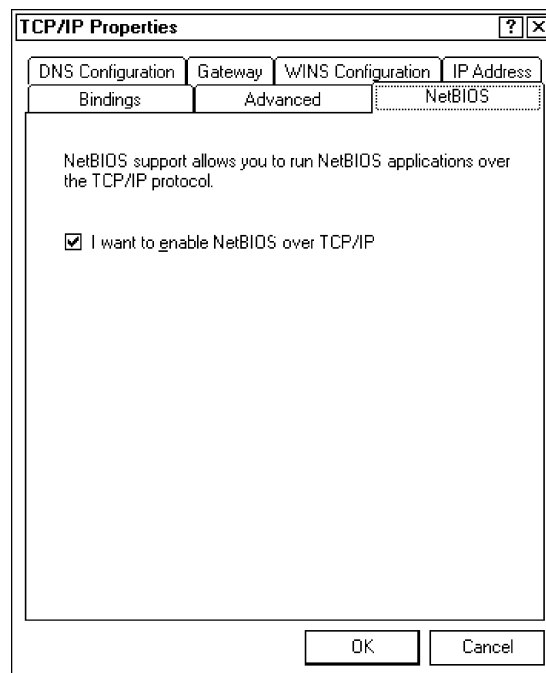
3. Tap **OK** again to quit. Tap **Yes** to restart the computer.

Setup any other TCP/IP or RangeLAN properties that your specific site requires, if necessary. Reboot the 6110 Computer. Once it reboots, the PROXIM.EXE file can be deleted, if desired.

▶ **NOTE:**   *If building a 6110 image for mass duplication, leave **IP Address** and **Subnet Mask** (located under the **IP Address** tab) blank to avoid conflicting IP addresses once the units power-up.*

RS-485

See the *6920 Communications Client for Windows 95, 98, or NT User's Guide* (P/N: 961-055-002) for information on RS-485 using the NRInet protocol.

Winsock 2

Winsock 2 is installed on your 6110 boot PC Card when you run the Windows 95 Installation CD. However, if you need to reinstall Winsock 2, go to the *\Win95\Y2K* folder on the 6110 boot card and run W95WS2SETUP.EXE. After installation, WS2SETUP.LOG contains a log of the files that were created and updated during installation, as indicated below.

Files installed in the *C:\Windows\System* folder:

- AFVXD.VXD
- ICMP.DLL
- MSAFD.DLL
- MSTCP.DLL
- MSVCRT20.DLL
- MSVCRT40.DLL
- MSWSOCK.DLL
- MSWSOSP.DLL
- NDIS.VXD
- RNR20.DLL
- VDHCP.386
- VIP.386
- VNBT.386
- VTCP.386
- VTDI.386
- VUDP.386
- WS2_32.DLL
- WS2HELP.DLL
- WS2THK.DLL
- WSASRV.EXE
- WSHTCP.VXD
- WSIPX.VXD
- WSOCK.VXD
- WSOCK2.VXD
- WSOCK32.DLL

Files installed in the *C:\Windows* folder:

- ARP.EXE
- FTP.EXE
- INETMIB1.DLL
- NBTSTAT.EXE
- NETSTAT.EXE
- PING.EXE
- ROUTE.EXE
- SNMP.EXE
- SNMPAPI.DLL
- TELNET.EXE
- TELNET.HLP
- TRACERT.EXE
- WINIPCFG.EXE
- WINSOCK.DLL

Scanner Installation

For additional information relating to scanners, use your browser to view HTML files in the *\Docs* folder on the Windows 95 Toolkit CD.

Scanner APIs

Within your application, include the path to the scanner driver, so your application can make calls to the API functions.

The available prototypes for this API are defined in a document that is located in the *\Drivers\Scanners* folder on the Toolkit CD. Refer to specific scanners below for names of document files.

Pod Scanner

PODSCAN.DRV, provided for backwards compatibility, is the (internal 16-bit) Pod scanner driver that acts as a "wedge" device where data decoded by the scanner is forced into the edit field at the current screen cursor location.

PODSCAN.INF is the Windows 95 INF file that installs the 16-bit driver. Both are located in the *\Drivers\Scanners\16 Bit Internal* folder on the Toolkit CD.

The SCAN32.DLL 32-bit scanner driver is in the *\Drivers\Scanners\32 Bit Internal* folder on the Toolkit CD and provides a 32-bit Scan Communication Device API for your application.

The available prototypes for this API are defined in the SCAN32.DOC file in the *\6110\Scanners\32Bit Internal* folder on the PC Card. To use this driver, make sure it is copied to the *\Windows\System* folder on the PC Card.

To install the Pod Scanner in the 6110 Computer, you will need to copy these files onto the 6110 boot card.

1. Insert the 6110 boot card, or PC Card, in the personal computer's PC Card drive.

2. Using **My Computer** or **Windows Explorer**, create a "Scanners" directory (folder) on the PC Card.

3. Copy PODSCAN.DRV and PODSCAN.INF from the Toolkit CD into the "Scanners" folder on the PC Card.

Remove the PC Card from the computer, insert it in the 6110 Computer, then reboot the unit.

Install Pod Scanner in 6110 Computer

The pod scanner can be installed when the 6110 Computer boots to the Windows desktop.

Add New
Hardware

1. Select **Start → Settings → Control Panel**, then double-tap the **Add New Hardware** desktop icon to access the Add New Hardware Wizard. Tap **Next** to continue.
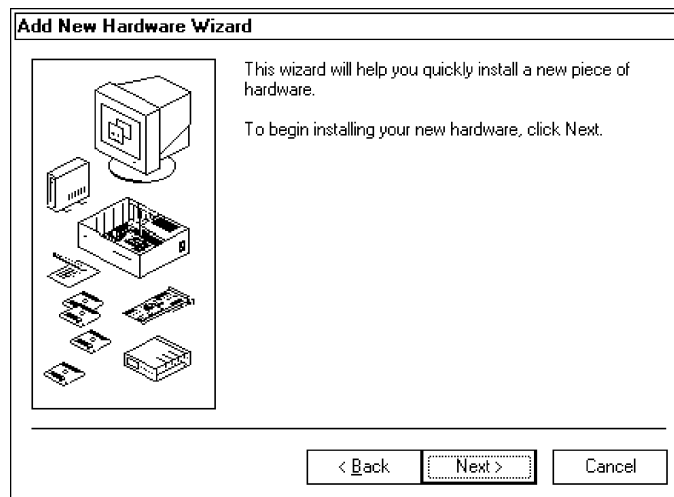
2.   Tap **No** to install the pod scanner yourself, then tap **Next** to continue.
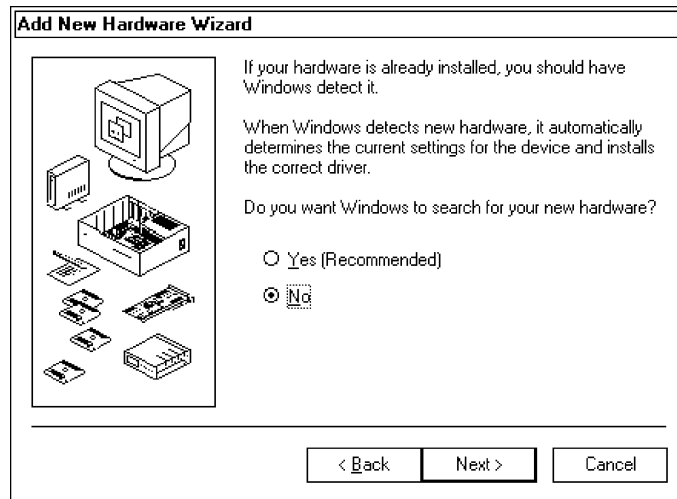
3.   Scroll down the components, then select **Other Devices** for the type of hardware to be installed. Tap **Next** to continue.
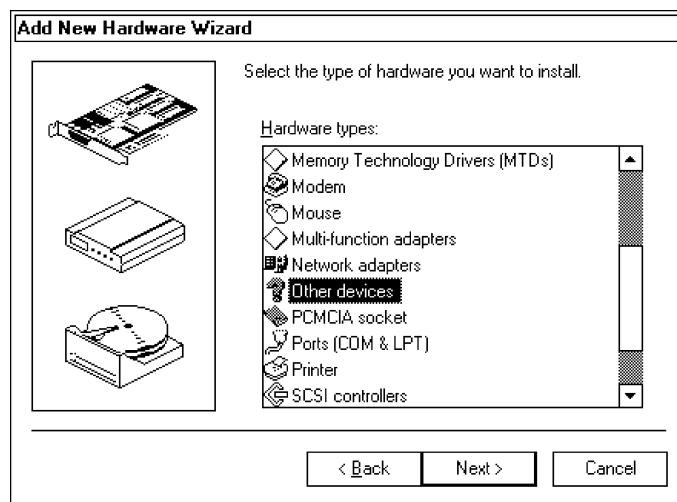
4. Tap **Have Disk** to access the Install From Disk screen.
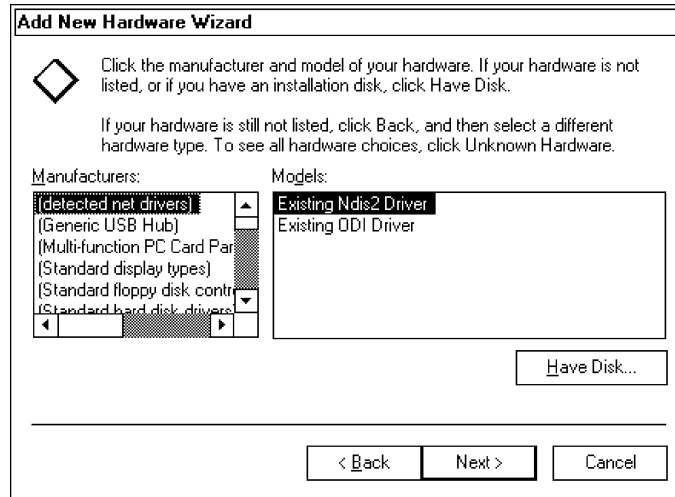
5. Tap **Browse** to access the Open screen and locate the "Scanners" folder on the PC Card (for this example, drive E:). This folder would have the PODSCAN.INF file copied earlier from the Toolkit CD. Tap **OK** to return to the Install From Disk screen.
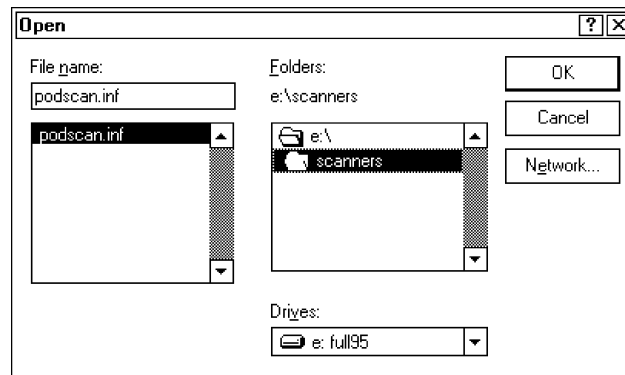
6. Tap **OK** to return to the Add New Hardware Wizard.
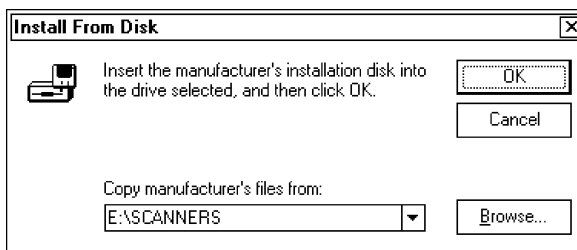
7. Tap **Next** to continue with installing the pod scanner.

```
Add New Hardware Wizard
    ◇   Click the manufacturer and model of your hardware. If your hardware is not
        listed, or if you have an installation disk, click Have Disk.

        If your hardware is still not listed, click Back, and then select a different
        hardware type. To see all hardware choices, click Unknown Hardware.

    Models:
    ┌─────────────────────────────────────────────────────────────┐
    │ Internal Scanning Driver                                     │
    │                                                              │
    │                                                              │
    │                                                              │
    │                                                              │
    │                                           [ Have Disk... ]   │
    └─────────────────────────────────────────────────────────────┘

                              [ < Back ]  [ Next > ]  [ Cancel ]
```

8. Tap **Finish** to complete the installation.

```
Add New Hardware Wizard

                    Windows can continue installing your hardware now.

                    To continue installing the software needed by your
                    hardware, click Finish.

                              [ < Back ]  [ Finish ]  [ Cancel ]
```

You will be prompted to reboot the 6110 Computer to change the system settings.
Tap **Yes** and wait for the system to reboot. After Windows 95 comes up again,
close the remaining desktop applications.

```
System Settings Change                              [X]
    (?)   To finish setting up your new hardware, you must restart your computer.

          Do you want to restart your computer now?

                    [ Yes ]      [ No ]
```
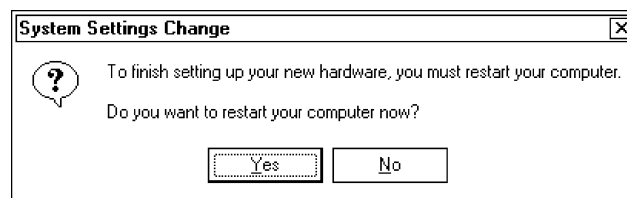
Disable Communications Port (COM6)

It is necessary to disable the Communications Port (COM6) on the Windows 95 image to ensure the Pod Scanner works properly on the 6110 Computer.

1. From the 6110 Windows desktop, select **Start** → **Settings** → **Control Panel**, then double-tap the **System** desktop icon for the System Properties.

2. Tap the **Device Manager** tab, scroll down and double-tap **Ports (COM & LPT)**, then double-tap **Communications Port (COM6)**.
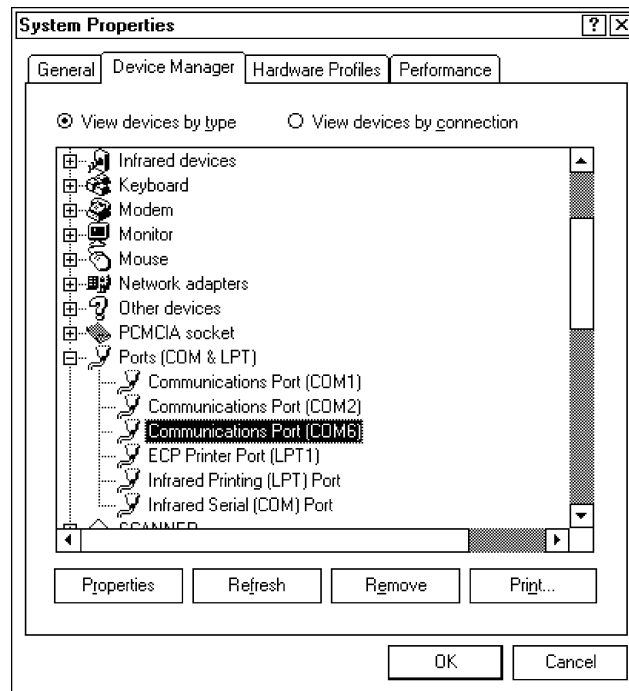
3. Add a check mark to the **Disable in this hardware profile** box, then tap **OK** to close.
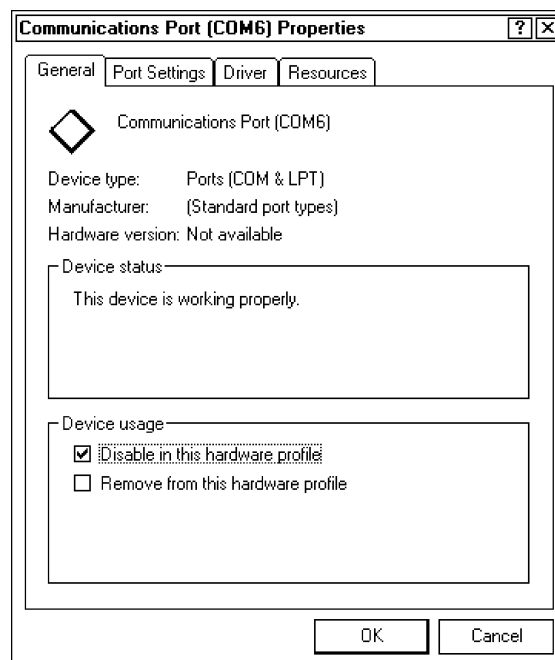
Initialize the 16-Bit Serial Pod Scanner

Before using the 16-bit scanner for the first time, scan the following configuration bar codes in the *SE1223 Integrated VLD Scanner User's Guide* (P/N: 961-032-042).

▶ RESET TO DEFAULT SETTINGS

▶ SEND PACKETED DECODE DATA

This initializes the bar code scanner to scan any configuration bar codes necessary for your particular application.

Tethered Scanner

W95TSCAN.DRV is the tethered scanner driver that provides a 16-bit Scan Communication Device API for your application and W95TSCAN.INF is a Windows 95 INF file. Both files are in the PC Card *\6110\Scanners\Tethered* folder.

Magnetic Stripe Reader

MSR32.DLL is the Magnetic Stripe Reader (MSR) driver that provides a 32-bit MSR Communication Device API for your application. This file is in the *\Drivers\Scanners\Mag Stripe Reader* folder on the Toolkit CD. The available API prototypes are defined in the MSR32.DOC document in the same location.

Copy the MSR32.DLL file to the *\Windows\System* folder on the PC Card.

Serial Drivers

The serial drivers supported for the 6110 Computer are as follows and can be installed by double-clicking any of the registry files defined in the next paragraph or manually via the Windows desktop Registry Editor.

▶ SERIAL.VXD   The default serial driver from Microsoft.
▶ PORT6110.VXD This file installs on COM3 or COM5 and is modified to work with external modems and the GSM radio.
▶ SCANPORT.VXD Factory-installed on COM6, this file fixes the scanner firing on startup and during suspend/resume activities.

Registry Files

These files are located on the 6110 Toolkit CD-ROM in the *\Drivers\Comm* folder. Double-click a registry file to install or reinstall a serial driver into one of the three communications ports (COM3, COM5, or COM6) on the 6110 Computer.

Table 3-1
Serial Driver Installation

Registry File	Serial Driver	COM Port
SCANPORT.REG	SCANPORT.VXD	COM6
PORT6110ONCOM3.REG	PORT6110.VXD	COM3
PORT6110ONCOM5.REG	PORT6110.VXD	COM5
UNINSTALLSCANPORT.REG	SERIAL.VXD	COM6
UNINSTALLPORT6110ONCOM3.REG	SERIAL.VXD	COM3
UNINSTALLPORT6110ONCOM5.REG	SERIAL.VXD	COM5

Registry Editor

To find the port on which to configure, use the Windows desktop Registry Editor to locate the applicable registry keys.

1. From the Windows desktop, select **Start → Run**, then type "regedit" in the **Open** field. Click **OK** to access the Registry Editor.

