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PTC-2124

Windows CE 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 Symbol PTC-2124 product line that uses the Microsoft® Windows CE® Operating System. Every effort has been made to provide accurate and concise information to you, our customer.

The *PTC-2124 Windows CE Guide* provides information that allows the user to set up and use the PTC-2124. This manual is meant to provide information on the various components of this product, including

- General regulations,
- Overview of the PTC-2124,
- Maintenance and troubleshooting,
- Available accessories.

This manual, however, does not provide instructions on how to perform the tasks specific to your job within your organization. For job-specific information, refer to the instructions provided by your organization.

Contacting Symbol's Support Center

Symbol's Support Center may be contacted to obtain help in resolving any PTC-2124 system problem that you may experience.

If you have a problem running your unit or using your equipment, contact your facility's technical or system support. If there is a problem with the equipment, the system support will contact the Symbol Support Center at 1-800-653-5350.

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

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PTC-2124 Overview

The PTC-2124 is a rugged AMD™ SC400 processor-powered, pen-based Portable Tele-transaction Computer (PTC). It couples standard PC technology with Symbol's expertise in data collection and radio technology to provide a flexible, high-performance portable system.

This section of the manual provides a basic overview of the PTC-2124's software environment, including brief discussions of the following:

- the boot loader,
- the operating system and applications,
- the software kernel,
- power management,
- software development kits (SDKs), and
- unit configurations.

Boot Loader

The boot loader is a piece of software that replaces the BIOS of a DOS-based system. The boot loader's primary functions are to load a Windows CE™ image into the RAM of a target unit and then boot the unit in the Windows CE Operating system.

The Boot Loader module resides in XIP FLASH memory in the upper 64 KB where the SC400's power on/hard reset vector exists. It is the first code executed when the device is turned on from a complete power down state.

The module first performs setup of the SC400 DRAM controller. The Symbol device has 4 MB of DRAM in Bank 0 and 16 MB (or 32 MB, or 64 MB) of expansion DRAM in Bank 1. Bank 0 is disabled with the 64 MB expansion. After setup of the DRAM controller, the module sets up the stack and then copies itself into RAM, executing out of RAM to allow for faster execution.

Once in RAM, the Boot Loader module initializes the debug serial port (19200, 8, N, 1) and attempts to load the CE registry and CE image from the Compact Flash memory card into RAM. After successfully loading to RAM, the Windows CE operating system is launched.

Operating System

Windows CE is a real time operating system that was developed specifically for use in embedded devices. In an effort to meet the portability and modularity needs of the embedded market, Windows CE was designed to be highly componentized and configurable. While Microsoft™ supplies much of the components for a Windows CE system, some components come from other sources, such as Independent Software Vendors (ISV) and Original Equipment Manufacturers (OEM). The sections below describe the interaction of these component sources.

> ***Note:*** *This guide was written to reflect Windows CE version2.12.*

Functional Overview

The following table illustrates the Windows CE software architecture, consisting of five major software levels sitting above the hardware:

- Applications,
- Shell,
- Core System API,
- Kernel,
- OEM Adaptation Layer (OAL),
- Hardware.

Architecture Level	Source
Applications	ISV
Shell	Microsoft
Core System API	Microsoft
Kernel	Microsoft
OAL	OEM (Symbol)
Hardware	OEM (Symbol)

Applications

The application is the highest software layer and provides controlling software programs for the unit. These are provided by Independent Software Vendors.

Shell

The shell is the outer layer of the operating system that allows users and application programs to interact effectively with the core operating system. Microsoft provides shell components that allow developers to build a customized shell to meet their needs. The shell used on the Symbol SC400-based devices is the standard Microsoft shell.

Core System API

The Core System API provides a mechanism through which applications can access the operating system. This includes a mechanism to transfer API calls to the GWES module and supports functions such as local heap and memory allocation.

Kernel

The software kernel is the central component that implements the core functionality of Windows CE. The software kernel is a simple program loader that is used to reprogram the PTC-2124 Flash PROM memory areas.

OEM Adaptation Layer (OAL)

The OEM Adaptation Layer serves as the interface between the software kernel and the hardware. It does this through a set of routines that provide functionality such as platform initialization, interrupt service routines, profiling, interval timer debugging, real-time clock, interrupt enable/disable, etc.

Other Software Components

Power Management

Power management is a necessity for battery-operated devices such as the PTC-2124. 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.

Software Development Kits

Symbol provides application development tools in the form of Software Development Kits (SDKs) to help developers design application programs for the SC400 product family. The SDK is a collection of run-time libraries and DLLs that assist in the development of C and C++ programs for the PTC-2124. The Windows CE Toolkit (for Maxall builds) can be used to develop software if no PTC-2124 or Symbol specific functionality is required. The Symbol SC400 SDK provides functions in addition to the Windows CE Toolkit.

PTC-2124 Unit Configurations

The PTC-2124 Windows CE 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,
- Displays,
- IrDA,
- Ethernet,
- 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 slot 0. However, an external antenna must be attached to 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 closest from the unit's display).

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-2124 has RAM configurations of 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 64 MB and the 4 MB on the CPU board is disabled.

ROM

The PTC-2124 comes with 512 KB of ROM.

Storage Options

ATA

The PTC-2124 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 in a variety of storage capacities. There is a factory installed restraining bar that prohibits removal of the ATA card when installed in slot 1.

The rotating ATA disks (any Type III) are installed in PCMCIA slot 1 (farthest from the display).

SRAM

The PTC-2124 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 relatively low. However, these cards may also be used by the application for data storage.

Compact Flash

The PTC-2124 has an internal Compact Flash adapter which is a standard 50 pin port that supports a variety of Compact Flash module sizes. (20 MB is the minimum required to run Windows CE.)

PCMCIA Slots

The PTC-2124 has two PCMCIA slots that are user-accessible. These external slots are controlled by an Intel PCMCIA controller.

Slot 0

This is the card slot closest to the display.

Slot 1

This is the card slot farthest from the display.

Display

The PTC-2124 is designed with a 4.7" (11.9 cm) diagonal ¼ VGA screen. The standard monochrome transflective LCD display offers 320 x 240 pixel resolution, 64 levels of gray, and an EL backlight. A scratch- and impact-resistant touch digitizer protects the display.

The PTC-2124 includes a transparent, resistive-touch digitizer mounted above the LCD display. The digitizer is designed to support both stylus and finger activation and incorporates a minimal amount of "palm rejection" to help minimize hand contact. It also uses transparent material and will not interfere with the LCD display.

> ***Note:*** *Some windows may appear too large to completely fit into the viewable are of the ¼ VGA display. To work around this, tap on the title bar portion of the window and drag into the viewable area.*

IrDA

The PTC-2124 supports an IrDA I/O port located on the right side of the unit that provides an optical serial communication interface. The IrDA communication port uses an infrared (IR) light beam to support a half-duplex, point-to-point communication link with a peripheral device.

Ethernet

The PTC-2124 supports Ethernet communications using a full 16-bit controller to provide a high-speed Ethernet interface via the cradle contacts for transmit and receive operation at 10 Mbps.

DCD Devices

The PTC-2124 supports Symbol's Data Collection Device (DCD) architecture. This architecture allows applications to obtain data from a variety of data input devices without requiring that device-specific code be written. Devices with DCD-compliant drivers are sometimes referred to as DCD Devices.

Scanners

The PTC-2124 supports an optional laser scanner module. Using an attached laser scanner, the unit can be programmed to automatically recognize, read, and discriminate between up to six 1D barcode types. For instructions on using a laser scanner module, refer to the ***PTC-2124 User's Guide***.

PTC-2124 Assignments

This section provides information on the following PTC-2124 components:

- Hardware Interrupts,
- COM Port Assignments.

Hardware Interrupts

Knowledge of hardware interrupt assignments will be useful for making system configuration decisions.

Interrupt Table

PTC-2124 hardware is assigned to the following interrupts (IRQs):

Hardware Interrupt	Device Usage
IRQ 0 (SC400 Internal)	Programmable Interval Timer
IRQ 1 (SC400 PIRQ 5)	Keyboard
IRQ 2 (SC400 Internal)	Reserved
IRQ 3 (SC400 PIRQ 6)	COM 2 and COM4 on T130 ASIC
IRQ 4 (SC400 Internal)	IrDA
IRQ 5 (SC400 PIRQ 3)	Audio
IRQ 6 (SC400 Internal)	SC400 PCMCIA Controller
IRQ 8 (SC400 Internal)	Real Time Clock
IRQ 9 (SC400 PIRQ 2)	External PCMCIA Controller
IRQ 10 (SC400 PIRQ 7)	Ethernet
IRQ 11 (SC400 Internal)	SC400 PCMCIA Controller
IRQ 12 (SC400 PIRQ 4)	Touch
IRQ 13 (SC400 PIRQ 1)	T130 ASIC
IRQ 14 (SC400 PIRQ 0)	Compact FLASH Memory Card

COM Port Assignments

The following are the default COM Port settings for the PTC-2124:

- COM 1: IrDA,
- COM 2: 15 pin serial or cradle serial ports,
- COM 3: Internal data collection peripheral (if present)
- COM 4: WAN radio or PCMCIA modem.

Rebooting/Resetting the PTC-2124

There are several ways to reset the PTC-2124. The following section describes the suggested procedures.

> ***Note:*** *Always suspend the unit before removing the battery pack. The bridge battery may not be capable of supporting some features by itself.*

Rebooting

The following warm reboot procedure stops the PTC, resets it, then restarts (boots) it. When the PTC starts again, it returns to the operating system.

1. Make sure the PTC-2124 is on.
2. Press and hold the **Contrast** button and the **On/Off** button.
3. Release the **Contrast** button.
4. Press and release the **Contrast** button.
5. Release the **On/Off** button. The reboot is now complete.

Resetting

If rebooting is not effective, the PTC may have to be reset.

To reset the unit perform the following steps:

1. Remove the unit’s battery pack.
2. Use a thin, non-conductive object to press the metallic Reset/Ship button located in the bottom of the battery compartment.
3. Reinstall the unit’s battery pack.
4. Press the **On/Off** button to restart the unit.

When the PTC reboots after a reset, it returns to the operating system.

Loading Windows CE

Requirements

The following requirements are necessary for loading Windows CE onto a PTC unit.

Required Files

The following files are required to load Windows CE on a PTC-2124 unit:

1. Windows CE Image,
2. Windows CE Boot Loader,
3. Genesis Creation Utility.

Windows CE Image

This contains two necessary files:

- **NK.bin**,
- **CE.ini**.

Windows CE Boot Loader

This consists of the file **Bootaj.rom**:

Genesis Creation Utility

This utiltily consists of the file **Genesis.zip**.

Copying and Booting the Operating System

Copying and booting the Windows CE OS involves the following three steps:

1. Load the boot loader (create Genesis card)
2. Copy the Windows CE OS image (**NK.bin** and **CE.ini**) to the Harddisk directory of the unit.
3. Genesis the unit.

Loading the Boot Loader (Creating the Genesis Card)

Boot loader is a program that resembles BIOS in function. Boot loader can be loaded by Genesis.

Requirements

To create the boot loader Genesis card, the following tools are needed:

- A PC running MS-DOS 6.22, with Card and Socket Services, and an available PCMCIA slot (card reader/writer). This PCMCIA card reader/ writer must support ATA Disk, Linear Flash, and SRAM cards.

  Or a PC running Windows 3.x, 95/98, or NT with an Adtron SDDB PC card drive.
- A PC SRAM card (of size 1, 2, or 4 MB).
- **Genesis.zip** (Genesis Creation Utility)
- **Bootaj.rom**.
- One of the following PCMCIA card format and copy utilities.
  - If the PC specified above is running CardPro Card and Socket Services, use the following:

    CPformat.exe and **CPIcopy.exe**. These utilities are included in **Genesis.zip**.
  - If the PC specified above is not running CardPro Card and Socket Services:

    PCformat.exe and **TPIcopy.exe**. These utilities are not included in **Genesis.zip** and must be obtained.

Procedure

The steps to create the boot loader Genesis card are as follows:

1. Extract the files in **Genesis.zip** to the DOS PC. This file contains the files needed for making a boot loader (Genesis card) for the PTC-2124.
2. Extract the Windows CE boot loader ZIP files to the same directory where **Genesis.zip** was extracted.
3. If the PC is not running CardPro Card and Socket services, perform the following procedure (if the PC is running CardPro Card and Socket services, go to step 4):
   - Copy **PCformat.exe** and **TPIcopy.exe** to the same directory where **Genesis.zip** was extracted.
   - Edit **MkCEgen.bat** and make the following changes in the ":BURN_CARD" section:
     - Put "**REM**" in front of the "**cpformat / nocis %3: /ok**" line.
     - Under the cpformat line, add "**pcformat %3:**"
     - Put "**REM**" in front of the "**cpicopy / ok GENESIS.IMG %3:**" line.
     - Under the cpicopy line, add "**tpicopy GENESIS.IMG %3:**"
4. At this point, one of two procedures can be used: the Standard Procedure or the Adtron Procedure.

• The Standard Procedure

The Standard Procedure uses the PC running DOS 6.22 with Card and Socket Services, and an available PCMCIA slot.

- Run **MkCEgen.bat** to copy the boot loader to the SRAM card. This command creates the Genesis card.

The syntax for **MkCEgen** is as follows:

MkCEgen [Device type] [size of PC card in MB] [Destination drive]

- Device type will be PTC-2124.
- Size of PC card (MB) can be 1, 2, or 4.
- Destination drive letter is where the PC card is placed (e.g. G).

- If PCFORMAT and TPICOPY is used, the Enter key will need to be pressed when invoked by **MkCEgen.bat**.

Once the process is complete, the PC should give a message that the Genesis card was created.

- **The Adtron Procedure**

The Adtron Procedure uses the PC running Wndows 3.x, 95/98, or NT and an Adtron SDDB PC card drive.

