Intermec

User's Manual

4400 Bar Code Label Printer

058607-006

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U.S. technical and service support: 1-800-755-5505
U.S. media supplies ordering information: 1-800-227-9947

Canadian technical and service support: 1-800-688-7043
Canadian media supplies ordering information: 1-800-268-6936

Outside U.S. and Canada: Contact your local Intermec service supplier.

Manual Change Record

This page records the changes to this manual. The manual was originally released as version 001.

Version	Date	Description of Change
002	3/93	The manual was updated to reflect changes made to the firmware. Information affected by the update includes the printhead resistance test and 4406 specific references.
003	9/93	Addendum 060093-001 was added to the manual. The addendum contains firmware version 2.2 information.
004	02/95	Addendum 061534-001 was added to the manual. The addendum contains firmware version 2.3 information including new information on 2D symbology and updates existing information on HIBC and UCC 128. It also contains new information on Maxicode.
005	07/96	The manual was updated to include PrintSet information. Revisions were added to include information on setting sensitivity ratings and downloading user-defined fonts.
006	11/96	The manual was converted to an 8.5 x 11 page size. Other minor revisions were made.

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Before You Begin

This section introduces you to standard warranty provisions, safety precautions, warnings and cautions, document formatting conventions, and sources of additional product information.

Warranty Information

To receive a copy of the standard warranty provision for this product, contact your local Intermec support services organization. In the U.S. call 1-800-755-5505, and in Canada call 1-800-688-7043. Otherwise, refer to the Worldwide Sales & Service list that ships with this manual for the address and telephone number of your Intermec sales organization.

Safety Summary

Your safety is extremely important. Read and follow all warnings and cautions in this book before handling and operating Intermec equipment. You can be seriously injured, and equipment and data can be damaged if you do not follow the safety warnings and cautions.

Do not repair or adjust alone Do not repair or adjust energized equipment alone under any circumstances. Someone capable of providing first aid must always be present for your safety.

First aid Always obtain first aid or medical attention immediately after an injury. Never neglect an injury, no matter how slight it seems.

Resuscitation Begin resuscitation immediately if someone is injured and stops breathing. Any delay could result in death. To work on or near high voltage, you should be familiar with approved industrial first aid methods.

Energized equipment Never work on energized equipment unless authorized by a responsible authority. Energized electrical equipment is dangerous. Electrical shock from energized equipment can cause death. If you must perform authorized emergency work on energized equipment, be sure that you comply strictly with approved safety regulations.

Warnings, Cautions, and Notes

The warnings, cautions, and notes in this manual use the following format.

Warning
A warning warns you of an operating procedure, practice, condition, or statement that must be strictly observed to avoid death or serious injury to the persons working on the equipment.

Avertissement
Un avertissement vous alerte d'une procédure de fonctionnement, d'une méthode, d'un état ou d'un rapport qui doit être strictement respecté pour éviter l'occurrence de mort ou de blessures graves aux personnes manupulant l'équipement.

Caution
A caution alerts you to an operating procedure, practice, condition, or statement that must be strictly observed to prevent equipment damage or destruction, or corruption or loss of data.

Conseil
Une précaution vous avertit d'une procédure de fonctionnement, d'une méthode, d'un état ou d'un rapport qui doit être strictement respecté pour empêcher l'endommagement ou la destruction de l'équipement, ou l'altération ou la perte de données.

***Note**: Notes are statements that either provide extra information about a topic or contain special instructions for handling a particular condition or set of circumstances.*

About This Manual

This manual serves as a complete user's guide for the installation and operation of the 4400 printer. All instructions for testing and configuring the printer are included as well as descriptions of options and advanced features.

This manual should be used by all printer users as a guide for installation, operation, and troubleshooting. Users generally include the following:

- Printer operators who use the printer daily.
- Technicians who install, test, and maintain the printer.
- Systems analysts who integrate the printer into a data collection system.
- Programmers who design bar code labels and configure the printer to a specific application.

To reduce the risk of printing errors, the buyer is advised to frequently check the accuracy of printed bar code and alphanumeric information. In those situations where accuracy is imperative, the buyer is advised to confirm the accuracy of all printed labels with the information originally intended to be encoded on the label. Persons operating the printer should maintain it in accordance with the procedures in this manual to keep it in good working condition.

Terms and Conventions

The following special terms and conventions occur throughout the manual. Refer to the glossary for a complete list of terms.

Terms

"Printer" or "4400" refer to the Intermec 4400 Bar Code Label Printer.

"Media" is the label stock on which the printer prints labels.

"Host" refers to a personal computer or other computer that communicates with the printer.

Conventions

The following conventions are used throughout this manual for operating procedures and descriptions of the printer.

- Feed / Reload refers to the Feed / Reload button on the printer control panel.
- Downloaded commands appear in the order that you enter them into the printer with the following conventions:

Convention	Description
< >	Angle brackets < > enclose mnemonic representations of ASCII control characters. For example, <ETX> represents the ASCII "End of Text" character.
data	Italic text represents variable data, which you must replace with a real value. For example, *n* signifies a variable for which you must designate a constant value.
[data]	Italic text within brackets represents optional data.
Ctrl	Bold text represents a key on your keypad. For example, **Ctrl** represents the Ctrl key.
Ctrl-Z	When two keys are joined with a dash, press them simultaneously. For example, if you see the command **Ctrl-Z**, press the two keys at the same time.
[**ENTER**]	Bold text enclosed in brackets represents a control panel key to press.
`E3;F3`	Type all characters that appear in the Courier font by pressing an individual key on the keypad.

Other Intermec Manuals

You may need additional information for working with the 4400 printer in a data collection system. To order additional manuals, contact your local Intermec representative or distributor.

Manual	Intermec Part No.
9154 Multi-Drop Line Controller System Manual	048517
9161B Installation Manual	049572
RF System/9180 Controller User's Manual	054292
RF System/9181 Controller User's Manual	056543
Data Communications Reference Manual	044737
The Bar Code Book by Roger C. Palmer	

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Getting Started

This chapter contains a brief introduction to the components of your printer and provides procedures for loading media and printing a configuration test label that shows the printer's current configuration.

If you have followed the procedures in the Getting Started Guide for printing a configuration test label, then you can proceed with installation, which is described in Chapter 2.

Unpacking the Printer

1. Unpack the printer and put it on a clean stable surface for testing.
2. Store the shipping container and materials in case you need to ship the printer for any reason.
3. Check the order for completeness.
4. Report any damage or defects.

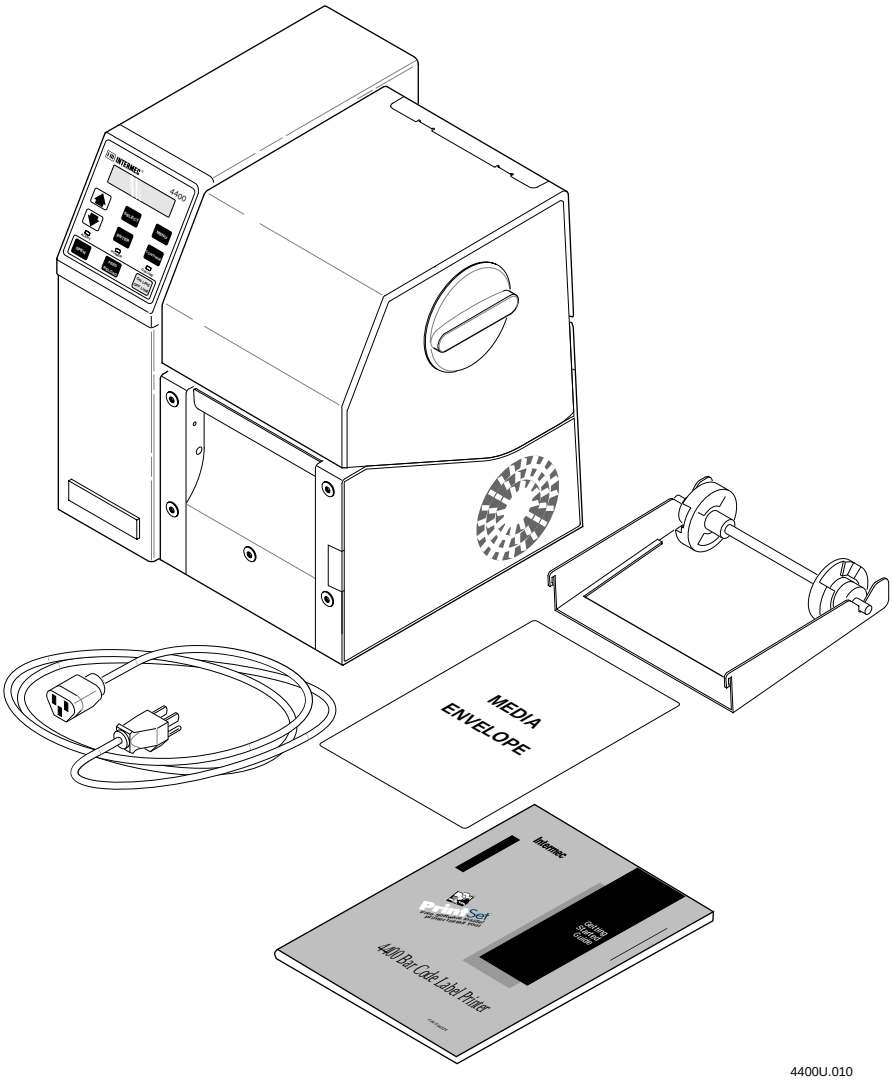
Checking the Order for Completeness

Verify the contents of the shipping container against the list below. Use the figure on the following page to help identify these items.

- 4400 bar code label printer
- AC power cord
- Media roll holder
- Media Envelope
- *4400 Bar Code Label Printer Getting Started Guide*

Verify your order against the packing slip to ensure that your order is complete. If any parts are missing, please contact your local Intermec representative.

Contents of 4400 Shipping Container



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Reporting Damage or Defects

Your printer was thoroughly tested and inspected before it was shipped from the factory. If any items are damaged you can take the following steps to correct the problem.

- Take photographs if necessary.
- Contact the transport carrier.

Note: *The customer is responsible for all damage claims against the carrier. See the "Intermec Terms of Sale" printed on your sales invoice.*

Learning About the 4400 Printer

The Intermec 4400 printer is a thermal and thermal transfer bar code printer designed to print high quality labels in an industrial environment. These labels can contain data in both text and bar code form as well as graphics, lines, and boxes in a variety of sizes and orientations. The flexibility and advanced design of the hardware and software that comprise the printer make it possible to create and print labels quickly and efficiently for many applications.

You can use the printer for all your labeling applications since it prints many different bar codes, lines, and graphics in user-defined fields.

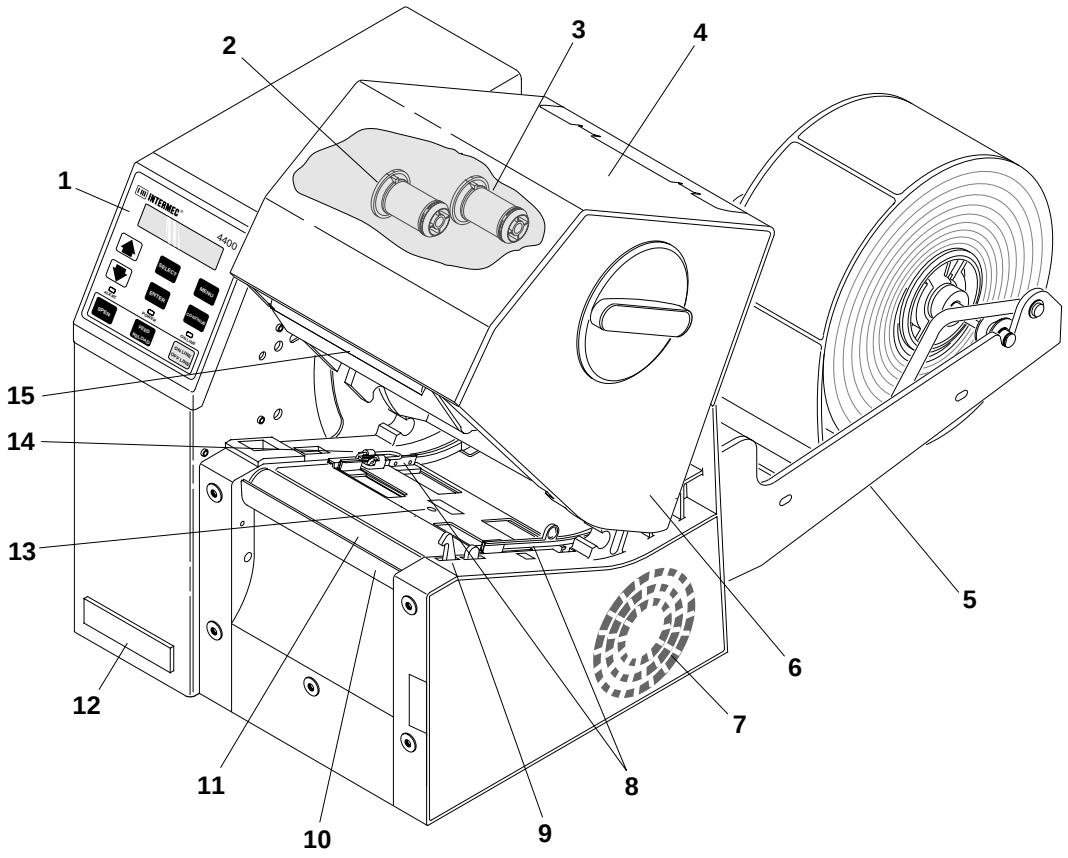
The following figures and tables can help familiarize you with the front view and back view of your printer.

Front View Part Descriptions

Number	Name	Description
1	Control Panel	Lets you operate the printer directly.
2	Thermal Transfer Ribbon Takeup Hub	Collects used thermal transfer ribbon.
3	Thermal Transfer Ribbon Supply Hub	Holds the supply of unused thermal transfer ribbon.
4	Printer Cover	Covers the paper path and house the thermal transfer ribbon.
5	Media Roll Holder	Holds media rolls up to 8 inches (200 mm) in diameter. Can be removed if fanfold media is used.
6	Ribbon Access Door	Provides access to the thermal transfer ribbon and the cover's manual release latch. An interlock prevents printer operation if the door is open.
7	Cooling Fan	Runs while the printer is on to prevent overheating.
8	Edge Guides (Adjustable)	Keeps media aligned as it moves through the printer.
9	Manual Release	Lets you manually open the printer when it is turned off.
10	Tear Bar*	Used for tearing off labels.
11	Platen Roller	Advances media through the printer.
12	External Option Communications Port	Provides communications with external options such as the Self-Strip or Cutter.
13	Label Mark Sensor (Photoelectric)	Scans media for indexing marks that indicate a new label.
14	Label Gap Sensor (Photoelectric)	Scans media for label gaps that indicate a new label.
15	Printhead	Prints label formats on the 4.46 inches of media that pass underneath.

***** For optimal print quality on tag stock, the tear bar may need to be removed.

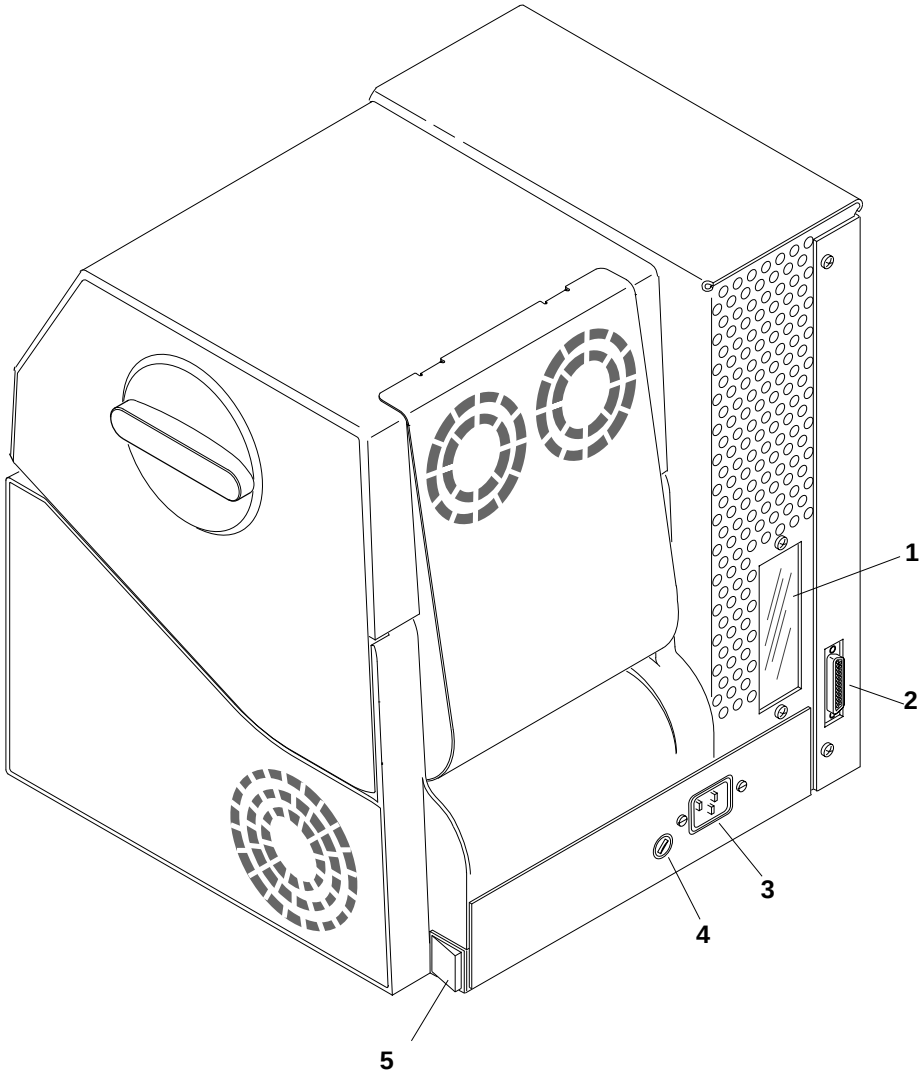
Front View of the 4400 Printer



Rear View Part Descriptions

Number	Name	Description
1	Optional I/O Port	Enables the printer to communicate with a host through an optional interface in addition to the standard serial interface. Optional boards are not shown installed.
2	Serial Communications Port Connector	Connects the printer to a host computer with a 25-pin "D" style subminiature receptacle. This connector supports communications over RS-232, RS-422, and RS-485 serial ports.
3	AC Power Receptacle	The AC power cord plugs into this receptacle. The printer can operate at 100 to 240 VAC at frequencies of 50 to 60 Hz.
4	Fuse	The 4400 printer uses a 3AG, Slo-Blo, 5A, 250V fuse. See Chapter 10 for replacement procedures.
5	Power (On/Off) Switch	To switch the printer on, press the line (|) on the switch. To switch the printer off, press the circle (O).

Rear View of the 4400 Printer



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Printing a Configuration Test Label

Before you install your printer and connect it to your data collection system, you should print a configuration test label. This label provides you with a copy of the current configuration settings. You will need to know these settings when you install your printer and incorporate it into your system.

Note: *These instructions for printing a configuration test label are identical to those in the* Getting Started Guide. *If you have already followed the procedures in the* Getting Started Guide, *you can skip to the next chapter.*

To print a configuration test label, follow these steps that are described in the next sections:

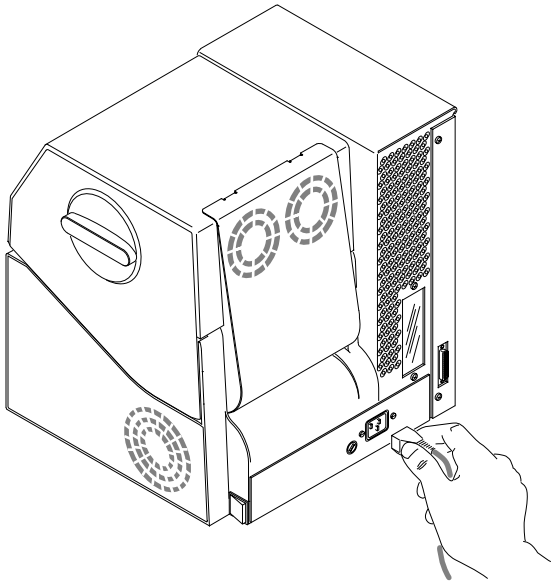
1. Power up the printer.
2. Open the printer.
3. Load media.
4. Close the printer.
5. Print the label.

Powering Up Your Printer

1. Plug the AC power cord into the receptacle on the back of the printer. Plug the other end into a wall outlet or surge protector.
2. Set the power switch (located on the back panel of the printer) to the on (|) position. When the printer is fully powered, the Power and Online indicator lights are lit and the display reads as follows:

   ```
   PAPER FAULT
   ```

   Note: *All three indicator lights, including the Alert light, flash when you turn on the printer.*



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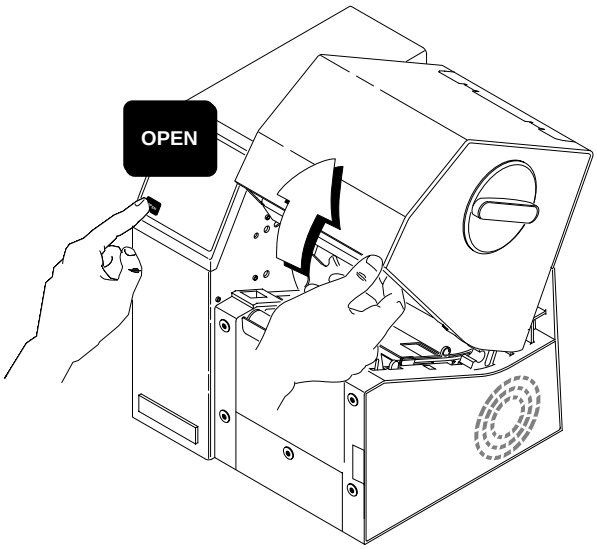
Opening the Printer

1. Press [ONLINE/OFFLINE]. The display reads:

```
OFFLINE
READY
```

2. Press [OPEN]. Lift the cover open to expose the paper path. The display reads:

```
PAPER PATH OPEN
```



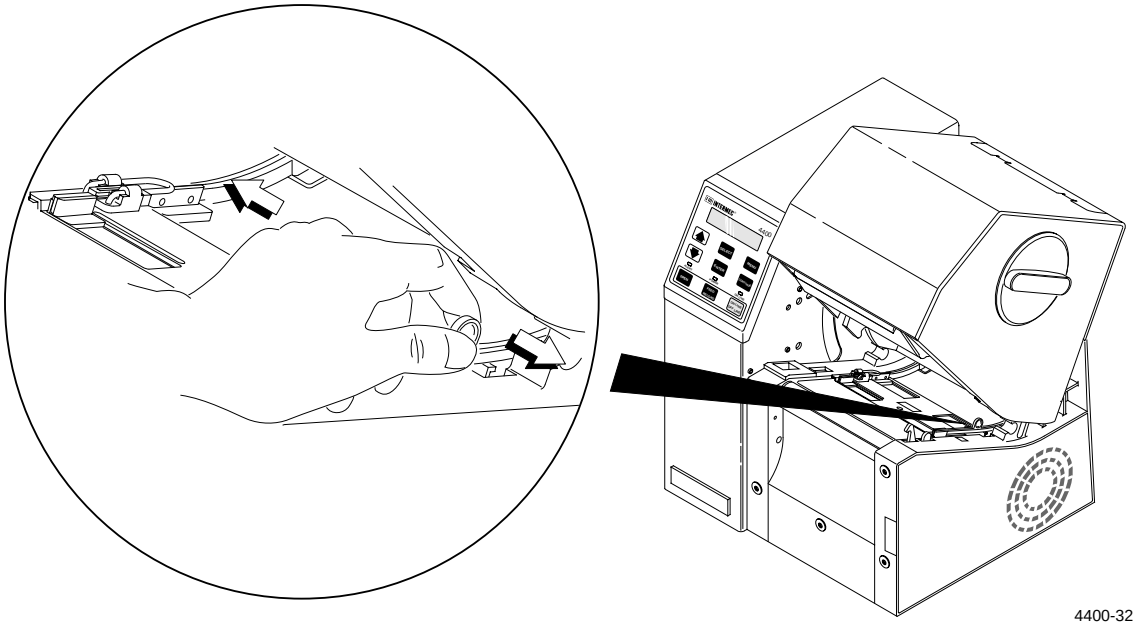
Loading Media

Use the direct thermal media supplied in the Media Envelope to learn how to load media.

***Note**: If you want to load thermal transfer ribbon and use your own media, refer to "Loading the Thermal Transfer Ribbon" in Chapter 4.*

To load media

1. Remove the media from the Media Envelope. Lay it out flat, with the labels facing up.
2. Open the edge guides to accommodate the width of the media. Slide the edge guides apart by pulling on the edge guide tab.



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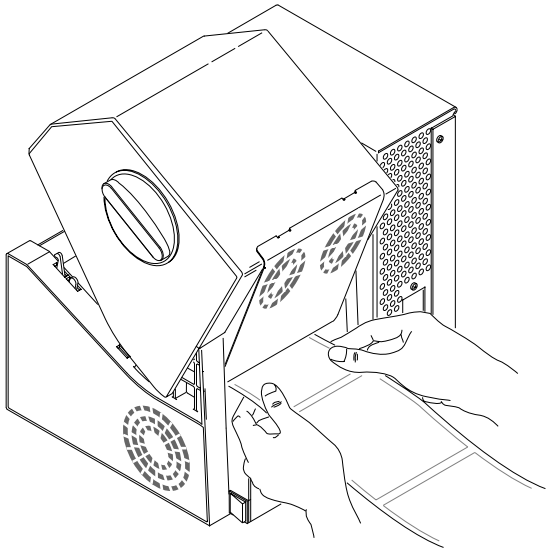
3. Feed one end of the media into the opening at the back of the printer. Continue feeding media until several inches extend out the front of the printer.



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4. Adjust the edge guides so that the media does not shift as the label is printed. To do this, push the edge guide tab in until the inside edges of the guide just contact the edges of the media.

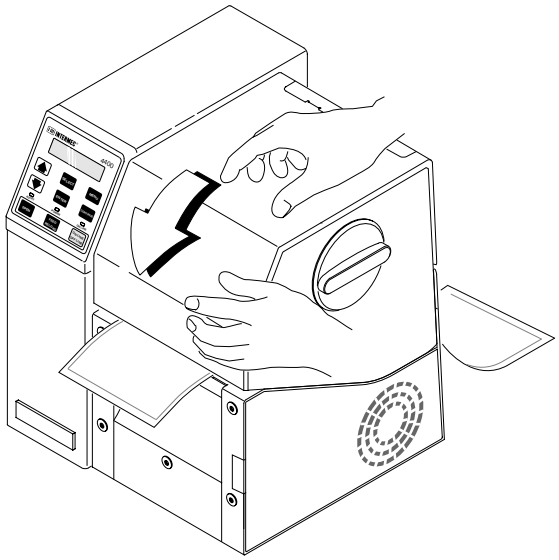
Closing the Printer

1. Close the printer by pressing down on the cover until it latches. The display shows the following:

PRESS RELOAD

2. Press [FEED/RELOAD]. Media advances to the next label and the display shows the following:

OFFLINE READY



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Printing the Label

1. From the OFFLINE READY display, press [MENU]. The display shows:

OFFLINE OPERATOR MENU

2. Press [↑] or [↓] until the display shows:

OFFLINE SERVICE MENU

3. Press [SELECT]. The display shows:

SERVICE MENU PRINT PAGE

4. Press [↑] or [↓] until the display shows:

```
SERVICE MENU
PRINT CONFIG
```

5. Press [SELECT]. The display shows:

```
PRINT CONFIG
USER DEFINED
```

6. Press [SELECT]. The display shows:

```
USER DEFINED
EXECUTE TEST
```

7. Press [ENTER] to print the configuration test label. A sample label is shown in Chapter 5 under "About Configuration Test Labels."
8. To exit from the Service Menu, press [CONTINUE]. The display shows:

```
OFFLINE
OFFLINE READY
```

9. Turn off the printer. Save the configuration test label for reference when you install and configure the printer.

If you have trouble printing your configuration test label, try restoring the default configuration using the procedure in the next section.

Restoring Printer Default Configuration

If your configuration test label is not satisfactory, or if you have trouble printing, your printer may have lost its configuration during shipment.

To restore the factory default setting

1. Start at the OFFLINE READY display (press [ONLINE/OFFLINE] if necessary).
2. Press [MENU]. Then press [↑] or [↓] until the display shows:

```
OFFLINE
SERVICE MENU
```

3. Press [SELECT]. Then press [↑] until the display shows:

```
SERVICE MENU
MEMORY RESET
```

4. Press [SELECT]. The display shows:

```
MEMORY RESET
ALL
```

5. Press [↓] until the display shows:

```
MEMORY RESET
CONFIGURATION
```

6. Press [ENTER] to restore the default configuration settings.
7. Press [CONTINUE] to return to the OFFLINE READY display.

Now follow the procedure under "Printing the Label" earlier in this chapter.

ATTENTION
After using Memory Reset you must reinstall the software drivers for options, such as Cutter or Self-Strip. Memory Reset also resets all parameters to their default settings, as listed in Chapter 5. Sensitivity will be set at 420. See Chapter 4 for procedures on resetting parameters to non-default settings and Chapter 8 for procedures on reinstalling the options' software drivers.

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Installing the Printer

You can connect the 4400 printer to almost any system available and establish communications. Use this chapter for:

- ***preparing for installation.***
- ***connecting the printer to your system.***
- ***configuring the serial port.***
- ***verifying printer communications with your system.***

About Printer Installation

The Intermec 4400 printer is designed to operate in a wide range of environments and you can configure it to meet the printing requirements of almost any data collection system. You can connect it directly to a host computer or integrate it into a large data collection network through a port concentrator or controller. The printer can run in either point-to-point or Multi-Drop network configurations. It can also run from a remote location through a dedicated modem.

The printer's default communications parameters are suitable for most serial point-to-point installations but can easily be changed if they do not meet the requirements for your system.

To install the printer, you may want to perform some or all of the following procedures:

- Assemble and set up the printer
- Determine the appropriate configuration
- Connect the printer to the host computer
- Configure the main port
- Set security levels

Preparing for Installation

Before you connect the printer to your system, make sure that you have chosen a proper physical location for the printer and that you have installed the media roll holder. Also, print a configuration test label by following the instructions in Chapter 1 or in the *4400 Bar Code Label Printer Getting Started Guide*.

Situating the Printer

When choosing a physical location for the printer, use the following guidelines:

- Choose a location within 5 feet (1.5 meters) of an electrical source.
- Set the printer up on a level, sturdy surface.
- Allow easy access to the power switch and the rear panel.
- Make sure the grill covering the fan is kept clear of obstructions and debris.
- Keep water and other liquids away from the printer.

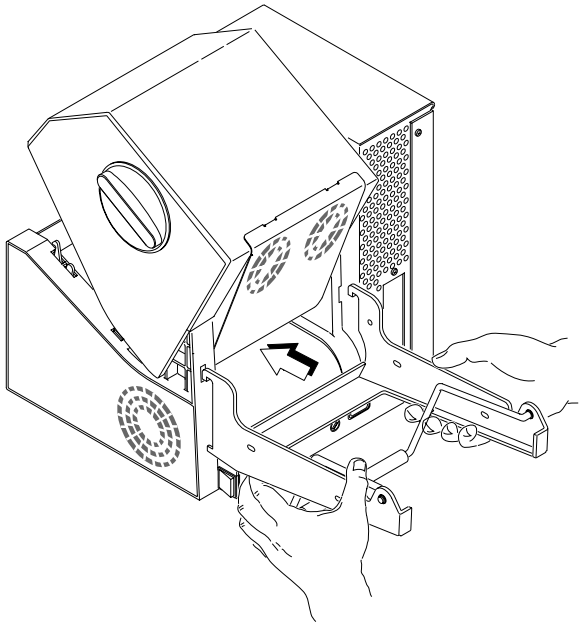
Installing the Media Roll Holder

The 4400 printer accepts both fanfold and roll media. If you are planning to use roll media, install the Media Roll Holder as shown below.

If you are using fanfold media, skip this procedure.

To install the media roll holder

1. Open the printer and lift the cover.
2. Insert the tabs at the ends of the arms into the slots at the back of the printer as shown in the figure below. Make sure the holder is installed securely before loading roll media. Refer to the following illustration.



4400-25B

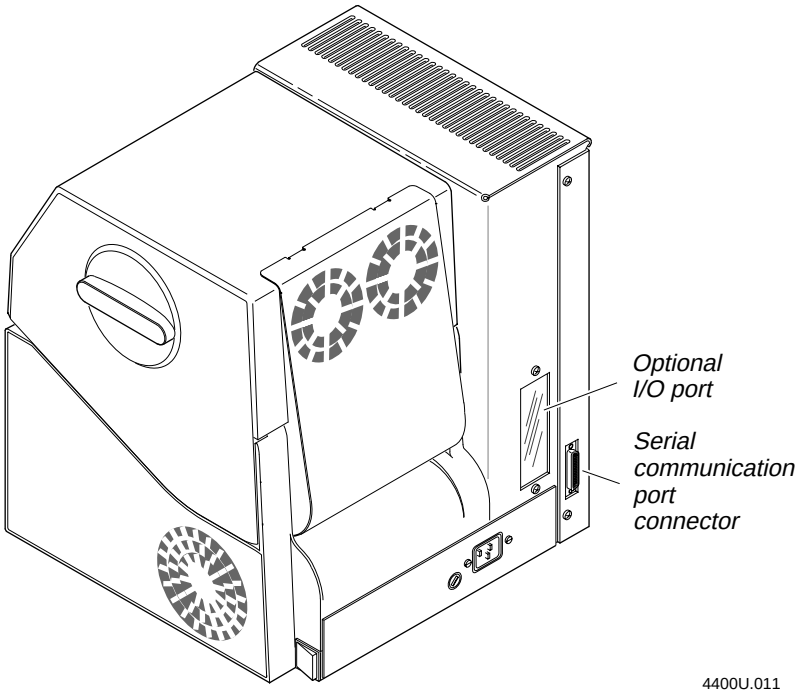
Connecting the Printer to Your System

The proper method for connecting your printer to the host computer is determined by the way your system is configured. This section contains procedures for point-to-point and non-switched modem installations. There is also a reference section for network installations.

You can connect your 4400 printer to a PC, a local area network, an AS/400 (or other midrange), or a mainframe. This section provides the information necessary for connecting to any of these systems.

The following illustration shows you where to connect your system to the printer. You can use either of these two ports on the rear of the printer:

- Serial communications port
- Optional I/O board port (if you have an adapter card installed)



Connecting the 4400 to a PC

You can connect the 4400 to either a serial port or parallel port (if you have the option installed) on your PC. You must provide the correct cables for connecting the printer. Refer to the following instructions for cable information. Contact your Intermec representative for ordering assistance if you do not have the appropriate cables.

Connecting the Printer to a PC Serial Port

To connect the 4400 to your PC serial port, you need a shielded EIA RS-232, RS-422, or RS-485 electrical interface with a 25-pin D-style subminiature connector. It must have pins on the printer end and an appropriate serial port connector on the other end.

Use the following table to determine the correct Intermec cable for your application. Cable schematics for these cables appear on the next page.

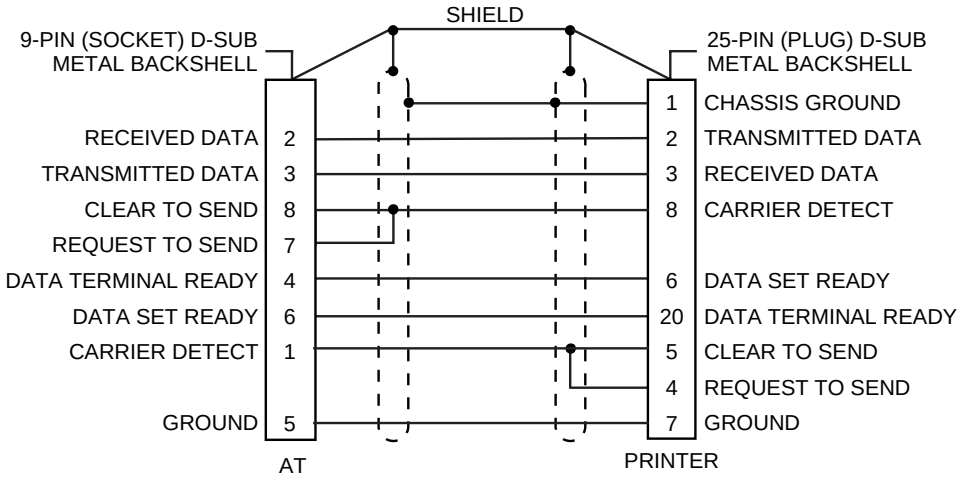
For Connecting To	Use Intermec Cable Part Number
IBM PC AT	048693 (25-pin printer to 9-pin serial port straight-through)
IBM PC XT	048668 (25-pin printer to 25-pin serial port null modem)

To connect your printer to a PC serial port

1. Turn the On / Off switch to the off position.
2. Plug the 25-pin connector into the serial communications port on the back of the 4400 printer.
3. Plug the other end of the cable into a serial COM port on the PC.
4. If necessary, change the PC serial port configuration to match your printer. The default configuration settings for the 4400 printer are:
   - 9600 baud
   - even parity
   - 7 bit word length
   - XON / XOFF no status response protocol
   - device address A
   - direct thermal media

   See "Configuring the Serial Port" later in this chapter for more information.

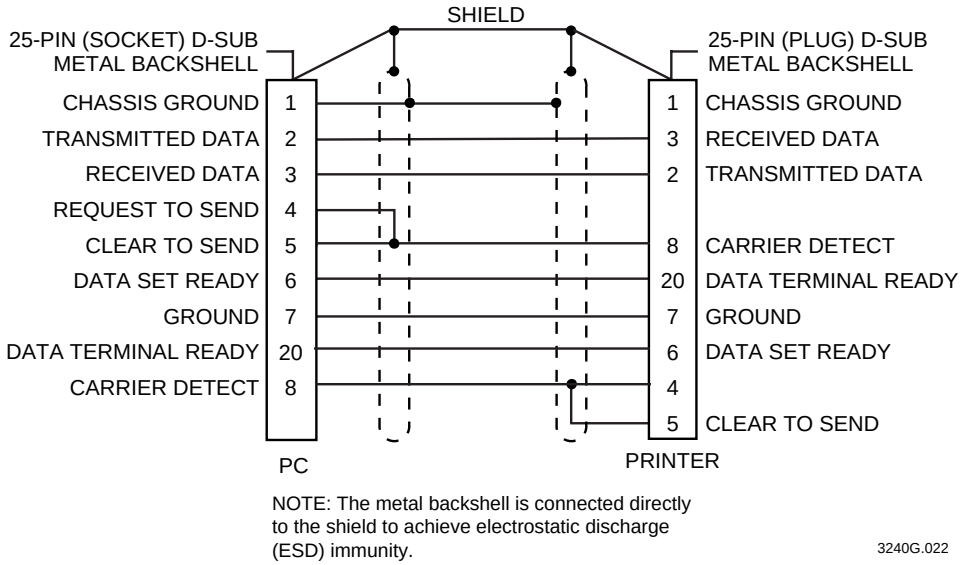
RS-232 Null Modem Cable for AT (Part Number 048693)



NOTE: The metal backshell is connected directly to the shield to achieve electrostatic discharge (ESD) immunity.

4400-19B

RS-232 Null Modem Cable for PC (Part Number 048668)



NOTE: The metal backshell is connected directly to the shield to achieve electrostatic discharge (ESD) immunity.

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Connecting the Printer to a PC Parallel Port

If you are using a parallel port to communicate with the printer, you need:

- a Centronics interface adapter installed in the printer.
- a parallel cable to run between the printer and the PC.

If you did not have the parallel interface installed at the factory, you can install the field installable option (Part No. 056830) in the optional I/O board port of your printer. You can purchase a parallel cable from Intermec (Part No. 051211) or from your local computer store.

To connect your printer to a PC parallel port

1. Turn the On/Off switch to the off position.
2. Plug the Centronics cable connector into the interface adapter port on the back of the 4400 printer.
3. Plug the other end of the cable into a parallel port on the PC.

Connecting the 4400 to a Network

You can connect the 4400 printer to Novell NetWare networks, Token Ring networks, or TCP/IP networks. To connect the 4400 printer to a network, you must have:

- a Centronics parallel interface installed in your printer.
- a network interface adapter (for example, Ethernet).

If you did not have the interface installed at the factory, you can install the field installable option (Part No. 056830) in the optional I/O board port of your printer.

The network interface adapter (for example, Ethernet) connects to the Centronics parallel interface on the back of the printer. Your network must be able to use XON/XOFF (hardware handshake) protocol. Refer to your network documentation for more information.

Connecting the 4400 to an AS/400

To connect a 4400 printer directly to an AS/400 or midrange system, you need:

- a twinax adapter card.
- a twinaxial cable (equivalent to IBM Part No. 7362267 or 7362062). The maximum cable length for the twinax interface is 5000 feet (1525 meters).

If you did not have the twinax card installed at the factory, you can install the field installable option (Part No. 056835) in the optional I/O board port of your printer.

For help on cabling and communications, see the manual that comes with the twinax adapter card.

Note: *If you are using a midrange computer other than the AS/400, refer to your system documentation for information on cabling and setting up communications.*

Connecting the 4400 to a Mainframe

To connect a 4400 printer directly to an IBM mainframe, you need:

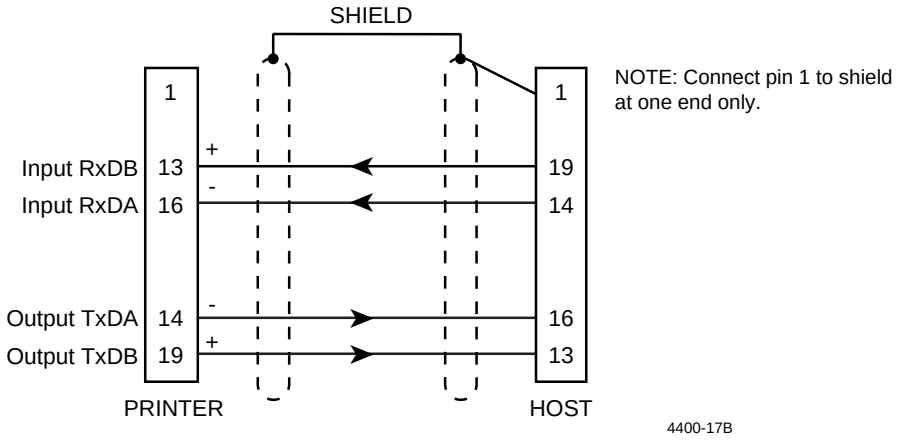
- a coax adapter card.
- a coaxial cable (equivalent to IBM Part No. 2577672 or 1833108).

The maximum cable length allowed is 4920 feet (1500 meters). See the IBM specification *Installation and Assembly of Coaxial Cable and Accessories*, part number GA27-2805-4, for further information.

If you did not have the coax card installed at the factory, you can install the field installable option (Part No. 056836) in the optional I/O board port of your printer.

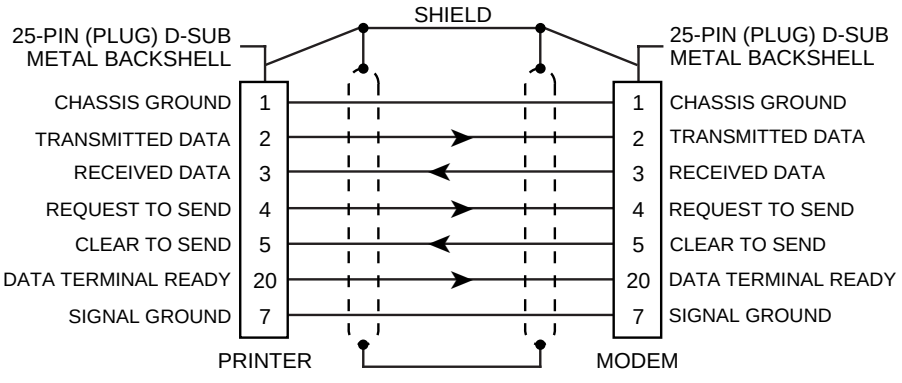
For help on cabling and communications, see the manual that comes with your coax adapter card.

RS-422 Intermec Pin Assignments



***Note**: The host in this case includes Intermec products that support RS-422. Non-Intermec controllers may have different pin assignments.*

Straight Through DTE to DCE Cable for Use With a Modem



NOTE: The metal backshell is connected directly to the shield to achieve electrostatic discharge (ESD) immunity.

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RS-485 (Multi-Drop) Cables

Refer to the following manuals for information on Multi-Drop cabling and connections.

- 9154 Multi-Drop Line Controller System Manual (Part No. 048517)
- 9161B Installation Manual (Part No. 049572)

Cabling Considerations in Noisy Electrical Environments

The items listed below create noisy electrical environments that can disrupt data communications between your host computer and the printer:

- Large power transformers
- Large electric motors
- Arc welders
- Motor controllers
- Switch gears

Following are several suggestions for reducing the effects of electrical noise if any of the items listed above are located near the printer. Some experimentation may be required to eliminate the problems. If you need help, ask your Intermec representative for assistance.

- Always use shielded cable. Connect the cable shield to the metal backshells on the cable connectors and fasten the connectors to the serial ports using screws.
- Install ferrite cable clamps.
- Connect the printer chassis ground to the building ground. The chassis ground is located on the ground pin of the printer power cord.

Configuring the Serial Port

The printer's main port settings should match those of your host computer or controlling device. If the default settings are not satisfactory for your needs, follow the instructions below to change them.

The choices for the main port settings are summarized below. The default values are shown in bold.

Command	Settings	Description
Baud Rate	110, 300, 600, 1200, 2400, 4800, **9600**, 19200	The rate (in bits per second) at which the host exchanges data with the printer.
Data Bits	**7** or 8	The number of bits that represent the ASCII characters.
Message Length	**255**, 512	Determines the maximum number of characters in a block (including overhead) that is sent to the printer in Standard, Polling Mode D and Multi-Drop protocols.
Parity	Odd, **Even**, Mark, Space, Off	Checks each transmitted character for errors.
Stop Bits	**1** or 2	Bits that follow each character to synchronize character transmission.
Protocol	**Standard,** XON/XOFF*,	The type of network used to connect the printer, Multi-Drop, Polling Mode D host and the rest of the data collection system.
Device Address	**A** to Z, or 0 to 5	Unique address for each device connected with Multi-Drop protocol.

*Use for READY/BUSY buffer control.

To change the main port settings, you must use the control panel to reach the selections in the main port menu.

To change any of the values listed in the previous table

1. Start at the OFFLINE READY display.
2. Press [MENU]. Then press [↑] or [↓] until the display shows the following:

```
OFFLINE
INSTALL MENU
```

3. Press [SELECT]. The display shows:

```
INSTALL MENU
SECURITY
```

4. Press [↑] or [↓] until the display shows the following:

```
INSTALL MENU
MAIN PORT
```

5. Press [SELECT]. The display shows the following:

```
MAIN PORT
BAUD RATE
```

6. Press [↑] or [↓] to scroll through the available commands.
7. Press [SELECT] when you reach the command you want to change. The display shows the current setting with an asterisk (*).
8. Press [↑] or [↓] to scroll through the available settings for the command.
9. When you see the setting you want, press [ENTER]. The asterisk (*) appears next to the new setting, indicating it is now active.
10. Press [CONTINUE] to return to the OFFLINE READY display or, to change other settings, press [MENU] and repeat Steps 6 through 9.

Note: *You must cycle the printer power (turn the printer off and then on again) to put any changes into effect. Cycling the power after making a number of changes activates all of them at once.*

Verifying Printer Communications With Your System

Once you have the printer connected to your system, you need to verify that the printer communicates with your system.

This feature is available through the Data Line Print command in the Service menu. You have two selections for Data Line Print:

Enabled The printer prints all ASCII characters it receives from the host, including control characters. The corresponding hexadecimal code is printed underneath each character.

Disabled The printer prints normally. This is the default setting.

To enable or disable Data Line Print

1. Start at the OFFLINE READY display.
2. Press [MENU] to enter the main menu. Press [↑] or [↓] until you reach the Service menu.
3. Press [SELECT] to enter the Service menu. Press [↑] or [↓] until the display shows:

   ```
   SERVICE MENU
   DATA LINE PRINT
   ```

4. Press [SELECT]. The display shows:

   ```
   DATA LINE PRINT
     DISABLED*
   ```

5. Press [↑] or [↓] to change to Enabled, and then press [ENTER] to move the asterisk next to the new selection. The display shows:

   ```
   DATA LINE PRINT
     ENABLED*
   ```

   The printer will now print characters received from the host.

   The data line print automatically returns to DISABLED after you exit this menu. Press [ONLINE/OFFLINE] to return to normal printing.