2. Access the *HKEY_Local_Machine\Enum\BIOS*PNP0501* registry path and note the port value to be configured under **[PORTNAME "COMX"]**:

    Also, note the index into the port driver under **[Driver "Ports\000X"]**, such as "0002." Use this index in the next step to locate the name of the driver controlling this port, such as "serial.vxd."
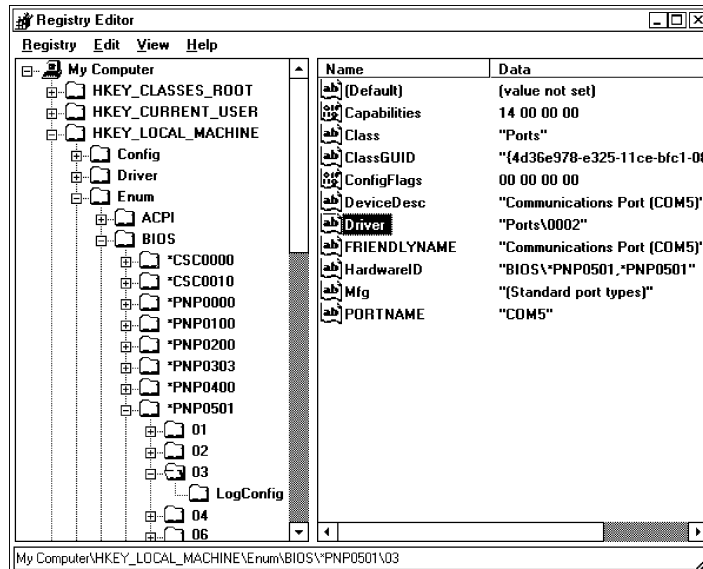
3. Access this registry path with the index key noted earlier. The driver controlling the port will be under **[PortDriver "XXXXXX.VXD"]**.

HKEY_Local_Machine\System\CurrentControlSet\Services\Class\Ports\000X
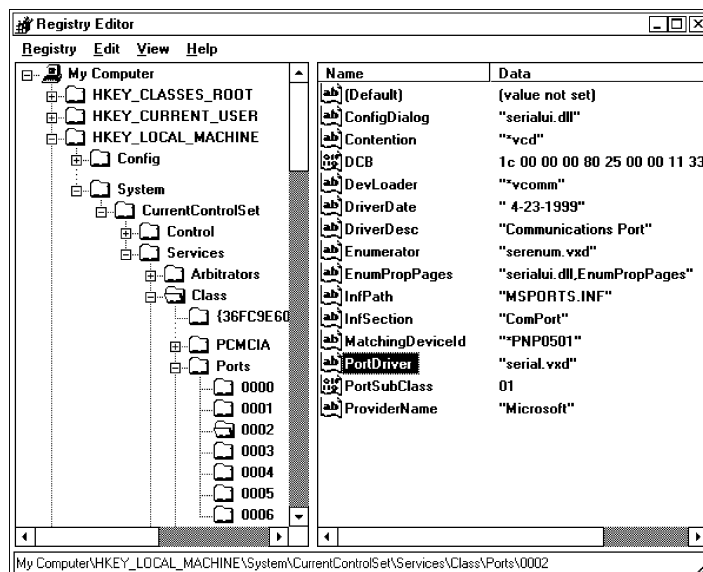
Windows 95 Flash

After preparing your PC Card with a "Lite" Windows 95 image, you can reflash the 6110 Computer using the latest 6110FLSH.EXE flash version. It is retrievable from the BBS (norbbs.norand.com) in the PK6110 library under the name 6110FXXX.EXE where XXX = version number (for example 6110F109.EXE for flash v1.09). This file needs to be self-extracted to a temporary directory. It will contain the file 6110FLSH.EXE created for that flash version.

If you do not have access to the BBS, contact your Account Representative.

Reset the 6110 Computer

Before attempting to reset the computer, shut down any running applications, then shut down the Windows 95 desktop. Here are a few suggestions.

If your application is locked up, terminate your application as follows. Use an external keyboard and press and hold the **[Ctrl]**, **[Alt]**, **[Delete]** keys at the same time to access the Close Task screen.

1. Use your stylus, or the ▲ and ▼ keys on the keypad, to select the name of your application, if found in the list

2. Tap **End Task** or press **[Tab]** twice to move the cursor over to **End Task**, then press **[Enter]**.

3. Another window may appear, informing you that Windows cannot automatically shut down your task. If so, tap **OK** or press **[Enter]**.

If the screen is blank, the touch screen is not responding, or if none of the instructions are successful in shutting down Windows 95, then reset the computer.
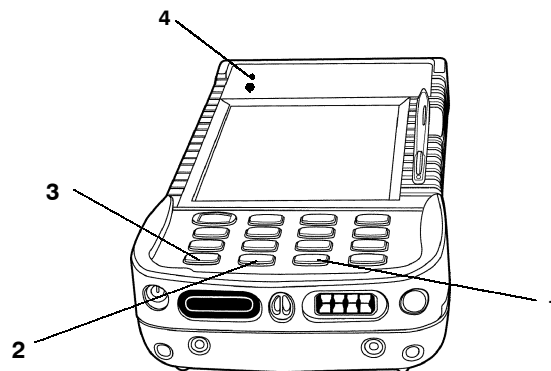
1. Zero key [0]
2. Escape key [Esc]
3. [GOLD] key
4. Power status LED

Figure 3-1
[GOLD], Esc, [0] Keys

Shut Down Windows Via End Task Menu

Using an external keyboard, press and hold **[Ctrl]**, **[Alt]**, and **[Delete]** at the same time to access the Close Task screen. Tap **Shut Down** or press **[Tab]** to select **Shut Down**, then press **[Enter]** on the external keyboard.

Shut Down Windows Via Desktop

Select **Start** → **Shut Down** to access the Shut Down Windows screen, select **Shut down the computer?**, then tap **Yes**.

If using the keypad, press and hold **[GOLD]**, press and hold **[Ctrl]**, release **[GOLD]**, press **[Esc]**, then release both **[Ctrl]** and **[Esc]** to access the "Start" menu. Press and hold **[GOLD]**, press ▲, then quickly release both **[GOLD]** and ▲ to highlight the **Shut Down** entry. Press **[Enter]** to access the Shut Down Windows screen. Use the ▲ and ▼ to select **Shut down the computer?**, then press **[Enter]**.

Tips for Successful Application Integration

Many factors should be considered before target application integration takes place. Ask the following questions:

How much space do I need for the application to run?
A desktop PC typically has large amounts of disk space, and very often, large installations of physical RAM memory. It is important for software developers to take into consideration the limitations of RAM, virtual memory, and disk availability when using the 6110 system.

Am I planning to use virtual memory?
Virtual memory can consume large amounts of disk space and use up much of the available free disk space in a Minimal Windows 95 image. From the Windows desktop, select **Start** → **Settings** → **Control Panel**, then double-click the **System** desktop icon to access the System Properties.

1. Click the **Performance** tab, then click **Virtual Memory**.
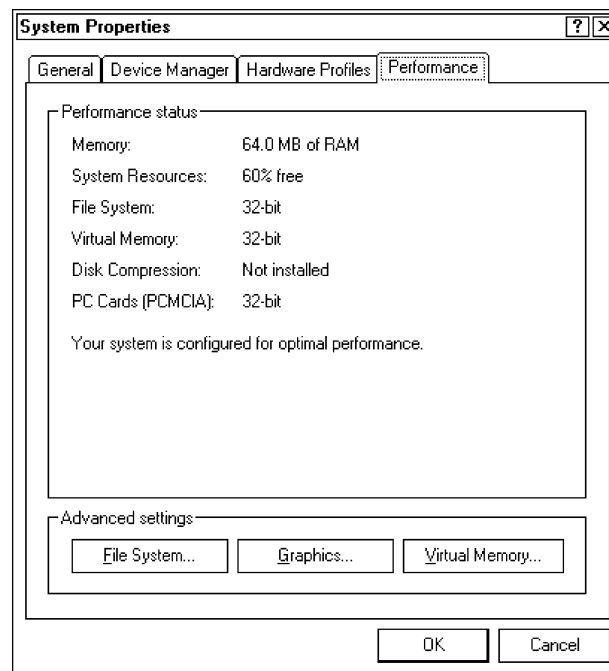
2. *Note this warning before continuing with this step.* Select **Let me specify my own virtual memory settings**, then select **Disable virtual memory (not recommended)** to disable virtual memory. Click **OK** to quit.

   Turning off virtual memory keeps disk space from being used as temporary swap space, but may affect application operation. It may also cause "out of memory" errors, depending on the RAM installed in the 6110 Computer.
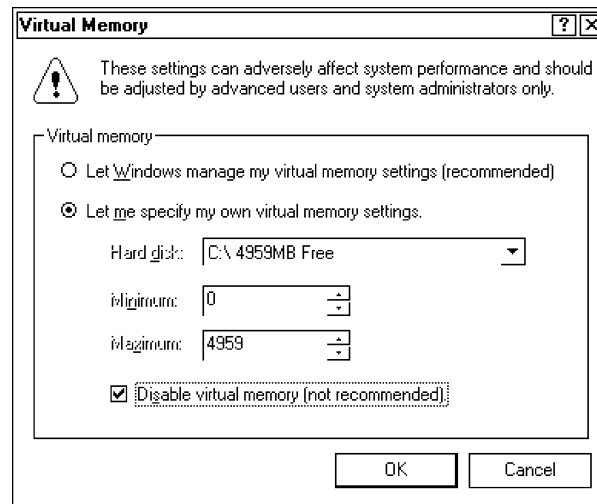
Will the application still work without virtual memory?
   Adding more RAM to the system does reduce the Windows 95 disk swap file substantially. The maximum option for the 6110 Computer is 32 MB of RAM.

If I use virtual memory, do I want Windows to manage the swap file size, or merely set it to what I want?
   This requires some experimentation. If an application has memory problems, try it both ways to observe the resulting behavior.

Do I expect the application to increase in size in the future?
   Take care to plan for expansion of the application.

Is the language and/or compiler, chosen for the application development, suitable for producing compact executables?
   If size is an issue, it is important to select an appropriate development environment that can create small and efficient code for the 6110 Computer. It is not a desktop PC, so take into consideration the limited memory and disk resources available to you.

Can the compiler be set to generate compact code?
   Check the options on the compiler, to see if it supports small code generation.

To aid integration, do I plan to statically link DLLs into the target application?
   This creates an application that should run without the need for additional DLLs, but may also duplicate code that is already part of the Minimal Windows 95 image. If size is not an issue, you may want to consider using static linking, so that integration may go smoothly.

What if the target application runs on a desktop PC, but does not run on the 6110 Minimal Windows 95 image?
   Before going through the integration process, make sure the application is capable of running on a full Windows 95 image for the 6110 Computer. If the application fails to run with the Full Windows 95 image, there could be a hardware conflict.

How can I reduce the Minimal Windows 95 image further?

Plug and Play / Installation Support (INF files)

Windows 95 comes with INF files to support plug and play software installation for most devices that can be added via the PC Card slot. Unfortunately the files consume approximately 6 MB of data in the Minimal Windows 95 image. Once the image for the 6110 Computer is complete, all the INF files can typically be deleted without affecting the application operation.

SETUPX.DLL

It is only needed to run setup functions, and can be removed later. These files are used by various setup programs and the Windows Control Panel. They consume approximately 500 KB of disk space. Once removed, many parts of Windows 95 image cannot be modified. To regain Control Panel operation, copy the files back from the following folder on the Windows 95 Toolkit CD:

\Win95\6110\Images\Full\Windows\System

Control Panel Files

The CPL files in the *\Windows\System* folder can be deleted; but doing so prohibits further image changes to the Windows 95 system. Deleting the CPL files saves approximately 500 KB of space. To restore functionality to the Control Panel, merely restore the .CPL files from the Windows 95 Toolkit CD, from the following folder:

\Win95\6110\Images\Full\Windows\System

Section 4

DOS Device Drivers

▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸   ▸

This section contains installation and configuration information for DOS device drivers, communications device drivers, and DOS utilities.

APM Clock Driver

CLOCK.EXE is part of the Advanced Power Management system when running under DOS. CLOCK is a device driver that replaces the standard DOS clock driver. It must be installed as a device driver at system startup time.

Besides the normal clock driver functions, CLOCK makes sure that the date and time are maintained during suspends. It does this by forcing a read from the real-time clock upon Resume.

CLOCK is installed as a device driver in the CONFIG.SYS file. Install CLOCK after NORDOSPM.EXE. A typical entry in CONFIG.SYS to install CLOCK would look like this:

```
DEVICE=NORDOSPM.EXE
DEVICE=CLOCK.EXE
```

After installation, CLOCK displays the following message:

```
CLOCK.SYS:  NORAND DOS Clock Driver
Version n.nn
Copyright (c) nnnn by Norand Corporation
All rights reserved.
```

▶ **NOTE:**   *In future revisions of this product, the name, Intermec Technologies Corporation may appear above in the Copyright line.*

There are no installation switches or user-programmable parts of CLOCK.EXE.

Battery Monitor

DOSGAS.EXE monitors charging and discharging of the main battery pack.

Command Line Switches

DOSGAS has optional parameters. The switch symbol before the parameter can be "/" or "–." The parameter letter can be upper- or lower-case. Text within brackets represent numeric values, such as <ms>. Only provide the numeric value.

```
DOSGAS.EXE  [<x> <y>] [–U<ms>] [–W] [–P<scan–code>] [–C]
```

–C   Change. Battery gauge is only updated when a change in battery level affects the display.

–P<scan-code>
          Popup display mode. **<scan-code>** is the keystroke that causes the information to display when that key is pressed.

–U<ms> Update. Time between updates if not in popup mode, or duration information is displayed if in popup mode. **<ms>** represents milliseconds.

–W   Windowed. Forces the gauge to display in a VROTATED DOS window; otherwise it is displayed in an absolute screen position.

<x> <y> X,Y coordinates, where **<x>** and **<y>** represent the location column and row to display the gauge on screen; supply integer values, in base 10.

Annunciators

Four stages of visual and audible low battery warnings should occur according to the following intervals. The annunciators indicate the level of the main battery. The "Bs" represent battery icons on the 6110 Computer. There may be a one-minute delay for the icons to update when the battery pack is replaced.

Table 4-1
Low Battery Indications

Low Battery Level	% Capacity	Icons	Beeps
0	76—100%	BBBB	
	51—75%	BBB	
	26—50%	BB	
	21—25%	B	
1	16—20%	LLLL	
2	11—15%	LLL	
3	6—10%	LL	Three beeps on 10% Three beeps on 7%
4	0—5%	L	One 5 second beep on 5%

When the capacity reaches 20%, the single annunciator icon changes to four L's (Table 4-1).

When charging, the annunciator icons change to C's. Each "C" represent 25% of battery capacity: "C" = 0 to 25%, "CC" = 26 to 50%, "CCC" = 51 to 75%, and "CCCC" = 76 to 100%.

BGI Support

N6110.BGI is a custom Borland Graphics Interface (BGI), and is located in the DOS Toolkit. It develops Borland graphics based applications for this display. One way to use this in a DOS application is to keep the application and the BGI driver separate. This requires loading the driver from your application. The calls for this are documented in the Borland C++ DOS Reference book. Start with *installuserdriver*. This is the method used by CALIB.EXE, described elsewhere in this section. You will need the following file:

```
N6110.BGI          Real mode PENKEY.BGI driver
```

The driver "plugs in" to the Borland BGI graphics library via the *installuserdriver()* function. Mode selection is accomplished through a series of *#define* symbols in the BGIDEMO.C file.

▶**NOTE:**   *You may initialize and close the N6110.BGI driver many times during a program run, but call installuserdriver( ) once and save the value returned for subsequent driver initializations.*

Bitmap Text Output

The standard Borland BGI drivers do not fill the background color when rendering the bitmap font, thus erase the text before writing over it. Use the *bar( )* function to erase (clear) the text area (text cannot be written over with new text or spaces).

N6220.BGI fills the bitmap text background, eliminating text erasure gyrations. This new text mode is set using the BGI setwritemode() function and passing the BGI_NIFTYTEXT constant (defined in N6220.H). Pass BGI_NORMALTEXT to the setwritemode() function to return to normal BGI text rendering.

BGI Demonstration Files

If you want to copy and modify the demo file, BGIDEMO.C, for your own needs, be sure to copy other files included with *#include* lines found in the demo file.

DOS Utilities

Configuration Utility

SC400CFG.COM provides configuration for timers, activity monitors, keypad, and features such as: standby/radio, powerfail, enable/disable suspend key, processor slowdown percent, system clock slowdown rate. The SC400CFG.INI file is located in your Windows 95 image, under the *\6110\Sc400cfg* folder on your boot PC Card, on the Windows 95 Toolkit in the *\Config\Sc400cfg* folder, or on the DOS Toolkit in the *\Utils* folder.

For additional information, refer to *\Docs\6110SC40.HTM* on the Windows 95 Toolkit CD.

Remapping Keypad

You can remap all keypad keys, including the shifted and unshifted keys, with the exception of the **[I/O]** key (suspend/resume) or the **GOLD** shift key.

▶**NOTE:**   *Before reprogramming certain keys, consider the effect it might have on other operations. For example, remapping the [1] and [2] keys would lose the contrast adjustment.*

Configuring Power Management

Advanced Power Management (APM) software is implemented to coordinate power-saving operations between applications and the hardware.

Using SC400CFG

You can use this configuration utility to reconfigure the keypad or power management. First, make a copy of the example SC400CFG.INI file from the Toolkit CD. You can also change the name of your copy of the INI file.

The example SC400CFG.INI file lists all the parameters that can be reconfigured. Your copy should include only those parameters that you intend to change. Delete all others.

After modifying the configuration file, add the following line to the AUTOEXEC.BAT file on the PC Card, then reboot.

```
sc400cfg.com [options]
```

If your configuration file has a different name, specify that name in the command line, as described below. If an INI file is *not* specified, SC400CFG.INI is used, if available.

▶ **NOTE:** *SC400CFG.COM is a DOS utility, which means the only way you can execute it is from the AUTOEXEC.BAT file before running Windows 95. It cannot be executed from a DOS window under Windows 95.*

EXAMPLE: SC400CFG –F:MyConfig.ini –S:NewConfigs
where *MyConfig.ini* is the configuration file and [*NewConfigs*] of the configuration file contains the applicable settings.

–?   Displays a help list similar to that shown here.

–F:<filename>
Specifies file with setting changes. Omitting *-F* defaults to the default configuration filename, SC400CFG.INI.

–S:<section>
Specifies section in file to use. Omitting *-S* tells SC400CFG.COM to use the [Default] section of the configuration file.

Create Download Include File

With a list of files, IPLFMT.EXE creates a download include file by concatenating a list of the initial program files to be loaded onto a 6110 Computer, prefixing each file with an appropriate DOSFIL header. Use this format to create a network download file: `iplfmt.exe <list file> <include file>`

list file
Name of the file that contains a list of files to include.

include file
Name of the download include file, such as DOWNLOAD.INC (this file is created by IPLFMT.EXE).

IPLFMT.EXE also extracts files from a network download file, using this format:

```
iplfmt.exe –r <include file> [<path>]
```

include file
Name of the download include file, such as DOWNLOAD.INC (this file is read by IPLFMT.EXE).

path   Name of the output directory where the files are to be extracted; this parameter is optional.

