PTC-960SL-III
User's 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-960SL-III portable telecommunications computer. Every effort has been made to provide accurate and concise information to you, our customer.

The *PTC-960SL-III User's Guide* provides information that allows the user to setup and operate the PTC-960SL-III. The major topics covered by this manual include

- Regulations and safety,

- Overview of the PTC-960SL-III,

- Getting started,

- Hardware features,

- Bar-code recognition,

- Communication interfaces, and

- Device maintenance.

Contacting Symbol's Product Support Center

Symbol's Support Center may be contacted to obtain help in resolving any PTC-960SL-III system problem that you may experience.

The Symbol Support Center's toll-free number is 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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Regulations

General regulations

FCC statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the Federal Communications Commission (FCC) rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.

DOC statement

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as outlined in the Radio Interference Regulations of the Canadian Department of Communications (DOC). This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe A respecte toutes les éxigences du Réglement sur le matériel broilleur du Canada.

Spread spectrum radio regulations

FCC regulations

The PTC-960SL-III uses radios (transceivers) and radio communication in its operation. The PTC-960SL-III uses a spread spectrum radio transceiver that qualifies for unlicensed use. The FCC ID is on a label on the back of the unit.

DOC statement

The PTC-960SL-III's radio is also approved for use in Canada. The PTC-960SL-III uses a spread spectrum radio transceiver that qualifies for unlicensed use. The Canadian DOC ID is on a label on the back of the unit.

This device complies with RSS-210 of Industry and Science Canada. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Safety information

Using the batteries

Follow these guidelines when handling the PTC's lithium-ion or nickel-cadmium battery pack:

- Do not expose the battery pack to water, metal objects, direct sunlight, extreme heat, or fire.

- Do not attempt to disassemble the battery pack.

- Do not handle a damaged or leaking battery pack.

Disposing of lithium-ion or nickel-cadmium batteries

Lithium-ion and nickel-cadmium batteries contain chemically active materials that are hazardous to the environment; therefore, they must be disposed of properly. Never attempt to incinerate a lithium-ion or nickel-cadmium battery; doing so could cause it to explode. Symbol urges you to contact the Environmental Protection Agency, the Department of Natural Resources, a local hazardous waste disposal agency, or the Symbol Support Center at 1-800-653-5350 for assistance prior to disposing of your lithium-ion or nickel-cadmium batteries.

PTC having a radio

This device is compliant to the ANSI C95.1 (1992) Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields per FCC Docket 93-62.

PTC having an internal laser scanner

Do not stare into the scanner's laser beam. Permanent eye damage could result.

The PTC-960SL-III's internal laser scanner module is a Class II laser product. It emits a 1.0 mW beam of laser light from the output window. No maintenance is required to keep this product in compliance with U.S. Department of Health and Human Services (DHHS) Regulation 21 CFR Subchapter J. No controls are provided for operation or maintenance. Laser light in excess of Class I limits is inside an internal protective cover.

The laser safety warning label required by the DHHS for the PTC-960SL-III's optional laser scanner module is located on the scanner module near the scanning window.

Note: *The M88 imager uses a digital camera instead of a laser and, therefore, poses no safety risk.*

Scope of the manual

This manual provides general information on the PTC-960SL-III's parts, features, and accessories. It also explains how to operate and maintain the PTC. This manual does not include the specific operating instructions for your organization's unique data collection program. Operating instructions and training should be available from your organization.

Document conventions

The following conventions are used throughout this manual.

Warnings

Warnings indicate potential bodily injury or death. They are set off in the left-hand columns of this manual by the following symbol: ⚠.

Cautions

Cautions indicate potential damage to equipment. They are set off in the left-hand columns of this manual by the following symbol: **!**.

Notes

Notes provide supplementary information. They are set off in the left-hand columns of this manual and are not preceded by a symbol.

Overview of the PTC-960SL-III

The Symbol PTC-960SL-III is a battery-powered, hand-held computer used to collect, store, and transmit data. It has a built-in laser scanner and may contain a spread spectrum radio.

The PTC-960SL-III automates data collection procedures and is custom programmed to handle efficiently your organization's unique data collection jobs.

The PTC runs a program specially designed to collect data for your organization. This program leads the user through the data collection procedure with a series of display messages, prompts, and beeps. Messages tell the user when you make an error and provide information on the program or the PTC's status. Prompts and beeps tell the user when to enter data, what type of data to enter, and when certain operations are complete.

The PTC-960SL-III is extremely durable. It is designed to withstand the low atmospheric pressure at high altitudes, a 4 ft (1.2 m) drop to concrete, vibration, shock, and dust.

See the section titled "Extended temperature units," starting on page 33, for more information on extended temperature versions.

An extended temperature version of the PTC-960SL-III is designed for use in extremely cold environments, such as those found in walk-in freezers. This optional unit may be operated in temperatures as low as –22° F (–30° C).

Entering data

Entering data into the PTC-960SL-III is easy. Data can be keyed in through the keyboard or bar codes can be scanned with the internal laser scanner. Additionally, data may be received through an optional internal direct-sequence or frequency-hopping spread spectrum radio.

Through the keyboard

Entering data through the keyboard is similar to operating a calculator. As the user presses the data keys, the corresponding numbers or letters appear on the screen. Pressing the **ENTER** key stores data in the PTC's memory.

With the internal laser scanner or imager

A *bar code* is a series of vertical bars and spaces used to encode information in a machine-readable form. They are used on nearly every item in business today.

A second method of entering data is with the PTC's internal laser scanner or imager. When scanning a bar code that the PTC is programmed to read, the PTC and scanner interpret the data and store them in the PTC's memory.

Via the radio

Refer to the sections titled "Radio (optional)," on page 15, and "Using the radio," on page 27, for information on radio communication.

Storing data

Data entered into the PTC may be stored in files in the PTC's memory.

Each file holds a separate group of application-related data. For example, a PTC used to collect many types of data (sales orders, inventory changes, and employee hours) would store all data relating to sales orders in one file, all data relating to inventory changes in another, and all data relating to employee hours in still another.

Communicating data

After collecting the data, the PTC must either transmit them to a host computer for processing or send them to a printer, or both, to make them useful to you and your organization. The PTC-960SL-III can transmit data through its internal radio, via an optional communication cradle, or by being connected by cable to a host computer, printer, or other accessory.

Once the host computer receives the data from the PTC, it uses that data to update its master files and records. In some cases, the host computer may even transmit data back to the PTC, requesting the user of the PTC to perform a new task.

Getting started

Unpacking the PTC-960SL-III

Any additional accessories are shipped separately.

Each shipping box contains

- a PTC-960SL-III,

- a 1,300 mAh lithium-ion or 500 mAh nickel-cadmium battery pack,

- a 12 VDC, 200 mA power module (if ordered),

- an antenna (if your PTC was ordered with a radio),

- a wrist strap,

- a *Guide to Maintaining Nickel-Cadmium and Lithium-Ion Batterie*s,

- a *PTC-960SL-III Getting Started Guide*, and

- a *PTC-960SL-III User's Guid*e.

To unpack the PTC-960SL-III and its accessories, follow these steps:

1. Remove the PTC from the box.

2. Remove all packing material from the PTC. Save the packaging in case the PTC is ever stored or shipped to Symbol for service.

3. Check the contents of the package to make sure that you have received everything ordered.

If anything is missing or damaged, notify your Symbol sales representative.

4. Check the PTC and accessories for shipping damage. Pay particular attention to the PTC case, display screen, and scanner lens.

Connecting the antenna

If your PTC-960SL-III contains a radio, screw the supplied antenna into the antenna connector on the top of the unit.

Installing the battery pack

If your PTC was not shipped with the battery pack installed, follow the instructions in Chapter 10 to insert the battery pack.

Charging the battery pack

The PTC-960SL-III's lithium-ion or nickel-cadmium battery pack may be recharged via a power module, a communication cradle, or a universal four-bay battery charger. Charge the PTC's battery pack when the unit is first received and whenever the pack becomes low. The Batt LED glows and a low-battery message may display when the battery pack is running out of power.

