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PTC- 2134/2234

WINDOWS 95 Software Guide

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Introduction

This Guide's Purpose and Scope

This manual was written by the Symbol Technical Publications Group. This group is tasked with providing technical documentation for the for the PTC-2134/2234 product line. Every effort has been made to provide accurate and concise information to you, our customer.

The *PTC-2134/2234 Windows 95 Software Guide* provides information pertaining to SC400-based units that operate in a Windows 95 software environment. It is meant to provide an overview of the various software components of this powerful, pen-based product, including

- Unit configurations,
- Resource maps,
- BIOS,
- Boot options,
- Available drivers and utilities, and
- Cradle information.

Contacting Symbol's Customer Support Center

Contact the Symbol Customer Support Center to obtain help in resolving any PTC-2134/2234 system problems that you may experience.

The Customer Support Center's toll-free number is 1-800-653-5350. The center is open from 8 a.m. to 6 p.m. EST, Monday through Friday.

For further information on Symbol's products and services, please visit our website at www.Symbol.com.

The WINDOWS 95 Software Environment

The Symbol PTC-2134/2234 is a mobile computer powered by an SC400 100-MHz processor. It is small, lightweight, handheld, and ruggedly constructed.

The PTC-2134/2234 combines standard PC technology with Symbol's expertise in data collection and wireless radio technology to provide a flexible high-performance product.

The PTC-2234 is a version of the PTC-2134 that has been modified and approved for use in certain hazardous locations. The product has been approved by Underwriter Laboratories for the Class 1, Division 2 rating for Parts A, B, C, and D. A detailed description of hazardous locations may be found at www.ul.com.

This section of the manual provides a basic overview of the PTC-2134/2234's software environment, including brief discussions of

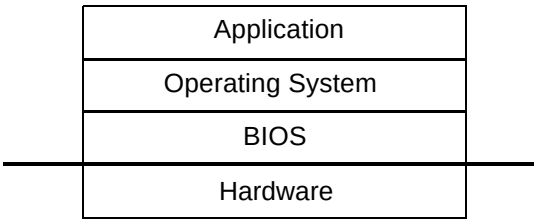
- the system BIOS,
- the operating system and applications,
- the software kernel,
- power management, and
- the Windows 95 Software Development Kit (SDK) Programming Guide.

Functional Overview

The Symbol PTC-2134/2234 is a mobile computer powered by an SC400 100-MHz processor. This device is designed for convenient single-handed operation; data are entered using a stylus or by selecting options via a full VGA graphical LCD display and touch-sensitive screen interface.

The Symbol PTC-2134/2234 uses a PC-type software architecture consisting of three major software layers:

- BIOS (Basic Input/Output System)
- Operating System
- Application



BIOS

The BIOS is the lowest software layer and typically exists in ROM memory. It provides basic input/output services for the system and an insulating interface between the upper software layers and the hardware layer.

The PTC-2134/2234 uses a customized version of the Phoenix™ BIOS to support PTC-2134/2234 hardware features. To achieve this level of support while maintaining PC compatibility, a system extension called the Symbol BIOS or TBIOS is used.

TBIOS is a method for expanding the BIOS functions without reserving a function number that could be used by another application. This is accomplished by forcing the TBIOS code to reside with standard BIOS code, but by providing a different entry point to the TBIOS. The entry point is defined by the contents of a static location in the BIOS Compatibility Area (COMPAS).

Operating System

The Windows 95 operating system provides additional higher level services to the Application Layer and uses the BIOS interface for performing hardware functions. By using standardized BIOS interfaces, the PC architecture supports standard operating systems.

The operating system is installed on the Compact Flash at the factory into each PTC-2134/2234 unit. Because the PTC-2134/2234 does not contain a floppy disk drive, the installation of the operating system image is also initially performed at the factory. However, revision or replacement of the operating system image may be performed via the PCMCIA slot using PC cards.

Application

The application is the highest software layer and provides controlling software programs for the unit.

Other Software Components

Software Kernel

The software kernel is a simple program loader that is used to reprogram the PTC-2134/2234 Flash PROM memory areas.

Power Management

Power management is a necessity for power conservation of the battery-operated PTC-2134/2234. The unit is designed to incorporate battery-saving power management functions directly into the unit hardware and software architecture. The platform hardware incorporates features that allow most internal elements to be slowed down or deactivated. Together, the hardware and software constantly monitor system activity and implement power management activity states that are used for power management functions.

The activity states represent different activity levels and allow the platform to slow down or deactivate internal elements as the activities change.

Additionally, the platform Power Management functions can be deactivated or placed into a fully automatic mode not requiring application software control.

Software Development Kits

Symbol provides application development tools in the form of a Software Development Kit (SDK) Programming Guide to help developers design application programs for the SC400 product family. The *SDK Programming Guide* is a collection of run-time libraries that assist in the development of C application programs on PC-compatible computers. Once an application program is developed, it can be copied to a PCMCIA card and inserted into the PTC-2134/2234 to load or run the application.

Note: *If converting applications from a PTC-1134, any portion of the application software that directly manipulates the SLC (PTC-1134) hardware will have to be re-written before it will work on the PTC-2134. The internal architecture of the PTC-2134/2234 is not compatible with the SLC. Any software (BIOS, drivers, or applications) that manipulates hardware must be written specifically for the PTC-2134/2234.*

PTC-2134/2234 Unit Configurations

The PTC-2134/2234 Windows 95 unit is available in a wide variety of configurations.

This section will cover the configuration options for the following devices:

- Radio,
- RAM,
- ROM,
- Storage,
- PCMCIA Slots,
- Display Types,
- IrDA,
- Ethernet, and
- DCD Devices.

Radio Options

Batch

A batch unit does not have an antenna cable integrated in the unit. It is still possible to install a radio in the unit by way of the user accessible PCMCIA slots. However, an antenna must be installed on the radio. Either of the PCMCIA slots may be used for a radio card.

LAN Radio Ready

The radio ready unit has an RSMA antenna cable integrated into the unit. The end of the cable routes through the unit to the externally accessible PCMCIA slot door. A radio can be installed into PCMCIA Slot 0 (slot farthest from the unit's display) or in PCMCIA Slot 1 (closest to the display).

LAN Radio Factory Installed

The factory installed radio uses the internal PCMCIA slot (Slot 2). An RSM antenna cable integrated into the unit is routed to the radio via this internal slot. This provides the unit with three PCMCIA card slots and frees up both external PCMCIA slots for other uses.

WAN Radio Factory Installed

When ordered with a WAN radio such as a DataTac or Mobitex network radio, the radio module is installed internally in the unit. Because these radio types are not PCMCIA form factor, they require additional space in the unit. The unit therefore has a deeper backshell than non-WAN radio equipped units.

Memory

RAM

The PTC-2134/2234 has RAM configurations of 4, 20, 36, or 64 MB on the CPU board. When the 16 and 32 MB memory modules are added, the 4 MB is included. The 64 MB configuration actually contains 68 MB of RAM, but the SC400 is able to address only up to 64 MB and the 4 MB on the CPU board are disabled.

ROM

The PTC-2134/2234 comes with 512 KB of ROM, which contains the BIOS for Windows 95.

Storage Options

ATA

The PTC-2134/2234 supports ATA drives, both solid state and rotating. ATA Type II cards can be applied to either of the user accessible PCMCIA slots. Symbol offers factory installed card options of 60, 110, and 175 MB. There is a factory installed restraining bar that prohibits removal of the ATA card when installed in Slot 1.

The 520 MB rotating ATA disks (Type III) are installed in PCMCIA Slot 1.

SRAM

The PTC-2134/2234 also supports SRAM (static RAM) cards. Generally, these cards are used for special purposes like reloading the ROM images (Genesis procedure) or booting the unit, rather than data storage because the capacities are rather low — 1, 2, and 4 MB. However, these cards may also be used by the application for data storage.

Compact Flash

The PTC-2134/2234 has an internal Compact Flash adapter which is a standard 50-pin port that supports a variety of Compact Flash module sizes.

PCMCIA Slots

The PTC-2134/2234 has three PCMCIA slots: two that are user accessible and one that is internal. The two external slots are controlled by an Intel PCMCIA controller. The internal slot is controlled by a Vadem PCMCIA controller and is register compatible with industry standard 82365 PCIC host controller.

External Slots

Slot 0

This is the card slot farthest away from the display.

Slot 1

This is the card slot closest to the display.

Slot 2

This slot is located inside the unit and is usable only when the unit is ordered with a factory installed LAN radio. Other unit configurations will not be equipped to support Slot 2 functions.

For more information on PCMCIA functions, see section "PCMCIA" on p. 34.

Display Types

The PTC-2134/2234 has a 640 x 480 VGA monochrome liquid crystal display (LCD) screen, which can show up to 64 shades of gray. The display also has a resistive touch panel digitizer. The digitizer enables the unit to recognize data entered with a passive stylus. It also has a palm reject feature, which prevents accidental activation of the unit by casual hand or finger contact.

The display can be of either Transmissive or Transflective type.

Transmissive Displays

Transmissive displays generally produce brighter images than transflective displays but consume more battery power. A transmissive display does not reflect ambient light and is intended for indoor use only. It requires the backlight to be on at all times.

Transflective Displays

Transflective displays use reflected ambient light to produce viewable display images. It is ideal for use in outdoor applications. For indoor use, the unit's backlight must be used to optimize the display visibility. The backlight is defaulted to the ON setting and can be turned off to conserve power.

IrDA

The PTC-2134/2234 supports infrared communications via an IrDA (Infrared Data Association) compliant port at the base of the unit.

Refer to the "MS Windows 95 IrDA Communications Driver 2.0" on p. 62 of this guide for details on the IrDa driver.

Ethernet

The PTC-2134/2234 has an internal Ethernet interface and is implemented by a CS8920 Crystal ISA Ethernet controller. When the unit is docked into a cradle, Ethernet signals pass through the contacts on the cradle and unit, and then pass through the cradle's RJ-41 jack.

DCD Devices

Auto ID devices are attached to the 40-pin Scanner/Expansion module at the top of the unit.

Scanners

The PTC-2134/2234 supports contact and non-contact barcode scanners. The appropriate module attaches to the front underside of the unit. For non-contact scanners, there are four activation buttons; two on the top along the sides of the display, and two in the scanning module itself, underneath the unit. The buttons on the scan module are more accessible than the buttons on the top of the unit and may be the preferred activation buttons.

Magnetic Stripe Reader

Magnetic Stripe Reader support is designed into the PTC-2134/2234. For more information on this available option see page p. 65.

Boot Options

The PTC-2134/2234 uses a customized version of the Phoenix BIOS (Basic Input/Output System) that supports PTC-2134/2234 features. Because the BIOS interfaces with the hardware, it must be aware of the physical devices present in the system. This chapter provides information on:

- Resetting/rebooting the PTC-2134/2234,
- Reflashing the BIOS,
- Changing the BIOS settings,
- The POST function,
- Available boot sources, and
- Drive letter mapping.