A download list file contains the names of the files to be sent to your hand-held computer. Each line in the file specifies one name. The file names may include path information so that all of the files need not be in the same directory on the host. However, the file is transmitted without the source path information, and placed in the current directory of the hand-held computer.

To specify a destination path or to rename a file on the computer, use a line with the following format:

        "newname=oldname"

This causes the file "oldname" to be read from the PC and transmitted to the hand-held computer with the name "newname." Both "oldname" and "new-name" may include path information. Below is a sample download list file:

        \App\app.lzh=app.lzh
        \config.sys=config.sys

Drive Mapping Utility

MAPDRIVE.EXE works much like SUBST.COM, in that you can assign drive letters to other drives. However, one major difference is that deleting a drive assignment with MAPDRIVE.EXE means the drive letter becomes an invalid drive, whereas deleting a drive assignment with SUBST.COM means that only the drive assignment is invalid. Use this syntax to assign a path to a drive letter: mapdrive.exe d=[path]

EXAMPLE: The following example assigns path (E:\temp) to drive A:.

mapdrive.exe A=E:\temp

To delete an assignment, use the following syntax, where "d" represents the drive letter assignment you want to remove: mapdrive.exe d=

EXAMPLE: You can also perform multiple drive mappings with a single command line. The following example deletes drive assignments for A: and B:.

mapdrive.exe A= B=

File Integrity Verification Utility

▶**NOTE:**   *Wildcard processing in the filename is only allowed on the command line, but not within the argument file. CRC32.EXE processes directories with any attribute set, such as 'read-only.'*

The DOS Toolkit contains a utility, CRC32.EXE, which computes a 32-bit Cyclic Redundancy Check (CRC-32) on a set of files. This check is computed using a complex mathematical equation, resulting in a unique, accurate CRC-32 file transfer value. Even a minor file change results in a different CRC. This CRC value can validate corrupt system files.

To verify file integrity, run CRC32.EXE to calculates the 32-bit CRC value. Then compare that value with the factory CRC value listed in the RELNOTES.TXT file in the Toolkit. One or more files or directories can be processed at one time. For command line help, use the /*?* switch.

        CRC32 [@][filename | pathname] [/s]

filename   Name of the file on which the CRC is calculated.

pathname   Location of the file name to be processed.

/***s***   Indicates all subdirectories should be searched for matching file names.

@   *(Optional)* Indicates that *filename* is an argument file with file names to be checked. A valid CRC32.EXE argument file has the same format as an IPLFMT.EXE argument file.

Multi-Purpose Delay Utility

DELAY.EXE serves the following functions:

- ► Displays a message to the screen (like the Echo command)
- ► Waits for specified amount of time before continuing (similar to the Sleep command or DOS 6 Choice command with a time-out specified)
- ► Pauses system execution until key is pressed (like the Pause command)
- ► Returns an error level based on which key was pressed (like the DOS 6 Choice command)

The first three functions perform even when DELAY.EXE is loaded as a device driver. Since the error level concept does not apply to CONFIG.SYS processing, the fourth function applies to command line (batch file) execution. To perform these functions:

1. To display one or more different messages, supply the new messages within quotes on the command line. Each quoted text string displays on a separate line. Use a null message ("") to display a blank line. To keep the cursor positioned immediately after the last character displayed, do not supply the trailing quote ("). To display a message without waiting for either a timeout or a keypress, specify a delay timeout of zero (/0).

2. To force DELAY.EXE to exit after a period of time, even with no key press, specify the "/nnnn" switch anywhere on the command line. The decimal value of "nnnn" is the hundredths of seconds to elapse before DELAY.EXE exits. The maximum delay is about 640 seconds or ten minutes.

3. The /K parameter locks the keyboard during execution of DELAY.EXE.

4. When DELAY.EXE is executed from a command shell, the error level set (upon return) is based on the key, if any, that was pressed prior to exiting. The return value is geared to determine which numeric key was pressed.

Use the `[device=]Delay[.exe] [/nnn [/K]] {"Message(s)"}` syntax.

device=
> Loads DELAY.EXE as a device driver. Specify the full pathname for the executable, as follows. When executing DELAY.EXE on the command line, omit "device=" and include full pathname for the executable if path is not in PATH environment variable: `device=c:\utils\delay.exe`

/nnn   Forces DELAY.EXE to time out, specifying a timeout period ***nnn*** in hundredths of a second. Thus, /100 causes DELAY.EXE to time out after one second. If using DELAY.EXE from a Windows DOS box, the timeout duration is longer due to how Windows implements the timeout function.

/K   Disables the keyboard while pausing. Only specify the /**K** switch after supplying a timeout value. Otherwise there is no way to terminate the delay. Without this switch, the delay terminates when a key is pressed, even if a timeout is specified.

{"Messages(s)"
> One or more messages can be specified on the command line. Each message starts with a quote (") that is not displayed. If a trailing quote (") is not supplied, then the cursor remains positioned immediately following the message. Otherwise a carriage return and line feed is issued at the end of the message. The default message is "Press any key to continue"

Errorlevel return values:

When DELAY.EXE is run as a command, use the errorlevel set (at the completion of the delay) to determine which key was pressed or whether a timeout occurred. The return value states which numeric key was pressed.   Below are error levels and their common key pressed values.

▶ 0	"0"		▶ 6	"6"
▶ 1	"1"		▶ 7	"7"
▶ 2	"2"		▶ 8	"8"
▶ 3	"3"		▶ 9	"9"
▶ 4	"4"		▶ 221	The ENTER key
▶ 5	"5"		▶ 235	The ESC key

▶ 12 to 154   Value returned consisting of the key value minus 30h

▶ 256   No key was pressed, time already expired

EXAMPLE:

Standard PC Function	6110 Commands Required to Perform Function
Pause	DELAY.EXE
Wait for "1" to be pressed	:Loop
	DELAY.EXE "Press '1' to continue . . . "
	If not Errorlevel 1 goto Loop
	If Errorlevel 2 goto Loop
Echo "message"	DELAY.EXE /0 "message"
Sleep 100 ms	DELAY.EXE /10 ""
Echo "Pause for 1 second	DELAY.EXE /100 /K "Pause for 1 second"
Sleep 1 second (with keyboard disabled)	
Choice /c:12 "message"	DELAY.EXE "message"
	IF ERRORLEVEL 3 GOTO InvalidDigit
	IF ERRORLEVEL 2 GOTO PressedTwo
	IF ERRORLEVEL 1 GOTO PressedOne
Echo "message two"	DELAY.EXE "message two" "Press any key to continue"
Pause	

System Reset Utility

RESET.EXE enables batch files or other software to reset the system.

FTP Software Drivers

The FTP Software drivers (BOOTP.EXE, DHCP.EXE, INET.EXE, TFTP.EXE and ETHDRV.EXE) are no longer in the DOS Toolkit. ODIPKT.COM is still in the Toolkit, but not in the FTP Software version. These drivers were in the toolkit up to version 1.02 and were removed starting in version 1.03.

Starting in version 1.03, the TCP/IP protocol stack is embedded in the Norand$^{®}$ Utilities program.

Bootstrap Protocol

BOOTP.EXE is a UDP/IP-based protocol that enables a diskless client computer to determine its own IP address, the server host IP address, and the file name to be loaded into memory and executed. Other configuration information such as the local subnet mask, the local time offset, the addresses of default routers, and the addresses of Internet servers can also be communicated to a host via BOOTP. BOOTP.EXE uses this command line format:

```
bootp [-nuvw] [-l <seconds>] [-r <number>] [-t <seconds>] [ini_file] [-version] [-?]
```

where the items in brackets [ ] represent the following:

–?	Display the help screen, including switches and descriptions.
–l <seconds>	Set the requested lease time in seconds.
–n	Specify that the kernel settings are not to be changed.
–r <number>	Set the maximum number of retries.
–t <seconds>	Set the maximum timeout in seconds.
–u	Unload the DHCP module.
–version	Display the current version.
–w	Write to the PC/TCP configuration file.
inifile	Use an alternative configuration file as specified.

Display Configurations

As part of the FTP, INET.EXE displays configurations, statistics, the IP routing table, and active TCP connections. INET also unloads the PC/TCP kernel from memory and uses this command line format: inet [arguments]

Note that the vertical bar represents an "exclusive or" function (one item only) and items in brackets are optional:

arp	Lists the Address Resolution Protocol (ARP) cache.
*config [advanced	security]*	Displays the kernel configuration.
debug	Displays hardware error statistics.
help	Displays a help screen with command line format and arguments.
*ipcp [stats	config]*	Lists IPCP-layer statistics or configurations.
*lpc [stats	config]*	Lists LPC-layer statistics or configurations.
pap	Lists Password Authentication Protocol (PAP)-layer statistics.
ppp	Lists Point-to-Point Protocol (PPP)-driver statistics.
route	Lists Internet Protocol (IP) routing table.
slip	Lists Serial Line IP (SLIP)-driver statistics.
stats	Displays network statistics.
tcp	Lists active Transmission Control Protocol (TCP) connections.
unload	Unloads the PC/TCP kernel.
version	Displays the version numbers of the PC/TCP kernel.

DOS TCP/IP TSR Kernel

ETHDRV.EXE is the DOS TCP/IP TSR kernel from FTP. It generates Ethernet II frame types. It can be unloaded from memory using "inet unload." It expects to find an environment variable like "PCTCP=c:\pctcp.ini" where it can find a configuration file. This is the unprotected, unserialized version of the kernel, so the usual serial number and authentication key pair are not required. ETHDRV.EXE uses the following command line format:

```
ethdrv [–?] | [–version]
```

or

```
ethdrv [–Bm] [–b <address>] [–i <number>]
       [–p <lg_pkt_count>] [–s <sm_pkt_count]
       [ t <maxtcpconn>] [–u <maxudpconn>]
```

where the vertical bar represents an "exclusive or" function (one item only) and the items in brackets [ ] are optional and represent the following:

–?   Displays the help screen, includes these switches and descriptions

–version   Displays the current version.

–B   Uses BSD-style urgent pointers.

–m   Enables use-emm option.

–b <address> Sets non-standard IP broadcast address.

–i <number> Sets interrupt number.

–p <lg_pkt_count>
                         Sets the large packet count.

–s <sm_pkt_count>
                         Sets the small packet count.

–t <maxtcpconn>
                         Sets maximum number of simultaneous TCP connections.

–u <maxudpconn>
                         Sets maximum number of simultaneous User Datagram Protocol (UDP) connections.

Dynamic Host Configuration Protocol

DHCP.EXE and DHCPHLPR.EXE provide DHCP client support for FTP's DOS kernel, ETHDRV.EXE. These clients also accept replies from BOOTP servers.

Both of the executables use the same command line format and parameters as BOOTP.EXE. ETHDRV.EXE must be loaded first followed by DHCP.EXE. It is not necessary to explicitly load DHCPHLPR.EXE.

The Dynamic Host Configuration Protocol (DHCP) provides a framework for passing configuration information to hosts on a TCP/IP network. DHCP is based on the Bootstrap Protocol (BOOTP), adding the capability of automatic allocation of reusable network addresses and additional configuration options.

From the client's point of view, DHCP is an extension of the BOOTP mechanism. This behavior allows existing BOOTP clients to interoperate with DHCP servers without requiring any change to the clients' initialization software.

IP Address Allocation Mechanisms

DHCP supports three mechanisms for IP address allocation. A particular network may use one or more of these mechanisms.

Automatic allocation

DHCP assigns a permanent IP address to a client.

Dynamic allocation

DHCP assigns an IP address to a client (for a limited period of time, or until the client explicitly relinquishes the address).

This mechanism simplifies network administration because the software keeps track of IP addresses rather than requiring an administrator to manage that task. This means that a new computer can be added to a network without the hassle of manually assigning it a unique IP address.

This is the only mechanism that allows automatic reuse of an address that is no longer needed by the client to which it was assigned.

Manual allocation

A network administrator assigns a client's IP address, and DHCP is used simply to convey the assigned address to the client.

DHCP Message Format

The DHCP message format is based on the BOOTP message format, to capture the BOOTP relay agent behavior as part of the BOOTP specification and to allow interoperability of existing BOOTP clients with DHCP servers. Using BOOTP relay agents eliminate having a DHCP server on each physical network segment.

ODI Packet Driver

ODIPKT.COM is an ODI Packet Driver for FTP with the following switches.

```
ODIPKT   [?]   [unl] [SINT=XX] [MLID=NAME] [FRAME=FRAME-STRING]
```

?   Displays command line switches syntax similar to this list

unl   Causes ODIPKT to be unloaded

XX   The software interrupt number (Range: Hex 60–80, default: 60)

NAME *(case-sensitive)*

MLID with ETHERNET_II, ETHERNET_SNAP, or TOKEN-RING_SNAP support. Default: ETHERNET_II or TOKEN-RING_SNAP (first found).

FRAME-STRING *(case-sensitive)*

Media type ETHERNET_II, ETHERNET_SNAP, or TOKEN-RING_SNAP

Trivial File Transfer Client/Server

TFTP.EXE is the trivial file transfer client/server for FTP. TFTP is generally used at boot time following a BOOTP request to retrieve a start-up file. The response from the BOOTP server generally contains the server IP address and the name of the file to retrieve. TFTP uses the following line command format:

```
TFTP server
TFTP {get|overwrite|put} <local file> <host> <foreign file> [image]
```

serve	Starts the TFTP server.
get	Retrieves a file from another machine; a get operation fails if a local file already exists.
overwrite	Retrieves a file from another machine, overwriting the local file if it exists.
put	Transfers a local file to another machine.
local file	Names the file on the local machine.
host	IP address of the host machine.
foreign file	Names the file on the host machine.
image	Transfers the file in binary mode.

IrDA Printing

IrDA printing support under DOS consists of the device driver, NORIRDA.SYS, the actual driver handler, link management wrapper, and protocol stack. Together these two software components form the IrDA printer solution, providing a standard DOS character driver to support IrDA printers.

The IrDA printer driver supports the following DOS device driver entry points, compatible with the standard input and output libraries provided by DOS compilers, handling the request as indicated by the summarized processes details:

open   Attempts discovery of an IrDA device, and if discovery is successful, establishes an IrLMP connection for a printer with the device discovered.

▶ **NOTE:**   *Only one open connection is allowed at this time.*

read   Returns any data sent by the system. A return count of zero implies that no data is available.

close   The coalescence buffer is sent to the printer and, after having verified that ll data is sent to the printer, the IrLMP and IrLAP disconnects are performed (if there is a coalescence buffer being used, refer to the *–n* switch for details).

write   The written character is stored in a local coalescence buffer (with the IrLMP protocol header inserted) until the frame size is reached, at which time the frame is transmitted to the printer. If the *–n* switch is used, each user write byte count is sent with the IrLMP protocol header inserted without any attempt at local coalescence.

ioctl   This processing is specific to Intermec and is intended to support printing applications. A printing program may hook the DOS INT 24 critical error interrupt and then call the driver's ioctl directly using the information provided by INT 24. The driver responds by setting an extended error code in the application's memory, using a pointer that was passed to it through the ioctl interface.

If an error returns after making an ioctl call, the following list of error codes and descriptions apply:

0   PREADY
Device driver is open, a printer connection is established.

50   IRLAP_DISCONNECT_ERROR
Close failure, a disconnect event state change failure occurred during the disconnect procedure processing.

51   DISCOVERY_FAILURE
Open failure. No devices responded during the discovery procedure.

52   LINK_MANAGEMENT_CONNECT_FAILURE
Open failure. A buffer flushing operation failed during the establishment of the link management session with a discovered device.

53   TX_BUFFER_DESC_GET_FAILURE
Write failure. Could not get a transmit buffer descriptor to send the data to the printer.

54   BUFFER_GET_FAILURE
Write failure. Could not get a transmit buffer descriptor to send the data to the printer.

55   BAD_CONNECTION_HANDLE
Open, write, or close failure. A defective connection handle was encountered during the flushing of the driver's coalescence buffer.

56   UNKNOWN_TRANSMIT_FAILURE
Open, write, or close failure. The link access protocol failed for "unknown" reasons during an attempt to flush the driver's coalescence buffer.

57   WRITE_WITH_PRINTER_NOT_READY
Write failure. A write was attempted to the driver while the driver is in an error state.

58   I_QUEUE_FULL
Open, write, or close failure. The driver could not get a queue for the transmission of an information frame.

59   CONNECT_FAILURE
Open failure. After a successful discover of an IrDA device, a connection could not be established.

60   DRIVER_CLOSED
Write, read, ioctl, close failure. An attempt was made to access the driver while the driver was in a closed state.

61   NO_RECURSION
Write, read, ioctl, close failure. An attempt was made to recursively access the driver.

62   BAD_LINK_CONTROL_FRAME_SIZE
Open failure, link management failure. The system did not receive the correct frame size for a connect confirmation by IrMLP after the IrLAP link session was established with the remote device.

63   LINK_MANAGEMENT_CONTROL_FRAME_EXPECTED
Open failure, link management failure. The system did not receive an IrLMP control frame from the remote device after the IrLAP link session was established.

64   NOT_LINK_MANAGEMENT_CONNECT_CONFIRM
Open failure, link management failure. The system did not receive an
IrLMP connect confirm frame from the remote device after the IrLMP
link session was established.

65   RECEIVE_FRAME_FAILURE
Open failure, link management failure. The system did not receive the
IrLMP connect confirm frame from the remote device that had a
successful IrLAP link established.

66   READ_FAILURE_PRINTER_NOT_READY
Read failure. An attempt was made to read from the character stream
with the connection not in the ready state.

67   READ_FAILURE_PRINTER_IN_NDM
Read failure. An attempt was made to read from the character stream
with the connection in the normal disconnect mode.

68   READ_FAILURE_BAD_CONNECTION_HANDLE
Read failure. An attempt was made to read from the core, and the
connection handle used is no longer valid.

69   READ_FAILURE_UNKNOWN_STATUS
Read failure. An attempt was made to read from the core that resulted in
the core posting an unknown error.

70   WRITE_REQUEST_EXCEEDS_COALESCING_BUFFER
Write failure. The user's write buffer is too large to fit in the local
coalescing buffer and is being rejected. Present the data to the driver
with a buffer size of less than 128 bytes at this time.

Make sure the NORIRDA.SYS file is on the system. If your system was deliv-
ered with an application requiring this file, it should already be in flash. If not,
it can most likely be found in the toolkit.

The following entry is required in the CONFIG.SYS file:

```
device=d:\pathname\norirda.sys
```

where *d:\pathname* is the specific path to the directory with the printer drivers.

There are no required entries in the AUTOEXEC.BAT file for NORIRDA.SYS.

NORIRDA.SYS has optional parameters.

```
NORIRDA.SYS   [ −? −c −d:n −n:drivername −r:n ]
```

−?   Provides information about version, revision level, a command line
example, a list of the available switches, and brief descriptions of each.

▶ **NOTE:**   *Use only the switches shown here. This driver is a multi-platform program, providing fea-
tures for all of the 6000 Series platforms. None of the other switches are intended for the
6110 Computer and could cause a malfunction, if used on this platform.*

−c   Indicates the driver should use a local coalescing buffer, rather than
present the data to the connected device as it is delivered to the driver.