Charging via the power module

The following items are required to charge the battery pack:

• A 12 VDC, 200 mA power module,

• An electrical outlet within 6 ft (1.8 m) providing 110 volts AC in the U.S. or Canada.

Follow these steps to charge the battery pack.

1. Turn off the PTC and disconnect any attached accessories.

2. Connect the power module's cable to the PTC's micro DB-15 connector.

3. Plug the power module into the electrical outlet. The Chg LED glows.

4. Charge the PTC's battery pack for 8 hours (lithium-ion) or 5 to 6 hours (nickel-cadmium).

5. When charging is finished, first unplug the power module from the electrical outlet; then, disconnect it from the PTC.

Charging via the communication cradle

To charge the PTC's battery pack via the SC-960SL-III Single-Bay Communication Cradle, simply insert the PTC into the cradle, following the instructions shipped with the cradle. The PTC's battery pack will be recharged automatically.

Charging via the universal battery charger

The Universal Battery Charger can recharge up to four PTC-960SL-III lithium-ion or nickel-cadmium battery packs in 3 hours or less. Refer to the documentation shipped with the charger for specific instructions.

Turning on the PTC

Press the **ON/OFF** key to turn on the PTC-960SL-III.

Checking the PTC

Perform the following steps to check the operation of the PTC.

1. Make sure the PTC is turned on.

2. Look at the PTC's display screen. What appears on the screen depends on the program that your organization uses.

If the PTC is operating correctly, the user should not observe or hear any of the following:

• A low-battery warning,

• A blank display screen, or

• Any warning beeps.

Parts

Figures 1 through 3 on the following pages show and describe the external parts of the PTC-960SL-III. The parts listed below are internal and, therefore, are not shown in any of the figures.

Flash EPROM

A *flash EPROM* is an electronic component installed inside the PTC. It contains the PTC's data collection program and determines the PTC's key functions, the display prompts and messages, and how and when the PTC prints or transmits data. If your PTC has an internal radio, a second flash EPROM holds the program that controls the radio.

For details on erasing and reprogramming flash EPROMs, refer to the *Guide to the Flash Utilities (TCAL or MS-DOS Version)***.**

Flash EPROMs may be erased and reprogrammed while they are inside the PTC. First, the PTC must be connected to a host computer, via a cable or by being placed in an optical communication cradle. Then, using software in the PTC's operating system, you can erase the flash EPROMs and reprogram them with a new program from the host computer.

Radio (optional)

Your PTC's application program controls the radio. Refer to your application's manual for details.

The PTC-960SL-III may be equipped with a 2.4 GHz direct-sequence spread spectrum radio or with a 2.4 GHz frequency-hopping spread spectrum radio. Each radio allows the PTC to interactively communicate in real-time with a host computer on a radio-based local area network. Spread spectrum provides secure, interference-free communication and does not require a license for operation.

1. Antenna connector

2. Keyboard

4. Micro DB-15 connector

3. Wrist strap connector
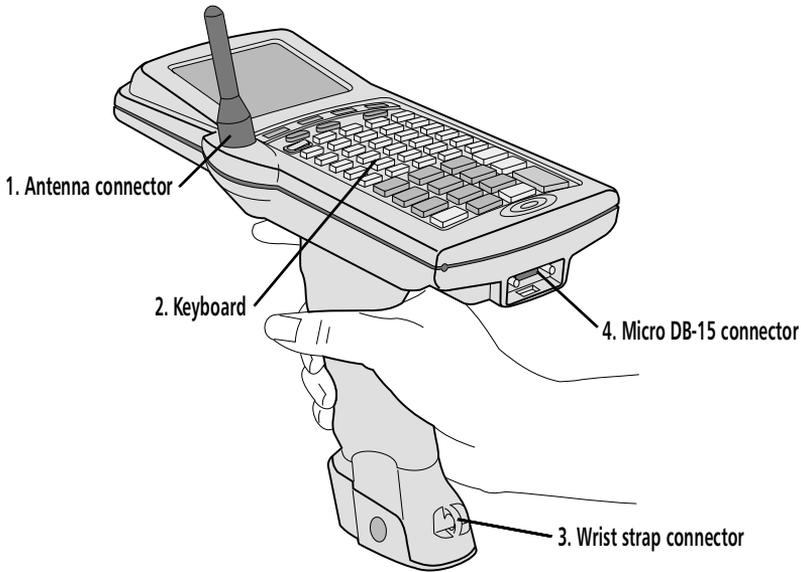
Figure 1. The PTC-960SL-III (top, front, and side view)

1. If your PTC has an internal radio, an antenna screws into this connector. Otherwise, the connector is sealed with a plastic plug. The antenna sends and receives radio transmissions, allowing the PTC to communicate with a host computer. The antenna must be attached to t he PTC before the unit can be used.

2. The PTC-960SL-III's standard keyboard has 45 keys. An optional 28-key keyboard is also available. Both keyboards have two different types of keys: data keys and function keys. Data keys are the letter and number keys, A–Z and 0–9. These keys are used to type data into the PTC. Function keys include the F1-F4, ENTER/YES, and SEND keys. They are used to perform a special procedure or function. For example, the SEND function key is used to transmit data to the host computer.

    ENTER/YES key—The use of this key depends on your applicaion. Usually, this key is pressed to inform the application that the typing of data has been completed, that an operation has been completed, or that the PTC is to begin an operation, such as sending data to the host computer.

    ON/OFF key—Pressing this key turns the PTC on or off.

    SHIFT key—On a 45-key keyboard, the SHIFT key activates only the function keys labeled on the overlay. The numeric keys are always available. On a 28-key keyboard, the SHIFT key shifts between the numeric and alphabetic keyboard and also activates some of the function keys your application uses.

3. A looped wrist strap attaches to this connector. Put your hand through the wrist strap and use it to prevent the PTC from falling if you should accidently let go of it.

4. This 15-pin connector connects the PTC via cable to a host computer or to standard serial devices such as printers and modems. It may also be used with a power module to recharge the PTC's lithium-ion or nickel-cadmium battery pack. Refer to Appendix C for cable part numbers.
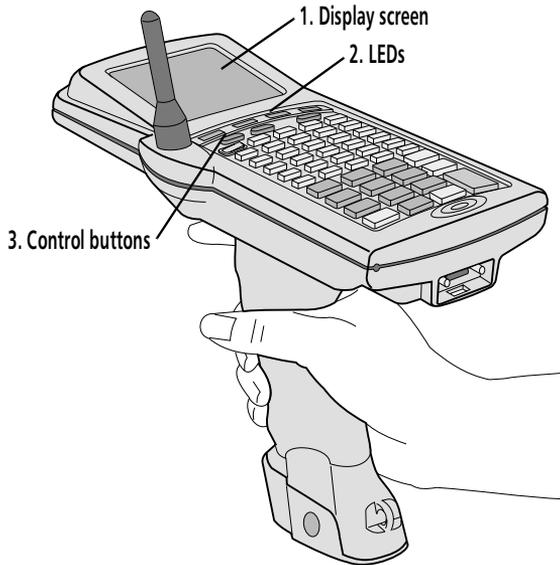
Figure 2. The PTC-960SL-III (top, front, and side view)

1. The liquid crystal display (LCD) screen shows the information typed or scanned into the PTC as well as messages from the PTC or host computer. The screen can show 8 or 16 lines of information with 16 or 21 characters each. Your screen may also be able to display graphics.

2. These four light-emitting diodes (LEDs) provide information on the PTC's status.

   Batt—This red LED glows when the PTC's battery pack is running out of power. A low-battery message may also display on the PTC's screen. Immediately stop the current activity, save any data that was entered, and recharge or replace the PTC's battery pack whenever this LED lights.

   Func—This red LED glows when the FUNC key is pressed.

