Intermec

User's Manual

4100 Bar Code Label Printer

P/N 057713-005

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Manual Change Record

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

Version	Date	Description of Change
B	12/92	Added an addendum describing new features of ribbon save and the cutter.
001	2/93	Incorporated addendum and added the cut option. Added a new label that can be downloaded to the printer.
002	8/93	Chapter 7 was reformatted to make it easier to use. Chapter 8 was made to be a universal printer reference guide. Commands that are not compatible with the 4100 printer are noted. Small changes were made to the appendix.
003	10/93	Firmware version 2.3 addendum added to the manual. The changes were made to the communications protocols and the configuration commands such as end-of-print skip distance and the label rest point.
004	10/94	Manual updated to reflect the current style guide. A new file called 4100u-fr.pm4 was added. It contains all of the front matter that was previously included in Chapter 1. What used to be Chapter 2 is now Chapter 1, and so forth. There is no longer a Chapter 8. Firmware version 2.4 information added to the manual. The new information includes: Image before print command HIBC Code 128 New Code 128 selection to ignore brackets and spaces Label rest location range expanded to +/-30 Top of form adjust range expanded to -10 to 4000 Reimage only changed fields Test and Service DIP switch settable functions Different sensitivity number for DT and TTR
005	6/95	Page numbers added to the printer command tables in Chapter 7 and several command descriptions corrected. New cable diagrams added to Chapter 2.

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3 Operating the Printer

5 Troubleshooting

6 Designing Labels and Using Commands

A

Appendix

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 sales organization. In the U.S. call (800) 755-5505, and in Canada call (800) 688-7043. Otherwise, refer to the Worldwide Sales & Service list shipped 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 eqiupment can cause death. If you must perform authorized emergency work on energized equipment, be sure that you comply strictly with approved safety regulations.

Warnings and Cautions

The warnings and cautions 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'apport qui doit être strictement respecté pour éviter l'occurrence de mort ou de blissures 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.

About This Manual

This manual contains all of the information necessary to install, operate, configure, design labels, troubleshoot, and maintain the 3400 printer. Below is a table listing the information contained in each chapter of this manual.

For information on:	Refer to:
Loading Media	Chapter 1, "Getting Started." Provides information on plugging in the printer, loading media, configuring the printer, and printing a configuration test label.
Installing the Printer	Chapter 2, "Installing the Printer." Describes printer installation for a variety of data collection systems.
Printer Operation	Chapter 3, "Operating the Printer." Gives step-by-step procedures for normal printer operations and for everyday maintenance such as reloading media and ribbon.
Maintenance	Chapter 4, "Routine Maintenance." Describes how to keep your 4100 printer running efficiently so it continues to produce top quality labels.
Troubleshooting	Chapter 5, "Troubleshooting." Provides instructions for clearing error messages, troubleshooting programming and configuration problems, and performing DIP switch settable procedures.
Designing Labels	Chapter 6, "Designing Labels and Using Commands." Describes how to use the printer command set to design your labels.
Printer Commands	Chapter 7, "Printer Commands." Provides a complete guide to the printer command set.

Related Intermec Manuals

The following manuals provide additional information about printing labels with your 4100 bar code printer.

Manual	Intermec Part No.
Data Communications Manual	044737
Bar Code Book by Roger C. Palmer	051241

Terms and Conventions

Listed below are special terms and conventions used throughout the manual. For a complete list of terms, refer to the glossary.

Terms

"Printer" refers to the 4100-series bar code printer.

A "symbol" or "bar code symbol" consists of alphanumeric characters encoded in a bar code format.

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

"Reader" refers to a data collection device that decodes bar code symbols into alphanumeric characters.

"Input device" refers to a device used for scanning bar codes, such as a wand or laser scanner.

Conventions

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

- Names of buttons on the printer front panel are uppercase, bold, and enclosed in square brackets. For example, [**FEED**] refers to the button labeled FEED.
- Downloaded commands appear in the order you enter them into the printer:

  Mnemonic representations of ASCII control characters are enclosed in angle brackets <>. For example, <ETX> represents the ASCII "End of Text" control character.

Variable data are enclosed in braces {}. For example: {n} signifies a variable for which you could designate a constant value.

All characters not enclosed in brackets are taken literally. For example, E3;F3; means: [**E**][**3**][**;**][**F**][**3**][**;**] with E and F in uppercase.

Customer Advisory

To reduce the risk of printer errors, the buyer should frequently check the accuracy of printer bar code and alphanumeric information. In those situations where accuracy is imperative, the buyer must 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 according to the procedures in this manual to keep it in good working condition.