▶ **NOTE:**   *Using the −c switch creates a situation where the application is no longer assured of the data
being delivered to the connected device when the write returns, as is the case when this
switch is omitted.*

−d:n   Specifies the disconnect time (in seconds) requested during negotiation,
where (n) is one of: 3, 8, 12, 16, 20, 25, 30, or 40. This switch is
accumulative and can add any or all of the above disconnect times to the
default, which is 3. The two negotiating systems select the largest
common value.

–l   Specifies that the driver should link on open. This switch causes the driver to behave more like NORIRDA.SYS version 1.0, in that whenever an open is performed the driver initiates an XID, then links to whatever is discovered.

–n:driverName
Specifies the new name to which this character device driver should respond. This string must be supplied. The default name for this driver is IRDADRVR.

–r:n   Specifies the number of seconds of discovery retries to be performed at the first DOS write command by the driver. The default is five seconds.

LAN Communications

MININET.EXE provides communications over Local Area Networks (LANs). The default baud rate is 500 KB, but automatically adjusts to the baud rate of the host. If this switch is not used, the default baud rate is used, otherwise the speed can be set to any of the following values:

- ▶ 5000   500 KB *(default)*
- ▶ 4608   460.8 KB
- ▶ 1152   115.2 KB *(secondary default)*

To load MININET, add a command line to the AUTOEXEC.BAT file, according to the following syntax:

```
MININET.EXE  [–s#] [–c#] [–t#]
```

All parameters are optional, as designated by the brackets [ ]. You replace '#' with a value that is appropriate for each parameter, according to the purpose as described below:

–c#   Sets the default COM port to be used.

▶ **NOTE:**   *Supplying the –c# switch prohibits an application from selecting a COM port via the NCB CALL used to establish a session. In this way it is possible to force which COM port to use.*

–s#   Sets the speed of communication.

▶ **NOTE:**   *The only baud rates currently supported by Intermec/Norand Host code for LAN communications are: 500 KB and 115.2 KB. The 460.8 KB baud rate is reserved for future use.*

–t#   Sets the secondary baud rate to automatically toggle between the primary and secondary baud rates, depending on the speed of the host. A value of zero indicates that only the default baud rate is used (set with **–s** switch). Any of the baud rate values listed above are valid for this switch.

If neither **–s#** or **–t#** are set, MININET.EXE autoselects a baud rate from the three valid speeds.

If only **–s#** is set, MININET toggles the baud rate selection between the requested speed and 115.2 KB.

If both **–s#** and **–t#** are set to valid speeds, MININET toggles the baud rate selection between those two values.

If **–t#** is set to zero, MININET sets the baud rate to the value set by **–s#** or to the default value of 500 KB.

Magnetic Stripe Reader

The H2MAGSCN.EXE 6110 Magnetic Stripe Reader (MSR) allows magnetic stripe cards to be read in either direction. When the card is read, the hardware is powered up, then shortly after the read power is removed. Thus very efficient power management is accomplished. The card data is read from the first three tracks and passed to a UART device. The driver interfaces with the UART to control the process of retrieving data.

The 6110 MSR driver controls the hardware to provide the data to the application. The driver can return the data through the keyboard buffer, keyboard entry, or through the API specified in the SCANBIOS API Interface document.

The hardware may reside at COM port address 0x03E8 with IRQ 6 or 0x0218 with IRQ 11.

Command line options:

–A   Alternate COM port, allows the driver to work with hardware at 0x03E8 (default address is 0x0218).

–E   Permits the scanner to always be enabled to scan or read magnetic stripe cards. When this option reinitializes the driver, the read mode is set to wedge mode again. This is the default mode.

–SCANBIOS
       An alternate method of operation (in place of **–E**). This permits the enabling and disabling of the scanner under software control. Once the driver is loaded, it can be reinvoked with other command line options to change its behavior.

–Sn   Specifies the Output Field Separator (default API only) for the always enabled mode of operation. The parameter represents the field separator where **n** equals "1" for a carriage return *(default)*, "2" for both a carriage return and a line feed, or "3" for a tab character.

–RAW Driver sends data from the card "as is" without parsing.

EXAMPLE: H2MAGSCN —E —S3

NPCP Printer

NPCP printing support under DOS consists of the DOS device driver PC4800.SYS, that allows DOS and PL/N applications written for the 6110 Computer to print to NORAND 4800 and 6800 Series Printers, using NPCP. PC4800.SYS is installed as a device driver in the CONFIG.SYS file, such as:

```
device=pc4800.sys [device name [port number [/Ilpt]]]
```

device name
       Name to use for this instance of the device driver. This name opens the device. It can be anything except PRN, and can be up to eight characters long. The default name is NP4800.

port number
       COM port used for output by the driver. Valid values: 1=COM1, 2=COM2, etc. Default: COM1

/I   Redirects LPT output to the BIOS INT 17h API, and is required to support PL/N applications.

lpt   LPT port to be redirected. Valid values: 1=LPT1, 2=LPT2, etc. By default only output directed to the specified device name is captured.

▶**NOTE:**   *The order of the command line parameters is important (for example, you must specify a*
                   ***device name** if a **port number** is specified).*

EXAMPLE 1:   Redirect LPT2 to COM1: Do not redirect any LPT2 output at the INT 17h (BIOS) interface.

```
device=pc4800.sys LPT2 1
install=4000api.exe ...   { refer to 4000API.EXE for switches }
```

EXAMPLE 2:   Redirect all LPT1 output to COM.

```
device=pc4800.sys LPT1 2 /I1
install=4000api.exe ...   { refer to 4000API.EXE for switches }
```

If PC4800.SYS is not in the root directory, be sure to include the path.

▶**NOTE:**   *The /i switch is only intended for support of PL/N applications. Do NOT use the switch for*
                   non-PL/N applications. The interface provided is not 100 percent PC-compatible.

For additional information describing how PC4800.SYS can be loaded, refer to
the 4000API documentation on page 5-4. Normally, 4000API.EXE is loaded in
CONFIG.SYS using:

```
install=4000API ... {refer to 4000API.EXE for switches}
```

However, if it needs to be loaded high, you must load it in AUTOEXEC.BAT.

Intermec Technologies Corporation supplies PL/N and C standard printer rou-
tines that handle critical errors and the printing of text to INTERMEC printers.
The following is for those who might want to create their own print routines.

Open PC4800.SYS before using it, such as in C programming language, *fopen()*.
Use the correct open call for the language being used that allows writing to the
device. Also, the open call used should return an error if the device does not ex-
ist. Some open calls will create a file if the device driver is not present.

To write to the device, use any appropriate output function that can be directed
to the device (for example, in C programming language, you can use *fprintf()*).

You should install a critical error handler that process errors from the printer.
The printer driver returns only "device not ready" errors to DOS for the sake of
compatibility with the standard PRINT program supplied with DOS. You can
retrieve the extended error by bypassing DOS and calling the driver directly
from the error handler.

Ioctl calls (DOS Function AH = 44h, AL = 02h) are supported by the device driv-
er (refer to a DOS reference manual for details). Calls require the printer device
handle number in register BX, a data item with the following structure pointed
to by DS:DX, and the number of bytes to be read in register CX.

```
struct ioargs {
    far *unsigned char ioctl_cmd;
    far *unsigned char ioctl_buf;
};
```

The ioctl_command field may point these commands for execution by the driver:

```
ONLINE = 2
STATUS = 3
GET DEVICE FEATURES = 4
SELFTEST = 5
RESET = 6
GET CURRENT CONFIGURATION =7
XTENDED ERROR = 255
```

Data is returned to the buffer pointed to by the ioctl_buf, for the number of bytes
specified in register CX when the ioctl call is made. The first byte of the re-
turned data represents any error encountered during the call. If the call was
successful, this byte is set to zero. If the call was unsuccessful, this byte repre-
sents the extended error. The format of the rest of the data is described in the
documentation for the printer being communicated with.

Open and close the printer driver for each report transaction with the printer to take advantage of the NPCP line-loss detection features. Applications should status (ioctl 3) the printer after the last line of a report or a series of reports are sent to the printer to ensure that all lines were printed successfully.

The printer driver is multi-tasking. If the application needs to take full advantage of this feature, it must enable time slicing through the appropriate call to INT 15h (refer to the 4000API documentation).

If time-slicing is not activated, the last line buffered by the driver is not sent to the printer until the device is closed or an ioctl status call to the printer is made. Perform an ioctl status call before all closes to make sure the driver print buffer is sent to the printer successfully, since DOS closes to character devices do not perform output flushes as part of the close operation. The driver flushes the buffer upon a close, but no error is returned if the flush is unsuccessful.

PC Card Services

NORMOD.SYS is a PC Card services client that handles the identification and initialization of serial device PC Cards (such as modems and radios). NORMOD is installed in the CONFIG.SYS file, as follows:

```
DEVICE=NORMOD.SYS [—A] [—Bd] [—Cx] [—Dx x x] [—Ix] [—Nname] [—R] [—S] [—V]
```

–A   Suspends requests that are allowed, even if an open session is present. Normally, NORMOD rejects suspend requests whenever an application has an open connection.

–Bd   Defines a battery cutoff level, where "d" is the value in millivolts. If a voltage reading for your main battery is below this level, then *open* requests fails. This protects against loss of data when power fails because of low batteries.

EXAMPLE: –B610 would set the cut off at 610 millivolts (0.61 volts).

–Cx   Overrides the default COM port. It defaults to the first available comm port; probably COM4 since COM3 is usually taken.

EXAMPLE: –C4 would designate COM4.

–D x x x
Defines the timeout used for a particular manufacture's code, rather than always using the timeout value. If a modem card has an unreliable ready line, this switch could be used to define a timeout value instead of examining the ready line. The first two hexadecimal numbers must match both the code and the information values returned by a *GetConfigInfo* call before the third value will be used as the timeout value. The timeout value needs to be specified in tics (1/18th of a second).

EXAMPLE: */D 16b 21 20* sets the timeout to 20h tics, about 1.8 seconds. The *16b 21* identifies the Ericsson PIA radio.

–Ix   Changes the interrupt request level that will be used. The *x* parameter should be supplied in hexadecimal. The default value for *x* is *IRQ 5*.

EXAMPLE: –I7 would use *IRQ 7* instead of *IRQ 5*.

–Nname

> Changes the device name that will be installed. The default value for *name* is *MODEM*.

EXAMPLE: –Ncom4 would set the device name to *COM4* instead of *MODEM*. The device name can be any valid eight character filename. Note however, that you should use a name that does not correspond to any files or directories that may exist or may need to exist. Because once you have defined a name as a device name, you will not be able to access any files or directories with the same root name.

–R   Using this switch, a card can be left powered on with ring-indicate enabled during suspend. Thus, a ring-indicate wakes up the terminal.

–S   Causes UART registers to be saved when a suspend occurs, and it restores them upon resume.

–V   Turns on the 12-volt VPP whenever a modem session is open.

Application Interfaces and Device Behavior

This driver allows applications to power the modem on by application request. This is supported by the following methods.

- ► DOS OPEN command
- ► INT 14h, function 0 (SERIAL BIOS INITIALIZE COMMAND)
- ► INT 14h, function FF01h (4000API PORT POWER ON COMMAND)
- ► APM function 5307h (SET DEVICE POWER STATE) to the correct serial port and power state

The modem can be turned off by application request. This is supported by the following methods:

- ► DOS close command
- ► INT 14h, function FF00h (4000API PORT POWER OFF COMMAND)
- ► APM function 5307h (SET DEVICE POWER STATE) to the correct serial port and power state.

Once the driver is opened, power is maintained to the PC Card as long as the card is in the slot and battery-low or power-fail events are not detected. On detection of battery-low or power-fail events, power is removed from the card and the application is to recover from modem failure by detecting protocol errors.

► **NOTE:**   *To recover properly, applications must always power-down (CLOSE) the modem before modem power-up (OPEN).*

It is not possible to SUSPEND the system, while the modem driver is opened. The modem driver rejects the request to preserve the communications session.

Supported DOS Driver IOCTL Functions

IOCTL Function	Buffer Length	Description
1	12	Return the command line parameters.
2	16	Return the manufacturer ID string.
3	64	Return the product version 1 information string.
4	2	Return the current extended device error.

CMD 1: Command Line Parameters

The buffer returned, for the command line parameters, has the following format:

```
struct cmdline {
   unsigned char len;          // length of data returned
   unsigned char devname[8];   // device driver name
   unsigned char socket;       // PC Card socket device to load in
   unsigned char IRQ;          // system IRQ associated with modem
   unsigned int base;          // base i/o address of modems UART
      }
```

CMD 2: Manufacturer ID String

Manufacturer IDs are assigned by the PCMCIA standards committee. Each modem manufacturer is required to provide their ID in the card CIS for examination by software. Consult the PCMCIA specification for the format of the TUPLE string returned by this call.

CMD 3: Product Version 1 Information String

Each PC Card manufacturer is required to provide a Version 1 Information TUPLE in the card CIS for examination by software. Consult the PCMCIA specification for the format of the TUPLE string returned by this call.

CMD 4: Return Extended Error

Status of the modem driver or an extended error can be retrieved via this call.

Status Variable	Value	Meaning
SUCCESS	0x00	
BAD_ADAPTER	0x01	Device in the slot is possibly not a modem.
BAD_ATTRIBUTE	0x02	Device in the slot is possibly not a modem.
BAD_BASE	0x03	Requested COM port is already assigned.
BAD_IRQ	0x06	Requested IRQ is already assigned.
BAD_SOCKET	0x0B	Requested socket is already owned by another device.
BAD_TYPE	0x0D	Possibly the device in the slot is not a modem.
NO_CARD	0x14	No card is present in the socket.
IN_USE	0x1E	Requested configuration is already in use.
NO_MORE_ITEMS	0x1F	Requested configuration did not match configurations.
POWER_ERR	0xF0	Modem power was removed because of power event.
NOT_INITIALIZED	0xF1	Card was rejected or inserted after driver was opened.

Device Driver Errors

The following errors are returned to DOS applications:

- ► 0x0100   Command OK
- ► 0x8102   Device not ready. Indicates card not in slot
- ► 0x8103   Unknown DOS command
- ► 0x810c   General failure; all other errors and power too low to run modem

Interrupt 14h

Interrupt 14h interfaces, supported by NORMOD.SYS, manage modem power and return error codes dealing with the modem power-on sequence. The supported INT 14h functions are intercepted when DX+1 represents the COM port specified on the modem driver line. The list of INT 14h functions supported by the NORMOD device driver is as follows:

- ▶ Initialize Communications Port   AH=00h
- ▶ Extended Initialize   AH=04h
- ▶ Get Extended Error   AH=FEh
- ▶ Port Power Off/On   AH=FFh

▶ **NOTE:**   *Interrupt 14h interfaces are reserved solely for internal use and application use of these methods may affect application portability. Therefore, applications should not use them.*

Interrupt 15h

APM interfaces manage modem power. The NORMOD device driver supports the Set Power State (AX=5307) and the Get Power State (AX=530C).

Pen Calibration

CALIB.EXE is the DOS Pen Calibration utility. It performs calibration of the pen interface for your hand-held computer.

Calibration is simply the alignment of the cursor, placing it in the same location where a stylus (or pen or finger) is placed on the touch screen. The 6110 Computer comes with default settings that are normally acceptable for most applications. However, some applications, such as signature capturing, may require a calibration adjustment to compensate for variations in touch panel alignment and user preferences.

Configuration settings are stored in flash. If flash contains invalid information, the program displays the calibration screen, regardless of the existence of the calibrate command-line option.

CALIB.EXE is a DOS application program and can be invoked from the AUTOEXEC.BAT file or from the DOS command line. The appropriate mouse driver must be installed. The driver contains extensions to the standard Mouse API which provides digitizer information, screen resolution, and raw coordinate points, which is required for this implementation of CALIB.EXE.

▶ **NOTE:**   *Load the pen driver before running the calibration utility. See page 4-3 for BGI Drivers.*

```
61MOUSE.COM (pen driver)
CALIB.EXE     (calibration utility)
N6110.BGI     (BGI driver)
```

CALIB.EXE begins calibration by placing one of four targets at a fixed location on the screen and waits for a pen to be pressed at the center of the target three times. It is important during this process to apply moderate pressure while pressing the target. Lightly tapping or placing too much pressure generates incorrect results. The unit beeps after each successful pen press. Therefore, if a beep is not heard when the pen is down, lift and press again. Also, do *not* allow fingers or any other object to touch the screen. When three good data points are acquired for a target, the next target is displayed.

When data for all four targets are acquired, the program displays a screen to check the calibration results. Match the cursor with the location of the pen near the four corners of the screen. The best way to do this is to place the pen down near each corner of the display and see if the cursor appears at the location of the pen. If the cursor is offset from the pen location by some fixed amount, adjust it by pressing the appropriate **UP**, **DOWN**, **LEFT**, or **RIGHT** buttons on the screen. (You may prefer to add some amount of offset to place the cursor away from the pen using the same buttons.) If the cursor position varies significantly from the pen location, as the pen is placed at the different corners, the four target calibration process was not successful. Restart the program and pay closer attention to how the pen is pressed against the targets.

When satisfied with the calibration, press **SAVE** on the screen to store the results. The results are then available for use by the pen (or mouse) driver. Press **CANCEL** to lose any changes. In either case, the program exits. If the calibration program is unable to recognize the pen, press **[Esc]** to quit the program and not store the new calibration values.

Pen Driver

The 61MOUSE.COM pen driver is actually a DOS mouse driver that interprets the standard INT 33h mouse interface. Most of the functions are supported.

For detailed information relating to the standard mouse interface, see the *DOS Applications Programming Interfaces (APIs)* on the internet:
     http://partners.intermec.com/regions/devspt/api/index.htm

The pen driver installs as a Terminate-and-Stay-Resident (TSR) as a result of placing the 61MOUSE.COM statement in the AUTOEXEC.BAT file. If the drive and directory for this driver is not in the path, include the information as follows:

```
d:\path\61MOUSE.COM
```

d: is the driver; *path* is the directory path to the driver

After installation, the driver displays the following message:

```
Driver installed
6110 Digitizer enabled
```

PenPrint

PENPRINT.EXE provides the capability of printing to INTERMEC printers with appropriate error handling. It is currently shipped with the 6110 DOS Toolkit.

```
PENPRINT [options] <print-file> <print-device>
```

[options]:

–a   Cancels report printing when error message is displayed. If not specified, "PenPrint" cancels printing only if a fatal error occurs.

–h   Displays a help screen.

–m   Suppresses the "Fix top-of-page" message.

–p   Disables using a pointing device. If not specified, "PenPrint" attempts to auto detect a touch pad. It can not always reliably determined whether such a device is present. In these situations, use this option to ensure the proper prompts are used for error messages.

–r   Provides the option to restart the report, after a fatal error occurred. If selected, "PenPrint" does not restart the report itself, but returns to the calling application with a return code of choice. The calling application then restarts the report because a report may consist of a header and trailer. The calling application may need to make two separate calls to "PenPrint" to print them to do a prompt like "TICKET OKAY?" before printing the trailer. If not specified, cancel the report after fatal errors.