   Chg—This red LED glows when the PTC's battery pack is being recharged.

   Scan—This LED glows red while the PTC's internal laser scanner is active. It glows green when the scanner has successfully read a bar code.

3. These three buttons control the PTC's display screen:

   The Decrease Contrast button decreases screen contrast in steps until the screen reaches minimum contrast.*

   The Increase Contrast button increases screen contrast in steps until the screen reaches maximum contrast.*

   The Backlight button turns the screen's backlight on or off.

   * Repeatedly pressing either the Decrease or the Increase Contrast button will loop the PTC's display screen through all 16 contrast settings, eventually returning to the first setting.
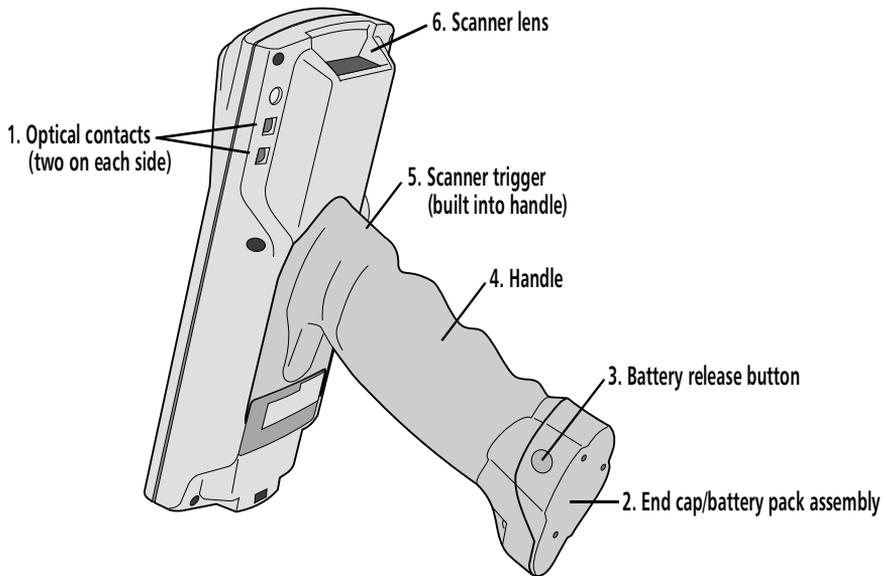
Figure 3. The PTC-960SL-III (bottom view)

1. These four contacts (two on each side) allow the PTC to communicate with a host computer through an optional optical communication cradle. Instead of sending data in the form of electronic signals through the micro DB-15 connector, the PTC sends the data in the form of pulses of light to similar contacts on the cradle. Then, the cradle converts the pulses of light into electronic signals and transmits them to the host computer. The cradle can also send data to the PTC via the optical contacts. Refer to the *SC-960SL-III User's Guide* for instructions on using the cradle.

2. The PTC-960SL-III is powered by a lithium-ion or nickel-cadmium battery pack, which is inserted into the PTC's handle. The PTC handle end cap and the battery pack are combined into a single module. Removing the end cap also removes the battery pack. When the battery pack is replaced, the entire module is replaced with a new one. In general, a lithium-ion battery pack doubles the run time of the PTC (in comparison with a nickel-cadmium battery pack).

3. Pressing these buttons (one on each side of the PTC's end cap) releases the battery pack, allowing it to be removed from the PTC.

4. The handle allows you to hold the PTC and aim the built-in laser scanner when you are scanning bar codes. It also contains the PTC's lithium-ion or nickel-cadmium battery pack.

5. Pressing this trigger, which is built into the rubber skin of the handle, activates the PTC's internal laser scanner or imager, allowing you to scan bar codes. *Note: Your application program may not support scanned data for all fields. Consult the documentation for your application to determine when the scanner and trigger are enabled.*

6. The laser light emitted from the PTC's internal laser scanner exits the unit through this lens.

   ⚠ *Do not stare into the laser beam or point the scanner at anyone's eyes while the scanner is active; permanent eye damage could result.*

Features

Autodiscrimination between bar codes

Refer to Appendix B for a list of the
bar-code types that your PTC is
programmed to read.

Your PTC-960SL-III's application program can read
and automatically discriminate among six different
bar-code types.

Automatic shut off

To conserve battery power, the PTC-960SL-III
automatically turns itself off after approximately 1
minute of inactivity. The exact length of time depends
on your application program.

Automatic return at On

When the user turns off the PTC-960SL-III (or when
the PTC turns itself off), the PTC remembers the
point at which the application was suspended. Then,
when the PTC is turned back on, it returns to that
same point in the application. The user does not need
to remember the point at which the application was
suspended or perform any other start-up function to
automatically resume the application from where it
was suspended.

Backlight

The screen's backlight lights up the screen and makes
information on the display readable in dark or dim
conditions. Pressing the **Backlight** button turns the
backlight on or off.

Backup battery

The PTC-960SL-III's built-in backup battery provides enough power to protect data stored in the PTC's memory when the battery pack is being replaced or if it runs out of power. The backup battery system provides approximately 20 minutes of protection when the battery pack is removed.

Beeper

The PTC's beeper is used by the PTC and your application to warn you of problems or to prompt you to take an action. For example, if your application program has temporarily turned off a key, the PTC will beep if you press that key.

Depending on your organization's application software, you may be able to control the beeper's volume. Refer to the manual or instructions provided by your organization.

Clock

The PTC's clock may be set using the MS-DOS TIME and DATE commands.

The PTC-960SL-III has a built-in clock that keeps track of the date (month, day, year, and day of the week) and the time (hours, minutes, seconds, and tenths of seconds). The clock operates continuously. How the clock is used depends on your application program. For example, the PTC can use the clock to show the date and time on its screen or to time-stamp a file.

Communication

The PTC-960SL-III is capable of communicating with a host computer through its internal radio, through an optional optical communication cradle, or by being connected directly via a cable. Refer to the manual or instructions provided by your organization for the proper communication procedure for your application.

Memory

The PTC-960SL-III has two types of memory: read-only memory (ROM) and random access memory (RAM).

The PTC's ROM is contained on an electronic chip called a *flash EPRO*M, which may be reprogrammed while inside the PTC. It is used to store the PTC's operating system and application programs.

RAM is used to store data entered into the PTC and application configuration settings. Data stored in RAM can be easily read, written, and changed. It is also volatile. All data in RAM will be lost if the PTC's battery pack and backup battery run out of power.

The amount of memory in your PTC determines how much data can be entered before the data must be sent to a host computer or printed. Various amounts of memory are available from Symbol, and the amount actually installed in your PTC has been determined by your organization's needs.

Scanning bar-code labels

The PTC-960SL-III is programmed to recognize, read, and discriminate automatically among six different bar-code types. Refer to the information provided by your organization and to Appendix B for a list of the bar-code types that your PTC is programmed to read.

PSC scanners are preconfigured for the marker beam feature at the factory, but Symbol scanners must be configured for this feature through the PTC's application program. If your PTC contains an SE 1200 scanner, refer to the RAMSaver Application Development Manual for instructions on enabling the marker beam feature.

When the PTC's scanner trigger is pressed, the PTC usually emits a horizontal scanning line and immediately initiates the scanning process. However, the PTC-960SL-III's laser scanner features a marker beam option that can assist you by temporarily providing a highly visible marker. With the marker beam feature enabled, the PTC emits a bright red dot that can be used to aim the laser and center it over a bar code. This feature is especially useful for outdoor or long-range scanning applications, which typically require additional time to aim the laser beam.

Follow this procedure to scan bar-code labels with the PTC-960SL-III's built-in laser scanner.

⚠ Do not stare into the PTC's laser beam or point the scanner at anyone's eyes. Eye damage could result.

1. Point the PTC-960SL-III at the label to be scanned. The scanner may be at an angle to the label.

    The maximum distance from the scanner lens to the label will depend on the size of the label being scanned and the type of laser that was selected by your organization. Refer to Appendix B for the recommended scanning distance.