   Note: *An example using DOS to verify printer communications follows this procedure.*

Example of Using DOS to Verify Printer Communications

1. At the DOS prompt, type the following command and press **Enter** to configure the serial port:

   ```
   MODE COM1 96,E,7,1,N
   ```

2. Type the following command lines and press **Enter**:

   ```
   COPY CON COM1
   ABCDEF^Z
   ```

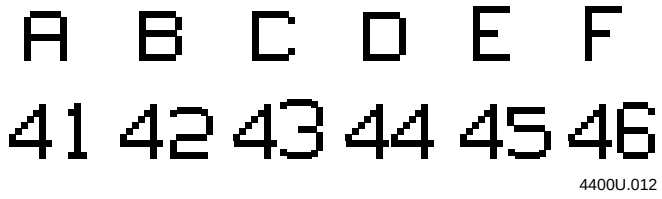
   where:

   `COPY CON COM1` tells the PC to copy the next line of information to communications port COM1.

   `ABCDEF` are random characters typed at the host.

   `^Z` (**Ctrl**-**Z**) sends the information to the printer.

   The printer prints the following characters:



4400U.012

Note: *If you are using a different platform to communicate with your printer, please refer to your system user's manual for information on downloading commands.*

3

Using the Control Panel

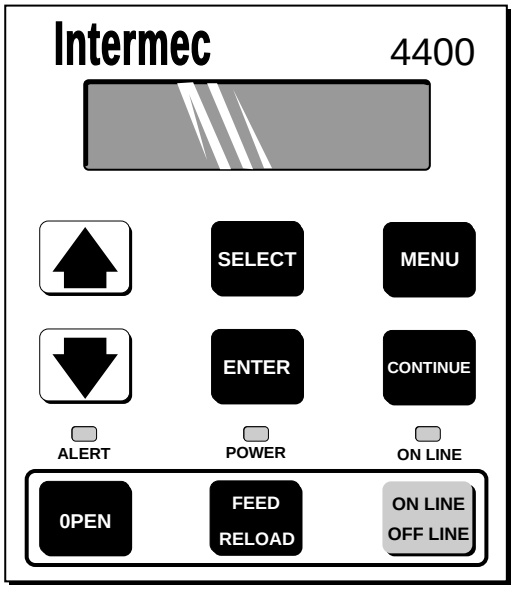
This chapter explains how to read the control panel display, understand the indicator lights, and operate the printer keys.

About the Control Panel

You can operate the printer directly at the control panel instead of through a host computer. The control panel provides the means for all direct communications with the printer. You can use it for many everyday tasks, such as replacing media, and for less frequently used features, such as resetting printer parameters.

The list below describes operations that require use of the control panel, based on different user categories.

- Printer operators who use the printer daily can use it to open the printer for general maintenance and to adjust the quality of their labels.
- System administrators, systems analysts, and programmers can use it to configure the printer and set printing parameters and security levels.
- Service technicians can use it to run diagnostic tests on the printer.



4400-13

Reading the Display

Messages that indicate printer settings and alert conditions appear on the control panel display.

Operating Messages These messages appear during normal operation of the printer. Shown below is an operating message that indicates the printer is online and ready to print labels:

```
ONLINE
READY
```

Menu Messages When you change printing adjustments, messages appear indicating the selections that are active and the task you are performing. For example, when you are adjusting the darkness of your labels, a message similar to the one shown below appears:

```
DARK ADJUST
5*
```

The asterisk (*) appears next to the current setting.

Error Messages Error messages indicate a problem with the printer or the data from the host. The message shown below indicates the supply of thermal transfer ribbon is depleted or jammed:

```
RIBBON FAULT
```

See Chapter 9 for instructions on clearing error messages.

Understanding the Indicator Lights

The control panel has three lights that indicate the current operating status of the printer. All three are lit briefly when the printer is turned on.

Alert

This light flashes when a condition arises that requires your attention, such as an open paper path. A message describing the alert condition is displayed. A beep will sound at regular intervals until the problem is corrected.

Power

This light remains on as long as the printer is turned on and is receiving power.

Online

When lit, this light indicates the printer is online (it can receive data from the host computer). While the printer is online, the only commands you can access from the control panel are the commands in the Operator menu.

Using the Operator Keys

There are three Operator keys that are beneath the indicator lights on the control panel.

Key	Description
[OPEN]	Opens the printer. This key is only operational when the printer is offline.
[FEED/RELOAD]	Advances media to the next label and feeds media when reloading. This key is only operational when the printer is offline.
[ONLINE/OFFLINE]	Toggles the printer between online and offline. When online, the printer prints any data it receives. When offline, the printer stops printing and cannot accept data (but can accept protocol commands) from the host computer.

[ONLINE/OFFLINE]

For most front panel operations, the printer must be offline. The following message and the online indicator light show the printer is online:

```
ONLINE
READY
```

Press [ONLINE/OFFLINE] to toggle between online and offline. When offline, the online indicator light is off and the display shows:

```
OFFLINE
READY
```

[OPEN]

Make sure the printer is offline before you open or close it (when it is offline, it stops printing).

To open and close the printer

1. Press [OPEN] to unlock the cover, and then lift it up. The Alert light flashes and the display shows:

   ```
   PAPER PATH OPEN
   ```

2. Close the cover. The display shows:

   ```
   PRESS RELOAD
   ```

3. Press [FEED/RELOAD]. The media is advanced and the display shows OFFLINE READY.

[FEED/RELOAD]

When the printer is offline, you can use the [FEED/RELOAD] key to reload media or advance the media. Pressing this key once advances media to the next print point. Pressing it twice feeds an entire blank label through the printer.

Using the Selection Keys to Access the Menus

The six keys located above the indicator lights are used for accessing printer features and label adjustments. As you go through these procedures, refer to the circle on page 3-9. This will help you understand how to access the features shown on the circle.

The table below lists a brief description of each selection key.

Key	Description
[↑] and [↓]	Scrolls through menus and choices of selections within menus.
[SELECT]	Selects menus and features, and returns to the last adjustment screen after you have left the menus. This key also selects a digit to be changed when changing parameters.
[ENTER]	Activates a selected option. This key also starts a selected Test or Service function.
[MENU]	Returns to a menu list so you can change menus.
[CONTINUE]	Exits the menus.

About the Printer Menus

The four menus in the Main menu divide the features of the printer into categories described by the title of each menu. Use this table to locate the menu you will use the most, based on the tasks you are performing with the printer.

Menu	Description	User
Operator	Used for setting media sensitivity and for making fine adjustments to the darkness, print alignment and cutoff point of your labels. This menu can be accessed when the printer is online or offline.	Operators who use the printer daily.
Install	Select communication parameters and security levels and install printer options. The printer must be offline to access this menu.	Programmers, systems analysts, or other personnel who install and set up the printer
Service	Set and adjust operating features, calibrate printer sensors, and test current settings. The printer must be offline to access this menu.	Technicians or other personnel qualified to do repair and service.
Configuration	Change the operating parameters and activate or disable optional features. The printer must be offline to access this menu.	Programmers, systems analysts, or supervisors who program and set up the commands for the printer and label formats.

Accessing the Main Menu

The selections for changing the printer settings are divided into four menus that cover four different categories for maintaining and customizing your printer. These four menus are listed in the Main menu, which is shown on page 3-9 as the first circle of menus from the center.

To access the Main menu

1. Make sure the printer is offline and the display shows:

```
OFFLINE
READY
```

2. Press [MENU]. The display shows:

```
OFFLINE
OPERATOR MENU
```

3. Press [↓]. The display shows:

```
OFFLINE
INSTALL MENU
```

4. Continue pressing the [↑] and [↓] keys to scroll through the Main menus.

Moving Around Within the Circle

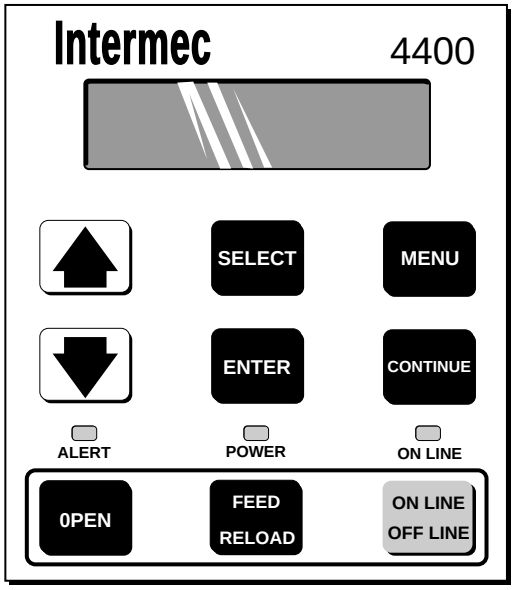
The circle lets you review all of the printer features at once. Once you are used to using the circle to access the menus and features you need, you will find it quite useful for whenever you need to quickly locate and change a feature.

This manual contains complete procedures for activating or changing each feature shown in the circle and it is not necessary for you to know how to use the circle to follow these procedures. The circle shows the menu structure in the following way:

- The ONLINE READY or OFFLINE READY screen is in the middle.
- As you move outwards, you see the menu levels. The final level, at the edge, contains the settings.

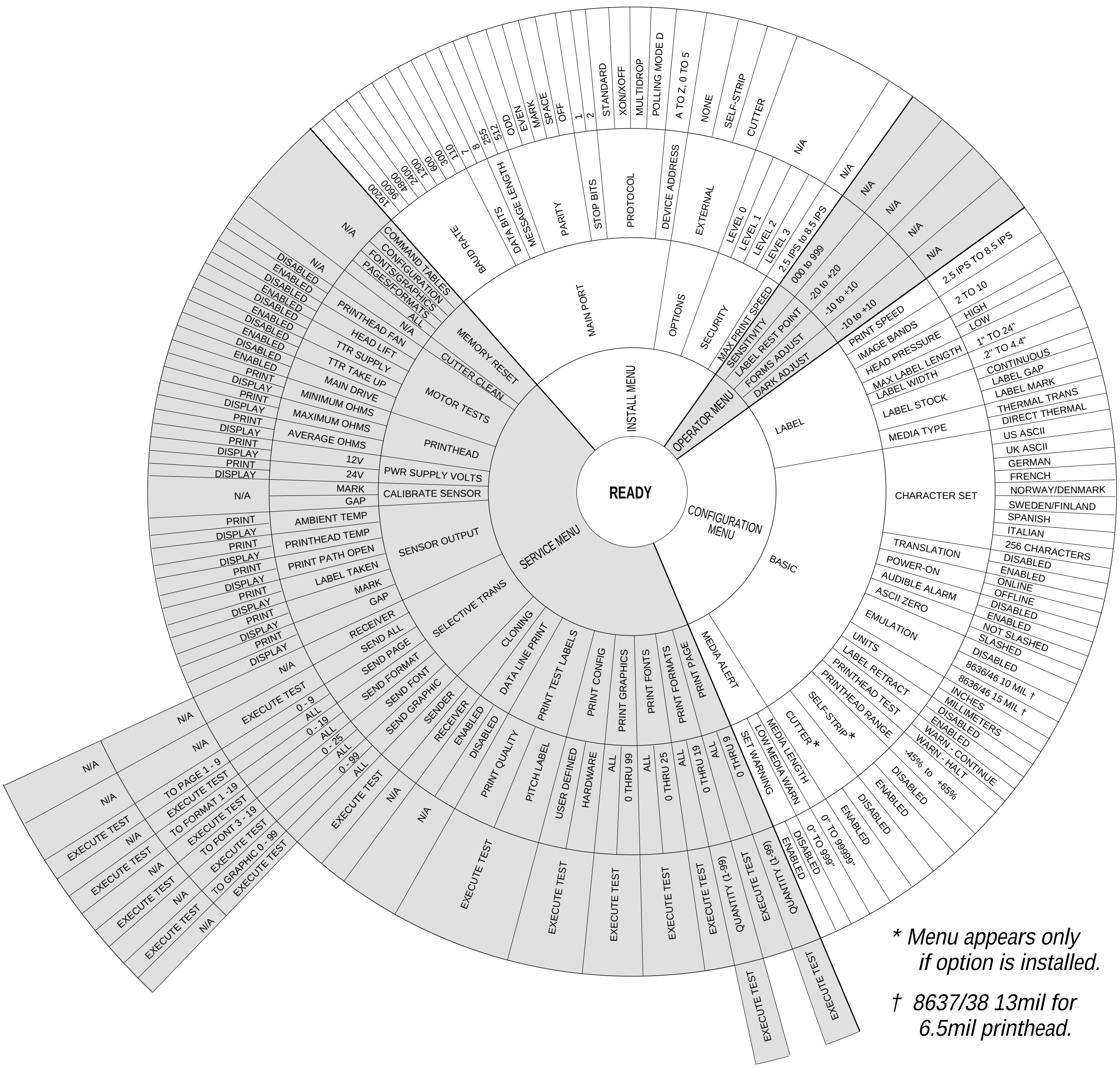
To use the circle

1. Start at the OFFLINE READY display (only the Operator menu is accessible from ONLINE READY).
2. Press [MENU] to enter the Main menu.
3. Press [↑] or [↓] to reach the menu you need.
4. Press [SELECT] when you reach the right menu.
5. Repeat Steps 3 and 4 to find and select the features you are changing.
6. Press [ENTER] to activate the new setting.
7. Press [CONTINUE] to return to the Ready display.



4400-13

Using the Main Menu



* Menu appears only if option is installed.

† 8637/38 13mil for 6.5mil printhead.

Wheel-6x7

Tips for Using the Control Panel

Press	To Move	When You Want To
[SELECT]	Outwards towards the edge of the circle.	Select a menu choice.
[MENU]	In towards the center of the circle.	Return to a menu. ***Note**: Use this key to enter the Main menu.*
[↑] or [↓]	Around the circle.	Scroll through menu choices.
[CONTINUE]	Back into the center.	Exit menus and return to READY.
[ENTER]		Activate a setting.

- To determine the printer's present configuration, print a configuration test label as described in Chapter 1.
- To stop printing immediately, without losing data, press [ONLINE/OFFLINE].
- To go directly back to the screen where the last adjustment was made, press [SELECT] at the ONLINE READY or OFFLINE READY screen. This feature saves many keystrokes when making trial-and-error adjustments.
- To go directly back to the menu where the last adjustment was made, press [MENU] at the ONLINE READY or OFFLINE READY screen. This feature saves many keystrokes when making trial-and-error adjustments.
- To return to the previous menu, press [MENU] from within a menu. This feature is convenient if you are making many setting changes.
- When you finish making an offline adjustment and wish to go right back to online printing, press [ONLINE/OFFLINE]. This feature returns you directly to the ONLINE READY screen.

4

Operating the Printer

This chapter explains how to open and close the printer, load media, change the thermal transfer ribbon, set the sensitivity rating for your media, set the dark adjust, set the forms adjust, adjust the label rest point, and print the buffer contents.

About Printer Operation

Your 4400 printer comes with a wide variety of features and many choices for configuring and programming. However, normal operation is quite straightforward. The printer is designed to continually produce high quality labels in harsh environments with minimal supervision and maintenance.

The Operator menu in the printer contains four selections that let you adjust the media sensitivity, print darkness, print alignment and label rest point (perforation point). Since operators must also reload media, clear jams, and perform other maintenance tasks, this chapter includes procedures for these activities as well as for using the Operator menu.

Refer to Chapter 1 if you need to locate a part of the printer or a description of the part's function.

Opening and Closing the Printer

The following procedures describe how to open and close the printer for replacing media, clearing paper jams, or performing maintenance.

Opening the Printer With Power On

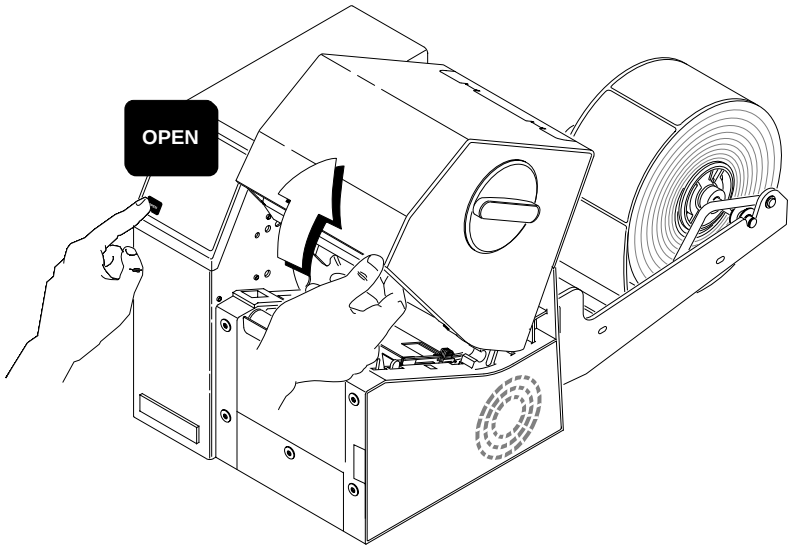
1. Make sure the printer is turned on.
2. If the printer is online, press [ONLINE/OFFLINE]. Printing stops and the display shows:

```
OFFLINE
READY
```

3. Press [OPEN] to unlatch the cover. Refer to the following figure. Lift up the cover to expose the paper path. The display shows:

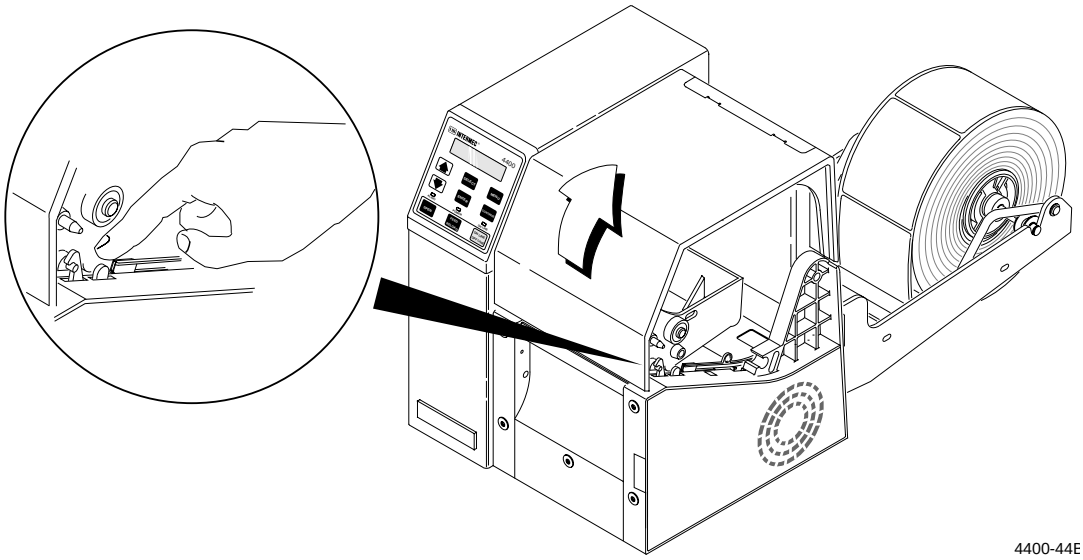
```
PAPER PATH OPEN
```

Opening the Printer With Power On



Opening the Printer With Power Off

1. Make sure the printer is turned off or the printer is unplugged.
2. Turn the knob on the Ribbon Access Door one quarter turn counterclockwise, and then lift the door away from the printer.
3. Press down on the cover release and open the printer to expose the paper path.
4. When you are ready to close the printer, replace the Ribbon Access Door. Make sure that the grip on the knob is in the Open or vertical position. Then position the door on the printer and press it into place, making sure it seats evenly.
5. Lock the door into place by turning the knob 1/4 turn clockwise.
6. Close the paper path by pressing down on the cover until the latch catches.



4400-44E

Closing the Printer

1. Close the cover until the catch latches. The display shows:

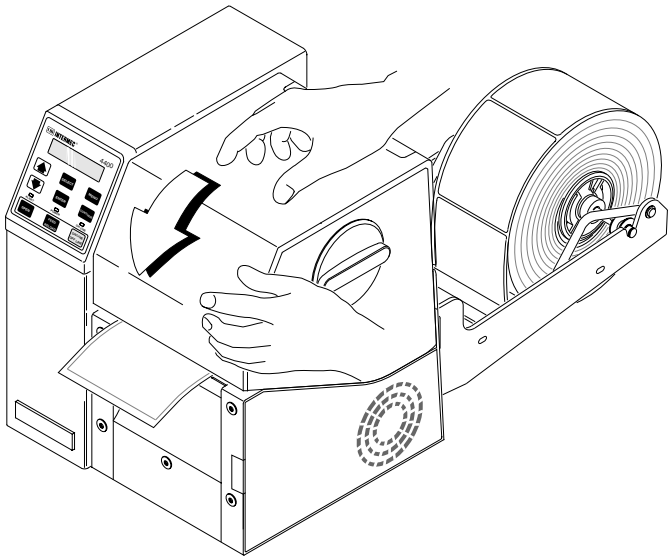
```
PRESS RELOAD
```

2. Press [FEED/RELOAD]. The display shows:

```
OFFLINE
READY
```

3. Press [ONLINE/OFFLINE]. The display shows:

```
ONLINE
READY
```



Opening and Closing the Printer With the Media Alert Enabled

1. If the printer is online, press [ONLINE/OFFLINE]. Printing stops and the display shows:

OFFLINE READY

2. Press [OPEN] and lift the cover. The display shows:

PAPER PATH OPEN

3. After changing media or clearing a jam, close the printer. The display shows:

PRESS RELOAD

4. Press [FEED/RELOAD]. The display shows:

RESET MEDIA ALERT?

5. Follow one of these two steps:
   - If a new roll of media has been loaded, press [ENTER]. The display shows:

     ```
     MEDIA ALERT
     RESET COMPLETE
     ```

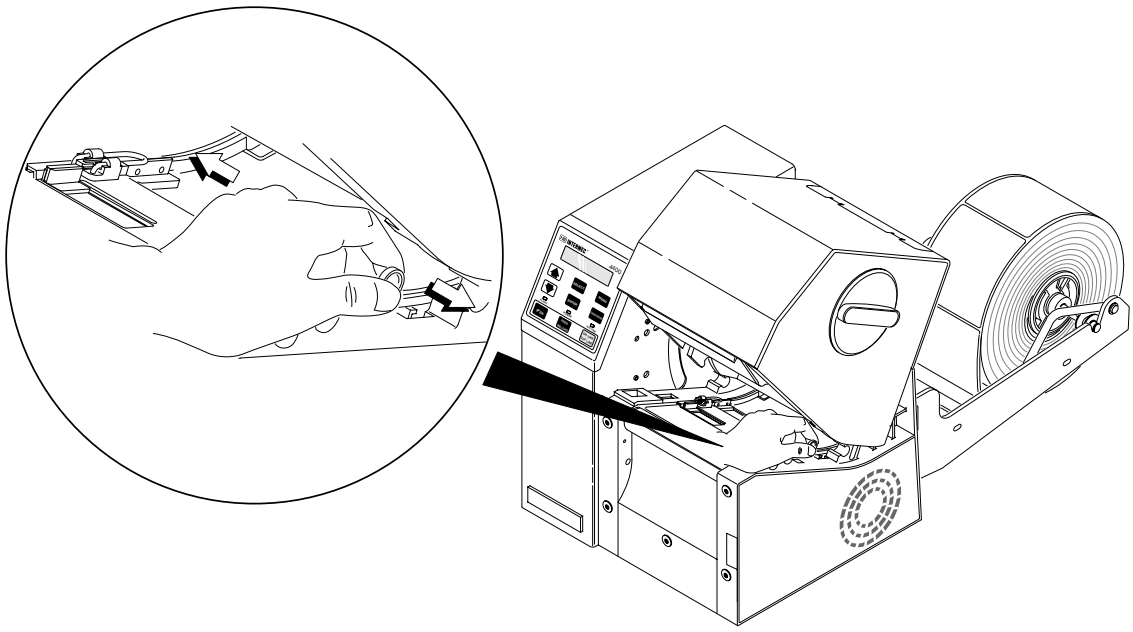
     Press [CONTINUE] to return to OFFLINE READY.
   - If you have not changed the media, press [CONTINUE] to return to OFFLINE READY.
6. Press [ONLINE / OFFLINE] to return to the ONLINE READY display and resume printing.

Loading Media Into the Printer

The procedures on the next few pages explain how to load media (label stock) into the printer. If you are using the Media Alert feature, see "Opening and Closing the Printer With the Media Alert Enabled" earlier in this chapter.

Opening the Edge Guides

1. Slide the edge guides apart by pulling the tab on the outside edge guide away from the center.
2. Remove any pieces of media from the paper path.



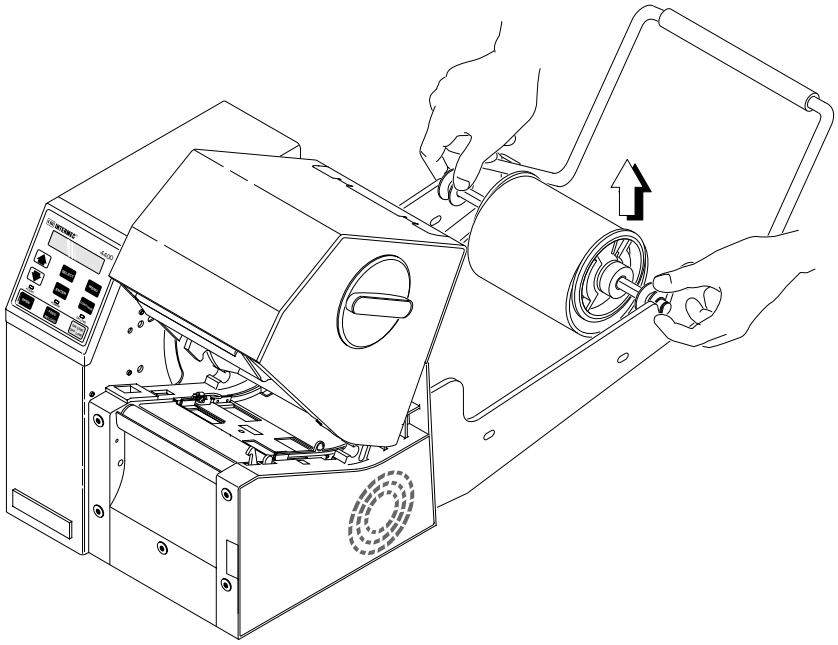
4400-40B

Removing the Media Roll and Shaft

You may need to remove the media roll core and shaft when you replace the roll media.

To remove the media roll and shaft

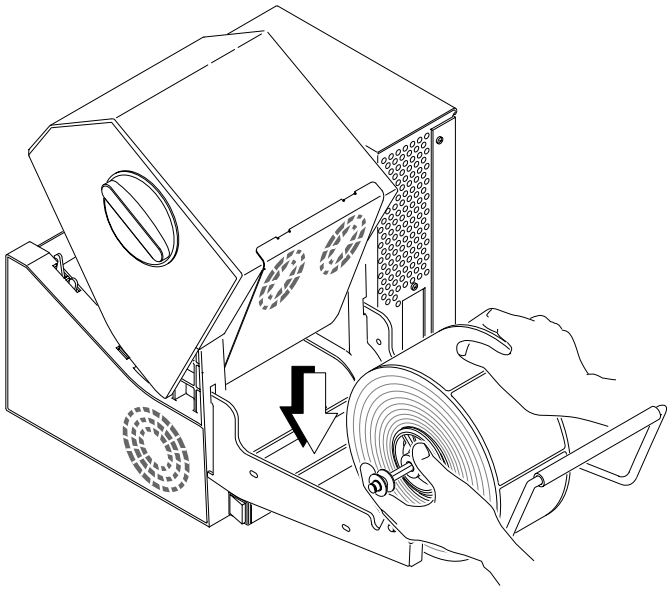
1. Lift the roll shaft off the roll hanger arms.
2. Remove the media roll core from the shaft and throw it away.



4400-54B

Installing a New Media Roll

1. Install a new roll of media on the roll shaft between the collets. Make sure the labels are sent underneath the tension bar before entering the printer.
2. Place the shaft on the hanger arms.



4400-29B

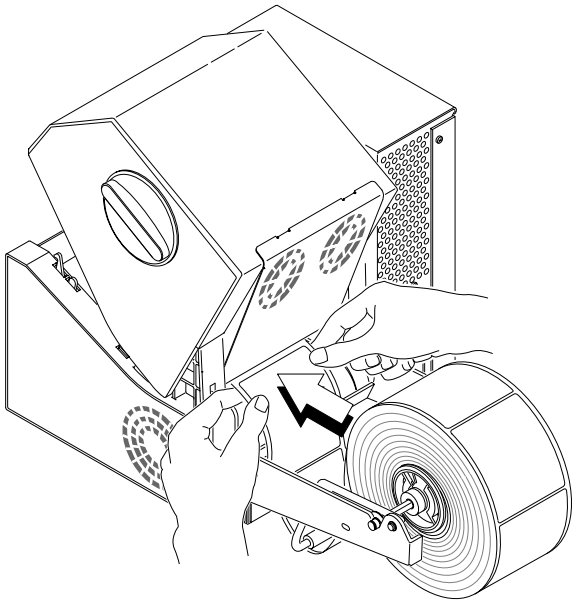
Feeding Media Into the Printer

Note: *If you are using fanfold media, open the media box and place it in back of the printer so the media feeds easily into the printer.*

1. Feed the end of the media into the opening in the back of the printer. Make sure the labels are facing up.

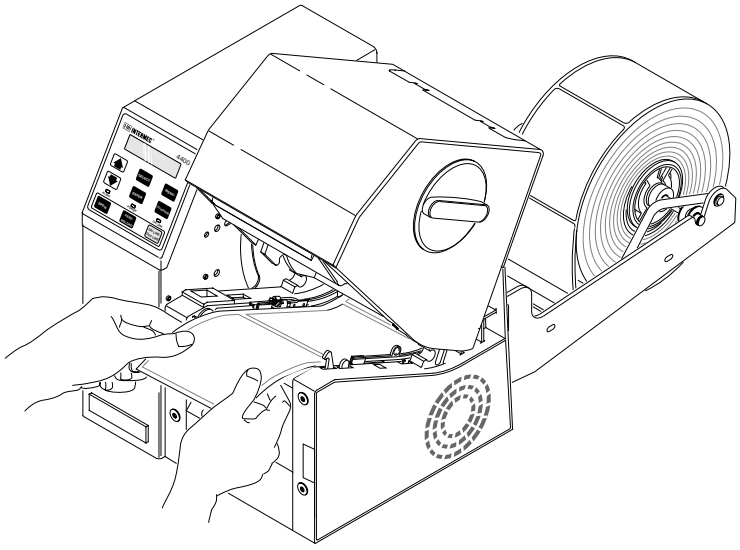
   Note: *If you are using roll media, make sure the labels are fed under the tension bar before they enter the printer.*

Feeding Media Into the Printer



4400-39B

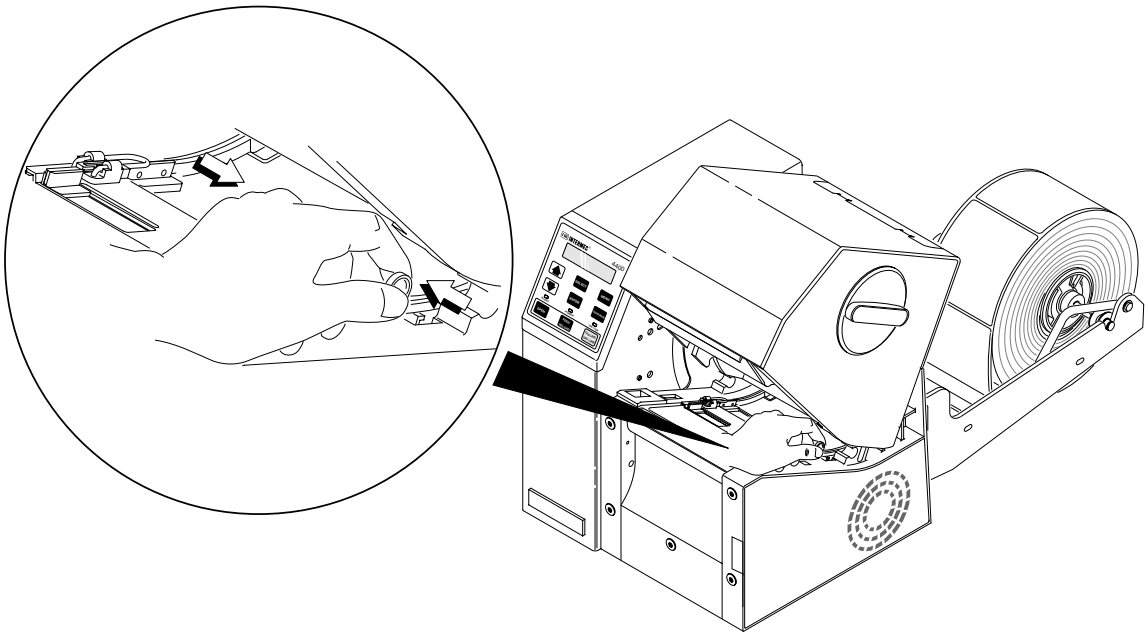
2. Continue feeding media until several inches extend from the front of the printer.



4400-55B

Adjusting the Edge Guides

1. Push the tab on the outside edge guide in until the inside edge just touches the edge of the media.
2. Make sure that the media does not pinch or buckle in the label path.
3. Close the printer.



4400-56B

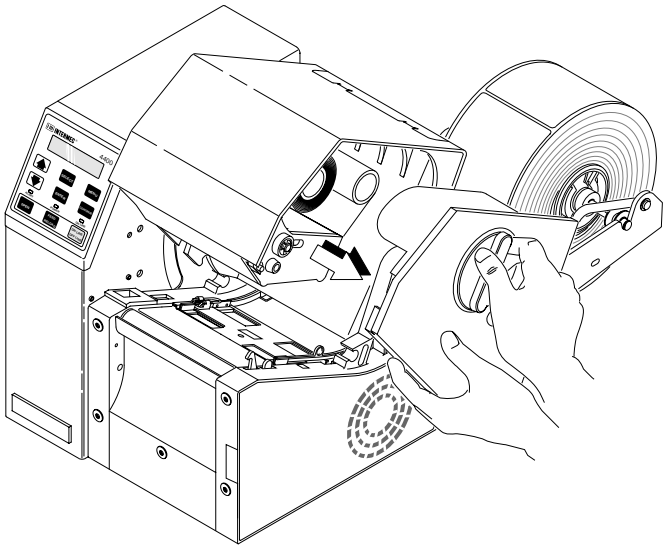
4. If you have opened a new box of media, be sure to check the media sensitivity rating. See “Setting the Media Sensitivity Number” later in this chapter. If the sensitivity rating is correct, the printer is now ready to print.

Changing Thermal Transfer Ribbon

The following procedures explain how to load thermal transfer ribbon into the printer if you are printing on thermal transfer media.

Removing the Ribbon Access Door

1. Make sure the printer is turned on.
2. Turn the large knob on the door 1/4 turn counterclockwise.
3. Lift the door away from the printer.

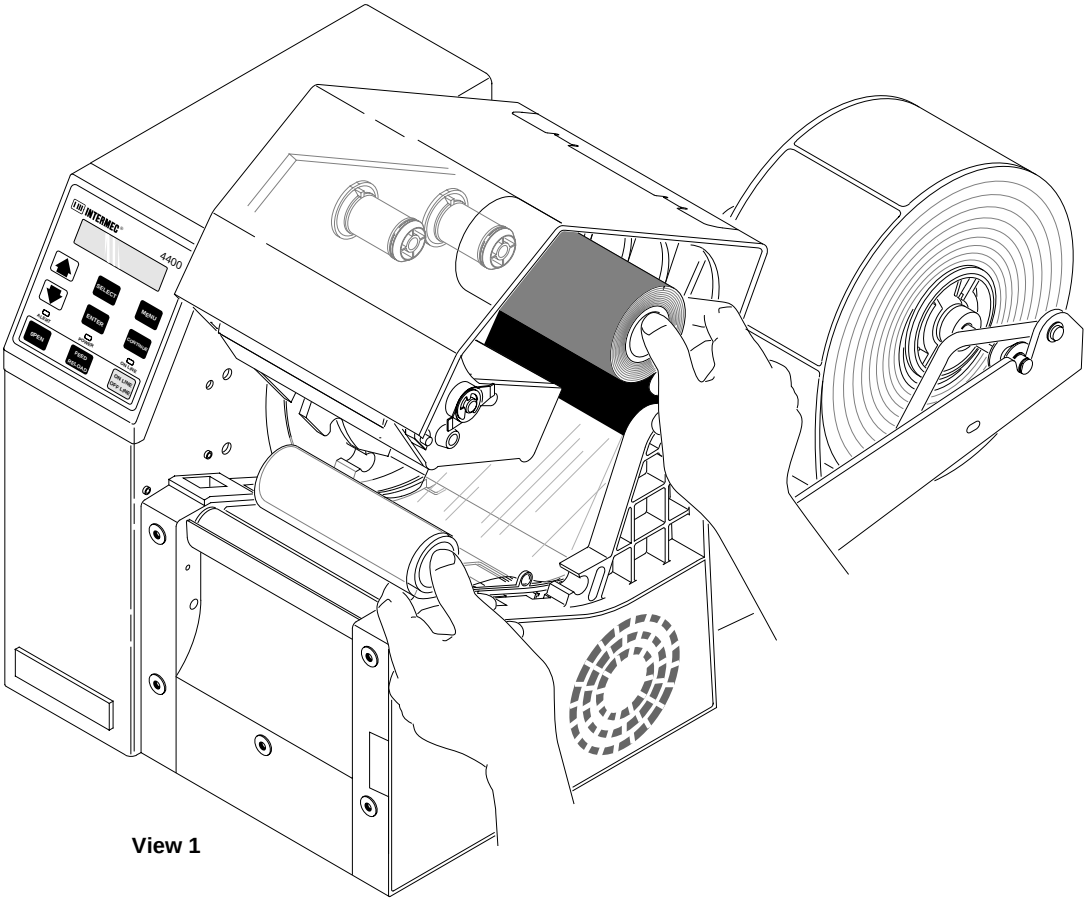


4400-43B

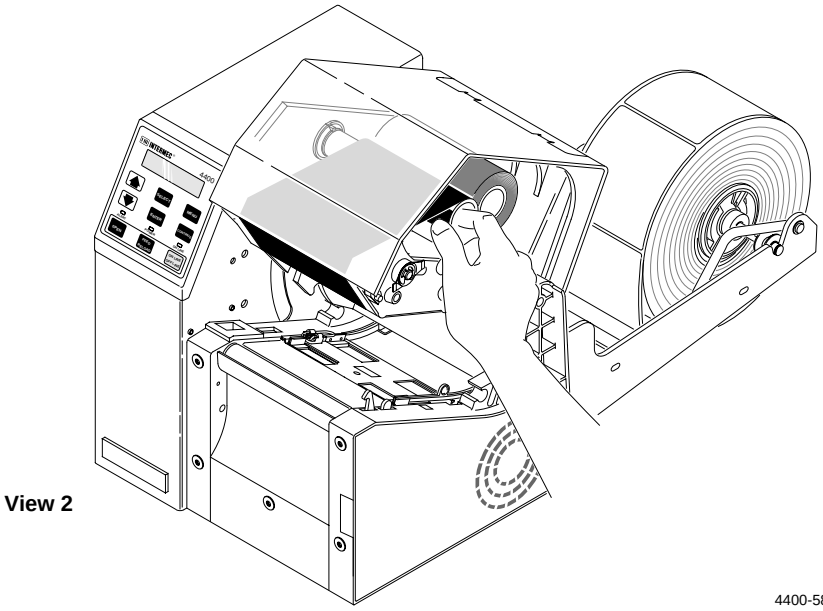
Loading the Thermal Transfer Ribbon

1. Remove and discard the used ribbon and inner cores on the ribbon supply and takeup hubs.
2. Remove and discard the protective wrapping on the new ribbon supply.
3. Slide the supply roll onto the supply hub until the notches engage the keys on the hub. Make sure the ribbon unwinds from the bottom of the roll. See View 1 in the figure on the next page.
4. Pull the ribbon around underneath the printhead assembly and up to the takeup hub. See View 2 in the figure on the next page.
5. Slide the ribbon takeup core onto the takeup hub, making sure the notches engage the keys on the takeup hub.
6. Wind the ribbon onto the takeup core until the inked part of the ribbon is past the printhead.
7. Make sure that you enable the thermal transfer ribbon command for the printer. Using the control panel, in the Configuration menu, select Label, Media Type, and Thermal Transfer.

Loading the Thermal Transfer Ribbon



View 1

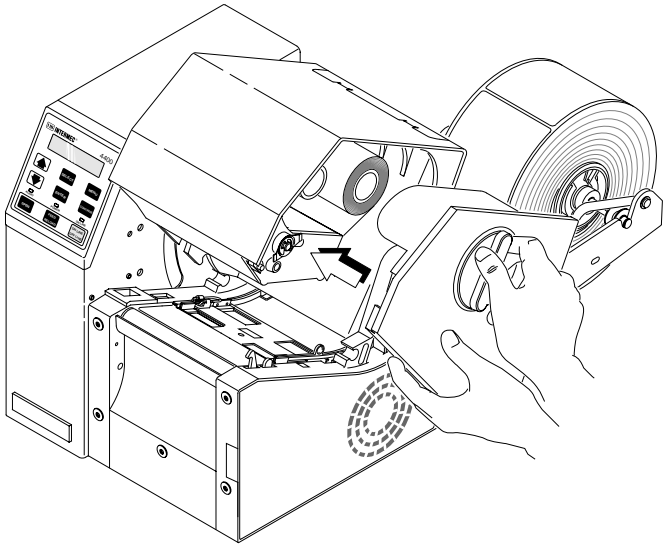


View 2

4400-58B

Replacing the Ribbon Access Door

1. Make sure that the grip on the knob is in the Open (vertical) position.
2. Position the door on the printer and press it into place, making sure it seats evenly.
3. Lock the door into place by turning the knob 1/4 turn clockwise.



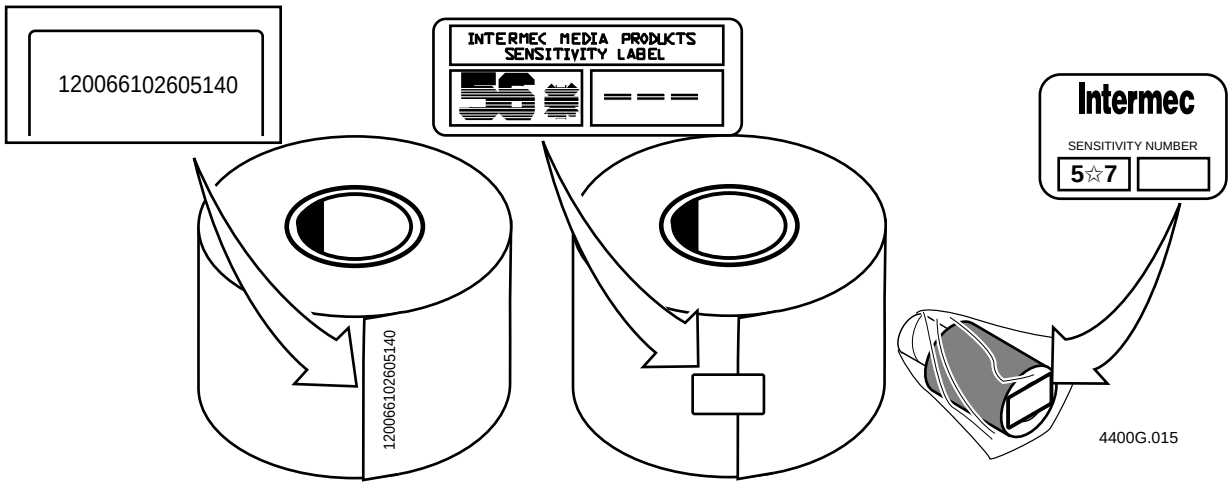
4400-59B

Setting the Media Sensitivity Number

Media sensitivity is important because you use it to optimize print quality and print speed. The three-digit sensitivity number specifies the amount of heat required by the printhead to image a label. The amount of heat that each roll of media or ribbon requires is unique to different chemistries and manufacturing processes.

Intermec has developed heating schedules (the amount of heat required to image a label) to produce the highest possible print quality for Intermec media and ribbon combinations on Intermec printers. Look for the three digit media sensitivity number on:

- The side of the media roll. Use the last three digits (140 in the example) of the 15 digit number stamped on the roll for the media sensitivity number.
- A small label attached to the roll of the media.
- A small label attached to the plastic bag of your ribbon roll.



Use this three-digit number to optimize print quality and print speed on the 4400 printer. You can achieve the best print quality on the 4400 printer by using Intermec ribbon and media products.

Use the information on the packaging that you saved when loading media and ribbon to determine the correct sensitivity number.

When you load media into the printer, you should check to see that the sensitivity rating for the media matches the rating set in the printer. The default values set the correct sensitivity for most printing needs.

Direct thermal media	420
Thermal transfer media	567

When you set Sensitivity in the printer to match the rating for your media, the amount of energy the printhead uses is adjusted to a value that is suitable for your media. This improves print quality and sets the darkness to an appropriate level.

You only need to enter the first digit to set the approximate rating for your media. Setting the other two digits is recommended for fine-tuning the sensitivity to improve print quality.

First Digit The first digit (in the hundreds place, at the left) designates the range of sensitivity for your media.

Second and Third Digits The second and third digits are used to fine-tune the printhead energy to improve print quality and darkness of your labels.

Setting the Media Sensitivity Number for Thermal Transfer Media

The sensitivity rating, printed on each roll of thermal transfer media or ribbon, has an asterisk (*) in place of one of the digits. On thermal transfer media, the rating contains the first and second digits, and then an asterisk in place of the third digit because this digit is reserved for ribbon. The rating on the ribbon has the first and third digits, with an asterisk in place of the second digit because this digit is reserved for media.

For example, you may see 56* on the media, and 5*7 on the ribbon. To fine-tune the printhead for your media, you should set the sensitivity to 567.

Note: *If you change media types often, you may decide to choose types with the same first digit in their sensitivity rating and then set sensitivity to that digit only. This will make it unnecessary to alter the setting each time you change to a different type of media. See the following tables to compare settings for various types of media.*

Setting the Media Sensitivity Number for Other Media and Ribbons

If you are not using Intermec media and ribbon, or you misplaced your packaging with the three-digit sensitivity number label on it, you can set the approximate sensitivity setting. The approximate sensitivity numbers are the first entry (in bold text) for each series in the media sensitivity settings table on the following pages. Enter the three-digit approximate sensitivity setting (for example, 800) to achieve acceptable print quality.

Use the following tables to find the correct sensitivity rating for you direct thermal media or thermal transfer media and ribbon combination.

Direct Thermal Media and Ribbon Sensitivity Settings

Approximate Sensitivity Ratings	Sensitivity Setting	Thermal Transfer Media/Ribbon
700 Series High Sensitivity	740	Duratherm Lightning Plus-1
	720	Duratherm Lightning Plus-2
400 Series Medium Sensitivity	480	Duratherm Lightning IR-2
	470	Duratherm Lightning-1
	460	European Thermal IR
	450	Duratherm Lightning IR-1
	440	European Thermal Economy
	430	Duratherm Lightning Synthetic
	420	Duratherm Lightning-2
100 Series Low Sensitivity	190	Duratherm Buff Tags
	180	Duratherm II-1
	170	European Thermal Top Board / Reinforced
	160	Duratherm II Tag
	150	Duratherm Buff Labels
	140	European Thermal Top
	130	Duratherm II-2
	120	European Thermal Economy Tag

Thermal Transfer Media and Ribbon Sensitivity Settings

Approximate Sensitivity Ratings	Sensitivity Setting	Thermal Transfer Media/Ribbon
800 Series High Sensitivity (Paper)	864	European Uncoated / Standard
	854	Duratran I / Standard
	834	Duratran I Tag / Standard
600 Series Medium Sensitivity (Plastic)	687	Duratran Matte Polyester / Premium
	677	Duratran Syntran / Premium
	647	Duratran Tyvek / Premium
	633	European Polyethylene / Premium
	627	Duratran Kimdura / Premium
500 Series Medium Sensitivity (Paper)	567	Duratran II-1 / Premium
	565	Duratran European / Premium
	547	Duratran II-2 / Premium
	533	European Tag / Premium
	527	Duratran II Tag-5 mil and 7 mil / Premium
	513	European Coated and Board Tag / Premium
300 Series Low Sensitivity (Plastic)	369	Super Premium Poly. / Super Premium 3
	366	Super Premium Poly. / Super Premium 7
200 Series Low Sensitivity (Plastic)	238	Gloss Polyimide (Kapton) / Gloss Super Premium 7
	236	Gloss Polyimide (Kapton) / Super Premium 7
	226	Matte Polyimide (Kapton) / Super Premium 7
	222	Matte Polyimide (Kapton) / Matte Super Premium

You should check the Sensitivity rating each time you open a new box of media, and change it if necessary.