–v*\<f>* File name with VOID message. Overrides default VOID message sent to printer when either fatal error occurs or the report cancels. "PenPrint" sends the data in **\<f>** to the printer like it handles *print-file*, except error processing is disabled. If **\<f>** is not specified, nothing is sent to the printer after a fatal error. Do this only if printing a VOID message when detecting a fatal error. Otherwise, indicate an invalid report.

print-file
Name of the file with the data to be sent to the printer. "PenPrint" does *not* modify this file in any way. The data is sent "as is" to *print-device*.

print-device
Name of the DOS device driver that provides the printer interface (LPT1).

Return Codes:

0   Report OK; report was not canceled.

2   Report was canceled by the user after a non-fatal printer error.

3   Report was canceled after a fatal printer error.

5   After a fatal printer error, user selected to restart report.

128   An error occurred on a device other than the printer.

253   The print file could not be opened.

254   The display could not be initialized.

255   Invalid parameter or incorrect number of parameters.

PenPrint depends upon BGI graphics drivers to implement the graphics needed. Thus the correct BGI driver must reside in the current directory. See page 4-3.

▶ Recoverable errors require manual intervention. PenPrint will:

a. Display the error message.

b. Display the response options: "Continue" or (optionally) "Cancel" *(see "–a" parameter)*.

c. Require an option to be selected.

d. Restore the display.

With "Continue," PenPrint continues printing. With "Cancel," PenPrint attempts to print a VOID message. If VOID message fails, PenPrint prompts for "Fix-top-of-page". PenPrint then exits with a return code. The calling application prompts you to change the printer type or to restart the report (either choice is optional).

▶ When handling fatal (unrecoverable) errors, PenPrint will:

a. Display the error message and response options: "Cancel" and *(optional)* "Restart Report" *(see "–r" parameter)*.

b. Prompt for an option and restore the display.

c. Attempt to print the VOID message. If the VOID message fails, prompt for "Fix top-of-page."

d. Exit with the return code

With "Restart Report," calling the application will restart the report. With "Cancel," calling the application will either change the printer type or restart the report *(both choices optional)*.

▶ **NOTE:**   *If the **–v** parameter is not specified, the following VOID message is printed by "PenPrint" (bold double-wide mode):*

```
VOID * VOID * VOID
```

This message requires at least a 38-column printer. For printers that have more than 38 columns, the default message is printed at the left margin.

▶ When printing the VOID message, error handling is disabled (such as you see only the error message for the original error). This is because you could be stuck in an infinite loop of error messages in "PenPrint," if the original error was a result of a nonfunctional printer.

▶ If a pointing device is detected and the **–p** switch is not used, PenPrint displays the choices as buttons/boxes on the screen. The prompts are displayed as "Continue" or "Restart Report" or "Cancel." Any touch within a box activates that response. If **–p** is specified, or no pointing device is detected, the prompts display as "[YES] Continue" or "[YES] Restart Report" or "[NO] Cancel."

Power Management

NORDOSPM.EXE, part of the Advanced Power Management (APM) system, is the DOS power management driver interface between applications and the APM BIOS. The power management driver must be installed as a device driver at system startup time. This driver implements the following general functions:

▶ Attempts to determine when the DOS environment is idle and saves power by idling the CPU.

▶ Polls for APM events and broadcasts them to DOS drivers and applications. Mediates events that can be failed such as suspend, user suspend, standby, and user standby requests.

▶ Incorporates code that patches around bugs in SystemSoft PC Card drivers.

Figure 4-1 has a simplified diagram of the Power Management Software.

NORDOSPM.EXE	DOS APM driver
BIOS Extension	APM BIOS
BIOS	System BIOS
Hardware	600 Series Computer hardware
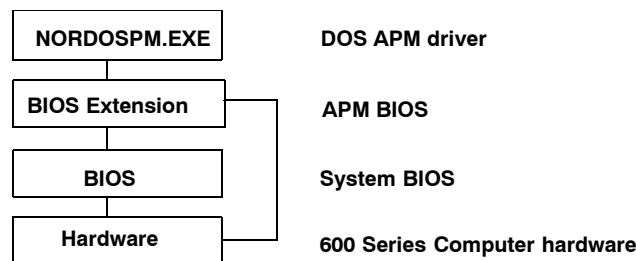
Figure 4-1
Power Management Software

The APM BIOS is a BIOS extension. Both the APM BIOS and the system BIOS are factory installed. NORDOSPM.EXE, installed as a device driver in the CONFIG.SYS file, must be installed before H2PODSCN.EXE and H2THRSCN.EXE. Both the APM BIOS and the system BIOS load automatically before DOS loads.

RS-485 Communications

RS485ATT.COM provides communications over Local Area Networks (LANs), and is the RS-485 version of OWLATTCH.COM that was originally developed for Proxim radio enabled hand-held computers. RS485ATT.COM sends periodic OWL protocol "attach" messages to refresh their route table entries in the access point. RS485ATT.COM must receive an attach response before it accepts the fact that it is successfully attached to the access point. RS485ATT.COM also passively determines the host IP address and includes this information in the attach message. The access point then uses this information to provide the so-called Proxy ARP services. RS485ATT.COM performs the task of a protocol driver in the ODI specification from Novell.

The RS485ATT.COM module attempts to attach to an access point, looking for a response. If no response is received it will retry up to ten times (in three-second intervals). After completing ten retries, it waits for 3.5 minutes before attempting it again. If an attach response is received then RS485ATT remains silent for 3.5 minutes, at which time it attempts to attach again.

If a TCP/IP protocol driver is present and active, RS485ATT.COM attempts to determine the host IP address and puts the address in the attach message so the access point can become aware of it and use Proxy ARP services on the RS-485 LAN. RS485ATT.COM determines the IP address by "sniffing" ARP requests as the TCP/IP driver sends them. If the TCP/IP driver changes its IP address (via BOOTP or DHCP) and the RS485ATT.COM module becomes aware of the change, the module will immediately send an attach message to the access point with the updated IP address in it. The RS485ATT module also detects whether or not AC power is present. If it is present, that is an indicator that the 6110 Computer is in the dock and able to participate in RS-485 communications; RS485ATT attempts to send attach messages. If AC power is not present, the RS485ATT holds itself in a reset state and attempts an attach as soon as AC power is applied.

The first attach message is sent three seconds after the module is loaded or after AC power is applied. If the IP address changes, an attach message is sent one second after the address change is detected.

RS485ODI.COM provides a standard ODI layer interface to an RS-485 based network. It autoselects either COM1 or COM2, based upon the terminal type.

Scanners

Pod Scanner

H2PODSCN.EXE is the internal pod scanner. It collects and passes scanned data to an application via the standard DOS type-ahead buffer, where the scanned bar code is available to an application as simple keystrokes. The program also manages power for the scan operations. Its features are as follows:

- ► I/O is transferred through the standard DOS type-ahead buffer
- ► Scanner provides the capability of a fully decoded RS-232 scanner
- ► Handles SE1223 hardware
- ► Baud rate: 19200

The pod scanner uses command line switches to drive the desired functions. The syntax is as follows:

```
H2PODSCN [<switches>]
```

where <switches> include combinations of the following:

–? or –H
> Either option displays a help screen that briefly describes the various options.

–C   Appends CR/LF to decoded data.

–E   Enables scanner immediately, and continually, not just when enabled via software API.

–O[n] Power off delay, where *n* is the number of seconds from trigger release to the time power is removed from the scanner.

–SAVEPARMS
> Saves the current configuration parameters to H2PODSCN.PAR.

–SCANBIOS
> Uses the SCANBIOS API interface.

–U   Unloads this TSR.

EXAMPLE: The following is an example command line for the pod scanner:

```
H2PODSCN –E
```

EXAMPLE: This example scanner testware enables the scanner, displays the DOS keystrokes until the return or newline character is encountered, then it exits.

```
#include <dos.h>
#include <stdio.h>
#include <conio.h>
void main (void) {
  int c;
                              //
  _AH = 0x80;                 // collect only one scan, 4500 compatible
                              //
  geninterrupt(0x7a);         // thread thru scan tsr
                              //
  while ((c != '\n') && (c != '\r')) {
    while (kbhit()){
      c = getch();
      putchar(c);
      if (c == '\n' || c == '\r') break;
    }
  }
}
```

H2 CPU Series Tethered Scanner Driver

H2THRSCN.EXE is the tethered scanner. Its features are as follows:

- ▶ I/O is transferred through the 9-pin D-sub serial port connector
- ▶ Scanner provides the capability of a fully decoded RS-232 scanner
- ▶ Handles SE1223 hardware.
- ▶ Baud rate: 9600

H2PODSCN is generally installed from the AUTOEXEC.BAT file using the following statement:

```
H2PODSCN [—option[value]] ...
```

This program must be installed after the CardSoft drivers and TSRs are installed (if they are used) and after NORDOSPM.EXE is installed. Also, if CardSoft drivers and TSRs are present in the system, the command line option on NORDOSPM.EXE that "fixes" some CardSoft bugs (/ss:1) must not be used on NORDOSPM.EXE. Make sure the NORDOSPM.EXE, H2PODSCN.EXE, and H2THRSCN.EXE files are located in the *C:\Drivers* folder of the 6110 Computer.

NORDOSPM.EXE should already be in the flash, all other files listed above can be found in the toolkit.

The following entry is required in the CONFIG.SYS file for DOS scanning, because the scanner driver uses features of the APM system:

```
device=nordospm.exe
```

The following is required in the AUTOEXEC.BAT entry:

```
h2podscn.exe
h2thrscn.exe
```

The format of the configuration parameters is the same as it is in the SSI protocol in the *SE1223 Integration Guide*. Even the checksum is included and is used to verify data integrity.

▶ **NOTE:**   *The default baud rate is 9600, which is determined when Set-all-defaults is scanned. To gain speed, the baud rate is automatically changed to 19,200 (which is the maximum rate), when the H2PODSCN driver is loaded.*

When using the get help switch (**H2ThrScn/?**), the following is displayed:

```
Norand Tethered Scanner Driver vx.xx
(C) 1995—1999 Intermec Technologies Corporation
All rights reserved.
```

The tethered scanner uses command line switches to drive the desired functions. The syntax is as follows:

```
H2THRSCN [<switches>]
```

where *<switches>* include combinations of the following:

–H   Displays this information

–A[n] Enables the aiming beam for **n** 1/2 second-intervals. If the wand or hand-held scanner supports the aiming beam, use this switch to enable it. The message at load time is "Aiming beam set to Xms." where **x** is **n** (interval) times 500 ms.

–E   Causes the tethered bar code reader to always be enabled for used. The message is "Scanning permanently enabled." However, **–SCANBIOS** requires the program to use the API calls to enable and disable the scanner. The message at load time will be "SCANBIOS API enabled."

–SCANBIOS
         Controlled using the SCANBIOS API

–U   The scanner driver may be unloaded if the TSR finds it can safely do so, thus freeing memory for other uses. If the unload is successful, a "disabled" message is displayed.

–R   Appends a carriage return (CR) to the end of the data string. Some devices supply this in the form of a post amble string. When using this switch, the driver message is "Enter appending enabled." If the hardware is in working order, the "Scanner initialized!" message appears; if not, then "Scanner HW initialization failed!" appears.

EXAMPLE: The following is an example command line for the tethered scanner:

```
H2THRSCN [—E] [—R]
```

If the driver is successfully loaded, then "Existing driver reinitialized" appears and the command line options are updated. This way, driver operations can be changed from always enabled to using the SCANBIOS APIs.

If the driver is reloaded and is a different version, the command line switches are not updated. The "existing driver is an incorrect version" will appear.

Tethered bar code reader power is supplied through the ring indicate (RI) signal when the device is enabled. Scanner UART base of 0x3E8 and IRQ 6.

Screen Emulation

6110RTAT.EXE and FONTSEL.EXE are 4000 Series screen emulation programs for the 6110 Computer, in DOS text mode. These programs port applications written for the 4000 Series platform to the 6110 Computer without modifying the display logic.

6110RTAT is a TSR program that provides screen rotation and FONTSEL switches between fonts which are already loaded, or loads a new user defined font. 6110RTAT and FONTSEL provide 4000 Series screen features, such as character mapping, cursor fixed mode, or variable font sizes (20, 21, or 16 characters across the screen). 6110RTAT and FONTSEL.EXE work together providing several font selections, as described below.

These programs replace the standard VGA BIOS interface for the 6110 Computer with a 4000 Series compatible video BIOS interface. Since they replace the standard VGA BIOS, standard VGA calls are not available once 6110RTAT and FONTSEL are loaded. The 6110RTAT utility provides a rotate INT 10 interface that rotates the INT 10 calls into a portrait mode. It filters out video BIOS calls.

6110RTAT and FONTSEL work only with the 320x240 pixel display of the 6110 Computer. In the absence of command line switches, the default mode for 6110RTAT and FONTSEL are as follows:

- ► Cursor chase video mode
- ► 8x16 bitmap font
- ► Inverse mode on (characters above 127 are mapped to inverse video characters 0–127 when the high bit is turned off)
- ► Cursor turned off

FONTSEL.EXE Command Line Switches

FONTSEL.EXE either switches between fonts already selected or loads a new defined font. It works in conjunction with 6110RTAT.

```
FONTSEL [<font_number>] | [<font_number>=<[path\]font_file_name>]
```

If the format includes the font_number only, then the current active font is selected, where <font_number> is one of the following:

0   Sets up the display for 8x8 pixels per character resulting in a 40-column, 30-line display.

1   Sets up the display for 8x16 pixels per character resulting in a 30-column, 20-line display.

2   Sets up a user-selectable display.

If the file name (and optional path) is included, the font represented by the font number supplied is replaced by that which is defined in the font file, where:

<font_number>
Represents the font number.

path \ is the DOS path where the font file is located.

<font_file_name>
Represents the name of the font to be loaded.

If you replace the currently used font, select the font again to use the new character size. If not trashed, it shows up on the display. The font file format is:

```
Version       dw    1
Char_width    dw    ?
Char_height   dw    ?
Font_data     db    ?  dup(?)
```

The 8x8 and 8x16 fonts can only be replaced with an 8x8 and 8x16 font. The user font can be replaced by any size font that meets the following requirements: width must be a multiple of 4, height must be a multiple of 8, and the total font data size cannot exceed 9216 bytes, the 12x24 font size *(maximum default)*.

6110RTAT.EXE Command Line Switches

The 6110RTAT command line format is as follows. The brackets [ ] indicate optional parameters.

```
6110RTAT [x y [width height]] [—Repaint_scroll] [—Nowrap] [—PLN] [Disable]
```

x y Coordinates of the upper-left corner of the display.

width height
Window size and rotated position of the display, under which the INT 10 calls are limited or emulated.

–Repaint_scroll
Causes the rotated BIOS to repaint the screen on all scroll operations, which is much slower, but very compatible.

–Nowrap
Truncates the screen at the right margin.

–PLN Applies hacks to support the PL/N error screen.

–Disable
Disables the screen rotation driver, which remains in memory, and can be reenabled by running it again.

Upper Memory Provider

H2UMP.SYS is an *upper memory provide*r. Since it is based on the Elan H2 processor, it supports the minimal set of XMS function calls required to provide upper memory to MS-DOS when you have a "DOS=UMB" statement in the CONFIG.SYS file. It does not support the XMS calls that deal with either the deallocation or reallocation of upper memory blocks.

H2UMP supplies up to 128 KB of upper memory block elements, in the range of C000–DFFF. Option ROM blocks are automatically scanned for and reserved (that is, untouched). It can be used with HIMEM.SYS, or as a stand-alone program. If used with HIMEM, H2UMP must be loaded after HIMEM.

H2UMP is similar to EMM386.EXE for loading devices into HMA. Unlike EMM386 with the NOEMS switch, H2UMP supplies DOS with memory from the first megabyte of the system memory. This is memory that would otherwise be available for use as shadow RAM.

H2UMP is much smaller and simpler than EMM386. Since EMM386 is a virtual mode system extension, it also slows down processing somewhat as it handles special exception interrupts that are required when providing virtual memory to DOS. H2UMP uses less system memory, therefore making more memory available to the system, but does not use expanded memory.

A single command line switch is provided to force H2UMP to reserve memory block elements, other than those with option ROM signatures in them. The syntax for this switch is:

```
/X=aaaa[,aaaa]
```

where the addresses specified are hexadecimal starting addresses for each block of memory to be reserved. The H2UMP provides two 64 KB blocks of upper memory; one at C000, and the other at D000.

Below are three sample configurations:

EXAMPLE 1:
```
DEVICE=H2UMP.SYS
DOS=UMB
DEVICEHIGH=...
```

EXAMPLE 2:
```
DEVICE=HIMEM.SYS
DOS=HIGH
DEVICE=H2UMP.SYS
DOS=UMB
DEVICEHIGH=...
```

EXAMPLE 3:
```
DEVICE=HIMEM.SYS
DOS=HIGH
DEVICE=H2UMP.SYS  /X=D000
DOS=UMB
DEVICEHIGH=...
```

Example 3 reserves the D000 address range for PC Card support.

Section 5

Application Conversion

▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶

This section contains information applicable for converting 4000 Series applications for use on the 6110 Computer.

4000 Series Conversion

When applications are converted from a 4000 Series System to a 6110 Computer, consider the following information:

Unsupported Files

The following 4000 Series files are not used in 6110 configurations:

Table 5-1
Unsupported 4000 Series Files

File	Comments
10X16.EXT	Use 6110RTAT.EXE and FONTSEL.EXE (see page 5-3)
BOOT.SYS	
BOOTCFG.SYS	
BOOTPH0.SYS	
CATFILES.EXE	Use IPLFMT.EXE (see page 5-3)
CATMAKE.BAT	Use IPLFMT.EXE
CATPREAM.BIN	
DEXIO.BIN	Use PC-DEXIO.BIN
FONTBUF.COM	
FPNOP.COM	
IO.SYS	Use IO.SYS in full MS-DOS 6.22
MAXI-DOS.SYS	
MEMIO.EXT	
MINI-DOS.SYS	Use MSDOS.SYS in full MS-DOS 6.22
MINI-IO.SYS	Use IO.SYS in full MS-DOS 6.22
MINI-NET.COM	Use MININET.EXE (see page 5-3)
NOR-ANSI.SYS	
NORANDBB.EXE	
NP4805.EXT	The 4805 Endcap Printer is specific to 4000 Series systems.

Table 5-1 (Continued)
Unsupported 4000 Series Files

File	Comments
NPRTBIOS.EXT	Use PC4800.SYS (see page 5-2)
NT4800.SYS	Use PC4800.SYS (see page 5-2)
PRTBIOS.EXT	RCT printers (NP207, NP111) are not supported.
PRTIO.BIN	Use PC-PRTIO.BIN
RAMCARD.SYS	
RAMCFMT.EXE	
RAMCUTIL.EXE	
RAMDISK.EXT	
RPLHOST.EXE	Use INTERLNK.EXE
SCAN4000.EXE	
SETDISP.EXE	Use 6110RTAT.EXE and FONTSEL.EXE (see page 5-3)
SOFTBIOS.EXT	BIOS is loaded from flash
TNETBIOS.EXE	
XLMEMIO.BIN	

Changed Files

The following 4000 Series Files are used differently on the 6110 Computer. You can make the changes as specified.