PTC-2134/2234 Resource Map

This section provides information on the following PTC-2134/2234 components:

- Resource Map,
- Hardware Interrupts, and
- COM Port Assignments.

Resource Map

PTC-2134/2234 components are assigned various address ranges within the system's memory.

Memory Allocation Table

The PTC-2134/2234's memory is allocated as follows:

Address	Size	Resource	Comments
000000-09FFFF$_h$	640 KB	Base	Base Memory
0A0000-0BFFFF$_h$	128 KB	Video	Video Display Frame Buffer
0C0000-0C7FFF$_h$	32 KB	Video	VGA BIOS ROM
0C8000-0C9FFF$_h$	8 KB	ASIC	Shared RAM area for ASIC
0CA000-0CBFFF$_h$	8 KB	--	Unused
0CC000-0CCFFF$_h$	8 KB	PCMCIA/UMB	PCMCIA Window or Upper Memory Block
0CD000-0CDFFF$_h$	8 KB	PCMCIA/UMB	PCMCIA Window or Upper Memory Block
0CE000-0CEFFF$_h$	8 KB	PCMCIA/UMB	PCMCIA Window or Upper Memory Block
0CF000-0CFFFF$_h$	8 KB	PCMCIA/UMB	PCMCIA Window or Upper Memory Block
0D0000-0DFFFF$_h$	64 KB	UMB	Upper Memory Block
0E0000-0EFFFF$_h$	64 KB	UMB	Upper Memory Block (reserved)
0F0000-0FFFFF$_h$	64 KB	BIOS	System BIOS (shadowed)
100000-xxxxxxxx$_h$	>1 MB	EMS	Extended Memory

Hardware Interrupts

Knowledge of hardware interrupt assignments will assist in making system configuration decisions.

Interrupt Table

The PTC-2134/2234's hardware is assigned to the following interrupts (IRQs):

H/W Interrupt	PC/AT Usage	PTC-2134/2234 Usage	Notes
IRQ 0	Timer 0	Timer 0	
IRQ 1	Keyboard	Keyboard	
IRQ 2	IRQ(15:9) Cascade	IRQ (15:9) Cascade	
IRQ 3	COM2	COM2/4	COM2 = User Port COM4 = WAN Radio Serial Port
IRQ 4	COM1	COM1/3	IrDA Port I/F
IRQ 5	LPT2		
IRQ 6	Floppy Disk		
IRQ 7	LPT1	LPT1	
IRQ 8	RTC	RTC	
IRQ 9		PCMCIA	Open for PCMCIA devices
IRQ 10		Ethernet	
IRQ 11		PCMCIA	Open for PCMCIA devices
IRQ 12	Mouse	Digitizer	
IRQ 13	Math Exception	ASIC	
IRQ 14	Hard Disk	IDE ATA SS Hard Disk	
IRQ 15		PCMCIA	Open for PCMCIA devices

COM Port Assignments

The following are the default COM Port settings for the PTC-2134/2234:

- COM1: IrDA,
- COM2: 15 pin serial or cradle port,
- COM3: Scanner or MSR, and
- COM4: WAN radio.

Resetting/Rebooting the PTC-2134/2234

There are several ways to reset the PTC-2134/2234. It should be noted that removing the battery will not reset the PTC-2134/2234. The bridge battery maintains all pointers and memory such that when the battery is reapplied to the unit, the unit will resume operations at the point at which the power was removed.

Cold Reboot

The blue push button switch located inside the PCMCIA door performs a cold reboot. It powers off the unit and puts it in ship mode. Turning on the unit at this point (by pressing the Resume button) will reinitialize the PTC-2134/2234.

Console Reboot

The following Console Reboot procedure stops the PTC, resets it, then restarts (boots) it. This procedure erases all programs and data stored in RAM. When the PTC starts again, it returns to the operating system.

Table 1. Console Reboot Procedure

Step	Action
1	Turn on the PTC-2134/2234.
2	Press and hold the Contrast button.
3	Press and hold the Resume button.
4	Release the Contrast button.
5	Press and release the Contrast button.
6	Release the Resume button.

Changing BIOS Settings

There are many settings in the BIOS of the PTC-2134/2234, that you would expect to see in a desktop computer system. Once set, the BIOS settings generally do not have to be returned. However, access will need to be gained to the BIOS configuration.

To access the BIOS settings, attach a physical keyboard to the PTC-2134/2234 via the keyboard port on the right side of the cradle. During the memory test portion of the POST process, press F2. Upon completion of the memory test, access will be granted to the BIOS setup menu.

> ***Note:*** *The system's contrast and brightness controls become disabled while in the BIOS setup mode.*

Power Management

There are five time-out settings: high speed, low speed, Standby, Suspend, and Off.

Boot Location and Sequence

This determines which drive is booted.

CPU Speed

There are three possible settings: 33, 66, and 100 MHz. The default is 100 MHz.

Reflashing the BIOS

TFLASH Utility

The TFlash utility is a DOS command line program that will reflash a system BIOS image into the unit. To use the TFlash program, perform the following:

Table 2. TFlash Procedure

Step	Action
1	Locate the TFlash.exe file and copy the binary ROM image of the BIOS to be flashed to the same directory.
2	With a keyboard connected to the PTC-2134/2234, restart the unit and momentarily press F8 during the Phoenix Technologies Ltd. copyright screen display. Select option 7 (safe mode command prompt only) from the resulting menu.
3	From the directory of the TFlash location, type TFlash <BIOS filename>. *(<BIOS filename>=new BIOS ROM Image name)*
4	Press Enter.

When the flash process is complete, restart the unit. If the unit displays a blank screen without restarting, or if the user does not receive the restart message, the unit should be reset by pressing the Reset button and then the Resume button. The unit is now operable with the new BIOS image.

No “crisis mode” is associated with this utility. If a failure occurs during the flash process, the process must be repeated in its entirety.

The TFLASH utility can also read the BIOS image from ROM and write it to disk. The command line option for this is

"Tflash romimage.bin –r8000"
romimage.bin = filename.bin
-r8000 is the starting memory location for the bios.
The resulting file size will be 256 KB.

Available TFLASH commands are

Example1: TFlash <Filename> [-o<offset>]
Example2: TFlash <Filename> [-r<length>] [-o<offset>]
Example3: TFlash [-e<length>] [-o<offset>]

Where:

-o <offset>, default=0, from base of ROM.
-r Reads <length> bytes, default=512k, from ROM into a file.
-e Erases <length> bytes, default=512k, ROM area to all FFs.

Automatic Genesis Flash

To perform an Automatic Genesis Flash, perform the following steps:

Table 3. Automatic Genesis Flash

Step	Action
1	Insert the Genesis formatted SRAM card into Slot 0.
2	Turn on the PTC-2134/2234.
3	Press and hold the Backlight button.
4	Press and hold the Resume button.
5	Release the Backlight button.
6	Press and release the Backlight button.
7	Release the Resume button.
8	The Status light will start to flash and the backlight will turn on. The unit will then beep 15 – 20 times to indicate that the BIOS is being reloaded.
9	After the unit stops beeping, remove the SRAM card.
10	Perform a Warm Boot on the unit.

Power-On Self Test (POST)

In PC-based systems, after a boot, the BIOS is responsible for testing and initializing all hardware components and boot-loading the operating system into memory. This process is known as the Power-On Self Test or POST.

What Happens During POST

During the POST process, messages must be generated for the system. The POST test, initializations, and messages are customized for the PTC-2134/2234.

Once the POST operations are complete, the BIOS loads the operating system. Once a bootable disk is found, the boot loader is loaded into memory and executed. If no bootable disk is found, the system displays the message: No Boot Device Available.

Boot Sources and Drive Letter Mapping

Normal Boot

Under normal conditions, the unit boots from the internal Compact Flash card.

Drive Letter Assignments when Booting from a Compact Flash card.

Installation Slot	Drive Letter
Compact Flash	C
0	D
1	E

Booting From an ATA Card

The PTC-2134/2234 may be configured to boot from an ATA card instead of its internal Compact Flash card.

The ATA card must be formatted and loaded with the system files before it can be used. To format an ATA card, see “Formatting an ATA Card” on p. 45.

To boot from an ATA card, perform the following steps:

1. Remove the Compact Flash card from the CF slot inside of the unit.

2. Insert the bootable ATA card into PCMCIA Slot 0 (slot closest to the battery).

3. Restart the system and press F2 during POST to enter the CMOS Setup.

4. Arrow down to the Embedded Features screen and press Enter.

5. Ensure that the PCMCIA ATA option is enabled and that the [ROM/RAM Disk 0] option is set to [PCMCIA].

6. Save the new settings and exit the CMOS Setup by selecting Exit.

7. Restart the system.

   Note: *If the system fails to boot, ensure that there is neither a Genesis card nor an unformatted/non-system ATA card in Slot 0. If either of these are true, the system will not boot. Ensure that a properly prepared ATA card is in Slot 0 and retry.*

Drive Letter Assignments when Booting from an ATA

Installation Slot	Drive Letter
Compact Flash	Not Installed [1]
0	C
1	Not Supported [2]

[1] CF Card must be removed.

[2] Card and Socket Services cannot be loaded. Doing so will cause the unit to lock up.

Booting from an SRAM Card

The PTC-2134/2234 may be configured to boot from an SRAM card instead of its internal Compact Flash card. This is similar to booting a desktop PC from a floppy disk.

For an SRAM card to be recognized by the unit, it should be a 1, 2, or 4 MB SRAM card with No-Attribute Memory. SRAM cards with Attribute Memory may not be recognized properly by the unit at boot up.

The SRAM card must be formatted and loaded with the system files before it can be used. To format an SRAM card, see "SRAM Card Formatting Information" on p. 43.

To boot from an SRAM card, perform the following steps:

1. Insert the bootable SRAM card into PCMCIA Slot 0 (slot closest to the battery).

2. Restart the system and press F2 during POST to enter the CMOS Setup.

3. At the Main menu tab, ensure that the Boot Sequence is A: then C:.

4. Arrow down to the Embedded Features screen and press Enter.

5. Ensure that the PCMCIA ATA option is enabled and that the [ROM/RAM Disk 0] option is set to [PCMCIA].

6. Restart the system.

   Note: *If the system fails to boot, ensure that there is neither a Genesis card nor an unformatted/non-system SRAM card in Slot 0. If either of these are true, the*

system will not boot. Ensure that a properly prepared SRAM card is in Slot 0 and retry.

The SRAM card used as the boot source must remain in the PCMCIA slot. Do not attempt to remove it.