To change the sensitivity rating

1. Start at the ONLINE READY display:

```
ONLINE
READY
```

2. Press [MENU] to enter the Operator menu. Then press [↑] or [↓] until you see the display:

```
OPERATOR MENU
SENSITIVITY
```

3. Press [SELECT]. The current setting appears with a cursor under the first digit:

```
SENSITIVITY
420*
```

4. If the setting is correct, skip to Step 8. Otherwise, press [↑] to increase the digit, or press [↓] to decrease it:

```
SENSITIVITY
320*
```

5. Press [SELECT] until the cursor is under the digit you need to change as shown in the example below:

```
SENSITIVITY
420
```

6. Repeat Steps 4 and 5 until the setting is correct.

   Note: *Pressing [SELECT] at the last digit moves you to the first digit.*

7. Press [ENTER] to activate the new setting.
8. Press [CONTINUE] to return to the ONLINE READY display.

Setting the Dark Adjust

Print darkness can be adjusted when the printer is online or offline. The dark adjust setting is for fine-tuning only. As long as you set the sensitivity rating, a darkness setting of zero should provide optimal print quality. However, as the printhead wears or if you use a lot of media, some adjustment may be necessary.

Check the sensitivity rating first before using the Dark Adjust command.

To adjust the darkness of your labels

1. Start at the ONLINE READY display:

```
ONLINE
READY
```

2. Press [MENU] to enter the Operator menu. Press [↑] or [↓] until the display shows:

```
OPERATOR MENU
DARK ADJUST
```

3. Press [SELECT]. The display shows the current dark adjust setting with an asterisk (*) as shown in the example below:

```
DARK ADJUST
5*
```

4. Press [↑] to increase the number and darken the printing. Press [↓] to decrease the number and lighten the printing. The range is from -10 (lightest) to 10 (darkest).
5. Press [ENTER] at the desired setting. The asterisk (*) moves to the new setting as shown in the example below:

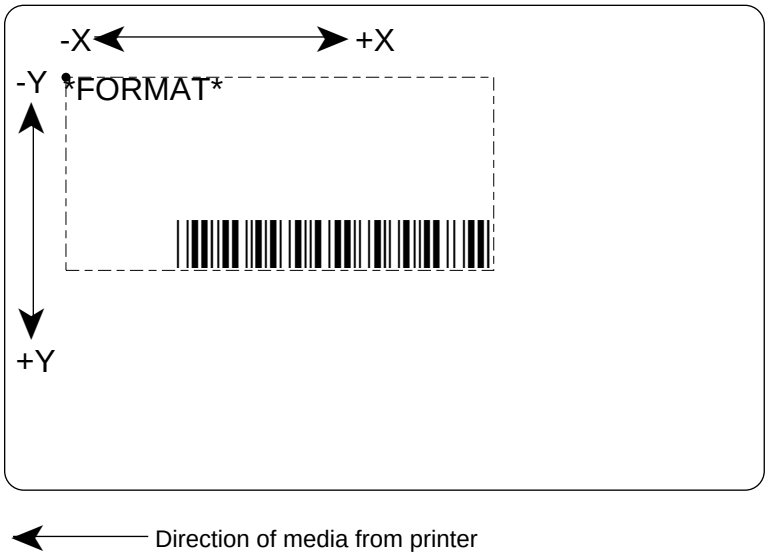
```
DARK ADJUST
3*
```

6. Press [CONTINUE] to return to the ONLINE READY display. Print out a few labels. You may want to scan some labels to see if they are too dark or light to scan.
7. If the labels are too dark or too light, repeat Steps 3 through 6.

Using the X and Y Forms Adjust

If the print on your labels is not positioned correctly, you can center the printed image with the X and Y Forms Adjust. The X Forms Adjust lets you adjust the position of the printed image in the direction of media movement (moves the print further towards the front or back of the label). The Y Forms Adjust lets you adjust the position of the print in the direction parallel to the front of the printhead (moves the print towards the sides of the label). You can use X and Y Forms Adjust when the printer is online or offline.

***Note**: Make sure you set the Label Width before you use the Forms Adjust command. Refer to "Configuring the Label Width," in Chapter 5.*



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You can adjust the print alignment on your labels without interrupting normal label production. The following example uses the X Forms Adjust feature. The procedure is performed the same way for the Y Forms Adjust feature.

***Note**: The x-dimension is also affected by the Top-of-Form configuration command. For more information, see "Top-of-Form, Set" in Chapter 7.*

To adjust the print alignment (example)

1. Start at the ONLINE READY display:

```
ONLINE
READY
```

2. Press [MENU] to enter the Operator menu. Press [↑] or [↓] until the display shows:

```
OPERATOR MENU
X FORMS ADJUST
```

3. Press [SELECT]. The display shows the current X Forms Adjust setting with an asterisk (*) as shown in the example below:

```
X FORMS ADJUST
0*
```

4. Press [↑] to increase the number and move the print towards the back of the printer. Press [↓] to decrease the number and move the print towards the front of the printer.

Note: *The range for the X Forms Adjust is from -20 (furthest towards the front) to +20 (furthest towards the back). The range for the Y Forms Adjust is from -30 (closest to the top) to +30 (closest to the bottom).*

5. Press [ENTER] at the desired setting. The asterisk (*) moves to the new setting as shown in the example below:

```
X FORMS ADJUST
3*
```

6. Press [CONTINUE] to return to the ONLINE READY display. Print out a few labels.
7. If the print is not positioned properly, repeat Steps 3 through 6.

Adjusting the Label Rest Point

This command is used mostly with the Self-strip option. If you are using Self-Strip, you may find that your labels are not stopping at the right point for removal and you are tearing off part of a label each time you remove one from the printer. Adjusting the label rest point changes the point at which labels are presented for removal.

To adjust the label rest point

1. Start at the ONLINE READY display:

```
ONLINE
READY
```

2. Press [MENU] to enter the Operator menu. Press [↑] or [↓] until the display shows:

```
OPERATOR MENU
LABEL REST POINT
```

3. Press [SELECT]. The display shows the current Label Rest Point setting with an asterisk (*) as shown in the example below:

```
LABEL REST POINT
0*
```

4. Press [↑] to increase the number and move the labels farther before tearing them off. Press [↓] to decrease the number so the labels do not move as far forward before you tear them off.

Note*: The range for the Label Rest Point is from -30 to +30 dots.*

5. Press [ENTER] at the desired setting. The asterisk (*) moves to the new setting as shown in the example below:

```
LABEL REST POINT
      3*
```

6. Press [CONTINUE] to return to the ONLINE READY display. Print out a few labels.
7. If the labels do not stop at the right point on the tear bar or cutter, repeat Steps 3 through 6.

Printing the Buffer Contents

You can print the data that is stored in the printer memory when the printer is offline. This clears the printer's data buffer so you can print the labels stored in the buffer before turning off the printer.

To print the buffer contents

1. At the ONLINE READY display, press [ONLINE/OFFLINE]. The printer stops printing and the display shows:

```
OFFLINE
READY
```

2. Press [CONTINUE]. The printer resumes printing. Since it is offline and cannot receive new data, it prints only what is in the printer buffer.
3. When printing stops, the buffer is empty.

About Error Messages

If the printer encounters a problem that prevents it from operating properly, the Alert light flashes and an error message appears on the display. An alarm will also sound at regular intervals until the problem is corrected. If the problem affects printing, the printer will stop and wait for you to clear the error message.

If you get an error message, refer to Chapter 9, "Troubleshooting."

5

Configuring the Printer

This chapter explains how to set the configuration parameters for optimizing label quality, printer performance and print speed, emulating an 8636/46 printer, and customizing your printer for media type, media alert, and character set. It also explains how to restore the factory default configuration.

About Printer Configuration

When you configure your printer, you customize it to meet your distinct operational needs, which include optimizing the print quality and print speed of your labels. The printer is shipped with default configuration settings that work in most operating environments, but are easily changed if necessary. The 4400 printer has a large variety of configuration settings as shown on the foldout page in the previous chapter. Use this circle to familiarize yourself with all the options available under the Configuration menu.

Changing the Basic Configuration Settings

The following table shows all the configuration settings available under Basic in the Configuration menu, except the Printhead Range setting. (For information on this setting, see "Adjusting the Printhead Range" later in this chapter.) Commands to enable options (Self-Strip or Cutter) are marked with an asterisk (*) since they appear on the menu only after being installed. Default values are shown in bold.

Note: *For some commands you must cycle the power (turn the printer off and then on again) or press [FEED/RELOAD] after changing the setting. Cycling the power puts all changes into effect at once.*

Basic Configuration Settings

Command	Settings	Description
Character Set	**US ASCII**, UK ASCII, German, French, Norway / Denmark, Sweden / Finland, Spanish, Italian, 256 ISO Characters	Selects the character set for the language being used.
Translation	Enabled, **Disabled**	Enables IBM character translation for the selected printer language.
Power-On	**Online**, Offline	Sets the printer to online or offline when it is turned on.
Audible Alarm	Enabled, **Disabled**	Enables audible alarm (beep) for alert conditions.
ASCII Zero	Slashed, **Not Slashed**	Selects whether zeros are printed with a slash.
Emulation	8636 / 46 10 mil, 8636 / 46 15 mil, (8637 / 38 13 mil for 4400 users with a 6.5 mil printhead), **Disabled**	Emulates an Intermec 8636 or an 8646 printer. The 4400 printers with the 6.5 mil printhead can emulate 8637 or 8638 printers. Cycle the power after changing this setting.
Units	**Inches**, Millimeters	Displays measurements in selected units.
Label Retract	Enabled, **Disabled**	Retracts a label before printing to prevent skipped labels. Press [FEED / RELOAD] after changing this setting.
Printhead Test	**Warn - Continue**, Warn - Halt	Determines whether printing continues if the Printhead Test sends a warning.
Printhead Range	-45% to +45%	Determines the percentage by which the elements may deviate in resistance before generating a warning.
Self-Strip*	Enabled, **Disabled**	External option that stops the printer at each label so the backing can be removed. Press [FEED / RELOAD] after changing this setting.
Cutter*	Enabled, **Disabled**	External option that cuts labels as they are printed. Press [FEED / RELOAD] after changing this setting.

To change the default values

1. Start at the OFFLINE READY display (if necessary, press [ONLINE/OFFLINE]).
2. Press [MENU]. Then press [↑] or [↓] until the display shows:

```
OFFLINE
CONFIGURATION
```

3. Press [SELECT]. The display shows:

```
CONFIGURATION
LABEL
```

4. Press [↑] or [↓] until the display shows:

```
CONFIGURATION
BASIC
```

5. Press [SELECT]. The display shows:

```
BASIC
CHARACTER SET
```

6. Press [↑] or [↓] to scroll through the available commands.
7. Press [SELECT] when you reach the command you want to change. The display shows the current setting with an asterisk (*).
8. Press [↑] or [↓] to scroll through the available settings for the command.
9. When you see the setting you want, press [ENTER]. The asterisk (*) appears next to the new setting, indicating it is now active.
10. Press [CONTINUE] to return to the OFFLINE READY display or, to change other settings, press [MENU] and repeat Steps 6 through 9.

Changing the Label Configuration Settings

To obtain the best print quality, you must adapt your printer to print at the desired print speed on the type of media (label stock) you are using. Your Intermec Media Products representative can recommend media types for your system.

The following table shows the available settings for optimizing print quality and speed with the commands under Label in the Configuration menu. Default values are shown in bold.

Command	Settings	Description
Print Speed	2.5, 3.0, **3.5**, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.5, 10 in/sec (64, 76, 90, 104, 117, 132, 142, 153, 165, 180, 198, 221, 254 mm/sec)	Sets the rate at which labels are printed. See "Optimizing the Print Speed and Image Bands" later in this chapter.
Image Bands	2 to 10. Default is **3**.	Controls the amount of printer memory that is allocated to create label images.
Head Pressure	**Low**, High	Changes the printhead pressure. Pressure should be set to Low for labels and High for tag stock. See "Printhead Pressure" later in this chapter.
Max Label Length	1 to 24 in (25 mm to 600 mm). Default is **5 in** (125 mm).	Sets maximum amount of label stock the printer will advance before looking for low stock.
Label Width	0.20 to **4.40 inches** in increments of 0.05 inches (5 to 112 mm)	Calculates the image position according to the label width. See "Configuring the Label Width" later in this chapter. Press [FEED/RELOAD] after changing this setting.
Label Stock	Continuous, **Label Gap**, Label Mark	Lets the printer recognize where labels start and end as they are printed. Press [FEED/RELOAD] after changing this setting.
Media Type	**Direct Thermal**, Thermal Transfer	Selects direct thermal or thermal transfer media. Press [FEED/RELOAD] after changing this setting.

To change the default values

1. Start at the OFFLINE READY screen as shown below:

```
OFFLINE
READY
```

2. Press [MENU]. The display shows:

```
OFFLINE
OPERATOR MENU
```

3. Press [↑] or [↓] until the display shows:

```
OFFLINE
CONFIGURATION
```

4. Press [SELECT]. The display shows:

```
CONFIGURATION
LABEL
```

5. Press [SELECT]. The display shows:

```
LABEL
PRINT SPEED
```

6. Press [↑] or [↓] to scroll through the available commands.
7. Press [SELECT] when you reach the command you want to change. The display shows the current setting with an asterisk (*).
8. Press [↑] or [↓] to scroll through the available settings for the command.
9. When you see the setting you want, press [ENTER]. The asterisk (*) appears next to the new setting, indicating it is now active.
10. Press [CONTINUE] to return to the OFFLINE READY display or, to change other settings, press [MENU] and repeat Steps 6 through 9.

About the Printhead Test

Each time you turn on the printer, or send a specific command from the host, the elements in your printhead are tested to make sure they are heating properly. If an element's resistance level is above or below the acceptable range, the printer displays the following warning:

```
PRINTHEAD TESTED
OUT OF RANGE
```

When you get this warning, check the print quality of your labels. If the quality has decreased, contact your Intermec representative. If your labels are satisfactory, you can adjust the test so the warning coincides with faulty labels. See "Adjusting the Printhead Test" later in this chapter.

You can make the printer stop printing when it tests out of range by setting the PRINTHEAD TEST command in the Basic Configuration menu to WARN-HALT. In this configuration, the warning appears on the control panel and is sent to the host. The default value for the printhead test is WARN-CONTINUE. This command allows the printer to continue printing upon test failure and causes a warning to appear on the control panel. No warning is sent to the host.

***Note**: If you have a dot out of range, make sure that it affects the quality of your label. It may apply to a dot that you are not using in your specific format.*

Printhead Pressure

The printhead pressure setting controls the pressure applied to the media as it passes between the platen roller and the printhead. This adjustment helps compensate for variations in the thickness between tag stock and other label stock. You can set the pressure as follows:

- Low for labels
- High for tag stock

Changing the pressure will not harm the printer. If your labels are slipping, or you notice the pressure is too light (and the printhead has been cleaned), try changing the pressure to the other setting.

***Note**: You may need to remove the tear bar for tag stock.*

Adjusting the Printhead Test

The printer displays the following warning if any of the elements in the printhead are not within the tolerance resistance values:

```
PRINTHEAD TESTED
OUT OF RANGE
```

There are two indications of a faulty printhead:

- You receive a warning, but your labels look fine. This happens when the printhead elements that are "out of range" do not affect your labels.
- You notice a decrease in label quality but the printer does not send a warning. This may mean that the elements affecting your labels are not heating perfectly, but are still within the acceptable resistance range.

You can adjust the printhead test so that you receive the warning at a time when the wear on the printhead is truly affecting your labels. When you adjust the test, you adjust the resistance range that is considered acceptable.

***Note**: If you have a dot out of range, make sure that it affects the quality of your label. It may apply to a dot that you are not using in your specific format.*

***Note**: A decrease in label quality is usually not due to the printhead elements. Check the sensitivity rating and Dark Adjust commands and then clean the printhead before adjusting the printhead test.*

The Printhead Range Percentage

You adjust the resistance range by increasing or decreasing the percentage by which the elements may deviate in resistance before generating a warning. This range extends on both the negative and positive sides of the perfect resistance.

The resistance deviation is caused when the wires that carry energy to the printhead elements begin to wear out. If the resistance of the wires increases, the printhead elements do not heat up enough so you need to decrease the positive side of the range. If the resistance of the wires decreases, the elements heat up too much so you need to increase the negative range.

Adjusting the Printhead Range

If you get a warning and your labels are fine, widen the range by increasing the positive side or decreasing the negative side.

If print quality decreases and you did not get a warning, adjust the range as follows:

- If the labels show dark streaks, some of the elements are too hot. Increase the negative range (so that it is less negative).
- If the streaks or are too light (and the printhead is clean), some elements are not hot enough. Decrease the positive range.

To adjust the printhead range

1. From OFFLINE READY, press [MENU], and then press [↑] or [↓] until the display shows:

   ```
   OFFLINE
   CONFIGURATION
   ```

2. Press [SELECT]. Then press [↑] or [↓] until the display shows:

   ```
   CONFIGURATION
   BASIC
   ```

3. Press [SELECT]. Then press [↑] or [↓] until the display shows:

   ```
   BASIC
   PRINTHEAD RANGE
   ```

4. Press [SELECT]. The display shows the current settings for the printhead range. The example below shows the default values.

   ```
   PRINTHEAD RANGE
   -45% TO +45%
   ```

5. Press [SELECT] to move the cursor between the negative range and the positive range.
6. Press [↑] to increase a value, or press [↓] to decrease it. The widest available range is between ±45% and the narrowest is between ±10%.

   Note: *The keys work in a circular fashion, so pressing [↑] at the highest value takes you to the lowest and vice versa.*

7. Press [CONTINUE] to return to the OFFLINE READY display.

Optimizing the Print Speed and Image Bands

In order to print labels as quickly as possible, you must adjust the print speed in conjunction with the number of image bands. The Print Speed and Image Band settings determine the rate at which the printer processes the images of your labels. This in turn affects the speed of the entire printing process.

In the 4400 printer, label printing and image processing occur simultaneously. For this reason, it is very important that these settings be synchronized. If the Image Band command is too low, the imaging process is unable to keep up with the print speed. In this case, the printer stops printing and starts again at the lowest print speed. If the Image Band command is set too high, the printer spends too much time imaging, which slows down label production.

About the Image Bands Command

The Image Bands command controls the amount of memory allotted to the imaging process. When you increase the image band adjustment to a higher number, you are adding more buffers to the imaging memory. By doing this, you are giving the printer more memory (and time) to image the label before it starts printing.

The minimum number of required image bands is dependent upon the print speed and the complexity of the label. Labels that contain numerous fields with different rotations, graphics, different sizes of outline fonts, or combinations of any number of these formatting options may require a higher number of image bands.

Optimizing Image Bands for Print Speed

To optimize the number of image bands for your print speed, set the image bands at the lowest number (2) and then print a label at the desired speed. If the label prints, the Image Band setting is correctly optimized.

If the number of image bands is still too low, the printer aborts the label before printing is completed and attempts to reprint the label at the slowest speed (2.5 ips) with the highest number of image bands (10). At this point, return to the original print speed and increase the original number of image bands one at a time. Continue to increase the number of image bands until the printer prints a label correctly.

If the printer still aborts and reprints at the highest image band setting, you may be trying to optimize at a print speed that is too high for your labels. Try optimizing the number of image bands at a lower print speed.

Optimizing Image Bands for Batch Printing

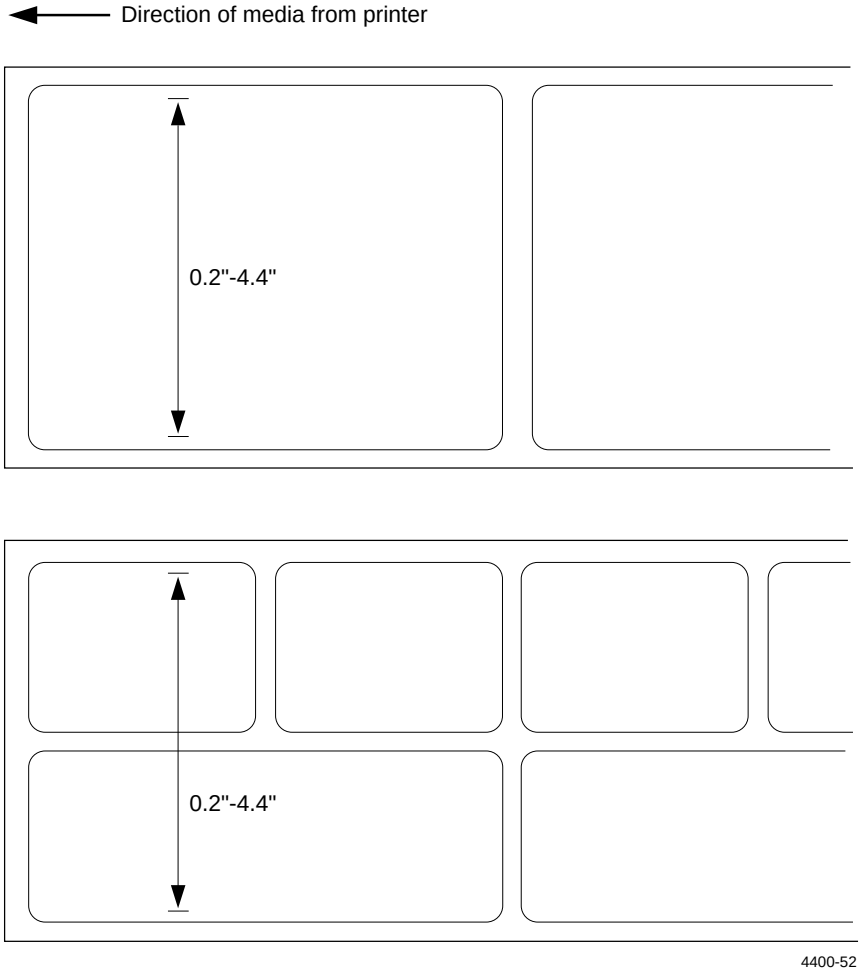
If you frequently print batches of identical labels (using the <US> command), you may want to optimize the number of image bands for batch printing. This is especially helpful if you experience delays between the printing of each label.

To optimize the number of image bands for batch printing, you must select enough image memory to allow the printer to retain the entire label image PLUS ONE INCH (one image band is equal to 1 inch). Therefore, if the printed image stops at a distance of 4 inches from the beginning of the label, you must select five image bands to prevent reimaging.

Note: *If you use the quantity count command <RS> instead of <US>, the printer software assumes that each label is different and will reimage every time a label is printed.*

Configuring the Label Width

Label Width redefines the vertical origin of the printed image. Setting this command lets the printer reposition the image when media width changes. If you are printing in a page format, the label width may extend across more than one label. See the following figure for an illustration of measuring across single and multiple (page format) labels.



To change the label width setting

1. Press the [ONLINE/OFFLINE] key until the control panel display shows the following:

```
OFFLINE
READY
```

2. Press the [MENU] key.
3. Press the up or down arrow key ([↑] or [↓]) until you select the Configuration menu. The display shows:

```
OFFLINE
CONFIGURATION
```

4. Press the [SELECT] key.

5. Press the up or down arrow key ([↑]or [↓]) until the display shows:

```
CONFIGURATION
LABEL
```

6. Press the [SELECT] key.
7. Press the up or down arrow key ([↑] or [↓]) until the display shows:

```
LABEL
LABEL WIDTH
```

8. Press the [SELECT] key.
9. Press the up or down arrow key ([↑] or [↓]) until the correct width appears in the display. Then press the [ENTER] key. An asterisk appears next to the setting.
10. Press the [CONTINUE] key. The printer returns to Offline status.
11. To return the printer to Online status, press the [ONLINE/OFFLINE] key.

Setting the Media Alert

The Media Alert feature can warn you when your media supply is getting low. When set, it causes the Alert light to flash when the label stock supply gets down to a preset level. You can also set an audible alarm.

Note: *Be sure to reset the media length and low media warn each time a different size roll of media into the printer. If this is not done, the printer may not give sufficient warning of a low media condition.*

To use the Media Alert, you set three control panel commands that give the printer the information it needs to run the alert. These commands are summarized in the table below. The default settings are in bold.

Command	Settings	Description
Media Length	**0** to 99999 in. or 0 to 9999999 mm.	Sets the media supply length (in inches or millimeters), so the printer can count backwards down to the low media warning point
Low Media Warn	**0** to 999 in. or 0 to 99999 mm.	Sets the minimum amount media supply. When the media reaches this amount, the alert light and low media warning are activated.
Set Warning	Enabled, **Disabled**	Enables or disables the Media Alert feature.

To set the media length

1. Start at the OFFLINE READY display. Press [MENU] and then press [↑] or [↓] until the display shows:

```
OFFLINE
CONFIGURATION
```

2. Press [SELECT] and then press [↑] or [↓] until the display shows:

```
CONFIGURATION
MEDIA ALERT
```

3. Press [SELECT] and then press [↑] or [↓] until you see the command you are changing, such as in the example shown below:

```
MEDIA ALERT
MEDIA LENGTH
```

4. Press [SELECT]. The display shows the current setting with a cursor under the first digit, such as shown below:

```
MEDIA LENGTH
06000 INCHES*
```

5. Press [SELECT] until the cursor is under the next digit you want to change.
6. Press [↑] to increase the digit or [↓] to decrease the digit.
7. Repeat Steps 5 and 6 until the number is correct, and then press [ENTER].

   Note: *Pressing [SELECT] at the last digit moves the cursor to the first digit.*

8. Press [CONTINUE] to return to the OFFLINE READY display.

To set the low media warning

1. Start at the OFFLINE READY display. Press [MENU] and then press [↑] or [↓] until the display shows:

```
OFFLINE
CONFIGURATION
```

2. Press [SELECT] and then press [↑] or [↓] until the display shows:

```
CONFIGURATION
MEDIA ALERT
```

3. Press [SELECT] and then press [↑] or [↓] until you see the command you are changing, such as in the example shown below:

```
MEDIA ALERT
MEDIA LENGTH
```

4. Press [SELECT]. The display shows the current setting with an asterisk (*).
5. Press [↑] or [↓] to change the setting and then press [ENTER] to move the asterisk (*) to the new setting.
6. Press [MENU]. Press [↑] or [↓] until the display shows:

```
MEDIA ALERT
SET WARNING
```

7. Press [SELECT] and then press [↑] or [↓] until the display shows:

```
SET WARNING
  ENABLED
```

About Configuration Test Labels

To review your printer's current configuration, you can print a Configuration Test Label that shows either the user-defined software or hardware configuration of your printer.

User-Defined

This label lists current configuration parameters that are set from the Configuration, Operator and Install menus, as well as defined pages, formats, graphics, and fonts. Any installed options also appear on this label.

Hardware

This label shows the amount of memory installed in your printer (static, expanded, and dynamic RAM), the width and dot size of the printhead, whether an I/O option card is installed, and the printhead mileage. The printhead mileage consists of both the amount of media that has been processed (passed underneath the printhead) and the amount of media that has been burned (printed on).

Printing a Configuration Test Label

1. Start at the OFFLINE READY display.
2. Press [MENU] and then press [↑] or [↓] until the display shows:

```
OFFLINE
SERVICE MENU
```

3. Press [SELECT] to enter the Service menu. Then press [↑] or [↓] until the display shows:

```
SERVICE MENU
PRINT CONFIG
```

4. Press [SELECT]. The display shows:

```
PRINT CONFIG
USER DEFINED
```

5. Press [↑] or [↓] to scroll from the user-defined label to the Hardware label. Press [SELECT] when the display shows the label you want to print.
6. The display shows EXECUTE TEST. Press [ENTER] to print the Configuration Test Label. Both types of labels are shown on the next page.

Note: *For 4400 printers with a 6.5 mil printhead, the Label Width is 672 dots, and the dot size is 6.5 mil.*

4400 Configuration Test Labels

Hardware Configuration Label

```
Hardware Configuration

Memory Installed
        Static RAM: 39 kilobytes
      Expanded RAM:   none
    Dynamic RAM: 370 kilobytes

I/O Option Card: none

Printhead

        Width     : 896 dots
        Dot Size: 5.0 mil

Mileage

        Inches Processed : 0
        Inches Burned    : 0
```

User Defined Configuration Label

INTERMEC 4400 Printer

```
Program Version: 1.3.1          PRINT SPEED - 3.5 IPS
Pages Defined : 0               IMAGE BANDS - 3
Formats Defined : 0             HEAD PRESSURE - Low
Fonts Defined: 0,1,2,7,20,21,22,23,24, MAX LABEL LENGTH - 5 inches
Graphics Defined : none         LABEL WIDTH - 896 dots
                                LABEL STOCK - Inter-label gap
                                MEDIA TYPE - Direct Thermal
                                MEDIA LENGTH - 0 inches
                                LOW MEDIA WARN - 0 inches

SET WARNING - Disabled          PRTHD TEST WARN - Continue   BAUD RATE - 9600
CHARACTERSET - US ASCII         PRTHEAD RANGE - -45% to 45%  DATA BITS - 7
TRANSLATION - Disabled          SELF STRIP - Disabled        MESSAGE LENGTH - 255
POWER-ON - Online               CUTTER - Disabled            PARITY - Even
AUDIBLE ALARM - Disabled 25     DARK ADJUST - 0              STOP BITS - 1
ASCII ZERO - Not Slashed        X FORMS ADJUST-0             PROTOCOL - Standard
EMULATION - Disabled            Y FORMS ADJUST - 0           DEVICE ADDRESS - A
UNITS - Inches                  LABEL REST POINT - 0         INTERNAL OPTIONS - none
LABEL RETRACT - Enabled         SENSITIVITY - 420            EXTERNAL OPTIONS - none

                                                             SECURITY - Level 0
```

4400G.009

Restoring Printer Default Configuration

To return the 4400 printer to its default configuration settings, follow the "Memory Reset" procedure outlined below. A complete table of the default settings follows on the next page.

Memory Reset

1. Start at the OFFLINE READY display.
2. Press [MENU]. Then press [↑] or [↓] until the display shows:

```
OFFLINE
SERVICE MENU
```

3. Press [↑] until the display shows:

```
SERVICE MENU
MEMORY RESET
```

4. Press [SELECT]. The display shows:

```
MEMORY RESET
ALL
```

5. Press [↓] until the display shows:

```
MEMORY RESET
CONFIGURATION
```

6. Press [ENTER] to reset the configuration settings.

***Note**: After using Memory Reset to restore the printer default configuration, you must reinstall the software drivers for options such as the Cutter or Self-Strip. Memory Reset also resets all parameters to their default settings, as listed in the table following this procedure. Sensitivity will be set at 420. See Chapter 8 for procedures on reinstalling the options' software drivers.*

Factory Default Settings

After you complete the preceding procedure on restoring the factory default settings with the Memory Reset command, your configuration parameters match the ones shown in the table below:

Command	Factory Setting	Command	Factory Setting
ASCII Zero	Not Slashed	**Max Label Length**	5 Inches
Audible Alarm	Disabled	**Max Print Speed**	6 ips
Baud Rate	9600	**Media Length**	0
Character Set	US ASCII	**Media Type**	Direct Thermal
Cutter*	Disabled	**Message Length**	255
Dark Adjust	0	**Parity**	Even
Data Bits	7	**Power-On**	Online
Device Address	A	**Print Speed**	3.5 ips
Emulation	Disabled	**Printhead Test**	Warn - Continue
External Options	None	**Printhead Range**	-45% to +45%
Forms Adjust	0	**Protocol**	Standard
Head Pressure	Low	**Ribbon Save**	Disabled
Image Bands	3	**Security**	Level 0
Internal Options	None	**Self-Strip***	Disabled
Label Rest Point	0	**Sensitivity**	420
Label Retract	Enabled	**Set Warning**	Disabled
Label Stock	Gap	**Stop Bits**	1
Label Width	4400: 896 dots (4.40 inches) 4400 with 6.5 mil printhead: 672 dots (3.30 inches)	**Translation** **Units**	Disabled Inches
Low Media Warn	0	**X Forms Adjust**	0
		Y Forms Adjust	0

*If the optional software drivers are installed at the factory, they are set to Enabled. See "Installing Options" in Chapter 8.

Replacing an 8636/46 Printer With a 4400 Printer

If you are replacing an Intermec 8636 or 8646 printer, you can retain your existing network, hardware, software, and label formats and continue to produce labels on the 4400 printer that are identical to those produced on the 8636 or 8646 printer. You may want to eventually change your label formats, network, and software to take advantage of the 4400's advanced capabilities, but until then you can easily emulate the 8636 or 8646 printer.

Note: *If you have a 4400 printer with a 6.5 mil printhead, Emulation mode simulates an Intermec 8637 or 8638 printer. The procedures are the same as for the normal 4400, but the print dimensions are different. Differences are noted throughout the manual where applicable.*

Before you replace the 86XX printer, print out a User-Defined Configuration Test Label for a copy of the 4400's current settings. The procedure is discussed in "Printing a Configuration Test Label" earlier in this chapter.

To replace the 8636/46 printer

1. Upload label formats, fonts, and graphics from the 8636 or 8646 printer to the host computer.
2. Unplug the 8636 or 8646 printer and install the 4400 printer (see Chapter 2).
3. Enable 86XX emulation (see "Changing the Basic Configuration Settings" earlier in this chapter).
4. Download the 86XX formats, fonts, and graphics from the host to the 4400.

About the Emulation Settings

The Emulation settings in the Basic Configuration are described in the following table.

Setting	Description
86XX 10 mil	The printer emulates an 8636 or 8646 printer printing multiples of 5 mil (0.005 inch) drag and 10 mil (0.01 inch) picket bar codes.
86XX 15 mil	The printer emulates an 8636 or 8646 printer printing multiples of 10 mil (0.01 inch) drag and 15 mil (0.015 inch) picket bar codes.
Disabled (Default)	The printer uses the 4400 command set and prints in multiples of 5 mil (0.005 inch) drag and 10 mil (0.01 inch) for picket bar codes. If you have a 4400 printer with a 6.5 mil printhead, printing is in multiples of 6.5 mil (0.0065 inch) drag and picket bar codes.

Printing in Emulation Mode

In Emulation mode, the 4400 uses a subset of its command set to let you print labels identical to those produced on an 86XX printer. There are some operational and programming differences between an 86XX printer and 86XX emulation on the 4400 printer. The differences are noted in the following table.

Note: *In 4400 printers with a 6.5 mil printhead, Emulation mode simulates an Intermec 8637 or 8638 printer. The procedures are the same as for the 4400, but the print dimensions are different. Differences are noted where applicable.*

Printing in Emulation Mode

Feature	8636 or 8646 Printer	4400 Printer in Emulation Mode
Format Error	Sends a <BEL> character (error code) back to the host and does not try to execute the command or print a label.	Does not send a <BEL> character (error code) back to the host. The printer attempts to execute the command and print a label by substituting the printer default settings for the invalid syntax. Displays syntax error message. Certain erroneous commands generate error codes that are stored in the printer. When the host sends a <BEL> character to the printer, the printer transmits the most recent error code to the host.
Range Errors	Does not attempt to print a label unless the label format definitions fit within the media boundaries.	Attempts to print a label even if the image runs onto the next label. If this happens, the printer skips the rest of the overrun label.
User-Defined Protocol	Supports the capability for users to define their own communications protocol.	Has limited user-defined protocol. You can redefine protocol characters by substituting one character for another, but you cannot change the rules of a given protocol.
Auto-Transmit Commands	No Auto-Transmit 3 command.	Supports the Auto-Transmit 3 command.
Configuration (SI) Commands	No SI configuration commands.	A new set of SI configuration commands added to the command set.
Format Storage	5.5K bytes	40K bytes
Number of Formats	10	20
Fields per Format	100	200
Field Data Buffer	50 bytes	200 bytes
Number of Graphics (UDCs)	10	100

Printing in Emulation Mode (continued)

Feature	8636 or 8646 Printer	4400 Printer in Emulation Mode
Number of User-defined Fonts	7	17
Maximum Graphic Size	3 square inches	3 square inches but prints if graphic exceeds maximum length.
Breach Printing (Enhanced Stepping Speed)	available	not available
8100 (Polling Mode C) Protocol	available	not available
Outline Fonts	not available	Prints outline fonts that are downloaded.
Page Formatting Commands	not available	available
Specify Font Size	Specify height and width only.	Same as for an 8636 or 8646 printer.
International Characters	Different character sets are preceded by <SUB> characters.	Same as for an 8636 or 8646 printer.
Downloading Bitmap Graphics	Bitmap graphics are downloaded at one bit per byte.	Same as for an 8636 or 8646 printer.
Print Resolution	10 mil (0.010 inch) dots, or 15 mil (0.015 inch) dots (13 mil, or 0.013 inch, dots for 4400 users with a 6.5 mil printhead)	Same as for an 8636 or 8646 printer.

6

Designing Labels and Using Commands

This chapter describes how to use the printer's command set when designing labels. In addition, there are several examples of label formats containing different field types.

Introduction to Label Design

The 4400 printer is designed to print labels in formats consisting of fields that may contain lines, boxes, graphics, bar codes, and text in many orientations. You can use the printer to design labels that are easy to read, contain accurate information, and conserve media by using space efficiently.

If you have never designed labels before, it may take some practice to design ones that meet all your requirements.

An alternative to using the command set and downloading formats with communications programs is Intermec's PrintSet, described later in this chapter.

Label Formats

Before printing a label, you must specify a label format and send data to fill in the designated fields in the format. The format defines where and how the data appears on the label. A label format is composed of several different fields that contain dimensions and terms used to map the information printed on a label. For example, if you want to print a number on a label, the format indicates the location, font, size, and orientation of the number.

Note: *Whenever a format is created, a human-readable field zero (H0) is automatically created along with it. It is created with all field parameters at default and can be deleted only after one or more fields are created.*

An example of a simple label format accompanied by sample data is shown on the following page.

This example shows how format and data strings appear before being downloaded. The mnemonics represent control codes (such as <STX> for start of message). These mnemonics can be translated into hex or ASCII control characters using the table in the Appendix. The line breaks are to make the program easier to read and do not represent carriage returns.

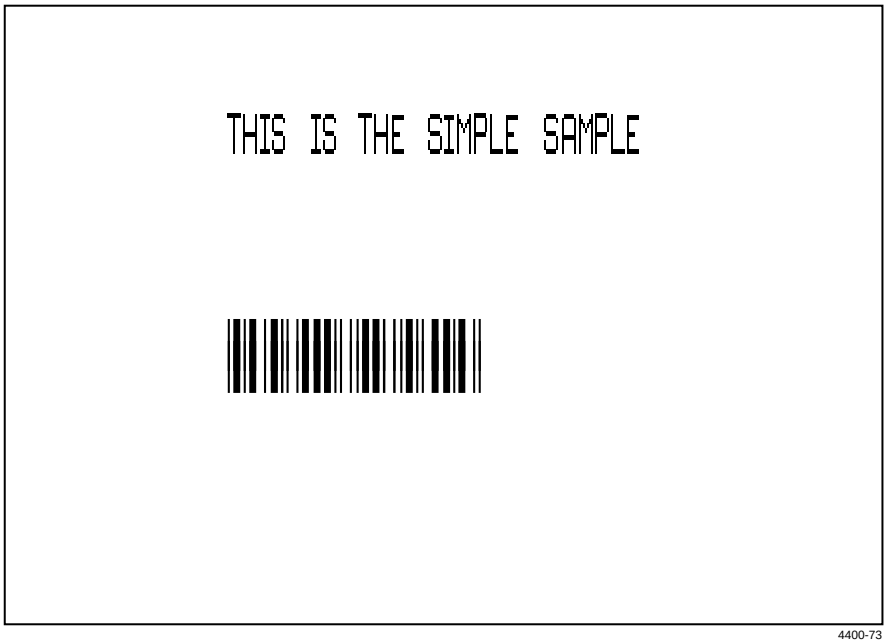
Sample Format

```
<STX><ESC>c<ETX>
<STX><ESC>P<ETX>
<STX>E4;F4;<ETX>
<STX>H0;o120,50;f0;c2;h2;w1;d0,30;<ETX>
<STX>B1;o120,220;c0,1;h50;w1;i0;d0,11;p@;<ETX>
<STX>R<ETX>
```

Sample Data

```
<STX><ESC>E4<ETX>
<STX><CAN><ETX>
<STX>THIS IS THE SIMPLE SAMPLE<CR><ETX>
<STX>SAMPLE<ETX>
<STX><ETB><ETX>
```

Label Printed With Sample Format and Data



Communicating With the Printer

To send a label format to the 4400, you must go through a process called *downloading*. Downloading is the universal term that describes the transfer of information from a computer to any connected peripheral device (a printer, a reader, etc.). *Uploading* describes the transfer of data from your printer to your PC or host.

There are several ways to download information. You can either download from a terminal on your host or from a PC. Many different methods may be used from either platform.

Using the PrintSet Software

Use the PrintSet application software to easily configure your printer from your PC. You can upload the current configuration settings, modify them, and then download them to the 4400 printer. PrintSet also lets you:

- download graphics and fonts (including TrueType).
- print test labels.
- allocate memory.
- download configuration files.

For help using PrintSet, refer to the online helpportion of the application software.

Using the Printer Command Set

If you are not using PrintSet, you can create labels by downloading formats and data created with the printer command set. See Chapter 7 for a complete list of commands and their descriptions. The example on the previous page uses several commands from the printer command set.

The commands in the printer command set can perform many functions and activate any feature of the 4400 printer. The method you use to download the commands is up to you. If you do not use PrintSet, try some of the options listed on the following pages.

Downloading Commands Using DOS

To download commands using DOS, you must connect the printer to the serial port on your PC using the correct Intermec cable (see Chapter 2). Next, configure the serial port using the DOS Mode command. From the DOS prompt, type in a command similar to the following (replace COM1: with the serial port used):

```
C:\MODE COM1: 96,E,7,1,N
```

The DOS Copy or Print commands commonly use the hardware flow control (Ready/Busy) communication protocol. To use this protocol, the printer must be in Ready/Busy mode (which is the factory default configuration).

Note: *If you do not set the hardware flow control protocol, the file you want to download must be less than the input buffer of the printer (2K). However, you can use the DOS Copy or Print commands for large files if you enable hardware flow control by configuring the printer for XON/XOFF protocol and make the proper pin connections.*

Enter the commands into a text file using a text editor or a word processor. Make sure that you save the file as an ASCII text file. See your DOS user's manual for more information.

Send the file to the printer using the following DOS commands:

```
COPY (filename) COM1:
PRINT (filename):
```

where filename is the name of your text file. The copy command copies the file to serial port 1 (COM1) of your PC. The print command sends your text file to LPT1 (unless redirected).

Using the DOS Copy command you can create files that you can store on your PC, and then modify and download them several times. For example, if your first attempt at a label format does not work, you can return to the text editor and change the commands, and then download the format again. By using this method, you eliminate the need to retype command strings that you decide to change.

For an example of how to use a word processor to recreate ASCII characters, here is the same label format shown in two different ways.

Sample Format

```
<STX><ESC>c<ETX>
<STX><ESC>P<ETX>
<STX>E3;F3;<ETX>
<STX>H0;o120,50;f0;c0;h2;w1;d0,30;<ETX>
<STX>B1;o170,220;f0;c0,1;h50;w1;i0;d0,11;p@;<ETX>
<STX>R<ETX>
```

Keystrokes to Enter Sample Format From a Word Processor

Alt-02 **Alt**-27 c **Alt-**03
Alt-02 **Alt-**27 P **Alt-**03
Alt-02 E3;F3; **Alt-**03
Alt-02 H0;o120,50;f0;c0,1;h50;w1;i0;d0,11;p@;**Alt-**03
Alt-02 B1;o170,220;f0;c0,1;h50;w1;i0;d0,11;p@;**Alt-**03
Alt-02 R **Alt-**03

Note: *When ASCII decimal equivalents are entered in a word processor, they are displayed on the screen as characters.*

Downloading Commands Using Readable Protocol/Command Characters

If it is difficult for you to edit or transmit command files containing control characters, you may want to utilize the new readable protocol/command characters feature. To use the readable characters feature, type the ASCII characters in as a string. Angle brackets around ASCII strings are used to represent these characters. For example, if you want to enter the ASCII mnemonic for Start of Text, type the control character out as a readable character string <STX>. The printer automatically detects whether you are using control characters or readable protocol/command characters by the start of text (<STX>) character.

All characters in a message must be in the same form as the start of text (<STX>) character. For example, if you include control characters in a message that begins with the readable protocol/command character <STX>, they are thrown away. Using readable characters may consume more space and time, but it has the distinct advantage of displaying everything on the screen in readable characters.

Downloading Commands Using PC Communications Programs or Host Terminals

Other ways to download commands to your printer are through a PC communications program, a terminal emulation program, or from a host terminal. In any of these situations, the commands you enter through the keyboard will be sent immediately to the printer in real time. The only drawback of using these programs is that mistakes are sent to the printer in real time as well. If you make an error while entering commands, you must retype the command string.

This inconvenience can be overcome for the most part by keeping your command strings short. Design your formats as combinations of many short command strings rather than in one long string.

The following examples demonstrate two ways a format can be downloaded using PC communications programs.

Breaking the Format Into Separate Lines

This example shows the format divided into separate lines, each of which starts with the <STX> (start of message) command and ends with the <ETX> (end of message) command. When the printer receives the <ETX> command, it returns a positive or negative response, depending on whether it received a valid message. Since an <ETX> follows each line, only one line needs to be retyped if the printer detects a mistake.

```
<STX><ESC>P<ETX>
<STX>E3;F3;<ETX>
<STX>H0;o81,100;f0;c0;d0,16;h1;w1;<ETX>
<STX>H1;o81,120;f0;c0;d0,16;h1;w1;<ETX>
<STX>H2;o81,150;f0;c2;d0,14;h1;w1;<ETX>
<STX>H3;o81,190;f0;c2;d0,16;h1;w1;<ETX>
<STX>B4;o81,0;f0;c0,1;h50;w1;d0,11;i0;p@;<ETX>
<STX>R<ETX>
```

Sending One Long String of Commands

This next example shows the same format typed as one long string of commands, using the <STX> and <ETX> characters only at the beginning and end of the entire format. This method calls for fewer keystrokes, but if you make a mistake anywhere, you must retype the entire format.

```
<STX><ESC>P;E3;F3;H0;o81,100;f0;c0;d0,16;h1;w1;H1;o81,120;f0;c0;
d0,16;h1;w1;H2;o81,150;f0;c2;d0,14;h1;w1;H3;o81,190;f0;c2;d0,16;
h1;w1;B4;o81,0;f0;c0,1;h50;w1;d0,11;i0;p@;R<ETX>
```

Using ASCII Control Characters

With many communications or terminal emulation software, you create the commands by using the equivalent ASCII control characters. For example, <ETX> is entered as **Ctrl-C**. A table listing the ASCII control characters is located in the Appendix.

The following example is the format shown earlier with the command mnemonics replaced by ASCII control characters. Hold down the **Ctrl** key on your keyboard and type the letter as shown to create the printer command.

```
Ctrl-B <ESC>P Ctrl-C
Ctrl-B E3;F3; Ctrl-C
Ctrl-B H0;o81,100;f0;c0;d0,16;h1;w1; Ctrl-C
Ctrl-B H1;o81,120;f0;c0;d0,16;h1;w1; Ctrl-C
Ctrl-B H2;o81,150;f0;c2;d0,14;h1;w1; Ctrl-C
Ctrl-B H3;o81,190;f0;c2;d0,16;h1;w1; Ctrl-C
Ctrl-B B4;o81,0;f0;c0,1;h50;w1;d0,11;i0;p@; Ctrl-C
Ctrl-B R Ctrl-C
```

Switching Between Print Mode and Program Mode

Before you download information to the printer, you must be in the correct operating mode. Download printer commands in either Print mode or Program mode as follows:

- Use Program mode to define formats, pages, fonts, and characters.

  The command to enter Program mode is:

  <STX><ESC>P<ETX>

  To ensure correct downloading, you may want to send this command every time you download formats, even if you think the printer is already in Program mode. If the printer is in Program mode, this command is ignored.

- Use Print mode to download data and print labels.

  The command to enter Print mode is:

  <STX>R<ETX>

  This command can be entered before each set of data or at the end of every format. If the printer is in Print mode already, this command is ignored.

  Note: *Besides being used to pass data, Print mode is also used to download configuration commands that are used for setting certain printer features to your specifications and for enabling options. For example, you use configuration commands to emulate an Intermec 8636 or 8646 printer or to change the character set.*

Understanding Label Design Components

Label formats are combinations of several different fields that determine where and how different types of data appear in the label design. The fields on a label may differ in size, location, orientation, and data type. Once the fields in a format are defined, data can be passed into the fields and then printed.

A field is defined to hold a certain data type. You can define bar code fields, human-readable fields, graphic fields, lines, boxes, or interpretive fields. You must define the data you plan to print on your label as a field in the label format.

The fields on your label can differ both in the data and in the way the data is displayed. For example, your label could show one number printed as a bar code and a different number printed in large black letters. The bar code field is a different kind of field than the large black lettered field.