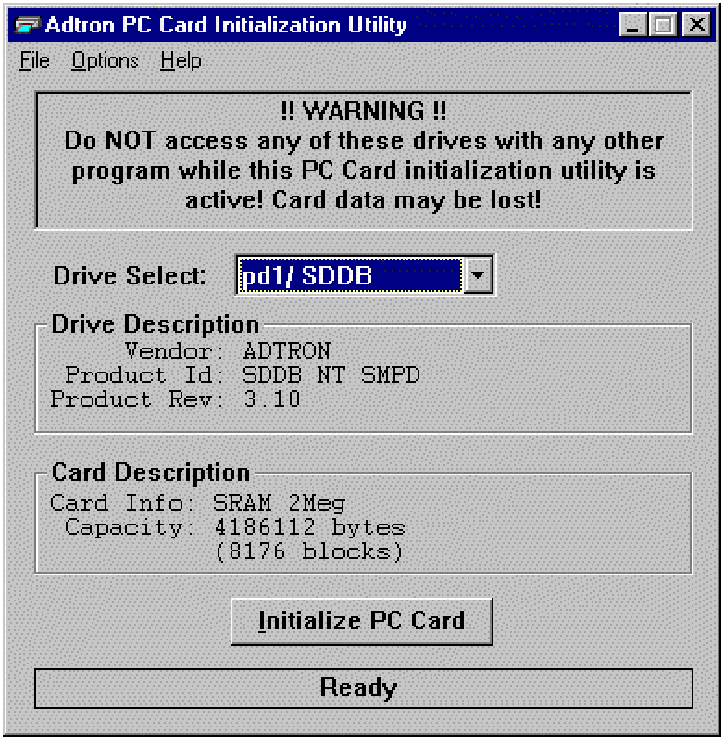
- Modify the **MkCEgen.bat** file by looking under :BURN_CARD and REM Changing *cardinit*, then *cardcopy*, according to the PCMCIA card socket service. *Cardinit* and *cardcopy* can be downloaded from www.adtron.com.

- Be sure you have the BIOS and boot files needed for your target in the same directory where the new **MkCEgen.bat** will reside. These files are the same as needed using the old mkcegen.bat genesis procedure.

- Place an SRAM card in the attached Adtron SDDB PC Card drive (we assume that the drive has been correctly installed).

- Run the new **MkCEgen.bat** from a Command window in Windows 3.X,
95/98, or NT. in the directory where the batch file resides (along with the Adtron sub directory from the attached zip archive).

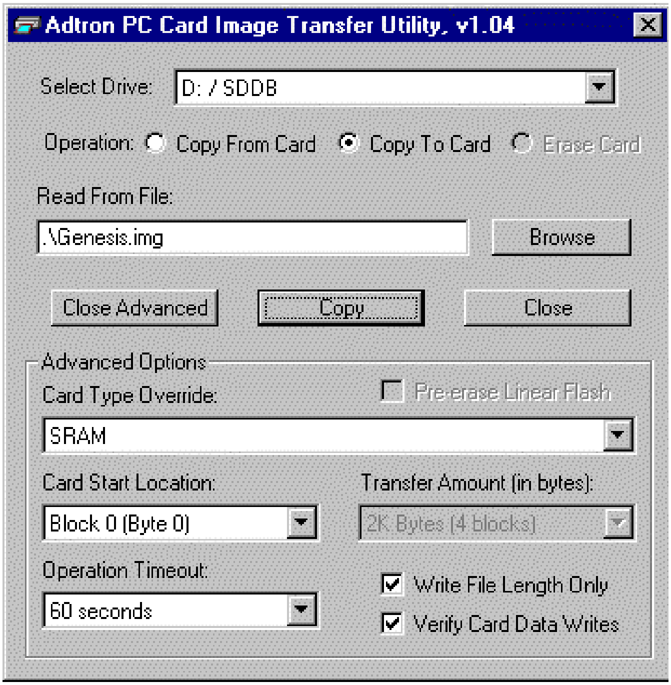
- The Adtron 'cardinit' utility will then execute and you will see something like the following:



- Click on 'Initialize PC Card', and the following will be displayed:

- Click **Yes**. The SRAM card will then be initialized. Click the **X** to close or select file/ exit.

- The Adtron 'cardcopy' command will then execute. You should see something like this:



- Verify that the **Read From File** path is correct and that the **Card Type Override** is set to the correct type of card. Be sure that the **Select Drive** entry is set to the correct PC Card drive.
- Click on **Copy** to transfer the image. When the copy completes, click **Close**. You are done. When **cardcopy** executes during any additional run of **MkCEgen.bat**, the parameters to 'cardcopy' will come up the same as the last run.

Once the process is complete, the PC should give a message that the Genesis card was created.

Copying the Windows CE OS Image

Requirements

To copy the Windows CE image, the following tools are needed:

- Target device (PTC-2124).
- **NK.bin** and **CE.ini** files.
- PC with Card and Socket services (can be DOS, Win95, Win98, etc.).

  NK.bin and **CE.ini** should reside on this PC.
- A PC card (ATA) with at least 8 MB of free space or a Compact Flash adapter card.

Procedure

The steps to copy the Windows CE image are as follows:

1. If the unit is already loaded with an operating system (such as DOS or Windows95), verify that the unit's Compact Flash (Harddisk directory) has at least 10 MB of free disk space. If not, delete some files to free up space. (10 MB of free disk space is the minimum required to load only Windows CE and does not allow for any application Compact Flash requirements.)
2. Extract the Windows CE Image ZIP files (**NK.bin** and **CE.ini**) to the PC.
3. Insert the PC card into the PC and copy **NK.bin** and **CE.ini** to the card.
4. Remove the card and insert into the PTC-2124.
5. Copy **NK.bin** and **CE.ini** from the card to the root directory of the unit's Compact Flash (Harddisk directory).

Genesis Utility

Requirements

To Genesis the unit, the following is needed:

- The SRAM card preloaded with boot loader. (see the section titled "Loading the Boot Loader (Creating the Genesis Card)" on page 17.)
- The unit with the **NK.bin** and **CE.ini** files preloaded.

Procedure

The steps to Genesis the unit are as follows:

1. Insert the SRAM card into slot 0 in the unit.
    - On PTC-2124, this is the slot closest to the display.
2. Power on the unit.
3. Press and hold the **Backlight** button.
4. While keeping **Backlight** pressed, press and hold the **On/Off** button.
5. While keeping **On/Off** pressed, release, press, and then release the **Backlight** button.
6. Release the **On/Off** button.
7. The display should go blank. After a few seconds the unit should start to beep once a second for about 15 seconds.
8. After the unit stops beeping, remove the SRAM card and reboot the unit using the normal reboot procedure. (See the section titled "Rebooting" on page 15.)

The unit should boot up with Windows CE. The unit is now ready for use.

Updating Earlier Builds of Windows CE

To update an earlier build of Windows CE, perform the following steps:

1. Boot the PTC.
2. Copy **NK.bin** and **CE.ini** to an ATA or flash card.
3. Run **Start** ⇒**Programs** ⇒**Windows Explorer**.
4. Change directory to Harddisk.
5. Select and delete **Saved.reg**, **NK.bin**, and **CE.ini**.
6. Copy the **NK.bin** and **CE.ini** from Storage card to Harddisk.
7. Cold boot the PTC. It is now ready for use.

Connecting to a Host

The PTC-2124 can be connected to a host machine or network using Ethernet, Serial or IrDA ports. To use Ethernet, a Cradle is required. To connect using a Serial port, a NULL modem cable and a Cradle are required. For IrDA, respective hardware is required on the Host.

Using Serial or IrDA

The host should have either Windows CE Services or MS ActiveSync installed. ActiveSync is preferred over Windows CE Services for ease of operation and Switching between ports. Follow the installation guide for ActiveSync or Windows CE Services. On the PTC-2124, the Serial port is configured as the default connection. This can be changed to IrDA.

To change the Port settings:

1. Tap **Start** ⇒**Settings** ⇒**Control Panel**.
2. Double tap on **Communications**.
3. Tap on **PC Connection** ⇒**Change**.
4. Select IrDA or COM2.
5. Tap **OK**.

If using a cradle:

1. Tap **Start** ⇒**Settings** ⇒**Control Panel** ⇒ **Cradle Config**.
2. Select appropriate port.
3. Tap **OK**.

To start the PC link, tap **Start** ⇒**Programs** ⇒ **Communication** ⇒**PC Link**.

Network Setup

This section describes how to configure a Windows CE device to connect to the network and copy files from the host to the Windows CE target device. This will simplify the file transfer process.

Connecting on LAN that uses DHCP

1. Before connecting the LAN cable, please change the name of your device.
2. Open Control panel.
3. Open Communications.
4. Make sure Device tab is selected.
5. Change the device name from **Symbol_PTC** to some other name.
6. Tap **OK** Button.
7. Connect the target device to the same LAN that the host is connected to.
   - On the target device, do the following:
     - Open the control panel.
     - Open Network.
     - Make sure the Adapters tab is selected.
     - Double tap on **Crystal 89xx ISA** Ethernet Controller.
     - Tap on the **Obtain an IP address via DHCP** button, then tap **OK.**
     - Tap on IDENTIFICATION.
     - Type in your user name, your password, and the Domain as set in your host and Tap **OK.**

8. Close the Control panel.
9. Access the Host and share the required directories for yourself.
   - Access the Command Prompt by tapping on **Start/Programs/Command Prompt.**
   - At the Command prompt, type **\\computername\directory.**

     The following is an example:

     \\SHARED_PC_NAME\2124_release
   - Copy **\SHARED_PC_NAME\2124_release\Myapp.exe** from the host to the Harddisk directory on the target device. (Can also be copied to an installed storage card.)
   - Copy results. **\\SHARED_PC_NAME\2124_release*.***

Connecting on LAN that uses Fixed IP Address

Before connecting the LAN cable, change the name of the target device by performing the following steps:

1. Open Control Panel.
2. Open Communications.
3. Make sure the Device tab is selected.
4. Change the device name from **Symbol_PTC** to some other name.
5. Tap **OK** button.

Connect the target device to the same LAN that the host is connected to. On the target do the following:

1. Open the Control Panel.
2. Open Network.
3. Make sure the Adapters tab is selected.
4. Double tap on **Crystal 89xx ISA Ethernet Controller**.

5. Tap the **Specify an IP Address** button, and type in the IP address. (You will need the help of your Network administrator.)
6. Tap on IDENTIFICATION.
7. Type in your user name, your password, and the Domain as set in your host and Tap **OK.**
8. Close the Control Panel.
9. Access the Host and share the required directories for yourself.

   - Access the Command Prompt by tapping on **Start/Programs/Command Prompt.**
   - At the Command prompt, type **\\computername\directory.**

     The following is an example:

     \\SHARED_PC_NAME\2124_release
   - Copy **\SHARED_PC_NAME\2124_release\Myapp.exe** from the host to the Harddisk directory on the target device. (Can also be copied to an installed storage card.)
   - Copy results. **\\SHARED_PC_NAME\2124_release*.***

You can also use the Explorer to copy the files from your host machine.

LAN Radio Installation

To install a LAN radio, follow these steps:

1. Boot your PTC.
2. Tap **Start** ⇒**Settings** ⇒**Control Panel** and select **Communications**.
3. Change the name of the PTC from Symbol_PTC to something else.
4. Insert a radio card with an Antenna into PCMCIA slot 0 (closest to the display).
5. Soon a dialog box will appear on the screen with ‘unidentified PCCard Adapter’ message. Replace the message “**Network Card in Socket x**” with ‘***aironet***’ and tap **OK**.
6. After a few seconds, another box with ‘Aironet Wireless LAN Adapter’ will appear. Depending on requirement, DHCP or Specify IP address can be selected. Fill the required fields and tap OK. Now the driver has been identified for this PC Card.

To install the registry for the Aironet LAN radio, perform the following steps:

1. Tap **Start** ⇒**Run** ⇒**Browse** ⇒**Windows** ⇒ **Aironet_Setup.exe**.
2. Tap **OK**.
3. **“Aironet Wireless LAN Adapter Setup**” window will popup. Fill in the correct values for Client Name, Data Rates, Infrastructure Mode, Power Save Mode, SSID, and Transmitter Power.
4. Tap **Start** ⇒**Run** ⇒**Browse** ⇒**Windows** ⇒ **Reg2Disk.exe**.
5. Tap **OK**.

Test the Radio

To test the connectivity, open a command window by using the **Start** ⇒**Programs** ⇒**Command** Window and type in ping <host name>.

If the response is correct, the radio driver is up and running.

Uninstall Aironet driver

The Radio driver can be uninstalled by following these steps:

1. Tap **Start** ⇒**Run** ⇒**Browse** ⇒**Windows** ⇒ **Aironet_Remove_Adapter.exe**.
2. Tap **OK**.

Windows CE Recovery

Overview

The Symbol Windows CE OS recovery process is used to update the Windows CE boot loader (**Boot.rom**) of the Flash memory, restore the Windows CE OS image (**NK.bin** and **CE.ini**) to the Compact Flash (CF), and delete the saved registry (**Saved.reg**) on the CF. This recovery process is very helpful if **NK.bin** is corrupted or the CF is infected with a virus. It loads the appropriate Windows CE OS image or user applications into the CF without disassembling the unit. The Windows CE recovery process conducts the following stages:

1. Replace the Windows CE boot loader (**Boot.rom**) in flash memory with the MS-DOS BIOS by using the genesis method so that the unit can be operated in MS-DOS mode.

2. Put the unit into the MS-DOS mode to initialize the unit's compact flash card or to enable the unit's PCMCIA drives.

3. Delete the Windows CE registry file (**Saved.reg**) if it exists on the unit's compact flash card.

4. Copy the Windows CE OS image (**NK.bin** and **CE.ini**) from an ATA boot disk to the unit's compact flash card.

5. Replace the MS-DOS BIOS in the flash memory area with the Windows CE boot loader (**Boot.rom**) by using the Genesis method.

6. Clean up the copied MS-DOS tools/utilities (**Format.exe**, **Autoexec.bat**, etc.) from the unit's compact flash card.

7. Reboot the unit with Windows CE Operating System.

Hardware Requirements

The following equipment is required for Windows CE recovery process:

- The PTC unit with 20 MB or more Compact Flash.
- A desktop PC with a PCMCIA card socket service (PCMCIA card reader/writer must support ATA Disk, Linear Flash, and SRAM cards) and MS-DOS 6.22 or above.
- A 1 MB or larger PCMCIA SRAM card containing the unit's BIOS to be used as the Genesis Card.
- Another 1 MB or larger PCMCIA SRAM card containing MS-DOS 6.22 system files (**Command.com**, **IO.sys**, **MSDOS.sys**, **Config.sys**, and **Autoexec.bat**), MS-DOS 6.22 utilities (**Format.com**, **Sys.com**, and **Choice.com**), Symbol tools and utilities (PCM drivers, batch files, and **Warmboot.com**). This card will be used as the MS-DOS boot disk. If the boot disk is large enough to hold the Windows CE boot loader, Windows CE OS image, and utilities, then the PCMCIA ATA card procedure listed in the next section is not needed.
- An additional 8 MB or larger PCMCIA ATA card containing Windows CE boot loader (**Boot.rom**), Windows CE OS (**NK.bin** and **CE.ini**), optional user applications, and Symbol **TFlash.exe** utility. More details are provided in the three (3) card process sections.