Drive Letter Assignments When Booting From SRAM

Installation Slot	Drive Letter
Compact Flash	C
0	A or B
1	Not Supported[1]

[1] Card and Socket Services cannot be loaded. Doing so will cause the unit to lock up.

There is a possibility of a boot error if all video modes are not calibrated. As the PTC-2134/2234 boots up, tapping on the screen as the config.sys, autoexec.bat, user_boot.bat, or application are loading may produce one of the following errors:

- Run-time error R6002 — integer divide by 0.
- Divide overflow — memory allocation error.
- Divide overflow.

Should any of these errors occur, it may be corrected by performing the following steps:

1. Delete tmouse.ini in the mouse directory.
2. Reboot unit and allow it to go into the calibration mode.
3. Calibrate all video modes.
4. Save and Exit.
5. Reboot the unit.

Power Management

APM

As battery conservation measures are dependent upon user operations and preferences, the PTC-2134/2234 allows the user application program to direct and control Power Management operations via the industry standard Advanced Power Management (APM) software interface. This interface is defined by the APM Interface Specification which is currently at revision Level 1.2. The platform software uses the APM functions and states to place the PTC-2134/2234 into the appropriate platform Power Management Activity State.

To support the APM interface in the PTC-2134/2234, Telxon enhanced the APM BIOS functions supported in the Phoenix BIOS from APM revision 1.0 to 1.2. The APM BIOS functions manages power in the background based on device activity and is specific for the PTC-2134/2234 hardware platform. The APM BIOS is the software interface to the PTC-2134/2234 platform and its power managed devices and components. This interface allows software applications to take an active part in managing the power consumed by the PTC-2134/2234 unit.

Monitoring

When full power management is enabled, system activity is monitored at two different levels. The APM Driver software monitors the frequency of certain interrupts, and the APM BIOS monitors the hardware activity directly. Both work together to inform APM-aware applications and Device Drivers about power management events and conditions. The PTC-2134/2234 allows all elements to work together to conserve power.

Power Management States

There are four operational states for the PTC-2134/ 2234: Ship, Full Run, Standby, and Suspend.

State	Description
Ship	The unit is completely powered off. The Resume key must be pressed to power-up the unit. Pressing the Blue Button, which may be found inside of the PCMCIA door, puts the unit into this mode.
Full Run	The system CPU and devices are fully awake and functional — also referred to as being fully operational.
Standby	A state generated by software-controlled timers and lack of activity on monitored buses. While in the Standby state, the unit's power usage is reduced by up to 50%, and the unit is able to process many functions at a reduced rate (8 MHz).
Suspend	A state in which the system further reduces the power consumption from Standby mode. There are several suspend options that are controlled by the BIOS or device drivers. Most of the state changes that occur to get into the Suspend mode are due to lack of activity of devices. While in the Suspend mode, the unit's power usage is reduced by up to 90%; however, the unit is functionally deactivated until it is reawakened.

The PTC-2134/2234 allows the user to help conserve power directly via the Suspend/Resume feature. This feature allows the user to place the unit into Suspend state by depressing the Resume switch on the unit's top cabinet. This deactivates the unit and most internal hardware elements. The user may reactivate the unit by pressing the Resume switch again.

Additionally, the PTC-2134/2234 provides a Standby Timer, which specifies the inactive time before automatically entering the Standby state and deactivating most internal elements. The system default setting for this timer is approximately 32 seconds. During this period, the unit may be reactivated via the Digitizer or the Resume switch. Once the unit enters the Suspend state, the Digitizer will no longer wake the unit.

Magic Packet Mode

Another feature of the PTC-2134/2234's power management is the ability to enable the Magic Packet Wake Up mode (Magic Packet is an E-Wake utility developed by AMD) when the unit is docked in a cradle and is in the Suspend state. Magic Packet mode provides the ability to wake up the unit remotely by using the Ethernet connection established through the cradle. This allows the unit to be accessed and managed remotely even if the Suspend state has been entered. The Magic Packet feature does not require that a software network driver nor hardware drivers be loaded in the unit.

When the unit goes into the Suspend state (while docked in a cradle), the Ethernet controller will enable the Magic Packet mode automatically. While in the Magic Packet mode, the unit will monitor all incoming frames to determine whether any of them is a Magic Packet frame. A Magic Packet frame is a unit of data that is sent by a network manager, via Ethernet connection, from a remote site with the intent to wake up the unit. When a Magic Packet frame is received and detected, the Ethernet controller will wake up the unit and disable the Magic Packet mode. The unit then returns to the Full Run state, regaining full functionality, including network accessibility.

Note: *The **Magic Packet** function wakes a suspended unit only. A unit in **standb**y is not affected by **Magic Packets**.*

Features of Power Management in the Standby State

While in the Standby mode, the PTC-2134/2234 has the following features:

- Power usage is reduced (up to 50% savings, approximately 200 mA).
- Processor speed drops to 8 MHz.
- Display is turned off and all other devices remain on.

With the IrDA drivers loaded, the PTC will not go into the Standby mode.

The following table illustrates wake sources used to bring the PTC-2134/2234 out of the Standby mode:

Wake Source	Comment
Touch/Digitizer	Unit wakes when the digitizer registers a touch.
RTC Alarm	Unit wakes when a Real Time Comparator Alarm is initiated.
Dock/Undock	Unit wakes when it is connected to or disconnected from a cradle.
Keyboard	Unit wakes with input from a keyboard that is attached to a cradle.
Resume button	Unit wakes when the Resume button is pressed.

Features of Power Management in the Suspend State

While in the Suspend mode, the PTC-2134/2234 has the following features:

- Power usage is reduced (up to 90% savings).
- Processor speed drops to 8 MHz.
- All devices are turned off, except for WAN.
- Ethernet is in Low Power.

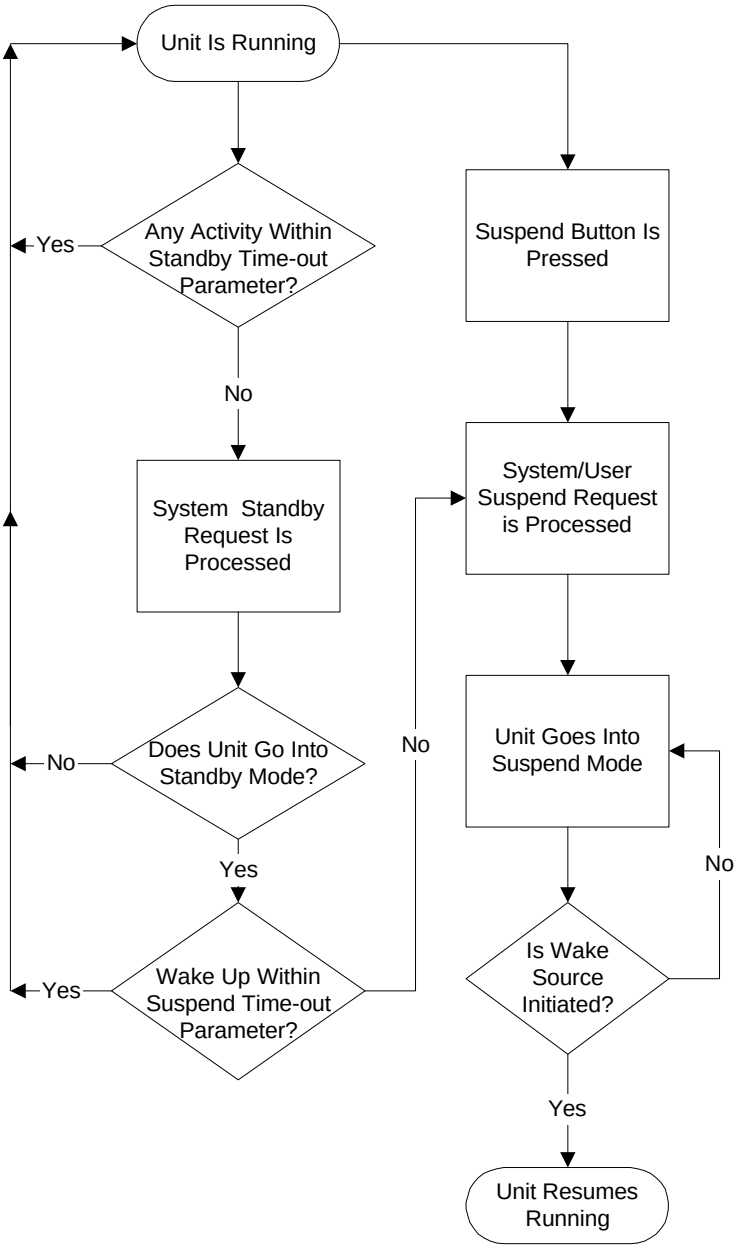
The following conditions will prevent the unit from entering the Suspend mode:

- IrDA drivers loaded, or
- LAN radio and drivers loaded.

The following table illustrates wake sources used to bring the PTC-2134/2234 out of Suspend mode:

Wake Source	Comment
User serial port	Unit wakes in response to a Ring Indicator.
Cradle serial port	Unit wakes in response to a Ring Indicator.
WAN	Unit wakes in response to a Ring Indicator.
Ethernet	Unit wakes in response to E-Wake.
Dock/Undock	Unit wakes when it is connected to or disconnected from a cradle.
Resume button	Unit wakes when the Resume button is pressed.

SC 400 Power Control Flow



PCMCIA

PCMCIA Overview

A PCMCIA card (Personal Computer Memory Card International Association), which is also referred to as a PC Card, is a small form factor device about the size of a credit card. The card provides superior expansion capability to portable and notebook computers. A number of PCMCIA card device specifications were standardized by PCMCIA.

The PTC-2134/2234 has three PCMCIA slots available. Slots 0 and 1 are user accessible and may be used for increased file storage capacity (ATA Card) or RAM expansion (SRAM). Slot 2 is internal and is used primarily for the radio.

PCMCIA Device Architecture

The PCMCIA standards consist of several specifications. The PC card standard defines the physical, electrical, and logical attributes for PC cards. Other specifications describe the software interface and specific card standards. Furthermore, the PC card AT attachment (ATA) and Auto-Indexing Mass Storage (AIMS) standards define additional attributes for these mass storage cards.

At the lowest hardware level is the socket controller. The socket controller furnishes the interface between the host system and the PC card.

Socket Services

The first software level is Socket Services (SS). SS provides a standard software interface to the socket controller hardware. It provides services for initializing the socket and PC card, setting up memory and I/O windows, and handling changes in the state of the socket controller or PC card. Applications and drivers do not interface to SS directly. In most systems, the sole user of SS is Card Services.

Card Services

Card Services (CS) is the interface between applications and PC card resources. CS is responsible for coordinating access to PC card resources. Software seeking to use PC card resources is a client of Card Services. CS provides the basic bulk memory services such as read, write, and erase. PC card memory access and programming algorithms are provided through memory technology drivers (MTDs).