Each field type gives you options on how you want your data to be interpreted. Most of the options are in bar code fields (what type of bar code) and human-readable fields.

Bar Code Fields

You can print bar codes in any of the symbologies listed below. A full description of each bar code symbology can be found in the Appendix.

Symbology	Characters per Inch
Code 39	7.00
Code 2 of 5	
Interleaved 2 of 5	12.69
Codabar	9.23
Code 128	18.46
Code 93	11.28
UPC/EAN	14.50
Code 49	49.0*
Code 16K	37.0*
Code 11	11.28
Code One†	
PDF 417†	
Maxicode†	

*0.719 inches high by 0.690 inches wide, 8 rows
†2D symbologies have variable sizes. See the Appendix for details.

Character Fields and Fonts

Human-readable fields can be printed in any one of the printer's internal fonts. These fonts can be resized or rotated by using the appropriate commands.

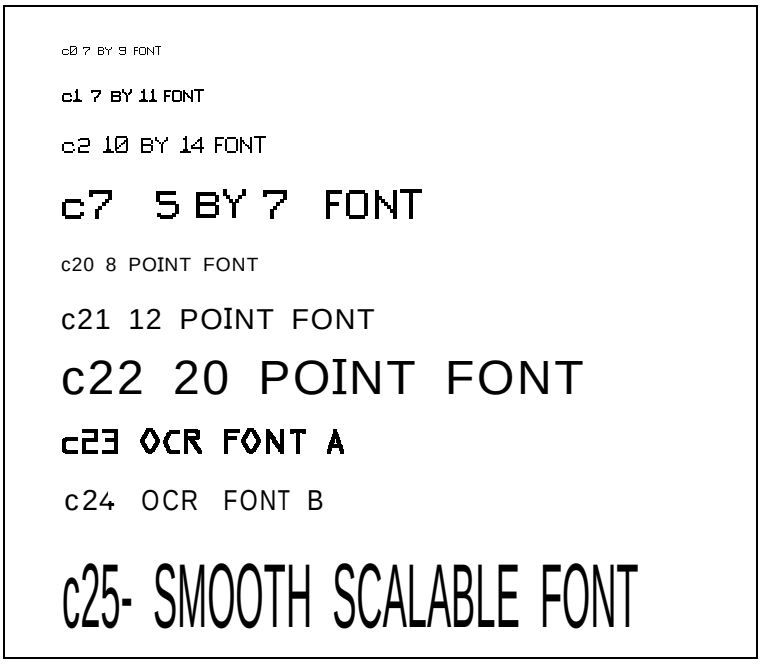
There are two kinds of fonts available in the printer, bitmap or outline fonts. Bitmapfonts distort much easier when they are magnified. Outline fonts, rather than being defined as a matrix of dots and blanks, are defined by vectors and curves and hold their smooth shape better when enlarged. You may want to keep this in mind for scaling purposes.

The following figure shows the difference between enlarged outline and bitmap fonts.

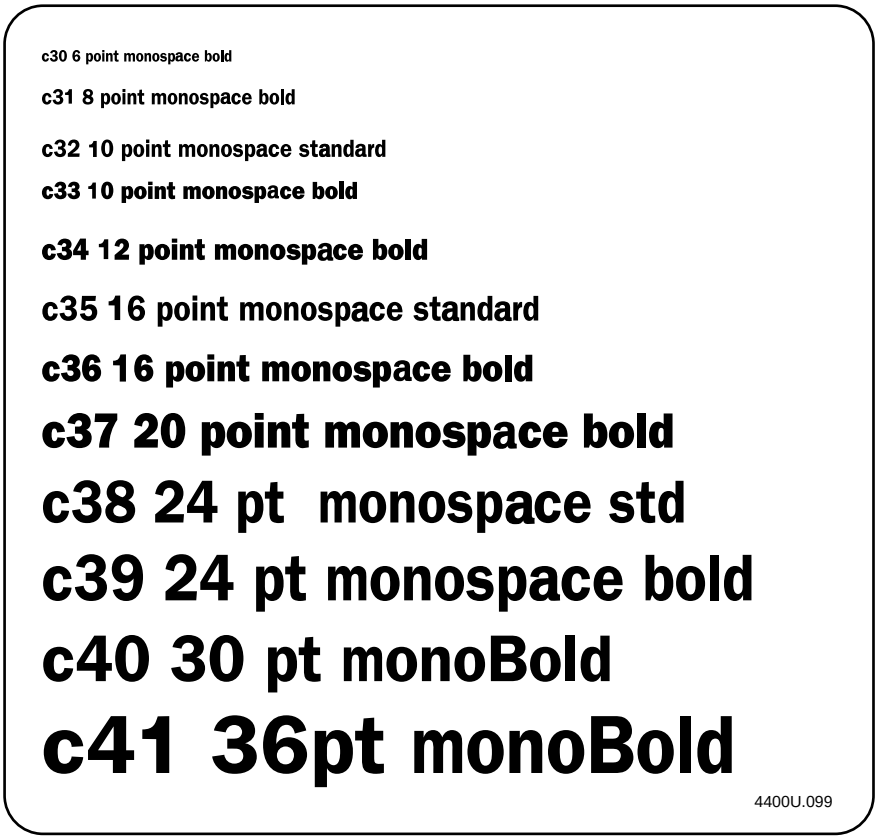
The printer contains the following internal fonts. The following figures show the fonts listed next to the corresponding command, in numerical order. The font set includes:

- Four standard bitmap fonts measured in dot sizes (5x7, 7x9, 7x11, and 10x14).
- Six standard bitmap fonts measured in point sizes (8, 10, 12, 16, 20, and 24).
- Nine bold bitmap fonts in point sizes (6, 8, 10, 12, 16, 20, 24, 30, and 36).

- Two bitmap fonts that can be recognized by optical character recognition (OCR) programs.
- One smooth scaleable outline font from Bitstream Typeface Packages for the PC.



Printer Internal Fonts c30 through c41



User-Defined Fonts

In addition to the permanent fonts in your printer, you can also download user-defined (fixed) fonts. Bitmap fonts commonly:

- print in one fixed size.
- print quickly.
- are memory intensive when defined as large characters.
- consume less memory when defined as small characters.
- are widely available with Windows and PrintSet.

Downloading User-Defined Fonts

You can download user-defined fonts (UDFs) to the 4400 printer and store them in non-volatile memory. Although the printer reserves 16 font ID numbers, 3 to 6, an d8 to 19) for UDFs, memory constraints may limit the number of fonts you can store.

Intermec's PrintSet software provides the easiest way to download fonts to the printer form a PC. If you do not have your 4400 printer connected to a PC, you can use PrintSet to create a *.PCF file for downloading at a later time. You can also use IPL commands to edit the *.PCF files.

If you have not done so, install the PrintSet disk provided with this guide. PrintSet uses a standard Windows user interface and includes online help. Refer to the online help for specific instructions on using PrintSet.

Downloading Bitmap Fonts

Use PrintSet to select and download bitmap fonts.

Bitmap fonts can be memory intensive. You can use PrintSet to define a subset of that font (such as only the number). Then you can download that subset and save storage space on the printer.

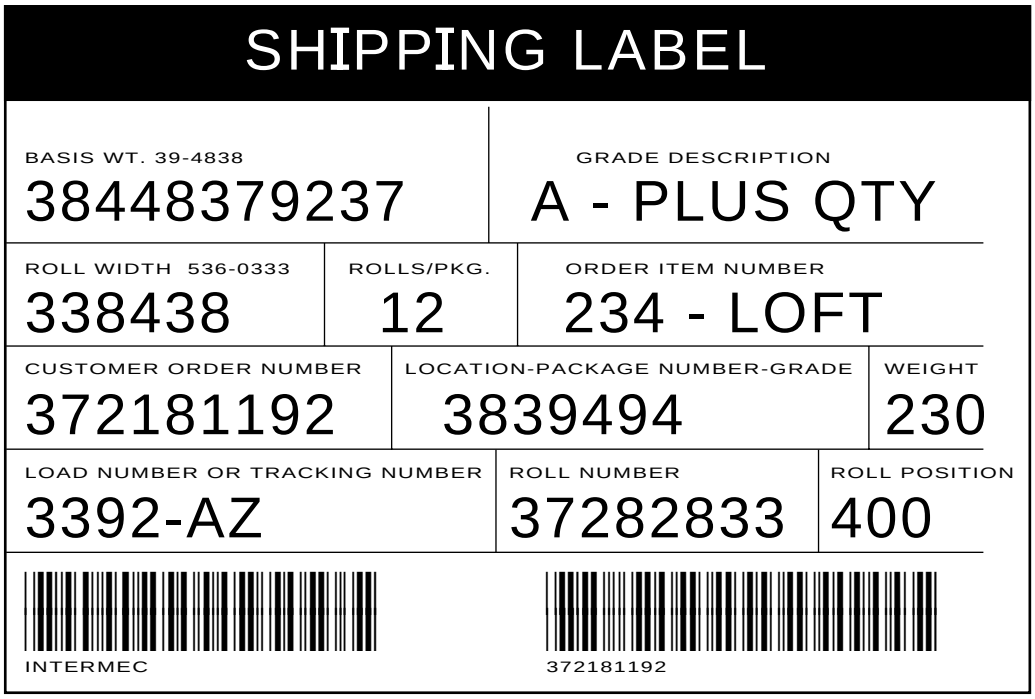
The 4400 printer accepts two formats for bitmap fonts: 1 bit per byte, or 6 bits per byte. PrintSet automatically converts all bitmap fonts to the 6 bits per byte format.

Lines and Boxes

You can use the command set to define fields that appear as lines or as boxes when you print your label. Use the rotation commands to determine whether a line or box will appear vertically or horizontally and the height and width commands to set the length and thickness of the lines.

The following figure shows a label where vertical and horizontal lines are used to separate data types and make the label easier to read.

Lines and Boxes Separating Data on a Label



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Graphics

A graphic field is used to print a graphic. Before you can use this field you must download the graphic to the printer. Once the graphic is downloaded, you can call it up and print it just like any letter or bar code image.

To get a graphic into a format that can be understood by the printer, you must send it as either a one bit per byte or six bits per byte bitmap image.

One Bit Per Byte

One bit per byte is the standard graphics format used for downloading to an Intermec 8636 or 8646 printer. A one bit per byte bitmap image is an arrangement of ones and zeros that can look similar to the following example (but usually larger).

```
00000000100000000
00000001110000000
00000010111000000
00000100111100000
00001000111110000
00010000111111000
00100000111111100
01000000111111110
00100000100000100
00010000100001000
00001000100010000
00000100100100000
00000010101000000
00000001110000000
00000000100000000
```

If you look closely at the bitmap file above, you can see that it is the outline of a diamond with a line down the middle, and the upper right corner blacked in.

You can create your own graphic by drawing it on graph paper and then converting each of the squares to either a one or a zero, and typing it into a text file column by column. When you send the file to the printer, a character in the file represents either a dot or a blank when the image is printed. (The zeros are blanks and the ones are dots.)

To download a one bit per byte user-defined image to the printer, you must use the correct protocol characters and define the bitmap as a user-defined image. The 4400 printer must also be operating in 8636/46 emulation mode.

The following example is the same bitmap shown above, but it now includes the commands needed to download it to the printer. The ones and zeros are now listed one vertical column at a time. The graphic is given the number G3, the name DIAM, the dimensions 15 rows by 15 columns, and each column is assigned a number between u0 and u14 (it looks as if the rows are assigned numbers, but they become the columns as explained below).

```
<STX><ESC>c<ETX>
<STX><ESC>P<ETX>
<STX>G3,diam;x15;y15;<ETX>
<STX>u0,000000010000000;<ETX>
<STX>u1,000000101000000;<ETX>
<STX>u2,000001000100000;<ETX>
<STX>u3,000010000010000;<ETX>
<STX>u4,000100000001000;<ETX>
<STX>u5,001000000000100;<ETX>
<STX>u6,010000000000010;<ETX>
<STX>u7,111111111111111;<ETX>
<STX>u8,011111110000010;<ETX>
<STX>u9,001111110000100;<ETX>
<STX>u10,000111110001000;<ETX>
<STX>u11,000011110010000;<ETX>
```

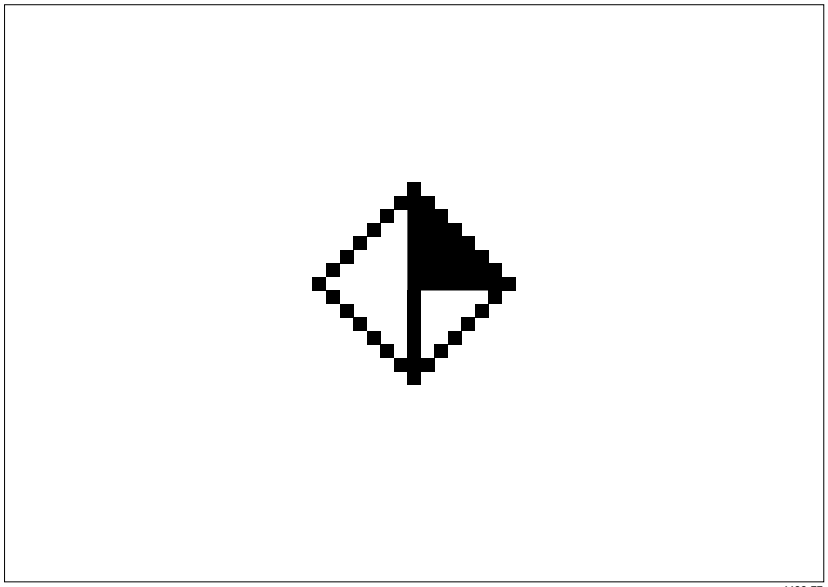
Example (continued)

```
<STX>u12,000001110100000;<ETX>
<STX>u13,000000111000000;<ETX>
<STX>u14,000000010000000;<ETX>
<STX>R<ETX>
```

When you download a bitmap, the rows become the columns, and the beginning of the last row becomes the top of the last column. For an example, study the bitmap above and then look at the following printout.

It is important to remember that the bitmap is defined in terms of columns rather than rows.

Here is what the graphic looks like when incorporated into a format, enlarged, and then printed.



Six Bits Per Byte

Six bits per byte format is more compact than one bit per byte. When you use six bits per byte, you can download large graphics more quickly with the printer in 4400 mode rather than Emulation mode.

The arrangement of the bits is very important in this format. Every byte is composed of eight bits (0 through 7), but only bits 0 through 5 are used to map the image.

Bit 6 (the 7th bit) must always be set to 1 so data can be downloaded to the printer. Bit 7 (the 8th bit) is reserved for parity and compatibility on 7-bit hosts.

Graphics like the previous one bit per byte (diamond) bitmap example, can be downloaded in six bits per byte format.

To create a six bits per byte format

1. Draw the graphic on graph paper.
2. Change the graph paper drawing into a pattern of ones and zeros.
3. Starting from the top row, divide each vertical column into groups of six digits. (If the bottom group has less than 6 digits, add zeros to this group until it also has six.) The six digits in each group are the six bits that will be downloaded in a byte of data. The top digit of each group is bit 0, the bottom digit is bit 5.
4. Add a 1 in the bit 6 position, and then add a 0 in the bit 7 position so that each group now has eight digits. (Eight digits complete the byte.)
5. Reverse the order of each group so that bit 0 is now last and bit 7 is first. Each eight-digit group is now a binary representation of an ASCII character.
6. Translate each eight-digit group into an ASCII character according to the chart in the Appendix, and the method you choose to download the data.
7. Make sure the printer is in 4400 mode and not in Emulation mode.
8. Download the graphic so that each column is represented by a command string.

Here is the same diamond shape graphic shown earlier, but this time it is in six bits per byte format with ASCII characters.

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>G2,diam;x15;y15;<ETX>
<STX>u0,@B@;<ETX>
<STX>u1,@E@;<ETX>
<STX>u2,`H@;<ETX>
<STX>u3,PP@;<ETX>
<STX>u4,H`@;<ETX>
<STX>u5,D@A;<ETX>
<STX>u6,B@B;<ETX>
<STX>u7,<DEL><DEL>G;<ETX>
<STX>u8,~CB;<ETX>
<STX>u9,|CA;<ETX>
<STX>u10,xc@;<ETX>
<STX>u11,pS@;<ETX>
<STX>u12,`K@;<ETX>
<STX>u13,@G@;<ETX>
<STX>u14,@B@;<ETX>
<STX>R<ETX>
```

Working With Fields

Now that you have learned about the different types of fields printable with the 4400 printer, you need to know how to arrange them to define or change the format of a label. The following part of the chapter uses examples to describe the commands that position, size, rotate, and edit label formats. A complete list of all programming commands is given in Chapter 7.

Editing Fields

If you make a mistake in a label format, you may not have to redownload the entire format (depending on the severity of the mistake). You can change a specific field in a format by sending a command in Program mode.

The printer uses a field pointer to point to the field that is to be modified when the printer is in Program mode. The pointer continues to point to the most recently selected field until a different format or field is selected.

The following format is used as an example. Assume you want to change field 3 (which is defined by the third line from the bottom) from h1;w1; to h2;w2;:

```
<STX><ESC>P<ETX>
<STX>E3;F3;<ETX>
<STX>H0;o81,100;f0;c0;d0,16;h1;w1;<ETX>
<STX>H1;o81,120;f0;c0;d0,16;h1;w1;<ETX>
<STX>H2;o81,150;f0;c2;d0,14;h1;w1;<ETX>
<STX>H3;o81,190;f0;c2;d0,16;h1;w1;<ETX>
<STX>B4;o81,0;f0;c0,1;h50;w1;d0,11;i0;p@;<ETX>
<STX>R<ETX>
```

Download the following command:

```
<STX><ESC>P;F3;H3;h2;w2;R<ETX>
```

Each command in this string is described below:

Command	Description
<ESC>P	Enter Program mode
F3;	Access format number 3 from memory
H3;	Access field 3
h2;	Set the height to 2
w2;	Set the width to 2
R	Return to Print mode

Note: *The <STX> and <ETX> commands mark the beginning and end of a message. The semicolon (;) is the command terminator. All commands in Program mode must end with this terminator except the last command in a message.*

Deleting Fields

You can delete a field from a label format entirely. However, you cannot delete the last field in a format.

For example, you cannot delete field 0 from a format that has no other fields. When a format is created, human-readable field zero (H0) is automatically created along with it. If you want to delete field 0 from a format, define field 1, and then delete field 0.

The following command string can be used to delete field x from format y.

```
<STX><ESC>P;Fy;Dx;R<ETX>
```

Each command in this string is described below:

Command	Description
<ESC>P	Enter Program mode
Fy;	Access format y
Dx;	Delete field x
R	Return to Print mode

Scaling Fields

The size of a field is determined by the size of either the font or graphic you use and the field magnification factors you apply. The human-readable and bar code fonts have default sizes, and the user-defined character fields will print as large as you design them, but by using magnification commands, you can scale them to be up to 4 inches by 4 inches.

Magnifying Fonts and Character Fields

The internal fonts in the printer already have sizes associated with them. For example, the letters in font c0 are 7 dots wide by 9 dots high, and there is a one-dot gap between characters. If you design a field that will print 10 letters in font c0, the field will be 79 dots wide by 9 dots high.

By applying magnification factors (h for height and w for width) you can increase a field's height or width. If you increased the height to 2 (h2) for the field described above, the field height would double, and the final field would print 79 dots long by 18 dots high. If you changed the magnification to h3, the field height would triple, and the field would print 79 dots by 27 dots.

Increasing the width of a text field to 2 would make each letter in the field twice as wide. If this was done to the example above, with field height h2, the final field would print 158 dots wide by 18 dots high.

Magnifying Bar Code Fields

Bar code fields may also be magnified using the height and width commands, but the commands do not behave the same as with human-readable fields.

For bar code fields, the height magnification is the actual dot height of the bar code. If you choose a height magnification of h20, the height of the bar code field will be 20 dots.

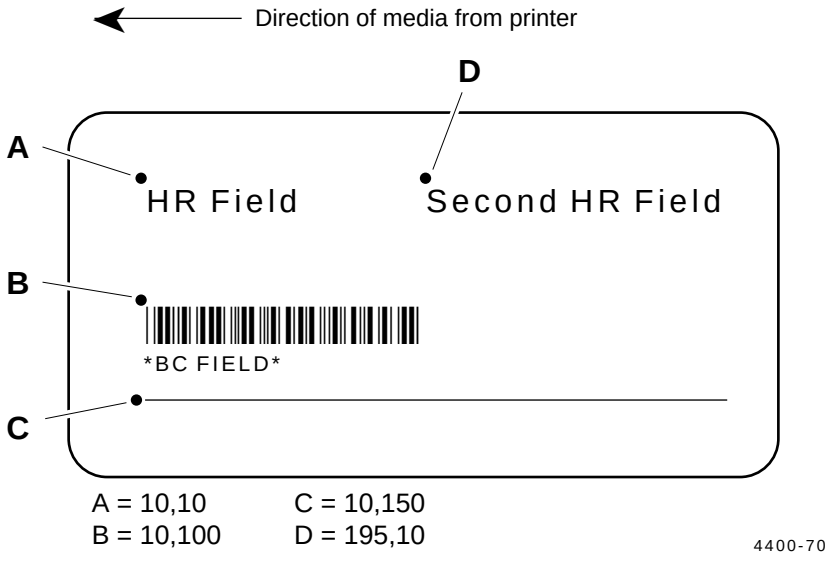
Printing narrow bar codes conserves space on each label as well as media. If you plan to scan bar codes from a distance, you may need to magnify the bar code widths.

The width magnification factor for bar code fields refers to the width of the narrowest element of the bar code. The minimum bar code width is 5 mil (in drag mode). When you specify a narrow element width of w3, the width of the narrowest element in the symbology will be three dots wide. The spaces and large element widths will grow according to preset ratios for each symbology.

The default height for bar code fields is 50 dots, and the default width for narrow elements is 1 dot. You can magnify bar code fields to print up to 9999 dots high, with a narrow element of up to 9999 dots wide, but you will need special equipment to scan a bar code that wide.

Positioning Fields

Positioning fields using downloaded commands may be the trickiest part of designing labels. Since you cannot tell exactly how the field will look until it prints, you may need to make several test prints before you get the field positioned exactly right.



For all types of fields, the print position is determined by defining the coordinates of the upper left corner of the unrotated field.

The upper left corner of an unrotated field is referred to as the field origin. To define the coordinates of the field origin, you use the origin command (oxxx,yyy) where o is the command that specifies origin, xxx is the distance from the left side of the label, and yyy is the distance from the top of the label.

The xxx and yyy coordinates of the field origin are measured in dots. There are 203.2 dots per inch, or 8 dots per millimeter.

For example, to position a field to print one inch from the top of your label and approximately 1/2 inch from the left side, the origin command would be o101,203.

Note: *If you are operating your printer in 86XX emulation mode, the dot sizes will double in 10 mil mode and increase by 1.5 in 15 mil mode.*

To position a field which uses font c20, c21, c22, c23, c24, or c25 (the outline font), you must make an extra calculation. Where the origin of a bar code field, bitmap text field, line, box, or graphic is easy to determine, the outline font will seem to print below the field origin. This occurs because the outline font contains special characters that are actually larger than uppercase letters.

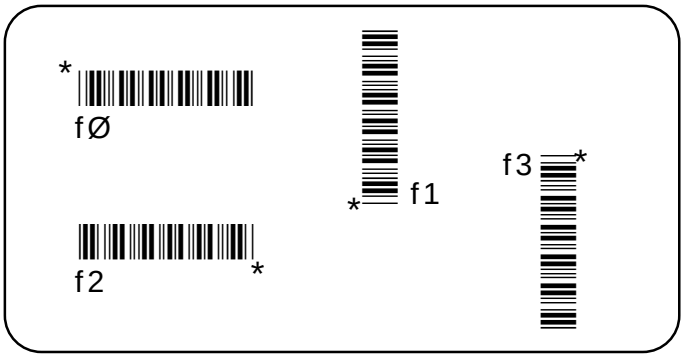
These special characters require extra space between the top of the outline font uppercase letters and the origin of the field. If you are not using the special characters, but are trying to position an outline font field, set the yyy coordinate a little higher than you would for a different field.

Rotating Fields

Any type of field you print can be rotated in increments of 90 degrees counterclockwise around the field origin.

To position a rotated field, you should keep in mind that the field origin will remain on the corner where it was before the field was rotated. If a field is rotated 90 degrees counterclockwise, the origin (which used to be at the upper left corner but is now at the lower left corner) is still the origin.

- For fields that are rotated 90 degrees, you must position the lower left corner of the rotated field.
- For fields that are rotated 180 degrees, you must position the lower right corner of the rotated field.
- For fields that are rotated 270 degrees, you must position the upper right corner of the rotated field.



Storing Label Formats

When a label is defined, either by downloading printer commands or by using PrintSet or a similar program, the format is stored in the printer's RAM.

Once a label is stored in the printer, it can be used at any time. You can call it up to print labels with, or you call it up in Program mode to modify one or all of the fields.

Designing Pages

A page is a collection of one or more formats that are combined to print at the same time. This is very practical in cases where you may need to attach several different labels on each one of your objects. For example, you may need to attach one kind of label to a product, and a different label to its container. With the printer's page printing capability, you can print both labels at the same time. Being able to print pages of several formats at once also allows you to print labels on media rolls that have different sizes and shapes of labels already precut.

When you group label formats into a page, the formats are put in positions that are assigned the letters a through z. Formats combined in pages may still be printed independently.

Using Printer Memory

There is enough RAM in the printer to store several different label formats and still retain enough memory to store downloaded fonts, graphics, and data. Be careful of how you use your printer memory. There is a limit to how much can be stored in the printer.

In its base configuration, the printer is equipped with 39K of static RAM. You may expand the available RAM to 295K by installing a RAM expansion board.

There are limits to the number of formats, fonts, graphics, or pages that you can store in the printer. You can define up to 16 soft fonts, but there may not be enough room depending on the amount of memory being used for other purposes. The more formats, graphics, and fonts you store, the less memory is available.

When you run into a memory usage problem, use the <ESC>m command to see how much memory remains available. If you find that it is necessary to increase your available memory, you can do one of the following:

- Use one of the Service Memory Reset menus to increase the amount of available memory in part or all of the sections. See “Increasing Available Memory” in Chapter 9 for more information.
- The commands used to create a font or graphic can be used to delete them as well (see the Program mode commands in Chapter 7):

  Outline fonts: **J***n* without any following data will delete outline font *n*.

  Bitmap fonts: **T***n* without any following data will delete bitmap font *n*.

  UDCs: **G***n* without any following data will delete UDC *n*.
- Use the Program commands (see Chapter 7) to delete pages and formats:

  Pages: Delete a page with the **s***n* command.

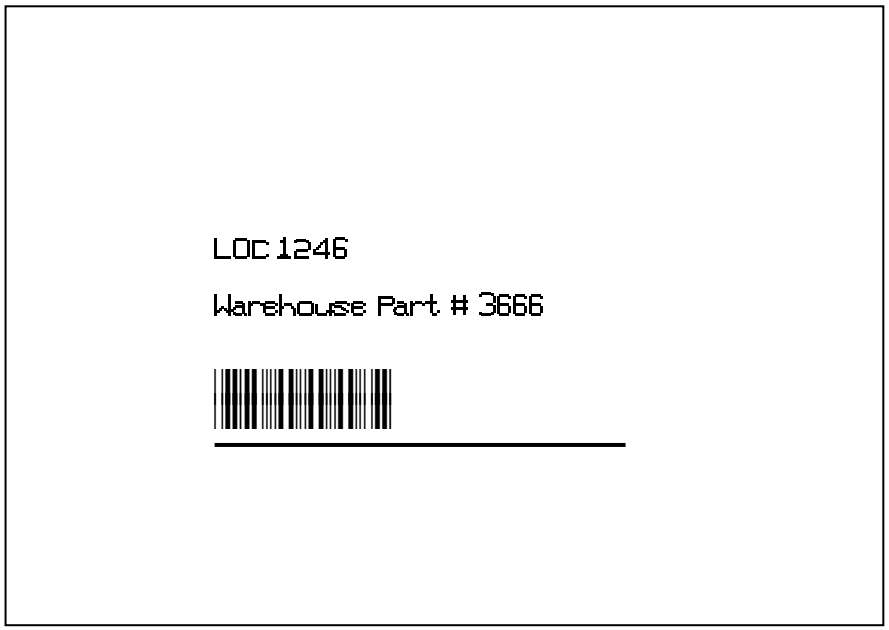
  Formats: Erase format *n* by using the E*n* command.

Format Examples

Label formats (designs) incorporate the different types of fields that were previously described. Following are some practical examples of label designs.

Example 1

The first example is a fairly simple label designed to demonstrate the different types of data that can be printed.



Format for Example 1

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>E3;F3;<ETX>
<STX>H0;o162,200;f0;c2;d0,16;h2;w2;<ETX>
<STX>H1;o162,300;f0;c2;d3,Warehouse Part #
3666;h2;w2;<ETX>
<STX>B2;o162,400;f0;c0,1;h100;w2;i0;d0,11;p@;<ETX>
<STX>L3;o162,530;f0;l600;h2;w6;<ETX>
<STX>R<ETX>
```

Data for Example 1

```
<STX><ESC>E3<CAN><ETX>
<STX>LOC 1246<CR><ETX>
<STX>3666<ETX>
<STX><ETB><ETX>
```

The <STX> and <ETX> characters mark the beginning and end of each command string. The semicolon (;) is the command terminator. All commands in Program mode must end with this terminator except the last command in a message. The other characters are described in the table below.

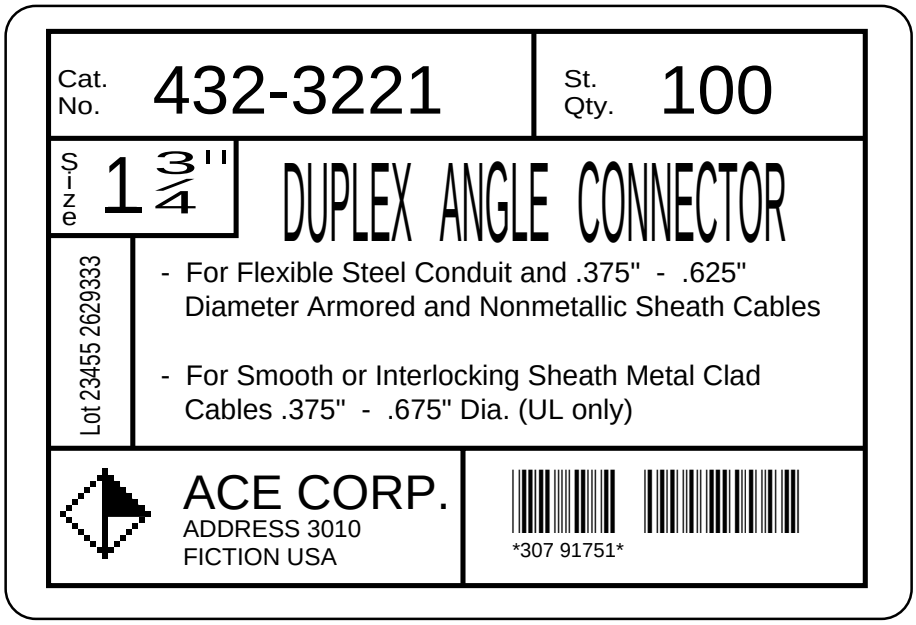
Command	Description
<ESC>C	Sets 4400 (advanced) mode.
<ESC>P	Enters Program mode.
E3;	Erases anything previously stored as format three.
F3;	Creates format three.
H0;	Designates field zero as a human-readable field.
o162,200;	Sets the origin at grid coordinates (162,200).
f0;	Sets the field rotation to zero, which is unrotated or horizontal.
c2;	Selects internal font two.
d0,16;	Determines that data is sent during print mode and its maximum length is 16 characters.
h2;	Sets the height magnification factor to twice its original height.
w2;	Sets the field width magnification factor to twice its original width.
H1;	Defines field one as a human-readable field.
o162,300;	Sets the field origin at coordinates (162,300).
f0;	Sets the rotation factor of the field to zero.
c2;	Selects internal font two.
d3,Warehouse Part # 3666;	Determines that data for the field has this constant value: Warehouse Part # 3666.
h2;	Sets the field height magnification factor to twice its original height.
w2;	Sets the field width magnification factor to twice its original width.
B2;	Defines field two as a bar code field.
o162,400;	Sets the origin at coordinates (162,400).
f0;	Sets the field rotation to zero (unrotated).
c0,1;	Selects Code 39 with a check digit entered by the printer.
h100;	Sets the field height to 100 dots.

Example 1 Command Descriptions (continued)

Command	Description
w2;	Sets the narrowest element width to two dots.
i0;	Determines that no human-readable interpretive field prints below the bar code.
d0,11;	Sets data from Print mode at 11 characters long.
p@;	Determines the bar code field has no prefix.
L3;	Defines field three as a line field.
o162,530;	Set the field origin at coordinates (162,530).
f0;	Define the field rotation as horizontal.
l600;	Determines the length of the line is 600 dots.
h2;	Sets the height magnification factor to twice its original height.
w6;	Determines the width of the line is six dots.
R	Exits Program mode and enters Print mode.
<ESC>E3	Accesses format three.
<CAN>	Clears all data for the current format and points to the lowest numbered field in the format that can accept variable data.
LOC 1246<CR>	This is the data for the first field in the format. Moves to the next field
3666	This is the data for the bar code field.
<ETB>	Prints the label.

Example 2

This example is given to demonstrate some of the more complex labels that you can design with the 4400 printer. This format has fields that include a graphic, lines, boxes, and several fields with constant data.



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Graphic for Example 2

```
<STX><ESC>c<ETX>
<STX><ESC>P<ETX>
<STX>G2,diam;x15;y15;<ETX>
<STX>u0,000000010000000;<ETX>
<STX>u1,000000101000000;<ETX>
<STX>u2,000001000100000;<ETX>
<STX>u3,000010000010000;<ETX>
<STX>u4,000100000001000;<ETX>
<STX>u5,001000000000100;<ETX>
<STX>u6,010000000000010;<ETX>
<STX>u7,111111111111111;<ETX>
<STX>u8,011111110000010;<ETX>
<STX>u9,001111110000100;<ETX>
<STX>u10,000111110001000;<ETX>
<STX>u11,000011110010000;<ETX>
<STX>u12,000001110100000;<ETX>
<STX>u13,000000111000000;<ETX>
<STX>u14,000000010000000;<ETX>
<STX>R<ETX>
```

Format for Example 2

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>E5;F5;<ETX>
<STX>H0;o45,40;c25;d3,Cat.;k10;<ETX>
<STX>H1;o45,70;c25;d3,No.;k10;<ETX>
<STX>H2;o175,0;c25;d3,432-3221;k40;<ETX>
<STX>H3;o795,40;c25;d3,Std.;k10;<ETX>
<STX>H4;o795,70;c25;d3,Qty.;k10;<ETX>
<STX>H5;o925,0;c25;d3,100;k40<ETX>
<STX>L6;o750,10;f3;l130;w8;<ETX>
<STX>L7;o35,140;l1075;w8;<ETX>
<STX>H8;o40,165;c25;f3;r1;d3,Size;k10<ETX>
<STX>H9;o100,130;c25;d3,1 ";k40;<ETX>
<STX>H10;o145,165;f3;r1;c25;d3,3/4;h16;w65;<ETX>
<STX>L11;o310,140;f3;l130;w8;<ETX>
<STX>L12;o35,270;l275;w8;<ETX>
<STX>H13;o60,560;f1;c25;d0,20;k10;<ETX>
<STX>L14;o170,270;f3;l310;w8;<ETX>
<STX>H15;o350,140;c25;d3,DUPLEX ANGLE CONNECTOR;h70;w28;<ETX>
<STX>H16;o205,320;c25;d3,- For Flexible Steel Conduit and .375"
- .625";k12;<ETX>
<STX>H17;o247,375;c25;d3,Diameter Armored and Nonmetalic Sheath
Cables;k12;<ETX>
<STX>H18;o205,450;c25;d3,- For Smooth or Interlocking Sheath
Metal Clad;k12;<ETX>
<STX>H19;o247,505;c25;d3,Cables .375" - .675" Dia. (UL
only);k12;<ETX>
<STX>L20;o35,580;l1075;w8;<ETX>
<STX>U21;o50,610;c2;h9;w9;<ETX>
<STX>H22;o220,600;c25;d3,ACE CORP.;k20;<ETX>
<STX>H23;o220,670;c25;d3,ADDRESS 3010;k10;<ETX>
<STX>H24;o220,710;c25;d3,FICTION USA;k10;<ETX>
<STX>B25;o675,625;c0,0;d0,20;i25;h100;p@;<ETX>
<STX>L26;o585,580;f3;l175;w8;<ETX>
<STX>R<ETX>
```

Data for Example 2