- PCMCIA card socket instruction manual and tools/utilities that are used to prepare and transfer files to the PCMCIA SRAM cards and ATA cards. For example, if CardPro is used, **CPformat.exe**, **CPIcopy.exe**, etc. are needed. Refer to the PCMCIA card socket manufacturer's manual.
- Manufacturer's instructions for the PCMCIA SRAM cards and PCMCIA ATA cards.

Software Requirements

In the event that a recovery of Windows CE is needed, the required software can be obtained by contacting Symbol Product Support at the following telephone number:

1-800-653-5350.

Preparations

All of the PCMCIA SRAM and ATA cards need to be initialized with BIOS, tools, and utilities before using in the recovery process.

BIOS Genesis Card

The genesis card contains device dependent kernel and BIOS. The procedure for creating the BIOS genesis card is as follows:

1. Use the MS-DOS copy command to create a 1 MB file, such as the following:

   COPY /b 97050228.ROM + 97050228.ROM 512K.ROM

   COPY /b 512K.ROM+512K.ROM 1MB.ROM

2. Insert 1 MB SRAM card into desktop PCMCIA slot.

3. Use desktop PCMCIA card socket tool/utility to format the card and transfer 1MB.ROM to it. The following is a CardPro example:

   CPFORMAT /nocis E: /ok

   CPICOPY /ok 1MB.ROM E:

4. Remember to clean up the 512K.ROM and 1MB.ROM from the desktop.

   NOTE: *97050228.ROM is device dependent BIOS binary file.*

Boot Disk

The boot disk contains the MS-DOS files required to boot the unit into DOS mode. This boot disk should contain **Command.com**, **IO.sys**, **Command.sys**, etc.

1 MB SRAM Card

The procedure for creating a 1 MB SRAM boot disk is as follows:

1. Insert SRAM card into desktop's PCMCIA drive.

2. Use the Symbol format command to erase the SRAM card and transfer the system file to it:

   tfmtsys.bat E: ("E:" is the driver letter)

   Tfmtsys.bat uses the CardPro format utility, **CPFormat**, to format the SRAM card. The contents of **Tfmtsys.bat** are as follows:

   cpformat %1 /nocis /f:msdos /erase /n=9 /root:224 /drivenum=0 /mediadesc=240 /sys

3. Copy MS-DOS tool/utility files **Format.com**, **Sys.com**, **Choice.com**, Symbol utility **Warmboot.com**, Symbol predefined **Autoexec.bat**, **Autorec.bat**, and **CFconfig.sys** from desktop DOS directory to the SRAM card.

4. Create PCM directory on the SRAM card.

5. Copy all of Symbol PCM driver files from desktop PCM directory to PCM directory of the SRAM card.

PCMCIA ATA Card (Optional)

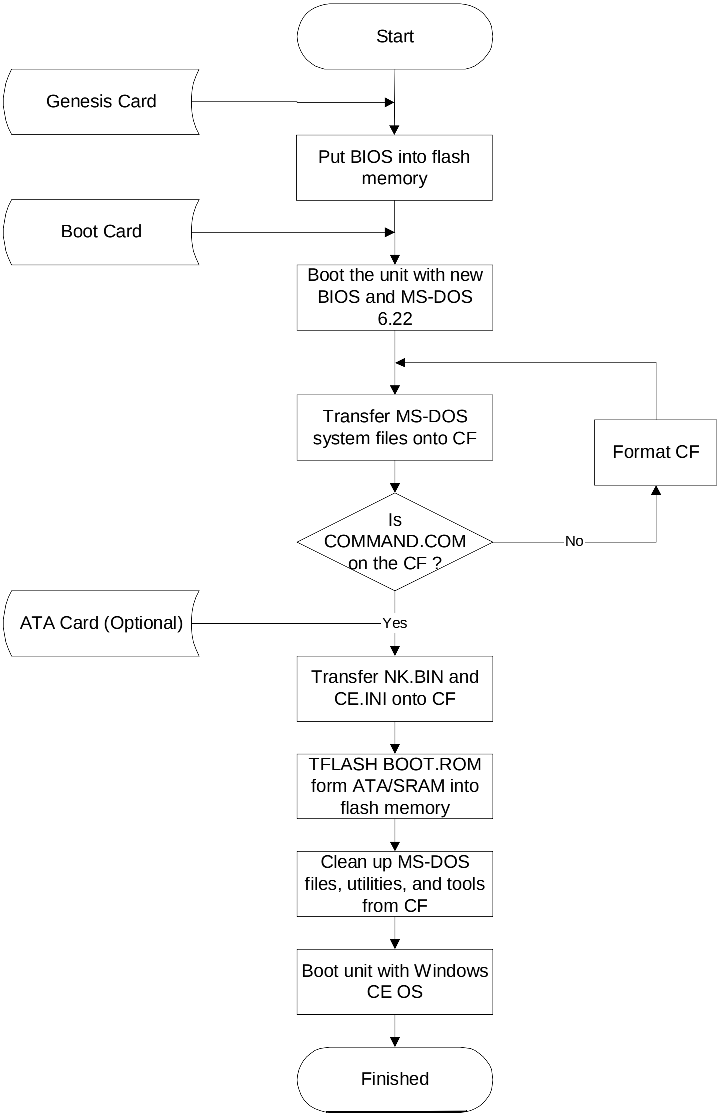
This ATA card is only used in case the MS-DOS boot SRAM card is not big enough to hold the Windows CE boot loader, OS image, and **TFlash.exe** utility. The procedure for creating an 8 MB or larger ATA card is as follows:

1. Insert ATA card into desktop's PCMCIA drive.

2. Copy **Attrib.exe**, **TFlash.exe**, Windows CE boot loader (**BOOT.ROM**), and Windows CE OS (**NK.bin** and **CE.ini**) image from desktop's hard drive to the ATA card.

Recovery Procedure

The purpose of the Windows CE recovery process is to update the **boot.rom** of the unit's flash memory and restore **NK.bin** and **CE.ini** onto the unit's CF. The following flowchart will describe the complete recovery process:



Three (3) Card Process

The procedure for recovering the Windows CE unit by using the three (3) card process is as follows:

1. Insert the 1 MB SRAM genesis card into slot 0 of the unit. Refer to the unit's User's Guide.
2. Perform the genesis boot sequence as described in the section titled "Genesis Utility" on page 24. Then the unit should alarm during the genesis process (about 18 beeps).
3. Recovering unit should boot up with BIOS and hang after the genesis process is finished.
4. Remove the genesis card from slot 0.
5. Insert the boot card into the slot 0 of the unit.
6. Perform the reset sequence (cool boot) then the machine will boot into MS-DOS mode.
7. Follow the on-screen directions. When prompted, remove the boot card from slot 0 and insert ATA card with Windows CE OS, Windows CE boot loader, and MS-DOS tools/utilities into slot 0.
8. Once the files are copied and Windows CE boot loader (**Boot.rom**) is flashed into flash memory, remove the ATA card as prompted on the screen.
9. Perform the reset sequence (cool boot) then the recovering unit will boot with Windows CE OS (e.g. Start the Touch Panel calibration sequence).

Power Management

This section describes Windows CE power management as implemented on Symbol's PTC-960M/2124/2134 Win CE 2.12 (Microsoft version images) based product line.

For information on user configuration of Power Management features, see the section of this guide titled "Power Applet" on page 103.

Windows CE Power Management

The Windows CE kernel recognizes three different power management states. These are summarized in the following table:

PM State	Comments
On	Threads are actively executing in the system. Since interrupt handlers are implemented as threads of execution in the **Device.exe** process, the On state includes interrupt handlers.
Idle	No threads are scheduled for execution. Generally, this means that there are no interrupts pending and no I/O is in progress.
Suspend	The unit is turned off and must be "resumed" before applications or device drivers can execute.

These three kernel states comprise a very high-level and generic power management system. While in the Windows CE On state, Symbol's SC400-based units implement a multi-tiered system of power management states that optimize power consumption.

AMD Elan SC400 Power Management

The SC400 Power Management Unit (PMU) supports 7 distinct power management states. These states are summarized below:

PM State	Clock Speed	Comments
Hyper-speed	66 or 99 MHz	The CPU clock of 33 MHz is multiplied by 2 or 3 in this mode, to produce an effective clock speed of 66 or 99 MHz. This mode is relatively power intensive, not only because of the high clock speed but also because a special Phase-Locked-Loop (PLL) must be running to supply the multiplied clock signal to the SC400's CPU core.
High-speed	8, 16, or 33 MHz	This mode conserves power at the expense of CPU performance. Note that the ISA bus runs at 8 MHz. Setting Low-speed mode below 8 MHz may impact performance of some devices.
Low-speed	1, 2, 4, or 8 MHz	The CPU clock is stopped. The CPU can re-awaken to service "activities" (see below).
Standby	N/A	When the CPU is awakened from Standby mode as a result of a secondary activity (see below), it goes into Temporary Low-speed mode. When the activity service is complete, the CPU will go back into Standby mode.
Temporary Low-speed	Same as Low-speed	The CPU clock is stopped and various SC400 peripherals are powered down. The CPU will re-awaken when one or more "wake sources" is asserted (see below).

PM State	Clock Speed	Comments
Suspend	N/A	The CPU enters this mode when it determines that the battery power level has fallen below an acceptable threshold. This mode is similar to Suspend mode, but the CPU will not resume unless adequate power is available.
Critical Suspend	N/A	This mode conserves power at the expense of CPU performance. Note that the ISA bus runs at 8 MHz. Setting Low-speed mode below 8 MHz may impact performance of some devices.

For more information on SC400 PMU states consult the SC400 documentation set, available from AMD.

The SC400 PMU supports the concept of “activities” to keep the processor running at high speed and to awaken it from standby mode. Primary activities cause the processor to jump directly to High-speed or Hyper-speed (if enabled) mode. Secondary activities cause the processor to leave Standby mode by going into Temporary Low-speed mode. The activity handler can allow the processor to return to Standby mode or force it to a higher activity level.

> ***Note:*** *Symbol’s Windows CE kernel does not use Standby mode or activities.*

The SC400 PMU also supports wake sources to bring the processor out of the Suspend state. The major wake sources enabled in the PMU are battery failure and the suspend/resume button. Other wake sources, such as Ring Indicate, are handled outside the SC400 PMU.

APM And Windows CE

It is commonly thought that Windows CE supports Advanced Power Management (APM). However, this is not the case. APM and its successor, Advanced Configuration and Power Interface (ACPI), are specific to PCs running desktop Windows.

Symbol Windows CE Power Management

Symbol's implementation of Windows CE uses many of the SC400 PMU modes to modulate power consumption while the system is in the various kernel modes. The following table summarizes the power management modes in Symbol units:

Unit Mode	Kernel Mode	PMU Mode	Comments
Sprint	On	Hyper	Clock speed is doubled or tripled (66 MHz or 99 Mhz). This mode can be disabled to conserve power.
Run	On	High	Clock speed is set according to High-speed mode configuration. This mode cannot be disabled, but its duration can be made very brief.
Walk	On	Low	Clock speed is set according to Low-speed mode. This mode cannot be disabled.
Inactive	On	Low	Clock speed is set according to Low-speed mode. The clock speed in Inactive mode does not have to be identical to the Walk mode speed. In this mode, the display is put into a low-power mode ("turned off") and the backlight is powered down.
Suspend	Suspend	Suspend	Unit is powered off. When awakened, it will continue execution from where it entered Suspend mode.

Unit Mode	Kernel Mode	PMU Mode	Comments
*See note	Idle	*See note	*The kernel Idle mode can be entered from any of the PMU or unit modes other than Suspend. Idle mode means that no threads are scheduled for execution. In idle mode, the CPU is halted using the HLT instruction to conserve power. It resumes operation when an interrupt occurs or a new thread is ready to execute.

To avoid confusion between unit mode types and APM, unit mode names have been chosen to avoid overlapping.

Note: *Unless otherwise noted, references to power management modes refer to "unit modes" as opposed to "kernel modes" or "PMU modes". Also, "activities" generally refers to device/thread activities (described below), as opposed to SC400 PMU "activities".*

Each mode has a time-out associated with it. The time-out value controls how long the unit will remain in that mode before dropping to the next slower mode. If a device or thread activity occurs, the unit will jump to the highest enabled mode; this will be either Sprint or Run mode. These time-outs can be controlled via a control panel applet or directly, using the Symbol Power Management SDK. Both of these mechanisms are described in subsequent sections. Modes can be entered directly using SDK calls as well as via time-outs or device/thread activities.

The power management system is implemented cooperatively between the Windows CE *OEM Adaptation Layer (OAL)*, a specialized power management driver, and power management aware device drivers. These software components are accessible via the Power Management SDK.

For more information on SDK calls, refer to the ***SC400 Windows CE SDK Programming Guide***.

Online And Offline Configuration

The power management system on Symbol's SC400 product line supports differentiation between online power and offline power. Online power is available when the unit is connected to an A/C power source, such as a charger or a cradle. Offline power is supplied by batteries.

The following table summarizes the default configurations.

Mode Name	Online/Offline Settings
Sprint	Disabled
Run	33 MHz / 4 seconds
Walk	8 MHz / 32 seconds
Inactive	8 MHz / 32 seconds

Drivers And Thread Activities

Transitions between unit modes are controlled primarily by a specialized power management driver which monitors driver/thread activities. When such an activity occurs, the unit jumps to the highest enabled mode (Sprint or Run mode) and reloads the associated transition timer. If the unit is already in that mode, the timer is reset.

The following system events cause an activity notification:

- Ring Indicate on a PCMCIA modem.
- Ring Indicate on a system serial port (including the currently selected cradle connector, if enabled)
- Good-link on the Ethernet interface (i.e., “the light is on in the hub”). Good-link will keep the system in the highest enabled mode as long as it is active and the unit is docked in a cradle. This doesn’t cause battery drain, since the cradle docking status requires AC power.
- Keyboard/Keypad key presses.
- Stylus taps on the touch screen.
- ATA disk interrupts, including Compact Flash cards and the unit’s internal boot drive.
- Received data on any serial port.
- Real-time clock interrupts (IRQ 8).