CONFIG.SYS
The extended CONFIG.SYS commands in the 4000 Series version of IO.SYS are no longer supported:

EXT=
BIOS is loaded from flash. Remove these lines from CONFIG.SYS.

TSR=
Use INSTALL= or execute TSRs from AUTOEXEC.BAT.

VERIFY
You can use the VERIFY ON COMMAND.COM command. However, it is not identical with its use on 4000 Series platforms, where MINI-DOS and MAXI-DOS wrote through the disk buffers, as well as to directory information to the media when it changed. These actions do not occur in DOS. The application has to perform file comments.

CPLNI.COM
Do not use the *–d* command line switch. Do not delete driver files from the RAM drive after they are loaded. All files needed to restart the application after a reset must remain on the RAM drive.

PC4800.SYS
Use Version 1.80 or later for a 6000 Series platform. Provides Norand® Portable Communications Protocol (NPCP) printer support for both PL/N and non-PL/N applications. Load 4000API.EXE when using PC4800.SYS.

PC-DEXIO.BIN
Use Version 1.26 or later for a PEN*KEY 6000 Series configuration. Load 4000API.EXE when using PC-DEXIO.BIN.

New 6000 Series Files

The following files are new 6000 Series files that were not used on the 4000 Series platform.

AUTOEXEC.BAT
A standard DOS configuration file. See the AUTOEXEC.BAT file in the DOS toolkit to see an example of how this file is used.

4000API.EXE
Provides functionality for certain applications written for the 4000 Series to run unmodified on the PEN*KEY 6000 Series platform. See page 5-4 for additional information.

6110RTAT.EXE and **FONTSEL.EXE**
Use 6110RTAT.EXE for rotating the display screen. Use FONTSEL.EXE to change the screen font. These programs also provide functionality expected by applications written for the 4000 Series so that these applications can run unmodified on the PEN*KEY 6000 Series Computer. See page 4-27 for additional information.

*.FNT
Font files for use with FONTSEL.EXE.

IPLFMT.EXE
Concatenates a list of files into a single file that is suitable for download in a communications session. See page 4-4 for additional information.

MININET.EXE
Replaces the 4000 Series MINI-NET.COM on the PEN*KEY 6000 Series platforms. It provides the NET BIOS interface to the NPCP LAN. To use the NPCP protocol, load MININET.EXE, a TSR that supplies a NetBIOS compatible interface for accessing the NPCP LAN. See page 4-14 for additional information.

Unchanged Files

The following 6000 Series files have not changed from the 4000 Series.

- CLKIO.BIN
- DELETE.COM
- HOSTIO.BIN
- KBDIO.BIN
- LZEXE.DOC
- LZEXE.EXE
- MEMIO.BIN
- MV.EXE
- NORSESS.COM
- PRN2COM.COM
- TTYIO.BIN
- XYXFER.COM
- INT15.EXE   For PC only. Do not run on PEN*KEY 6000 Series platforms.

4000 Series Programming Interfaces

4000API.EXE is a TSR that supplies Application Programming Interfaces (APIs) that are compatible with those previously supplied on 4000 Series Terminals. With the capability to port 4000 Series applications to the 6000 Series environment, the amount of work required to port an application is greatly reduced.

However, please note that 4000API functions are not industry standards. The use of certain 4000API functions limits the ability of the application to function on standard platforms. If you desire portability and standardization of applications, consider modifying old programs and developing new programs to conform to industry standards. The 6000 Series platforms are PC-compatible.

Installation and Configuration

To load 4000API.EXE for use with a C++ application (disabling the interrupt override) use the following command:

```
4000API.EXE /C3 /PC /10 /14 /16
```

Use these commands to use 4000API.EXE with a PL/N application:

▶ If an internal modem is used: `4000API.EXE /C3 /16 /10 /PC`

▶ If an internal modem is not used: `4000API.EXE /16 /10 /PC`

Command Line Switches

Supply the following switches, unless your application is a PL/N application originally designed to run on a 4000 Series Computer. Use either a slash (/) or a dash (–) for command line switches.

/*C3*   Do not redirect COM3 to COM1. Do not ignore modem control signals. Existing PL/N applications frequently use COM3 to communicate with COM1, only without using modem control signals.

/*PC*   Changes value returned by INT 15h (AX=01FBh). Default value is "SOFT BIOS V3.00." When using this switch, value is "PC BIOS V3.00."

/*10*   Do not trap INT 10h (video BIOS interrupt). There are a few 4000-compatible video BIOS extensions enabled by default and disabled with this switch.

/*14*   Do not trap INT 14h (COM port BIOS interrupt). By default, 4000API supplies 4000-compatible BIOS extensions to communicating with COM ports. Supplying this switch, the 4000API services are replaced by the COM port BIOS (from ROM BIOS).

/*16*   Do not trap INT 16h (keyboard BIOS interrupt). By default, 4000API emulates the 4000 keyboard, complete with the ability to remap keys. Since the 6110 Computer has INT 16h support, apply this switch to return PC-compatible key codes instead of 4000-style key codes.

Cross-Reference to Functions

Using a standard browser, access the following path to access a DOS API document. The HTML files contain API information about Norand-enhanced video BIOS functions and the extended SCAN BIOS interface.

http://partners.intermec.com/regions/devspt/api/index.htm

Section 6

Communications

▸ ▸ ▸ ▸ ▸ ▸ ▸ ▸ ▸ ▸ ▸ ▸ ▸ ▸ ▸ ▸ ▸ ▸ ▸

This section discusses INTERLNK and INTERSVR products from Microsoft Corporation and are bundled with MS-DOS. This also includes Norand® Utilities from Intermec Technologies Corporation and an overview of a telecommunications session.

INTERLNK and INTERSVR

INTERLNK connects a PEN*KEY® 6000 Series Computer and a PC through serial ports. INTERSVR is the INTERLNK server, a communication option in Norand Utilities. These two resources are shipped with the DOS Toolkit. The cable that connects the PC to your hand-held computer can be either a standard null modem cable or a TTY TCOM cable. You also need a dock.

INTERLNK makes the hand-held computer drives appear as virtual drives on the PC, with drive letters that are beyond the highest drive letter currently used on the PC.

After installing INTERLNK, type "INTERLNK" from the PC command line to display the designations for the redirected drives. See the diagram below.

```
        Port=COM2

        This Computer          Other Computer
           (Client)                (Server)
        ---------------        ------------------
         F:                        equals    A:
         G:                        equals    B:
         H:                        equals    C:
         I:                        equals    D: (519Kb)
```

For more details, refer to the DOS online help text.

Norand Utilities

The Norand Utilities program (PSROM0C.EXE, PSROB0C.EXE) provides the basic functions required to prepare the 6000 Series Computer for use. It can also be called from applications to perform data communications.

Initial Program Load

By default, the 6110 DOS Toolkit startup files execute PSROM0C.BAT (residing in the *Psrom0c*\ directory), which starts Norand Utilities to perform an Initial Program Load (IPL).

During IPL, the working directory is *App*. In other words, downloaded files are placed in the *App* directory by default.

Do not download *AUTOEXEC.BAT* directly because it could be deleted during a failed communication session, making the computer unable to boot. Instead, include AUTOEXEC.BAT in a compressed archive or download it under a different filename. The application's CONFIG.SYS file must install the application's AUTOEXEC.BAT file. For example, include these lines in the CONFIG.SYS file:

```
set path=c:\psrom0c;c:\utils
install=c:\command.com c:\ /c updates.bat
```

The UPDATES.BAT file provided in *c:\Psrom0c* extracts all .LZH archives located in the *App* directory. Files are extracted relative to the root directory.

NPCP Network

NPCP is the Norand Portable Communications Protocol. This protocol is supported by the Norand 6920 Communications Server, the 4920 Series Telecommunications Packages, 498x Communication Controllers, and 6980/6985 Network Managers.

1. Create a download include file, as described on page 4-4.

2. Create a 6920 or 4920 boot disk, if necessary.

    The only file on a 6920 or 4920 boot disk is a download include file. The include file is copied to the DOWNLOAD subdirectory of the 6920 or 4920.

▶ **NOTE:**   *4000 Series applications are copied to a BOOT subdirectory.*
6000 Series applications are copied to the DOWNLOAD subdirectory.

3. Create a 4980 boot disk, if necessary (be aware there is limited space on the 4980 system).

    Place the 4980 system files on the 4980 boot disk in the same way as is done for 4000 Series applications (such as using the 4980 Boot Toolkit).

    Place the download include file on the disk by executing the following commands:

    ```
    MD A:\DATA
    COPY <include file> A:\DATA
    NCDIR.EXE A:\DATA
    ```

▶ **NOTE:**   *NCDIR.EXE is included in the 4980 Boot Toolkit.*

▶ **NOTE:**   *The Norand Utilities program first attempts a session to NORAND_SERVER, which allows the application to be retrieved from a 498x Communications Controller or 6980 Series Network Manager. If the application is not stored on the network manager, a session is initiated to NORAND_HOST, which connects to the host.*

▶ **NOTE:**   *For a list of errors that may be displayed when attempting an NRInet session or a TFTP con-*
                       nection, see the 6110 Hand-Held Computer User's Guide P/N: 961-054-102.

NRInet

NRInet is a protocol that performs a Norand file transfer session over TCP/IP
Ethernet. It is supported by the Norand 6920 Communications Server.

1. Create a download include file, as described on page 4-4. Place it in the
    download directory of the 6920 Communications Server.

2. Optionally, configure a DHCP server to provide information required by the
    hand-held computer, including the IP addresses of the client, router, and
    subnet mask. Any information not provided by DHCP must be entered
    manually by the user on the hand-held computer. A DHCP server can also
    provide a domain name and IP addresses of domain name servers, which
    allows you to enter a host name rather than an IP address. If the
    SERVER_NAME field on the hand-held computer is left blank, a connection
    to the name "Norand6920" is attempted, as a default.

Version 2.xx of the Norand Utilities program creates a NET.CFG file and a
PCTCP.INI file on the RAM drive. The NET.CFG and PCTCP.INI files are not
erased, so they may be used by applications. For a description of the contents of
these files, see page 6-4.

TFTP

TFTP (Trivial File Transfer Protocol) is a standard TCP/IP protocol supported on
many TCP/IP servers.

1. A TFTPD service must be running on a TCP/IP server.

2. Optionally, configure a DHCP server to provide information required by the
    hand-held computer (IP addresses of the client, router, and subnet mask).
    Any information not provided by DHCP must be entered manually by the
    user on the hand-held computer. A DHCP server can also provide a domain
    name and IP addresses of domain name servers, which allows the
    hand-held computer user to enter a server name rather than an IP address.
    If the SERVER NAME field on the hand-held computer is left blank, a
    connection is attempted to the name "NorandTftp" as a default.

3. Create a download list file, as described on page 4-4. Place it in the default
    working directory for the tftpd service. The list file must be named
    <workgroup>.BCF where <workgroup> is the value of the WORKGROUP
    field in the UNIT ID menu.

TTY

TTY is a Norand proprietary protocol supported by the 6920 Communications
Server and 4920 Series Telecommunications Package.

▶ Create a 6920 or 4920 boot disk, as described in the preceding paragraphs
  for the NPCP Network.

Norand Utilities From an Application

The following paragraphs describe how an application can use the communications facilities of the Norand Utilities to perform data communications.

PSROM0C.EXE is the primary program module that supports data communications between a Norand 6000 Series hand-held computer and a host computer. It supports the Norand two-way TTY, NPCP Local Area Network (LAN), and NRInet protocols.

PSROB0C.EXE is not called directly by applications. It is called by PSROM0C.EXE.

Use the following syntax on the command line:

```
PSROM0C.EXE ctl-file
```

where *ctl-file* is the name of a text file containing parameters that control the telecommunications session. Valid parameters are described in the following paragraphs. Parameters that are not applicable may be omitted.

The return value from PSROM0C.EXE is a session status code. Values for this code are described on page 6-9.

System Setup Requirements

To use PSROM0C.EXE, the file NRTCMERR.TBL must exist in the current working directory or in the PATH.

When using PSROM0C.EXE Version 2.00 or later, if the application uses CardSoft device drivers to access PC Cards, it must reassign the drive letters A and B. For example:

```
ASSIGN.COM  A:=E:  B:=F:
```

NPCP

Load the program MININET.EXE to useNPCP. See page 4-14 for details.

TTY

To use the TTY protocol., the NRTTYM.TBL file must exist in the current directory or in the PATH. NRTTYM.TBL is the modem table. For information about creating a customized modem table, see the *PSMDM0C, DOS HHC MODEM TABLES* product, P/N: 215-968-001.

If the application uses NORMOD.SYS or NGENMOD.SYS to support PC Card modems but uses different command line settings than the default Norand Utilities configuration, the command line for the driver must include "–NMODEMn" where "n" is the COM port number used by the driver.

NRInet Using PSROM0C Version 3.xx

To use the NRInet protocol version 3.xx, the PATH must include the directories of the following drivers:

- ► LSL.COM
- ► ODIPKT.COM
- ► RS485ODI.COM

Optionally, configure a DHCP server to provide IP information required by the computer, such as the IP addresses of the client, server, router, and domain name servers. The NET.CFG and WATTCP.CFG files are overwritten by PSROM0C.

Some computers support two network interfaces for NRInet: Ethernet and RS-485. The network interface is selected in a menu in Norand Utilities during the IPL sequence. This setting is stored on the RAM drive so it is lost any time the RAM drive is removed or formatted. For example, applications that boot from a PC Card often format the RAM drive before installing the application. In these cases, return to the Norand Utilities menu to reselect the setting in order for NRInet sessions to work correctly.

NRInet Using PSROM0C Version 2.xx

To use the NRInet protocol, the PATH must include the directories of the following drivers:

- BOOTP.EXE
- DHCP.EXE
- ETHDRV.EXE
- INET.EXE
- LSL.COM
- ODIPKT.COM
- RS485ODI.COM

BOOTP.EXE and DHCP.EXE are required only if IP information is to be retrieved from a BOOTP server or a DHCP server as described below. PSROM0C.EXE executes BOOTP.EXE first. DHCP.EXE is executed only if BOOTP.EXE fails.

The files NET.CFG and PCTCP.INI are required to load these drivers.

NET.CFG must exist in the current working directory and must include the following, indented as shown:

```
Link driver RS485ODI
    Frame Ethernet_II
```

PCTCP.INI must include:

```
[pctcp ifcust 0]
async-send = yes
ip-address = nnn.nnn.nnn.nnn
subnet-mask = nnn.nnn.nnn.nnn
router = nnn.nnn.nnn.nnn

[pctcp general]
etc-dir = d:\tcp\etc
domain = xxxxxxxx.com

[pctcp addresses]
domain-name-server = nnn.nnn.nnn.nnn

[pctcp kernel]
interface = ifcust 0
```

The "etc-dir" field must specify a directory that contains a SERVICES file. A minimal SERVICES file exists in the flash at d:\tcp\etc. For NRInet, SERVICES must contain a protocol entry for NRInet with a protocol type of "tcp". For example:

```
nrinet 44965/tcp #Norand Inet File Transfer
```

The fields "domain" and "domain-name-server" are not required if the host is specified by IP address rather than domain name. Also, the fields that specify IP addresses (nnn.nnn.nnn.nnn) and the "domain" field can be omitted if BOOTP.EXE or DHCP.EXE loads the information from a BOOTP server or a DHCP server.

Set the environment variable PCTCP to the path of PCTCP.INI. For example, in AUTOEXEC.BAT:

```
SET PCTCP=C:\PCTCP.INI
```

Valid Control File Parameters

▶ **For all protocols:**
PROTOCOL, TRIES

▶ **For TTY:**
COM, CONFIG, DATABITS, MODEMSELECT, MODEMTYPE, PARITY, PHONE, SPEED, STOPBITS

▶ **For NPCP:**
COM, NPCPHOST

▶ **For NRInet:**
IPCLIENT, IPHOST, NETMASK, ROUTER

The following is a list of control file parameters and their descriptions.

COM= The COM port to use for two-way TTY or NPCP communications.

Default Values:
1 (COM1) = Two-way TTY
2 (COM2) = NPCP

Example:
COM=4

CONFIG= Modem command string to configure a Hayes-compatible modem.

Example:
CONFIG=ATE0V0Q0X4&C1&D2&M0&RS0=0

DATABITS= Valid only if two-way TTY protocol was specified.

Valid values:
7, 8

Example:
DATABITS=7

IPCLIENT= *Supported in PSROM0C V3.xx only.*
This is the IP address of the client computer. If this parameter is specified, the NETMASK parameter is also required. If this parameter is omitted, PSROM0C attempts to retrieve IP information from a DHCP server or a BOOTP server.

IPHOST= This is the host IP address or domain name of the Ethernet host. The value can be at most 18 characters long. If this parameter specifies a domain name, the IPCLIENT parameter must be omitted because DHCP information about domain name servers is required to resolve the host name. For PSROM0c V3.xx, if IPHOST and IPCLIENT are both omitted, the host name is retrieved from DHCP if available. Otherwise, this parameter defaults to "Norand6920."

MODEMSELECT=
Valid only if two-way TTY protocol was specified. This is the modem ID of of a record in the modem table file NRTTYM.TBL. If this parameter is specified, the COM= and CONFIG= parameters may be omitted. The parameters MODEMSELECT= and MODEMTYPE= are mutually exclusive; therefore only one may be specified in a control file.

Example:
MODEMSELECT=30

MODEMTYPE= Valid only if two-way TTY protocol was specified. It indicates the type of modem, if any, to which the hand-held computer is connected. The parameters MODEMSELECT= and MODEMTYPE= are mutually exclusive; therefore only one may be specified in a control file.

Valid Values:
0 = No modem, such as direct connect *(default)*
1 = NORAND modem, or other Hayes-compatible modem

Example:
```
MODEMTYPE=1
```

NETMASK= *Supported in PSROM0C V3.xx only.*
This is the local subnet mask and is required if IPCLIENT is specified.

Example:
```
NETMASK=255.255.240.0
```

NPCPHOST= NPCP host name.

Valid values:
NORAND_HOST
NORAND_SERVER

PARITY= Valid only if two-way TTY protocol was specified.

Valid values:
0 = None *(default)*
1 = Odd
2 = Even

Example:
```
PARITY=2
```

PHONE= Dials a Hayes-compatible modem. This value can be at most 20 characters long.

Example:
```
PHONE=ATDT3693361
```

PROTOCOL= Indicates the protocol to be used:

▶ 3 = TTY
▶ 4 = NPCP (LAN)
▶ 14 = NRInet

Example:
```
PROTOCOL=3
```

ROUTER= *Supported in PSROM0C V3.xx only.*
This is the router IP address.

SPEED= TCOM speed for two-way TTY. Valid only if two-way TTY protocol was specified.

Valid values:
1200, 2400, 9600, 19200, 38400, 57600, or 115200.

Example:
```
SPEED=2400
```

STOPBITS= Valid only if two-way TTY protocol was specified.