Your application program may not support scanned data for all fields. Consult the documentation for your application to determine when the scanner and trigger are enabled.

2. Press and hold the trigger on the PTC's handle to start scanning. The Scan LED glows red while the scanner is active.

   If the scanner's marker beam feature is enabled, quickly center the aiming dot over the bar code.

3. Watch the line of light made by the scanner as it scans the bar code.

If the scan is successful, the Scan LED glows green, and the PTC beeps.

4. Hold the PTC so that the scanning line is perpendicular to the bars in the bar-code label. Also, make sure that the line passes over all of the bars. Refer to Figure 4.

Make sure that the scan line extends beyond both sides of the bar code
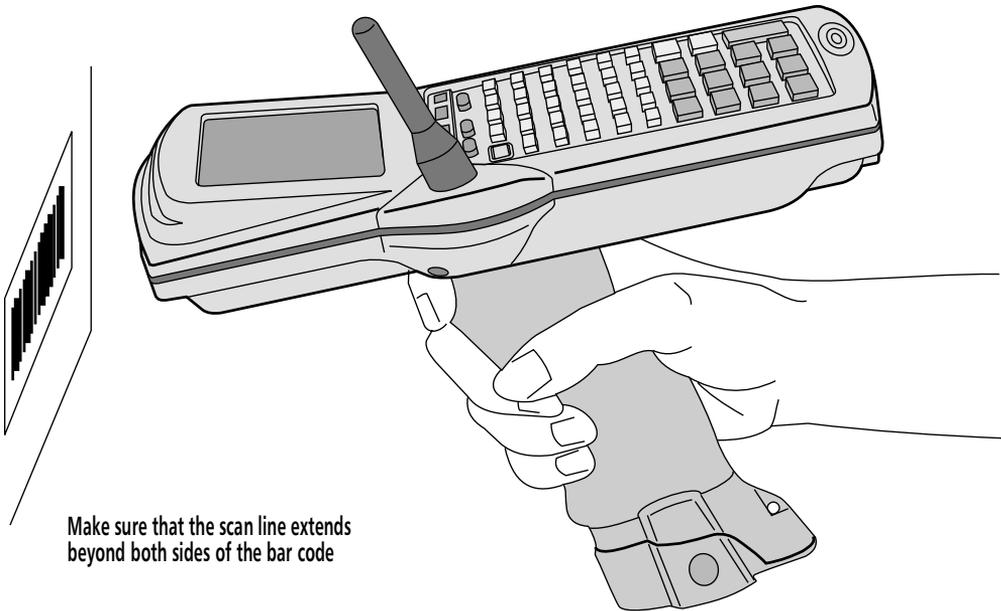
Figure 4. Scanning bar-code labels

Using the M88 imager

The M88 imager is an optional feature of the PTC-960SL-III. Some advantages of using the M88 imager are

- The M88 projects a red cross and can read a one-dimensional (1D) bar code at **any** angle of rotation**.** The user will not need to align the laser line (red cross) with the bar code.

- The M88 works fast and will use 5–26% of the battery capacity in moderate to heavy usage, based on an average of 2500–5000 scans per 8-hour shift.

- The M88 will read **only** the following seven 1D bar codes:

  1. Code 39,

  2. Code 93,

  3. Code 128,

  4. Codabar,

  5. Interleaved 2 of 5,

  6. Plessey, and

  7. UPC/EAN.

- The M88 will read UPC codes within a range of 3 to 8 inches.

- The time of scan and decode is 250–300 ms.

- The M88 will operate within a temperature range of 0–50° C.

Communicating data

The PTC-960SL-III is able to communicate with other PTCs, host computers, and external accessories such as printers. It can both send and receive data and instructions. Communication is controlled by your organization's application program. Refer to the manual or instructions provided by your organization for details on conducting communication sessions.

The PTC-960SL-III is designed to use its internal radio as its primary means of communicating with a host computer, but it can also communicate by being connected directly to the host computer via cable, or by being placed in an optical communication cradle that is connected to the host computer. Accessories such as printers are connected to the PTC via a cable.

Using the radio

! If your PTC contains a radio, do not turn on the PTC or attempt to transmit data unless the antenna is attached; otherwise, the radio may be damaged.

All radio communication is controlled by your organization's application program. Refer to the instructions provided with the program for information.

Using the micro DB-15 connector

To connect the PTC-960SL-III to another PTC, host computer, or accessory via the micro DB-15 connector, the correct cable is needed. Different cables may be required depending on what you are connecting to the PTC. Refer to the manual or instructions your organization supplies for your application program.

Connecting a cable

1. Verify that the correct cable is being used for the device to which you are connecting. If the wrong cable is used, the PTC may not be able to communicate.

2. Turn off the PTC and the computer or accessory to which you are connecting.

! Do not force any connectors together if they do not mate easily; they could be damaged.

3. Connect the 15-pin connector on the appropriate cable to the PTC's micro DB-15 connector.

4. Connect the other end of the cable to the computer or accessory.

5. Turn on the PTC and, then, turn on the device to which it is connected.

6. Follow the instructions for your application program to communicate.

Disconnecting a cable

1. Turn off the PTC.

2. Turn off the attached computer or accessory.

! Pull on the cable connector when disconnecting. Pulling on the cable can break the internal wires.

3. Pull the cable's connector directly away from the PTC's micro DB-15 connector.

4. If necessary, disconnect the other end of the cable from the computer or accessory.

Using the optical communication cradle

The PTC-960SL-III's optical contacts convert electronic signals inside the PTC into pulses of light that can be detected by the SC-960SL-III Single-Bay Communication Cradle.

When the PTC-960SL-III is placed in the cradle, optical contacts on the cradle sense the pulses of light from the PTC and convert them into electronic signals for direct communication to the host computer or, with an external modem, for transmission over telephone lines. Likewise, the cradle can communicate back to the PTC through the optical contacts.

Replacing the battery pack

Use the procedures in this section to remove a weak lithium-ion or nickel-cadmium battery pack from the PTC-960SL-III and replace it with a new one.

Removing the battery pack

1. Turn off the PTC.

! Do not leave the PTC without a battery pack for longer than 20 minutes; all data and programs in the PTC's memory will be lost.

2. With your thumb and index finger, press the battery release buttons on both sides of the handle end cap; then, pull the end cap and the attached battery pack out of the handle. Refer to Figure 5.

3. Refer to the "Safety Information" section on page 3 for instructions on properly disposing of your lithium-ion or nickel-cadmium battery pack.

Press the battery release buttons (one on each side) and pull the battery pack out of the handle
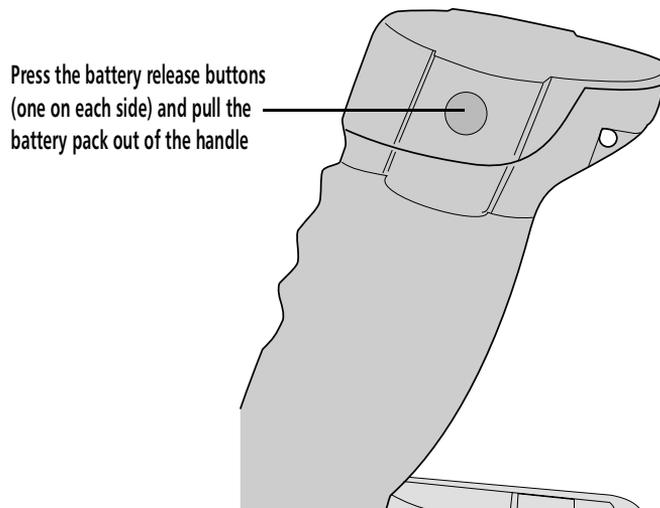
Figure 5. Removing the battery pack

Installing a new battery pack

The PTC-960SL-III is shipped with a different nickel-cadmium battery pack than older versions of the PTC-960SL; however, either pack can be used in any PTC-960SL. Lithium-ion battery packs, on the other hand, can be used in only with the PTC-960SL-III. A lithium-ion pack will physically not fit into the handle of an older PTC-960SL.