If necessary, applications can simulate activity using the PowNotifyActivity() SDK call. See the ***SC400 Windows CE SDK Programming Guide*** for more information on this API routine.

Received serial port data is only treated as an activity if the SC400 PMU is in Low-speed or Temporary Low-speed mode. This avoids significant internal overhead in communication between the serial driver and POWMAN because activities will only be generated when the unit times out into Walk or Inactive mode. This optimization is important because of the time-sensitive nature of RS-232 communications. While the PMU is in High-speed mode, no activity notifications will be generated.

Power Management Initialization

Power management initialization culminates in setting the SC400 PMU to the highest enabled unit mode and starting the associated mode timer. To get to this point, the unit passes through three distinct phases following a reboot:

1. The bootloader initializes the SC400 PMU. Currently, it sets the PMU to High-speed mode at 33 MHz with no timeout. It loads the Windows CE image from the internal ATA card (\HardDisk) and transfers control to it.

2. The Windows CE HAL initializes the SC400 PMU. Currently it sets the PMU to High-speed mode at 33 MHz with no timeout. Windows CE device drivers and the windows subsystem are initialized at the same speed.

3. The POWMAN device driver is loaded during device driver initialization. It is responsible for initializing the PMU with its Sprint, Run, Walk, and Inactive settings, transitioning to the highest enabled mode, and starting the associated mode timer. However, it defers this processing until it determines that the windowing subsystem and the shell have been initialized. (Internally, it uses the IsAPIReady() system call for this purpose.) Once the windows subsystem and the shell are up and running, it transitions to Sprint or Run mode (as enabled) and starts the associated timeout.

Once step 3 is complete, the unit will be running normally. POWMAN defers starting the first mode time-out until device drivers and windows are initialized to avoid having the time-out occur while Windows CE is still initializing.

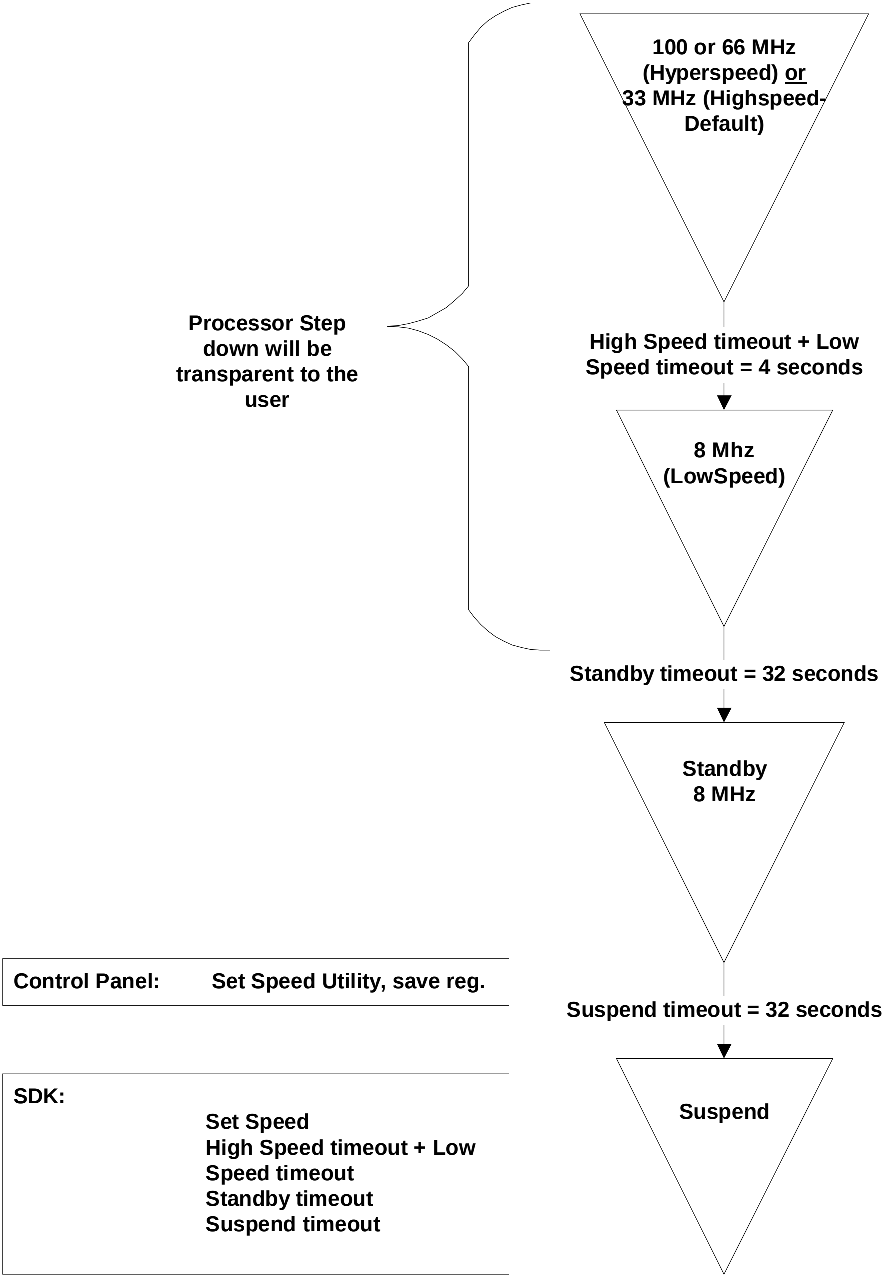
> ***Note:*** *If an application is launched before the shell completes initialization, power management SDK calls will have unpredictable behavior. Applications that are launched automatically should use IsAPIReady(SH_SHELL) before calling power SDK functions.*

Magic Packet Mode

Another feature of the PTC-2124'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 in the Suspend state. Magic Packet mode provides the ability to remotely wake up the unit by using the Ethernet connection established through the cradle. This allows the unit to be remotely accessed and managed even if the Suspend state has been entered.

When the unit is manually put into the Suspend state (while docked in a cradle), the Ethernet controller will automatically enable Magic Packet mode. While in Magic Packet mode, the unit will monitor all incoming frames to determine if 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 Magic Packet mode. The unit then regains full functionality, including network accessibility.

SC 400 Power Control



Cradle Information

Cradle Overview

The Symbol PTC-1124 Desktop/Vehicle Cradle is a specialized docking station that is used for the PTC-2124. The cradle provides the following services:

- External Serial Port Connection,
- Battery Recharging Connection,
- External Ethernet Connection,
- External Keyboard Connection.

The SC-1124 is designed for use on a flat horizontal surface, such as a table or desk. The VC-1124 securely mounts inside a vehicle's cab (using a vehicle mount).

Each cradle holds one PTC and one spare battery pack at a time and works with the PTC in two ways:

1. It acts as a communication link. Through the cradle, the PTC can send data to and receive data from a host computer or other serial devices.
2. The cradle provides power for rapidly recharging the PTC's lithium-ion battery pack and a spare battery pack when the PTC and spare pack are installed in the cradle.

The cradle can be connected via cable to a network through its Ethernet port or to external serial devices via its three 9-pin RS-232 serial ports. In addition, a keyboard can be connected to the cradle for use with the installed PTC.

PTC-2124 Cradle Interaction

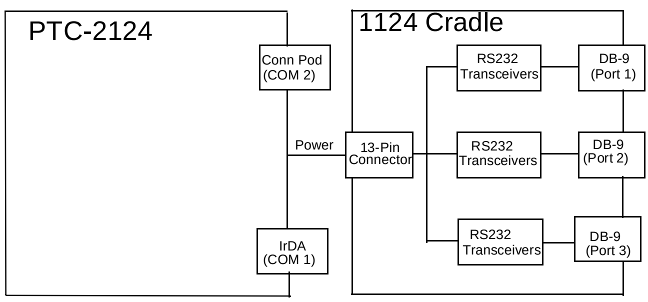
The PTC-2124 only has one COM port available for use by peripherals. The PTC-2124 uses an electrically controlled serial switch-box with a 9-wire interface to provide additional serial ports for this single COM port.

The PTC-2124 provides IrDA on COM1 and wired serial on COM2. An infrared sensor on the PTC-2124 provides the IrDA outlet. A Connector Pod on the PTC-2124 provides the serial outlet.

The following table summarizes the possibilities for a PTC-2124. When out of the cradle, COM1 is available as IrDA and COM2 is available through an attached Connector Pod. When docked, COM1 is available as IrDA and COM2 is re-routed to one of the DB-9 serial connectors.

Cradle	COM1 Outlet	COM2 Outlet
Undocked	IrDA on PTC-2124	Connector Pod on PTC-2124
Docked	IrDA on PTC-2124	DB-9 on cradle

PTC-2124 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 two external ports. Since the serial ports are multiplexed, only one port can be active at a time.

Serial Port 1	DB9 Connector (Male Pins)
Serial Port 2	DB9 Connector (Male Pins)
Serial Port 3	DB9 Connector (Male Pins)
Control Port	No Connector, Internal to unit

The Vehicle/Desktop-1124 Cradle supports the communication chip interface to the PTC-2124 unit via the Cradle Contacts. The Communication Interface uses COM 2 (2F8 Hex) on the PTC-2124 unit. This interface is specifically designed for use with the Symbol cradles and is provided by the communication chip. The Vehicle/Desktop-1124 Cradle uses a wired implementation of the interface.

The same COM 2 Port is used for both the Vehicle/Desktop-1124 Cradle's Serial Connectors and the serial port in the PTC-2124 unit's Connector Pod. Hence, only one COM interface can be used. When the PTC-2124 is placed in a cradle, the cradle's serial ports can be used if the unit's application program uses the cradle serial routines from the PTC-2124 SDK. (Refer to the PTC-2124 SDK for software details)

Note: *When the connector Pod is connected, the Serial connection is a 4-wire implementation only. When attached to a cradle, the active port is a full 9-wire serial port implementation.*

The Optical Serial Signals use the cradle contacts on the PTC-2124 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, where as the Data Lines operate at the rate programmed for the internal communication chip UART controlling the Serial Port. The Serial communication chip UART can 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.
- Stop Bits 1 or 2.

DTR and RTS Latching

The Vehicle/Desktop-1124 Cradle provides DTR and RTS latching on inactive Serial Port 3 to prevent the connected device from dropping the communication link with the PTC-2124. 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

In order to allow the Ring Indicator (RI) signal to reach the PTC-2124 unit from any serial port (active or not), the RI signals from all Serial Ports are logically Ored together. The RI signal can be used to wake the PTC-2124 unit from Standby 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

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 be used only in a Desktop configuration.*

Keyboard Port

The Vehicle/Desktop-1124 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

Note: *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.*

CRADMON.EXE

Cradmon is an executable file that sends cradle status change notifications to applications and adds the Cradmon icon to the taskbar.

To run **Cradmon.exe** and add the Cradmon icon to the taskbar, follow these steps:

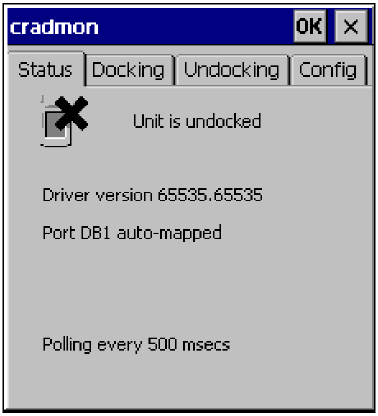
1. Tap on the **Start** menu button.
2. Select **Run**, then **Browse**.
3. Double-tap on the **Windows** folder.
4. Select **Cradmon.exe**.
5. Tap on **OK**, then **OK** again.

The Cradmon popup menu items are briefly described below:

- Tapping on **Properties...** launches the Cradmon main configuration dialog box.
- Tapping on **About...** displays Cradle Monitor version information.
- Tapping on **Cancel** closes the Cradmon popup menu.
- Tapping on **Exit** causes Cradmon to terminate and removes the Cradmon icon from the taskbar.

The Cradmon Dialog Box

The Cradmon dialog box is the main configuration interface for Cradmon and can be accessed through the **Properties...** menu item on the Cradmon icon popup menu. It contains two tabs, the Status tab and the Properties tab. Tapping on a tab heading will select that tab page.



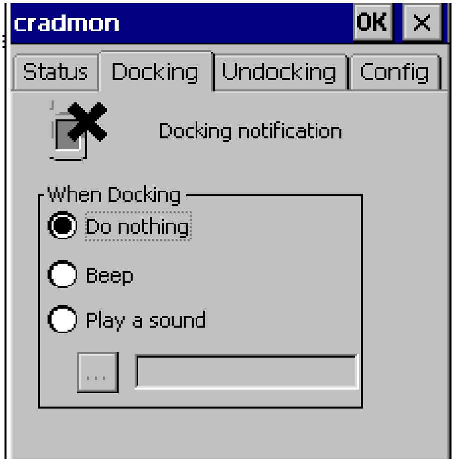
The Status Page

The Status tab page displays different types of cradle-related status information. It is for monitoring only and offers no user action. The Status page displays information regarding the following:

- Whether the unit is docked or undocked,
- Driver version,
- List of ports that are automapped,
- Polling Interval.

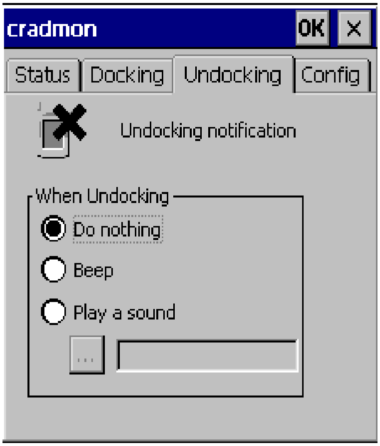
The Docking Page

The Docking tab page allows the user to select sound options for **Docking Notification**. The user can choose either **Do Nothing** (no sound) or **Beep.**



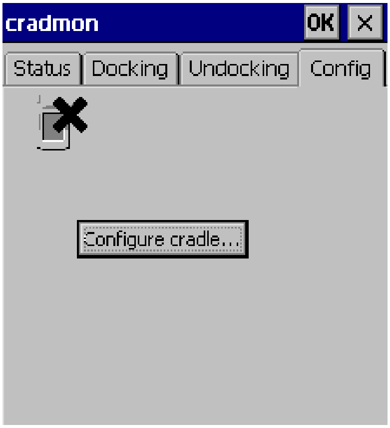
The Undocking Page

The Undocking tab page allows the user to select sound options for **Undocking Notification**. The user can choose either **Do Nothing** (no sound) or **Beep.**



The Config Page

The Config tab page displays the **Configure Cradle…** button.