Types of PC Cards

PC cards may be one of the following types:

Type	Description
Type I	3.3 mm thick
Type II	5.0 mm thick
Type III	10.5 mm thick
Type I Extended	3.3 mm thick, with 40 mm extended length
Type II Extended	5.0 mm thick, with 40 mm extended length

Type I cards are compatible with all host sockets. Type II cards are for applications that cannot fit within the 3.3 millimeter thick form factor of Type I cards. Type III cards provide additional space for mechanical ATA hard disk PC cards.

The interface to the PC card is made through a 68-pin connector which includes all the signal and power connections required to communicate with the host computer. It is an 8- or 16-bit I/O or memory interface. Polarizing keys in the card frame prohibit reverse installation of the card in the socket.

PC Card Products

PCMCIA technology offers two types of PC cards; memory cards and I/O cards.

Memory cards provide data storage media and include ATA cards, a battery-backed static RAM (SRAM) card, EPROM cards, one-time-programmable ROM cards, EEPROM cards, flash PROM cards, and masked ROM cards.

I/O cards conduct data transfer with a remote station using modem or network technology.

SRAM Cards

SRAM cards come in a variety of sizes and some cards come with attribute memory. All SRAM cards contain a battery to provide non-volatile storage. Battery life depends on the type and number of SRAM chips integrated on the card. Currently, most SRAM cards do not contain a card information structure (CIS).

Note: *When memory card device drivers detect the absence of a CIS, it assumes that an SRAM card is present. Although system software can determine the size of the card, it has no way to ascertain the access speed. Therefore, it automatically uses 250 nanoseconds as the default access time.*

Flash Cards

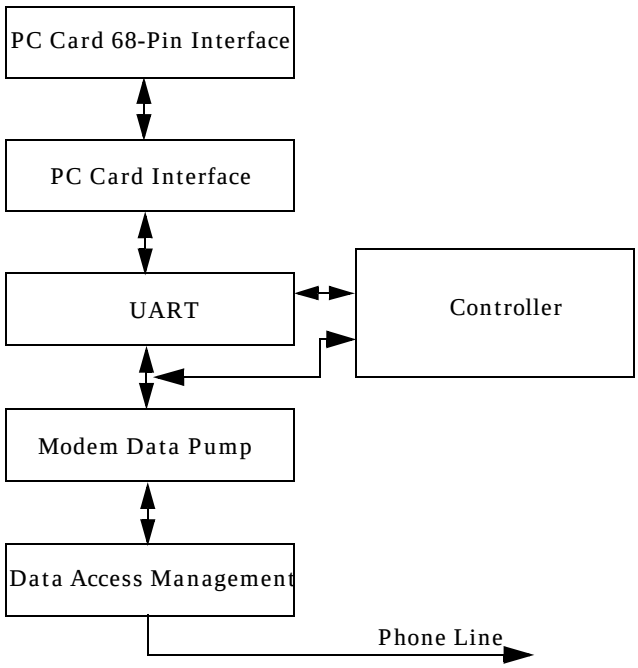
Flash cards currently have the highest read/write memory storage density of any silicon-based PC card. Flash memory renders quick read access time. This requires larger block erase size for updates, up to 256 KB at a time. Cycle life is between 10,000 and 1 million read/write cycles.

PSRAM Cards

A PSRAM (Pseudo Static RAM) PC card contains high-density RAM chips that are based on dynamic RAM technology. PSRAM cards contain their own refresh circuitry, and their data retention power consumption is considerably higher than SRAM cards. They typically contain four times the density of SRAM cards and are a lower cost product. However, battery life of PSRAM cards is measured in weeks, whereas SRAM cards have a battery life that is measured in months to years.

Modem Cards

Modulator/demodulator (modem) cards consist of a PC card interface, a universal asynchronous receiver/ transmitter (UART), a modem data pump that converts digital signals to phone-network-compatible analog signals, and data access management circuitry. The following figure illustrates a block diagram of a typical modem card.



The modem controller interfaces with the host system through a standard serial UART. Most all PC modem cards use the standard 16C450 or 16C550 UART. The controller also handles the interface from the serial UART to the data pump. The controller controls the Hayes-AT command set to initiate calls and control the modem data pump.

Most of the current PC modem cards support some level of facsimile transmission. Like modems, fax support is defined by the fax modem data pump and the fax controller. The fax modem data pump is based on a half-duplex protocol. Some lower cost fax PC cards do not support the same send/receive speed. Instead, they may send data at 4800 bps and receive data at 2400 bps.

Wired Network Cards

Wired network cards include all PC cards that connect to a wired high-speed network such as Ethernet or Token Ring. The most popular of the network PC cards is Ethernet, in both 10Base2 thin wire and 10BaseT twisted pair. These cards contain a standard network interface controller (NIC) in addition to the PCMCIA interface.

Network cards can be one of the highest power-consuming PC cards. 10BaseT cards may draw up to 300 mA, and 10Base2 cards may reach up to 750 mA.

SCSI Cards

Small Computer System Interface (SCSI) is a high-speed interface used mainly for hard disks, tape drives, and CD ROMs. SCSI-based PC cards allow the portable user to access these types of devices but require software support in the form of device drivers.

Wireless Local Area Network Cards

There are currently few standards in the wireless network arena. Although the band allocation has been set by the FCC, transmission standards, protocols, and topologies are currently proprietary.

Telxon's spread spectrum radio card falls into this class of card.

Special Purpose Cards

With the architecture provided by the PCMCIA standard, many special types of PC cards are available. Some examples are listed below:

- Pager receivers,
- Global Positioning System (GPS) cards,
- Audio cards,
- Data encryption cards, and
- Serial interface cards.

CIS Information

Card information structure (CIS) allows the host software to determine the type and capabilities of a particular PC card when inserted into a socket. The basic compatibility layer indicates manufacturer information, whether the card is a memory card or I/O device, and the card's type, size, organization (if it is a memory card), as well as power requirements. The data recording format layer (DRFL) defines the formatting of the card.

Memory cards may be formatted as a disk using partition structure or bit-addressable memory. The data organization group (DOG) specifies whether a file system, a memory image, or application-specific information resides on the card. A fourth layer in the Card Metaformat is the system-specific standard. Layer 4 defines the format for specific operating environments. Presently, only DOS-specific standards exist for this layer.

PCMCIA Memory Card

A PCMCIA SRAM card is a pseudo floppy memory card based on the existing ROMdisk technology. It is formatted as a block device similar to a normal floppy disk. It has a boot sector as the first logical sector, uses a file allocation table (FAT) and directory structure with a 512-byte sector size, and does not contain CIS information.

A memory card is constructed with static random access memory (SRAM) chips and a backup battery. It may be erased and reprogrammed as a data storage device.

Assembling an SRAM Card

CAUTION! If an SRAM card is stored for a long period of time, the battery may run down and data may be lost. Back up files and change the battery periodically to protect the stored data.

If using a new SRAM memory card, this card may need to be assembled. These cards use a small battery to maintain the data in the card's memory. Before the card may be used, the battery must be inserted. Refer to the instruction sheet packed with the SRAM card for instructions on battery installation.

Inserting and Removing a Memory Card

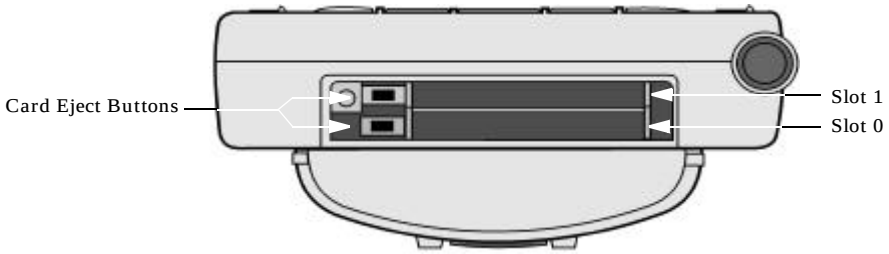
Prior to beginning, examine the memory card. The end with two rows of holes connects the card to the card drive. A notch on one side of the card and a slot on the other side allow the card to be inserted into the drive only the correct way.

CAUTION! Do not force a PC card into a card drive. Damage to both the card and the drive may result. If it does not go in easily, confirm proper insertion alignment and try again.

Follow these steps to remove a data card:

Step	Action
1	Make sure the PCMCIA drive is not in use.
2	Press the Eject button and the data card will pop free.
3	Grasp the card and pull it out of its slot.

Location of External PCMCIA Slots



SRAM Card Formatting Information

An SRAM data card can hold up to 4 MB of data. PTC PCMCIA drives accept memory cards ranging from 1 MB to 4 MB in size. If using a new memory card, it must be formatted prior to writing data to it.

To format a new SRAM card, perform the following:

1. Remove the REM statement from the config.sys file for lines:

   Device=C:\Windows\System\Csmapper.sys, and

   Device=C:\Windows\System\Carddrv.exe /slot=1.

2. Restart the PTC-2134/2234 to invoke the new config.sys settings.

   Note: *To properly format an SRAM card using the PTC-2134/2234, a 3rd party formatting utility will be required. Card Pro's* ***cpformat.exe*** *performs satisfactorily.*

3. From the DOS prompt, enter

   cpformat <drive letter>.

   Note: *The drive letter will vary depending on the system-generated drive letter assigned to the card.*

   Add the suffix ***\sys*** *to the* ***format*** *command if the disk is to be made bootable.*

4. Enter Yes when queried about data loss on the targeted drive.

5. Upon completion of the format, the format status for the drive will be displayed. The card will function as a typical file disk. Windows 95 functions may be used to copy or delete files and to write or read data to/from files on the card.

Note: *Uncommenting the* ***config.sys*** *lines may force Windows to run in the 16-bit mode rather than the 32-bit mode, resulting in slower system performance.*

Formatting an ATA Card

An ATA data card may be of solid state or rotating media type. The PTC-2134/2234 PCMCIA drives accept a wide variety of ATA storage cards. If using a new ATA card, it must be formatted prior to writing data to it. An ATA card may be formatted using either Windows or DOS.

Note: *Do not attempt to format a PCMCIA ATA card using the* ***cpformat.exe*** *command.*

To format from an ATA card using Windows, perform the following steps:

1. Locate the icon My Computer on the desktop.

   Note: ***"Touch"*** *means touch the screen using the stylus.*

2. Rapidly touch the icon My Computer twice. The icon's contents will be displayed.
3. Touch the drive to be formatted.
4. From the File menu, touch Format.
5. Answer the confirmation queries and touch OK.

   Note: *Choose* ***Copy system files*** *from the format menu options if the disk is to be made bootable.*

6. The format process will begin, and a summary will be provided upon its completion.

To format from an ATA card from the DOS prompt, perform the following steps:

1. At the C:\ prompt, enter

   format <drive letter>:.