1. Make sure the PTC is off.

2. Line up the end cap/battery pack assembly with the opening in the handle. The curved sides of the end cap allow the battery pack to be inserted in only one way.

3. Slide the end cap/battery pack into the handle until the end cap presses against the body of the handle and the release buttons snap into place.

4. Pull on the end cap to make sure it is locked into place.

Maintaining the PTC-960SL-III

Operating conditions

The PTC-960SL-III is designed for use in harsh environments. It may be operated at temperatures between –4° F (–20° C) and 122° F (50° C) and at 32° F (0° C) to 122° F (50° C) if the unit has an M88 imager.

If a Cisco 343 radio is installed, the unit will have an operating temperature range of 32° F (0° C) to 122° F (50° C).

Extended temperature units

If your PTC-960SL-III was ordered as an extended temperature unit, it may be used in extremely cold environments, such as those found in walk-in freezers.

- An extended temperature version of the PTC-960SL-III can be operated at temperatures between –22° and 70° F (–30° to 21° C).

- The PTC can be operated in environments with a maximum relative humidity of 70% non-condensing.

While the PTC is held by a user, body heat is transferred to the PTC, preventing freezing of the unit and its components.

- Do not leave the PTC unattended (without being held or operated by a user) in a freezer environment, 0° to –22° F (–18° to –30° C) for more than 2 hours.

If the PTC's battery pack freezes, allow it to warm up to at least 65° F (18° C) before recharging it.

- Do not leave the PTC's battery pack unattended in a freezer environment for more than 1 hour as the battery pack will freeze and will appear to be **dead**.

Handling the PTC

The following information will help to ensure that you receive safe, reliable, and trouble-free service from your PTC-960SL-III.

- Do not point the PTC's scanner at anyone's eyes, and do not stare into the laser beam. Permanent eye damage could result.

- Do not open the PTC's case. Only a trained technician can service the parts inside the PTC.

- If your PTC has an internal radio, do not operate it without the antenna installed.

- Make sure the PTC is off before connecting or removing any accessories.

- Make sure that all accessories are connected correctly and that the correct cables are used.

- Use only Symbol-approved accessories. Do not attempt to connect any electrical device that is not part of your PTC system to the PTC-960SL-III.

- If a PTC-960SL-III containing a lithium-ion or nickel-cadmium battery pack is in below-freezing temperatures for more than 1 hour, do not charge the battery pack until it warms up to room temperature. Charging cold battery packs could damage them.

Storing the PTC

Do not store the PTC-960SL-III in temperatures below –40° F (–40° C) or above 167° F (75° C).

Do not store the PTC-960SL-III in a damp or humid environment.

Follow the instructions below if planning to store the PTC for an extended period of time.

1. Transfer any data stored in the PTC to a host computer or another PTC or print the data. Refer to the manual or instructions for your organization's application program for directions.

2. Make sure you have a copy of any programs stored in the PTC.

3. Disconnect all accessories from the PTC.

4. Recharge the PTC's battery pack or replace it with a charged pack.

5. Pack the PTC in the original packing material or in a padded box and put it in a safe place, away from dust, dirt, humidity, and excessive cold.

6. Recharge the PTC's battery pack every two months.

Cleaning the PTC

! Be careful not to scratch the scanner lens when you clean it. Scratches can reduce the scanner's effectiveness.

! Do not soak the cloth and do not spray or pour water directly onto the PTC.

The following items are required for cleaning the PTC.

• A soft, lint-free cloth;

• A nonabrasive liquid cleaner such as Windex.

To clean the PTC, slightly moisten a soft, clean, lint-free cloth **only with water** and wipe the outside surfaces. Do not use a paper towel.

> *Note:* *Using soap or other cleaning products may discolor the finish and damage the components.*

If the PTC becomes extremely dirty or if liquids, dirt, or other foreign materials get inside the case, contact your Symbol service representative.

Servicing the PTC

Do not attempt to service the PTC. Only a trained Symbol technician may service the PTC. Follow the procedure set up by your organization to have the PTC serviced properly.

Troubleshooting

If you experience any of the problems in this section, follow the instructions provided.

PTC does not turn on

• Recharge or replace the lithium-ion or nickel-cadmium battery pack.

• Contact your Symbol service representative.

Laser scanner does not read a label

• Make sure the bar-code label that you are attempting to scan is one of the bar-code types that your PTC is programmed to recognize.

Refer to Appendix B for recommended scanning distances.

• Move the laser scanner closer to or farther away from the bar-code label. The scanner may be too close or too far from the bar-code label.

• Change the angle of the laser scanner to the bar-code label. The scanner may be too far above or below the bar-code label, or too far to the side to scan properly.

Refer to the section titled "Cleaning the PTC," on page 35, for instructions.

• Clean the scanner lens.

• The PTC's application program may not support scanned data at this particular field. Consult the documentation for the PTC's application program to determine when the scanner and trigger are enabled.

- Point the scanner at a blank surface and press the scanner trigger. Look for the scanning line or aiming dot that appears on the blank surface when the scanner is operating.

  If no scanning line or aiming dot appears, follow your organization's procedure to have the scanner serviced.

  > *Note:* *If your PC is equipped with an M88 imager, you will see a red cross rather than a line or a dot.*

Radio fails to establish contact

- Change your location by a few feet and transmit again.

- Make sure the antenna is attached.

- Recharge or replace the PTC's lithium-ion or nickel-cadmium battery pack.

- Make sure the receiving equipment is turned on and is properly connected to the host computer.

- If the PTC still does not establish contact, follow your organization's procedure to have the PTC serviced.

Other problems

If you experience any other problems with your PTC-960SL-III that you cannot solve, notify your Symbol service representative or contact the Symbol Support Center at 1-800-653-5350.

Appendix A

Specifications

Communication and I/O

Serial: RS-232 via micro DB-15
                                connector; 300 to 38,400 baud.

Optical: Via optical contacts and
                                SC-960SL-III.

Internal radio: Optional 2.4-GHz direct-
                                sequence spread spectrum radio
                                or 2.4-GHz frequency-hopping
                                spread spectrum radio.

Spread spectrum
radio data rates
    2.4 GHz DS: 11 Mbps.
    2.4 GHz FH: 2 Mbps.

Display

Type: FSTN monochrome liquid
                                crystal display.

Text mode: 8 or 16 lines with 16 or 21
                                characters; double-height
                                character option available.

Microradio: Optional 433-Mhz microradio.

Graphics mode: 128 x 128 pixel resolution.

Pixel size: 0.015 x 0.014 in./0.38 x 0.36 mm.

Active area: 2.1 x 1.9 in./53.3 x 48.3 mm.

Backlight: Electro-luminescent (EL) panel.

Electrical

Battery pack:	500 mAh nickel-cadmium or 1,300 mAh lithium-ion.
Backup battery:	Supercap.

Power module
Input:	110 VAC @ 50/60 Hz.
Output:	12 VDC @ 200 mA.

Environmental

Operating temperature

Standard units:	–4° to 122° F (–20° to 50° C).
Low temp. units:	–22° to 70° F (–30° to 21° C).
M88 imagers:	32° F (0° C) to 122° F (50° C).

Relative humidity
Standard units:	95% non-condensing.
Low temp. units:	70% non-condensing.

Storage temperature:	–40° to 167° F (–40° to 75° C).
Shock:	4 ft/1.2 m drop to concrete.
Vibration:	Loose cargo 1" peak-to-peak orbital movement @ 400 RPM.
Operating altitude:	Up to 15,000 ft/4,572 m.
ESD protection:	15 kV.

Keyboard

Types:	45-key alphanumeric (standard), 28-key numeric (optional), 11-key consumer scan (optional).
Keypad options:	DOS, 3278/5251, or ANSI/VT220.