When tapped, the **Configure Cradle…** button brings up the Cradle setup dialog box. This is the same dialog box that is displayed when the Cradle Configuration Control Panel Applet is initiated.

For more information on this, refer to the section titled “Cradle Configuration Applet” on page 102 of this guide.

PCMCIA

The PCMCIA Card

A PCMCIA 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.

The PTC-2124 uses an Intel PCMCIA controller to access the two PCMCIA slots (slot 0 and slot 1) which are accessible through the access door on the top of the unit. Slot 0 is closest to the display and slot 1 is farthest from the display.

The PCMCIA slots in the PTC-2124 will support a variety of cards. This includes spinning drives, memory, modem, radio, and network cards.

PC cards can be one of the following types:

Type	Description
Type I	3.3 millimeters thick
Type II	5 millimeters thick
Type III	10.5 millimeters thick
Type I Extended	3.3 millimeters thick, with 40 millimeters extended length
Type II Extended	5 millimeters thick, with 40 millimeters extended length

Location of External PCMCIA Slots:

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

- Data Storage cards,
- Serial interface cards.

Formatting an SRAM or ATA Card

Data storage card can be of solid state or rotating media type. PTC-2124 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.

When an unformatted or unrecognized card is inserted into the PTC-2124, Windows CE will display a message asking if the user wants the system to format the card.

If the user selects **Yes**, the storage card will be automatically formatted.

Note: *If Yes is selected, any files on the storage card will be erased.*

DCDWedge

This section describes how to configure and use DCDWEDGE for Windows CE. The DCDWEDGE application accepts data from device drivers written according to Symbol's Data Collection Device (DCD) specification and converts it into keyboard events. This is often referred to as "wedging" the data into the keyboard queue. The "wedging" mechanism allows applications to receive data notifications from DCD devices in the form of keyboard input.

System Requirements

In order to use DCDWEDGE, the following minimum system requirements must be met:

- Windows CE 1.20 or later.
- Quarter-VGA display or larger (for example, PTC-960M, PTC-2124, PTC-2134).
- **DCDAPI32.dll** must be installed.
- At least one DCD-compliant device driver must be properly installed. This driver may impose additional system requirements.

Data being "wedged" into the keyboard queue must be numeric data or string data. That is, not all possible DCD data types are supported by DCDWEDGE.

DCDWEDGE Operation

Overview of DCD

A complete discussion of the Data Collection Device (DCD) programming model is beyond the scope of this document. However, a basic understanding of DCD is important in order to understand how DCDWEDGE works.

The DCD application programming interface does not deal with data from devices in terms of hard-coded data types. DCD devices supply a stream of “data events”, each of which consist of data name/value pairs. The data name is a human-readable name that generally provides some indication of what the data represents. For example, a given device might have two data fields: “text data” and “numeric data.”

The DCD programming model supports many types of data; however, DCDWEDGE only supports text and numeric data. In the example data event above, the “text data” field would have the “text” data type and the “numeric data” field would have a “numeric” data type.

Example data inputs using the format described above might be:

- First data event

  “text data” equals “foo”

  “numeric data” equals 100

- Second data event

  “text data” equals “bar”

  “numeric data” equals 3

- Third data event

“text data”	equals “baz”
“numeric data”	equals 405
“event time”	equals 655301

Note that the third data event contains an extra data field. It is acceptable for DCD devices to use a different format for each data event (although in general most do not). DCDWEDGE will ignore data events that do not contain all of the named fields that it is configured to expect.

The advantage of having named data fields is that it allows applications such as DCDWEDGE to process them without any special knowledge of what they mean. The DCDWEDGE user can simply “browse” the data fields he or she is interested in, set up the appropriate wedge formatting, and DCDWEDGE will do the rest.

For more information about DCD API, refer to the ***SC400 Windows CE SDK Programming Guide***.

Data Formatting

DCDWEDGE is capable of converting character string or numeric data into keyboard events. It is also capable of formatting the data using a combination of standard text or special keys (such as **Alt**, **Return**, **Escape**, and function keys).

For example, assume that the value of the “Text Data” field for a given DCD data event is “demo data”. In this case, DCDWEDGE will generate keyboard events that spell out:

    wedge: demo data[RETURN]

Here, [RETURN] indicates a carriage return, not the text “[RETURN]”. Whichever application currently has the keyboard input focus will receive this data, exactly as if it had been typed in at the keyboard.

User Interface

The primary user interface to DCDWEDGE is via its icon on the taskbar. To place this icon on the taskbar, follow these steps:

1. Tap on the **Start** menu button.
2. Select **Run**, then **Browse**.
3. Double-tap on the **Windows** folder.
4. Select **DCDWedge.exe**.
5. Tap on **OK**.

Tapping this icon brings up the DCDWEDGE popup menu. The DCDWEDGE popup menu items are briefly described below:

- Tapping on **Exit** causes DCDWEDGE to terminate and removes the DCDWEDGE icon from the taskbar.
- Tapping on **Properties...** launches the DCDWEDGE main configuration dialog box.
- Tapping on **Config...** launches a dialog box that allows the user to save the current configuration or load a stored configuration.
- Tapping on **About...** launches a dialog box that displays version information about DCDWEDGE, the DCDAPI32 DLL, and the currently selected driver.
- The last menu item, labeled **Enable** or **Disable**, enables or disables the selected device. This menu item is grayed out if no device is selected or if the selected device is not configured.

DCDWEDGE Configuration Options

DCDWEDGE requires configuration in the following four major areas:

1. Which DCD device to use.
2. Configuration information for that DCD device.
3. Formatting information indicating how to process data events from the DCD device.
4. Options controlling DCDWEDGE behavior at startup or when DCDWEDGE receives a data event from the currently configured DCD device.

All of these options are described in detail in the section titled “DCDWEDGE Dialog Box” on page 71. However, this section provides a quick summary of the options alluded to in (4) above.

DCDWEDGE is capable of providing audible feedback when it enables or disables the currently selected DCD device, or when the device generates a data event that DCDWEDGE can process. The audible feedback can consist of beeps or no sounds at all. Different audible feedback can be associated with device enabling, device disabling, and data events. DCDWEDGE will not generate audible feedback if it cannot convert a data event into keyboard events – if the data event does not contain all the named data fields DCDWEDGE expects, for example.

DCDWEDGE can be configured to automatically enable the selected DCD device when it is invoked. It can also be configured to disable the device after it receives a data event or after a given time has elapsed and no data events have occurred. Depending on the DCD device, automatic disabling can help conserve battery power.

Some DCD device drivers supply icons that can be displayed on the taskbar in place of DCDWEDGE's default icon at the user's request. In addition, DCDWEDGE can be configured to use its most recent configuration whenever it is restarted or to prompt the user for a configuration each time. It can also be configured to *not* prompt the user if it restarted with no configuration in place. However, DCDWEDGE will always display a warning at start-up time indicating that it cannot be enabled until a device is selected and configured.

Running DCDWEDGE

DCDWEDGE is fairly simple to set up, and once it is configured it is very simple to use. This section describes how to set up and use DCDWEDGE.

Setting up DCDWEDGE

When DCDWEDGE is launched for the first time it will automatically launch the DCDWEDGE dialog box (described in the section titled "DCDWEDGE Dialog Box" on page 71) to prompt the user for configuration information. Typically, users plan to use DCDWEDGE to supply keyboard data for a particular application and they are familiar with the format of keyboard data the application expects. They generally also expect to use DCDWEDGE with a specific device, such as a barcode scanner or magnetic stripe reader, for which they have already installed the device driver.

Setting up DCDWEDGE consists of the following steps (These steps are described in more detail on the following pages):

1. Select a DCD device using the Device page.
2. Configure the DCD device using the DCD page.
3. Define the data format rules, which DCDWEDGE will use to convert DCD data events into keyboard data for the application, using the Wedge page.
4. Optionally, set up other DCDWEDGE configuration parameters using the remaining pages.

Once these steps are complete, the user can launch their application, and enable the DCD device. DCDWEDGE is ready to go.

Using DCDWEDGE

In normal operation, the most users will have to do with DCDWEDGE is enable and disable the currently configured DCD device. This is done using the popup menu that is launched when the user taps on the DCDWEDGE icon on the taskbar, and selecting the Enable/Disable menu item.

For some applications, it may be convenient to configure DCDWEDGE to disable the device automatically after a data event, or if a certain amount of time elapses with no data events. This can be set up through the Activation page of the DCDWEDGE dialog box.

Some users may wish to use DCDWEDGE with different devices at different times, or with multiple configurations for the same device. DCDWEDGE supports saving and loading named configurations using the Wedge Configurations. This dialog is launched using the **Configs...** menu item of the DCDWEDGE popup menu. To cause DCDWEDGE to always prompt the user for which configuration to use, clear the **Use last configuration** check box and check the **Prompt user if no config** check box in the Miscellaneous page of the DCDWEDGE dialog box.

DCDWEDGE Dialog Box

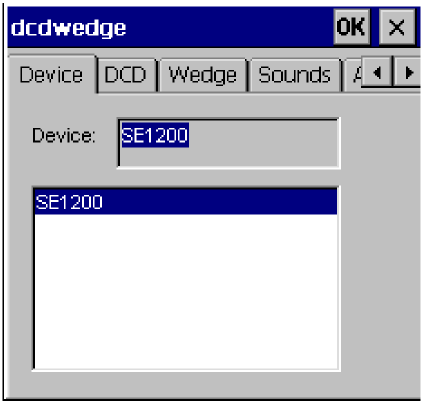
The DCDWEDGE dialog box is the primary mechanism for configuring DCDWEDGE. It is accessed by tapping on the **Properties...** menu item on the icon popup menu. If the DCDWEDGE dialog box is closed without a DCD device selected and configured, or without the wedge formatting rules being specified, DCDWEDGE will generate a warning message.

This section describes each of the tabs in the DCDWEDGE dialog box. Tapping on a tab heading will select that tab page. Once the first three pages (Device, DCD, and Wedge) are filled in, the device is ready to enable. The other pages control other aspects of DCDWEDGE behavior, such as automatic device activation and deactivation, audible feedback, and so forth.

Note: *When the user launches the DCDWEDGE dialog box, DCDWEDGE will automatically disable the selected DCD device if it is enabled. When the dialog box is closed, the user must manually re-enable the device using the DCDWEDGE popup menu’s Enable menu item.*

Device Page

The Device page allows users to select one of the DCD devices installed on their system. This is done simply by double-tapping one of the entries in the device list.

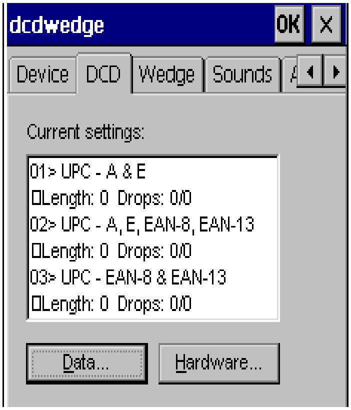


When the device is selected, its name will appear at the top of the page, in the edit box labeled “Device.”

> ***Note:*** *Changing the device will invalidate the device’s configuration and the wedge format configuration. In other words, the first three tab pages of the DCDWEDGE dialog box will need to be filled in just as if DCDWEDGE were being started for the first time. Because of this, if the user attempts to change the device, DCDWEDGE will prompt them for confirmation.*

DCD Page

The DCD page allows users to review the configuration of the selected DCD device and update it if desired.



The **Data...** and **Hardware...** buttons allow the user to launch the DCD device's data and hardware configuration dialog boxes, respectively.

According to the DCD programming model, "hardware configuration" affects the device driver's basic interaction with the device's physical hardware. This kind of configuration is usually done once for a particular handheld device, if at all, and should generally be carried out with some caution. The device's default hardware configuration is usually acceptable.

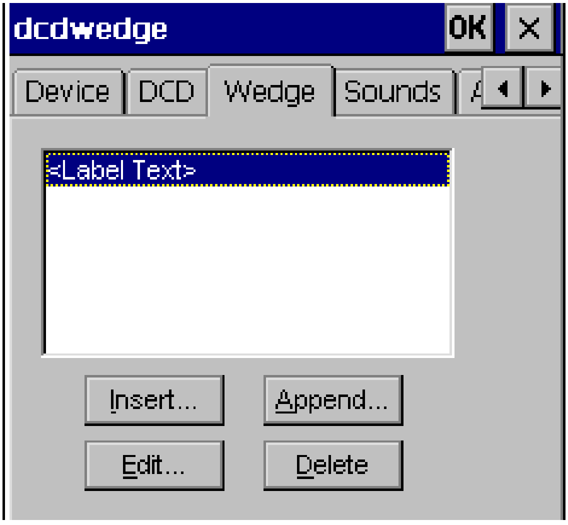
On the other hand, "data configuration" allows the user to control the format, type, or amount of data the device will generate. For example, a barcode scanner's data configuration might allow the user to select which types of labels should be decoded. As another example, the data configuration might specify which tracks a magnetic stripe reader might read from credit cards. Data configuration generally needs to be carried out more frequently than hardware configuration, although once it's done for a particular customer application it doesn't need to be changed.

The DCD device driver provides DCDWEDGE with a human readable “summary” of its configuration, which DCDWEDGE displays in the “Current Settings” window of the DCD page.

> ***Note:*** *It is possible that some DCD devices will not export their configuration in a format that allows it to be displayed in the “Current Settings” window. In this case, users will have to launch the device’s hardware and data configuration dialogs if they wish to review the device’s settings.*

Wedge Page

The Wedge page allows users to set up DCDWEDGE’s data formatting rules. DCDWEDGE is capable of sophisticated formatting of keyboard data based on DCD data events. An example of the Wedge page is shown below:

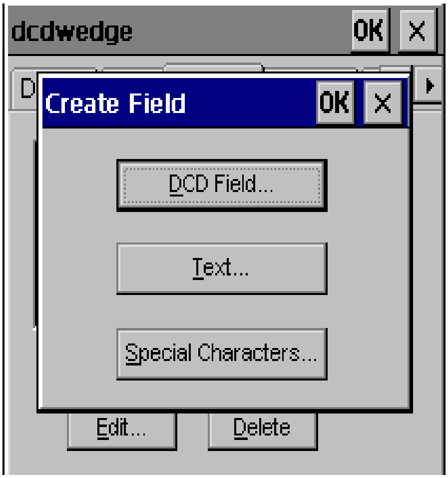


DCDWEDGE can generate keyboard data based on fields in the DCD data event, on static text configured by the user, and on “special keys” such as function keys and shift-key modifiers such as the **Alt** key. A simple example of DCDWEDGE’s formatting capabilities is described in the section titled “Data Formatting”.