Valid values:
1 = One stop bit
2 = Two stop bits
3 = 1 1/2 stop bits

Example:
```
STOPBITS=1
```

TRIES=   Specifies the number of times to attempt a successful communication session. If TRIES is exhausted before a session is successful, PSROM0C.EXE returns the error of the last session. A parameter value of zero indicates that the retry is to continue until a session is successful or the user aborts.

EXAMPLE: Example Control File for NPCP

```
PROTOCOL=4
```

EXAMPLE: Example Control File for NRInet

```
PROTOCOL=14
IPHOST=nnn.nnn.nnn.nnn
```

EXAMPLE: Example Control File for TTY

```
PROTOCOL=3
COM=1
SPEED=9600
PARITY=0
DATABITS=8
STOPBITS=1
```

Upload Control File Parameters

Information about files to be transferred must be contained in a NRUPLD.CTL file. Valid parameters for this file are described in the following paragraphs.

FILE=   Name of upload file, uploaded according to the preceding header information. Multiple FILE parameters may follow a single HEADER parameter, if the header applies to all the specified files.

Example:
```
FILE=BYPRD.DAT
```

FORMAT=   Defines the format of variable-length records whose record types match the preceding RECTYPE parameter. The format of a record consists of the data type ("t") and length of each field within the record ("nnn"), specified as follows:

```
FORMAT=tnnntnnn . . .
```

The field length is right-justified and zero-padded. Although the Norand file transfer protocol supports a number of data types, many of these are specific to the PL/N language from Intermec Technologies Corporation. For the sake of simplicity, just specify a data type of X (for character) and the record length, which does not include the record type character. If you need more information on PL/N file formats, see the host TCOM manual.

Example:
```
FORMAT=X020
FORMAT=N012X016N004
```

HEADER=   Precedes the files subsequently specified in FILE parameters. This header record provides the host information on data formatting.

If the HEADER parameter is omitted or blank, the files subsequently specified are transferred *as is*; that is, no header precedes the file. Any header information is assumed to be embedded in the file itself.

When you specify the binary file descriptor (DOSFIL), you do not need to completely specify the header. If the size is not specified or is zero, the entire file is uploaded, and the actual size is inserted into the header that is uploaded to the host. If the file name is not specified, the file name specified in the FILE parameter is inserted into the header that is uploaded to the host.

Example:
```
HEADER=<DBYPRD  00000x040>
```

RECTYPE=   RECTYPE and FORMAT parameters upload files that contain variable-length records, in which the first character of each record identifies the type of record. These parameters remain in effect only until the next HEADER parameter is encountered. (*Example: RECTYPE=A*)

                RECTYPE is a single, printable ASCII character; it indicates the record type to which the following FORMAT applies.

▶**NOTE:**   *At a minimum, the NRUPLD.CTL file must specify a session control file or a download request file. For a description of these files, see page 6-13.*

EXAMPLE: Example NRUPLD.CTL

```
HEADER=<DSCNTRl00001X042>
FILE=SCNTRL.DAT
HEADER=<DBYPRD 00000X040>
FILE=BYPRD.DAT
HEADER=<DBYTRXN00000X001>
RECTYPE=A
FORMAT=N004N005
RECTYPE=B
FORMAT=X010
RECTYPE=C
FORMAT=N004X005
FILE=BYTR00.DAT
FILE=BYTR01.DAT
file=bytr02.dat
FILE=BYTR03.DAT
HEADER=<DDOSFIL00001X010>FIMAGE.PCX
FILE=IMAGE.PCX
HEADER=<DDOSFIL00001X020>F\RT00001\COMMON.DAT
FILE=COMMON.DAT
HEADER=<DDOSFIL00001X000>
FILE=MYFILE.DAT
```

Communications Log File

A log of the communications is output to a text file named NRTLOG.DAT. Information is continually appended to the file until it is deleted. It is not cleared by PSROM0C.EXE. Your application is responsible for deleting NRTLOG.DAT. The format and syntax for this information are described in the following.

BEGS=nnnn   Indicates start of TCOM session. "nnnn" equals the session number (currently always 1). *EXAMPLE: BEGS=1*

DOWN=d:\pathname\filename.nnn
    Indicates that a file download was attempted. "nnn" is the error code. Zero is a valid value that indicates a successful download.
    EXAMPLE: DOWN=C:\CUST.DAT,23

ENDS=x,m,nnn Indicates the end of a TCOM session. "x" is the session status (a single character code), "m" is the stage of the communications session, and "nnn" is the protocol error code. The code is also the return value of PSROM0C.EXE.

                The following table shows the valid values for *(x)*.

Code	Meaning
"G"	Good session.
"T"	Unexpected end of transmission.
"H"	An incorrect file header was encountered.
"F"	A file error was encountered.
"L"	Communication aborted before first file header

The following table shows the valid values for *(m)*.

Value	Meaning
5	Sign-on started.
4	Data send started.
3	Turn-around started.
2	Data receive started.
1	Sign-off started.
0	Session complete.

UP=d:\pathname\filename,nnn

Indicates that a file upload was attempted. "nnn" is the error code, with zero as a valid value indicating a successful upload.   See the next paragraph for valid values for *(nnn)*. *(Example: UP=C:BYTRXN.DAT,0)*

Protocol Errors

When PSROM0C.EXE returns the session status code, an application can view the Communications Log file for a specific protocol error that occurred. Valid Protocol error code for *(n)*, as indicated in the "ENDS=" parameter, are listed.

Table 6-1
NPCP Protocol Errors

Error #	Meaning
0	No error.
1	MININET.EXE is not installed.
6	User aborted communications by pressing EXIT.
11	An invalid parameter was specified in the control file.

The following errors are returned by MININET.EXE. 100 is added to the error returned by MININET.EXE to avoid conflict with other defined errors.

Table 6-2
MININET Protocol Errors

Error #	Meaning	Error #	Meaning
101	Illegal buffer length	120	No answer
103	Invalid command	121	Name not found
105	Command timed out	122	Name in use on remote adapter
106	Message incomplete	123	Name deleted
108	Illegal local session number	124	Session ended abnormally
109	No resource available	125	Name conflict
110	Session closed	126	Incompatible remote device
111	Command canceled	133	Network interface is busy
113	Duplicate name in local name table	134	Too many commands outstanding
114	Name table is full	135	Invalid LAN adapter number
115	Name is deregistered, command completed	136	Command completed while cancel occurring
117	Local session table full	138	Command not valid to cancel
118	Session open rejected	164–179	Unusual network condition
119	Invalid name number	180–354	Adapter malfunction

Table 6-3
NRInet Protocol Errors

Error #	Meaning
0	No error.
1	PSROBOC.EXE could not be loaded. Ensure the directory for PSROB0C.EXE is in the PATH.
6	User aborted communications by pressing [NO].
11	An invalid parameter was specified in the control file.
800	TCP/IP kernel could not be loaded. Possible causes for this are: ♦ *(PSROM0C V2.XX only)* NET.CFG or PCTCP.INI does not exist. ♦ *(PSROM0C V2.XX only)* The PCTCP environment variable is not set. ♦ The PATH does not include the directories of the drivers. ♦ The computer does not have an Ethernet ID or the Ethernet ID could not be accessed. ♦ *(PSROM0C V3.XX only)* Invalid client IP address. Verify the IPCLIENT parameter, or make sure the DHCP or BOOTP server is running.
801	Invalid client IP address. *For PSROM0C V2.XX*, verify the entry for 'ip-address' in PCTCP.INI, or ensure the DHCP or BOOTP server is running. *For PSROM0C V3.XX*, verify the IPCLIENT parameter, or ensure the DHCP or BOOTP server is running.
802	*(PSROM0C V2.XX only)* Invalid Service or Service Type, or invalid port number. Verify the 'etc-dir' entry in PCTCP.INI specifies the correct path for the SERVICES file, and that an entry exists for 'nrinet.'
803	Invalid host name or IP Address. Ensure the host computer is running. *For PSROM0C V2.XX only,* verify the IPHOST parameter and the entries for 'subnet-mask,' 'router,' 'domain,' and 'domain-name-server' in PCTCP.INI. *For PSROM0C V3.XX*, verify the IPHOST, NETMASK, and ROUTER parameters.
804	*(PSROM0C V2.XX only)* Could not create socket. Check all cables and network connections.
806	Block sent was incomplete, or block received was incomplete.
807	Client/server negotiation failed.
808	Server specified an unsupported block size.
809	Invalid buffer pointer.
810	All server connections are already in use. Try again later.
811	Timeout while sending data. Connection to remote machine dropped. Ensure host is still running; check all cables and network connections.
812	Timeout while receiving data. Connection to remote machine dropped. Ensure host is still running; check all cables and network connections.
813	*(PSROM0C V2.XX only)* Attempt to send data to the server failed due to a closed connection. Ensure server is still running, and check all cables and network connections.
814	Attempt to receive data from the server failed due to a closed connection. Ensure server is still running, check all cables and network connections.
815	Could not access the network attach information. Ensure the Access Point, such as 6710, is connected and running.
816	An error occurred reading the network attach information. Ensure the Access Point, such as 6710, is connected and running.
817	Server did not respond to the connect request. Ensure the server is still running, and check all cables and network connections.
818	An error occurred reading the TCP/IP kernel information.
935	Client/server negotiation failed.
939	Destination address required.
940	Message too long.

Table 6-3 (Continued)
NRInet Protocol Errors

Error #	Meaning
948	Address already in use.
950	Network is down.
951	Network is unreachable.
952	Network dropped connection or reset.
954	Connection reset by peer.
955	No buffer space available.
960	Connection timed out.
961	Connection refused.
962	Too many levels of symbolic links.
963	File name is too long.
964	Host is down.
965	Host is unreachable.
966	Directory not empty.

Table 6-4
TTY Protocol Errors

Error #	Meaning
0	No error.
6	User aborted communications by pressing EXIT.
11	An invalid parameter was specified in the control file.
23	End of transmission.
101	Line lost.
102	Parity error.
103	Character gap too long.
104	Data loss.
105	Excessive NAKs.
106	Block count error.
107	Block check error.
108	Block framing error.
109	Control character error.
2xx	Modem error. xx is Hayes response code or program-defined code:
	03 No carrier.
	04 Command not recognized.
	06 No dial tone.
	07 Dialed number is busy.
	08 No answer.
	86 Error sending command to modem.
	87 Expected numeric response was not numeric.
	88 Invalid response format.
	89 No significant response from modem.
	97 System disabled COM port — low battery, PC Card modem removed.
	98 Unrecognized English response.
	99 Memory allocation error.

TCOM Session

Under the Norand standard file transfer session, the 600 Series Computer uploads first. Once all upload files are sent, the line is turned around and the host then sends download files. Each file is preceded by a header record listing the receiving 600 Series Computer information on the format used by that file.

The hand-held computer must first send a session control file, to identify the computer to the host computer. The hand-held computer may then send a download request file. This prepares the host computer to download one or more files to the hand-held computer. Upload files can then be sent to the host.

Session Control File

To identify itself to the host, the hand-held computer sends the session control file at the beginning of a TCOM session. The host uses the application-dependent terminal identification to identify the proper files for downloading to the hand-held computer. The format of the session control file is as follows:

```
<DSCNTRL00001Xnnn>PPPPPPPPPPPPPPPPTTTTTTTTTTTTTTTTTTTTYYMMDDHHMMSS. . .
```

```
                       < = beginning of file header
                       D = file type (fixed)
                  SCNTRL = file name (fixed)
                   00001 = decimal number of records in file (fixed)
                       X = data type (ignored by host)
                     nnn = decimal number of bytes in file record
                       > = end of file header
     PPPPPPPPPPPPPPPP = program identification
 TTTTTTTTTTTTTTTTTTTT = terminal identification (determined by application)
                  YYMMDD = date
                  HHMMSS = time
                 . . . = additional hand-held computer information
```

The application determines the actual data in the session control file. The data fields shown in the preceding list are simply a convention in Norand applications. However, the session control header always consists of 18 bytes. Further, Norand host communication packages usually expect to find the terminal ID starting in byte 33 of the data stream; this location is configurable.

Download Request File

A 6110 Computer may directly request specific files from the host by sending a download request file to the host just after sending the session control file. The files are downloaded after the line has been turned around. If a download request file is sent, the host does *not* use the terminal identification in the session control file to determine which files to download to the computer. Include as many filename records as specified in the number of records field of the header. This permits requests for more than one file to be batched together.

▶ **NOTE:**   *The download request file must be the first or second file sent; otherwise it is not treated as a special file by the host.*

```
<DDWNLRQnnnnnX016>[--filename1---][--filename2---]. . .
                < = Beginning of file header
                D = File type (fixed)
           DWNLRQ = File name (fixed)
            nnnnn = Decimal number of records in file
                X = Data type (X for character)
              016 = Decimal number of bytes in record (fixed)
                > = End of file header
[--filename?---] = File to download, left-justified, blank-padded to 16 characters
```

Upload and Download Files

While the Norand file transfer protocol supports a number of data types and file types, many of these are specific to the Norand PL/N language. If more information is needed on PL/N file formats, see the host TCOM manual. For the sake of simplicity, DOS programmers can use one basic file header for all upload and download files. The general format of a file header is as follows:

```
<tffffffmmmmmtnnntnnntnnn>data...
```

<	=	beginning of file header
t	=	file type
		"D" for unpacked data
		"E" for unpacked executable
		"P" for packed data
		"B" for packed executable
ffffff	=	file name
mmmmm	=	decimal number of records in file, right-justified zero-padded
t	=	field data type (described below)
nnn	=	unpacked length of the field, right-justified and zero-padded
>	=	end of file header
. . .	=	additional hand-held computer information

The actual name of the file that is created on the hand-held computer has ".DAT" or "P.PL6" appended to the ffffff file name. File types "D" and "P" have ".DAT" extensions. File types "E" and "B" have "P.PL6" appended to the name.

Type	C Data Type	Comments
X	char[ ]	Specifies a character buffer that does *not* have a NULL terminator.
B	unsigned char	File header field length can be 001 to 003. Valid field values are 0 to 255.
I	signed int	File header field length can be 001 to 006. Valid field values are –32767 to 32767. "+" is not uploaded for positive values. Leading zeroes are uploaded if necessary to meet the specified field length.
D	signed long	File header field length can be 001 to 011. Valid field values are –2147483647 to 2147483647. "+" is not uploaded for positive values. Leading zeros are uploaded if necessary to meet the specified field length.
S	char[ ]	Specifies a NULL terminated string. The field length does not include the NULL, as the NULL is not included in the unpacked file. The NULL is inserted when the field is written to the hand-held computer file.
N	not applicable	Specific to the Norand PL/N programming language. For further information, see the PL/N Reference Manuals.
W	N/A	Specific to the PL/N programming language from Intermec Technologies Corporation. For further information, see the PL/N Reference Manuals. This type is equivalent to an unsigned integer in field size, but is packed in the opposite byte order.
(	N/A	Marks the beginning of a repeated field descripter sequence. The field length is the number of repetitions of the sequence. For example, the sequence: B002X004B002X004 can be written as: (002B002X004)000 "(002" marks the beginning of a pattern repeating twice. ")000" marks its end.
)	N/A	Marks the end of a repeated sequence begun with a "(nnn" descriptor. Field length is the number of repetitions of the sequence. For example, the sequence: B002X004B002X004 can be written as: (002B002X004)000 "(002" marks the beginning of a pattern repeating twice. ")000" marks its end.

In Norand host communication packages, a record length of one indicates the file contains variable-length records, with the first record character identifying the record type. The single character record types format the file into logical records.

PL/N File Descriptor for Binary Files

For the support of full DOS file names and for better support of non-PL/N binary files, an expanded header structure is defined:

```
<DDOSFIL00001Xmmm>F[⎯dosfilename⎯] S[filesize]data. . .
```

<	=	beginning of file header
D	=	file type (fixed)
DOSFIL	=	file name (fixed)
00001	=	fixed
X	=	data type (fixed)
mmm	=	decimal number of bytes of file information between EOF header and start of file
>	=	end of file header
F	=	indicates the file name parameter
[⎯dosfilename⎯]	=	complete DOS file name (this parameter may be of any length)
<space>	=	a space must separate the parameters
S	=	S indicates the file size parameter
[filesize]	=	the exact number of bytes in binary file (may be up to eight digits long)
data. . .	=	the binary file starts immediately after the filesize parameter
. . .	=	additional hand-held computer information

For example, to send a file named *\DATA\DATAFILE.DAT* with a size of 102,000 bytes, the following header would precede the file:

```
<DDOSFIL00001X027>F\DATA\DATAFILE.DAT S102000
```

It is the responsibility of the PEN*KEY 6000 Series application program to ensure that the file name specified is unique on the host. This could be accomplished by incorporating the terminal identification as part of the file name or path name:

```
<DDOSFIL00001X027>F\DATA\DATA0001.DAT S102000
<DDOSFIL00001X031>F\HH000001\DATAFILE.DAT S102000
```

Glossary

▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶

1/0 Key

Power suspend/resume switch — suspends or resumes operations on most hand-held computers.

ALZ Files

Script files that contain a listing of files needed by an application, and used by the Builder utility to determine what Windows 95 files were missing from the minimal load.

ANSI (American National Standards Institute)

A private organization that coordinates some United States (US) standards setting. It also approves some US standards that are often called ASNI standards. ANSI also represents the US to the International Organization for Standards (ISO).

API (Application Program Interface)

A method of defining a standard set of function calls and other interface elements. An API usually defines the interface between a high-level language and the lower-level elements used by a device driver or operating system.

APM (Advanced Power Management)

The APM BIOS manages CPU/core logic, display, and backlight power in the background, based on device activity. It consists of one or more layers of software. The APM BIOS resides at the lowest layer, providing portability at the higher layers of the APM system, supplying a software interface to the hardware.

ARP (Address Resolution Protocol)

A TCP/IP protocol that converts an IP address into a physical address, such as an Ethernet address. A host wishing to obtain a physical address broadcasts an ARP request onto the TCP/IP network. The host on the network that has the IP address in the request then replies with its physical hardware address.

There is also *Reverse ARP (RARP)* which a host uses to discover its IP address. In this case, the host broadcasts its physical address and a RARP server replies with the host's IP address.

ASCII (American Standard Code for Information Interchange)

A standard character set that typically assigns a 7-bit binary code to each letter, number, and selected control character. Erroneously used now to refer to 8-bit Extended ASCII. The other major encoding standard is EBCDIC.

ASYNC

Asynchronous communications. A method of transmitting data using an external clocking source (the transmitted characters are preceded by a start bit and followed by a stop bit).

ATA Card

A credit-card-sized device, which has been specially designed to meet the needs of small computers, and can be inserted and removed from a PC Card slot. In the PEN*KEY products, it is generally a flash storage card, modem, radio, etc. (See also: Flash Card, SanDisk, Spinning Media, or Hard Disk Card)

Auto Panning

The Auto Panning mode causes the display driver to automatically pan, so the active window remains displayed inside the viewport. (See also: Pan Border)

Autorun

Also referred to as autoload. A feature of Windows 95 that allows you to automatically start up a program (usually an installation program) located on CD.