   Note: *The drive letter will vary depending on the system-generated drive letter assigned to the card.*

   Note: *Add the suffix* ***\s*** *to the* ***format*** *command if the disk is to be made bootable.*

2. The format process will begin, and a summary will be provided upon its completion.

Once formatted, the card functions as a typical file disk. Windows 95 functions may be used to copy or delete files and to write or read data to/from files on the card.

Cradle Information

Cradle Overview

The Telxon PTC-2134/2234 Desktop/Vehicle Cradle is a specialized docking station designed for the PTC. The cradle provides the following services:

- Battery recharging connection,
- External keyboard connection,
- External Ethernet connection, and
- Three external serial port connection(s):
  - 2 DB-9 ports,
  - 1 DB-15 port.

The Desktop and Vehicle cradles are identical units. The PTC identifies the type of cradle type in which it is installed, on the basis of the cradle's power source. The cradle has two power jacks: a connector identical to the one on the bottom of the PTC and a second DIN type connector. When power is applied to the cradle's PTC-type power connector, the cradle is identified as a desktop cradle. When power is applied to the cradle's DIN connector, the cradle is identified as a Vehicle cradle.

Telxon's cradle driver allows users to take advantage of cradle services in two ways: (1) it detects cradle docking and undocking and automatically enables interfaces to the cradle connectors; and (2) it allows application developers to write cradle-aware applications which may make a more sophisticated use of cradle services.

PTC-2134/2234 Cradle Interaction

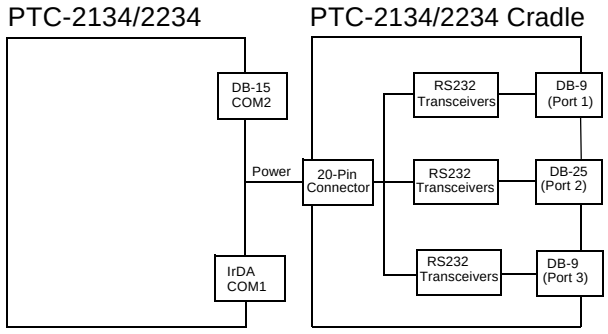
The PTC-2134/2234 has only one COM port available for use by peripherals. The PTC-2134/2234 uses an electrically controlled serial switch-box with a 9-wire interface to provide additional serial ports for this single COM port.

The PTC-2134/2234 provides IrDA on COM1 and wired serial on COM2. An infrared sensor on the PTC-2134/2234 provides the IrDA outlet. A DB-15 connector on the PTC-2134/2234 provides the serial outlet.

The following table summarizes the possibilities for a PTC-2134/2234. When out of the cradle, COM1 is available as IrDA and COM2 is available at the DB-15. When docked, COM1 is available as IrDA and COM2 is rerouted to one of the DB-9 serial connectors or the DB-25 serial connector on the cradle.

Cradle	COM1 Outlet	COM2 Outlet
Undocked	IrDA on PTC-2134/2234	DB-15 on PTC-2134/2234
Docked	IrDA on PTC-2134/2234	DB-9 or DB-25 on cradle

Block diagram of a PTC-2134/2234 plugged into a Cradle.



Cradle Serial Interface

The cradle serial interface is implemented using a communication chip and cradle electronics to create four multiplexed RS232 serial ports: one internal port and three external ports. Because the serial ports are multiplexed, only one port may be active at a time:

Serial Port 1	DB-9 Connector (male pins).
Serial Port 2	DB-25 Connector (male pins).
Serial Port 3	DB-9 Connector (male pins).
Control Port	No Connector, internal to unit.

The Vehicle/Desktop PTC-2134/2234 Cradle supports the communication chip interface to the PTC-2134/2234 unit via the Cradle Contacts.

The Communication Interface uses COM 2 (2F8 Hex) on the PTC-2134/2234 unit. This interface is specifically designed for use with the Telxon cradles and is provided by the communication chip. The Vehicle/Desktop PTC-2134/2234 Cradle uses a wired implementation of the interface.

The same COM 2 Port is used for both the Vehicle/Desktop PTC-2134/2234 Cradle's Serial Connectors and the serial port in the PTC-2134/2234 unit's DB-15 connector. Therefore, only one COM interface may be used. When the PTC-2134/2234 is placed in a cradle, the cradle's serial ports may be used if the unit's application program uses the cradle serial routines from the PTC-2134/2234 SDK (Refer to the PTC-2134/2234 SDK for software details).

The Optical Serial Signals use the cradle contacts on the PTC-2134/2234 unit as shown below:

Pin	Signals	Description
1	OTXD	Optical Transmit Data
2	ORXD	Optical Receive Data
3	OTXS#	Optical Transmit Status
4	ORXS#	Optical Receive Status

In the Optical Serial Interface, two lines are used for Receive and Transmit data and two lines are used for status lines. The two status lines (OTXS#, ORXS#) provide communication status information via Time-Division-Multiplexing. In this technique, the status information is embedded in the status data of each line.

The Status Word, like a normal Data Word, begins with a Start Bit and ends with a Stop Bit. However, the Status Word uses three Stop Bits to provide an easy identification of the end of the word.

The Status Lines operate at a 38.4 KBPS data rate, whereas the Data Lines operate at the rate programmed for the internal communication chip UART controlling the Serial Port. The Serial communication chip UART may be programmed to support the following standard communications functions:

- Data Rate 75 to 115.2 Kbps,
- Data Width 5, 6, 7, or 8 bits,
- Parity Even, Odd, None, and
- Stop Bits 1 or 2.

Internal Control Port

The internal Control Port is used to interface with application software within the PTC-2134/2234 unit. Using the Control Port signals, the application program can determine the cradle configuration being used.

The external power source is used by the cradle electronics to determine the cradle environment as described below:

- Desktop Cradle — external power is connected to the Power Jack Connector.
- Vehicle Cradle — external power is connected to the 3-Pin Power Connector.

The cradle loops back the following signals:

From		To	
Pin #	Signal Name	Pin #	Signal Name
7	RTS	8	CTS
7	RTS	1	CD
3	TX	2	RX
4	DTR	6	DSR
4	DTR	9	RI

See p. 56 for Loopback signal name definitions.

Loopback Signal names:

Signal Name	Description
RTS	Ready To Send
CTS	Clear To Send
CD	Clear Detect
TX	Transmit
RX	Received
DTR	Data Terminal Ready
DSR	Data Set Ready
RI	Ring Indicate

Note: *User-In and User-Out signals are not connected and are reserved for possible future implementation.*

DTR and RTS Latching

The Vehicle/Desktop PTC-2134/2234 Cradle provides DTR and RTS latching on inactive Serial Port 3 to prevent the connected device from dropping the communication link with the PTC-2134/2234. Prior to switching to another Serial Port, the cradle will latch the DTR and RTS lines at their current levels. For example, if the signal is currently high, the line will be latched high, or if the signal is currently low, the line will be latched low. This feature is particularly useful when connecting to devices such as WAN radios.

Ring Indicator

To allow the Ring Indicator (RI) signal to reach the PTC-2134/2234 unit from any serial port (active or not), the RI signals from all Serial Ports are logically Ored together. The RI signal may be used to wake the PTC-2134/2234 unit from Stand By or Suspend Modes.

DB-9 Serial Connector Pinout

The pin-out of the RS232 port DB-9 (male pins) connectors are as shown in the tables below:

Pin	Signal
1	CD
2	RXD
3	TXD
4	DTR
5	GND

Pin	Signal
6	DSR
7	RTS
8	CTS
9	RI

DB-25 Serial Connector Pinout

The pin-out of the RS232 port DB-25 (male pins) connector is shown below:

Pin	Signal
1	n/c
2	TXD
3	RXD
4	RTS
5	CTS
6	DSR
7	GND
8	CD
9	n/c

Pin	Signal
10	n/c
11	n/c
12	n/c
13	n/c
14	n/c
15	n/c
16	n/c
17	n/c
18	n/c

Pin	Signal
19	n/c
20	DTR
21	n/c
22	n/c
23	n/c
24	n/c
25	n/c

Ethernet Port

The 10 Mbps Ethernet Port is available via an RJ-45 connector. The Ethernet Port is located on the right side of the cradle and interfaces to the Cradle Contacts. The cradle RJ-45 port will be wired as DCE accepting a standard male LAN cable. The Ethernet RJ-45 connector pin-out is as follows:

PIN	SIGNAL
1	TXD+
2	TXD–
3	RXD+
4	NC

PIN	SIGNAL
5	NC
6	RXD–
7	NC
8	NC

Note: *The Ethernet Port is located on both the Desktop and Vehicle configurations, however, the port will typically only be used in a Desktop configuration.*

Keyboard Port

The Vehicle/Desktop PTC-2134/2234 Cradle supports an external PS/2 Keyboard Port which is located on the right side of the unit. The PS/2 Keyboard Port supports the following connector pinout:

Pin	SIGNAL	DESCRIPTION
1	KB_DATA	Keyboard Data
2	N/C	Not Connected
3	GND	Ground
4	5VSW	Keyboard Power (+ 5 VDC)
5	KB_CLOCK	Keyboard Clock
6	N/C	Not Connected

CAUTION! Permanent Keyboard damage may occur if the user connects or disconnects the keyboard from the cradle's keyboard connector while the unit is docked unless the unit is suspended first.

Driver Support

The PTC-2134/2234 provides support for Symbol drivers. Supported Symbol drivers are described in the following sections.

Video Driver

Video driver ASP8106, version 1.40, is a utility that allows the screen of the 2134/2234 to be displayed as a landscape or portrait. The driver control may be accessed via the Microsoft Control Panel.

From the control panel, select Display and then Settings. Choose either 640 x 480 pixels (landscape) or 480 x 640 pixels (portrait).

SRPON.EXE

Srpon.exe is a power control utility. When this command is entered, the power to the radio is turned on. There are no command line options for this utility.

SRPOFF.EXE

Srpoff.exe is a power control utility. When this command is entered, the power to the radio is turned off. There are no command line options for this utility.

Wide Area Radio Drivers

The PTC-2134/2234 supports non-PCMCIA type Wide Area Network (WAN) radios. These radios interface to the unit via COM4. The radios allow the unit to access various networks, such as DataTac or Mobitex.

As mentioned in the section labeled "PTC-2134/2234 Unit Configurations" on p. 6, units installed with these non-PCMCIA type WAN radios will require additional space inside of the unit. The PTC-2134/2234 is, therefore, equipped with a deeper backshell to accommodate the larger form factor radio on units having these radio types.

Before the non-PCMCIA type radio may be used, the PTC-2134/2234 must be configured to control the radio's power.

Discussions of this function may be found on p. 58.