1

Getting Started

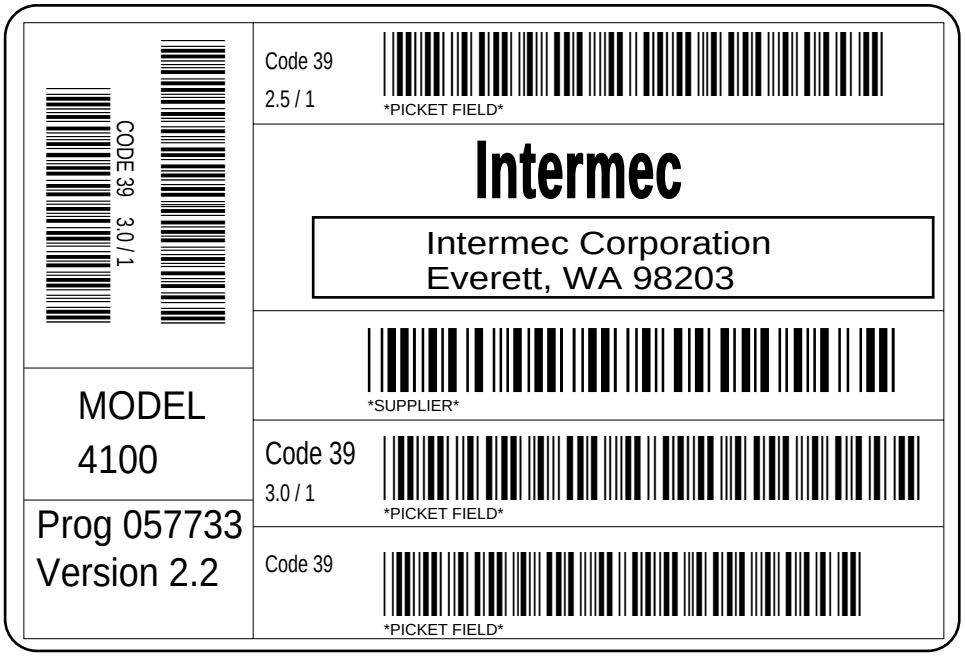
Introduction to the 4100 Printer

The Intermec 4100 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 4100 is an economical printer that can emulate the Intermec 4400 and Intermec 86XX series bar code label printers.

Printing Capabilities

You can use the 4100 printer for all your label needs since it prints many different bar codes, lines, and graphics in user-defined fields. Below is an example of a label printed with a 4100 printer.

Sample Label Printed With a 4100 Printer

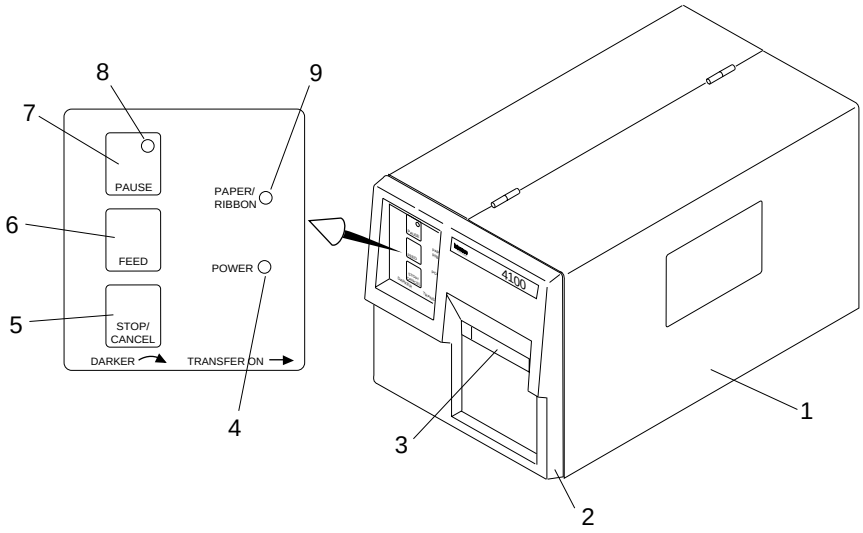


4100-01

Printer Components

The following figures and tables will help familiarize you with the 4100 bar code printer. Be sure you understand the purpose of these components before you use the printer.