As a more interesting example of DCDWEDGE data formatting, imagine that the user’s application contains a dialog that has two input fields, one of which accepts a text string and one a number. To enter data into this hypothetical dialog manually, the user would have to type **Alt-M** (for Menu) to access a menu in the title bar of their application, then type **D** (for Dialog) to launch the dialog. They would then enter the text string, type the **Tab** key to jump to the next input field, type the number, and type the **Return** key to close the dialog.

Static text is enclosed in single quotes (‘), DCD field names are enclosed in angle brackets (<>) and special keys are enclosed in square brackets ([]).

The four buttons at the bottom of the Wedge page allow the user to add, edit, or delete selected data format rules. The **Insert...** and **Append...** buttons bring up the Create Field dialog box, shown below:.



This dialog allows the user to specify what kind of data formatting rule they would like to create. These rules are described in more detail in the following sections. The **Insert...** button causes the newly created formatting rule to be inserted ahead of the currently selected rule. It can also be used to create the first Wedge formatting rule.

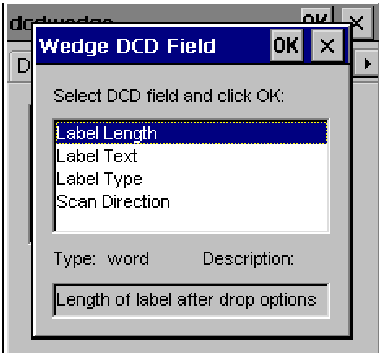
The **Delete** button deletes the currently selected formatting rule. The **Edit...** button allows the user to modify the contents of an existing format rule. It does this by launching the same editing dialog boxes as the Create Field dialog box, so it is not possible to change the formatting rule type. To replace one kind of field configuration with another, delete the field configuration and insert a new one of the proper type. Double-tapping a formatting rule has the same effect as tapping the **Edit...** button.

DCD Field Data Formatting Rules

The Wedge DCD Field dialog allows the user to choose a DCD data field, which might be generated by the selected DCD device during a data event. Properly implemented DCD drivers will inform DCDWEDGE of all possible data fields so that they can be included in this list. Some DCD drivers will not include all of the possible data fields in every DCD event.

For example, magnetic stripe reader drivers need to be able to read all four tracks of data from a credit card. However, not all credit cards actually have data on all four tracks. In this case, the driver would simply not populate the missing tracks in its data events. If DCDWEDGE receives a data event that does not contain all of the data fields it has been configured to expect, it will ignore the data event.

A sample Wedge DCD Field dialog is shown below:

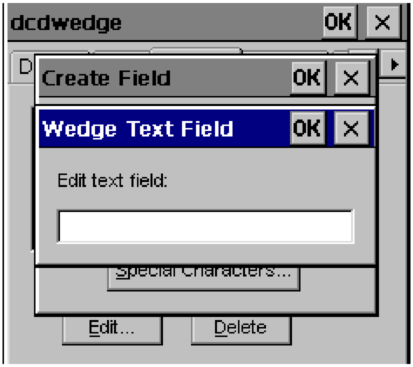


The Type and Description fields on the dialog provide additional information about the selected DCD data field.

Note that DCDWEDGE processes all numeric (“word”, “dword”, and “byte”) data fields in base 10. The DCD driver informs DCDWEDGE whether the data should be treated as signed or unsigned. For example, a “byte” value can range from –127 to 127 if it is signed, or from 0 to 255 if it is unsigned. DCDWEDGE will generate a keyboard event for the minus sign if the numeric value is both signed and negative. Consult the SC400 Windows CE SDK Programming Guide for more information about DCD data types.

Text Data Formatting Rules

The Wedge Text Field dialog allows users to create and/or edit static text to be inserted into the keyboard queue during data events. A sample Wedge Text Field dialog is shown below:.



Any text that can be entered into a “normal” Windows edit control can be entered into the Wedge Text Field dialog.

Special Key Data Formatting Rules

DCDWEDGE supports the use of “special keys” in its data formatting rules. These are key sequences which cannot be entered into a Windows edit control and therefore cannot be specified using the Wedge Text Field dialog described in the section titled “Text Data Formatting Rules”. The Special Keys dialog allows users to specify these characters.

Special keys fall into three major categories:

1. Shift modifiers, such as the **Control**, **Alt**, and **Shift** keys.
2. Special characters, such as **Return**, **Esc**, **Backspace**, and **Tab**.
3. Function keys (**F1**, **F2**, etc).

The Special Keys dialog allows users to select keys from each of these categories using combo box controls. An example Special Keys dialog is shown below:.

Many applications use **Alt** key combinations to bring up menus and dialogs, sometimes in conjunction with the **Control** key. However, capitalized letters and certain punctuation marks that can be entered using the Wedge Text Field dialog implicitly use the **Shift** modifier key. This option is also provided in the Special Keys dialog because some applications expect key sequences such as **Shift+F1**.

Shift modifiers do not actually generate keyboard events until DCDWEDGE generates a non-shift keyboard event. In other words, if a shift modifier is the last data formatting rule in the list, it will have no effect on the wedged data.

When multiple consecutive shift modifiers are present in the list, they always generate keyboard shift key events in the order **Alt**, **Control**, **Shift**. For example, if the formatting lists [Control], [Alt], 'm' and [Alt], then [Control] and 'm' are functionally identical.

Both produce the following sequence of keyboard events:

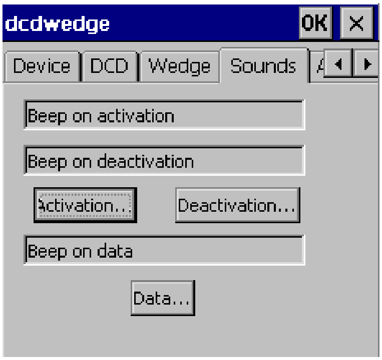
- Alt key down,
- Control key down,
- 'm' key down,
- 'm' key up,
- Control key up,
- Alt key up.

This behavior should not cause a problem for most applications, since most applications do not care about the order in which shift modifier keys are pressed.

If the same shift modifier key is repeated consecutively in the data format list, the shift modifier will only take effect once. For example, the formatting list [Shift], [Shift], 'm' is functionally the same as [Shift], 'm'.

Sounds Page

The Sounds page allows users to specify what audible feedback (if any) they choose to associate with DCD events. A sample Sounds page is shown below:.



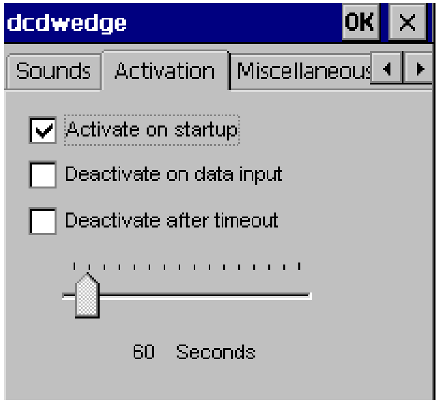
Three types of DCD events can be associated with audible feedback:

- Device activation,
- Device deactivation,
- Device data events.

Changing these three setting can be accomplished by tapping on the **Activation…**, **Deactivation…**, and **Data…** buttons. By default, DCDWEDGE plays a beep for each of these events. However, users can choose have no audible feedback at all associated with the data event.

Activation Page

The Activation page allows users to define certain rules governing how and when DCDWEDGE will activate and deactivate the selected DCD device. The Activation page is shown below:.



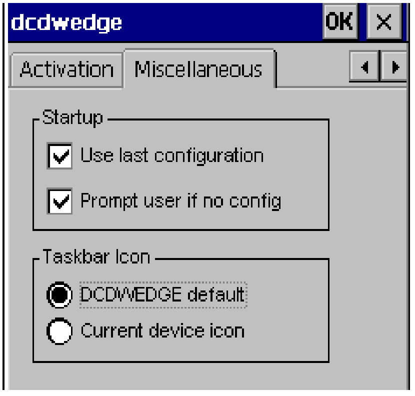
If **Activate on start-up** is checked, DCDWEDGE will configure and enable the selected DCD device when it is launched. Of course, if no device is selected, no device will be configured.

If **Deactivate on data input** is checked, DCDWEDGE will disable the selected DCD device after it generates a data event. This is sometimes useful in keeping the device from “getting ahead” of the application to which it is providing data.

If **Deactivate after time-out** is checked, DCDWEDGE will deactivate the device if no data event is generated within the time interval specified by the slider. Depending on the device, this can help conserve battery power for the handheld on which DCDWEDGE and the user application are running.

Miscellaneous Page

The Miscellaneous page is used to control DCDWEDGE’s behavior at start-up and how it displays itself on the system taskbar. An example of the Miscellaneous page is shown below:.



If **Use last configuration** is checked, DCDWEDGE will attempt to reload whatever configuration it used during its previous invocation.

If **Prompt user if no config** is checked, DCDWEDGE will prompt the user to configure it if no previous configuration was saved or the **Use last configuration** checkbox was unchecked in the previous configuration.

If DCDWEDGE finds that one or more named configurations have been saved, it will launch the Wedge Configurations dialog (see the section titled “Wedge Configuration Dialog Box” on page 84 for more information on this dialog). If no named dialogs have been saved, DCDWEDGE will launch the DCDWEDGE dialog box instead.

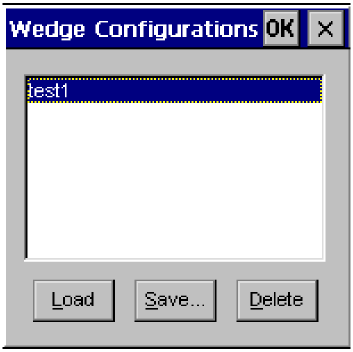
DCDWEDGE will always warn the user if no configuration is present, even if both of these checkboxes are unchecked. It will also warn the user if the user attempts to close the Properties dialog without configuring a device. A device is considered unconfigured if (1) no device is selected, (2) no data configuration has been created for the device, or (3) no wedge data formatting rules have been defined.

The **Taskbar Icon** group box allows users to choose how DCDWEDGE should display itself on the taskbar. Most DCD devices supply a set of icons that can be displayed on the taskbar; one of these icons represents the device in its enabled state, and one represents the device in its disabled state.

DCDWEDGE will use these icons if the **Current device icon** button is selected. It will use its own (default) icon if the **DCDWEDGE default** button is selected or if the DCD device does not supply icons.

Wedge Configuration Dialog Box

DCDWEDGE allows users to store and load named configurations using the Wedge Configuration Dialog Box. This dialog is launched by tapping the **Config...** menu item in the DCDWEDGE icon popup menu. An example of the Wedge Configuration dialog box is shown below:.



The user can load a saved configuration either by selecting a configuration name and tapping the **Load** button or by double-tapping a configuration name. Saved configurations can be deleted by selecting a configuration name and tapping the **Delete** button.

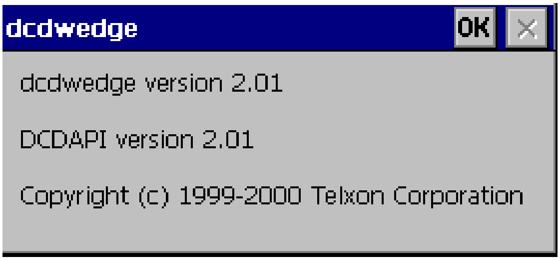
When the user taps the **Save...** button, they are prompted for the name of a new or existing configuration. If they enter the name of an existing configuration (or if they select a configuration prior to taping the **Save...** button) that configuration will be overwritten. If the user enters the name of a new configuration, that configuration will be created.

> ***Note:*** *When the user launches the Wedge Configuration dialog box, DCDWEDGE will automatically disable the selected DCD device if it is enabled. When the dialog is closed, the user must manually re-enable the device using the DCDWEDGE popup menu's Enable menu item.*

Other DCDWEDGE Popup Menu Items

In addition to the **Properties...** and **Config...** menu items, the DCDWEDGE icon popup menu has other menu items that are simple enough that all of them can be discussed in a single section.

The **About...** menu item displays version information about DCDWEDGE and a copyright notice. It also displays information about DCDAPI32 (the system DLL that actually implements the DCD interface to DCD devices). Also, if a DCD device is selected, the device's name and version information will be displayed.



The Enable/Disable menu item allows the user to enable or disable the DCD device. It will be grayed out if the device is unconfigured (see the section titled "Miscellaneous Page" on page 82 for a definition of "unconfigured"). The text of this menu item will reflect the device's current state; that is, it will read "Enable" if the device is currently disabled and "Disable" if the device is currently enabled.

The Exit menu item causes DCDWEDGE to shut down and removes the DCDWEDGE icon from the taskbar. When it restarts, it will reload its configuration from the Registry if the **Use last configuration** check box is checked on the Miscellaneous page of the DCDWEDGE dialog box.

Driver Support

Listed below are the Windows CE drivers used in Symbol's SC400-based units. Most of the Windows CE drivers used are standard Microsoft drivers and are not directly user configurable. Exceptions to this are Battery, Power Management, and Cradle; also Touch Panel and Serial IrDA.

Ethernet

The Ethernet driver initializes the CS8920 Ethernet controller chip and provides Ethernet connectivity.

Display

The Display driver initializes the Epson SPC8106 LCD controller to interface with the LCD monochrome display. The LCD controller is put in the 4 bpp display mode. The driver is also responsible for allocating the display frame buffer.

Keyboard

The Keyboard driver is responsible for sending key presses to the operating system. The Symbol PTC-2124 Windows CE device uses the Mitsubishi M38867M8A keyboard controller and is capable of receiving key presses from a PS/2 keyboard.

PCMCIA

The PCMCIA driver (PC Card Adapter driver) manages any PC card slots on a Windows CE platform. It contains the card services library and socket services library functionality. All higher level drivers, requiring PCMCIA card and socket support, use this driver to interface with the PCMCIA card.

Battery

The Battery driver allows the user to monitor various types of battery and power source information including status of the Main and Backup Batteries, as well as identifying the unit's power source. It can be accessed through the Symbol Control Panel Applet. For more information, refer to the section titled "Telxon Applet" on page 95 of this Guide.

Power Management

The Power Management (PM) driver, along with the kernel adaptation layer, provides for the Symbol-specific power management. This includes

- Processing of time-outs for dropping through the unit modes.
- Notification method for drivers to inform power management of activity and the need to return to Run mode.
- Registration for drivers that are to be informed of a change between unit modes.