3500 Radio Drivers

The driver disk shipped with the 3500 radio contains the following files:

File Name	Description
README.TXT	Contains latest information about the disk contents.
DIAG	Directory containing utilities.
FLSH3545.COM	PC card flash firmware.
35C???.BIN	Latest firmware release.
NDIS3	Directory containing NDIS3 driver files.
PC3500.INF	Windows 95 install file.
PC3500.SYS	NDIS3 driver.
PC3500.DLL	NDIS3 library.
VXD3500.VXD	Virtual device driver for Aironet WinDGS utility.
OEMSETUP.INF	Win NT install file.

4500 Radio Drivers

The driver disk shipped with the 4500 radio contains the following files:

File Name	Description
README.TXT	Contains latest information about the disk contents.
DIAG	Directory containing utilities.
FLSH3545.COM	PC card flash firmware.
45C???.BIN	Latest firmware release.
NDIS3 (PC4500)	Directory containing NDIS3 driver files.
PC4500.INF	Win95/98 install file.
PC4500.SYS	NDIS3 driver.
PC4500.DLL	NDIS3 library.
VXD4500.VXD	Virtual device driver for Aironet WinDGS utility.
OEMSETUP.INF	Win NT install file.

MS Windows 95 IrDA Communications Driver 2.0

IrDA support enables Windows 95 users to use infrared energy to connect to peripheral devices or other Windows 95-based PCs without using cables. This driver set provides an Infrared-equipped laptop or desktop computer with the capability of networking, transferring files, and printing wirelessly with other IrDA-compatible Infrared devices.

IrDA 2.0 includes a new feature called “IrLan Access Point Mode” that enables a computer with an IrDA adapter to attach to a local area network (LAN) through an access point device that acts as the network adapter for the computer.

CS8920 Ethernet Adapter

The CS8920 Ethernet Adapter is built into the PTC-2134/2234. For the adapter to function properly, the PTC must be docked into the PTC-2134/2234 Desktop/Vehicle Cradle. A standard Ethernet cable must be connected to the Network connector on the side of the cradle.

Configurable Parameters

Below is a description of the configurable parameters for the Crystal LAN(tm) Ethernet Adapter.

These parameters may be found by

1. Select Control Panel ⇒ Network.
2. Click on Crystal LAN(tm) CS8920 Ethernet Adapter.
3. Click on Properties.
4. Click on the Advanced tab.

Serial Number

The 8-digit, factory- assigned serial number for the Ethernet Adapter may be changed when multiple Crystal LAN™ Ethernet Adapters are installed. Specifying a serial number allows the device driver to locate and bind with a specific adapter. The serial number parameter is optional.

Note: *Entering an incorrect serial number will prevent the Ethernet Adapter from functioning. Use the adapter setup utility provided with the adapter to determine its serial number.*

Network Address

The NetworkAddress parameter may be used to override the Ethernet Adapter's universally administered (i.e., permanent) network address. When overriding the universally administered network address, specify a 12-digit hexadecimal address that is unique for your LAN.

Duplex Mode

The Duplex Mode parameter determines whether the Ethernet Adapter will operate in full or half duplex. If Auto-Negotiate is selected, the Crystal LAN(tm) Ethernet Adapter will automatically determine the correct duplex mode when the device driver loads. If Half Duplex or Full Duplex is selected, the auto negotiation feature will be disabled and the Crystal LAN(tm) Ethernet Adapter will operate in the specified duplex mode. Before selecting Half or Full Duplex, check with your network administrator to determine the correct duplex mode for your LAN.

DCD Magnetic Stripe Reader

This section describes the DCD Magnetic Stripe Reader. The driver is a Data Collection Device (DCD) driver intended for use with magnetic stripe readers connected to Telxon's T130 custom chip.

System Requirements

- System must be a 2134/2234 running Windows 95.
- Dcdapi32.dll version 1.2 or better must be installed.
- The tlxt130.vxd driver must be loaded in the [386enh] section of the Windows system.ini file.
- Files msrt130.dll and msrt130.vxd must be in the C:\windows\system directory.
- Msrt130.reg must be in the registry (accomplished by double clicking on the file from the explorer).

Magnetic Stripe Reader Operation

The magnetic stripe medium supports four tracks of data. Data are stored on these tracks using a number of encoding algorithms, each of which has a number of distinguishing characteristics, including

- Which track or tracks are expected to contain valid data,
- Type of checksum (CRC, LRC, or none),
- What set of characters may be stored on the track (numeric, alphanumeric, or binary), and
- Compression mechanism.

The MSR driver may be configured to recognize zero or more decode algorithms, and to auto-discriminate which decode algorithm appears to work best on the data that has been read by the magnetic stripe hardware.

The MSR driver may return several kinds of data, including

- Raw (undecoded) data from each of the four tracks,
- Decoded data from each of the four tracks, determined by which decode algorithm seems to produce the best results from the raw data,
- An indicator of which decode algorithm best matched the data (if any),
- A status value indicating the decode status of each track, and
- A DCD “primary field” which is a concatenation of one or more successfully decoded tracks.

Not all data fields are necessarily present in the data provided by the driver. These data fields are described in more detail in the Data Field Description table below:

Field Name	Field Type	Field Description
Track Status	DCD_WORD	Bitmask describing the decode status of each track (more details provided below).
Decode Type	DCD_WORD	Integer describing which decode algorithm best matched the raw MSR data. This value will be 0 if no decode was successful (more details provided below).
Raw Track 1	DCD_BINARY	Raw (undecoded) data from Track 1.
Raw Track 2	DCD_BINARY	Raw (undecoded) data from Track 2.
Raw Track 3	DCD_BINARY	Raw (undecoded) data from Track 3.
Raw Track 4	DCD_BINARY	Raw (undecoded) data from Track 4.
Track 1	DCD_BINARY	Decoded data from Track 1, using the algorithm indicated in Decode Type. If no decode was successful, this field will be zero length.
Track 2	DCD_BINARY	Decoded data from Track 2, using the algorithm indicated in Decode Type. If no decode was successful, this field will be zero length.
Track 3	DCD_BINARY	Decoded data from Track 3, using the algorithm indicated in Decode Type. If no decode was successful, this field will be zero length.
Track 4	DCD_BINARY	Decoded data from Track 4, using the algorithm indicated in Decode Type. If no decode was successful, this field will be zero length.

Field Name	Field Type	Field Description
Magstripe Text	DCD_SZ	This field is synthesized from the Track 1, Track 2, Track 3, and/or Track 4 data as configured by the user. Note that all configured tracks must decode successfully for this field to be created. In addition, all track data, including fill characters in fixed-length decodes, must be printable ASCII data.

During normal operation, the driver is configured to apply at least one decode algorithm and to provide a DCD primary field. When a card is passed through the reader, the MSR VxD receives an interrupt. It copies the data from a buffer internal to the T130 and passes it to the ring 3 MSR DLL loaded by the DCD application the currently owns the active device. The MSR DLL attempts to decode the raw data using each of the configured decode algorithm and then determines which algorithm was the best match (if any). The best match is the one that has the most tracks of decoded and checksummed data. These data are used to synthesize a DCD primary field. Finally, a data event containing the raw, decoded, and synthesized data is generated and passed to DCDAPI32, which notifies the application that data has arrived.

Table 4. Glossary

Term	Definition
API	Application Programming Interface
ASIC	Application-specific Integrated Circuit
DCD	Data Collection Device
Magstripe	Magnetic Stripe
Msb	Most significant bit
MSB	Most significant byte
MSR	Magnetic Stripe Reader

DCDWedge

The Symbol DCDWedge program selectively converts input data read from a data collection (DC) device into keyboard input data usable by virtually any Windows 95 application. The DCDWedge utility provides freedom from writing custom applications for Symbol DC devices such as bar-code scanners and magnetic-stripe readers. It also provides Telxon DC device access to off-the-shelf Windows software.

This chapter describes

- enhancements to DCDWedge,
- loading the program,
- the Property Sheet, and
- configuration storage.

DCDWedge Features

The following is a summary of DCDWedge Features.

Registry Usage

DCDWedge uses the HKEY_LOCAL_MACHINE\Software\Symbol\DcdWedge path to store its configuration information (in compliance with MS Windows software development guidelines).

Win32 Compatibility

DCDWedge was designed and written for Win32 using C++ and the Microsoft Foundation Classes. All functions used are compatible with x86 versions of Windows 95 and Windows NT, with a large majority compatible with the entire Win32 platform set. Special care was taken to ensure easier international support if required.

Taskbar Icon Usage

With one minor exception, DCDWedge follows Microsoft's guidelines for taskbar icons. As per MS guidelines, a right click on the DCDWedge icon presents the Context Menu (note that the right-button icon program, RBTNICON, is needed to use DCDWedge). However, DCDWedge uses a single left click, rather than a double left click, to activate its primary function (which is wedge mode). This feature simplifies pen operation.

Audible Alerts (Activation, Good Scan, etc.)

DCDWedge provides sound capabilities. The system has a digital sound interface. Default internal or custom external wave files may be used for activation, shutdown, and data event sounds.

Device Error Reporting

DCDWedge uses English to report errors, including those from the DC device. Detected critical errors result in a controlled shutdown of DCDWedge. Non-critical errors are reported along with appropriate corrective measures where possible.

Intermixed Keystroke and DC Field Method

This design allows for multiple fields of information to be derived from DC device data. For example, an application may now obtain, via keyboard input, a bar code's type, length and scan direction, as well as its label.

DCDWedge Installation and Loading Procedure

To install the DCWEDGE program, see the “Symbol Setup Wizard” on p. 84..

Once installed on the system, DCDWedge is loaded by running the dcdwedge.exe program. During normal operation, DCDWedge does not display a window as do most MS Windows programs. Instead, DCDWedge creates a small icon on the Windows 95 taskbar. This icon appears in the Task Bar located in the lower right corner of the Windows desktop.

The DCDWedge icon is used to enable and disable DCDWedge and to access the DCDWedge Context Menu. From the Context Menu, the DCDWedge Properties window may be displayed or the DCDWedge program may be closed. The DCDWedge Context Menu is displayed by right-clicking on the DCDWedge icon, which may be found in the Task Bar in the lower right side of the screen. The Properties window provides access to the Property Sheet.

Dcdwedge.exe may be run without command line arguments. However, it may be useful to access a Windows shortcut that specifies the name of a previously saved configuration in the command line so that DCDWedge will automatically load the configuration when it starts up. DCDWedge creates this shortcut and places it on the Windows desktop.

The shortcut may be selected from the desktop or placed in another folder (including the Startup folder). DCDWedge will load when booting the system).

DCDWedge Properties Sheet

After the DCDWedge icon is right-clicked and the Properties option is selected, the program will display the DCDWedge Property Sheet, which is used to configure the various options DCDWedge provides. From the Property Sheet, the available choices are

- the DC device to be used,
- the data to be sent from the device to the keyboard, and
- the DCDWedge operation mode.