Laser scanner

Options: SE-1200, or SE-1200LR, or SE-1200HP.

Safety classification: Class II.

Imager: M88 image reader.

Memory

Flash EPROM
    Application: 512 KB.
    Operating System: 256 KB.

RAM: 1 to 4 MB.

Microprocessor

Type: V20H/80C88 @ 10 MHz
                        (for terminal processing) and
                        Z182 (for RF communications).

Physical

Length: 8.5 in./21.6 cm.

Width: 3.5 in./8.9 cm.

Depth: 7 in./17.8 cm.

Weight: 22 oz/0.62 kg (w/ nickel-cadmium battery pack);
                        26 oz/0.73 kg (w/ radio and nickel-cadmium battery pack).

Software

Operating system: MS-DOS 5.0 or TCAL.

RF term. emulation: 3278, 5251, or ANSI/VT220.

Appendix B

Bar-code types and scanning distances

This appendix provides a list of the bar-code types supported by the PTC-960SL-III and the ranges at which they can be read.

Bar-code types supported

Other bar-code types (such as Code 11, Code 16K, and Code 93) are available by special order. However, the PTC can support only six bar-code types, so any additional barcode will have to replace one of the default bar codes.

The PTC-960SL-III is programmed to read and automatically discriminate among the following bar-code types:

- Codabar,

- Code 2 of 5,

- Code 39,

- Code 93,

- Code 128,

- Plessey, and

- UPC/EAN.

Scanning distances

The following table lists the supported ranges for scanning bar-code labels based on the size of the label and the type of scanner installed in the PTC.

Table 1. Scanning ranges

Supported scanning distance (in inches)			
Label size	M88	SE-1200	SE-1200LR
5 mil	3 to 4	3 to 5.5	
6 mil		2.5 to 6.5	
7.5 mil		2.5 to 9	12 to 15.75
10 mil	3 to 7	2.5 to 13	11 to 20
15 mil		2.5 to 20	
20 mil	5 to 10	2 to 22	8.25 to 37
40 mil		2 to 30	8.25 to 65
55 mil		2 to 36	11.25 to 85

Appendix C

Accessory part numbers

Table 2 contains part numbers for ordering PTC-960SL-III accessory hardware.

Table 2. Accessory part numbers

Item	Part number
Accessories	
Antenna, 2.4 GHz version	21990-402
Battery pack, lithium-ion	23065-002
Battery pack, nickel-cadmium	19903-107
Power module (12 VDC, 200 mA)	20210-001
SC-960SL-III Single-bay Communication Cradle Intelligent-charge version	20825-201
Universal Battery Charger Base charger (desktop version)	23151-002
Base charger (wall-mount version)	23152-002
PTC-960SL-III adapter	23153-003
Wrist strap	17495-000
Protective handle wrap	30836-001
Manuals	
Guide to the Flash Utilities (TCAL or MS-DOS Version)	16541-000
Guide to Maintaining Nickel-cadmium and Lithium-ion Batteries	16488-000
SC-960SL-III User's Guide	20714-000
Universal Battery Charger Instruction Manual	23324-000
RAMSaver Application Development Manual	14303-103

** Use this cable with AC wall adapter 12176-000 or 10142-200.

Item	Part number
Cables	
Pigtail (12 ft) micro DB-15-to-DB-25	
adapter cable (with charging jack)**	20955-002
Pigtail (12 ft) micro DB-15-to-DB-25	
adapter cable (w/o charging jack)	21019-001
Micro DB-15-to-DB-9 adapter cable (6 ft)	21146-001
Clone cable	21018-001
PTC-to-1/2 duplex modem cable*	10124-0X1
PTC-to-full duplex modem cable*	10124-0X2
PTC-to-host (DTE) cable*	10124-0X3
PTC-to-host (9-pin) download cable*	
3 ft/0.91 m	13656-313
6 ft/1.8 m	13656-323
10 ft/3.05 m	13656-333
PTC-to-host (25-pin) download cable*	
6 ft/1.8 m (female)	10582-000
6 ft/1.8 m (male)	10582-110

Appendix D

Communication connections

This chapter provides information on the connections used to establish and maintain communication between the PTC-960SL-III and other devices.

Table 3 lists the pinouts for the PTC-960SL-III's micro DB-15 connector. All I/O lines are directional and support RS-232 voltage levels.

Figures 6 through 14 illustrate the configurations for cables that can connect the PTC-960SL-III to other devices.

Table 3. Micro DB-15 connector pinouts

Pin	Signal	Description	Direction
1	Open	N.C.	
2	TXD	Transmit data	Output
3	RXD	Receive data	Input
4	RTS	Request to send	Output
5	CTS	Clear to send	Input
6	DSR	Data set ready	Output
7	GND	Ground	
8	CD	Carrier detect	Input
9	DTR	Data terminal ready	Output

Pin	Signal	Description	Direction
10	RING	Ring indicate	Input
11	DS0	Device select zero	Output
12	DTMF	Dual-tone audio analog	Output
13	Open	N.C.	
14	VCC	Switched power +5 volts	Output
15	VCHG	Battery charge	Input

```
       PTC-960SL-III                           Other device
        Micro DB-15                                DB-25

                  Shield ───────────── Shield

   N.C.        1  ─────────────────  1      N.C.

   TXD         2  ─────────────────  2      TXD

   RXD         3  ─────────────────  3      RXD

   RTS         4  ─────────────────  4      RTS

   CTS         5  ─────────────────  5      CTS

   DSR         6  ─────────────────  6      DSR

   GND         7  ─────────●───────  7      GND

   CD          8  ─────────────────  8      CD

   DTR         9  ─────────────────  20     DTR

   RI         10  ─────────────────  22     RI

   DS0        11  ─────────────────  12     DS0

   DTMF       12  ─────────────────  23     DTMF

   N.C.       13  ─────────────────  13     N.C.

   VCC        14  ─────────────────  9      VCC

   VCHG       15  ───●─────────────  18     VCHG
                      │
                      └──────⊙ 12-volt charger input
```
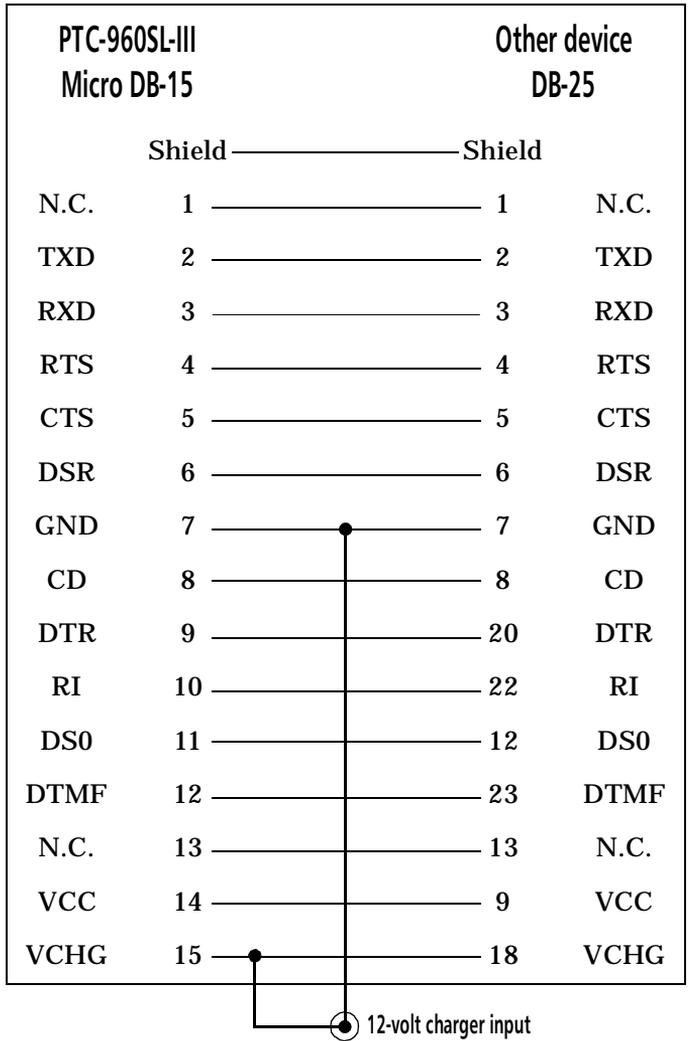
**Figure 6. Pigtail micro DB-15-to-DB-25 adapter cable
(w/ charging jack), P/N 20955-00**

```
PTC-960SL-III                              Other device
Micro DB-15                                   DB-25

VCHG      15 ————————————————— 18      VCHG

DTR        9 ————————————————— 20      DTR

TXD        2 ————————————————— 2       TXD

CTS        5 ————————————————— 5       CTS

RING      10 ————————————————— 22      RING

DSR        6 ————————————————— 6       DSR

RTS        4 ————————————————— 4       RTS

RXD        3 ————————————————— 3       RXD

GND        7 ————————————————— 7       GND

N.C.       1 ————————————————— 1       N.C.

CD         8 ————————————————— 8       CD

DS0       11 ————————————————— 12      DS0

DTMF      12 ————————————————— 23      DTMF

N.C.      13 ————————————————— 13      N.C.

VCC       14 ————————————————— 9       VCC

           Shield ——————————— Shield
```