For information on user configuration of Power Management features, see the section of this guide titled "Power Applet" on page 103.

For more information about the power management software interface, refer the ***SC400 Windows CE SDK Programming Guide***.

Cradle

The Windows CE Cradle driver for the Symbol SC 400-based units will provide the following services:

- Create a thread which polls for cradle insertion and removal at a configurable interval.
- Maintain a pair of system-wide events that reflect the status of the system's cradle connection.
- Provide an I/O control interface that allows applications to determine the cradle connection status.
- Provide an I/O control interface that allows applications to control which serial connector on an optical port should be used while in the cradle.

- Support multiple open handles (simultaneous access from different applications).
- Perform any special code that needs to be executed during power state transitions.

These services will be exposed to applications indirectly using the Symbol SDK.

User configuration options for the Cradle driver can be accessed through the Cradle Configuration Control Panel Applet. For more information on user configuration instructions, refer to the section titled “Cradle Configuration Applet” on page 102 of this guide.

For more information about the cradle software interface, refer to the ***SC400 Windows CE SDK Programming Guide***.

Touch Panel

The Touch driver is responsible for sending pen touch events to the operating system. Only on the Symbol PTC-2124 and PTC-2134 devices, the Touch driver is also responsible for notifying the touch digi-button and user button driver. The Symbol Windows CE device uses the Nissha NIS/RC-872 touch panel controller.

The PTC-2124 and PTC-2134 Symbol device touch digi-button and user button driver are responsible for responding to notification from the Touch driver and either sending keystrokes to the current focus or invoking a program.

A cold boot will automatically prompt the user to calibrate the touch panel. Calibration is also accessible through the Stylus control panel applet.

Serial IrDA

The Serial driver allows application access to the Infrared Data Association (IRDA) port. The Symbol Windows CE device uses the integrated infrared port on the SC400 in slow-speed infrared mode, which supports transfer rates up to 115 Kb. This device is opened for IRDA access, by using the socket method or by using the low-level stream method.

The Serial driver is configured using standard Microsoft function calls.

DCDAPI

DcdAPI32 allows multiple single- or multi-threaded Win32 applications to share any available DC device. In addition, DcdAPI32 can simultaneously provides access to multiple DC devices.

DcdAPI32 exposes two levels of configuration to applications. The first level is that of *global* configuration. Global configuration parameters are in effect regardless of what data the DC device is processing. The second configuration level is that of *data* configuration. Data configuration parameters are specific to the data that the DC device is expected to process.

The use and configuration of the DCDAPI are discussed further in the ***SC400 Windows CE SDK Programming Guide***. Please refer to that guide for more information.

SE1200 Scanner

The SE1200 Scanner driver is configured using the menus accessed through the DCDWEDGE icon on the taskbar.

1. Select the **Device** tab.
2. From the list of devices, select **SE1200**.
3. Select the **DCD** tab.
4. Tap the **Hardware** buton.
5. In the **Configuration Bits** field, enter **1** or **2**.

For more information on configuration instructions, refer to the section of this guide titled “DCDWEDGE Dialog Box” on page 71.

Cisco/Aironet Windows CE Driver

Cisco/Aironet Windows CE Driver Installation

Follow these steps in order to install the Cisco/Aironet driver for Windows CE:

1. Plug the Cisco/Aironet PC Card into the unit's PCMCIA slot (follow manufacturer's instructions).

2. Turn on the PTC device.

3. Shortly after the device has booted up, a dialog will appear asking the user for confirmation to use the PC Card: choose **Yes**. This dialog will appear every time the user puts a card in the PCMCIA slot.

4. Another dialog will appear, asking for the name of the driver for the PC Card. This will only need to be answered once per installation, not each time the card is used. The answer for this dialog is **aironet**.

5. At this point, the amber LED on the Cisco/Aironet card should light briefly, and the green LED should begin blinking, indicating that the card is attempting to establish communication with an access point.

6. Configure networking on the PTC by waiting for the CE device to prompt for the needed information. Or if the device does not prompt, go to the Windows CE Control Panel and double-tap on the **Network** icon. These dialogs will allow the user to give the device a static or dynamic IP address, and to set the required DNS or WINS entries.

7. Once networking is configured, the user should be able to start and use the onboard Web browser.

8. The Cisco/Aironet card is now installed on the CE device.

Configurator Installation

Follow these steps to be able to configure the device once installed.

1. Run the **Aironet_Setup.exe** file to initiate the program which will allow card configuration changes.
2. It will prompt the user to remove and re-insert the card to initiate these changes.
3. Run **Reg2Disk.exe** to save the changes to the hard disk.

Control Panel Applets

The Control Panel Applets are "mini-applications" that serve as extensions to the Windows CE Control Panel. In addition to the standard MS Windows CE Control Panel Applets, there are two Symbol specific Applets: the Telxon Applet and the Cradle Configuration Applet.

The Control Panel can be accessed by going to the Start Menu and selecting Settings, then Control Panel. Double tapping one of the Control Panel icons will bring up the associated dialog box.

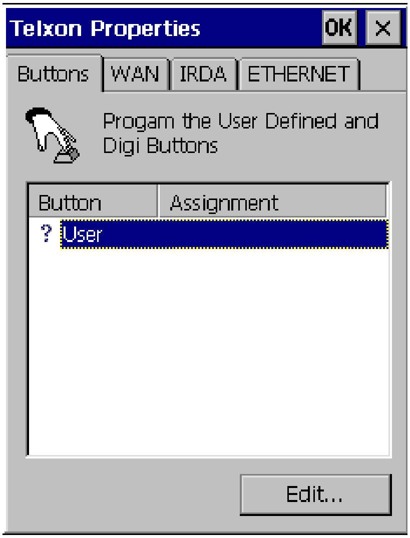
Note: *To prevent a dialog box from moving out of the display area while using the Windows CE popup keyboard, adhere to the following procedure:*

- *Close the popup keyboard before opening a new applet.*
- *After the new applet is opened, re-open the popup keyboard.*

Telxon Applet

This applet is implemented as a single binary file, **telxonpe.cpl**. This file in turn depends on one supporting file, **telxonsdk.dll**. Both of these files must exist in the \WINDOWS folder. When the Windows CE Control Panel is launched, it will automatically recognize the CPL file as a control panel extension and load it.

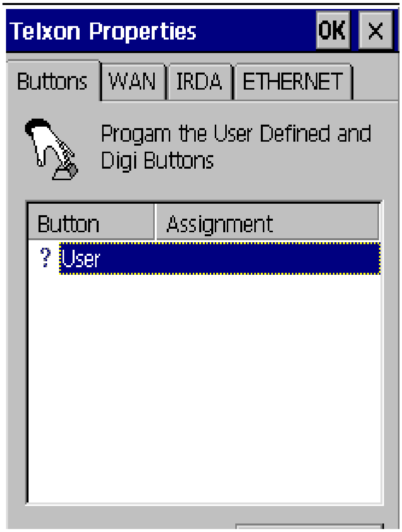
The Telxon Properties dialog box has four tab pages called Buttons, WAN, IRDA, and ETHERNET. Tapping on a tab heading will select that tab page.



The dialog title bar contains an OK button [**OK**], and a Cancel button [**X**]. These buttons are standard for Windows CE dialog boxes. The OK button will apply any changes made by the user and then close the dialog box. The Cancel button [**X**] will close the dialog box and discard any changes made by the user.

Buttons Page

On the PTC-2124, the Buttons tab page allows the user to view and reassign the use of the User Defined Button and Digi-Buttons. On the PTC-2134, this page is limited to viewing and reassigning the User Defined Button (**rt mouse** button) only.



This page displays a listview control. There is one entry for the User Defined Button and one entry for each Digi-Button that is currently installed on the PTC-2124. Each entry will display either the name of the file that will be launched when that button is pressed, or a list of the keycodes that will be played when that button is pressed. An icon prefix shows whether the entry is linked to a file or a keystroke sequence or is undefined. Note that on the PTC-2134 there is only one entry in this listview control.

Tapping the **Edit...** button will bring up the Edit Button Assignment dialog box, for the currently selected listview entry. If **Launch File** is selected, the user can type a file name into the edit control, and the **Browse...** button will be enabled.

Tapping the **Browse...** button will bring up the standard Windows CE File Selector dialog box.

If a file is selected by the user, its file name will be pasted into the edit control. Selecting **Play Keystrokes** will disable the **Browse...** button. The user can then type a list of keystrokes in the edit box.

Tapping the **OK** button will close the dialog box and update the changes in the Buttons page's listview control.

Tapping the Cancel button [**X**] will close the dialog box without updating any of the changes.

Each keystroke represents one virtual key. This keystroke text will be converted into Virtual Keycodes. All text must be upper case. The table below is a list of text to type and the Virtual Keycode that it will generate:

Text	VK Code	Text	VK Code
"<BACK>"	VK_BACK	"<END>"	VK_END
"<TAB>"	VK_TAB	"<HOME>"	VK_HOME
"<ENTER>"	VK_ENTER	"<LEFT>"	VK_LEFT
"<SHIFT>"	VK_SHIFT	"<RIGHT>"	VK_RIGHT
"<ALT>"	VK_ALT	"<UP>"	VK_UP
"<ESC>"	VK_ESC	"<DOWN>"	VK_DOWN
"<SPACE>"	VK_SPACE	"0".."9"	VK_0..VK_9
"<HELP>"	VK_HELP	"A".."Z"	VK_A..VK_Z
"<PAGEUP>"	VK_PAGEUP	"<123>"	The literal VK code entered as a decimal number
"<PAGEDOWN>"	VK_PAGEDOWN		

Text can be combined. *<SHIFT>A* will generate an uppercase 'A', while *A* will generate a lowercase 'a'. The string *<HOME><DOWN><DOWN><ENTER>* will generate 4 keystrokes. When these keystrokes are played back, they will do the same thing as if the user had pressed the HOME key, DOWN arrow key twice, followed by the ENTER key. There is a limit of 100 keystrokes that can be played back.

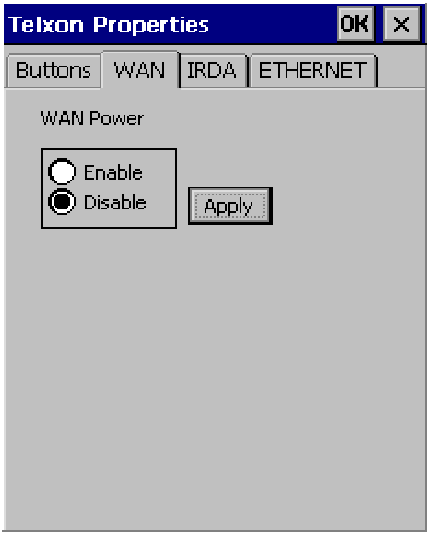
This page provides a GUI interface for the Symbol SDK SysUserBtnControl() and SysDigiBtnControl() functions.

WAN Page

The WAN tab page allows the user to turn the power to the WAN radio on or off.

To turn on the power to the WAN radio, select **Enable** and tap on the **Apply** button.

To turn off the power to the WAN radio, select **Disable** and tap on the **Apply** button.

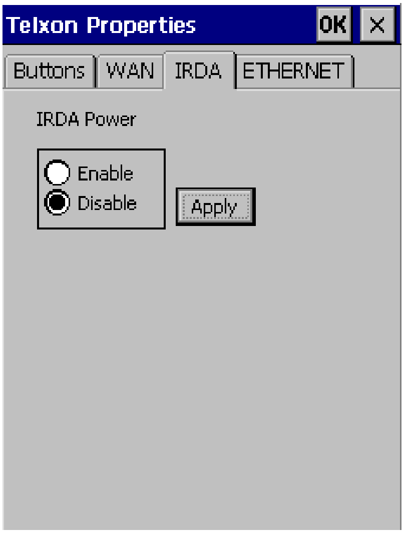


IRDA Page

The IRDA tab page allows the user to turn the power to the IrDA driver on or off.

To turn on the power to the IrDA driver, select **Enable** and tap on the **Apply** button.

To turn off the power to the IrDA driver, select **Disable** and tap on the **Apply** button.

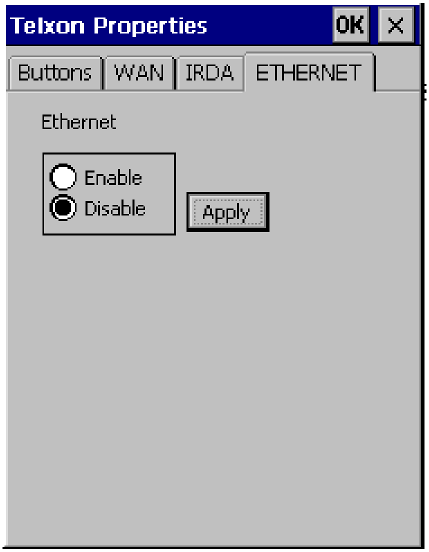


ETHERNET Page

The ETHERNET tab page allows the user to turn the power to the Ethernet driver on or off.

To turn on the power to the Ethernet driver, select **Enable** and tap on the **Apply** button.

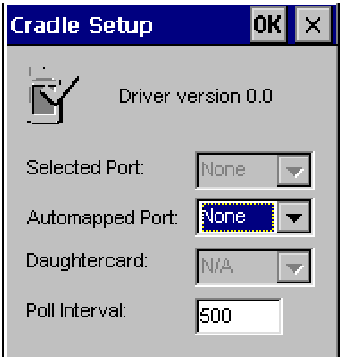
To turn off the power to the Ethernet driver, select **Disable** and tap on the **Apply** button.



Cradle Configuration Applet

The Cradle Configuration control panel applet will allow users to configure the cradle's COM port mappings and set up automatic mapping if desired. The control panel applet is basically a wrapper around the SysConfigureCradleDialog() API.

When the Cradle Configuration icon is double-tapped, the following dialog box is brought up.



This dialog box allows the user to monitor the Driver Version and the Poll Interval. From drop-down boxes, the user is allowed to select the Selected Port, Automapped Port, and the Daughtercard.

Note: *The Daughtercard drop-down box is valid only for the PTC-960M. On PTC-2124 and PTC-2134 units, this will be displayed as N/A and will not be user accessible.*

Power Applet

The Power Control Panel Applet allows users to monitor battery charge levels and current power source. It also provides an interface for configuring the CPU speed in different modes and the associated mode time-outs, both on and off AC power.