BBS (Bulletin Board System)

Intermec Technologies Corporation has a BBS available to customers. This BBS contains forums for discussions on Norand® hardware and software products, file libraries, email, and other services.

BIOS (Basic Input and Output System)

A set of programs, usually in ROM, that lets each computer's central processing unit communicate with printers, disks, keyboards, consoles, and other attached input and output devices.

BISYNC (BInary SYNChronous communications)

A method of transmitting data in which the transmission of a character is marked by a drop or rise in the signal. An IBM defined, byte-controlled communications protocol, using control characters and synchronized transmission of binary coded data.

Bootable ATA

The ability to run the CONFIG.SYS and AUTOEXEC.BAT from an ATA card. In some older versions of flash, the CONFIG.SYS from the flash drive had to be run to load the drivers for the ATA card. With *Bootable ATA* the CONFIG.SYS and AUTOEXEC.BAT are run from the ATA card without loading any drivers.

Bus (network)

The main (multiple access) network cable or line that connects network stations. Also refers to a network topology of multiple stations communicating directly with the same cable with terminators at both ends, like an Ethernet or token bus.

CGA (Color Graphic Adapter)

An old graphics system for PCs. Introduced in 1981 by IBM, CGA was the first color graphics system for IBM PCs. Designed primarily for computer games, CGA does not produce sharp enough characters for extended editing sessions. CGA's highest resolution mode is two colors at a resolution of 640x200. CGA is superseded by VGA systems.

CMOS (Complementary Metal Oxide Semiconductor)

1. Usually refers to the system configuration and real-time clock information, which is often stored in CMOS memory. 2. The construction method for a type of low-power computer chip.

Code 39 (Code 3 of 9) *(Bar Code Symbology)*

An alphanumeric bar code symbology with a set of 43 characters, including uppercase and seven special characters. The name comes from the idea that three of the nine elements representing a character are wide while the remaining six are narrow.

It is the most widely used industrial bar code. This code fits the needs of most major companies, trade associations, and the federal government.

Code 128 *(Bar Code Symbology)*

A high density bar code symbology, allowing encoding of all 128 ASCII characters without adding extra symbol elements. It is used by retail and manufacturing industries.

Codabar *(Bar Code Symbology)*

A discrete self-checking bar code symbology with each character represented by a stand alone group of four bars and three intervening spaces. It was developed for retail price-labeling systems and is currently accepted in libraries, medical industries, and photo finishing services. See also: Self-checking and Discrete Code

Compression

A method of providing more room for files on a storage media (such as a PC Card or Hard Disk Card). For the sake of convention, compressed drives are referred to as larger than without compression. However, in reality, the contents of the files on a compressed drive have been condensed so they take up less space.

DriveSpace 3 not only creates compressed drives up to two GB, but uses all the space on the media. Whereas, previous versions of DriveSpace only used unfragmented space on the drive, and could not create a drive over 512 MB. Compression gains about two times the space of an uncompressed drive. for example, a 40 MB PC Card provides almost 80 MB when compressed.

DEX/UCS (Direct EXchange/Uniform Communications Standard)

Part of UCS which is transmitted directly between computers with no intervening network. It is a face-to-face exchange between parties. DEX/UCS involves the exchange of invoice information between a supplier and a retailer at the retailer's receiving area.

Discrete Code

A bar code in which all spaces within the symbol are part of the characters. With no intercharacter gaps, greater information density is achieved.

Discrete 2 of 5 Code

A bar code symbology representing characters in groups of five, where two of the elements are wide with the remaining three elements narrow.

DLC (Data Link Control)

The second lowest layer in the OSI Reference Model. Every network interface card (NIC) has a DLC address or DLC identifier (DLCI) that uniquely identifies the node on the network. Some network protocols, such as Ethernet and Token-Ring use the DLC addresses exclusively. Other protocols, such as TCP/IP, use a logical address at the network layer to identify nodes. Ultimately, all network addresses must be translated to DLC addresses. In TCP/IP networks, this translation is performed with the ARP.

DRAM (Dynamic Random Access Memory)

A type of physical memory used in most desktop and portable computers, including hand-held computers. "Dynamic" indicates that the memory is volatile and must be constantly refreshed (reenergized) with a battery or some other power source or it will lose its contents.

EAN (European Article Numbering) *(Bar Code Symbology)*

European Article Numbering Code. A bar code symbology similar to the UPC symbology except that EAN contains 13 characters and uses the first two to identify a country.

EPROM (Erasable Programmable Read-Only Memory)

A special type of PROM that can be erased by exposing it to ultraviolet light.

EEPROM (Electronically Erasable Programmable Read-Only Memory)

A special type of PROM that can be erased by exposing it to an electrical charge.

Ethernet

A general term indicating both 802.3 and DIX Ethernet (also called Ethernet 2.0).

Flash

A technology for nonvolatile memory storage. A special type of EEPROM that can be erased and reprogrammed.

Flash Card

A memory storage PC Card that meets the ATA standard. (See also: ATA Card, SanDisk, Spinning Media, or Hard Disk Card)

Folder

The Windows term for a directory, where file names are viewed as sheets of paper in manila folders in a literal file cabinet.

FTP (File Transfer Protocol)

One of the protocols typically included as part of the TCP/IP suite of protocols supported in most implementations of TCP/IP. FTP is a TCP/IP-based protocol for transferring files between different systems.

GPS (Global Positioning System)

The Global Positioning System (GPS) is a satellite based positioning and navigation system that provides precise position, velocity, and time information.

Hard Disk Card

A spinning media, or PC Card hard drive that plugs into a PC Card slot. (See also: ATA Card, Flash Card, SanDisk, or Spinning Media)

HHC (Hand-Held Computer)

A generic acronym for a NORAND Hand-Held Computer, including the 4000 Series (43XX, 44XX, 4500) and the PEN*KEY or 6000 Series (61XX, 62XX, 63XX, 6400, 65XX, 66XX).

Also the trademark of another company.

HMA (High-Memory Area)

A part of memory that resides above Conventional and Upper memory.

Host

A customer's host computer.

A computer that provides services directly to users, such as the user's computer. In TCP/IP, an IP addressed device.

A large computer that serves many users, such as a minicomputer or mainframe.

Host Computer

A large computer that serves many users, such as a PC, minicomputer, or mainframe.

IFL Card (Initial Flash Load)

An SRAM card that installs the flash contents on most PEN*KEY systems.

InfraRed

A method for short-range wireless data communication.

Interleaved 2 of 5 (I 2of5 Code) *(Bar Code Symbology)*

An all numeric bar code symbology, widely used for warehouse and heavy industrial applications, such as the automobile industry.

Interleaved Bar Code

A bar code that pairs characters together, where the bars represent the first character and the interleaving characters to represent the second character, providing greater density of information with no intercharacter spaces.

IP (Internet Protocol)

The network layer for the TCP/IP Protocol Suite. It is a connectionless, best-effort packet switching protocol that offers a common layer over dissimilar networks.

IrDA

A standard for InfraRed communications. An IrDA device creates a connection between two devices or a device and a network, without a physical connection, using signals transmitted in the infrared spectrum.

IRQ (Interrupt Request)

A method involving a set of special address lines in PCs, connecting peripherals (such as a serial port or network adapter) to the processor and other computer architectures so the peripherals can request service from the processor.

ISP (Internet Service Provider)

A vendor that provides one or more Internet-related services, such as email, newsgroup access, and Internet Web site access.

LAN (Local Area Network)

A group of network devices in which each device can communicate through a wired or wireless link. The wired link may have several segments joined by repeaters and bridges. The LAN is characterized by the relatively short distance it is designed to cover, a high speed of operation, and relatively low error rates. The geographic scope of LANs is limited to thousands of feet or closely-spaced building complexes.

Landscape Mode

In terms of the display, it has an orientation such that the information displayed on the screen is viewed by rotating the image ninety degrees clockwise, resulting in a wide display.

Master Boot Card

See IFL Card

Master Mode Booting

The process of booting from a PC Card, where the system needs to be reflashed with a functioning version of flash. See IFL Card.

Memory

Internal storage areas in the computer. "Memory" identifies data storage that comes in the form of chips. "Storage" is for memory that exists on tapes or disks. "Memory" is usually a shorthand term for "physical memory," which refers to the actual chips capable of holding data. Some computers also use "virtual memory," which expands physical memory onto a hard disk.

Every computer comes with a certain amount of physical memory, usually referred to as main memory or RAM. Think of "main memory" an array of boxes, each holding a single byte of information. A computer with one MB of memory can hold about one million bytes (or characters) of information.

There are several difference types of memory: RAM, ROM, PROM, EPROM, and EEPROM.

NetBIOS (Network Basic Input/Output System)

An application programming interface (API) that augments the DOS BIOS by adding special functions for local area networks (LANs). Almost all LANs for PCs are based on the NetBIOS. Some LAN manufacturers have even extended it, adding additional network capabilities.

NetBIOS relies on a message format called Server Message Book (SMB).

NIC (Network Interface Card)

An expansion board you insert into a computer so the computer can be connected to a network. Most NICs are designed for a particular type of network, protocol, and media, although some can serve multiple networks.

nm (nanometer)

A measure of wavelength. One nanometer is the equivalent of 1×10^n meters.

NORAND Utilities

A program that provides the basic functions needed to prepare the PEN*KEY for use, including program load and data communications.

NOVELL

Novell is a company that sells networking software. PEN*KEY hand-held computers that have Novell as a communications option could be configured to boot from an existing Novell network. For more information on Novell see the web site at `www.novell.com`

NPCP (Norand Portable Communications Protocol)

A proprietary protocol that provides session, network, and datalink services for Intermec hand-held computers in the Intermec LAN environment used with printers and data communications.

NRINET

An Intermec protocol that transfers data over TCP/IP.

ODI (Open Data-Link Interface)
An Application Programming Interface (API) developed by Novell for writing network drivers. ODI separates the physical network layer (the Data-Link Layer in the OSI model) from the network protocol layer (the Transport Layer). As a result, the same network interface card (NIC) can carry data for different protocols. For example, ODI allows a computer with just one NIC to be simultaneously connected to both an IPX/SPX network and a TCP/IP network.

OEM (Original Equipment Manufacturer)
A misleading term for a company that has a special relationship with computer producers. OEMs buy computers in bulk and customize them for a particular application. They then sell the customized computer under their own name. The term is really a misnomer because OEMs are not the original manufacturers, they are the customizers. Another term for OEM is VAR (Value-Added Reseller).

To provide equipment to another company, an OEM, which customizes and markets the equipment.

OSR1 (OEM Service Release 1)
Original Microsoft Windows 95 operating system release. Microsoft Plus! is required to use compression with this version of the OS.

OSR2 (OEM Service Release 2)
Second release of Microsoft Windows 95 operating system.

Pan Border
An invisible border that extends inward from the edges of the physical display, providing an easy means of panning. (See also: Auto Panning)

Panning
Panning is a mechanism, by which you can move the information around within the physical display to view the entire virtual display area. When Windows starts up, the physical display provides visibility into the area located at the upper-left corner of the virtual screen. Pan to the right or downward, or both to see other parts of the virtual display. Pan to the left or upward to get back, as needed. See also, Pan Border and Auto Panning.

PC (Personal Computer)
1. A desktop computer developed by IBM or a clone based on the same architecture developed by a third party vendor. 2. Sometimes used more generically to refer to other desktop systems, such as the Apple Macintosh. 3. The original IBM computer using an Intel 8088 CPU and an 8-bit internal bus.

PC Card
A device that fits in the card slots of an Intermec or other computer. In some PEN*KEY computers, the smaller Type II card occupies one slot, while a Type III card may block the second slot. The card may be used for data storage, modem, printer, wireless, or other purposes.

Generally, PC Card is used in reference to devices, whereas PCMCIA is a reference to the standard.

PC Card Icon
An icon located in the System Tray, which indicates a PC Card is plugged into the PC Card slot. (See also: System Tray)

PCMCIA (Personal Computer Memory Card International Association)

An industry group responsible for creation of the standard for devices (slightly larger than a credit card) for small computers, such as laptop and hand-held computers.

Formerly, devices were referred to as PCMCIA cards, but are now generally referred to as PC Cards, while PCMCIA is a reference to the standard.

PDF (Portable Document Format)

A file format developed by Adobe Systems. PDF captures formatting information from a variety of desktop publishing applications, making it possible to send formatted documents and have them appear on the recipient's monitor or printer as they were intended. To view a file in PDF format, you need Adobe Acrobat Reader 3.0 or greater. Adobe Reader is a free application distributed by Adobe Systems.

PL/N (Programming Language/Norand)

A third generation high level programming language proprietary to Intermec. Many PLN applications, especially route accounting applications are ported to the 6100 and 62XX models from 4000 Series Hand-Held Computers.

Portrait Mode

In terms of the display, it has an orientation such that the information displayed on the screen is viewed in a normal manner, without rotating the image, resulting in a narrow display.

PROM (Programmable Read-Only Memory)

A memory chip on which you can store a program. Once the PROM is used, it cannot be wiped clean to store something else. Like ROMs, PROMs are non-volatile.

Protocol

A formal description of message formats and the rules computers must follow to exchange those messages.

RAM (Random-Access Memory)

Dynamic memory, sometimes known as main memory or core. When used by itself, "RAM" refers to read and write memory; you can both write data into RAM and read data from RAM. This is in contrast to ROM, which permits you only to read data. Most RAM is volatile, requiring a steady flow of electricity to maintain its contents. When power is turned off, data in RAM is lost.

Redundancy

The ability of a duplicate access point to immediately take over the function of another access point that goes offline.

Right Click

An operation using a mouse device, where the secondary mouse button is clicked.

Unless reversed for left-handed operation, the primary mouse button is usually the left mouse button and the secondary mouse button is the right button.

ROM (Read-Only Memory)

Computers almost always contain a small amount of read-only memory that holds instructions for starting up the computer. Unlike RAM, ROM contains read-only information that is protected from being overwritten, such as BIOS.

RS-232 (Recommended Standard 232)

An electrical interface standard approved by the Electronic Industries Association (EIA) for connecting serial devices. In 1987, the EIA released a new version of the standard and changed the name to EIA-323-D. And in 1991, the EIA teamed up with Telecommunications Industry Association (TIA) and issued a new version of the standard called EIA/TIA-232-E. Many people still refer to the standard RS-232C or just RS-232.

Almost all modems conform to the EIA-232 standard and most personal computers have an EIA-232 port for connecting a modem or other device. In addition to modems, many display screens, mice, and serial printers are designed to connect to a EIA-232 port. In EIA-232 parlance, the device that connects to the interface is called a Data Communications Equipment (DCE) and the device to which it connects (such as the computer) is called a Data Terminal Equipment (DTE).

RS-485 (Recommended Standard 485)

An electrical interface standard approved by the Electronic Industries Association (EIA) for connecting serial devices. RS-485 is used for multipoint communications. RS-485 is similar to RS-422 but can support more nodes per line because it uses lower-impedance drivers and receivers.

SanDisk

A brand of flash memory card. (See also: ATA Card, Flash Card, Spinning Media, or Hard Disk Card)

Self-checking Code

A symbology with a checking algorithm that is capable of detecting encoding errors within the bar code symbol.

Serial Interface

An interface in which the terminal or computer sends single bits of information to the other device, one after another.

SNMP (Simple Network Management Protocol)

A technology on which companies build management systems. The standard protocol for managing TCP/IP networks. The Internet standard protocol for managing nodes on an IP network. See also: MIB.

Spinning Media

A credit-card-sized hard drive that plugs into a PC Card slot, and is used to store a large amount of data. (See also: ATA Card, Flash Card, SanDisk, or Hard Disk Card)

SRAM (Static Random Access Memory)

A type of memory that is faster and more reliable than the more common DRAM. This memory is nonvolatile and does not need to be refreshed like DRAM.

While DRAM supports access times of about 60 nanoseconds, SRAM can give access times as low as 10 nanoseconds. In addition, its cycle time is much shorter than that of DRAM because it does not need to pause between accesses. Unfortunately, it also is much more expensive to produce than DRAM. Due to its high cost, SRAM is often used only as a memory cache.

SRAM Card

A memory storage PC Card which functions like a floppy disk.

Stylus

A pen-shaped device, used for input on a touch screen by tapping or sliding.

System Tray

The System Tray, which appears as an indented panel on the Task Bar, contains small icons. One example is the PC Card icon, which indicates there is a PC Card plugged into the PC Card slot. Other icons in the System Tray are indications of programs running in the background. The System Tray is located at the opposite end of the Task Bar from the Start button.

TCP (Transmission Control Protocol) *(SNMP)*

An Internet standard transport protocol in the Internet protocols suite for reliable, connection-oriented, full-duplex streams. Contrasts with UDP.

TCP/IP (Transmission Control Protocol, Internet Protocol)

Most networks combine IP with a higher-level protocol called Transport Control Protocol (TCP), which establishes a virtual connection between a destination an a source.

IP by itself is something like a postal system. It allows you to address a package and drop it in the system, but there is no direct link between you and the recipient. TCP/IP establishes a connection between two hosts so they can send messages back and forth for a period of time.

Telnet *(SNMP)*

The virtual terminal protocol in the Internet suite of protocols. Users on one host can access another host and work as users of that host.

Tethered

A scanning method requiring a cable between the computer and the scanner.

TTY

NORAND two-way TTY asynchronous data link protocol.

UART (Universal Asynchronous Receiver Transmitter)

This chip allows a serial port to communicate with other computers or networks through the peripherals. Devices such as internal serial modems rely on the UART for communications.

UCC (Uniform Code Council)

The UCC is responsible for many things, one of which is the administration of UCS. The UCC is also responsible for assigning UPCs to suppliers.

UPC (Universal Product Code)

A bar code symbology used throughout the grocery and retail industries.

VAR (Value-Added Reseller)

Same as OEM.

VGA (Video Graphics Array)

A graphics display system for PCs developed by IBM. VGA is one of the de facto standard for PCs. In text mode, VGA systems provide a resolution of 720x400 pixels. In graphics mode, the resolution is either 640x480 (with 16 colors) or 320x200 (with 256 colors). The total palette of colors is 262,144.

Unlike earlier graphics standards for PCs (MDA, CGA, and EGA), VGA uses analog signals rather than digital signals.. Consequently, a monitor designed for one of the older standards will not be able to use VGA.

Since its introduction in 1987, several other standards have been developed that offer greater resolution and more colors (SVGA, 8514/A graphics standards, and XGA), but VGA remains the lowest common denominator. All PCs made today support VGA, and possibly some other more advanced standard.

WAN (Wide Area Network)

A network that covers a large geographic area. It is often used to connect two or more LANs together. This usually involves a variety of methods to maintain communications between all nodes in the network. For example, microwave communications, fiber-optic connections or leased telephone lines.

XMS (eXtended Memory Specifications)

A procedure developed jointly by AST Research, Intel Corporation, Lotus Development, and Microsoft Corporation for using extended memory and DOS's high memory area (HMA), a 64 KB block just above 1 MB.

General Index

▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶

Files Index

▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶

NOTE:

This index section is provided to assist you in locating descriptions for device drivers, applications, utilities, batch files, or other files within this publication.