**Figure 7. Pigtail micro DB-15-to-DB-25 adapter cable
(w/o charging jack), P/N 21019-00**

```
┌──────────────────────────────────────────────────────────┐
│  PTC-960SL-III                          Other device      │
│  Micro DB-15                               DB-9           │
│                                                           │
│  DTR        9 ──────────────── 6      DSR                 │
│  TXD        2 ──────────────── 2      RXD                 │
│  DSR        6 ──────────────── 4      DTR                 │
│  CTS        5 ──────────────── 7      RTS                 │
│  RTS        4 ──────────────── 8      CTS                 │
│  RXD        3 ──────────────── 3      TXD                 │
│  GND        7 ──────────────── 5      GND                 │
│         Shield ──────────── Shield                        │
└──────────────────────────────────────────────────────────┘
```

Figure 8. Micro DB-15-to-DB-9 adapter cable, P/N 21146-001
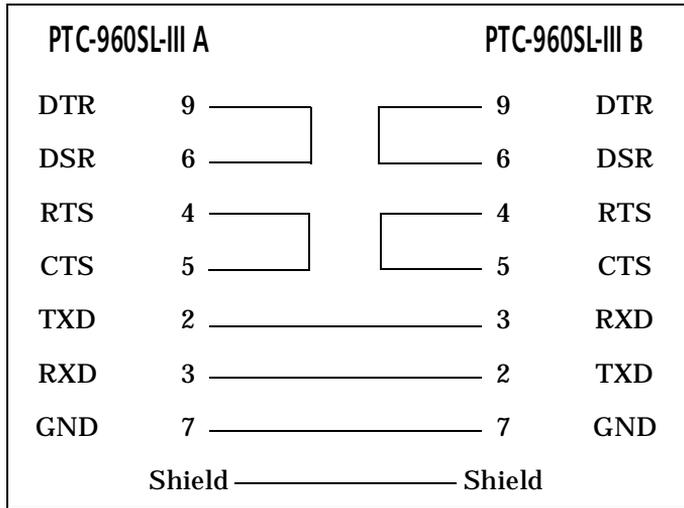
Figure 9. Clone cable, P/N 21018-00

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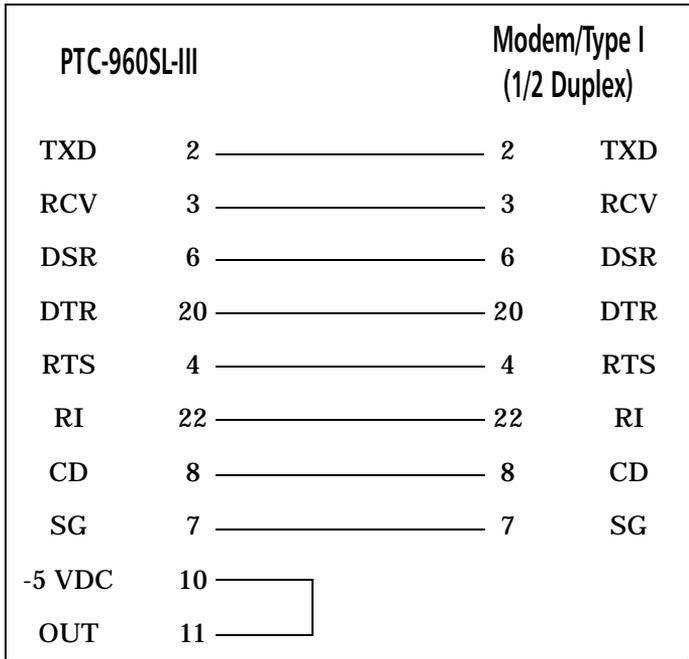
Figure 10. TC-to-1/2 duplex modem cable, P/N 10124-0X1
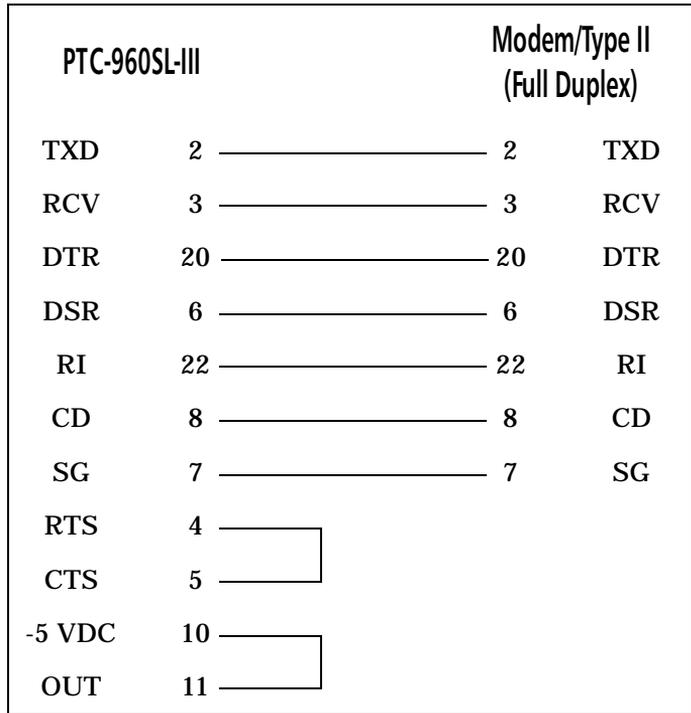
Figure 11. PTC-to-full duplex modem cable, P/N 10124-0X2
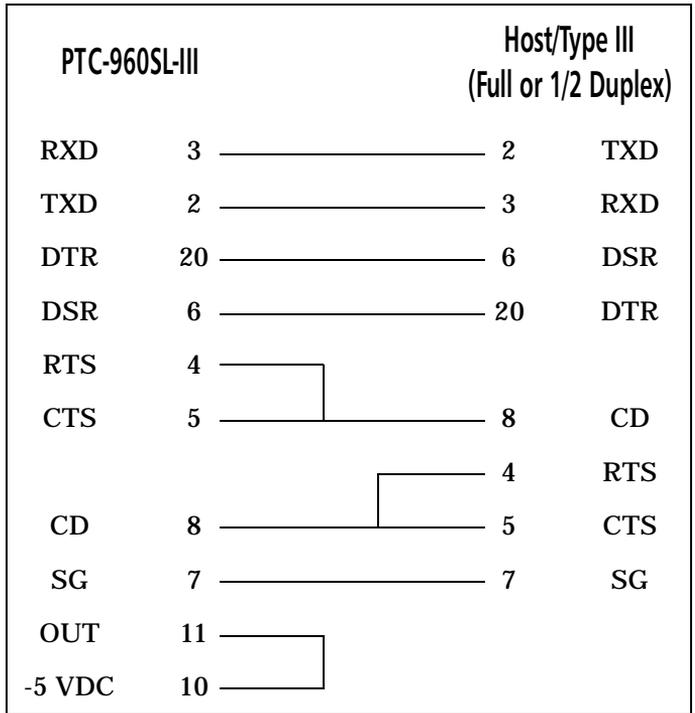
Figure 12. PTC-to-host (DTE) cable, P/N 10124-0X3
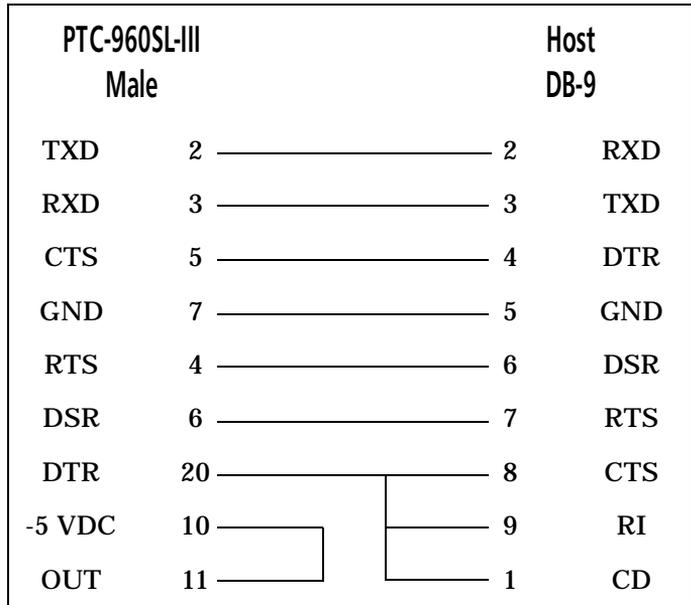
Figure 13. PTC-to-9-pin host download cable,
P/N 13656-3X3

```
┌─────────────────────────────────────────────────────────────┐
│                                                             │
│     PTC-960SL-III                    Host db-25             │
│         Male                      Female (000)/             │
│                                    Male (110)               │
│                                                             │
│   TXD      2 ─────────────────── 3      RXD                 │
│                                                             │
│   RXD      3 ─────────────────── 2      TXD                 │
│                                                             │
│   RTS      4 ─────────────────── 6      DSR                 │
│                                                             │
│   CTS      5 ─────────────────── 20     DTR                 │
│                                                             │
│   DSR      6 ─────────────────── 4      RTS                 │
│                                                             │
│   GND      7 ─────────────────── 7      GND                 │
│                                                             │
│   DTR     20 ─────────────────── 5      CTS                 │
│                                                             │
│  -5 VDC   10 ──────┐                                        │
│                    │                                        │
│   OUT     11 ──────┘                                        │
│                                                             │
└─────────────────────────────────────────────────────────────┘
```