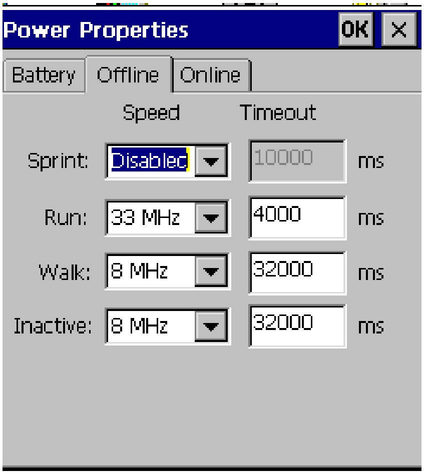
The Power applet can be launched from the Control Panel. If the unit is on AC power, it can also be launched by double-tapping the battery icon on the taskbar.

The Battery Page

The battery page indicates the current status of the system main and backup batteries. It also shows whether the batteries are currently being charged and displays the charge level in the system main battery pack. Finally, it indicates whether or not the unit is on AC power.

The Offline Page

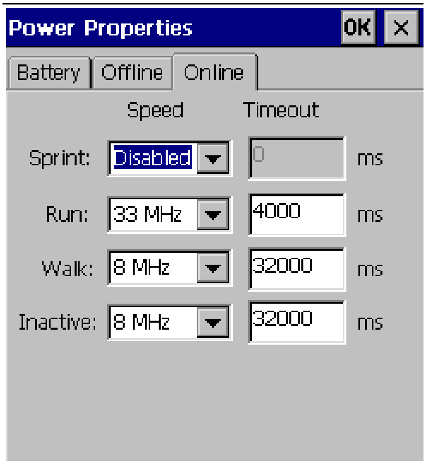
The Offline page allows users to view and update the unit power mode configuration that will be used when the unit is not connected to an AC power source. This page lists each of the modes available when the CE kernel is in the Run state, as well as the associated time-out. When a time-out occurs with no activity, the unit automatically drops to the next lower unit mode. When the Inactive mode time-out occurs, the unit drops into the Suspend mode. Time-out values are in milliseconds.



A time-out value of 0 disables time-outs. In other words, the unit will remain indefinitely at a unit mode whose time-out is 0 (unless it is explicitly suspended or the battery fails). The Run, Walk, and Inactive modes cannot be disabled completely. However, by setting their time-out values to 1 millisecond the system will drop quickly the next lower mode.

The Online Page

The Online page allows users to view and update the unit power mode configuration that will be used when the unit is connected to an AC power source. The page lists each of the modes available when the CE kernel is in the Run state and the associated time-out. When a time-out occurs with no activity, the unit automatically drops to the next lower unit mode. When the Inactive mode time-out occurs, the unit drops into the Suspend mode. Time-out values are in milliseconds.



A time-out value of 0 disables time-outs. In other words, the unit will remain indefinitely at a unit mode whose time-out is 0 (unless it is explicitly suspended or the battery fails). The Run, Walk, and Inactive modes cannot be disabled completely. However, by setting their time-out values to 1 millisecond the system will drop quickly the next lower mode.

ActiveSync

This section describes the procedure to connect a Symbol Windows CE device to an NT host using MS Active Sync.

Requirements

Requirements for using MS ActiveSync are as follows:

1. PC running MS ActiveSync3.0 (This can be downloaded from Microsoft's web site.)
2. Symbol Windows CE device.
3. A null modem cable.
4. For the PTC-2124, a Y-adapter cable for the Serial ports is also required.

   A list of accessories and part numbers can be found in the ***PTC-2124 User's Guide***, or obtained from a Symbol Sales Representative.

Establishing a Serial Connection Using ActiveSync

To establish a connection between a PC and a Symbol PTC-2124, perform the following steps:

1. Verify that ActiveSync is running on the PC.
2. Connect the PTC to the host PC using the above mentioned cables.
3. If this is the first time establishing a link, follow these configuration instructions. If this link has been established before, skip to step **4**.
   - On the PTC, Double-tap on the **Communication** control panel applet. This brings up the **Communications Properties** dialog box.
   - Under the PC Connection tab, press the **Change Connection…** button.
   - Change setting to **COM2**.
   - Under the Device Name tab, enter a device name in the device name field.
4. Open ActiveSync on the PC and from the **File** menu, click on **Get Connected**.
5. On the PTC, tap on **Start** ⇒**Programs** ⇒ **Communication** ⇒**PC Link**.
6. If this is the first time establishing a link, ActiveSync will prompt the user to establish the partnership—follow the instructions on the screen.
7. The link is now established.

The files on the PTC-2124 can be accessed by the PC by clicking on the **Explore** button on toolbar of the PC's ActiveSync window.

Breaking the ActiveSync Connection

To disconnect the ActiveSync connection between the PC and the Symbol PTC-2124, perform the following steps:

1. Double-tap the ActiveSync icon on the PTC-2124's taskbar.
2. Tap on the **Disconnect** button.

Note: *The ActiveSync connection can also be broken by unplugging the cable that is used to attach the PTC-2124 unit to the PC.*

Miscellaneous Utilities

The PTC-2124 includes the following utilities:

- Registry View,
- Time/Date,
- Save Registry,
- Version,
- TFlashsc.exe,
- CE.ini.

With the exception of Version, Tflashsc.exe, and CE.ini, these utilities are standard MS Windows CE utilities and are accessible through the My Computer icon on the Windows CE Desktop. To access them, follow these steps:

1. Double-tap the My Computer icon.
2. Double-tap the Windows folder.
3. Scroll through the files in the Windows folder to locate the icon with the appropriate file name.
4. Double-tap that icon.

For more information on these utilities, refer to Microsoft's documentation.

Registry View

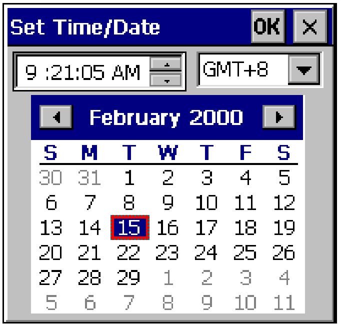
The file name for the Registry View utility is **RegEdit.exe**. Running this file displays the registry directory structure. It allows the user to browse this directory structure.

Save Registry

The file name for the Save Registry utility is **Reg2Disk.exe**. Running this file saves any changes made to the registry directory structure to the unit's harddisk.

Time/Date

This utility can be accessed through the Control Panel. When this file is run, the dialog box below is shown:



This dialog box allows the user to change the unit's time, date, and time zone settings. After adjusting the settings, tap **OK** to implement the changes.

Version

The file name for the Version utility is **Ver.exe**. Entering **Ver.exe** on the command line will display the following version information:

- Symbol Corporation.
- Windows CE on SC400 Platform.
- Microsoft Windows CE 2.12.

TFlashsc.exe

This utility is designed to flash the Windows CE boot loader into Symbol SC400 based PTCs. **TFlashsc.exe** currently supports the following flash memory device: AMD29LV400.

To use **TFlashsc.exe**, follow these steps:

1. Insert the Genesis/Boot loader card into slot 0 (farthest from the display).
2. Launch **TFlashsc.exe** from **My Computer** ⇒ **HardDisk**. The **Hardware Info** window should be displayed. The list boxes should show: Flash Type = AMD 29LV400, Flash Size = 524288 words and Number of Sectors = 11.
3. Select **Help/ About**. The copyright and version info should be displayed.
4. Select **File/Program** to program the flash. Tap **Select** and choose the **Boot.rom** file to flash into the flash device. Tap on **Program**. A confirmation box will be displayed. Tap on **OK** to start programming. Progress bars will show status.

   Note: *Programming takes approximately 30 seconds to complete, so be patient.*

5. When programming is complete, a pop-up window will appear, stating that **Programming is Complete**.
6. Tap the Cancel button [**X**] to close the pop-up window.
7. Force a cold reboot of the PTC.

CE.ini

When a Symbol Windows CE device is booted, the first program that is executed is **CEinit.exe**. This program allows the administrator of the device to execute a group of operations upon bootup that customize this unit for a given install. It does this by parsing the file **\harddisk\ce.ini** for operations to perform.

CE.ini is a text file whose format will be explained in the following sections.

The **CE.ini** file is divided into sections, with section header names framed by brackets
(i.e. [Default]) at the beginning of a new line.

In this document, braces (**{**, **}**) are used to define optional items in a list or section.

Default

The [Default] section must be present and must be the first section in the file. The [Default] section defines what sections need to be processed and how to handle them. Each subsequent section can be added after the [Default] section.

Parameter

[Default]

{Copyfiles=copyfile section name}

{DeleteFiles=deletefile section name}

{AddReg=add registry section name}

{DeleteReg=delete registry section name}

{Shortcuts=shortcut section name}

{DeleteShortcuts=delete shortcut section name}

Explanation

- The section name is determined by the user.
- Each line can have multiple sections listed, separated by commas. For example:

  AddReg=add registry section name,add registry section name

- No spaces allowed are allowed in any of the lines of **CE.ini**.

Example

The following is an example of a [Default] section that defines sections to copy a file, add a registry entry, and set up a shortcut:

[Default]

Copyfiles=Copyfiles.myapp

AddReg=AddReg.Radio

Shortcuts=Shortcuts.Programs

CopyFiles

The [CopyFiles] section allows the user to automatically copy specified files upon bootup.

Parameters

[copyfiles section name]

destination filename,source filename,{flags}

Explanation

- *Flags* are numeric values that specify an action to be done while copying files. Values supported by Windows CE are described in the following table:

Flag	Value	Description
COPYFLG_WARN_IF_SKIP	0x00000001	Warn user if attempt is made to skip a file after an error has occurred.
COPYFLG_NOSKIP	0x00000002	Do not allow user to skip copying a file.
COPYFLG_NO_OVERWRITE	0x00000010	Do not overwrite an existing file in the destination directory.
COPYFLG_REPLACEONLY	0x00000400	Copy source file to the destination directory only if the file is already in the destination directory.

Example

The following is an example of a [CopyFiles] section that will copy the file **myapp.exe** from the **\HardDisk** directory to the **\Windows** directory:

[Copyfiles.myapp]

\windows\myapp.exe,\harddisk\myapp.exe, 0x00000002

DeleteFiles

The [DeleteFiles] section allows the user to automatically delete specified files upon bootup.

Parameters

[deletefile section name]

delete filename

Example

The following is an example of a [DeleteFiles] section that will delete the existing **wombat.exe** file from the **\HardDisk** directory:

[DeleteFilesSection]

\harddisk\wombat.exe

AddReg

The [AddReg] section allows the user to automatically add specified registry entries upon bootup.

Parameters

[add registery section name]

registry root string,subkey,{value name},flags,value

Explanation

- A *registry root string* specifies the registry root location. Values supported by Windows CE are described in the following table:

Root String	Description
HKCR	HKEY_CLASSES_ROOT
HKCU	HKEY_CURRENT_USER
HKLM	HKEY_LOCAL_MACHINE

- A *subkey* specifies which subkey and its values is to be added.
- A *value name* is the Registry value name. If empty, the registry value name “default” is used.

- *Flags* are numeric values that specify an action to be done while copying files. Values supported by Windows CE are described in the following table:

Flag	Value	Description
FLG_ADDREG_NOCLOBBER	0x00000002	If the registry key exists, do not overwrite it. This flag can be used in combination with any of the flags later in this table.
FLG_ADDREG_TYPE_SZ	0x00000000	Registry data type REG_SZ.
FLG_ADDREG_TYPE_MULTI_SZ	0x00010000	Registry data type REG_MULTI_SZ. The value field that follows can be a list of strings separated by commas.
FLG_ADDREG_TYPE_BINARY	0x00000001	Registry data type REG_BINARY. The value field that follows must be a list of numeric values separated by commas, one byte per field, and must not use the 0x hex prefix.
FLG_ADDREG_TYPE_DWORD	0x00010001	Data type REG_DWORD. Only the noncompatible format in the Win32 Setup.inf documentation is supported.

Example

The following is an example of a [AddReg] section that will add a registry entry for a radio:

[AddReg.Radio]

HKLM,Comm\Aironet1\Parms\TcpIp,IPAddress,0x00010000,149.23.69.203

DeleteReg

The [DeleteReg] section allows the user to automatically delete specified registry entries upon bootup.

Parameters

[delete registry section name]

registry root string,subkey

Explanation

- A *registry root string* specifies the registry root location. Values supported by Windows CE are described in the following table:

Root String	Description
HKCR	HKEY_CLASSES_ROOT
HKCU	HKEY_CURRENT_USER
HKLM	HKEY_LOCAL_MACHINE

- A *subkey* specifies which subkey and its values is to be deleted.

Example

The following is an example of a [DeleteReg] section that will delete an existing registry entry for games:

[DeleteRegSection]

HKLM,Software\Microsoft\Games

Shortcuts

The [Shortcuts] section allows the user to automatically add specified shortcuts upon bootup.

Parameters

[shortcut section name]

short cut name,shortcut type flag,target file/path

Explanation

- The *shortcut name* identifies the name of the shortcut to be added. It does not need the .lnk extension.
- The *shortcut type flag* is a numeric value. It must be 0.
- The *target file/path* specifies the target destination.

Example

The following is an example of a [Shortcuts] section that will add a Programs shortcut for the game reversi:

[Shortcuts.Programs]

Programs\Accessories\Games\,Reversi,0,\windows\reversi.exe

DeleteShortcuts

The [DeleteShortcuts] section allows the user to automatically delete specified shortcuts upon bootup.

Parameters

[delete shortcut section name]

shortcut name

Explanation

- The shortcut name identifies the shortcut to be deleted.

Example

The following is an example of a [DeleteShortcuts] section that will delete the existing shortcut for Wombat:

[DeleteShortcutSection]

Wombat

Accessories

A list of PTC-2124 accessories, and their part numbers, can be found in the ***PTC-2124 User's Guide*** or obtained from a Symbol Sales Representative.

References

The following are additional reference materials available for the PTC-2124:

- ***PTC-2124 User's Guide***
  (Part Number: 30833-000-002)
- ***SC400 Windows CE SDK Programming Guide***
  (Part Number: 30669-701-001)
- ***21x4 SC/VC User's Guide***
  (Part Number: 24907-701-001)
- ***1124 Connector Pod Read-Me-First Sheet***
  (Part Number: 24830-701-001)

> ***Note:*** *Reference guides can be downloaded in PDF format from Symbol's website at **www.symbol.com**.*

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