The Property Sheet presents these options in a multi-page format and provides tabs that allow for the selection of Property Pages. As is typical for Windows 95 programs, the OK button saves the selections and the Cancel button resets them to their previous settings. The Help button provides an explanation of each setting and any choices it provides. Finally, the Config Menu allows for a group of settings to be saved under a user-defined name and to open and delete saved configurations.

The following sections will describe the DCDWedge Properties Sheet and its associated tabs:

- Device,
- Activation/Shutoff,
- Data Format, and
- Miscellaneous.

Properties Sheet

Device Page

The Device Page is accessed by clicking on the device tab. This page displays the name and version of the DC device currently in use, if any, along with a description of the device's current configuration. This description comes from the device itself and varies depending on the device and its configuration.

Select New Device

This button displays a list of DC devices installed on the system and allows the selection of the active device for the current configuration. If there is no active device, the display fields in the Device Page will be blank, and most of the options on the other Property Pages will be disabled.

> ***Note:*** *Because data formatting is based on device-specific data fields, selecting a new device for a configuration that already contains an active device will result in the loss of data formatting defined for the old device.*

Data Settings

This button displays the currently active DC device's own Data Settings window. This window, whose appearance depends on the active DC device, is typically used to select the types of data that will be read with the DC device and how the DC device driver is to interpret the data. DCDWedge saves these settings whenever it saves the DCDWedge configuration and automatically reconfigures the device whenever that DCDWedge configuration is opened.

Note: *The DC device Data Settings window is not used for defining which input data are translated into keystroke data. This function is performed on the DCDWedge Data Format Property Page.*

Hardware Settings

This button displays the currently active DC device's own Hardware Configuration window, which is typically used to set the device's hardware configuration. This window's content, as with the content of the Data Settings window, depends solely upon the active DC device. Unlike the Data Settings window, however, the Hardware Configuration window does not save this information with a DCDWedge configuration. Instead, it is saved by the DC device driver and affects all applications using the device.

Note: *It is not typically necessary to change a device's hardware configuration to allow different applications to use the device.*

Activation/Shutoff Page

The Activation/Shutoff Page is accessed by clicking on the Activation/Shutoff tab. The Activation/Shutoff Page provides access to DCDWedge settings that affect when and how DCDWedge becomes active or inactive. The information on this page is saved with a DCDWedge configuration.

Activation Setup Features

- Activate on Left Mouse Button Click

  If this box is checked, DCDWedge may be activated by left clicking on the DCDWedge icon in the Windows 95 taskbar. Similarly, it may be deactivated by left clicking on the icon a second time.

- Activate on User-Defined Hot Key

  If this box is checked, Windows 95 will try to use the Hot Key specified in the Hot Key edit window to activate DCDWedge or to deactivate it if it is already active. If other utilities running on the system are already using the specified hot key, DCDWedge will prompt the user to choose a different hot-key combination.

- Activate On Startup

  If this box is checked, DCDWedge will activate immediately upon start-up.

Activation Sound Setup

- Default Activation Sound

  Select this button to have DCDWedge play the default activation sound whenever it is activated. The default sound will play through an installed sound card if one is available; otherwise, the PC speaker will be used.

- Silent Activation

  Select this button to prevent sounds from being played when DCDWedge is activated.

- Play Wave File

  Select this button to specify a custom external wave file that DCDWedge will play whenever it is activated.

Shutoff Setup

- Turn Device Off After Each Input

  If this box is checked, DCDWedge automatically deactivates after each DC device input event. This is useful if the DC device is used infrequently for data input, especially for battery-powered devices that draw more power when active.

- Timeout If Inactive

  If this box is checked, DCDWedge automatically deactivates after a specified time period if no input activity occurs from the DC device. As with the previous setting, this is useful for preserving battery power. Once this box is checked, use the slider control to select the desired timeout period.

Shutoff Sound Setup

- Default Shutoff Sound

  Select this button to have DCDWedge play the default shutoff sound whenever it is deactivated. The default sound will play through an installed sound card if one is available; otherwise, the PC speaker will be used.

- Silent Shutoff

  Select this button to prevent sounds from being played when DCDWedge is deactivated.

- Play Wave File

  Select this button to specify a custom external wave file that DCDWedge will play whenever it is deactivated.

Data Format Page

The Data Format Page is accessed by clicking on the Data Format tab. The Data Format Page is used to define which DC device data will be transmitted as keyboard input (along with any additional keystrokes that may be desired). Defining a simulated key sequence requires creating a list of DC device data fields and keystroke combinations in the order in which they are to be sent to the keyboard input stream.

Simulated Key Sequence

This box lists the entries currently defined in the simulated key sequence. The highlighted item in the list is used as the insertion point for new entries and is the entry that is deleted if the Delete Highlighted Item button is pressed. As new entries are added to the list, existing entries below the insertion point are "pushed down" to create space.

Keystrokes are shown enclosed within angle brackets (< >).

An entry may consist of one or more keystrokes. When multiple keystrokes are defined in an entry, they are bound so that a single keystroke cannot be removed from a multiple keystroke entry.

Device Data Fields

This box shows the available data fields for the active DC device. These data fields represent the information provided by the device as input data that may be translated into the keyboard input stream.

> ***Note:*** *Some devices may have additional binary format fields that cannot be translated into keyboard input. These fields are not listed.*

DC device data fields are indicated by the field name as displayed in the first column of the Device Data Fields list. One or more of these data fields may be added to the Simulated Key Sequence list and interspersed with additional keystroke entries as needed by the application software. A data field may be repeated within the simulated key sequence if required.

The first column in the Device Data Fields box lists the field's name along with a small icon that indicates whether the field represents alphanumeric or numeric data. The second column provides a description of the field's contents.

Delete Highlighted Item

Pressing this button removes the highlighted item in the Simulated Key Sequence box.

Insert Field

Pressing this button inserts the currently selected field in the Device Data Fields box into the Simulated Key Sequence box at the highlighted insertion point.

Insert Keys

Pressing this button displays an on-screen keyboard that allows for the entry of keystrokes in the simulated key sequence as a single entry. Each keystroke entry may contain one or more keystrokes.

All keystrokes entered become part of the same simulated key sequence entry and cannot be removed individually. However, it is possible to create as many separate keystroke entries (interspersed with Device Data Field entries) as required.

Miscellaneous Page

The Miscellaneous Page is accessed by clicking on the Miscellaneous tab. The Miscellaneous Page displays the remaining DCDWedge configuration options and includes features that fall outside of the scope of a specific configuration. Of note here is the Create Configuration Shortcut button, which creates a shortcut icon on the desktop to run DCDWedge and load the current configuration.

Data Event Sound Setup

- Default Event Sound

  Select this button to have DCDWedge play the default event sound whenever it receives input data events from the DC device. The default sound will play through an installed sound card if one is available; otherwise, the PC speaker will be used.

- No Event Sound

  Select this button to prevent sound from being played when DCDWedge receives input data events from the DC device.

- Play Wave File

  Select this button to specify a custom external wave file that DCDWedge will play whenever it receives input data events from the DC device.

Taskbar Appearance

Through the Taskbar Appearance options, the user may determine which icon DCDWedge displays in the Windows 95 taskbar for this configuration.

- Show as DCDWedge Icon

  If this button is selected, the default DCDWedge icon appears in the Windows 95 taskbar.

- Show as Current Device Icon

  If this button is selected, the configuration's active device selects the icon that appears in the Windows 95 taskbar.

- Create Configuration Shortcut

  Pressing this button creates a shortcut icon on the Windows 95 desktop that will run DCDWedge and load the current configuration automatically. The configuration is identified by name, so the Config menu must be used to save the current configuration before this button is enabled. The created icon contains the default DCDWedge icon. It points to the instance of dcdwedge.exe that is currently running as its target and includes the configuration name as a command line argument for DCDWedge. The icon may be moved to any other folder or change the shortcut's properties as desired.

Wedge Startup Options

These options are not stored as part of the current configuration.

- Default to most recent configuration

  If this box is checked, the configuration settings from the previous session will be loaded whenever DCDWedge is loaded without a configuration name specified on the command line. The program will not actually load a named configuration but will restore the settings without a configuration name.

- Open Properties if no configuration provided

  If this button is checked, DCDWedge automatically displays its Property Sheet if

  - no saved configuration is specified on the command line and the most recent configuration option is disabled, or
  - the most recent configuration cannot be loaded.

DCDWedge Configuration Storage

DCDWedge stores named configurations in the Windows 95 system registry database rather than in external files. The location for this storage within the registry is

HKEY_LOCAL_MACHINE\Software\Symbol\DCD\Devices\SymbolIntegratedScanner\ConfigName

Where:

ConfigName is replaced with the actual name provided when the configuration is saved.

The DCDWedge registry information should not be changed manually, as unexpected behavior and failure of the DCDWedge program may occur. However, this information is provided in case there is a requirement to copy a DCDWedge configuration to many systems. By using the Windows 95 REGEDIT program or a similar utility, a registry import file may be created at this path and installed on other machines from the Windows 95 Explorer or from within REGEDIT.

Symbol Setup Wizard

Setup Wizard Overview

The Symbol Setup Wizard (TWIZARD) provides a Windows 95 GUI-based setup utility to install additional software components onto the PTC-2134/2234 base image.

TWIZARD may be found on the PTC-2134/2234 Windows 95 Installation/Drivers CD.

Currently, TWIZARD supports the installation of the software components listed on p. 88.

Running TWIZARD on the PTC-2134/2234

Because the PTC-2134/2234 does not have an integrated CD-ROM to run the TWIZARD utility directly from the CD, different methods of running the utility must be used.

Suggested methods are

- Attach a PCMCIA interface CD-ROM drive to the PTC and run TWIZARD directly from the CD.
- Copy the contents of the SETUPWIZARD directory from the CD to a 175-MB or larger ATA card. Insert the ATA card into the PTC and run TWIZARD from the ATA card.
- If the PTC-2134/2234 has the proper hardware and drivers installed, map a drive to a PC on the network with a shared CD-ROM drive using Microsoft networking.

Once the unit has access to the SETUPWIZARD directory, run twizard.exe to start the utility.

User Interface

The Symbol Setup Wizard produces a Welcome start-up sheet when started.

This display is followed by a list of software components that may be installed. Only one component may be installed at a time (to allow Windows to properly allocate resources and setup the registry).

The software list includes

- IrDAInfrared Drivers,
- Ethernet Drivers,
- LM3500 Radio Drivers,
- LM4500 Radio Drivers,
- TCP/IP Protocol Stack,
- Wand Driver, and
- DCWEDGE.

Select the software component to be installed and press Next.