Figure 14. PTC-to-25-pin host download cable,
P/N 10582-XX0

Glossary

application
: A PTC program that is designed to perform a specific task for the user. Examples include route accounting, payroll, price lookup, shipping, and inventory control.

application flash EPROM
: A flash EPROM that contains the PTC's application program.

bar code
: A series of vertical bars and spaces used to encode numeric or alphanumeric information. Bar codes are designed to be read by electronic means such as bar-code readers or laser scanners.

bps
: Bits per second.

byte
: A group of eight bits that acts as a basic unit for information transfer and storage.

CD
: Carrier detect signal. CD indicates that the modem is receiving a signal from the remote modem.

character
: A letter, number, or symbol.

CTS
: Clear-to-send signal. CTS indicates that the line between a modem and a terminal device is clear for transmission. CTS typically follows a raised request-to-send (RTS) signal.

data communication
: The transport of encoded information from one point to another.

DCE
: Data communications equipment. A device that controls and converts incoming data or communication. For example, a modem.

display
: The screen on the front of the PTC. It is used to show data entered into the PTC and warning prompts.

DSR
: Data set ready signal. The modem sends DSR to the attached device to indicate that the modem is connected, on, and ready.

DTE	Data terminal equipment. A device comprising the data source. For example, the host computer.
DTR	Data terminal ready signal. The signal sent by the terminal device to the modem to indicate that the terminal is ready for transmission.
ESD	Electrostatic discharge.
file	Any group or collection of related information stored in memory. To add data to a file or to read data from a file, the program must access the file by its file name.
flash EPROM	A type of erasable programmable read-only memory that can be erased and reprogrammed electronically while installed in a PTC.
frequency-hopping (FH) radio	A type of spread spectrum radio that continually jumps from one frequency to another to avoid interference.
function key	A key on the PTC's keyboard that is defined by an application to perform a specific task. When pressed, a function key executes a certain function (for example, **ENTER**, **END**, **ON/OFF**).
GND	Ground.
hardware	Equipment used in conjunction with programs or data communication. Contrast with *software*.
host computer	A personal computer or mainframe that receives and processes data from PTCs.
Hz	Hertz. A unit expressing frequency in vibrations per second.
interface	The connection between two devices, defined by common physical characteristics, signal characteristics, and signal meanings.
I/O port	Input/output port. The location on a PTC where RS-232-compatible accessories are attached. Also, the point through which the PTC sends and receives transmission signals.

keyboard overlay	The plastic label that lies on top of the PTC keyboard, identifying the function key definitions.
laser scanner	A type of bar-code reader that uses a beam of laser light.
LCD	Liquid crystal display.
LED	Light-emitting diode.
lithium-ion battery	A type of rechargeable battery used to power some PTCs. The advantage of lithium-ion batteries (over nickel-cadmium batteries) is their increased capacity in comparable weight and volume.
mAh	Milliampere hour(s). A measurement of the ability to provide electrical power.
modem	Modulator-demodulator. A communication device that converts serial digital data from a transmitting device to a signal suitable for transmission over a telephone line and then reconverts the signal to serial digital data for the receiving device.
MS-DOS	Microsoft Disk Operating System.
nickel-cadmium battery	A type of rechargeable battery used to power some PTCs and their accessories.
one-way communication	Transport of information from one device to another without interruption. In one-way communication, the receiving device cannot respond directly to the sending device.
O.S.	Operating system. For example, MS-DOS.
prompt	Messages shown by the PTC that guide the operator through the steps of the application program. Prompts are different for different programs.
PTC	Portable Teletransaction computer. A battery-powered, programmable device used to collect, store, and transmit data.
RAM	Random access memory. In a PTC, RAM chips store program files and data entered by the operator.

RF	Radio frequency.
RI	Ring indicate signal. RI alerts a modem to a call waiting on the attached telephone line.
ROM	Read-only memory. In a PTC, ROM chips contain the operating system and the application program.
RS-232	An Electronic Industries Association (EIA) standard that defines the connector, connector pins, and signals used to transfer data serially from one device to another.
RTS	Request-to-send signal. RTS initiates the data transmission sequence on a communication line between a modem and a terminal device.
RXD	Receive data signal. RXD indicates that a device is currently receiving data.
signals	Electronic impulses that transmit data from one device to another.
software	A stored program or set of programs that is loaded into RAM for execution. Contrast with *hardwar*e.
spread spectrum	A radio communication technology that distributes an RF signal over a wide range of frequencies for transmission; it then "despreads" the signal to the original frequency range at the receiver.
TCAL	Common Application Language. Symbol's proprietary programming language for PTCs.
two-way communication	Exchange of information between two devices. After each block of data, the receiving device sends a positive or negative acknowledgment to the sending device.
TXD	Transmit data signal. TXD indicates that a device is currently transmitting data.
VDC	Volts direct current. A unit of measure of electric potential or potential difference in a unidirectional current.

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