```
<STX><ESC>E5<CAN><ETX>
<STX>Lot 23455 2629333<CR>307 91751<ETX>
<STX><ETB><ETX>
```

The <ETX> and <STX> characters are used to mark the beginnings and ends of the command strings. The other characters are explained in the following table.

Command	Description
<ESC>C	Selects 4400 (advanced) mode.
<ESC>P	Selects Program mode.
E5;F5;	Erases anything previously stored as format five and accesses the location for format five.
H0;	Defines field zero as a human-readable field.
o45,40;	Sets the origin of field zero at coordinates (45,40).
c25;	Sets the font for field zero to font 25.
d3,Cat.;	Sets the data for field zero to have the constant value: Cat.
k10;	Sets the point size to 10.
H1;	Defines field one as a human-readable field.
o45,70;	Sets the origin of field one at coordinates (45,70).
c25;	Sets the fonts for field one to font 25.
d3,No.;	Set the data for field one the constant value: No.
k10;	Sets the point size to ten.
H2;	Defines field two as a human-readable field.
o175,0;	Sets the origin of field two at (175,0).
c25;	Sets the font of field two to font 25.
d3,432-3221;	Sets the constant data for field two.
k40;	Set the point size to 40.
H3;	Defines field three as a human-readable field.
o795,40;	Sets the origin of field three at (795,40).
c25;	Sets the font for field three to font 25.
d3,std.;	Defines constant data for field three.
k10;	Sets the point size to 10.
H4;	Defines field four as a human-readable field.
o795,70;	Sets the origin of field four at (795,70).
c25;	Sets the font for field four to font 25.
d3,Qty.;	Defines constant data for field four.
k10;	Sets the point size to ten.

Example 2 Command Descriptions (continued)

Command	Description
H5;	Defines field five as a human-readable field.
o925,0;	Sets the origin of field five at (925,0).
c25;	Sets the font for field five to font 25.
d3,100;	Defines the constant data for field five..
k40	Sets the point size to 40.
L6;	Defines field six as a line field.
o750,10;	Sets the origin for field six at (750,10).
f3;	Rotates field six 270 degrees counterclockwise around the field origin.
l130;	Sets the length of the line in field six to 130 dots.
w8;	Sets the width of field six to eight times its actual width.
L7;	Defines field seven as a line.
o35,140;	Sets the origin for field seven at (35,140).
l1075;	Sets the length of the line in field seven to 1075 dots.
w8;	Sets the line width to 8 dots.
H8;	Defines field eight as a human-readable field.
o40,165;	Sets the origin of field eight at (40,165).
c25;	Defines the font for field eight as font 25.
f3;	Rotates field eight 270 degrees counterclockwise around the origin.
r1;	Rotates the characters in field eight 90 degrees counterclockwise.
d3,Size;	Defines the constant data for field eight.
k10;	Sets the point size to ten.
H9;	Defines field nine as a human-readable field.
o100,130;	Sets the origin of field nine at (100,130).
c25;	Defines the font for field nine as font 25.
d3,1";	Defines constant data for field nine.
k40;	Sets the point size to 40.
H10;	Defines field ten as a human-readable field.
o145,165;	Sets the origin for field ten at (145,165).
f3;	Rotates field ten 270 degrees counterclockwise around the origin.
r1;	Rotates the characters in field ten 90 degrees counterclockwise.

Example 2 Command Descriptions (continued)

Command	Description
c25;	Sets the font for field ten to be font 25.
d3,3/4;	Defines constant data for field ten.
h16;	Sets the height to sixteen times the original size.
w65;	Sets the width to 65 times the original size.
L11;	Defines field 11 as a line field.
o310,140;	Sets the origin for field 11 at (310,140).
f3;	Rotates field 11 270 degrees counterclockwise around the origin.
l130;	Sets the length of the line in field 11 to 130 dots.
w8;	Sets the width to eight times the original size.
L12;	Defines field 12 as a line field.
o35,270;	Sets the origin of field 12 at (35,270).
l275;	Sets the length of the line in field 12 to 275 dots.
w8;	Sets the width of field 12 to eight times its actual width.
H13;	Defines field 13 as a human-readable field.
o60,560;	Sets the origin of field 13 at (60,560).
f1;	Rotates field 13 90 degrees around the origin 25.
c25;	Determines that field 13 prints in font 25.
d0,20;	Specifies that data for field 13 will be entered during Print mode and that the data will be a maximum of 20 characters long.
k10;	Sets the point size to ten.
L14;	Defines field 14 as a line field.
o170,270;	Sets the origin of field 14 at (170,270).
f3;	Rotates field 14 270 degrees counterclockwise around the origin.
l310;	Sets the length of the line in field 14 to 310 dots.
w8;	Sets the width of field 14 to eight times the actual size.
H15;	Defines field 15 as a human-readable field.
o350,140;	Sets the origin of field 15 at (350,140).
c25;	Determines that the field prints in font 25.
d3,DUPLEX ANGLE CONNECTOR;	Defines constant data for field 15.
h70;	Sets the height to 70 times the original size.

Example 2 Command Descriptions (continued)

Command	Description
w28;	Sets the width to 28 times the original size.
H16;	Defines field 16 as a human-readable field.
o205,320;	Sets the origin for field 16 at (205,320).
c25;	Determines that field 16 prints in font 25.
d3,-For Flexible Steel and Conduit and .375" - .625";	Defines the constant data for field 16.
k12;	Sets the point size to 12.
H17;	Defines field 17 as a human-readable field.
o247,375;	Sets the origin of field 17 at (247,375).
c25;	Determines that field 17 prints in font 25.
d3,Diameter Armored and Nonmetallic Sheath Cables;	Defines constant data for field 17.
k12;	Sets the point size to 12.
H18;	Defines field 18 as a human-readable field.
o205,450;	Sets the origin of field 18 at (205,450).
c25;	Determines that field 18 prints in font 25.
d3,-For Smooth or Interlocking Sheath Metal Clad;	Defines constant data for field 18.
k12;	Sets the point size to 12.
H19;	Defines field 19 as a human-readable field.
o247,505;	Sets the origin of field 19 at (247,505).
c25;	Determines that field 19 prints in font 25.
d3,Cables .3765: - .675" Dia. (UL only);	Defines the constant data for field 19.
k12;	Sets the point size to 12.
L20;	Defines field 20 as a line field.
o35,580;	Sets the origin of field 20 at (35,580).

Example 2 Command Descriptions (continued)

Command	Description
l1075;	Sets the length of the line in field 20 to 1075 dots.
w8;	Sets the width to eight times the original size.
U21;	Defines field 21 as a graphic field.
o50,610;	Sets the origin of field 21 at (50,610).
c2;	Determines that field 21 prints in font two.
h9;	Sets the height to nine times the original size.
w9;	Sets the width to nine times the original size.
H22;	Defines field 22 as a human-readable field.
o220,600;	Sets the origin of field 22 at (220,600).
c25;	Determines that field 22 prints in font 25.
d3,ACE CORP.;	Defines constant data for field 22.
k20;	Sets the point size to 20.
H23;	Defines field 23 as a human-readable field.
o220,670;	Sets the origin of field 23 at (220,670).
c25;	Determines that field 23 prints in font 25.
d3,ADDRESS 3010;	Defines constant data for field 23.
k10	Sets the point size to ten.
H24;	Defines field 24 as a human-readable field.
o220,710;	Sets the origin of field 24 at (220,710).
c25;	Determines that field 24 prints in font 25.
d3,FICTION USA;	Defines constant data for field 24.
k10;	Sets the point size to ten.
B25;	Defines field 25 as a bar code field.
o675,625;	Sets the origin of field 25 at (675,625).
c0,0;	Sets the bar code font to Code 39 with no check digit.
d0,20;	Determines that the data for field 25 is entered during Print mode and its maximum length is 20 characters.
i25;	Determines an interpretation of bar code prints including start and stop characters.
h100;	Determines that the bar code height is 100 dots.
p@;	Clears all prefixes from the bar code field.

Example 2 Command Description (continued)

Command	Descriptions
L26;	Defines field 26 as a line field.
o585,580;	Sets the origin of field 26 at (585,580).
f3;	Rotates field 26 270 degrees counterclockwise around the field origin.
l175;	Sets the length of the line in field 26 to 175 dots.
w8;	Sets the width of field 26 to eight times the actual width.
R	Sets the printer in Print mode.
<ESC>E5	Accesses format five from the printer memory.
<CAN>	Clears all host entered data for the current format and sets the field pointer to the lowest numbered data entry field.
Lot 23455 2629333<CR>	This is the data intended for the first data entry field. <CR> instructs the printer to go to the next data entry field.
307 91751 <CR>	This is the data intended for the next data entry field. <CR> instructs the printer to go to the next data entry field.
<ETB>	Tells the printer to print the label.

7

Printer Commands

This chapter gives detailed descriptions of the commands available on the printer. When designing label formats or printing labels, refer to this chapter for command descriptions.

If you are using this command set to design your labels, you may want to refer to Chapter 6 for information on label design. Chapter 6 includes sample formats of both simple and complex labels that incorporate all different parts of label design available by using the command set. You may also choose to use Intermec's label design software package, PrintSet, described in Chapter 6.

Command Set Summary

The commands that take effect when downloaded to the printer depend on which mode the printer is operating in: Print mode, Program mode, or Test and Service mode. When the printer is in any of these modes, it responds to the commands specific to that mode only. As described in the previous chapter, Print mode commands are used to print labels and download data, configuration commands are used to enable or disable printer features and options, and Program mode commands are used for label format design. Following the command descriptions and accompanying tables are the functional boundaries of the printer within which you need to define the boundaries of your labels.

Note: *When using the Centronics interface, the Print mode and Test and Service mode commands highlighted by an asterisk (*) will not receive a response from the printer. It is a one way only (host-to-printer) interface. Refer to the Appendix for more information.*

Summary of Print Mode Commands

The following table lists a summary of available Print mode commands. Each command is described in detail later in this chapter.

Command Code	Function	Factory Default	8636/46 Emulation
<ACK>	First Data Entry Field, Select		yes
<BEL>	Error Code, Transmit*		yes
<BS>	Warm Boot		yes
<CAN>	Clear All Data		yes
<CR>	Next Data Entry Field, Select		yes
<DEL>	Clear Data From Current Field		yes
<DLE>	Reset		yes
<EM>	Abort Print Job		yes
<ENQ>	Status Enquiry*		yes
<ESC>C	4400 Mode, Select		yes
<ESC>D	Field Decrement, Set	1	yes
<ESC>E	Format, Select	0	yes
<ESC>F	Field, Select	0	yes
<ESC>G	Page, Select	0	no
<ESC>H	Printhead Parameters, Transmit*		yes
<ESC>I	Field Increment, Set	1	yes
<ESC>L	Label and Gap Length, Transmit*		yes
<ESC>M	Program Number, Transmit*		yes
<ESC>N	Increment and Decrement, Disable		yes
<ESC>O	Options Selected, Transmit*		yes
<ESC>P	Program Mode, Enter		yes
<ESC>Q	Quantity and Batch Count, Transmit*		yes
<ESC>SP	Start and Stop Codes (Code 39), Print		yes
<ESC>T	Test and Service Mode, Enter		yes
<ESC>Z	User-Defined Tables, Transmit*		yes
<ESC>c	86XX Emulation Mode, Select		no
<ESC>d	Auto-Transmit 2, Enable		yes

Print Mode Commands (continued)

Command Code	Function	Factory Default	8636/46 Emulation
<ESC>e	Auto-Transmit 3, Enable		yes
<ESC>j	Auto-Transmit 1, Enable		yes
<ESC>k	Auto-Transmit 1, 2, and 3, Disable		yes
<ESC>m	Static RAM Usage, Transmit*		yes
<ESC>p	Configuration Parameters, Transmit*		yes
<ESC>u	User-Defined Characters, Transmit*	0	yes
<ESC>v	Font, Transmit*	0	yes
<ESC>x	Format, Transmit*	0	yes
<ESC>y	Page, Transmit*	1	no
<ETB>	Print		yes
<FF>	Form Feed		yes
<FS>	Numeric Field Separator		yes
<GS>	Alphanumeric Field Separator		yes
<LF>	Command Terminator 2		yes
<NUL>	Command Terminator 1		yes
<RS>	Quantity Count, Set	1	yes
<SO>	Cut		yes
<SUB>	Data Shift - International Characters		yes
<US>	Batch Count, Set	1	yes
<VT>	Status Dump*		yes

***Note**: Commands denoted by an asterisk (*) will not receive a reply from the printer when used with a parallel interface.*

Summary of Configuration Commands

The following table lists a summary of the available configuration commands. These commands are only valid under Print mode. Each command is described in detail later in this chapter.

Command Code	Function	Factory Default	8636/46 Emulation
<EOT>	Postamble, Set	NUL	yes
<ESC>d	Auto-Transmit 2		yes
<ESC>e	Auto-Transmit 3		yes
<ESC>j	Auto-Transmit 1		yes
<ESC>k	Auto-Transmit 1, 2, and 3		yes
<ESC><SYN>	Message Delay, Set	0	yes
<SI>A	Control Panel Access Permission, Set	0	yes
<SI>C	86XX or 4400 Mode on Power Up1		yes
<SI>D	End-of-Print Skip Distance, Set		yes
<SI>F	Top of Form, Set	20	yes
<SI>H	Printhead Pressure, Enable	0	
<SI>I	Number of Image Bands, Set	3	yes
<SI>L	Maximum Label Length, Set	1000	yes
<SI>O	Online or Offline on Power Up	0	yes
<SI>R	Label Retract, Enable or Disable	0	yes
<SI>S	Print Speed, Set	35	yes
<SI>T	Label Stock Type, Select	1	yes
<SI>U	Printhead Test Parameters, Set		yes
<SI>W	Label Width, Set	896	yes
<SI>a	Audible Alarm, Enable or Disable	0	yes
<SI>c	Cutter, Enable or Disable	0	yes
<SI>d	Dark Adjust, Set	0	yes
<SI>f	Label Rest Point, Adjust	0	
<SI>g	TTR or Direct Thermal, Select	0,420	yes

Configuration Commands (continued)

Command Code	Function	Factory Default	8636/46 Emulation
<SI>i	IBM® Language Translation, Enable or Disable	0	yes
<SI>l	Printer Language, Select	0	yes
<SI>r	Label Retract Distance, Set	284	yes
<SI>t	Self-Strip, Enable or Disable	0	yes
<SOH>	Preamble, Set	NUL	yes
<SYN>	Intercharacter Delay, Set	0	yes

Summary of Program Mode Commands

The following table lists a summary of available Program mode commands. Each command is described in detail later in this chapter.

Command Code	Function	Factory Default	8636/46 Emulation
Control Codes			
<BEL>	Transmit Error Code		yes
<DLE>	Reset		yes
<ENQ>	Status Enquiry		yes
Uppercase			
A	Format, Create or Edit		yes
B	Bar Code Field, Create or Edit	0	yes
C	Load Command Tables		yes
D	Delete Field	0	yes
E	Erase Format		yes
F	Format, Create or Edit		yes
G	User-Defined Character, Clear or Create		yes
H	Human-Readable Field, Create or Edit	0	yes
I	Interpretive Field, Edit		yes
J	Outline User-Defined Font, Clear or Create		no
L	Line Field, Create or Edit	0	yes
M	Format Position in a Page, Assign		no
N	Save Current Edit Session		yes
O	Format Offset Within a Page, Define	0,0	no
R	Program Mode, Exit		yes
S	Page, Create or Edit		no
T	Bitmap User-Defined Font, Clear or Define		yes
U	User-Defined Character Field, Create or Edit	0	yes

Program Mode Commands (continued)

Command Code	Function	Factory Default	8636/46 Emulation
W	Box Field, Create or Edit	0	yes
X	Character Origin Offset, Define	0	yes
Z	Font Character Width, Define		yes
Lowercase			
b	Border Around Human-Readable Text, Define	0	yes
c	Type of Graphic, Font or Bar Code, Select	0	yes
d	Field Data, Define Source		yes
e	Data Source for Format in a Page, Define		no
f	Field Direction, Define	0	yes
g	Pitch Size, Set	12	no
h	Height Magnification, Define		yes
i	Interpretive Field, Enable or Disable	0	yes
j	Outline Font Description, Download		no
k	Point Size, Set		no
l	Length of Line or Box Field, Define	100	yes
m	Format Position from Page, Delete	a	no
o	Field Origin, Define	0,0	yes
p	Code 39 Prefix Character, Define		yes
q	Format Direction in a Page, Define	0	no
r	Character Rotation or Bar Code Ratio, Define	0	yes
s	Page, Delete		no
t	User-Defined Font Character, Clear or Create		yes
u	Graphic or UDC, Define		yes
v	Print Line Dot Count Limit, Set		yes
w	Width of Line, Box, Bar or Character, Define		yes

Program Mode Commands (continued)

Command Code	Function	Factory Default	8636/46 Emulation
x	Bitmap Cell Width for Graphic or UDF, Define		yes
y	Bitmap Cell Height for Graphic or UDF, Define		yes
z	Intercharacter Space for UDF, Define	2	yes
;	Command Terminator		yes
(	Null Command		yes
)	Null Command		yes
<CR>	Null Command		yes
<LF>	Null Command		yes

Summary of Test and Service Mode Commands

The following table lists a summary of the available Test and Service mode commands. Each command is described in detail later in this chapter.

Command Code	Function Description
A	Ambient Temperature, Transmit*
B	Printhead Resistance Test, Begin
C	Pitch Label, Print
D	Reset Printer Configuration
G	Gap Sensor Value, Transmit*
L	Label Path Open Value, Transmit*
M	Mark Sensor Value, Transmit*
P	Printhead Temperature, Transmit*
Q	Print Quality Label, Print
R	Test and Service Mode, Exit
S	Printhead Resistance Values, Transmit*
T	Label Taken Value, Transmit*
U	12 Volt Supply Value, Transmit*
V	24 Volt Supply Value, Transmit*
;	Command Terminator

***Note**: Commands denoted by an asterisk (*) will not receive a reply when used with a parallel interface.*

Using Printer Commands According to Function

The following commands are grouped according to functionality.

Programming

A	Format, Edit
F	Format, Edit
E	Format, Erase
S	Page, Create or Edit
s	Page, Delete
R	Program Mode, Exit
N	Save
G	UDC, Clear or Create
J	UDF, Clear or Create Outline
T	UDF, Clear or Create Bitmap

Editing Pages

q	Format Direction in a Page, Define
O	Format Offset in a Page, Define
e	Format in a Page, Define Data Source
M	Format Position in a Page, Assign
m	Format Position in a Page, Delete

Editing Formats

B	Bar Code Field, Create or Edit
W	Box Field, Create or Edit
D	Field, Delete
H	Human-Readable Field, Create or Edit
I	Interpretive Field, Edit
L	Line Field, Create or Edit
U	UDC Field, Create or Edit

Editing Bar Code Fields

r	Bar Code Ratio, Define
c	Bar Code Type, Select
h	Bar Height Magnification, Define
w	Bar Width Magnification, Define
p	Code 39 Prefix Characters, Define
f	Field Direction, Define
i	Field Interpretive, Enable / Disable
o	Field Origin, Define
d	Source of Field Data, Define

Editing Human-Readable Fields

b	Border, Define
h	Character Height Magnification, Define
w	Character Width Magnification, Define
r	Character Rotation, Define
f	Field Direction, Define
o	Field Origin, Define
c	Font Type, Select
g	Pitch Size, Set
k	Point size, Set
d	Source of Field Data, Define

Editing Interpretive Fields

b	Border, Define
h	Character Height Magnification, Define
w	Character Width Magnification, Define
r	Character Rotation, Define
f	Field Direction, Define
o	Field Origin, Define
c	Font Type, Select
g	Pitch Size, Set
k	Point size, Set

Editing Line Fields

f	Field Direction, Define
o	Field Origin, Define
l	Length of Line Field, Define
w	Width of Line Field, Define

Editing UDC Fields

h	Character Height Magnification, Define
w	Character Width Magnification, Define
f	Field Direction, Define
o	Field Origin, Define
c	UDC Type, Select

Editing Box Fields

f	Field Direction, Define
o	Field Origin, Define
h	Height of Box Field, Define
l	Length of Box Field, Define
w	Width of Box Field, Define

Editing UDCs

y	Bitmap Cell Height of UDC, Define
x	Bitmap Cell Width of UDC, Define
u	One Column of Bitmap, Define

Editing Bitmap UDFs

y	Bitmap Cell Height of UDF, Define
x	Bitmap Cell Width of UDF, Define
X	Character Bitmap Origin Offset, Define
t	Font Character, Define
Z	Font Character Width, Define
z	Intercharacter Space, Define
u	One Column of Bitmap, Define

Editing Outline UDFs

j	Outline Font Description, Download
y	Height of Base Character, Define
x	Width of Base Character, Define

System

<BEL>	Error Code, Request
<EM>	Print Job, Abort
<DLE>	Reset
<VT>	Status Dump
<ENQ>	Status Enquiry
<BS>	Warm Boot

Printing

<ESC> c	86XX Emulation Mode, Select
<ESC> C	4400 Advanced Mode, Select
<GS>	Alphanumeric Field Separator
<US>	Batch Count, Set
<CAN>	Clear All Data
<DEL>	Clear Data From Current Field
<ACK>	Data Entry Field, Select First
<CR>	Data Entry Field, Select Next
<SUB>	Data Shift
<ESC> D	Field Decrement, Select
<ESC> F	Field, Select
<ESC> I	Field Increment, Set
<ESC> N	Field Increment / Decrement, Disable
<FF>	Form Feed
<ESC> E	Format, Select
<FS>	Numeric Field Separator
<ESC> G	Page, Select
<ETB>	Print
<ESC> P	Program Mode, Enter
<RS>	Quantity Count, Set
<ESC> <SP>	Start / Stop Characters Only, Enter
<ESC> T	Test and Service Mode, Enter

Configuring

<SI> C	Advanced or 86XX Mode on Power Up*
<SI> a	Audible Alarm, Enable / Disable
<SI> A	Control Panel Access Security Level, Set
<SI> c	Cutter, Enable / Disable*
<SI> d	Dark Adjust
<SI> g	DT / TTR Media Grade, Set
<SI> D	End-of-Print Skip Distance, Set
<SI> f	Label Rest Point, Adjust
<SI> r	Label Retract Distance, Set
<SI> R	Label Retract, Enable / Disable*
<SI> T	Label Stock Type, Select*
<SI> W	Label Width, Set
<SI> L	Maximum Label Length, Set*
<SI> I	Number of Image Bands, Set
<SI> O	Online / Offline on Power Up, Select*
<SI> S	Print Speed, Set
<SI> l	Printer Language, Select
<SI> U	Printhead Failure Condition and Threshold, Set
<SI> g	Select TTR or Direct Thermal
<SI> t	Self-Strip. Enable / Disable*
<SI> F	Top-of-Form, Set
D	Reset Memory to Default (Test and Service Command)

***Note**: When enabling these commands, you need to reset the printer or cycle its power.*

Transmitting

<ESC> p	Configuration Parameters, Transmit
<ESC> x	Format, Transmit
<ESC> L	Label and Gap Length, Transmit
<ESC> y	Page, Transmit
<ESC> H	Printhead Parameters, Transmit
<ESC> M	Program Number, Transmit
<ESC> Q	Quantity and Batch Count, Transmit Remaining
<ESC> m	Static RAM Usage, Transmit
<ESC> O	Options Selected, Transmit
<ESC> u	UDC, Transmit
<ESC> v	UDF, Transmit
<ESC> Z	User-Defined Tables, Transmit

Protocol Modification

<ESC> j	Autotransmit 1, Enable
<ESC> d	Autotransmit 2, Enable
<ESC> e	Autotransmit 3, Enable
<ESC> k	Autotransmit 1, 2, and 3, Disable
<SYN>	Intercharacter Delay, Set
<ESC> <SYN>	Message Delay, Set
<SOH>	Preamble, Set
<EOT>	Postamble, Set
C	Protocol/Command Tables, Set

Test and Service

U	12 Volt Supply Value, Transmit
V	24 Volt Supply Value, Transmit
A	Ambient Temperature Sensor Value, Transmit
L	Label Path Open Sensor Value, Transmit
T	Label Taken Sensor Values, Transmit
Q	Print Quality Label, Print
B	Printhead Resistance Test, Start
S	Printhead Resistance Value, Transmit
P	Printhead Temperature Sensor Value, Transmit
M	Mark Sensor Value, Transmit
D	Reset Memory to Default
R	Test and Service Mode, Exit
G	Gap Sensor Value, Transmit

Cutter

<SI> c	Cutter, Enable / Disable
<SI> R	Label Retract, Enable / Disable
<SI> r	Label Retract Distance, Set
<BS>	Warm Boot
<SO>	Cut

Self-Strip

<SI> R	Label Retract, Enable / Disable
<SI> t	Self-Strip, Enable / Disable
<BS>	Warm Boot

Automatic Printhead Resistance Test

<SI> U	Printhead Failure Condition and Threshold, Set

Print Mode Commands

The printer must be in Print mode to perform any of the following:

- Pass data to formats
- Print labels
- Change printer configuration

When you enter data into a format for printing, the printer uses a field pointer to designate the field in the format where the data should print. If a new format is chosen, the field pointer automatically points to the lowest numbered data entry field and will continue to point to that field unless a different field or format is selected. If a selected field already contains data, it will be overwritten by the new data. If the pointer is pointing to the same field that just accepted data, the new data will be concatenated to the previously entered data.

You may send Print mode commands through the methods described in Chapter 6. The command string to enter Print mode from Program mode or Test and Service mode is:

<STX>R<ETX>

Note: *Each string of commands must be preceded by the start of message character <STX>, and followed by the end of message character <ETX>. All Print mode commands are terminated by the next command in the message. The command separator (<NUL> or <LF>) is optional between commands, but is necessary to separate commands from data.*

The following command descriptions explain the print commands that are effective when the printer is in Print mode. The commands are listed in alphabetical order according to the command description.

4400 Mode, Select

Purpose: Instructs the printer to operate in 4400 mode.

Syntax: <ESC>C

Notes: The field pointer designates the first field in format 0. Page 0 is the default page.

All data downloaded before switching operating modes is lost.

86XX Emulation Mode, Enter

Purpose: Instructs the printer to operate in 86XX mode.

Default: *n* = 0

Syntax: <ESC>c*n*

n = 1 specifies emulation with 15 mil (0.015 inch) dot size for bar codes only (other fields will be at the 10 mil dot size).

n = 0 specifies 10 mil (0.010 inch) dot size.

Notes: The field pointer designates the first field in format 0.

The page select command is disabled and all previously downloaded data is lost.

Abort Print Job

Purpose: Stops batch printing.

Syntax: <EM>

Notes: The printer sets the remaining quantity and batch counts to 1. Other commands remaining in the buffer will continue to be executed.

Alphanumeric Field Separator

Purpose: Increments or decrements alphanumeric characters within a region.

Syntax: <GS>

Alphanumeric characters are 0 to 9 and A to Z.

The order of the characters is as follows:

0, 1, 2.....8, 9, A, B, C.....Y, Z, 0, 1....9, A, B.....

Notes: You may have more than one region in a field as long as they do not overlap and they are incremented or decremented independent of each other.

Increment and decrement regions cannot overlap.

If there are any non-alphanumeric characters within this region, they are ignored.

Batch Count, Set

Purpose: Sets the number of labels to be printed in the next batch.

Default: *n* = 1

Syntax: <US>*n*

The range for *n* is from 1 to 9999.

Notes: The total number of labels printed per print command is equal to the quantity in each batch multiplied by the number of batches.

An error code (21) is generated if *n* is out of range.

See "Optimizing Image Bands for Batch Printing" in Chapter 5.

Clear All Data

Purpose: Clears all host-entered data from the current page or format.

Syntax: <CAN>

Notes: If no page is selected, the pointer indicates the first data entry field in the format after the data is cleared. If a page is selected, the pointer designates the first data entry field in the first format.

Clear Data From Current Field

Purpose: Deletes data from the current field.

Syntax: <DEL>

Notes: The field pointer continues to designate the current field even after the data is cleared.

Command Terminator 1

Purpose: Terminates the current command.

Syntax: <NUL>

Command Terminator 2

Purpose: Terminates the current command.

Syntax: <LF>

Configuration Parameters, Transmit

Purpose: Uploads the current configuration commands from the printer.

Syntax: <ESC>p

Notes: Only the configuration parameters that can be set from the host are received.

Use this command to view, edit, or copy the current configuration command settings.

Cut

Purpose: Advances the label out to the cutter and cuts the label stock.

Syntax: <SO>

Notes: This command is only executed if the cutter is installed but not enabled.

Data Shift - International Characters

Purpose: Allows command characters to entered as data.

Syntax: <SUB>

Notes: In 8636/46 operating mode, this command shifts the next character (if not a control character) into the upper character bank (setting the eighth bit to 1) to print international characters.

This allows command characters to be entered as data instead of commands in both 4400 and 86XX mode.

An error code is generated if an invalid character follows this command.

Error Code, Transmit

Purpose: Solicits error codes from the printer.

Syntax: <BEL>

Notes: The most recent error code is sent back in the form of an ASCII number. The error code represents a command syntax error or a printer RAM usage error.

If no errors have occurred since powering on the printer, the printer sends a zero.

Field Decrement, Set

Purpose: Sets the field decrement value for the current field.

Default: *n* = 1

Syntax: <ESC>D*n*

The range for *n* is from 1 to 9999.

Field decrement values in data fields are decremented by *n* after each print.

Notes: An error code (22) is generated if the decrement value is out of range.

Field Increment, Set

Purpose: Sets the increment value for the selected field.

Default: *n* = 1

Syntax: <ESC>I*n*

The range for *n* is from 1 to 9999.

Field increment values in data entry fields are incremented by *n* after each print.

Notes: An error code is generated if the increment value is out of range.

Field, Select

Purpose: Selects a data field for entering or working with data.

Default: *n* = 0

Syntax: <ESC>F*n* or <ESC>F *"name"*

The range for *n* is from 0 to 199.

Notes: The parameter for this command may be either the field number *or* the field name. It cannot be both. If neither are present, the printer defaults to 0.

If the field number is used, all following data is entered into field *n*. If the field name is used, all following data is entered into all fields and in the current format or page. The field name must be bracketed by quotation marks ("").

An error code (33) is generated if an invalid field number is entered.

First Data Entry Field, Select

Purpose: Uses the field pointer to select the lowest numbered data entry field that can accept Print mode data.

Syntax: <ACK>

Notes: This command ensures that data will print in the field with the lowest number if you do not want to specify a data field by its field number.

Font, Transmit

Purpose: Uploads a font from the printer in the form of commands and data the printer receives to create the font.

Default: *n* = 0

Syntax: <ESC>v*n*

n is the font ID number.

The range is from 0 to 25.

Notes: The data is in 4400 advanced mode form. Each data byte represents 6 bits of the font's bitmap.

A target printer to which the commands and data are sent remain in 4400 mode.

Form Feed

Purpose: Feeds a label out to the next print point.

Syntax: <FF>

Notes: If self-strip is used, the printer feeds out one blank label to the self-strip bar, skipping an entire label.

If batch operation is used with die cut label stock, the label moves to the tear bar.

If continuous label stock is used, the label stock will move the end-of-print skip distance.

Format, Select

Purpose: Selects a format for data entry or printing.

Default: *n* = 0

Syntax: <ESC>E*n*

If the current page is 0, *n* is a numeric format ID ranging from 0 to 19.

If a page other than 0 is selected, *n* is an alphabetic format position within the page with a range from a to z.

Notes: After the format is selected, the field pointer points to the lowest numbered data entry field.

All host entered / variable data will be cleared form this format.

An error code is generated if an invalid format number is entered.

Format, Transmit

Purpose: Uploads a format from the printer in the form of commands and data the printer uses to create the format.

Default: *n* = 0

Syntax: <ESC>x*n*

n is the format ID number.

The range for the format ID number is from 0 to 19.

Notes: A target printer remains in 4400 mode.

An error code is generated if an invalid format number is entered.

Increment and Decrement, Disable

Purpose: Resets any increment or decrement flags for the current field.

Syntax: <ESC>N

Label and Gap Length, Transmit

Purpose: Transmits the label and gap length as measured by the number of dots.

Syntax: <ESC>L

Notes: Label length refers to the length of the label currently being processed. If the label is longer than the distance between the label sensor and the printhead, the printer transmits the length of the previous label.

If continuous stock is selected, the printer transmits the length defined by the <SI>L command (default is 1000). The gap length is 0.

Next Data Entry Field, Select

Purpose: Moves the field pointer to the next data entry field.

Syntax: <CR>

Notes: If a page is not selected and the pointer is designating the last field, the field pointer moves back to the first data entry field in the format.

If a multiformat page is selected and the field pointer is pointing to the last field in a format, it moves to the first field in the next format.

Numeric Field Separator

Purpose: Specifies which numeric data within a field to increment or decrement.

Syntax: <FS>

Notes: You can have more than one region per field as long as they do not overlap. The fields are incremented or decremented independent of each other.

Any non-numeric characters within the region are ignored.

Options Selected, Transmit

Purpose: Uploads the list of selected options.

Syntax: <ESC>O

The options include:

0 no options selected
1 cutter
2 batch takeup
3 self-strip and applicator
4 self-strip

Page, Select

Purpose: Selects a page for data entry or printing.

Default: *n* = 0

Syntax: <ESC>G*n*

The range for *n* is from 0 to 9.

Notes: After the page is selected, the field pointer points to the lowest numbered data entry field of the lowest position format.

All data will be cleared from this page.

An error code is generated if an invalid field number is entered.

Page, Transmit

Purpose: Uploads a page from the printer in the form of commands used to create a format. It also uploads all formats in a page.

Default: *n* = 1

Syntax: <ESC>y*n*

n is the page ID number.

The range is from 1 to 9.

Notes: A target printer receiving the commands and data remains in 4400 mode.

An error code is generated if an invalid page number is entered.

Print

Purpose: Prints the current page or format with data previously entered.

Syntax: <ETB>

Printhead Parameters, Transmit

Purpose: Transmits the number and size of dots in the printhead back to the host.

Syntax: <ESC>H

Notes: Example: 896,5.0.

Program Mode, Enter

Purpose: Causes the printer to enter Program mode for the purpose of editing pages, formats, fonts, or graphics.

Syntax: <ESC>P

Notes: All previously entered data is lost upon execution of this command.

Program Number, Transmit

Purpose: Transmits both the program number and the version number.

Syntax: <ESC>M

Notes: This command uploads the program and software version number to the host as an ASCII alphanumeric character string.

Example: 012345ver1.4.

Quantity and Batch Count, Transmit

Purpose: Uploads the remaining quantity and batch counts for the current print job.

Syntax: <ESC>Q

Quantity Count, Set

Purpose: Sets the quantity of label batches to be printed by the next print command.

Default: *n* = 1

Syntax: <RS>*n*

The range or *n* is from 1 to 9999.

Notes: An error code is generated if the quantity is out of range.

Incrementing and decrementing of data occurs between label batches.

Reset

Purpose: Executes a printer power up reset immediately.

Syntax: <DLE>

Notes: All data and commands in the input buffer are erased upon reset.

Start and Stop Codes (Code 39), Print

Purpose: Instructs the current Code 39 field to print only the start and stop characters.

Syntax: <ESC><SP>

Notes: All previous data for the current field is cleared.

This command is only valid for Code 39 fields.

Static RAM Usage, Transmit

Purpose: Uploads information on RAM usage.

Syntax: <ESC>m

The amounts are measured in kilobytes.

Notes: The printer uploads the amount of total RAM available for formats, fonts, and UDCs. It is followed by the amount of RAM still available for use.

Status Dump

Purpose: Causes the printer to upload all current printer status.

Syntax: <VT>

The printer status is uploaded in the following order:

<GS>	Buffer already full
<SO>	Printhead test failed
<US>	Paper path open
<US>	Ribbon fault
<EM>	No label stock
<DC3>	Buffer now full
<BS>	Takeup reel full
<FS>	Label at strip pin
<DC1>	Skipping
<DC1>	Printing
<DC1>	Ready

Status Enquiry

Purpose: Transmits the current printer status to the host.

Syntax: <ENQ>

Notes: If more than one status is true, the printer transmits the status with the highest priority according to the following list:

<GS>	Buffer already full
<SO>	Printhead test failed
<US>	Paper path open
<US>	Ribbon fault
<EM>	No label stock
<DC3>	Buffer now full
<BS>	Takeup reel full
<FS>	Label at strip pin
<DC1>	Skipping
<DC1>	Printing
<DC1>	Ready

Test and Service Mode, Enter

Purpose: Enters Test and Service mode.

Syntax: <ESC>T

Notes: Complete all print jobs before executing this command because any data entered prior to the command will be erased.

User-Defined Characters, Transmit

Purpose: Uploads a graphic from the printer in the form of commands and data the printer receives to create the graphic.

Default: *n* = 0

Syntax: <ESC>u*n*

n is the graphic ID number. It has a range from 0 to 99.

Notes: The data is uploaded using 4400 mode commands. Each data byte represents 6 bits of the graphic bitmap.

The target printer receiving the commands remains in 4400 mode.

User-Defined Tables, Transmit

Purpose: This command causes the printer to upload the user-defined command and protocol tables the printer receives to download a new command set.

Syntax: <ESC>Z*t*

The command table identifier *t* has the following values:

t = 0	Print mode commands
t = 1	Escape print commands
t = 2	Shift print commands
t = 3	Status response
t = 4	Protocol characters

Notes: Tables listing the default values are located later in this chapter at the end of the Program mode command descriptions under "Command Tables."

This command is used to substitute protocol and command characters.

Warm Boot

Purpose: Resets the printer with a warm boot.

Syntax: <BS>

Notes: Unlike the <DLE> command, this command does not take effect immediately. It waits until all previous commands have been executed before it takes effect.

Data sent after this command, or before the printer finishes rebooting, is lost. In XON/XOFF mode, the printer sends back a <DC2>.

This command is useful when changes in configuration settings require a printer reset.

Configuration Commands

Configuration commands, like Print mode commands, are effective when the 4400 is in Print mode. Use configuration commands to:

- Set parameters for configuration features.
- Enable or disable options.

Configuration commands come into effect when the printer is reset or the power is cycled. If a printer reset is needed, the warm boot command should be used. The reset will take place after all previous commands have been executed. This contrasts with the <DLE> reset command, which executes immediately after it is received even if other commands are waiting to be executed. The command string to enter Print mode from Program mode is:

<STX>R<ETX>

Note: *Each string of commands must be preceded by the start of message character <STX>, and followed by the end of message character <ETX>. All configuration commands are terminated by the next command in the message.*

The following command descriptions explain the configuration commands that are effective when the printer is in Print mode. The command descriptions are listed in alphabetical order.

86XX or 4400 Mode on Power Up

Purpose: Selects 86XX or 4400 printer mode on power up.

Default: *n* = 1

Syntax: <SI>C*n*

n = 0 Selects 86XX printer mode.
n = 1 Selects 4400 printer mode.

Notes: To make this command effective, reset the printer or cycle the power after issuing this command.

Audible Alarm, Enable or Disable

Purpose: Turns the audible alarm feature on or off.

Default: *n* = 0

Syntax: <SI>a*n*

n = 0 Disables the audible alarm.
n = 1 Enables the audible alarm.

Notes: This command is effective upon execution.

Auto-Transmit 1, Enable

Purpose: Enables auto-transmit level 1.

Syntax: <ESC>j

The status response codes are as follows:

<DC1> Fault cleared
<FS> Label at strip pin
<BS> Takeup reel full
<EM> No label stock
<US> Ribbon fault
<US> Label path open

Notes: The printer automatically transmits the status response codes listed above when necessary.

This command becomes effective upon execution.

Auto-Transmit 2, Enable

Purpose: Enables auto-transmit level 2.

Syntax: <ESC>d

Notes: At level 2, the printer automatically transmits the status response code <DC1> (room in input buffer).

This command becomes effective upon execution.

Auto-Transmit 3, Enable

Purpose: Enables auto-transmit level 3.

Syntax: <ESC>e

The status response codes are as follows:

<HT>	Imager overrun
<SOH>	Printing is done and the buffer is empty
<RS>	Insufficient RAM for printing or storage

Notes: A status response will be transmitted when this condition occurs.

This command becomes effective upon execution.

Auto-Transmit 1, 2, and 3, Disable

Purpose: Disables the auto-transmit status.

Syntax: <ESC>k

Notes: This command becomes effective upon execution.

Control Panel Access Permission, Set

Purpose: Sets a security level to restrict access to certain menus depending on the value of *n*.

Default: *n* = 0

Syntax: <SI>A*n*

n = 0	Allows access to all menus (operator, configuration, installation, and test and service).
n = 1	Allows access to operator and configuration menus only.
n = 2	Allows access to the operator menu only.
n = 3	Denies access to all menus.

Cutter, Enable or Disable

Purpose: Turns the Cutter feature on or off, if a Cutter option is installed.

Default: *n* = 0

Syntax: <SI>c*n*

n = 0	Disables the Cutter.
n = non-zero	Enables the Cutter.

Cutter, Enable or Disable (continued)

Notes: To make this command effective, reset the printer or cycle the power after issuing this command.

Dark Adjust, Set

Purpose: Sets the dark adjust command. This controls the print darkness on the labels.

Default: *n* = 0

Syntax: <SI>d*n*

n ranges from -10 to 10.

Notes: This command changes the setting in configuration.

This command becomes effective upon execution.

End-of-Print Skip Distance, Set

Purpose: Sets the end-of-print skip distance. This distance is a number in dot size increments that the label advances after printing. This command works for gap, mark, or continuous label stock.

Default: *n* = 0 Label stock mode
n = 141 Continuous stock mode

Syntax: <SI>D*n*

n must be a number from 0 to 9999 in dot size increments.

Notes: This command is effective upon execution.

To advance the label out to the tear bar in label stock mode, set *n* to 131.

If you enter a value for n, it applies to both continuous mode and label stock mode, regardless of the mode in which the value was entered.

Entering the <SI>D command without setting any parameters returns the setting to its default value.

This command is ineffective in Self-Strip and Cutter applications.

IBM Language Translation, Enable or Disable

Purpose: Turns the IBM language translation feature on or off.

Default: *n* = 0

Syntax: <SI>i*n*

n = 0 Disable IBM translation.
n = 1 Enable IBM translation.

Notes: This feature allows IBM compatible characters to replace standard ASCII characters based on the current printer language. This command overrides the language translation that is based on the current printer emulation.

This command is effective as soon as it is executed.

Intercharacter Delay, Set

Purpose: Sets the intercharacter delay equal to *n* in milliseconds. The intercharacter delay is the time delay between characters in a message transmitted by the printer.

Default: *n* = 0

Syntax: <SYN>*n*

n must be a number from 0 to 9999 in milliseconds.

Notes: This command is effective upon execution.

Label Rest Point, Adjust

Purpose: Adjusts the point at which labels are presented for removal. Positions the gap on the tear bar when using form feed. This command is used mostly for Self-Strip and Cutter applications.

Default: *n* = 0

Syntax: <SI>f*n*

Notes: The range for *n* is from -30 (furthest back) to +30 (furthest forward) in dot increments.

Label Retract, Enable or Disable

Purpose: Turns the label retract option on or off.

Default: *n* = 1

Syntax: <SI>R*n*

n = 0 Disables label retract.
n = non-zero Enables label retract.

Notes: If diecut label stock is selected, the printer determines the retract distance automatically.

If continuous label stock is selected, the printer uses the retract distance set by the Set Label Retract Distance command. See also Select Label Stock Type command.

This command is effective after a printer reset or power up.

Label Retract Distance, Set

Purpose: Sets the label retract distance to *n* dot increments. This command works with continuous label stock only. The label retracts to this distance at the start of a print.

Default: *n* = 284
n = 216 (6.5 mil printhead)

Syntax: <SI>r*n*

Notes: This command is effective upon execution.

Label Stock Type, Select

Purpose: Selects the type of label stock.

Default: *n* = 1

Syntax: <SI>T*n*

n = 0 Continuous label stock
n = 1 Label stock with gaps between labels.
n = 2 Label stock with marks between labels.

Notes: To make this command effective, reset the printer or cycle the power after issuing the command.

Label Width, Set

Purpose: Sets the label width to *n* in dot increments.

Default: *n* = 896
n = 672 (6.5 mil printhead)

Syntax: <SI>W*n*

n must be a number from 50 dots (0.25 inch) to 896 dots (4.4 inches).

Notes: This command is effective upon execution.

Maximum Label Length, Set

Purpose: Defines the maximum label length as *n* dot increments. This number is used only for detecting low stock. It is not used to limit the image size of a format on the label.

Default: *n* = 1000

Syntax: <SI>L*n*

n must be a number from 200 to 4800 in dot increments.

Notes: To make this command effective, reset the printer or cycle the power after issuing this command.

Message Delay, Set

Purpose: Sets the message delay to *n* milliseconds.

Default: *n* = 0

Syntax: <ESC><SYN>*n*

n must be a number from 0 to 9999 milliseconds.

Notes: This command is effective upon execution.

Modified Field Reimaging

It is possible to reimage only the fields in a label format which have received new data. If you are updating data in just a few fields, it might be faster to utilize field reimaging than to reimage the entire label format. It is important that you take into account the type of field you are thinking of reimaging. For example, if you choose to reimage a field that will take longer to erase and reimage than an entire label format, you will not be increasing throughput (because erasing a field requires reimaging it with zeros and erasing a label just requires clearing the RAM).

When used correctly, this command parameter can greatly increase the throughput of your printer.

You must select a format before you can enable the field reimaging portion of the command.

Selecting a Format for Field Reimaging

Purpose: Selects a format for data entry or printing.

Default: *n* = 0
,*m* = 0

Syntax: <ESC>E*n*[,*m*]

If the current page is 0 (default), *n* is a numeric format ID ranging from 0 to 19.

If a page other than 0 is selected, *n* is an alphabetic format position within the page that can be any letter from a to z.

When the ,*m* parameter is enabled, only the fields that receive new data are reimaged. If ,*m* is set to 0, it is disabled. If ,*m* is set to non-zero, it is enabled.

Notes: After the format is selected, the field pointer points to the lowest numbered data entry field.

All host entered / variable data is cleared from this format.

An error code is generated if an invalid format is entered.

When using the field reimaging parameter, make sure that you select enough image bands to allow the printer to retain the entire label image PLUS 1 INCH. One image band is equal to 1 inch. Therefore, if the printed image stops at a distance of 4 inches from the beginning of the label, you must select five image bands to prevent reimaging.

Number of Image Bands, Set

Purpose: Selects the number of image bands.

Default: *n* = 3

Syntax: <SI>I*n*

n must be a number from 2 to 10 if you have 512K of RAM in the printer.

Notes: This command is effective upon execution.

Online or Offline on Power Up

Purpose: Selects the printer to be online or offline when it is turned on.

Default: *n* = 0

Syntax: <SI>O*n*

n = 0 Printer is online on power up.
n = non-zero Printer is offline on power up.

Notes: To make this command effective, reset the printer or cycle the power after issuing the command.

Postamble, Set

Purpose: Sets the postamble character to *n*.

Default: *n* = <NUL>

Syntax: <EOT>*n*

When *n* = <NUL>, no postamble character is sent. *n* can be any ASCII character.

Notes: This command is effective upon execution.

Preamble, Set

Purpose: Sets the preamble character equal to *n*.

Default: *n* = <NUL>

Syntax: <SOH>*n*

When *n* = <NUL>, no preamble character is sent. *n* can be any ASCII character.

Preamble, Set (continued)

Notes: This command is effective upon execution.

Print Speed, Set

Purpose: Sets the print speed to *n* tenths of an inch per second (ips).

Default: *n* = 35

Syntax: <SI>S*n*

n must be a number from 25 to 100 (corresponds to 2.5 to 10 ips) in multiples of 5.

In 4400 printers with a 6.5 mil printhead, *n* must be a number from 25 to 85 in multiples of 5.

Notes: This command is effective upon execution.

Printer Language, Select

Purpose: Selects the printer language.

Default: *n* = 0

Syntax: <SI>l*n*

where *n* is one of the following:

0	USA	5	Sweden
1	UK	6	Italy
2	Germany	7	Spain
3	Denmark	8	8-bit ASCII
4	France	9	Switzerland

Notes: Only one language is used per print job.

This command is effective as soon as it is executed.

Printhead Pressure, Set

Purpose: Compensates for variations in the thickness of label stock.

Default: *n* = 0

Syntax: <SI>H*n*

When *n* = 0 it is set to low printhead pressure. When *n* = 1, the printhead pressure is set to high.

Notes: If your labels are slipping, or you notice that the pressure is too light, try changing the pressure to the other setting.

Printhead Test Parameters, Set

Purpose: Sets the printhead test parameters.

Default: *n* = 0
,*m* = 45
,*p* = 45
,*q* = 0

Syntax: <SI>U*n*[,*m*][,*p*][,*q*]

n determines whether printing continues if the printhead test sends a warning.

n = 0 When warning occurs, printing continues.
n = 1 When warning occurs, printing stops.

,*m* is the positive threshold of the percentage of the allowable deviation in resistance. ,*m* can be a number from 45 to 10 (corresponding to 45% to 10%).

,*p* is the negative threshold of the percentage of the allowable deviation in resistance. ,*p* can be a number from 45 to 10 (corresponding to 45% to 10%).

,*q* specifies how often (in terms of the number of labels printed) to automatically run the printhead resistance test. ,*q* must be a number from 0 to 9999.

,*q* = 0 Disables the test.

Notes: This command is effective upon execution.

Self-Strip, Enable or Disable

Purpose: Turns the Self-Strip option on or off. The Self-Strip option must first be installed from the control panel.

Default: *n* = 0

Syntax: <SI>t*n*

n = 0 Disables the self-strip option.
n = 1 Enables the self-strip option.

Notes: This command becomes effective after the printer is reset or the printer power is cycled.

Top of Form, Set

Purpose: Sets the top-of-form (left margin) to *n* which is the distance, in dot increments, from the label origin to its leading edge.

Default: *n* = 20

Syntax: <SI>F*n*

n must be a number from -10 to 4000 dot increments. The negative values let you decrease the margin and print closer to the edge of the label.

Notes: This command is effective upon execution.

TTR or Direct Thermal, Select

Purpose: Selects the label stock to be used.

Default: *n* = 0
m = 420

Syntax: <SI>g*n,m*

n selects the stock to be direct thermal (DT) or thermal transfer (TTR)

n = 0 Direct thermal
n = 1 Thermal transfer

,*m* sets the sensitivity. See Chapter 4 for details on how to set this parameter.

Notes: This command becomes effective after the printer is reset or the printer power is cycled.

Program Mode Commands

The Program mode commands are used specifically for label format design and to download user-defined fonts and graphics. To set the printer to Program mode, send the following command string:

<STX><ESC>P<ETX>

When creating or editing formats the printer uses a field pointer to designate the field that is to be modified when the printer is in Program mode. In order to download commands in Program mode, you must specify the field to be changed. If you do not select a field, the pointer will continue to point to the last selected field until a different format or field is selected.

New formats contain a default human-readable field numbered H0. New pages do not contain a default format.

Note: *Each string of commands must be preceded by the start of message character <STX>, and followed by the end of message character <ETX>. The semicolon (;) is the command terminator. All commands in Program mode must end with this terminator except the last command in a message. Parentheses {( )} and <LF> characters are ignored by the printer.*

The following command descriptions explain the commands that are effective when the printer is in Program mode. The command descriptions are listed in alphabetical order.

Bar Code, Select Type

Purpose: Selects a symbology for a bar code field.

Default: *n* = 0

Syntax: c*n*[,*m1*][,*m2*][,*m3*]

Values for *n* can range between 0 to 11.

Notes: Modifiers apply only to bar code symbologies. Fonts and bar codes are listed at the end of the Program mode command descriptions.

Bar Code Field, Create or Edit

Purpose: Use this command to edit or create a bar code field *n*.

Default: *n* = 0

Syntax: B*n*[,*name*]

n values can range between 0 and 199.

,*name* is optional. The field can be up to eight ASCII characters, but cannot start with a numeric character.

Notes: Parameters for the default field:

Field origin	0,0
Field direction	0 degrees
Bar code	Code 39
Check digits	disabled
Prefix	one
Ratio	3 to 1
Interpretive	disabled
Height magnification	50
Width magnification	1
Data origin	Print mode
Data length	20

Bitmap Cell Height for Graphic or UDF, Define

Purpose: Defines the height of a graphic or user-defined font.

Default: *n* = 1 Bitmap fonts and graphics
n = 10 Outline fonts

Syntax: y*n*

n values can range between 1 and 600.

n is the number of rows for a graphic or font (bitmap). For outline fonts, *n* represents the height of the base character in number of dots.

Notes: An error code (52) is generated for an invalid height.

Bitmap Cell Width for Graphic or UDF, Define

Purpose: Defines the maximum width for a graphic or any character in a font. Each character has a width within this amount, which should be at least as wide as the widest character in the font.

Default: *n* = 1 Bitmap fonts and graphics
n = 10 Outline fonts

Syntax: x*n*

n values can range between 0 and 599. *n* is the number of columns for the UDC, bitmap, or user-defined font.

For outline fonts, *n* represents the width of the base character in number of dots.

Notes: An error code (52) is generated if the width is invalid.

Box Field, Create or Edit

Purpose: Use this command to access or create a box field *n*.

Default: *n* = 0

Syntax: W*n*[,*name*]

n values can range between 0 and 199.

,*name* is an optional field. The field can be up to eight ASCII characters, but cannot start with a numeric character.

Notes: Parameters for the default field:

Field origin	0,0
Field direction	0 degrees
Box length	100
Box height	100
Box width	1

Box or Line Field, Define Length

Purpose: Defines the length of a line or box. The length of a line or box field is given in number of dot increments.

Default: *n* = 100 dots

Syntax: l*n*

n values can range between 1 and 9999 dots.

Character Origin Offset, Define

Purpose: Defines the offset, to the right, of all characters in a font. If each character's width is defined in columns, with the first column numbered 0, then the origin of each character is at the column with the same number as *n*.

Default: *n* = 0

Syntax: X*n*

n values can range between 0 and 599.

Example: *n* = 2 shifts the character origins over two columns to the right.

Notes: For bitmap fonts only.

Character Rotation or Bar Code Ratio, Define

Purpose: Defines the character rotation for human-readable fields, or the bar code ratio for a bar code field.

Default:

n = 0	Character rotation
n = 1	Bar code ratio

Syntax: r*n*

For human-readable fields, *n* determines the rotation.

n = 0	Horizontal
n = 1	90 degrees counterclockwise.

For bar code fields, the ratio of the wide element to narrow element depends on the value of *n* as follows:

n = 0	2.5 to 1
n = 1	3.0 to 1
n = 2	2.0 to 1

Notes: If the bar code width is odd and r0 is selected, r1 will be substituted.

Code 39 Prefix Character, Define

Purpose: Defines the prefix for a Code 39 field. The prefix is only valid for Code 39 fields.

Default: No prefix

Syntax: p[*n1*][*n2*][*n3*][*n4*];

n values can range between uppercase A to Z and 0 to 9.

Notes: The @ character clears all prefixes when entered as *n1*. Prefix characters do not appear in the interpretive field.

Delete Field

Purpose: Deletes field *n* from the format.

Default: *n* = 0

Syntax: D*n*

n values can range between 0 and 199.

Notes: The last field in a format cannot be deleted. If the current field is deleted, the field pointer points to the next field. If the master field is deleted, all slave fields of that master field are deleted.

Edit Session, Save Current

Purpose: Saves the current page, format, UDC, or UDF being edited. The printer remains in Program mode.

Syntax: N

Erase Format

Purpose: Erases format ID number *n*.

Syntax: E*n*

n values can range between 1 and 19.

Field Data, Define Source

Purpose: Defines a data source for the current field and how many characters are in the field.

Default: *n* = 0.20 Bar code fields
n = 0,30 Human-readable fields

Syntax: d*n*[,*m1*][,*m2*];

d0[,*m*] and d1[,*m*];
Optional data is entered in Print mode. *m* is the maximum number of data (up to 250) that can be entered into this field. The default for *m* is 20 characters for bar code fields, and 30 characters for human-readable fields.

d2[,*m1*][,*m2*];
Data is copied into this field from field *m*. *x* is an optional positive integer numeric field offset that can range from 0 to 9999, with 0 as the default. Only data delimited by numeric field separator (FS) or alphanumeric field separator (GS) can be offset. A bar code field cannot copy data from a human-readable field, but a human-readable field can copy data from a bar code field.

d3[,*m1*]
Fixed data *m1* is stored as part of the format and is used every time the current field is printed. The maximum number of characters in a field (including non-printing characters) is 250. Data entered cannot be changed by print commands.

Field Direction, Define

Purpose: Defines the field rotation.

Default: *n* = 0

Syntax: f*n*

n = 0 Horizontal
n = 1 Rotated 90 degrees counterclockwise from horizontal
n = 2 Rotated 180 degrees counterclockwise from horizontal
n = 3 Rotated 270 degrees counterclockwise from horizontal

Field Origin, Define

Purpose: Defines the origin for a field. The field origin is the upper left corner of the field. Horizontal *n* and vertical *m* locations represent the number of dot increments from the label's origin. The origin (0,0) is the upper left square on the label.

Default: *n* = 0
m = 0

Syntax: o*n*,*m*

n values can range between 1 and 19999
,*m* values can range between 1 and 19999.

Font, Select Type

Purpose: Selects a font type for human-readable fields.

Default: *n* = 0

Syntax: c*n*[,*m1*][,*m2*][,*m3*]

For human-readable fields, *n* values can range between 0 and 41.

Notes: Modifiers apply only to bar code symbologies. Fonts and bar codes are listed at the end of the Program mode command descriptions.

Font Character Width, Define

Purpose: Defines the amount of space from the origin of one letter to the origin of the next. If *n* is too small characters may overlap.

Default: Character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*).

Syntax: Z*n*

n values can range between 0 and 599.

Notes: For bitmap characters only.

Format, Create or Edit

Purpose: Use this command to edit or create a format *n*.

Syntax: A*n*[,*name*]

n is the format ID number. Values can range between 1 and 19.

,*name* is an optional field. The field can be up to eight ASCII characters, but cannot start with a numeric character.

Notes: An error code is generated if the format number is out of range.

Format, Create or Edit

Purpose: Use this command to edit or create a format *n*.

Syntax: F*n*[,*name*]

n is the format ID number. Values can range between 1 and 19.

,*name* is an optional field. The field can be up to eight ASCII characters, but cannot start with a numeric character.

Notes: An error code is generated if the format number is out of range.

Format Data in a Page, Define Source

Purpose: Defines a data source for a format assigned to a page position.

Default: *n* = 0
m1 = a
m2 = 0

Syntax: e*n*[,*m1*][,*m2*];

e0;
The format receives its data during Print mode.

e1[,*m1*][,*m2*];
The format is a slave of another format within this page.

,*m1* is the position of the master format within the page. The default is a.

,*m2* is the data offset to apply to the slave format. The default is 0. Only data delimited by numeric field separator <FS> or alphanumeric field separator <GS> can be offset.

Notes: The format ID must be the same for both the master and slave formats.

Format Direction in a Page, Define

Purpose: Defines the format directions within a page.

Default: *n* = 0

Syntax: q*n*

n = 0	Horizontal.
n = 1	Rotate 90 degrees counterclockwise from horizontal.
n = 2	Rotate 180 degrees counterclockwise from horizontal.
n = 3	Rotate 270 degrees counterclockwise from horizontal.

Format Offset With a Page, Define

Purpose: Defines the format offsets within a page and creates new origins for fields within a format by adding the format offsets to the original field offsets. *m* and *n* represent increments of dot sizes.

Default: *n* = 0
,*m* = 0

Syntax: O*n*,*m*

n values can range between 1 and 19999.
,*m* values can range between 1 and 19999.

Format Position in a Page, Assign

Purpose: Assigns the format *n* to page position *p*. *p* is the page position and *n* is the numeric format ID.

Default: *p*=a

Syntax: M*p*,*n*

p values can range between a and z.
,*n* values range from 0 to 19.

Notes: A format may be in multiple positions. An error code is generated if the format ID is out of range.

Format Position From Page, Delete

Purpose: Deletes the format position *p* from a page. *p* is the page position.

Default: *p*=a

Syntax: m*p*

p values can range between a and z.

Graphic or UDC, Define

Purpose: This is the command to map one column of bitmap for a graphic or a font character. *n* is the column to be mapped.

Syntax: u*n,m...m*

n values can range between 0 and 599.

Notes: In 86XX mode, *m...m* is a string of 1s and 0s that make up the column and specify whether or not to print in that row element of the column (*m* = 1 prints, *m* = 0 does not). Any unmapped columns or row elements default to *m* = 0.

In 4400 mode, each data byte *m* represents 6 bits of the bitmap.

Graphic, Select Type

Purpose: Selects a graphic for graphic fields.

Default: *n* = 0

Syntax: c*n*[,*m1*][,*m2*][,*m3*]

Values for *n* can range between 0 and 99.

Notes: Modifiers apply only to bar code symbologies.

Height Magnification, Define

Purpose: Defines box, bar code, or character height magnification. For bar code and box fields, the height *n* is defined in number of dot increments.

Default:

n = 50	Bar code height
n = 100	Box height
n = 2	POSTNET and human-readable fields
n = 1	Graphics

Height Magnification, Define (continued)

Syntax: h*n*

n values can range between 1 and 250 for human-readable fields and graphics. For bar code and box fields, the range for *n* is from 1 to 9999.

Notes: For human-readable fields, graphics, and the POSTNET symbology, *n* represents the vertical magnification of the character bitmap.

Human-Readable Field, Create or Edit

Purpose: Use this command to edit or create a human-readable field *n*.

Default: *n* = 0

Syntax: H*n*[,*name*]

n values can range between 0 and 199.

,*name* is an optional field. The field can be up to eight ASCII characters except for semicolon, but cannot start with a numeric character.

Notes: If *n* does not exist, a default human-readable field is created.

Parameters for the default field:

Field origin	0,0
Field direction	0 degrees
Character rotation	0 degrees
Font	7x9 standard
Height magnification	2
Width magnification	2
Pitch	disabled
Point	disabled
Border	disabled
Data origin	Print mode
Data length	30

Human-Readable Text, Define Border Around

Purpose: Defines a border around a human-readable field.

Default: *n* = 0 No borders (black letters).

Syntax: b*n*

n values range from 0 to 199.

Human-Readable Text, Define Border Around (continued)

Notes: When *n* is greater than 0, the field prints white letters with an *n* dot size border surrounding the field.

Intercharacter Space for UDF, Define

Purpose: Defines the intercharacter gap length for a user-defined bitmap font. Intercharacter gap length is defined by the number of dot increments *n*.

Default: *n* = 2

Syntax: z*n*

n values can range between 0 and 199.

Notes: An error code (52) is generated for invalid lengths.

Interpretive Field, Edit

Purpose: Use this command to edit an interpretive field.

Syntax: I*n*

n is the ID number of the corresponding bar code field. The range is from 0 to 199.

Notes: *n* is the field ID number of the bar code field to be interpreted. Interpretive fields cannot be created with this command; they can only be created or deleted with the i command when editing the corresponding bar code field.

Interpretive Field, Enable or Disable

Purpose: Determines if the interpretive field of the current bar code field prints.

Default: *n* = 0

Syntax: i*n*

n = 0 Disables the interpretive field.
n = 1 Enables the interpretive field with start and stop characters.
n = 2 Enables the interpretive field without start or stop characters.

Notes: When enabled, the human-readable information in font 0 (7x9 std) is printed 2 dots below the bar code field, left justified.

Line Field, Create or Edit

Purpose: Use this command to access or create a line field *n*.

Default: *n* = 0

Syntax: L*n*[,*name*]

n values can range between 0 and 199.

,*name* is an optional field. The field can be up to eight ASCII characters.

Notes: Parameters for the default field:

Field origin	0,0
Field direction	0 degrees
Line length	100
Line width	1

Line or Box Field, Define Length

Purpose: Defines the length of a line or box. The length of a line or box field is given in number of dot increments.

Default: *n* = 100 dots

Syntax: l*n*

n values can range between 1 and 9999 dots.

Load Command Tables

Purpose: Downloads a command table, with *t* as the command table identifier. This is followed by the nibblized command entries (c1-cn) to be loaded into the table. To change an entry in the table, the entire table must be sent to the printer as a string of ASCII characters in hexadecimal form. Any entry not redefined retains its old value. The printer expects two hex digit bytes for every entry in the table.

Syntax: C[*t*],[*command 1*],[*command 2*], ..., [*command n*]

The range for *t* is from 0 to 4

Data must be nibblized ASCII characters ranging from 0 to 9 and A to F.

Notes: New commands become effective after the printer is repowered or reset. Command tables are listed later in this chapter at the end of the Program mode command descriptions under “Command Tables.”

Outline Font Description, Download

Purpose: Use this command to download an outline font description. All characters are loaded at once; not individually as with bitmap fonts but since the maximum message length is 255 characters, the data may have to be split between successive j commands.

Syntax: `j`*`nn....nn`*

Notes: The printer stores all incoming data into the font selected with the J command. (See J*n*, *name*,)

Example:

J4, font name;
x30;y30;
jAFB0...4E; (maximum 255 characters)
jB32C...FF; (maximum 255 characters)

The font information must be sent to the printer as a string of ASCII characters in hexadecimal form. The printer expects two hex digit bytes for every eight-bit byte of information. Data must be nibblized ASCII characters range from 0 to 9 and A to F.

Outline User-Defined Font, Clear or Create

Purpose: Selects an outline font to download.

Syntax: `J`*`n`*`[,`*`name`*`]`

n is the font ID number. *n* values can range from 3 to 6 and 8 to 19.

,*name* is an optional field. The field can be up to eight ASCII characters, except for semicolon.

Notes: If font *n* has already been defined, the font is erased and redefined.

Page, Create or Edit

Purpose: Use this command to edit or create a page.

Syntax: `S`*`n`*

n is the numeric page ID. Values for *n* can range between 1 and 9.

Notes: The default page cannot be edited. An error code is generated if a page number is out of range.

Page, Delete

Purpose: Use this command to delete a page.

Syntax: s*n*

n is the numeric page ID. *n* values can range between 1 and 9.

Notes: The default page (page 0) cannot be deleted.

Pitch Size, Set

Purpose: In 4400 mode, this command can be used to set the pitch size which can define the size of the characters in human-readable fields. When used, the height and width magnification and point size are disabled.

Default: *n* = 12

Syntax: g*n*

n values can range between 1 and 50.

Notes: This command can be used for both bitmap and outline fonts.

Point Size, Set

Purpose: In 4400 mode, this command can be used to set the point size, which can define the size of the characters in human-readable fields.

Default: *n* = 12

Syntax: k*n*

n values can range between 4 and 212.

Notes: This command works most effectively on fonts c20, c21, c22, and c25.

The printer must be in 4400 (advanced) mode.

Print Line Dot Count Limit, Set

Purpose: This is a null command and is ignored by the printer.

Syntax: v*n*

Program Mode, Exit

Purpose: Instructs the printer to exit Program mode and enter Print mode. Any format or page currently being edited is saved.

Syntax: R

Reset

Purpose: Causes the printer to immediately perform a power up reset. All data and commands in the buffer are lost, even if they are entered prior to the reset command.

Syntax: <DLE>

Transmit Error Code

Purpose: The printer sends an ASCII number representing the latest host command syntax or printer RAM usage error.

Syntax: <BEL>

Notes: A table containing descriptions of each error code follows the Program mode command descriptions.

User-Defined Character, Clear or Create

Purpose: This is the command to clear or create a graphic bit map.

Syntax: G*n*[,*name*]

n values can range between 0 and 99.

,*name* is an optional field. The field can be up to eight ASCII characters except for semicolon, but cannot start with a numeric character.

Notes: If graphic *n* has already been defined, it is erased and redefined.

User-Defined Character Field, Create or Edit

Purpose: Use this command to edit or create a graphic field *n*.

Default: *n* = 0

Syntax: U*n*[,*name*]

n values can range between 1 and 199.

,*name* is an optional field. The field can be up to eight ASCII characters, except a semicolon.

Notes: Parameters for the default field:

Field origin	0,0
Field direction	0 degrees
Character rotation	0 degrees
UDC	0
Height magnification	1
Width magnification	1

User-Defined Font, Clear or Define Bitmap

Purpose: Use this command to clear or create a user-defined bitmap font set. *n* is the font ID number.

Syntax: T*n*[,*name*]

Values for *n* can range from 3 to 6 and 8 to 19.

,*name* is an optional field. The field can be up to eight ASCII characters.

Notes: If font set *n* has already been defined, all previous characters in the font set are erased. An existing font cannot be edited, only recreated. To change any characters, the entire font set must be transmitted.

User-Defined Font Character, Create

Purpose: Specifies which font character is to be defined. *n* is the decimal representation of the ASCII character.

Syntax: `tn[,name]`

n values can range between 0 and 255.

,*name* is an optional field. The field can be up to eight ASCII characters, but cannot start with a numeric character.

Notes: An error code is generated if the format number is out of range.

Width of Line, Box, Bar or Character, Define

Purpose: Defines the width magnification of a line, box, bar code, or character. For line, box, or bar code fields, the width of the narrow element is defined by number of dot increments *n*. For human-readable fields, graphics and the POSTNET symbology, *n* is the magnification of the character width.

Default: *n* = 1 Line, box, and bar code fields and graphics.
n = 2 Human-readable fields and POSTNET.

Syntax: `wn`

Values for *n* can range between 1 and 9999 for line, box, and bar code fields. Human-readable fields, graphics, and POSTNET symbology values can range between 1 and 250.

Command Tables

These command tables show commands in the order they must be downloaded when you replace the User-Defined Command / Protocol characters.

Print Mode Commands (t=0)

This list is the Print mode commands in the download order.

Print Command Description	Print Command	Hex Value
Command Terminator 1	NUL	00
Set Preamble	SOH	01
Set Postamble	EOT	04
Status Enquiry	ENQ	05
Select First Data Entry Field	ACK	06
Transmit Error Code	BEL	07
Warm Boot	BS	08
Command Terminator 2	LF	0A
Status Dump	VT	0B
Form Feed	FF	0C
Select Next Data Entry Field	CR	0D
Cut	SO	0E
Go To Shift Command Table	SI	0F
Reset	DLE	10
Set Intercharacter Delay	SYN	16
Print	ETB	17
Clear All Data	CAN	18
Abort Print Job	EM	19
Data Shift	SUB	1A
Go To Escape Command Table	ESC	1B
Numeric Field Separator	FS	1C
Alphanumeric Field Separator	GS	1D
Set Quantity Count	RS	1E
Set Batch Count	US	1F
Clear Data From Current Field	DEL	7F

Escape Print Commands (t=1)

This list is the Escape Print commands in the order they must be downloaded.

Escape Command Description	Escape Command	Hex Value
Set Message Delay	SYN	16
Enter Start / Stop Character	(space)	20
Select 4400 Mode	C	43
Set Field Decrement	D	44
Select Format	E	45
Select Field	F	46
Select Page	G	47
Transmit Printhead Parameters	H	48
Set Field Increment	I	49
Transmit Label and Gap Length	L	4C
Transmit Software Version Number	M	4D
Disable Increment / Decrement	N	4E
Transmit Options Selected	O	4F
Enter Program Mode	P	50
Transmit Quantity and Batch Count	Q	51
Enter Test and Service Mode	T	54
Transmit User-Defined Command Tables	Z	5A
Select 86XX Emulation Mode	c	63
Enable Auto-Transmit 2	d	64
Enable Auto-Transmit 3	e	65
Enable Auto-Transmit 1	j	6A
Disable Auto-Transmit 1, 2 and 3	k	6B
Transmit Static RAM Usage	m	60
Transmit Configuration Parameters	p	70
Transmit User-Defined Characters	u	75
Transmit Font	v	76
Transmit Format	x	78
Transmit Page	y	79

Shift Print Commands (t=2)

This list shows the Shift commands in the order they must be downloaded. These commands must be preceded by the Go To Shift Command Table command (default value SI) listed in the table of Print Commands (*t*=0).

Shift Command Description	Shift Command	Hex Value
Set Control Panel Access Permission	A	41
86XX or 4400 Mode on Power Up	C	43
Set End-of-Print Skip Distance	D	44
Set Top-of-Form	F	46
Transmit Printhead Parameters	H	48
Set Number of Image Bands	I	49
Set Maximum Label Length	L	4C
Define Static RAM Size	N	4E
Online or Offline on Power Up	O	4F
Enable or Disable Label Retract	R	52
Set Print Speed	S	53
Select Label Stock Type	T	54
Set Printhead Test Values	U	55
Set Label Width	W	57
Enable or Disable Audible Alarm	a	61
Enable or Disable Cutter	c	63
Set Dark Adjust	d	64
Label Rest Point, Adjust	f	66
Select TTR or Direct Thermal	g	67
Enable or Disable Translation	i	69
Select Printer Language	l	6C
Set Label Retract Distance	r	72
Enable or Disable Self-Strip	t	74

Status Responses and Auto-Transmit Commands (t=3)

The following lists the status responses and auto-transmit codes in the order they must be downloaded.

Status Description	Status Response	Hex Value
Buffer Already Full	GS	1D
Printhead Test Fail	SO	0E
Label Path Open	US	1F
Ribbon Fault	US	1F
No Label Stock	EM	19
Buffer Now Full	DC3	13
Takeup Reel Full	BS	08
Label at Strip Pin, Cutter Busy/Jammed	FS	1C
Skipping	DC1	11
Printing	DC1	11
Ready	DC1	11
Clear	DC1 -Auto-Transmit 1	11
Label at Strip Pin, Cutter Busy/Jammed	FS - Auto-Transmit 1	1C
Takeup Reel Full	BS - Auto-Transmit 1	08
No Label Stock	EM - Auto-Transmit 1	19
Ribbon Fault	US - Auto-Transmit 1	1F
Room in Buffer	DC1 - Auto-Transmit 2	11
Imager Overrun	HT - Auto-Transmit 3	09
Print Job Complete and Buffer Empty	SOH - Auto-Transmit 3	01
Insufficient RAM	RS - Auto-Transmit 3	1E

***Note**: The status responses in the above table are for standard protocol. In XON/XOFF protocol, most of the status responses are the same; however, instead of DC1, the status response is DC2, and instead of DC3, the status response is DC4.*

Protocol Commands (t=4)

The following list contains the protocol codes in the order they must be downloaded.

Command Description	Command Characters	Hex Value
SELECT IN	GS	1D
POLL IN	FS	1C
RES IN	EOT	04
REQ IN	ENQ	05
SOM IN	STX	02
EOM IN	ETX	03
AFF IN	ACK	06
NEG IN	NAK	15
DLE IN	DLE	10
XON IN	DC1	11
XOFF IN	DC3	13
SELECT OUT	GS	1D
POLL OUT	FS	1C
RES OUT	EOT	04
REQ OUT	ENQ	05
SOM OUT	STX	02
EOM OUT	ETX	03
AFF OUT	ACK	06
NEG OUT	NAK	15
DLE OUT	DLE	10
XON OUT	DC1	11
XOFF OUT	DC3	13
Proto-Cmd 1	ENQ	05
Proto-Cmd 2	VT	0B
Timeout on EOM ACK	20 (ms) (Range: 0 - 255)	14

Communication Protocol Characters

The following table shows the characters available for different protocols. Refer to the protocol you are using for your system.

Protocol Characters	Standard	XON/XOFF	Polling Mode D	Multi-Drop
Select In			GS	GS
Poll In			FS	FS
Reset In			EOT	EOT
Request for Acknowledgment In		ENQ	ENQ	
Start of Message In	STX	STX	STX	STX
End of Message In	ETX	ETX	ETX	ETX
Acknowledgment In			ACK	ACK
Negative Acknowledgment In		NAK	NAK	
Data Line Escape In	DLE	DLE	DLE	DLE
XON In		DC1		
XOFF In		DC3		
Select Out				GS
Poll Out				FS
Reset Out			EOT	EOT
Request for Acknowledgment Out		ENQ	ENQ	
Start of Message Out			STX	STX
End of Message Out			ETX	ETX
Acknowledgment Out			ACK	ACK
Negative Acknowledgment Out	NAK		NAK	NAK
Data Line Escape Out	DLE	DLE	DLE	DLE
XON Out		DC1		
XOFF Out		DC3		
Status Enquiry In	ENQ	ENQ		
Status Dump In	VT	VT		
Timeout on EOM ACK			20 (DEC)	20(DEC)

Fonts

The following table accompanies the command description for Select Type of Graphic Font or Bar Code (c*n*,*m1*,*m2*,*m3*;) for selecting fonts. Fonts may be selected in the following manner:

Font Selection	Font Description
c0	7x9 standard
c1	7x11 OCR
c2	10x14 standard
c3-c6	User-defined fonts
c7	5x7 standard
c8-c19	User-defined fonts
c20	8 point standard
c21	12 point standard
c22	20 point standard
c23	OCR A
c24	OCR B size 2
c25	Outline font
c30	6 point bold
c31	8 point bold
c32	10 point standard
c33	10 point bold
c34	12 point bold
c35	16 point standard
c36	16 point bold
c37	20 point bold
c38	24 point standard
c39	24 point bold
c40	30 point bold
c41	36 point bold

Bar Codes

The following table accompanies the command description for Select Type of Graphic, Font, or Bar Code (c*n*[,*m1*][,*m2*][,*m3*]) for selecting bar codes.

The bar codes listed below may be selected as shown. Optional modifiers are denoted by *m*.

Bar Code Selection		Bar Code Description
c0 ,*m*		Selects Code 39. Select *m* to specify parameters as listed below. The default for *m* is 0.
	c0,0	Selects 8646 compatible Code 39. No check digit.
	c0,1	Selects 8646 compatible Code 39. Printer enters check digit.
	c0,2	Selects 8646 compatible Code 39. Host enters check digit and printer verifies.
	c0,3	Selects full ASCII Code 39. No check digit.
	c0,4	Selects full ASCII Code 39. Printer enters check digit.
	c0,5	Selects full ASCII Code 39. Host enters check digit and printer verifies.
	c0,6	Selects 43 character Code 39. No check digit.
	c0,7	Selects 43 character Code 39. Printer enters check digit.
	c0,8	Selects 43 character Code 39. Host enters check digit and printer verifies.
c1		Selects Code 93.
c2 ,*m*		Selects Interleaved 2 of 5. Select *m* to specify parameters as listed below. The default for *m* is 0.
	c2,0	No check digit.
	c2,1	Printer enters check digit.
	c2,2	Host enters check digit and printer verifies.
c3 ,*m*		Selects Code 2 of 5. Select *m* to specify parameters as listed below. The default for *m* is 0.
	c3,0	Selects 3-bar start/stop code.
	c3,1	Selects 2-bar start/stop code.
c4 ,*m*		Selects Codabar. Select *m* to specify parameters as listed below. Default for *m* is 0.
	c4,0	Host enters start/stop codes and printer verifies.
	c4,1,*x*,*y*	Printer enters start code *x* and stop code *y*. *x* and *y* can range from A to D.

Bar Codes (continued)

Bar Code Selection		Bar Code Description
c5 ,*m*		Selects Code 11. Select modifiers to specify parameters as listed below. The default for m is 0.
	c5,0	Printer enters two check digits.
	c5,1	Printer enters one check digit.
	c5,2	Host enters two check digits. Printer verifies.
	c5,3	Host enters one check digit. Printer verifies.
c6,*m1,m2*		Selects Code 128.
		In 86XX Emulation mode, you can print the Function 1 character by entering <SUB>1. In Advanced mode, you can print the Function 1 by entering <SUB><SUB>1. You can print the characters for Function 2, 3, and 4 in the same way.
		UCC-128 serial shipping container code automatically starts in subset C and a <FNC1>. It is a fixed length version of Code 128 requiring you to enter 19 numeric characters. The printer forces the first two characters to zero. The default for *,m1* = 0 (Code 128O. The default for *,m2* = 0 (keep parentheses and spaces).
	c6,0,0	Code 128, keep parentheses and spaces.
	c6,0,1	Code 128, ignore parentheses and spaces in the bar code but keep them in the interpretive field.
	c6,1,0	Select UCC-128 Serial Shipping Container Code.
	c6,1,1	Select UCC-128 Serial Shipping Container Code and keep parentheses and spaces in interpretives.
c7,*m1,m2*		Selects UPC/EAN with *m1* as shown below. Default for *m1* is 0.
		The variable length option selects the UPC/EAN version by the number of characters in the data field. The number of data characters and check characters allowed for each version are:

EAN 8	7 data + 1 check character
EAN 13	12 data + 1 check character
UPC version A	11 data + 1 check character
UPC version E	6 data + 1 check character
UPC version D1	13 data + 1 check character
UPC version D2	18 data + 2 check characters
UPC version D3	22 data + 2 check characters
UPC version D4	25 data + 3 check characters
UPC version D5	29 data + 3 check characters

Use a "." to delimit the bar code data from the supplemental data. Data to the right of the "." is supplemental data; data to the left is bar code data. You can add the two- or five-digit supplemental to any version of the UPC/EAN code.

Bar Codes (continued)

		The flag 1 option only applies to EAN 8, EAN 13, and UPC version A. For EAN 13, enabling the flag 1 option prints the first character of the bar code interpretive. For EAN 8 and UPC version A, enabling the flag 1 option moves the first and last character of the bar code interpretive outside of the guard bars.
	c7,0 ,*m2*	Select UPC/EAN Codes. Printer enters check digit and flag 1 enable.
	c7,1 ,*m2*	Select UPC/EAN Codes. Printer enters check digit and flag 1 disabled.
	c7,2 ,*m2*	Select UPC/EAN Codes. Host enters check digit and printer verifies. Flag 1 enabled.
	c7,3 ,*m2*	Select UPC/EAN Codes. Host enters check digit and printer verifies. Flag 1 disabled.
		Use ,*m2* to select the UPC/EAN codes listed below. Default is 0. 0 variable length 1 EAN 8 2 EAN 13 3 UPC Version A 4 UPC Version E 5 UPC Version D1 6 UPC Version D2 7 UPC Version D3 8 UPC Version D4 9 UPC Version D5
c8,*m1*,*m2*		Selects HIBC Code 39 with ,*m1* as shown below. Default for ,*m1* is 0.
		The next three modifiers conform to Supplier Standard:
	c8,0	Selects HIBC Code 39. Primary format.
	c8,1	Selects HIBC Code 39. Alternate primary format.
	c8,2,*m2*	Selects HIBC Code 39. Secondary format. The linkage character comes from ,*m2* (which is the field identifier).
		The next four modifiers conform to Provider Standard:
	c8,3	Single format.
	c8,4	First data format.
	c8,5,*m2*	Selects HIBC Code 39. Second data format. The linkage character comes from ,*m2* (which is the field identifier).
	c8,6	Selects HIBC Code 39. Multiple data format.
c9		Selects Code 16K.
c10		Selects Code 49.
c11		Selects POSTNET.

Bar Codes (continued)

Bar Code Selection | **Bar Code Description**

c12,*m1,m2,m3* Selects PDF 417. The modifiers and their defaults are described below.

m1 = 0 Printer selects the number of columns needed to create a symbol that is as close to square as possible.

m2 = 9 The printer automatically selects the error correction level, based on the amount of data.

m3 = 0 Truncating disabled.

m1 selects the number of columns of data characters. The range is 0 to 30 and the default is 0. If you select zero, the printer provides the number of columns needed to create a symbol that is as close to a square as possible.

Note: *When you select zero, the printer selects a height magnification that is three times the width magnification. The specifications of PDF417 recommend these magnification values for creating a symbol that you can scan easily.*

m2 selects the level of error correction as shown in the table below. Each level provides a certain number of error detection characters, which can detect and recover a specific number of faulty characters.

m2	Recommended Data Amount	Error Detection Characters
0*	*	2 (error detected, no recovery)
1*	*	4
2	1-40	8
3	41-160	16
4	161-320	32
5	321-863	64
6†	863+	128
7†	863+	256
8†	863+	512
9‡	(default)	

* Not recommended. Should only be used if your labels are too small to allow more characters.

†Not recommended. Reserved for special applications.

‡The printer sets the recommended value for each symbol.

m3 is a truncate flag. The values for *m3* are 0 to disable truncating and 1 to enable truncating.

Bar Codes (continued)

Bar Code Selection		Bar Code Description
c13,*m1*,*m2*,*m3*		Selects Code One. The modifiers are described briefly below and the defaults are shown.
	m1 = 0	Code One version, variable.
	m2 = 1	First position in the group.
	m3 = 1	Total number of symbols in the group is one symbol.
		m1 determines the Code One version, and the values are listed below.
c13,0,*m2*,*m3*		Code One, variable length (Autoselects from Code One version A to Code One version H)
	c13,1,*m2*,*m3*	Code One version A
	c13,2,*m2*,*m3*	Code One version B
	c13,3,*m2*,*m3*	Code One version C
	c13,4,*m2*,*m3*	Code One version D
	c13,5,*m2*,*m3*	Code One version E
	c13,6,*m2*,*m3*	Code One version F
	c13,7,*m2*,*m3*	Code One version G
	c13,8,*m2*,*m3*	Code One version H
	c13,9,*m2*,*m3*	Code One version S10
	c13,10,*m2*,*m3*	Code One version S20
	c13,11,*m2*,*m3*	Code One version S30
	c13,12,*m2*,*m3*	Code One version T16
	c13,13,*m2*,*m3*	Code One version T32
	c13,14,*m2*,*m3*	Code One version T48

Note: *The data lengths in the following table are approximations of the maximum amount of data for each version of Code One. The data is compressed before it is encoded, which shortens its length from the amount you send. If you select the variable length, the printer may select a Code One version that is smaller than the one listed next to your data length.*

Bar Codes (continued)

The following table shows the data lengths for each Code One version.

m1 Value	Code One Type	Full ASCII	Alphanumeric	Numeric
0	variable*			
1	A	10	13	22
2	B	19	27	44
3	C	44	64	104
4	D	91	135	217
5	E	182	271	435
6	F	370	553	886
7	G	732	1096	1755
8	H	1480	2218	3550
9	S10	†	†	6
10	S20	†	†	12
11	S30	†	†	18
12	T16	10	13	22
13	T32	24	34	55
14	T48	38	55	90

*The printer selects the correct Code One version, between A and H.

†Supports numeric data only.

m2 and *m3* define symbols that are part of a group. *m2* is the position of the current symbol in the group, and *m3* is the total number of symbols in the group.

For example, a setting of ,*m2*,*m3* to ,2,5 indicates that the current symbol definition is the second in a group of five.

Both *m2* and *m3* have a range from 1 to 15, with a default of 1. Make sure *m2* is never greater than *m3*.

Note: *The printer does not check to ensure all positions of a group are defined. For example, if* m3 *is set to 5, and only three positions are defined, the printer will print three symbols that are encoded to be part of a group of five symbols. When these symbols are scanned, the scanner will wait for all five symbols and will not be able to transmit the data.*

Bar Codes (continued)

Bar Code Selection		Bar Code Description
c14,*m1,m2,m3*		Selects Maxicode. Default for m1 is 0. m2 and m3 are not currently supported.
	c14,0	Structured Carrier Message.
c16,*m1,m2*		Selects HIBC Code 128 with m1 as shown below. Default for m1 is 0.
		The next three modifiers conform to Supplier Standard:
	c16,0	Primary format.
	c16,1	Alternate primary format.
	c16,2,m2	Secondary format. The linkage character comes from m2 (which is the field identifier).
		The next four modifiers conform to Provider Standard:
	c16,3	Single format.
	c16,4	1st data format.
	c16,5,m2	2nd data format. The linkage character comes from m2 (which is the field identifier).
	c16,6	Multiple data format.

More About Printing 2D Symbologies

When you encode and print 2D symbologies, use the following guidelines:

- Select a symbol size that can encode all the data being downloaded. If you select one that is too small, then the symbol will not print. If you do not know the amount of data you are sending, allow space for the largest possible amount.
- In Program mode, the data length is confined to 255 characters. This means that the d3 command, which is used to define data in Program mode, cannot be followed by more than 255 characters. To send more than 255 characters, you must send the data in Print mode using the d0 command.
- To send more than 255 characters in Print mode with the d0 command, you must separate the data into packets of 255 characters. These packets are separated by <STX> and <ETX>.
- The maximum amount of data that can be entered into a field with the d0 command is 3550 characters. However, if you are declaring d0 fields to be much larger than necessary, you may run out of memory, especially if you use the maximum value of 3550. To avoid wasting memory, estimate the largest amount of data you will send and use a value that is close to that amount.

More About PDF 417

2D symbols encode data by compressing it in different amounts. Therefore, these values should be used as guidelines. The exact data capacity varies with the actual data being encoded.

Full ASCII	Alphanumeric	Numeric
1108	1850	2725

Using m1 *to Select Number of Columns*

When you select the default for *m1* (0), the printer selects a height magnification that is three times the width magnification. The specifications of PDF 417 recommend these magnification values for creating a symbol that you can easily scan.

Using m2 *to Select an Error Correction Level*

The level of error correction that works best for your data depends on the amount of characters in your symbols. If you decide to select your own error correction level, you will need to estimate the number of characters since they are formed by compressing the raw data you send to the printer. In general, 1.8 alphanumeric characters generate one symbol character. If you are using numeric data, 2.9 digits generate one data symbol character.

Intermec recommends that you leave the error correction level at the default setting of 9. This default setting lets the printer select a level, between level 2 and level 5, that provides the most efficient error correction of your data. The level selection is based on the number of symbol characters generated by your data.

Using m3 *to Set the Truncate Flag*

m3 is a truncate flag that indicates whether to print the symbol in truncated form. If truncated, the symbols are printed without right row indicators and with only a one-module wide stop character. To minimize errors and maintain the best reading performance, Intermec recommends that you leave *m3* equal to 0. Setting the truncate flag loses the symbol redundancy. Since row indicators are not error-corrected, elimination of one set of them increases your chances of losing row identification.

More About Code One

Code One modules must be square. Therefore, when you define a field for Code One, you only need to enter one value for both the height and width magnification. If you enter more than one value, the printer uses the last value for both height and width and ignores all previously entered magnification values. If no value is entered, the printer uses the default value.

You can use groups of Code One symbols to encode data so separate symbols can be scanned more efficiently. When you scan a group of symbols, the scanner accumulates the data from all members of the group and transmits the data as if it came from a single symbol.

Using m1 *to Select a Code One Version*

It is important that you select the correct version of Code One for the data you are encoding. If you try to encode an inappropriate amount of data or an incorrect type of data in the wrong version, your symbol may not print.

If your data lengths vary greatly for different labels, or if you are not sure which symbology to select, you can select the variable Code One version (set *m1*=0). This lets the printer select the correct version of Code One (from version A to version H) based on the data length. If your data lengths are known and consistent, or if the printer always chooses the same version, you should manually select the Code One version to save printer memory.

When you print Code One symbols, you may notice that part of your symbol contains no data. Each version of Code One has a fixed size, and the version that is large enough to accommodate all your data may be larger than you need. This does not mean you should use a version of a smaller size, because if it is too small for your data to fit, the symbol will not print.

More About Maxicode

When selecting Maxicode, you have to format your data into the following five fields:

Field	Number of Characters	Description of field	Default
1	five	Zip code	None
2	four	Zip code extension	None
3	three	Service class	999
4	three	Country code	840 (U.S.)
5	84	Message	None

Fixed-length fields If you will always fill in all fields, you can string the characters together without a delimiter.

Carat-delimited fields If you may want to use the default value for a field instead of typing it in, place carats (^) between each field. To use the default value for a field, do not place any characters between the carats.

Test and Service Mode Command Descriptions

The following table gives descriptions of the Test and Service mode commands. To enter Test and Service mode from Print mode, send <ESC>T from the host terminal.

***Note**: All commands in Test and Service mode end with a semicolon (;) except the last command in a message.*

Command Code	Summary	Description
A;	Transmit Ambient Temperature	Transmits the ambient temperature sensor A/D output back to the host. The value ranges from 00 to 255.
B;	Printhead Resistance Test	Causes the printer to begin the printhead resistance test. The printer will respond with the ASCII character string "pass" or "fail."
C;	Print Pitch Label	Causes the printer to print the pitch label.
D;	Reset Printer Configuration	Sets the printer configuration to the factory defaults. When you exit Test and Service mode after sending this command, the printer performs a warm boot (it resets).
G;	Transmit Transmissive Sensor Value	Transmits the label gap transmissive sensor A/D output back to the host. Value ranges from 00 to 255.
L;	Transmit Paper Path Open Sensor Value	Transmits the paper path open switch value back to the host. A value of 0 indicates the paper path is open and a value of 1 means it is closed.
M;	Transmit Reflective Sensor Value	Transmits the label mark reflective sensor A/D output back to the host. The value ranges from 00 to 255.
P;	Transmit Printhead Temperature Sensor Value	This command transmits the printhead thermistor A/D output back to the host. Range of the value is 00 to 255.
Q;	Print Quality Label	Causes the printer to print out the print quality program and model number label.
R;	Exit Test and Service	Causes the printer to exit Test and Service mode.
S;	Transmit Printhead Resistance Values	Transmits the average, maximum, and minimum printhead dot resistance value back to the host. Each value is a numeric data string separated by a comma.
T;	Transmit Label Taken Sensor Value	Transmits the label taken sensor A/D output back to the host. The value can range from 00 to 255.
U;	Transmit 12 Volt Supply Value	Transmits the 12V supply A/D output back to the host. The range of the value is 00 to 255.
V;	Transmit 24 Volt Supply Value	Transmits the 24V supply A/D output back to the host. The range of the value is 00 to 255.

Printer Functional Boundaries

Every printer feature has a functional limit that assumes unlimited common memory. Since several functions may compete for common memory, the memory limit may be reached before the functional limit is reached.

For example, even though you have a functional limit of 20 formats, you may run out of memory before you can store 20 formats if you have downloaded several large graphics. In cases like this, you may want to restructure your data or purchase additional printer memory.

Parameter	Functional Limit
Bar Code Height	50 inches
Bar Code Narrow Bar Multiplier	50
Characters in a Field (Including Control Characters and Delimiters)	200
Characters in a Field Name	8
Field Data Offset	9999
Fields in a Format	200
Font Character Size	3 sq. inches
Formats	20 including default
Formats in a Page	26
Graphic Size	4 sq. inches
Graphics	100
Image Bands	10
Increment or Decrement Skip Value	9999
Languages	8 per seven-bit character set; 1 per eight-bit character set
Length or Width of a Line or Box	9999 dots (50 inches)
Pages	10 including default
Quantity or Batch Size	9999
Slaves to a Field	20
User-Defined Fonts	16

8

Special Procedures

This chapter contains instructions for the following special procedures:

- ***Setting up security levels.***
- ***Copying the entire RAM contents from one printer to another (cloning).***
- ***Copying selected formats, fonts, graphics, or pages from one printer to another.***
- ***Installing options, such as the cutter or self-strip if you unload them during memory reset.***

About Security Levels

If you want to restrict access to certain menus in the printer, you can do so by setting a security level. Restricting access not only prevents unauthorized tampering with printer settings, but also eliminates the number of choices you scroll through when selecting menus and options.

Security Level Descriptions

The following table shows the restrictions imposed by different security levels.

Security Setting	Menus Allowed
Level 0 (default)	Allows access to all control panel menus.
Level 1	Operator and Configuration menus.
Level 2	Operator menu only. The audible alarm beeps (if enabled) at an attempt to scroll to other menus.
Level 3	Access not allowed to any of the control panel menus.

Note: *Regardless of the security level setting, you can switch between online and offline, reload media, and open the printer.*

Setting a Security Level

When setting a security level, you can always access restricted menus when necessary. Restricting menus reduces the choices when using the control panel.

To set a security level

1. Start at the OFFLINE READY screen (press [ONLINE/OFFLINE] if necessary).
2. Press [MENU]. Then press [↑] or [↓] until the display shows the following:

```
OFFLINE
INSTALL MENU
```

3. Press [SELECT]. Then press [↑] or [↓] until the display shows the following:

```
INSTALL MENU
  SECURITY
```

4. Press [SELECT]. The display shows the current Security level with an asterisk (*) such as in the example below:

```
SECURITY
LEVEL 0*
```

5. Press [↑] or [↓] until you see the security level you want, and then press [ENTER] to move the asterisk (*) to that level as in the example below:

```
SECURITY
LEVEL 1*
```

6. Press [CONTINUE] to return to the OFFLINE READY display.

Bypassing Security Levels

You can bypass a security level if you need to access a restricted menu from the control panel.

To bypass a security level

1. Turn the printer off.
2. Hold down the [FEED/RELOAD] key while you turn the printer on.

This procedure sets security level 0, which allows access to all menus.

Cloning

Cloning is the process of copying the RAM contents from one printer (the sender printer) to another printer (the receiver printer). By programming and configuring just one printer and then cloning its RAM to other printers, you can configure a large number of printers in much less time than it would take to program them individually.

The clone command copies the following RAM contents to the receiver printer:

- Printer configuration data
- Label formats, page formats, fonts, graphics and User-Defined protocol or command tables

The cloning procedure consists of connecting the main serial ports of two printers together with an RS-232 null modem cable. Control panel commands are then used to designate each printer as either a sender or receiver. The control panel on the sender printer is used to execute the clone command.

Keep in mind these cloning limits:

- You can only clone from like printer to like printer. You cannot clone an 8636 or 8646 printer to a 4400 printer, even when the 4400 printer is running in the 86XX emulation mode. The reverse is also true.
- The sender and receiver printers must be running the same firmware revision.
- The sender and receiver printer must have exactly the same amount of static RAM installed.
- If you are cloning printer configuration parameters to printers that are used in a multi-drop environment, be sure to assign each printer a unique device address when cloning is complete.

If you are not sure of your printer's RAM configuration, firmware revision, or setup configuration, print a configuration test label.

Connecting the Printers for Cloning

The first step to cloning involves connecting the sender printer (the printer containing the information you want to copy) to the receiver printer (the printer that is to receive the information).

To connect the sender and receiver printers

1. Obtain an RS-232 null modem serial cable with a 25-pin "D" style subminiature plug on each end (Intermec Part No. 048668).
2. Plug one end of the cable into the serial port on the rear panel of sender printer.
3. Plug the other end of the cable into the serial port on the rear panel of receiver printer.

Preparing the Receiver Printer

Note: *Cloning will erase any data stored in the receiver.*

1. Start at the OFFLINE READY display.

```
OFFLINE
READY
```

2. Press [MENU] to enter the main menu. The display shows:

```
OFFLINE
OPERATOR MENU
```

3. Press [↑] or [↓] until the display shows:

```
OFFLINE
SERVICE MENU
```

4. Press [SELECT] to enter the Service menu. The display shows:

```
SERVICE MENU
 PRINT PAGE
```

5. Press [↑] or [↓] until the display shows:

```
SERVICE MENU
  CLONING
```

6. Press [SELECT]. The display shows:

```
CLONING
 SENDER
```

7. Press [↑] or [↓] until the display shows:

```
CLONING
RECEIVER
```

8. Press [ENTER]. The display shows:

```
RECEIVING
```

Preparing the Sender Printer

1. Switch on the printer you are designating as the sender and start at the OFFLINE READY display:

```
OFFLINE
 READY
```

2. Press [MENU] to enter the Main menu as shown below:

```
OFFLINE
OPERATOR MENU
```

3. Press [↑] or [↓] until the display shows:

```
OFFLINE
SERVICE MENU
```

4. Press [SELECT]. The display shows:

```
SERVICE MENU
 PRINT PAGE
```

5. Press [↑] or [↓] until the display shows:

```
SERVICE MENU
  CLONING
```

6. Press [SELECT]. The display shows:

```
CLONING
SENDER
```

7. Press [SELECT] again. The display shows:

```
SENDER
EXECUTE TEST
```

Leave this display on the printer, which is now designated as the sender. You are now ready to download the contents to the receiver printer.

Downloading Sender RAM to the Receiver

Once you have designated the receiver and sender printers, you can download the RAM contents from the sender printer to the receiver printer.

***Note**: You will erase any data stored in the receiver's memory when you clone from the sender printer.*

To download the sender RAM to the receiver

1. The display on the sender printer shows:

```
SENDER
EXECUTE TEST
```

2. Press [ENTER] to start downloading the RAM contents to the receiver. During downloading, the display shows:

```
TRANSFERRING
```

3. When the downloading process is complete, the sender printer shows:

```
SENDER
EXECUTE TEST
```

4. The receiver printer's display shows:

```
CLONING
RECEIVER
```

Cloning is now complete. Disconnect the cable from the receiver. To clone another printer, designate the new printer as the receiver, attach it to the sender, and press [ENTER] on the sender.

Using Selective Transfer

If you want to copy select formats, pages, fonts, or graphics to another printer but you do not want to clone the entire RAM contents, you can use the Selective Transfer command. This command lets you set up many printers so they print the same label formats.

Using the Selective Transfer command, you can download the following from one printer to another:

- Any specified page (numbered 0 to 9), or all pages
- Any specified format (numbered 0 to 19), or all formats
- Any specified font (numbered 0 to 25), or all fonts
- Any specified graphic (numbered 0 to 99), or all graphics
- All pages, formats, fonts, or graphics

The selective transfer procedure consists of connecting the main serial ports of two printers with an RS-232 null modem cable, designating each printer as either a sender or receiver. The control panel of the sender printer is used to specify which items are to be downloaded and to execute the command.

Keep in mind that the receiver printer must have sufficient RAM to accommodate the information downloaded from the sender.

If you do not know which fonts, formats, graphics, or pages are in your printer, you can print a configuration test label as described in "About Configuration Test Labels" in Chapter 5.

Connecting the Printers for Selective Transfer

For this procedure, you will need an RS-232 null modem serial cable with a 25-pin, D-style subminiature plug on each end (Intermec Part No. 048668).

To connect the printers

1. Plug one end of the cable into the serial port on the rear panel of sender printer.
2. Plug the other end of the cable into the serial port on the rear panel of receiver printer.

Preparing the Receiver Printer

1. Start at the OFFLINE READY display on the receiver printer.
2. Press [MENU]. Then press [↑] or [↓] until the display shows:

```
OFFLINE
SERVICE MENU
```

3. Press [SELECT]. The display shows:

```
SERVICE MENU
 PRINT PAGE
```

4. Press [↑] or [↓] until the display shows:

```
SERVICE MENU
SELECTIVE TRANS
```

5. Press [SELECT]. The display shows:

```
SELECTIVE TRANS
  RECEIVER
```

6. Press [ENTER]. An asterisk (*) appears, indicating that the printer is now designated as the receiver as shown below:

```
SELECTIVE TRANS
  RECEIVER*
```

Preparing the Sender Printer

1. Start at the OFFLINE READY display on the sender printer.
2. Press [MENU]. The display shows:

```
OFFLINE
OPERATOR MENU
```

3. Press [↑] or [↓] until the display shows:

```
OFFLINE
SERVICE MENU
```

4. Press [SELECT]. The display shows:

```
SERVICE MENU
 PRINT PAGE
```

5. Press [↑] or [↓] until the display shows:

```
SERVICE MENU
SELECTIVE TRANS
```

6. Press [SELECT]. The display shows:

```
SELECTIVE TRANS
RECEIVER
```

The sender printer is now ready (its display shows RECEIVER but you scroll to the sender choices in the following procedures). The procedures that follow explain how to send data to the receiver printer. Follow the procedure for the type of data you want to send.

Sending Formats, Fonts, Pages, and Graphics to the Receiver Printer

You can send as many formats, fonts, pages, and graphics to the receiver printer from the sender printer as you need, either all at once or only selected items. Before performing any of the following procedures, you must have prepared both the sender and receiver printers.

Sending Fonts, Pages, Formats, and Graphics

This procedure explains how to send different combinations of pages, formats, fonts, and graphics.

To download fonts, pages, formats, and graphics

1. On the sender, press [↑] or [↓] until the display shows:

```
SELECTIVE TRANS
SEND ALL
```

2. Press [SELECT]. The display shows:

```
SEND ALL
EXECUTE TEST
```

3. Press [ENTER] to download the data to the receiver. While downloading the display shows:

```
TRANSFERRING
```

4. When the downloading process is complete, the display on the sender shows the following:

```
SEND ALL
EXECUTE TEST
```

5. On the receiver printer, press [ONLINE/OFFLINE] to show the ONLINE READY display. The transfer is now complete. You can detach the receiver and prepare another printer to receive the data.

Sending Only Fonts, Pages, Formats, or Graphics

You can download only one set of fonts, pages, formats, or graphics to the receiver printer, or you can download all fonts, pages, formats, or graphics. In this example, only pages are being sent.

To download fonts, pages, formats, or graphics

1. On the sender, press [↑] or [↓] until the display shows the item you are sending, as in the example below:

```
SELECTIVE TRANS
  SEND PAGE
```

2. Press [SELECT]. The display shows the lowest number:

```
SEND PAGE
    0
```

3. Follow either the procedure for downloading all versions of the item, or the one for downloading select versions below.

Downloading All Versions

1. Press [↑] or [↓] until you see ALL:

```
SEND PAGE
   ALL
```

2. Press [SELECT]. The display shows:

```
PAGE ALL
EXECUTE TEST
```

3. Press [ENTER] to download. While downloading, the display shows:

```
TRANSFERRING
```

4. When downloading is complete, the sender's display shows:

```
PAGE ALL
EXECUTE TEST
```

Downloading Specified Versions

1. To download a particular version of the item, press [↑] or [↓] until the number you wish to download appears, and then press [SELECT]. The display shows the number:

```
SEND PAGE
    4
```

2. Press [SELECT]. The display prompts you for a number to assign in the receiver:

```
TO PAGE
1
```

***Note**: In this example, the display is asking you which number to assign to this page once it is on the receiver printer.*

3. Press [↑] or [↓] until you see the number you are assigning. Then press [SELECT]. The display shows the assigned number:

```
PAGE 4 TO 1
EXECUTE TEST
```

4. Press [ENTER] to download the item. In this example, you are downloading page 4 from the sender printer to the receiver, where it is page 1. While downloading, the sender's display shows:

```
TRANSFERRING
```

5. When downloading is complete, the sender's display shows:

```
EXECUTE TEST
```

You have finished downloading. You can download another item, or disconnect the receiver and download to new receiver.

Setting Maximum Print Speed

The 4400 printer has the ability to print up to 10 inches per second (ips). You need to decide what print speed produces the highest quality labels for your application. For instance, if you decide that your printer operates best at 7.0 ips or lower, you may want to set the maximum print speed to 7.0 ips. Doing this enables the operator to print at any speed up to, but not surpassing, 7.0 ips. Only selected media can be used for high speed printing. Please consult your Intermec Customer Service representative before deciding to use high print speeds.

***Note**: The 4400 printer with the 6.5 mil printhead has a maximum print speed of 8.5 ips.*

Print speeds above 6.0 ips do not appear on the display under "Print Speed" unless you have set the "Max Print Speed" above 6.0 ips from the control panel. The only way to set the Max Print Speed in the Install menu is from the control panel.

Note: *Setting the Max Print Speed does not limit the print speed that you can select. It only limits the range of the selections from the control panel. By sending the <SI>S configuration command from the host, you can set any print speed up to 10 ips. However, if you use the control panel to scroll to another print speed, you cannot return to a speed above 6.0 ips without again sending the <SI>S command.*

To set the maximum print speed

1. Start at the OFFLINE READY display.
2. Press [MENU]. Then press [↑] or [↓] until the display shows the following:

```
OFFLINE
INSTALL MENU
```

3. Press [SELECT]. Then press [↑] or [↓] until the display shows:

```
INSTALL MENU
MAX PRINT SPEED
```

4. Press [SELECT] to enter the Max Print Speed menu.
5. Press [↑] or [↓] to select from values of 2.5 ips to 10 ips.
6. Press [ENTER] at the desired print speed for your application. The display shows the current setting with an asterisk (*) as in the example below:

```
MAX PRINT SPEED
6.5 INCH/SECOND*
```

7. Press [CONTINUE] to return to the OFFLINE READY screen.

Installing Options

This is a special procedure to be done only if the option software drivers are unloaded. This can happen if you use Memory Reset to set the configuration parameters back to their default values.

Note: *Enabling or disabling options does not unload the software drivers. After you install an option, be sure to enable the option.*

Printer options such as self-strip and cutter are installed at the factory. These options are controlled by software drivers that reside in the printer's internal software. If the software driver is unloaded, the option cannot function properly, and the enable / disable commands for your options will not appear in the Configuration menu.

The software drivers will be unloaded if you use the memory reset command to reset the configuration parameters. This procedure for loading options is provided in case you use memory reset or the options software drivers are unloaded by any other means.

Installing an option software driver is different than the option enable / disable commands in the Configuration menu, since the option is fully installed, not just enabled or disabled.

Note: *It is important to load only those software drivers for the options with which your printer was configured.*

Options Software Drivers

This table lists the options software drivers. Default values are in bold.

Command	Selections
External Options	**None**, Self-Strip, Cutter

Loading Options

You do not need to do this procedure if the driver is installed, but disabled.

To load options

1. Start at the OFFLINE READY display.
2. Press [MENU]. Then press [↑] or [↓] until the display shows:

```
OFFLINE
INSTALL MENU
```

3. Press [SELECT]. Then press [↑] or [↓] until the display shows:

```
INSTALL MENU
OPTIONS
```

4. Press [SELECT] to enter the options menu.
5. Press [↑] or [↓] to choose external options.
6. Press [SELECT] at the type of option you are installing. The display shows the current setting with an asterisk (*) as in the example below:

```
EXTERNAL
NONE*
```

7. Press [↑] or [↓] until you see the option you are installing, and then press [ENTER] to move the asterisk (*) next to the selection as shown below:

```
EXTERNAL
SELF-STRIP*
```

8. To load another type of option, press [MENU] and return to Step 4. Press [CONTINUE] to return to the OFFLINE READY screen.

9

Troubleshooting

This chapter provides some information for troubleshooting error messages that may appear on the printer control panel display, as well as certain problems you may have with your printer.

About Troubleshooting

Your printer is designed to operate reliably under harsh conditions. However, you may still encounter error messages. Most of the errors you encounter can be easily fixed and you will not need to have the printer inoperable for long.

If you encounter a problem with the printer, try the following:

- Check the display for an error message.
- If there is an error message on the display, find it in the table under “Error Messages” in this chapter and follow the instructions.
- If the display does not show an error message, try to locate the symptom in the tables under “Printer Operation Problems” or “Print Quality Problems” later in this chapter and follow the instructions.
- Clean the printer components and check all connections.

If the problem persists, contact your Intermec service representative.

Printer Operation Problems

If your printer is not operating correctly, try locating the problem in the table below:

Symptom	Cause	Solution
No power or power loss	AC power cable is damaged or disconnected.	Make sure the power cable is plugged into both the printer and an outlet or power strip. Replace the cable if it is damaged.
	Printer main power fuse is burnt out.	Replace the fuse. Refer to Chapter 10.
Labels stop indexing	Media is sticking to the paper path.	Clear any extraneous material from the paper path and clean it thoroughly.
	Printer is out of media.	Load new media. Refer to Chapter 4.
	Label gap or label mark sensors are dirty.	Clean label sensors. Refer to Chapter 10.
	Label stock is loaded incorrectly.	Check the paper path. Refer to Chapter 10.
	Label Stock command is not set for your media.	Change Label Stock setting to match the media you are using. Refer to Chapter 5.
Printer slows down	Image bands or print speed incorrectly set (and are not recovered when printer aborted).	Change the Image Bands or Print Speed settings. Refer to Chapter 5.
	Printer has aborted and print speed and image bands were reset.	Change the Image Bands or Print Speed settings. Refer to Chapter 5.

Print Quality Problems

If your labels are not being printed properly, check the following table to locate the symptom and correct the problem.

Symptom	Cause	Solution
Control panel does not access menus	Security command set to restrict access to menus.	Turn the printer off, then hold down the [FEED/RELOAD] key while turning it on to bypass security levels. Refer to Chapter 8.
Blotches on labels	Dirty printhead.	Clean the printhead. Refer to Chapter 10.
	Dirty paper path.	Clean the paper path. Refer to Chapter 10.
	Poor quality label or ribbon stock.	Contact your Intermec representative for suggestions on proper media or ribbons for your printing requirements.
Printing is too light or too dark	Sensitivity rating or dark adjust is incorrectly set.	Change sensitivity rating to match the type of media you are using (refer to Chapter 4). If sensitivity is set correctly, try changing the Dark Adjust command.
	Dirty printhead.	Clean the printhead. Refer to Chapter 10.
	Printhead Pressure incorrectly set.	Change the pressure to the other setting. Refer to Chapter 5.
	Poor quality label or ribbon stock.	Contact your Intermec representative for suggestions on proper media or ribbons for your printing requirements.
	The printhead adjustment lever is not positioned correctly.	Reposition the printhead adjustment lever to the default position (vertical).
Print goes off the side of the label	Label Width command incorrectly set.	Change Label Width setting. Refer to Chapter 5.
Print is too far forward or too far back	Forms Adjust command incorrectly set.	Reset Forms Adjust. Refer to Chapter 4.
Labels are not stopping at the right point to be removed	Label Rest Point command incorrectly set.	Adjust the Label Rest Point. Refer to Chapter 4.

Communication Problems

If your printer is not receiving downloaded data or you cannot reach a certain menu on the control panel, try the solutions in the following table.

Symptom	Cause	Solution
Printer does not communicate with host	Printer is offline.	Press [ONLINE/OFFLINE] on the control panel.
	Main Port or Auxiliary Port commands incorrectly set.	Make sure printer port settings match those of the host. Review port settings in the control panel, or print a user-defined configuration test label.
	Damaged or incorrect I/O cable.	Check the connections at both ends or replace the cable. Refer to Chapter 2.

Error Messages

Most of the problems you will encounter will generate an error message and cause the Alert light to flash. When this happens, find the message in the table below and follow the instructions to fix the problem.

Error Message	Problem	Solution
`+12 vdc error`	Power supply output voltage is not within the acceptable operating range.	Shut off the printer. Contact your Intermec service representative.
`+24 vdc error`	Power supply output voltage is not within the acceptable operating range.	Shut off the printer. Contact your Intermec service representative.
`80186 error`	The printer's microprocessors are not communicating. Printing stops and the control panel locks up. When the printer power is cycled, this message appears.	Cycle the power again. If the message reappears, turn off the printer and contact your Intermec service representative.
`80186 ram error`	The printer's main microprocessor cannot access RAM. Printing stops and the control panel locks up. When the printer power is cycled, this message appears.	Cycle the printer power again. If the message reappears, turn off the printer and contact your Intermec service representative.

Error Message	Problem	Solution
80186 rom error	The printer's main microprocessor cannot access ROM. Printing stops and the control panel locks up. When the printer power is cycled, this message appears.	Cycle the power again. If the message reappears, turn off the printer and contact your Intermec service representative.
80960 ram error	One of the printer's microprocessors cannot access RAM. Printing stops and the control panel locks up. When the printer power is cycled, this message appears.	Cycle the printer power again. If the message reappears, turn off the printer and contact your Intermec service representative.
80960 rom error	One of the printer's microprocessors cannot access ROM. Printing stops and the control panel locks up. When the printer power is cycled, this message appears.	Cycle the printer power again. If the message reappears, turn off the printer and contact your Intermec service representative.
ac volts low	There is not enough voltage reaching the printer through the AC power cord.	Test the line voltage. If sufficient voltage is reaching the printer, then the problem is internal to the printer and you should contact your Intermec service representative. If the printer is not receiving sufficient voltage, replace the power cord.
ambient temp sensor fault	The Ambient Temperature Sensor is disconnected or not working properly.	The printer will still operate but you cannot clear the alert. Contact your Intermec representative.
calls fault	The printer microprocessor has detected an internal fault.	Call your Intermec Product Support Representative.
checksum error	Portions or all of the static memory were found to be corrupted and were reset. Some or all of the fonts, UDCs, formats, configuration settings, etc., may have been lost.	Call your Intermec Product Support Representative.

Error Message	Problem	Solution
`Communications error`	Printer is not communicating with the host computer.	Make sure the host is running and all the connections are intact. Press [CONTINUE] to clear the error.
`cutter fault`	The Cutter is not operating properly.	Check to see the cutter is properly maintained and connected. Press [FEED / RELOAD] to clear the error.
`cutter not connected`	The Cutter is enabled from the control panel but not connected.	If you are not using the cutter, disable the cutter command (refer to Chapter 7). Otherwise, check the connections between the Cutter and the printer. Press [CONTINUE] to clear the error.
`Float fault`	The printer microprocessor has detected an internal fault.	Call your Intermec Product Support Representative.
`head lift fault`	The printhead mechanism has jammed and the printhead cannot lift between labels.	Open the printer manually (Refer to Chapter 4). Proceed to close the cover and press [FEED / RELOAD]. If this does not work, contact an Intermec representative.
`image rate error`	Image Buffer and / or Print Speed settings are not within the acceptable range for the label.	Change the Image Buffer and / or Print Speed settings. Refer to Chapter 5 for information on optimizing these settings. Press [CONTINUE] to clear the error.
`increase number of image bands`	You haven't set enough image bands to process the label.	Press [CONTINUE] to clear the error. Increase the number of image bands.
`machine fault`	The printer microprocessor has detected an internal fault.	Call your Intermec Product Support Representative.
`math fault`	The printer microprocessor has detected an internal fault.	Call your Intermec Product Support Representative.

Error Message	Problem	Solution
`media alert`	This message appears when the Media Alert feature has been enabled and the media supply needs to be replenished.	Replenish the media supply. Refer to Chapter 4. To disable this feature, refer to Chapter 5. Press [FEED/RELOAD] to clear this warning.
`memory reset`	Portions or all of the static memory were found to be corrupted and were reset. Some or all of the fonts, UDCs, formats, configuration settings, etc., may have been lost.	Call your Intermec Product Support Representative.
`Operation fault`	The printer microprocessor has detected an internal fault.	Call your Intermec Product Support Representative.
`overflow error`	The five overflow error messages are described below. Press [CONTINUE] to clear the alert.	

	Problem	Solution
32	Non-immediate command or data received with full buffer.	Resend message after buffer has cleared.
37	Not enough room in the printer memory to print the label format. The format fits into memory but there is not enough memory left to print.	Reduce the format complexity by deleting fields or decreasing the amount of data.
42	Not enough room in the printer memory to store the format.	Delete any formats, fonts, or graphics that you no longer need. If the format still does not fit, delete a few fields or other data from the format. ***Note:*** *To see how much printer memory is available, enter <ESC>m at the host.*
43	Too many fields in the label format.	Delete some fields, or reduce the number of characters in the fields.
53	Not enough room for graphic or user-defined font in the label format.	Delete any formats, fonts, or graphics that you no longer need. If there is still not enough room, reduce the size of the font or graphic.

Error Message	Problem	Solution
`paper fault`	You are out of media, there is a jam in the paper path, or the printer cannot find a label or index marker in the expected place.	Open the printer and check the paper path (refer to Chapter 4). Make sure the Label Stock and Label Length parameters are correct (refer to Chapter 5). Press [FEED / RELOAD] to clear the alert.
`paper path open`	The printer is open or the ribbon access door is not properly closed.	Make sure the printer is closed, the ribbon access door is installed correctly, and the knob is in the horizontal position. Press [FEED / RELOAD] to clear the message.
`PARAMETER error`	The four parameter errors are listed below. Press [CONTINUE] to clear the alert.	
	Problem	**Solution**
8	Invalid start or stop characters.	Verify start and stop characters in the label format.
11	Invalid data characters.	Verify data characters in label format.
36	Invalid or undefined format or page number.	Verify that the page numbers are between 0 and 9 and the format numbers are between 0 and 19.
38	Invalid or undefined field number.	Verify the field number in the label format.
`printhead cold`	The printhead is too cold to print properly.	Wait for the printhead to heat up. At the right temperature printing starts automatically and the alert clears. If the printer takes too long to heat up, contact your Intermec representative.
`printhead hot`	The printhead is too hot to print.	Wait while the printhead cools. At the right temperature, printing starts and the alert clears. If the printer takes too long to cool, or continues to overheat, contact your Intermec representative.
`printhead temp sensor fault`	The temperature sensor for the printhead is not working or is disconnected.	The printer will continue to print, but you cannot clear the alert. Contact your Intermec representative.

Error Message	Problem	Solution
printhead TESTED OUT OF RANGE	Some of the elements in the printhead are not within the acceptable temperature range.	If printing has stopped but your labels are satisfactory, you can continue printing by setting the Printhead Test command in the Configuration menu to WARN - CONTINUE. If the label quality becomes too poor, you may need to replace the printhead. To adjust the test, see "About the Printhead Test" in Chapter 5.
RANGE error	The six range errors are listed on the next page. Press [CONTINUE] to clear the alert.	

	Problem	Solution
12	Data count has been exceeded.	Reduce the amount of data entered into this field or increase the field's maximum data (up to 200).
21	Quantity or batch count is out of range.	Quantity of labels should be between 1 and 9999 and there should be 1-9999 batches of labels.
22	Increment or Decrement quantity is out of range.	Quantity should be between 1 and 9999.
23	Intercharacter delay or message delay is out of range.	Delay should be between 0 and 9999.
52	Invalid font / graphic height, width, or intercharacter gap.	Font or graphic height and width should be between 1 and 600. Intercharacter gap should be between 0 and 199 dots.

RECEIVER ERROR	If you are using the Cloning or Selective Transfer commands, the Receiver printer is not receiving the information from the Sender.	Make sure the Receiver printer is turned on and set up correctly for receiving information from the Sender. Check all connections between the Receiver and the Sender printers.
ribbon fault	You are out of thermal transfer ribbon or it is jammed.	Clear the jam or replenish the ribbon stock (refer to Chapter 4). Press [FEED / RELOAD] to clear the alert.
ROM VERSION MISMATCH	You do not have the same version of software for the two processors. The printer will not power up.	Contact your Intermec Product Support Representative.

Error Message	Problem	Solution
`self-strip not connected`	The self-strip option is not connected.	Make sure the self-strip is connected properly, or disable the option (refer to Chapter 5). Press [FEED / RELOAD] to clear the alert.
`sender error`	If you are using the cloning or selective transfer commands, the Sender printer is not set up properly to send information to the Receiver.	Check all connections between the Sender and the Receiver printers. Make sure the Sender printer is set up correctly for transmitting information to the Receiver.
`state fault`	The printer microprocessor has detected an internal fault.	Call your Intermec Product Support Representative.
`struct fault`	The printer microprocessor has detected an internal fault.	Call your Intermec Product Support Representative.
`SYNTAX ERROR`	The eight Syntax Error messages are listed below. See Chapters 6 and 7 for information on command syntax. In all cases, press [CONTINUE] to clear the alert.	
	Problem	**Solution**
24	Missing preamble or postamble data.	Delete the setup for preamble or postamble data, or include the data.
33	Invalid field delimiter. Either a start or end character is missing or they are different types.	Check for all pairs of field delimiters and make sure both are numeric, or both are alphanumeric.
34	Invalid escape command.	Correct the escape command syntax.
35	Invalid shift command.	Correct the shift command syntax.
44	Semicolon (;) missing after <ESC>P.	If data follows <ESC>P you must insert a semicolon (;) to separate commands.
46	Statement does not make sense.	Check the statement syntax.
54	Invalid UDC command.	Correct the UDC command syntax.
`trace fault`	The printer microprocessor has detected an internal fault.	Call your Intermec Product Support Representative.
`type fault`	The printer microprocessor has detected an internal fault.	Call your Intermec Product Support Representative.

Error Codes

The following list describes the error codes that are transmitted in response to the <BEL> command. After a <BEL> command is sent, the error code is cleared immediately after it is transmitted. Any subsequent <BEL> commands received return a 00.

Error Code	Description
00	No error
01	Invalid bar code check character
02	Invalid number of bar code characters (Code UPC/EAN)
04	Bar code check character within numeric field marks
05	Supplemental delimiter within numeric field marks (Code UPC/EAN)
06	Invalid supplemental character count (Code UPC/EAN)
07	More than one supplemental delimiter (Code UPC/EAN)
08	Invalid start/stop characters (Codabar)
11	Invalid bar code data
12	Data count exceeded
13	Data is being entered into a non-data entry field
21	Quantity or batch count out of range
22	Field increment or decrement out of range
23	Intercharacter/message delay out of range
24	Missing preamble or postamble data
25	Invalid format transmission syntax
26	Invalid page transmission syntax
27	Invalid font transmission syntax
28	Invalid UDC transmission syntax
32	Non-immediate command or data received after buffer is full
33	Invalid field marks
34	Invalid escape command
35	Invalid data shift command
36	Invalid or undefined format number
37	Insufficient room in RAM to print format
38	Invalid or undefined field number
41	Syntax error for Program Commands
42	Insufficient room in RAM to store format
43	Too many fields
46	Undefined statement
52	Invalid UDC or UDF bitmap cell height/width or intercharacter space
53	Insufficient room in RAM to store UDC or UDF
54	Invalid UDC command syntax

Using the Print Tests

If you are changing your label formats, there are several tests that print out formats, pages of formats, graphics, and fonts that are currently stored in the printer's memory. These tests are useful for reviewing your design options.

The following table shows the available print tests for pages, formats, fonts, and graphics. See the circle on the foldout page to locate these tests in the Service menu.

Command	Selections
Print Page	Print 1 to 99 copies of any page number (0 through 9), or print all pages.
Print Formats	Print 1 to 99 copies of any format number (0 through 19), or print all formats.
Print Fonts	Print any font number (0 through 25), or print all fonts.
Print Graphics	Print any graphic number (0 through 99), or print all graphics.

Use the following procedure to print examples of any page, format, font, or graphic, as shown in the preceding table. You can also print all examples of any item if you wish. For pages and formats, you are prompted to select a quantity before executing the test (unless you chose all pages or all formats). This quantity is the number of copies you want of the chosen page or format.

To print tests

1. Start at the OFFLINE READY display.
2. Press [MENU]. Then press [↑] or [↓] until you reach the Service menu as shown below:

```
OFFLINE
SERVICE MENU
```

3. Press [SELECT] to enter the Service menu. Press [↑] or [↓] until the display shows the item you want to print (in this example you are printing a page).

```
SERVICE MENU
PRINT PAGE
```

4. Press [SELECT]. The first page you define appears in the display. For example, if the first page defined is page 1, the display shows the following:

```
PRINT PAGE
1
```

5. Press [↑] or [↓] until the display shows the number of the page you want to print.

   Note: *You can select all pages by pressing [↓] to select ALL.*

   ```
   PRINT PAGE
     ALL
   ```

6. Press [SELECT]. This display shows one of the following prompts:

   - If you selected all pages, all formats, or any selection of fonts or graphics, the display shows:

     ```
     PAGE ALL
     EXECUTE TEST
     ```

   - If you selected a specific page or format, the display shown below appears. Press [↑] or [↓] until you reach the number of copies of the selected page or font you want to print, and then press [SELECT].

     ```
     PAGE QUANTITY
           1
     ```

7. Press [ENTER] at the EXECUTE TEST prompt to print.

Printing a Copy of the Data From the Host

If you need to see a hard copy of the data being sent to the printer, you can set the printer to print out all data and commands it receives from the host.

This feature is available through the Data Line Print command in the Service menu. You have two selections for Data Line Print:

Enabled The printer prints all ASCII characters it receives from the host, including control characters. The corresponding hexadecimal code is printed underneath each character.

Disabled The printer prints normally. This is the default setting.

To enable or disable Data Line Print

1. Start at the OFFLINE READY display.
2. Press [MENU] to enter the main menu. Press [↑] or [↓] until you reach the Service menu.
3. Press [SELECT] to enter the Service menu. Press [↑] or [↓] until the display shows:

   ```
   SERVICE MENU
   DATA LINE PRINT
   ```

4. Press [SELECT]. The display shows:

```
DATA LINE PRINT
  DISABLED*
```

5. Press [↑] or [↓] to change to Enabled, and then press [ENTER] to move the asterisk next to the new selection. The display shows:

```
DATA LINE PRINT
  ENABLED*
```

   The printer will now print characters received from the host.

   The data line print automatically returns to DISABLED after you exit this menu. Press [ONLINE/OFFLINE] to return to normal printing.

Note: *If the [FEED/RELOAD] key is pressed while Data Line Print is enabled, the software version number will be transmitted enabling the user to perform a loop-back test at the communications port.*

Calibrating Label Sensors

If the label sensors are not locating the beginning and ends of your labels properly, they can be calibrated with the Calibrate Sensor command.

Note: *The sensors may not work if they need cleaning. Follow the procedures in Chapter 10 before calibrating.*

To calibrate your label sensors

1. Start at the OFFLINE READY display.
2. Press [MENU]. Proceed to press [↑] or [↓] until you see:

```
OFFLINE READY
SERVICE MENU
```

3. Press [SELECT]. The display shows:

```
SERVICE MENU
PRINT PAGE
```

4. Press [↑] or [↓] until you see:

```
SERVICE MENU
CALIBRATE SENSOR
```

5. Press [SELECT]. The display shows:

```
CALIBRATE SENSOR
    GAP
```

6. If you are using gapped media, press [ENTER]. If you are using marked media, press [↑] or [↓] to choose Mark, and then press [ENTER]. The display shows:

```
HOLD FEED KEY
FOR TWO LABELS
```

7. Hold down the [FEED/RELOAD] key while the printer feeds two labels forward. The display shows:

```
CALIBRATE SENSOR
GAP
```

After the labels are forwarded, the label sensors are calibrated. Press [CONTINUE] to return to the READY display.

Increasing Available Memory

If you need to increase the amount of memory available in your printer, you can use one of the Service memory reset menus to clear fonts/graphics or pages/formats stored in battery backed RAM. Using either of these commands will destroy any data that you have previously downloaded. It is necessary to redownload any important fonts/graphics or pages/formats that you have just cleared from memory.

To increase available memory

1. Start at the OFFLINE READY display.
2. Press [MENU]. Then press [↑] or [↓] until you see the following display:

```
OFFLINE
SERVICE MENU
```

3. Press [↑] until the display shows:

```
SERVICE MENU
MEMORY RESET
```

4. Press [SELECT]. The display shows:

```
MEMORY RESET
ALL
```

5. Press [↓] until the display shows:

```
MEMORY RESET
FONTS/GRAPHICS
```

or:

```
MEMORY RESET
PAGES/FORMATS
```

6. Press [ENTER] to clear fonts/graphics or pages/formats.

Print Quality

The 4400 printer was designed and configured at the factory to provide maximum print quality for both direct thermal and thermal transfer media.

It is important that you select the proper media when printing at higher speeds. Using good quality media reduces the occurrence of images that fade or bleed. If you want to print quality labels at higher print speeds, you must select media with low reaction or release imaging temperatures. Printing at lower speeds produces the highest quality labels. Please consult your Intermec service representative to decide the proper media for your application.

There are many factors that need to be taken into account before you can achieve maximum print quality. These factors are addressed in the sections that follow.

Media Selection

The choice of media is one of the most important decisions you can make concerning print quality. The 4400 printer supports a wide selection of both direct thermal and thermal transfer media. To achieve optimum performance in your application, you must evaluate requirements such as print speed and environmental conditions.

Please consult your Intermec service representative to ensure the selection of the proper media for your individual application. A complete list of available media is included in the Media Envelope that is shipped with your printer.

Sensitivity

Each print element on the 4400 printer is heated individually. Different temperatures are required for various types of media. There is a three-digit sensitivity number printed on each media roll or box that specifies a heating schedule optimized for print speed and print history. Each heating schedule is unique due to different media chemistries and manufacturing processes. Assorted brands of direct thermal media contain many different types of dyes, coating, and base paper. These heating schedules have been developed to produce the highest possible ANSI print quality for bar codes.

Before you load media into the printer, check to see that the sensitivity rating for the media matches the rating set in the printer. When you set the sensitivity in the printer to match the rating for your media, the amount of energy the printhead uses is adjusted to a value suitable for your media. Refer to "Setting the Media Sensitivity Number," in Chapter 4 for more information.

Note: *Ensure that the Sensitivity rating is set before you alter the dark adjust.*

Print Speed

The print speed you select greatly affects the printed image. Therefore, it is important to select the proper media when printing at higher speeds. The highest quality labels are produced at lower speeds. Optimal print quality for most direct thermal media is achieved at speeds below 3.5 ips.

In order to print labels as quickly as possible, you must adjust the print speed in conjunction with the number of image bands. The Print Speed and Image Band settings determine the rate at which the printer processes the images of your labels. This in turn affects the speed of the entire printing process. Refer to "Optimizing the Print Speed and Image Bands" in Chapter 5.

In order to achieve optimal print quality at speeds greater than 6.0 ips, you may need to fine-tune the printer controls. At higher print speeds, it is important to properly set the sensitivity number and the dark adjust. If necessary, further adjustment of controls such as the printhead adjustment lever, altering of the format, and changing printhead pressure can improve print quality.

Formats

The format can be altered to improve print quality and print speed. At high speeds, the best quality bar codes are produced when the drag orientation (perpendicular to paper motion) is used. For more information on formats, please refer to Chapter 6, "Designing Labels and Using Commands."

Printhead Pressure

Raising the printhead pressure increases the force and area contact between the printhead and the media. The 4400 printer has two head pressure settings: high and low. Low printhead pressure is recommended for most applications. However, we recommend using high printhead pressure for tag stock. Please contact your Intermec service representative for specific information.

Dark Adjust

The dark adjust feature allows fine tuning of energy levels to optimize print quality. However, if you set too high of a darkness level, you may reduce printhead life. We recommend that you initially set the sensitivity rating and leave the dark adjust at zero. Only use the dark adjust as the printhead wears, for media variations from lot to lot, or for printhead resistance variations.

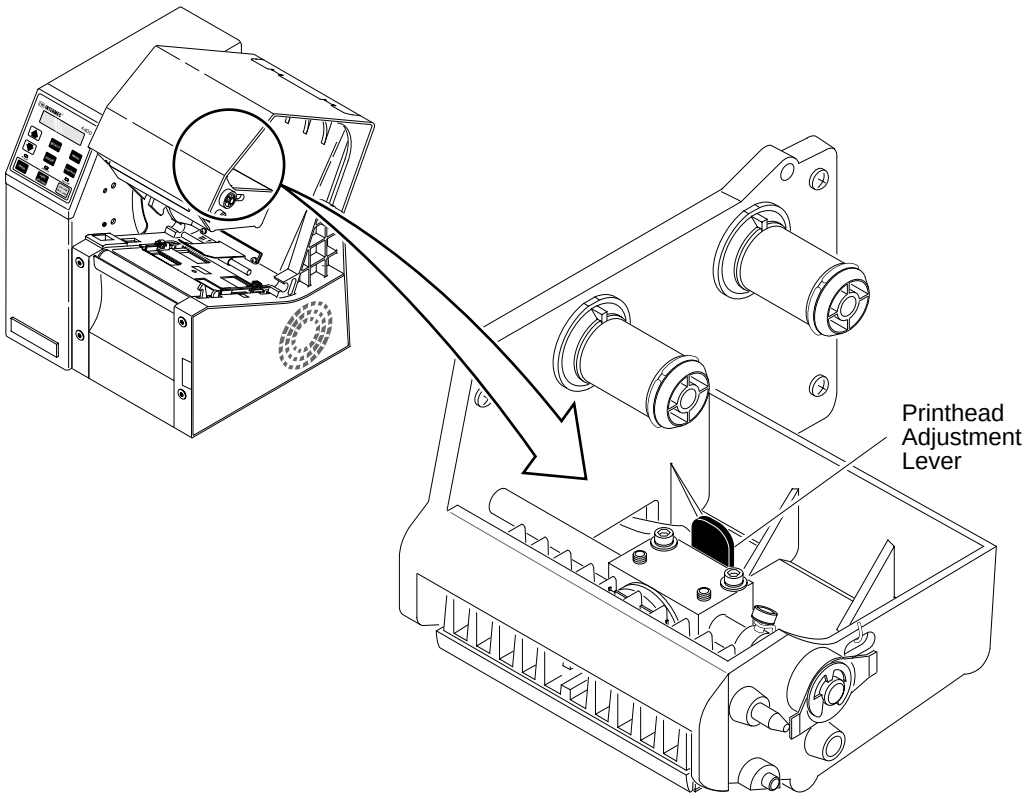
Refer to "Setting the Dark Adjust" in Chapter 4 for more information.

Note: *It is important to enter the sensitivity rating before you adjust the level of the darkness.*

Printhead Adjustment Lever

The location of the heating elements on the top of the platen roller can be critical in achieving optimal print quality. The 4400 printer contains a printhead adjustment lever inside of the printer cover that can be used to adjust the heating element relative to the platen roller. The printhead adjustment lever moves the heating element location both forward and backward from the top of the platen roller. The following figure illustrates where you can find the printhead adjustment lever.

Using the Printhead Adjustment Lever



4400-41

The printhead adjustment lever has seven settings. The default, or home position, of the lever is vertical. Adjustments can be made by moving the lever clockwise or counterclockwise. The lever allows flexibility in compensating for variables such as media thickness, high print speed, and printhead replacement.

***Note**: Intermec does not recommend that you adjust the printhead lever. It is meant for use by Intermec Service Technicians as a fine-tuning control when replacing the printhead.*

Printhead Aging

Print element wear is common in thermal printers. Over the life of a printhead, wear can result in a change of resistance in the print elements. The change in element resistance affects the print quality. If needed, the change in resistance can be compensated for by using the Dark Adjust command. Use the Printhead Resistance Test in Chapter 5 to warn you when the printhead elements are beginning to wear out.

10

Routine Maintenance

This chapter explains how to maintain the printer, inspect the printer work environment and system connections, and clean each printer component.

About Printer Maintenance

The printer is designed to withstand harsh environments but it should be cleaned on a regular basis to keep it running at full capacity, especially if it is exposed to debris.

For information on replenishing media or ribbon, clearing jams and other online maintenance procedures, refer to Chapter 4.

Inspecting the Printer

Inspect the printer and the rest of your data collection system on a regular basis. Your inspections should include the following:

- Make sure the printer is properly grounded.
- Inspect the work environment. Large electric motors, welders, and switching equipment can affect printer performance. See Chapter 2, “Installing the Printer,” for guidelines on appropriate environments.
- Keep the printer away from liquids.
- Check the network regularly for loose wires or poorly installed connections. Be sure to replace corroded wires.

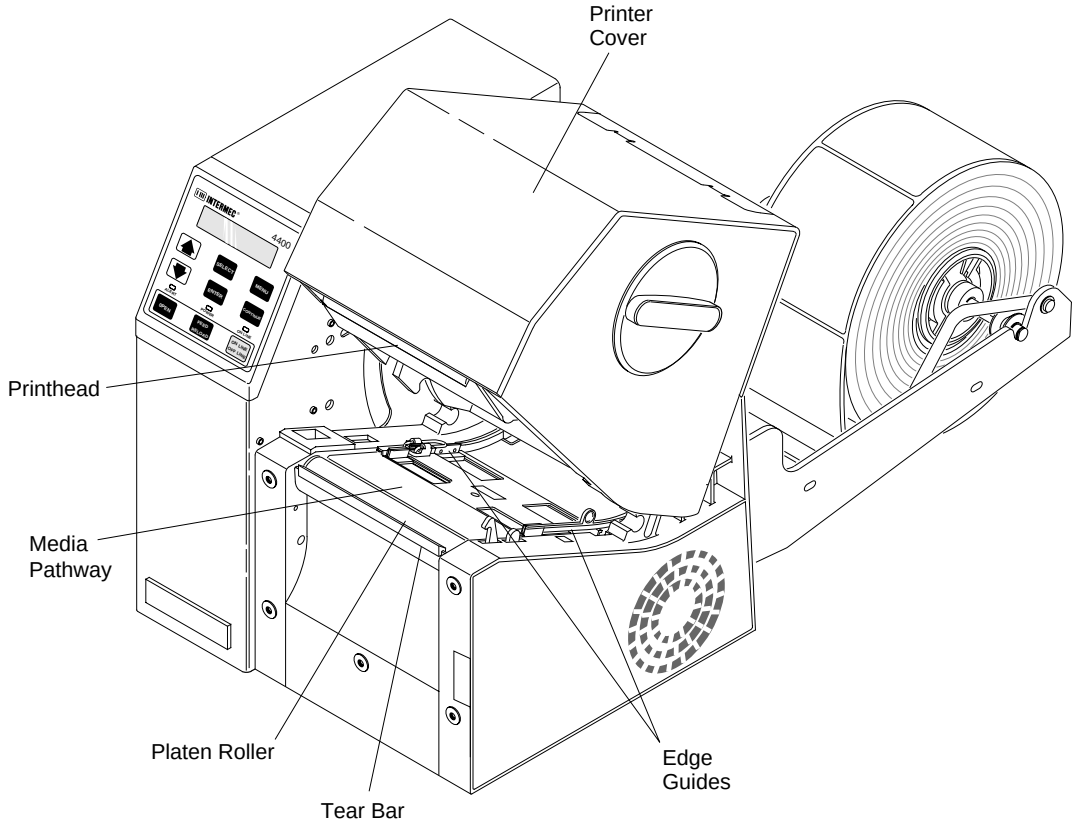
Components to Maintain

Clean your printer regularly to maintain the quality of your labels and extend the life of your printer. The following table contains suggestions for cleaning the printer.

To clean the printer effectively and safely use the following items: isopropyl alcohol, a cleaning brush, cotton swabs, and a clean lint-free cloth.

Printer Component	Maintenance Period
Printhead	Inspect after every roll of media. Clean after every five rolls of media.
Platen Roller and Tear Bar Label Gap and Label Mark Sensors Media Pathway and Edge Guides	Clean after every ten rolls of media. If you are using hi-tack adhesive you must clean after every roll of media. If you are using tag stock or continuous media, you should clean after every five rolls of media.
Printer Cover	Clean as necessary.

Components to Maintain



4400-61B

Cleaning the Printer

The following procedures tell you how to access the printer components and clean them without causing any damage.

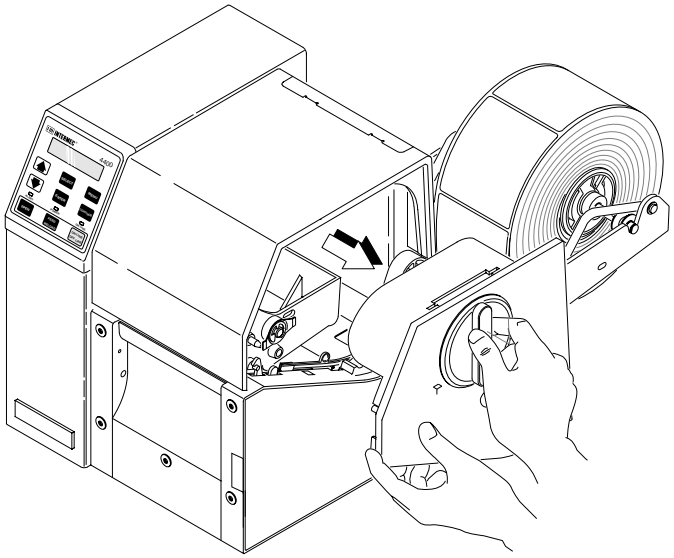
Note: *Turn off and unplug the printer before cleaning any components. The following procedures include instructions for opening the printer without power.*

Removing the Ribbon Access Door

To open the printer without power, it is necessary to remove the ribbon access door.

To remove the ribbon access door

1. Turn off and unplug the printer.
2. Remove the Ribbon Access Door by turning the knob 1/4 turn counterclockwise, and lifting the door away from the printer.

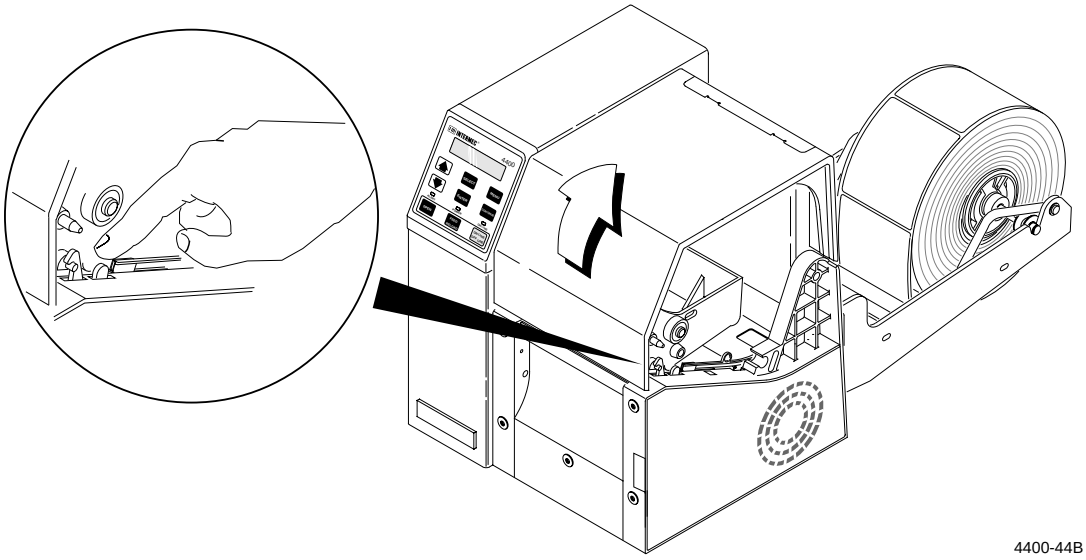


4400-27B

Opening the Printer

1. Press down on the manual cover release and lift the cover.
2. Remove the media and thermal transfer ribbon.

Opening the Printer



Cleaning the Printer Case

Clean the case with a lint-free cloth and isopropyl alcohol as necessary to remove dust from cooling vents. If the vents become obstructed, the printer may overheat, which can result in pauses while printing labels and damage to the electronic circuitry inside the printer.

Cleaning the Printhead

Cleaning media debris from the printhead maintains close contact between the media and printhead, which provides good print quality. The printhead should be cleaned after every five rolls of media. Always clean the printhead immediately if a label jams in the printer.

To clean the printhead, follow the steps under "Opening the Printer." Then use a cotton swab or a clean, lint-free cloth and isopropyl alcohol to clean the printhead. Be persistent. It may take a long time to remove label adhesive.

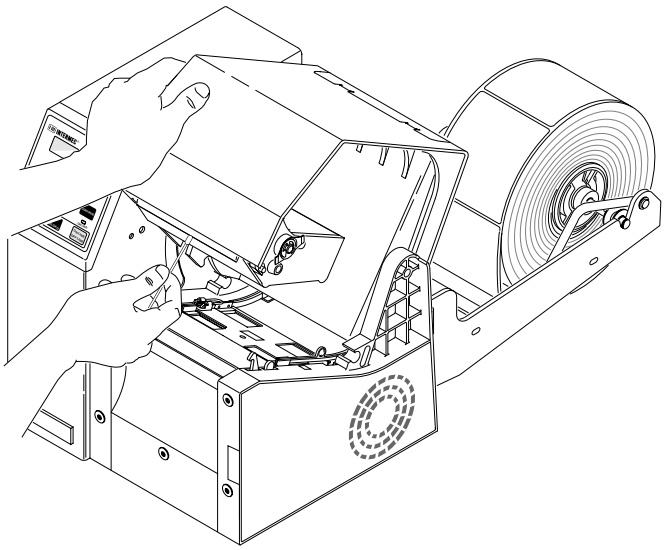
CAUTION

Caution

Do not use sharp objects such as knives or screwdrivers to scrape the printhead clean. Cleaning with sharp objects will damage the printhead. Clean with a cotton swab, or a clean, lint-free cloth and isopropyl alcohol.

Conseil

N'utilisez pas d'objets pointus tels que couteaux ou tournevis pour nettoyer la tête d'impression. Nettoyer avec des objets pointus endommagera la tête d'impression. Nettoyez-la avec de la ouate ou avec un linge propre et libre de peluches, humecté avec de l'alcool d'isopropyl.



4400-62B

Cleaning the Platen Roller and Tear Bar

Cleaning the platen roller and tear bar maintains even contact between the media and the printhead.

To clean these items

1. Follow the steps under “Opening the Printer.”
2. Clean the platen roller with a brush and isopropyl alcohol. Rotate the roller to clean all areas.

***Note**: If you do not have a brush and isopropyl alcohol, use a label to clean the platen roller. Place one end of the label on the roller and pull the label forward to remove any debris. Repeat the process until the roller is clean.*

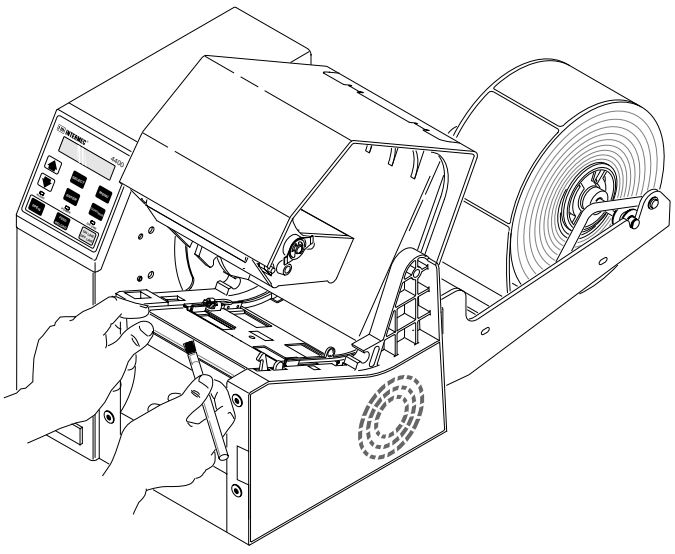
3. Clean the tear bar with a brush and isopropyl alcohol.

Warning
Use extreme caution when cleaning the tear bar to avoid cutting yourself.

Avertissement
Lors du nettoyage de la barre coupante, prenez bien soin de ne pas vous couper.

Caution
Do not scrape the rubber platen roller. Scraping will gouge the roller and void any applicable warranty. Gouged rollers must be replaced to maintain high quality label printing.

Conseil
Ne grattez pas le rouleau caoutchouté. Gratter le rouleau gougera le caoutchouc et annulera toute garantie applicable. Vous devez remplacer les rouleaux gougés pour maintenir une haute qualité d'impression d'étiquettes.



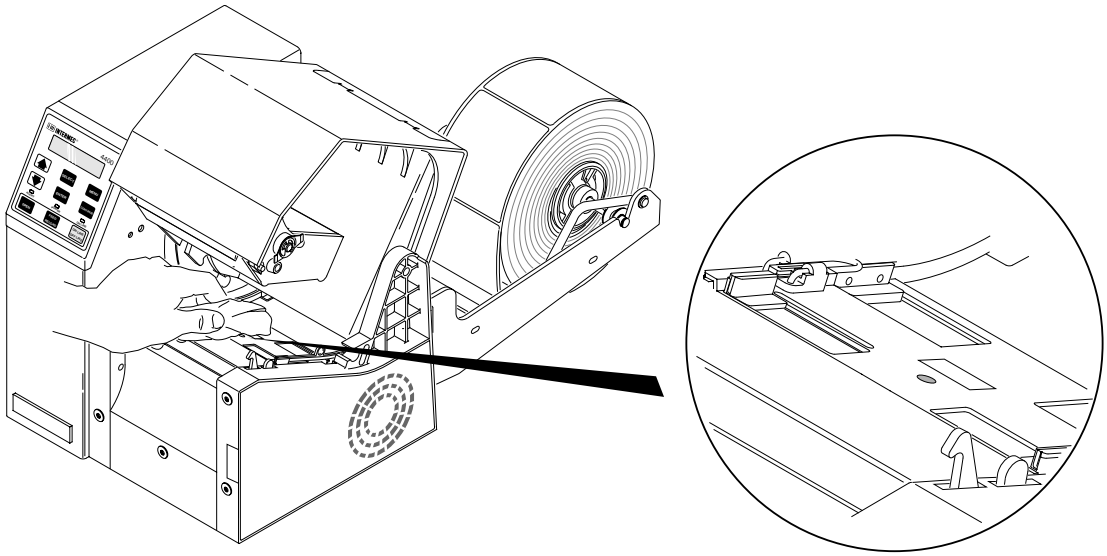
4400-63B

Cleaning the Label Gap and Label Mark Sensors

The label gap and label mark sensors should be checked for debris and cleaned after every ten rolls of media.

To clean the label sensors

1. Follow the procedures under “Opening the Printer.”
2. Clean both sensors with a brush and isopropyl alcohol. Be sure you clean both the label gap sensor and the label mark sensor.



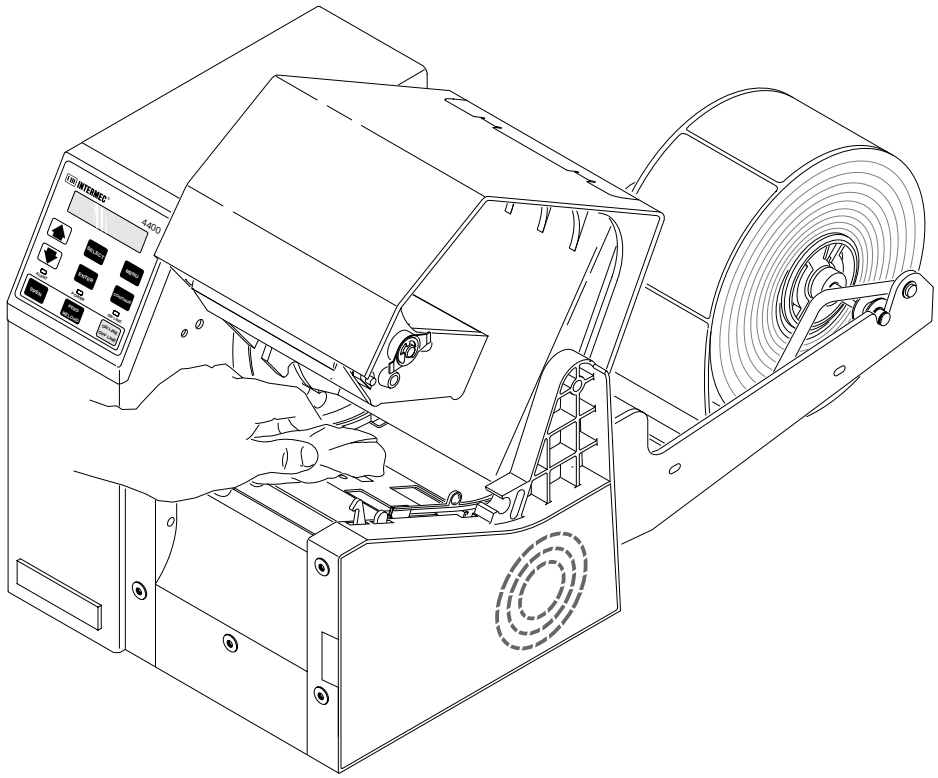
4400-64B

Cleaning the Paper Path

The paper path should be checked for debris and cleaned after every ten rolls of media. Cleaning media debris and dust from the paper path keeps the printhead and platen roller clean as well. If debris spreads within the printhead the print quality will be affected.

To clean the paper path

1. Follow the procedures under “Opening the Printer.”



4400-65B

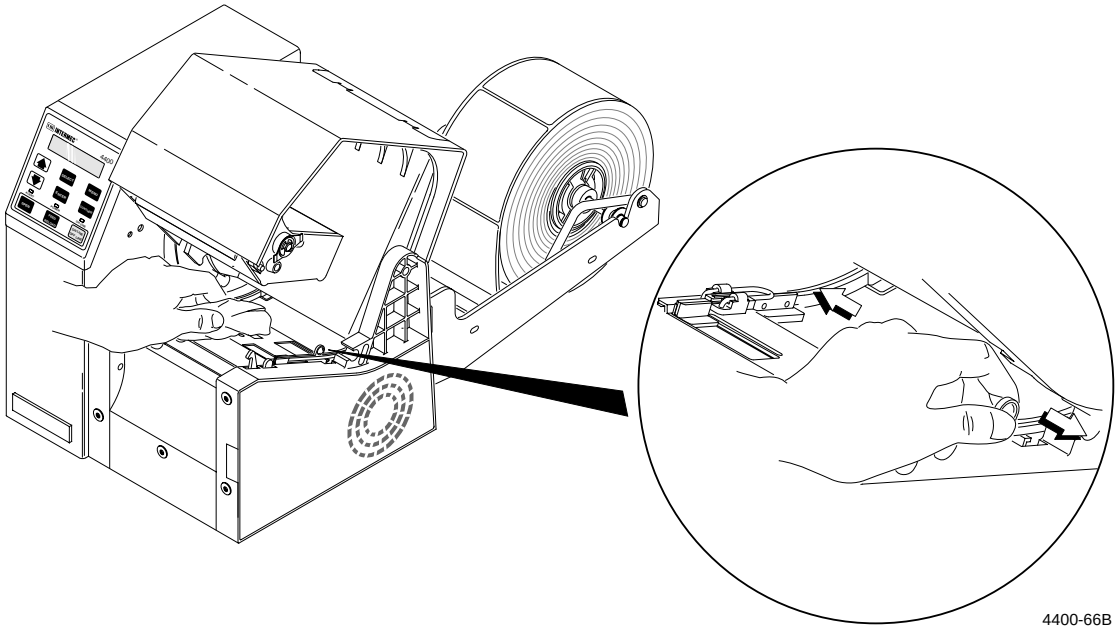
2. Clean the flat surfaces of the paper path with a clean, lint-free cloth and isopropyl alcohol. Remove all traces of dust, paper, and adhesive.

Cleaning the Edge Guides

You should clean the edge guides to keep debris off the media surface and the printhead where irregularities can spoil print quality. Cleaning the guides also prevents the media from skewing, or mistracking as it travels through the paper path which can smear images and print off the label edge. Always clean the edge guides immediately if a label jams in the printer.

To clean the edge guides

1. Follow the procedures under "Opening the Printer."
2. Clean the edge guide using a lint-free cloth and isopropyl alcohol.



Replacing the Fuse

If the Power light does not come on when you turn on the printer, you need to replace the main power fuse. You need the following items:

- Fuse for 5A, 250V, Slo-Blo fuse, (either 3AG or 5x20mm)
- Medium, straight slot screwdriver

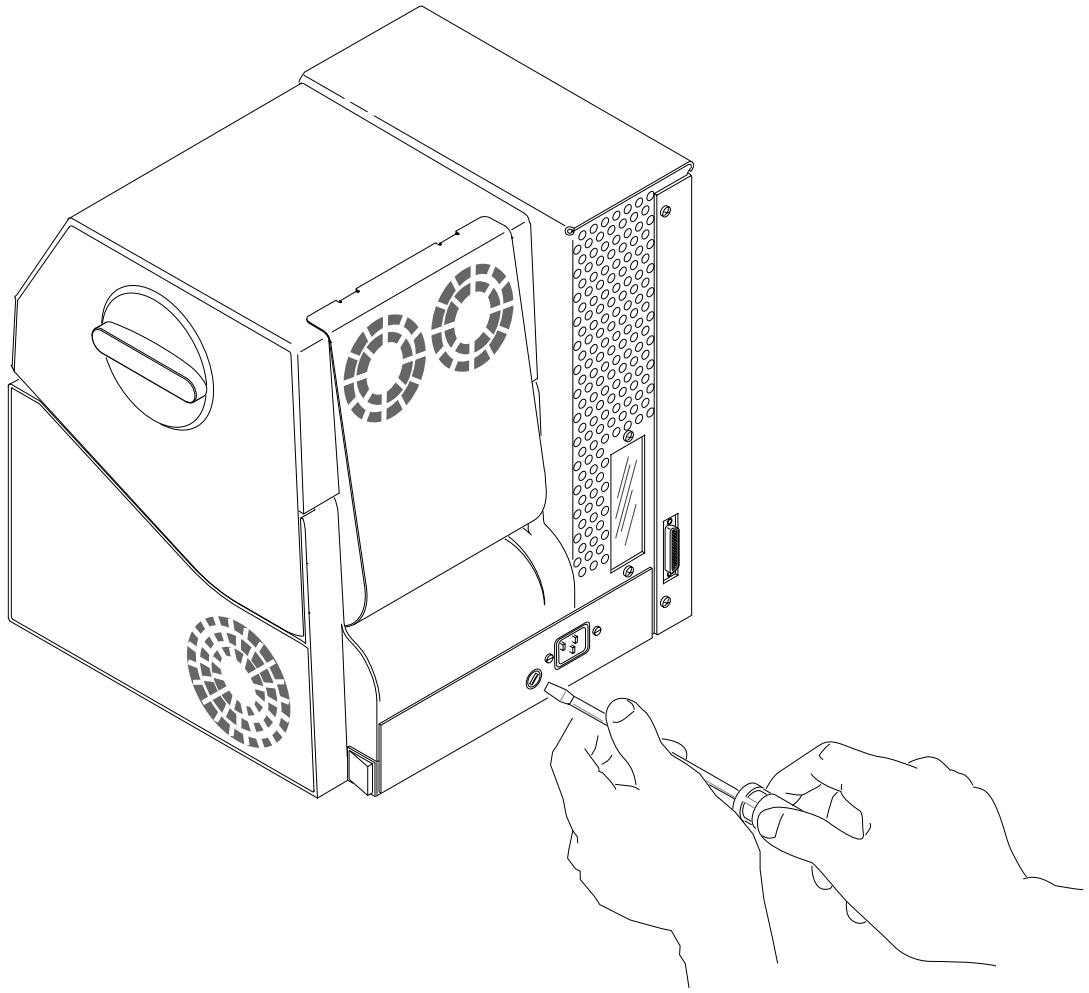
Warning
Always disconnect the power cord before replacing the fuse. Failure to disconnect the power cord may result in injury or death due to electric shock.

Avertissement
Débranchez toujours le cordon d'alimentation avant de remplacer la fusible. Si vous ne débranchez pas de cordon d'alimentation, vous courrez le risque de blessure ou de mort par électrocution.

To replace the fuse

1. Turn off and unplug the printer.
2. With the screwdriver, turn the fuse holder a 1/2 turn counterclockwise.
3. The spring-loaded fuse holder will pop out. Remove the fuse holder.

4. Remove the old fuse from the holder.
5. Install the new fuse into the holder.
6. With the screwdriver, press the fuse holder into place and turn it half a turn clockwise or until it stops.
7. Install the power cord.
8. Turn on the printer. If it still does not receive power, contact your Intermec representative.



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A

Appendix

4400 Printer Specifications

The specifications for the 4400 printer are as follows. The *4400 Maintenance Manual* has details on printer performance and upkeep. Chapters 9 and 10 of this manual contain troubleshooting and maintenance procedures for everyday use.

Dimensions (no options installed)

Height	13.0 inches (33.0 cm)
Width	12.0 inches (30.5 cm) with roll supply
Weight	35.0 pounds (15.9 kg)
Length	21.5 inches (54.6 cm)

Electrical Requirements

Input Voltage	90 to 264 VAC
Frequency	48 to 62 Hz
Fuse	115 or 230 VAC

The printer has an auto-ranging power supply that automatically adjusts itself to the line voltages within the range shown above when it is plugged in.

Power Usage

Typical usage	300 Watts

Typical usage is based on the amount of power required to print one label. This usage holds true for low line of 90 VAC to high line of 140 VAC. The typical usage of 300 Watts also applies to European power supplies.

Printing Method

The 4400 is capable of direct thermal (DT) printing, or thermal transfer (TTR) printing using thermal transfer ribbon (TTR).

Printing Speed

Maximum	4400: 10 inches (254 mm) per second
	4400 w/6.5 mil printhead: 8.5 inches (221 mm) per second
Minimum	4400: 2.5 inches (64 mm) per second
	4400 w/6.5 mil printhead: 3.0 inches (76 mm) per second

Printhead

Element	4400: 0.00492 inch (0.125 mm)
	4400 w / 6.5 mil printhead: 0.006575 inch (0.167 mm)
Width	4.4 inches (112 mm) maximum
Length	0.24 inch (6 mm) minimum, maximum is unlimited
Resolution	4400: 203 dpi (8 dots per mm)
	4400 w / 6.5 mil printhead: 152 dpi (6 dots per mm)
"X" dimensions:	4400: 10 mil to 50 mil (0.25 mm to 1.27 mm); 5 mil (0.13 mm) in drag mode only
	4400 w / 6.5 mil printhead: 6.5 mil, or 0.165 mm, for all modes

Media Specifications

Roll	6,000 inches (152 m) maximum length
	8.38 in (213 mm) maximum diameter
Core Size	3 inches (77 mm)
Label Length	0.24 inch (6 mm) to 24 inches (610 mm); fanfold, 19 inches (483 mm) maximum
Label Width	2.5 inches (64 mm) to 5.1 inches (132 mm)
Thickness	0.003 inch (0.08 mm) to 0.010 inch (90.25 mm)

Ribbon Specifications

Roll	18,000 inches (457 m)
Widths	2.5 inches (64 mm) 3.5 inches (91 mm) 4.5 inches (114 mm)

Environment

Operating	32°F to 104°F (0°C to 40°C)
Storage	-4°F to 152°F (-20°C to 70°C)
Humidity	10% to 95% relative humidity

Communications

Asynchronous RS-232C, RS-422, RS-485 interfaces

Serial ASCII code

Hardware (Ready / Busy) Flow Control

Software (XON / XOFF) Flow Control

Intermec Standard Block Protocol

Polling Mode D Protocol

Multi-Drop Protocol

Baud Rates: 110, 300, 600, 1200, 2400, 4800, 9600, 19200

Fonts and Graphics

Nine resident bitmap fonts (including OCR A and B), plus one resident smooth outline font, scaleable up to 3 inches.

Fonts installed with PrintSet™.

200 dpi graphics resolution

Character Sets

US ASCII

UK ASCII

German

Norwegian / Danish

Swedish / Finnish

Italian

French

Spanish

Swiss

7-bit and 8-bit ISO Character Sets

Bar Code Symbologies

This section lists and describes the available bar code symbologies.

Code 39

Code 39 is the first alphanumeric symbology ever developed and is the standard non-retail bar code. It is a discrete, self-checking symbology of variable length and is used mostly by the automobile and medical industries.

Intermec printer support 3 different types of Code 39: 43 character Code 39, full ASCII Code 39, and the 8646 compatible Code 39. The 8646 compatible version only differs from the full ASCII version by four characters. The "$," "%," "/," and "+" are encoded as single characters instead of as "/D," "/E," "/O," and "/K." The 8646 compatible version allows the 4400 printer to be backward compatible with 86XX printers.

If you enter <ESC><SPACE> as data, the start and stop characters are printed.

Code 93

Introduced in 1983, Code 93 was specially designed to complement Code 39. With the correct reading equipment, the two alphanumeric codes may be interchanged throughout a system without making any changes to software.

Code 2 of 5

Code 2 of 5 is a straightforward numeric symbology developed in the late 1960s. It has been used for warehouse sorting systems, photofinishing envelope identification, and for tracking sequentially numbered airline tickets. All information is contained in the width of the bars; the spaces do not contain information.

Interleaved 2 of 5

Interleaved 2 of 5 is a high density, self-checking, continuous numeric symbology, which has mainly been used in the distribution industry. Interleaved 2 of 5 actually encodes two digits, one in the bars and one in the spaces. A zero is added to character strings that are odd in length.

Codabar

Originally developed in 1972, Codabar is a numeric symbology most commonly used in libraries, blood banks, and air parcel express applications.

Valid start/stop characters range from “A” to “D” and from “a” to “d.” They can be defined as part of the bar code field or downloaded as part of the print data. Start/stop characters sent down with printer data override the characters defined by the bar code field.

Code 11

Code 11 was developed in early 1977 to satisfy requirements for a very high density, discrete numeric bar code. The most extensive application of Code 11 has been for labeling telecommunications equipment.

Code 128

Code 128 was introduced in 1981 as a very high density, alphanumeric symbology. It is a variable length, continuous code that employs multiple element widths.

In 86XX emulation mode, the Function 1 character is printed by entering <SUB> 1. In Advanced mode, the Function 1 character is printed by entering <SUB><SUB> 1. The characters for Function 2, 3, and 4 are represented in the same way.

UCC-128 serial shipping container code automatically starts with subset C and <FNC1>. It is a fixed length version of Code 128 allowing up to 19 numeric characters to be entered. The first two characters are forced to zeros, and the MOD 10 check digit is calculated and inserted before the standard Code 128 digit.

UPC

Universal Product Code (UPC) is a subset of EAN. It is a fixed length, numeric, continuous symbology employing four element widths. Two common types of UPC are Version A, which encodes 12 digits, and Version E, which encodes 6 digits. UPC has been used in the supermarket industry since 1973. UPC supplemental code is intended for only periodical issue numbers.

EAN

The European Article Numbering system (abbreviated as EAN) is a numeric superset of UPC. EAN has both a version that uses 8 digits and a version that uses 13 digits. The version with 13 digits encodes the same number of bars as 12 digit UPC Version A, but the 13th digit is encoded into a parity pattern at the left of the center guard bar.

The variable length option selects the UPC/EAN version by the number of characters in the data field. The number of data characters and check characters allowed for each version are:

EAN 8 check character	7 data + 1
EAN 13 check character	12 data + 1
UPC version A check character	11 data + 1
UPC version E check character	6 data + 1
UPC version D1 check character	13 data + 1
UPC version D2 check characters	18 data + 2
UPC version D3 check characters	22 data + 2
UPC version D4 check characters	25 data + 3
UPC version D5 check characters	29 data + 3

A period (".") is used to delimit the bar code data from the supplemental data. Data to the right of the "." is supplemental data; data to the left is bar code data. The two or five digit supplemental can be added to any version of the UPC/EAN code.

The flag 1 option only applies to EAN 8, EAN 13, and UPC version A. For EAN 13, enabling the flag 1 option prints the first character of the bar code interpretive. For EAN 8 and UPC version A, enabling the flag 1 option moves the first and last character of the bar code interpretive outside of the guard bars.

POSTNET

The Postal Numeric Encoding Technique (POSTNET) uses binary digits, represented as full bars and half bars, to provide a numeric bar code symbology that is easily read and decoded by optical reading systems. POSTNET provides both error detection and correction capabilities.

2D Symbologies

2D symbologies provide a more efficient way of encoding data than standard bar code symbologies. 2D symbologies use two dimensions to hold data instead of one, allowing much more information to be stored in a smaller amount of space. Your 4400 printer provides the capability for printing both stacked and matrix 2D symbologies.

2D Stacked Symbologies

2D stacked symbologies (such as PDF 417, Code 16K, and Code 49) consist of short linear segments stacked on top of each other. In addition to being able to condense a large amount of information into the stacked format, PDF 417 provides an extensive error detection and correction option. Up to 510 characters can be recovered if they are lost due to an error in scanning or if the label is damaged.

2D stacked symbologies can be scanned with a laser scanner or imaging device that features 2D code scanning capability.

Code 16K

Introduced in 1988, Code 16K is an alphanumeric symbology similar to Code 49 in that it employs multiple rows (from 2 to 16). Each row is fixed length and uses a mirror image of the Code 128 coding patterns.

<SUB> 1 is used to represent the Function 1 character in 86XX emulation mode. In advanced mode, the Function 1 character is represented by entering <SUB><SUB> 1. The characters for Functions 2, 3, and 4 are represented in the same way.

If you want to produce a square symbol, specify a height magnification of 1 in advanced mode.

Code 49

Code 49 is an alphanumeric symbology developed in 1987 as a means of labeling very small objects. A Code 49 bar code contains from two to eight adjacent rows, each separated by a one-module separator bar.

In emulation mode, <SUB> 1 is used to represent the Function 1 character. In advanced mode, <SUB><SUB> 1 is used to represent the Function 1 character. The characters for Functions 2 and 3 are represented in the same way.

If you want to produce a square symbol, specify a height magnification of 2 in advanced mode. A square symbol is specified by a height magnification of 250 in emulation mode.

Only alphanumeric (0) and numeric (2) modes are supported.

PDF 417

PDF 417 is a stacked 2D symbology that provides the ability to scan across rows of code. Each row consists of start/stop characters, row identifiers, and symbol characters (called "codewords"). Each codeword consists of four bars and four spaces and contain the actual data. In addition to being able to condense a large amount of information into the stacked format, PDF 417 provides an extensive error detection and correction option. Up to 510 characters can be recovered if they are lost due to an error in scanning or if the label is damaged. PDF 417 codes can be scanned with a laser scanner or imaging device that features 2D code scanning capability.

2D Matrix Symbologies

2D matrix symbologies, such as Code One, use both the horizontal and vertical axes to encode data even more efficiently than stacked symbologies. 2D matrix codes are created as a matrix of square elements, with each element being either white or black to encode data in a binary code. Extensive error detection and correction codes are appended to 2D matrix symbologies, often automatically.

2D matrix symbologies generally cannot be read with a laser scanner. Instead, they are read by a digital imager that captures the entire symbol at once instead of scanning each component individually. Since the components of 2D matrix symbologies are decoded after the image is captured, they permit very fast data collection.

Code One

Code One is a 2D matrix symbology that stores data directly in a matrix in a checkerboard pattern. This matrix makes Code One especially useful for applications such as small parts labels that do not provide sufficient space for linear bar codes. Code One automatically generates error correction symbol characters that are added to the matrix. In addition to data storage and error correction symbols, each Code One symbol contains a set of horizontal lines in the center, called a finder pattern, that helps readers quickly locate and identify each symbol. Code One symbols also contain vertical reference bars to help readers locate the relative positions of each data bit.

Code One symbols accommodate varying amounts of data using a different method than other codes. Other codes adjust their size to fit the data exactly. Code One symbols are divided into versions, with each version being a specific size. Each version can accommodate an amount of data from one bit to the maximum amount that will fit into that version. If more data is present than the version can accommodate, the printer will not print the symbol.

Code One symbols cannot be read with a laser scanner. Instead, they are read by a digital imager which captures the entire symbol at once instead of scanning each component individually. Since the components of each Code One symbol are decoded after the image is captured, they permit very fast data collection.

Maxicode

Maxicode is a fixed-size symbology that is made up of offset rows of hexagonal elements arranged around a bullseye finder pattern. Each hexagon represents one bit of information and is either black or white depending on the state of the encoded data bit. United Parcel Service (UPS) Research and Development developed Maxicode for the specific purpose of encoding information about a parcel.

This symbology only encodes very specific data that is divided into the following fields: a 5-digit zip code, a 4-digit zip code extension, a 3-digit country code, a 3-digit class of service, and a string of uppercase letters, numbers, or limited punctuation marks.

Printer Options

Listed below are some of the options available with the 4400 printer. Consult your Intermec representative for a complete listing of options.

Self Strip

If you apply labels one at a time, as soon as they are printed, you can work more quickly and easily using the Self-Strip option. With this option the printer does not present a new label until you have removed the backing from the previous one.

Cutter and Tray

With the Cutter and Tray, your 4400 printer cuts continuous media into individual labels and drop them into a tray ready for use. This option works best for individual random label lengths or short batches of different label lengths.

Narrow Media Accessory Kit

The narrow media adapter accessory kit allows you to print roll stock that is less than 1.5 inches (3.81 cm) wide. Using this narrow roll support accessory prevents the media roll from telescoping. The combination of the narrow media adapter and the narrow roll support accessory allows you to use media as narrow as 0.5 inches.

Memory Expansion

Expanded memory provides additional nonvolatile (battery backed) bulk storage to hold more formats, fonts, or bitmap graphics.

Twinax Interface

This option lets you connect your printer to an IBM Twinax cable system with a Twinax interface so your 4400 printer emulates an IBM 5256 Model 1 printer and can operate with an IBM System / 34, System / 36, System / 38 or AS / 400 host computer.

Coax Interface

The Coax Interface Adapter lets the 4400 printer emulate an IBM 3287 printer by connecting the printer to IBM 3270 Type A Coax cable computer systems operating in the VTAM (CICS / IMS / TSO) or 8100 (DPPX) environments. With the Coax adapter you can connect the printer to an IBM 3174 or IBM 3274 / 76 / 99 system controller / multiplexer.

Centronics Parallel Interface

This option lets you connect your printer to a PC through a Centronics parallel interface.

Intermec does not provide a cable for use with the parallel interface. The following information will allow you to make your own interface cable.

The following pin descriptions are for the printer's parallel interface connector:

Signal	Pin	Return	Direction	Description
DATASTB	1	19	IN	Negative pulse. Latches DB0-7 on the rising edge. 8 bits in parallel provide data input. High is logical 1 and LOW is logical 0.
DB0	2	20	IN	
DB1	3	21	IN	
DB2	4	22	IN	
DB3	5	23	IN	
DB4	6	24	IN	
DB5	7	25	IN	
DB6	8	26	IN	
DB7	9	27	IN	
ACK	10	28	OUT	Negative pulse. Data has been received.

Signal	Pin	Return	Direction	Description
BUSY	11	29	OUT	If HIGH, printer cannot receive data.
PE	12	30	OUT	If HIGH, out of ribbon or media.
SELECT	13	-	OUT	Pulled to +5V. Printer is on.
CHASSIS GND	17	-	-	Printer's chassis gnd isolated from logic gnd.
INIT	31	16	IN	Clears I/OINT0 latch.
FAULT	32	33	OUT	See printer display.

Note: *The maximum cable length for a parallel interface is 10 feet. The parallel interface only allows one way communication with the printer. You may download from the host terminal, but you cannot upload from the printer.*

International Character Sets

The following tables show which hex codes to download for international characters not available in the U.S. character set. To use the tables, find the hex code for the U.S. character that corresponds with the character in your language.

4400 Character Table

If you are running your printer in 4400 mode (you are not using 86XX emulation), use this table to find the right hex codes for the international character sets.

	23	24	40	5E	5C	5D	5E	60	7E	7C	7D	7E
U.S. ASCII	#	$	@	[	\	]	^	`	{	¦	}	~
U.K. ASCII	£	$	@	[	\	]	^	`	{	¦	}	¯
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
France	£	$	à	°	ç	§	^	`	é	ù	è	_
Norway/Denmark	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	¨
Sweden/Finland	#	Ì	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Spain	£	$	§	¡	Ñ	¿	^	`	°	ñ	ç	~
Switzerland	#	$	à	°	ç	é	^	ù	ä	ö	ü	è
Italy	£	$	§	°	ç	é	^	ù	à	ò	è	ì

8636/46 Character Table

This table shows the hex codes for the character sets that print if your printer is running under 86XX emulation mode.

	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S. ASCII	#	$	@	[	\	]	^	`	{	¦	}	~
U.K. ASCII	£	$	@	[	\	]	^	`	{	¦	}	~
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
France	£	$	à	°	ç	§	^	`	é	ù	è	¨
Norway/Denmark	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden/Finland	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Spain	P_t	$	@	¡	Ñ	¿	^	`	¨	ñ	ç	~
Switzerland	#	$	à	°	ç	é	^	ù	ä	ö	ü	è
Italy	#	$	§	°	ç	é	^	ù	à	ò	è	ì

Translation Character Table

If you are running your printer with Translation enabled, use this table to find the right hex codes for the international character sets.

	4F	7B	5B	7C	4A	E0	5A	5F	79	C0	6A	D0	A1
U.S. ASCII	¦	#	$	@	¢	\	!	¬	`	{	¦	}	~
U.K. ASCII	¦	#	£	@	$	\	!	¬	`	{	¦	}	_
Germany	!	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
France	!	£	$	à	°	ç	§	^	`	é	ù	è	¨
Norway/Denmark	!	Æ	Å	Ø	#	\	¤	^	`	æ	ø	å	ü
Sweden/Finland	!	Ä	Å	Ö	§	É	¤	^	é	ä	ö	å	ü
Spain	¦	Ñ	Pt	@	[	\	]	¬	`	{	ñ	}	¨
Switzerland	!	#	$	à	°	ç	é	^	ù	ä	ö	ü	è
Italy	!	£	$	§	°	ç	é	^	ù	à	ò	è	ì

Extended Character Sets

Each internal font in the 4400 has a different character set associated with it as shown in the following tables. The hex codes accompany each character.

Characters in Fonts c0: 7x9 Standard, c1: 7x11 OCR, c2: 10x14 Standard

NL ØØ	SH Ø1	SX Ø2	EX Ø3	ET Ø4	EQ Ø5	AK Ø6	BL Ø7	BS Ø8	HT Ø9	LF ØA	VT ØB	FF ØC	CR ØD	SO ØE	SI ØF
DL 1Ø	D1 11	D2 12	D3 13	D4 14	NK 15	SN 16	EB 17	CN 18	EM 19	SB 1A	EC 1B	FS 1C	GS 1D	RS 1E	US 1F
2Ø	! 21	" 22	# 23	$ 24	% 25	& 26	' 27	(28	) 29	* 2A	+ 2B	, 2C	- 2D	. 2E	/ 2F
0 3Ø	1 31	2 32	3 33	4 34	5 35	6 36	7 37	8 38	9 39	: 3A	; 3B	< 3C	= 3D	> 3E	? 3F
@ 4Ø	A 41	B 42	C 43	D 44	E 45	F 46	G 47	H 48	I 49	J 4A	K 4B	L 4C	M 4D	N 4E	O 4F
P 5Ø	Q 51	R 52	S 53	T 54	U 55	V 56	W 57	X 58	Y 59	Z 5A	[5B	\ 5C	] 5D	^ 5E	_ 5F
` 6Ø	a 61	b 62	c 63	d 64	e 65	f 66	g 67	h 68	i 69	j 6A	k 6B	l 6C	m 6D	n 6E	o 6F
p 7Ø	q 71	r 72	s 73	t 74	u 75	v 76	w 77	x 78	y 79	z 7A	{ 7B	¦ 7C	} 7D	~ 7E	▒ 7F
Ŗ 8Ø	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F
9Ø	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F
AØ	¡ A1	A2	£ A3	¤ A4	¥ A5	A6	§ A7	¨ A8	A9	AA	AB	AC	AD	AE	AF
° BØ	B1	B2	B3	B4	B5	B6	B7	B8	B9	BA	BB	BC	BD	BE	¿ BF
CØ	C1	C2	C3	Ä C4	Å C5	Æ C6	C7	C8	É C9	CA	CB	CC	CD	CE	CF
DØ	Ñ D1	D2	D3	D4	D5	Ö D6	D7	ø D8	D9	DA	DB	Ü DC	DD	DE	ß DF
à EØ	E1	E2	E3	ä E4	E5	æ E6	ç E7	è E8	é E9	EA	ë EB	ì EC	ED	EE	EF
FØ	ñ F1	ò F2	F3	F4	F5	ö F6	F7	ø F8	ù F9	FA	FB	ü FC	FD	FE	FF

4400-86

Characters in Font c7: 5x7 Standard

NL ØØ	SH Ø1	SX Ø2	EX Ø3	ET Ø4	EQ Ø5	AK Ø6	BL Ø7	BS Ø8	HT Ø9	LF ØA	VT ØB	FF ØC	CR ØD	SO ØE	SI ØF
DL 1Ø	D1 11	D2 12	D3 13	D4 14	NK 15	SN 16	EB 17	CN 18	EM 19	SB 1A	EC 1B	FS 1C	GS 1D	RS 1E	US 1F
2Ø	! 21	" 22	# 23	$ 24	% 25	& 26	' 27	(28	) 29	* 2A	+ 2B	, 2C	- 2D	. 2E	/ 2F
0 3Ø	1 31	2 32	3 33	4 34	5 35	6 36	7 37	8 38	9 39	: 3A	; 3B	< 3C	= 3D	> 3E	? 3F
@ 4Ø	A 41	B 42	C 43	D 44	E 45	F 46	G 47	H 48	I 49	J 4A	K 4B	L 4C	M 4D	N 4E	O 4F
P 5Ø	Q 51	R 52	S 53	T 54	U 55	V 56	W 57	X 58	Y 59	Z 5A	[5B	\ 5C	] 5D	^ 5E	_ 5F
` 6Ø	a 61	b 62	c 63	d 64	e 65	f 66	g 67	h 68	i 69	j 6A	k 6B	l 6C	m 6D	n 6E	o 6F
p 7Ø	q 71	r 72	s 73	t 74	u 75	v 76	w 77	x 78	y 79	z 7A	{ 7B	¦ 7C	} 7D	~ 7E	▒ 7F
Ŗ 8Ø	ȧ 81	■ 82	□ 83	▵ 84	△ 85	86	87	88	89	8A	8B	8C	8D	8E	8F
9Ø	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F
AØ	¡ A1	A2	£ A3	¤ A4	¥ A5	A6	§ A7	¨ A8	A9	AA	AB	AC	AD	AE	AF
° BØ	B1	B2	B3	B4	B5	B6	B7	B8	B9	BA	BB	BC	BD	BE	¿ BF
CØ	C1	C2	C3	Ä C4	Å C5	Æ C6	C7	C8	É C9	CA	CB	CC	CD	CE	CF
DØ	Ñ D1	D2	D3	D4	D5	Ö D6	D7	ø D8	D9	DA	DB	Ü DC	DD	DE	ß DF
à EØ	E1	E2	E3	ä E4	å E5	æ E6	ç E7	è E8	é E9	EA	ë EB	ì EC	ED	EE	EF
FØ	ñ F1	ò F2	F3	F4	F5	ö F6	F7	ø F8	ù F9	FA	FB	ü FC	FD	FE	FF

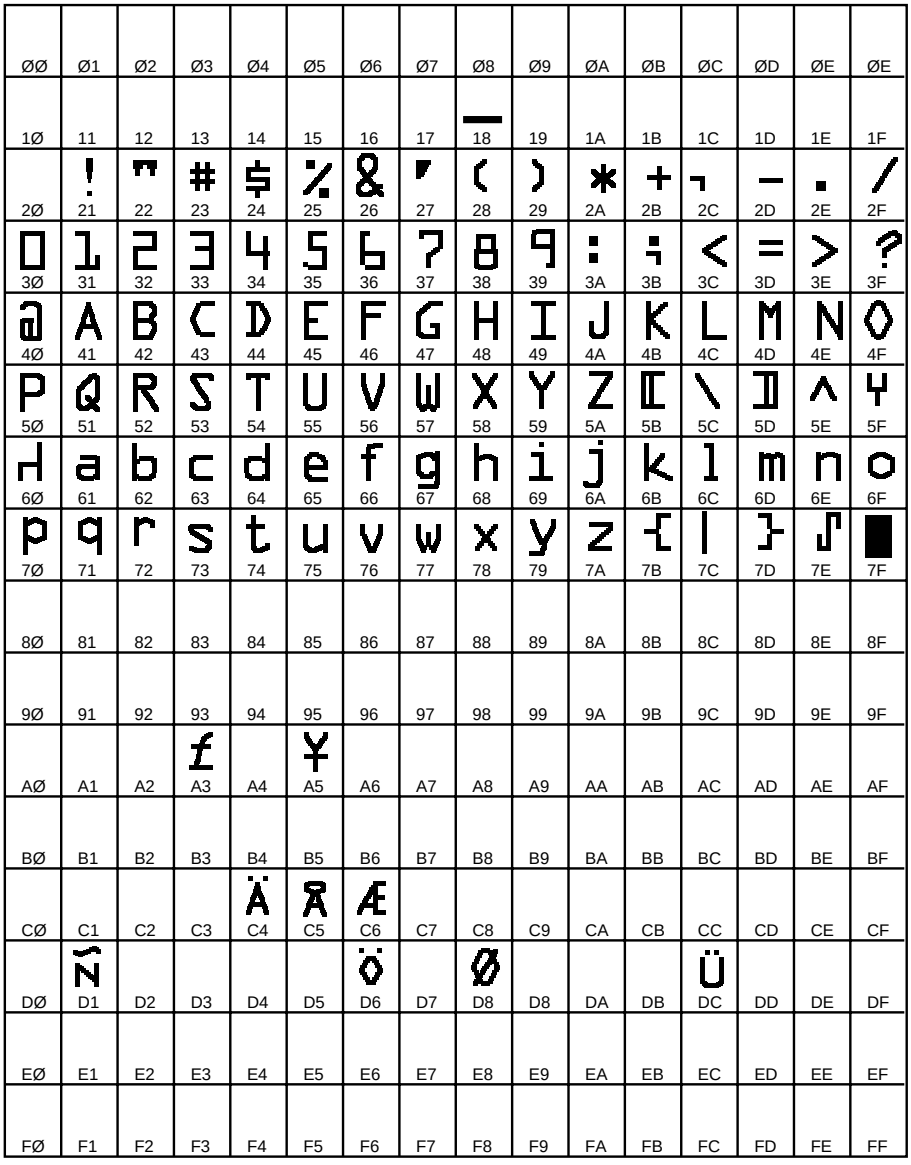
4400-80

Characters in Font c22: 20 Point

ØØ	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	ØA	ØB	ØC	ØD	ØE	ØE
1Ø	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
2Ø	! 21	" 22	# 23	$ 24	% 25	& 26	’ 27	(28	) 29	* 2A	+ 2B	, 2C	- 2D	. 2E	/ 2F
0 3Ø	1 31	2 32	3 33	4 34	5 35	6 36	7 37	8 38	9 39	: 3A	; 3B	< 3C	= 3D	> 3E	? 3F
@ 4Ø	A 41	B 42	C 43	D 44	E 45	F 46	G 47	H 48	I 49	J 4A	K 4B	L 4C	M 4D	N 4E	O 4F
P 5Ø	Q 51	R 52	S 53	T 54	U 55	V 56	W 57	X 58	Y 59	Z 5A	[5B	\ 5C	] 5D	^ 5E	_ 5F
` 6Ø	a 61	b 62	c 63	d 64	e 65	f 66	g 67	h 68	i 69	j 6A	k 6B	l 6C	m 6D	n 6E	o 6F
p 7Ø	q 71	r 72	s 73	t 74	u 75	v 76	w 77	x 78	y 79	z 7A	{ 7B	| 7C	} 7D	~ 7E	7F
8Ø	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F
9Ø	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F
AØ	¡ A1	A2	£ A3	¤ A4	¥ A5	A6	§ A7	¨ A8	A9	AA	AB	AC	AD	AE	AF
° BØ	B1	B2	B3	B4	B5	B6	B7	B8	B9	BA	BB	BC	BD	BE	¿ BF
CØ	C1	C2	C3	Ä C4	Å C5	Æ C6	C7	C8	É C9	CA	CB	CC	CD	CE	CF
DØ	Ñ D1	D2	D3	D4	D5	Ö D6	D7	Ø D8	D8	DA	DB	Ü DC	DD	DE	ß DF
à EØ	E1	E2	E3	ä E4	å E5	æ E6	ç E7	è E8	é E9	EA	ë EB	ì EC	ED	EE	EF
FØ	ñ F1	ò F2	F3	F4	F5	ö F6	F7	ø F8	ù F9	FA	FB	ü FC	FD	FE	FF

4400-81

Characters in Font c23: OCR A



4400-82

Characters in Font c24: OCR B Size 2

ØØ	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	ØA	ØB	ØC	ØD	ØE	ØE
1Ø	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
2Ø	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
3Ø	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
4Ø	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
5Ø	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
6Ø	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
7Ø	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
8Ø	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F
9Ø	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F
AØ	A1	A2	A3	A4	A5	A6	A7	A8	A9	AA	AB	AC	AD	AE	AF
BØ	B1	B2	B3	B4	B5	B6	B7	B8	B9	BA	BB	BC	BD	BE	BF
CØ	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB	CC	CD	CE	CF
DØ	D1	D2	D3	D4	D5	D6	D7	D8	D8	DA	DB	DC	DD	DE	DF
EØ	E1	E2	E3	E4	E5	E6	E7	E8	E9	EA	EB	EC	ED	EE	EF
FØ	F1	F2	F3	F4	F5	F6	F7	F8	F9	FA	FB	FC	FD	FE	FF

4400-83

Characters in Fonts c25: Outline Font, c20: 8 Point, c21: 12 Point

ØØ	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	ØA	ØB	ØC	ØD	ØE	ØE
1Ø	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
2Ø	! 21	" 22	# 23	$ 24	% 25	& 26	’ 27	(28	) 29	* 2A	+ 2B	, 2C	- 2D	. 2E	/ 2F
0 3Ø	1 31	2 32	3 33	4 34	5 35	6 36	7 37	8 38	9 39	: 3A	; 3B	< 3C	= 3D	> 3E	? 3F
@ 4Ø	A 41	B 42	C 43	D 44	E 45	F 46	G 47	H 48	I 49	J 4A	K 4B	L 4C	M 4D	N 4E	O 4F
P 5Ø	Q 51	R 52	S 53	T 54	U 55	V 56	W 57	X 58	Y 59	Z 5A	[5B	\ 5C	] 5D	^ 5E	_ 5F
` 6Ø	a 61	b 62	c 63	d 64	e 65	f 66	g 67	h 68	i 69	j 6A	k 6B	l 6C	m 6D	n 6E	o 6F
p 7Ø	q 71	r 72	s 73	t 74	u 75	v 76	w 77	x 78	y 79	z 7A	{ 7B	| 7C	} 7D	~ 7E	7F
8Ø	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F
9Ø	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F
AØ	¡ A1	¢ A2	£ A3	¤ A4	¥ A5	¦ A6	§ A7	¨ A8	© A9	a AA	« AB	¬ AC	- AD	® AE	¯ AF
º BØ	± B1	2 B2	3 B3	´ B4	µ B5	¶ B6	· B7	¸ B8	1 B9	0 BA	» BB	1/4 BC	1/2 BD	3/4 BE	¿ BF
À CØ	Á C1	Â C2	Ã C3	Ä C4	Å C5	Æ C6	Ç C7	È C8	É C9	Ê CA	Ë CB	Ì CC	Í CD	Î CE	Ï CF
Ð DØ	Ñ D1	Ò D2	Ó D3	Ô D4	Õ D5	Ö D6	× D7	Ø D8	Ù D8	Ú DA	Û DB	Ü DC	Ý DD	Þ DE	ß DF
à EØ	á E1	â E2	ã E3	ä E4	å E5	æ E6	ç E7	è E8	é E9	ê EA	ë EB	ì EC	í ED	î EE	ï EF
ð FØ	ñ F1	ò F2	ó F3	ô F4	õ F5	ö F6	÷ F7	ø F8	ù F9	ú FA	û FB	ü FC	ý FD	þ FE	ÿ FF

4400-84

ASCII Conversion Chart

FULL ASCII

Binary[0]	Hex[1]	Dec[2]	C39[3]	Char[4]	Binary	Hex	Dec	C39	Char	Control	Character Definitions[5]
00000000	00	00	%U	NUL	01000000	40	64	%V	@	NUL	Null, or all zeroes
00000001	01	01	$A	SOH	01000001	41	65	A	A	SOH	Start of Heading
00000010	02	02	$B	STX	01000010	42	66	B	B	STX	Start of Text
00000011	03	03	$C	ETX	01000011	43	67	C	C	ETX	End of Text
00000100	04	04	$D	EOT	01000100	44	68	D	D	EOT	End of Transmission
00000101	05	05	$E	ENQ	01000101	45	69	E	E	ENQ	Enquiry
00000110	06	06	$F	ACK	01000110	46	70	F	F	ACK	Acknowledgement
00000111	07	07	$G	BEL	01000111	47	71	G	G	BEL	Bell
00001000	08	08	$H	BS	01001000	48	72	H	H	BS	Backspace
00001001	09	09	$I	HT	01001001	49	73	I	I	HT	Horizontal Tab
00001010	0A	10	$J	LF	01001010	4A	74	J	J	LF	Line Feed
00001011	0B	11	$K	VT	01001011	4B	75	K	K	VT	Vertical Tab
00001100	0C	12	$L	FF	01001100	4C	76	L	L	FF	Form Feed
00001101	0D	13	$M	CR	01001101	4D	77	M	M	CR	Carriage Return
00001110	0E	14	$N	SO	01001110	4E	78	N	N	SO	Shift Out
00001111	0F	15	$O	SI	01001111	4F	79	O	O	SI	Shift In
00010000	10	16	$P	DLE	01010000	50	80	P	P	DLE	Data Link Escape
00010001	11	17	$Q	DC1	01010001	51	81	Q	Q	DC1	Device Control 1 (XON)
00010010	12	18	$R	DC2	01010010	52	82	R	R	DC2	Device Control 2
00010011	13	19	$S	DC3	01010011	53	83	S	S	DC3	Device Control 3 (XOFF)
00010100	14	20	$T	DC4	01010100	54	84	T	T	DC4	Device Control
00010101	15	21	$U	NAK	01010101	55	85	U	U	NAK	Negative Acknowledge
00010110	16	22	$V	SYN	01010110	56	86	V	V	SYN	Syncronous Idle
00010111	17	23	$W	ETB	01010111	57	87	W	W	ETB	End Transmission Block
00011000	18	24	$X	CAN	01011000	58	88	X	X	CAN	Cancel
00011001	19	25	$Y	EM	01011001	59	89	Y	Y	EM	End of Medium
00011010	1A	26	$Z	SUB	01011010	5A	90	Z	Z	SUB	Substitute
00011011	1B	27	%A	ESC	01011011	5B	91	%K	[	ESC	Escape
00011100	1C	28	%B	FS	01011100	5C	92	%L	\	FS	File Separator
00011101	1D	29	%C	GS	01011101	5D	93	%M	]	GS	Group Separator
00011110	1E	30	%D	RS	01011110	5E	94	%N	^	RS	Record Separator
00011111	1F	31	%E	US	01011111	5F	95	%O	_	US	Unit Separator
00100000	20	32	SP	SP[6]	01100000	60	96	%W	`	SP	Space
00100001	21	33	/A	!	01100001	61	97	+A	a	DEL	Delete
00100010	22	34	/B	"	01100010	62	98	+B	b		
00100011	23	35	/C	#	01100011	63	99	+C	c		
00100100	24	36	/D	$	01100100	64	100	+D	d		
00100101	25	37	/E	%	01100101	65	101	+E	e		
00100110	26	38	/F	&	01100110	66	102	+F	f		
00100111	27	39	/G	'	01100111	67	103	+G	g		
00101000	28	40	/H	(	01101000	68	104	+H	h		
00101001	29	41	/I	)	01101001	69	105	+I	i		
00101010	2A	42	/J	*	01101010	6A	106	+J	j		
00101011	2B	43	/K	+	01101011	6B	107	+K	k		
00101100	2C	44	/L	,	01101100	6C	108	+L	l		
00101101	2D	45	/M	-	01101101	6D	109	+M	m		
00101110	2E	46	/N	.	01101110	6E	110	+N	n		
00101111	2F	47	/O	/	01101111	6F	111	+O	o		
00110000	30	48	/P[7]	0	01110000	70	112	+P	p		
00110001	31	49	/Q	1	01110001	71	113	+Q	q		
00110010	32	50	/R	2	01110010	72	114	+R	r		
00110011	33	51	/S	3	01110011	73	115	+S	s		
00110100	34	52	/T	4	01110100	74	116	+T	t		
00110101	35	53	/U	5	01110101	75	117	+U	u		
00110110	36	54	/V	6	01110110	76	118	+V	v		
00110111	37	55	/W	7	01110111	77	119	+W	w		
00111000	38	56	/X	8	01111000	78	120	+X	x		
00111001	39	57	/Y	9	01111001	79	121	+Y	y		
00111010	3A	58	/Z	:	01111010	7A	122	+Z	z		
00111011	3B	59	%F	;	01111011	7B	123	%P	{		
00111100	3C	60	%G	<	01111100	7C	124	%Q	|		
00111101	3D	61	%H	=	01111101	7D	125	%R	}		
00111110	3E	62	%I	>	01111110	7E	126	%S	~		
00111111	3F	63	%J	?	01111111	7F	127	%T[8]	■[9]		

Notes

0 Bit positions are 76543210
1 Hexadecimal value
2 Decimal value
3 Code 39 character(s)
4 ASCII character
5 Hold down Control key and press key to left of definition
6 SP is the SPACE character
7 The Code 39 characters /P through /Y may be interchanged with the numbers 0 through 9
8 May be interchanged with %X or %Y or %Z
9 ■ is the DELETE character

ASCI7x10

G

Glossary

ASCII
American Standard Code for Information Interchange. A standard, 7-bit character code used for computing.

backing
Silicon release liner on media to which labels are attached until ready for use.

bar code
A printed machine-readable code that consists of parallel bars of varied width and spacing.

batch takeup
A device that rewinds media; useful for printing batches of labels.

BEL
A character that sends an error message.

character set
Refers to specific letters, numerals, and symbols that support a particular language, such as French or US ASCII.

cloning
A procedure that copies the RAM contents (configuration, formats, fonts, pages and graphics) from the memory of one printer to the memory of another.

configuration
The current settings that determine the operating characteristics of the printer.

control panel
A panel on the printer containing the operating and menu keys, liquid crystal display, and indicator lights.

cutter
An optional device for the 4400 printer that cuts individual labels and drops them into a tray.

Data Line Print
A mode of operation in which the printer prints each command (accompanied by its ASCII code) that it receives from the host.

data file
The collection of data and printer commands that, when sent to the printer, is merged with a format file to print a label.

density
The amount of information encoded in a given area.

direct thermal
A method of thermal printing in which images are printed when heat from the thermal printhead produces a black mark on the media.

display
Two-line screen on the control panel that displays messages such as printer status, menus, commands, and errors.

drag
A method of bar code printing in which all the bars are printed at once, in parallel. The bar code appears across the width of the label.

EAN
European Article Numbering. A bar code used widely in Europe.

emulation
An operating mode in which the printer has the operating characteristics of another printer. The 4400 can operate in 8636/46 emulation, which emulates an Intermec 8636 or 8646 printer.

field
A graphic element that is the basic unit of a format. The four basic types of fields are bar code, graphic, line, and text.

fixed data field
Bar code and text fields that never vary from one label to the next; the data in a fixed field is a permanent part of the format.

fixed format
A format in which the data never varies from one label to the next such as a return address label. A fixed format needs no additional data to print a label.

font
A character set of a given type size and style. See also Character Set.

font file
See Soft Font.

form feed
A printer control panel button that advances the media.

format file
The arrangement of fields on a label.

graphic
A bitmap picture downloaded to the printer by the host before printing.

HIBC
Health Industry Bar Code.

human-readable
See Text.

image bands
A portion of an image, in the shape of a strip of the image. A certain number of image bands are stored in memory before printing begins. This method allows printing and imaging to take place simultaneously.

imaging
The process of generating a picture of the label in printer memory.

increment/decrement field
Bar code or text fields the printer automatically changes from one label to the next. For example, a batch of labels with serial number text or bar code fields, that change from 001, to 002, to 003, and so on.

index
To move from the start of the label to the start of print. With continuous media, to advance the media over the “label gap” to the “edge” of the next label.

interpretive field
A text field that describes the data in the associated bar code field.

ISO
International Organization for Standardization. An internationally accepted 7-bit character code. (The US version is ASCII.)

ips
Inches per second. A measurement of print speed that measures the number of inches of media that is printed each second.

label
The part of the media on which data is printed.

label gap
The space between labels on diecut label stock.

LCD
Liquid crystal display. A display comprised of groups of transparent anisotropic liquid segments that are sandwiched between two transparent electrodes. Application of an electric field across a segment changes the reflectivity of the liquid and it becomes opaque.

Main menu
The menu from which all printer commands are available. These commands are divided into categories described by the title of the four menus within the main menu: Operator, Configuration, Service, and Install.

margin
The distance between the edge of a label and where the printing starts on that label. See also Top-of-Form.

media
The label stock on which the printer prints labels. Media can be made of plain paper, polyester, thermally reactive paper, or other materials with adhesive backing.

menu
A list of commands accessible through the Control Panel on the printer. Menus contain submenus and selections of printer features.

mnemonic code
An acronym or abbreviation for a computer instruction, routine or format. For example, <STX> represents the start of text.

Multi-Drop
A protocol capable of controlling communications between a single controller and multiple devices.

nibblized
A software term that refers to grouping bits into sets of four, called nibbles. Usually bits are grouped into sets of eight, called bytes.

OCR font
A font that is recognized by optical character recognition.

offline
The state in which the printer is not able to carry out two-way communication with the host.

online
The state in which the printer is able to carry out two-way communication with the host.

page
A group of labels that are always printed together. When labels on a page share the same data, it reduces the number of commands that must be sent to the printer.

parallel
A communication scheme in which the bits of a byte are transferred simultaneously over a multistrand cable.

parameters
The operating limits of the printer.

picket
A method of bar code printing in which the bars in the bar code are printed one at a time, in a series. The bar code appears along the length of the label.

pitch
(1) The number of characters printed in one horizontal inch determined by the increment by which the printer platen moves. (2) Rotation of a bar code symbol about an axis parallel to the direction of the bars.

point size
Font height; 72 points equals 1 inch as measured from slightly above the top of the uppercase letters to slightly below the bottom of the lowercase descenders.

Polling Mode D
A protocol capable of controlling communications between multiple devices and a single multiport controller.

print speed
Measured in inches per second (ips), the rate at which media travels past the printhead.

printhead
The mechanism inside the printer that prints. The printhead consists of 896 thermal elements (the 4406 contains 672 elements).

printhead elements
The parts of the printhead that print by placing a mark on the label when heated. Each element is 0.00485 square inches in area (the printhead for the 4406 is 0.006575 square inches), and is switched on and off separately in order to react with the media or thermal transfer ribbon to create a mark on the label.

printhead range
The range over which the resistance of the wires that carry energy to the printhead elements can vary before sending a warning. The wires are tested with each Printhead Test.

printhead test
A test that takes place each time the printer is turned on, or receives a specific command from the host. This test makes sure the resistance of the wires that carry energy to the printhead elements are within the acceptable range, which ensures the temperature of the elements is within the acceptable temperature range.

ready
The state in which the printer is able to print; the normal operating state of the printer.

Ready/Busy line
Pin 11 of the rear panel connector. Indicates the printer is ready or not ready.

ribbon save
An optional device for some Intermec printers that disengages the thermal transfer ribbon while labels are being fed forward, or any other time printing does not take place. The 4400 printer does not offer this option.

RS-232
Standard for serial binary data interchange. The standard covers the physical, electrical, and functional characteristics of the interface.

RS-422
Standard for the voltage and impedance levels for serial data transmission on balanced lines.

RS-485
Standard for allowing multiple devices to share a common set of serial data communication lines. The signaling is very similar to RS-422. The maximum number of devices allowed is 32.

scan
To read a bar code with a device known as a scanner, which converts optical information into electrical signals.

scannable
A symbol that can be successfully scanned and correctly decoded.

selective transfer
A procedure that copies selected formats, fonts, graphics, or pages stored in the memory of one printer to the memory of another.

self-strip
An optional device for the 4400 printer that presents each label after it is printed, with the backing removed so it may be applied immediately.

sensitivity
The responsiveness of thermal media, or of thermal transfer ribbon, to heat; it is determined by the time required for a unit measure of heat to affect the media or ribbon.

serial
A communication scheme in which the bits of a byte are transferred one at a time.

skip
To move the paper at slew speed to the next label.

soft font
A file stored in the printer to provide the ability to print text using fonts that are not resident in the printer.

Standard protocol
A communications protocol capable of controlling communications between two devices connected by a single data communication line.

symbology
A scheme for encoding data as bar code. Code 39, Interleaved 2 of 5, and Codabar are examples of different symbologies.

thermal transfer
A method of printing by which heat from the printhead melts ink from the ribbon onto media. The ink adheres to the media as it cools.

top of form
The point at which printing can start on a label. Separated from the edge of the label by the margin.

UPC
Universal Product Code. Bar code used widely in the United States.

user-defined characters (UDC)
See Graphic.

user-defined fonts (UDF)
See Soft Font.

variable data field
Bar code and text fields that change from one label to the next.

XON/XOFF
A protocol that stops the host from sending data when the printer buffer fills up and starts it again when the buffer empties.

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