After selecting the desired software component to be installed, the property sheet is presented. At this point, the user may press Back to return to the Install Selection Property Sheet to change the selection, Finish to complete the installation, or Cancel to abort the installation.

In cases in which the software installation requires user input for the Microsoft Add New Hardware Wizard, the Symbol Setup Wizard presents a dialog box to guide the user through the installation process. This dialog box remains open while the installation proceeds, allowing the user to toggle between the instructions and the Microsoft Add New Hardware prompts.

Special Processing for IrDA Installation

Installation of the IrDA software on the PTC-2134/2234 requires special processing, because it must be installed in three steps, and the order of the steps is important. It is also important that the user allow all three steps to complete before rebooting the computer.

To accommodate this, the Symbol Setup Wizard provides special processing and presents the user with a message box that must be acknowledged between each step.

When queried for the manufacturer and model of the hardware, choose Standard Infrared Devices for Manufacturer, and Built-in Infrared port on laptop or desktop for model.

When queried for the port to which the infrared device is physically connected to, choose Communications Port (COM1).

When queried for the windows-supported simulated ports, choose the Use Default Ports option.

Assumptions

To function properly, the Symbol Setup Wizard has to make some assumptions about where it resides on the recovery CD, as well as where the optional software components reside. This may be modified if necessary in the future. For the initial release, the Symbol Setup Wizard assumes that the following files reside within the same folder:

- twizard.exe,
- setupapi.dll,
- cfgmgr32.dll, and
- install.inf.

The OSR2.5 cabinets and the software components to be installed reside in subdirectories under the folder in which TWIZARD resides as follows:

- OSR25 (contains the .cab files for Windows 95),
- IRDA (contains irxfer.exe, serial.vxd, and msir20),
- ETHERNET (contains CS8920a software),
- RADIO (contains two subdirectories, LM3500 and LM4500),
- TCPIP (contains readme.txt),
- WAND (contains software and install.txt).

Installing Other Devices or Drivers Requiring Windows 95 Installation Disks

The Windows 95 installation software (.cab files) is not stored on the PTC-2134/2234 unit. Instead, it is stored on the PTC-2134/2234 Windows 95 Installation/ Drivers CD (PCN 200057/PN 24270-000-01).

Because the PTC-2134/2234 does not have an intergrated CD-ROM to access the .cab files, other methods of accessing the files must be used.

Listed below are several possible methods for accomplishing the file transfer:

- Install a PCMCIA interface CD-ROM into the unit and access the .cab files directly from the CD.
- Copy the contents of the \setupwizard\osr25 directory from the CD to a 175-MB (or larger) ATA card. Insert the card into the PTC-2134/2234 and access the files.
- If the PTC-2134/2234 has the proper hardware and drivers installed, map the CD from a PC on the network to the PTC-2134/2234 using Microsoft networking.

User Button Software

The Symbol User Button software provides enhancements to the Windows 95 operating system for launching a user-specified application. The User Button software also:

- Allows the Rt Mouse button on the unit's face to toggle between two functions.
- Allows the Rt Mouse button on the unit's face to invoke a user-defined application.
- Provides an icon on the Windows desktop which will invoke the user-defined application that is linked to the Rt Mouse button.
- Handles the emulation of the Rt Mouse button for the PTC-2134/2234 pen-based units.

The programs that implement the user button software and the Rt Mouse button work closely with the Symbol custom virtual pen driver (vpendc.vxd), which provides touch screen functionality on the PTC-2134/2234 series of handheld computers.

Right Mouse Button

The right mouse button support is implemented by enhancing Symbol's User Button Software so that it provides support for the right mouse emulation as well as for the user-defined function. The user is given a means of switching between Act as User Button and Act as Right Mouse. This is accomplished through a property sheet page that is available from the Control Panel.

To switch the button's function, the user invokes the Mouse control panel applet (Start ⇒ Settings ⇒ Control Panel ⇒Mouse). The Rt Mouse property sheet provides radio buttons for switching the button's function.

The following Rt Mouse button features are supported:

- By default, the Rt Mouse push button functions as a right mouse button.
- The user may switch between Act as Right Mouse and Act as User Button while the system is running (effective immediately, without rebooting).
- When used as a right mouse button, the small Right Mouse icon in the system tray provides visual and audio feedback to the user that the button was pressed.
- When Act as Right Mouse is selected, the user may still access the user-defined function using a shortcut on the desktop (essentially providing both features at once).

The VAR may easily change the default for the user button operation by modifying the following registry entry:

HKLM\SOFTWARE\Telxon\User Button\Rtmouse\RtmouseOption.

When this entry is set to 0 (the default), the user button will simulate a right mouse button click when pressed. This would be equivalent to selecting the Act as Right Mouse option from the mouse control panel applet. When this entry is set to 1, the user button will launch the user-defined application instead of emulating a right mouse button click.

User Button Software Function

The user button software provides support for specifying an application to be launched by the user. To define the application to be launched by the user button, perform the following:

From the Control Panel (Start ⇒ Settings ⇒ Control Panel), open the user button control panel applet and select which application is to be launched when the user button is pressed.

Required Software Components

There are several software components that provide the User Button and Right Mouse button support:

- Tlxurbtn.cpl — the control panel applet that allows the user to specify which application will be launched.
- Userinit.exe — an application that handles initialization functions and coordinates with the Virtual Pen Driver (vpendc.vxd).
- Tshell.dll — implements a library of functions supporting the user button software.
- Userbtn.vxd — implements system-level support for monitoring the press/release state of the physical push button.
- Rtmcplx.cpl — a control panel extension that adds the Right Mouse button tab to the Mouse control panel applet provided by Microsoft.

PEN Calibration Utility

This section describes Symbol's pen calibration utility and provides a functional description of the utility.

What is a Pen Calibration Utility?

To understand Symbol's pen calibration utility, it is necessary to understand Symbol's digitizer drivers. This section gives a brief overview of how the digitizer, the digitizer driver, and PENCAL work together.

The digitizer (or touchscreen) generates interrupts when the screen is touched using a stylus. The data provided by the digitizer is in a very raw format, consisting of X and Y coordinates in "digitizer units." These digitizer units do not correspond to pixels in any way; the digitizer simply converts analog X and Y voltages from the touchscreen into a digital value and generates an interrupt to the digitizer driver.

The digitizer driver reads the stylus position in digitizer units and makes it available to applications as "mouse" input. The digitizer driver is sometimes called the pen driver or mouse driver. The main roles of the digitizer driver are to

- emulate the DOS interrupt 33h mouse programming interface, and
- convert digitizer unit coordinates to mouse coordinates.

The conversion from digitizer units to mouse units is fairly simple once the digitizer driver is properly calibrated. The digitizer driver monitors the current video mode of the PTC-2134/2234, giving it the range of valid X and Y coordinates in mouse units. For example, video mode 18 is 640 x 480 pixels in the X and Y dimensions and has 16 colors. The digitizer simply has to convert digitizer units into a 640 x 480 range for each digitizer interrupt.

The calibration utility is the tool that configures the digitizer driver with the minimum and maximum X and Y digitizer unit coordinates for each video mode. It does this by displaying a configuration screen with four successive crosshairs and asking you to tap each one in sequence.

For each pen tap, the calibration utility obtains the digitizer coordinates of the crosshair. Because it knows the pixel coordinates of the crosshair, it will calculate the formula needed to convert between the two.

Why Use Symbol's Pen Calibration Utility?

Symbol's Pen Calibration Utility is useful because not all digitizers use the same mapping scheme between digitizer units and mouse units. Several possible reasons exist for this, including the following:

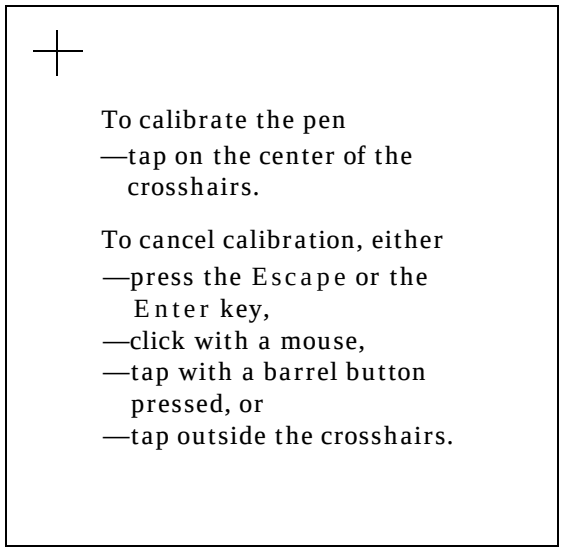
- Not all touchscreens have the same electrical characteristics. As a result, two touchscreens may report different digitizer coordinates for the same physical location on the display.
- During manufacture, the display may not be identically seated on two similar units.

Using the Pen Calibration Utility

To run the calibration utility, using the stylus, start from the desktop and open the following files:

My Computer ⇒ Control Panel ⇒ Pen.

Once in the Pen Properties screen, select the General tab and touch the Align Now button. The following screen will be displayed:



With each touch, the crosshair disappears and the next successive crosshair appears. There are four crosshair points used during calibration.

Upon completion, touch OK and Exit.

Known Issues

The following events are known PTC-2134/2234 issues. The outcome produced by the listed events is to be expected.

Booting Anomaly

When the F8 key is pressed during bootup, which is the correct choice to bring up the Win95 Startup Menu, and the Previous version of MS-DOS option is selected, the unit will boot to MS-DOS 6.22 successfully.

However, when the unit is rebooted, it will fail to boot from the C: drive. The device will reach the BIOS device configuration summary screen and remain there indefinitely.

The fix program may be found at:

www.tu-chemnitz.de/~jwes/win95boot.html.

To recreate the anomaly

1. Start the unit and press F8 to call up the Win95 Startup Menu during system initialization.
2. Select option no. 8 — Previous version of MS-DOS.
3. Allow the unit to boot into DOS, then restart the unit.
4. The unit will display the device summary screen from BIOS and remain there.

To fix the anomaly

1. Download the fix program from the web site listed above.
2. Put the fix program on a bootable SRAM card.
3. Reboot the unit from the SRAM card and run the fix program.
4. Remove the SRAM card and reboot the unit. It will boot successfully from the C: drive.

APM-Standby Anomaly

When Windows detects new hardware (i.e., radio card) upon bootup, it will display the Found New Hardware window. If the unit is left uninterrupted without continuing with the new hardware driver installation process, it will not go into the Auto-Standby mode.

However, once the Cancel button is pressed to cancel the new hardware installation, the unit will not exit the Standby mode. With each tap of the screen, to exit the Standby mode, the system momentarily acknowledges the operator's attempt to exit the Standby mode, but immediately returns to the Standby mode.

To exit the Stanby mode, the device must be restarted. Then the Found New Hardware event will repeat and must be processed or the new hardware device must be removed to return to the normal operating status.

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