Front View of the 4100 Printer

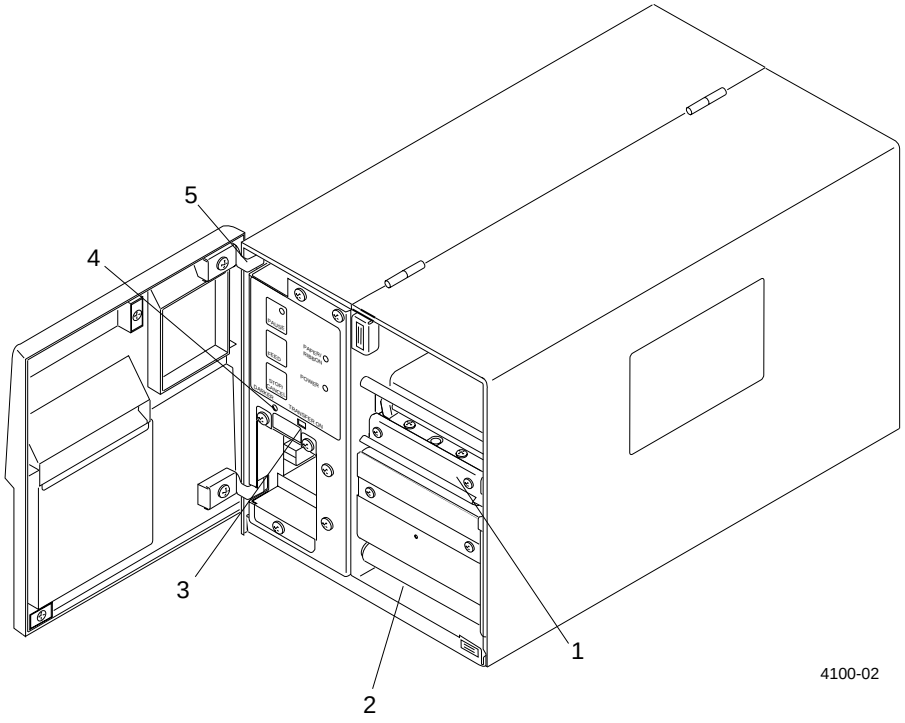


Printer Component Descriptions (Front View)

The following table contains descriptions of the printer components as shown in the previous illustration.

No.	Name	Description
1	Right side cover	Provides access to the media path, printhead, and thermal transfer ribbon.
2	Front panel cover	Provides access to the thermal / thermal transfer switch, and darkness control adjustment knob
3	Label dispense opening	Guides printed labels out of the printer mechanism for removal.
4	Power on indicator	Illuminates when the power switch on the rear panel is turned on.
5	Stop / Cancel button	Cancels the current print job. The printer continues to process subsequent downloaded commands.
6	Feed button	Advances the media.
7	Pause button	Temporarily stops printing and holds all data in memory until the button is pressed a second time to resume printing. Pauses communication with the host.
8	Pause indicator	Illuminates when the [**PAUSE**] button is pressed. Blinks during communication with the host.
9	Paper / Ribbon indicator	Illuminates when no media or ribbon are detected by the printer sensors.

Front View of the 4100 Printer With the Front Cover Open

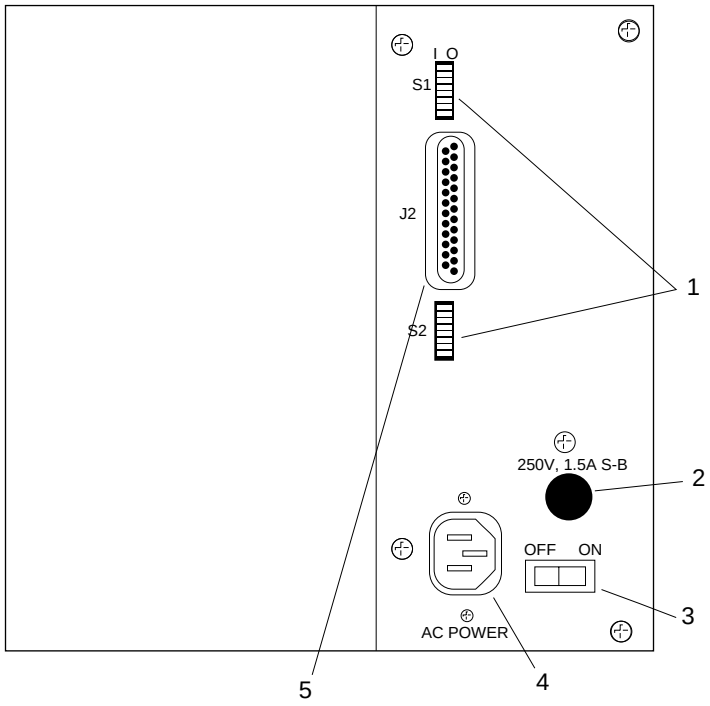


Printer Component Descriptions (Front Interior)

The following table contains descriptions of the printer components as shown in the previous illustration.

No.	Name	Description
1	Drive roller	Advances media through the printer.
2	Rewind assist roller	Guides media to the rewinder hub during batch take-up and self-strip printing.
3	Transfer on switch	Toggles between direct thermal printing (OFF) and thermal transfer printing (ON). Direct thermal printing is the factory default.
4	Darkness control adjustment	Adjusts a new printhead to produce the same level of darkness as the previous printhead. Does not adjust the darkness quality of individual print jobs.
5	Quick remove hinge	Allows the front cover to be easily removed or installed.

Rear View of the 4100 Printer

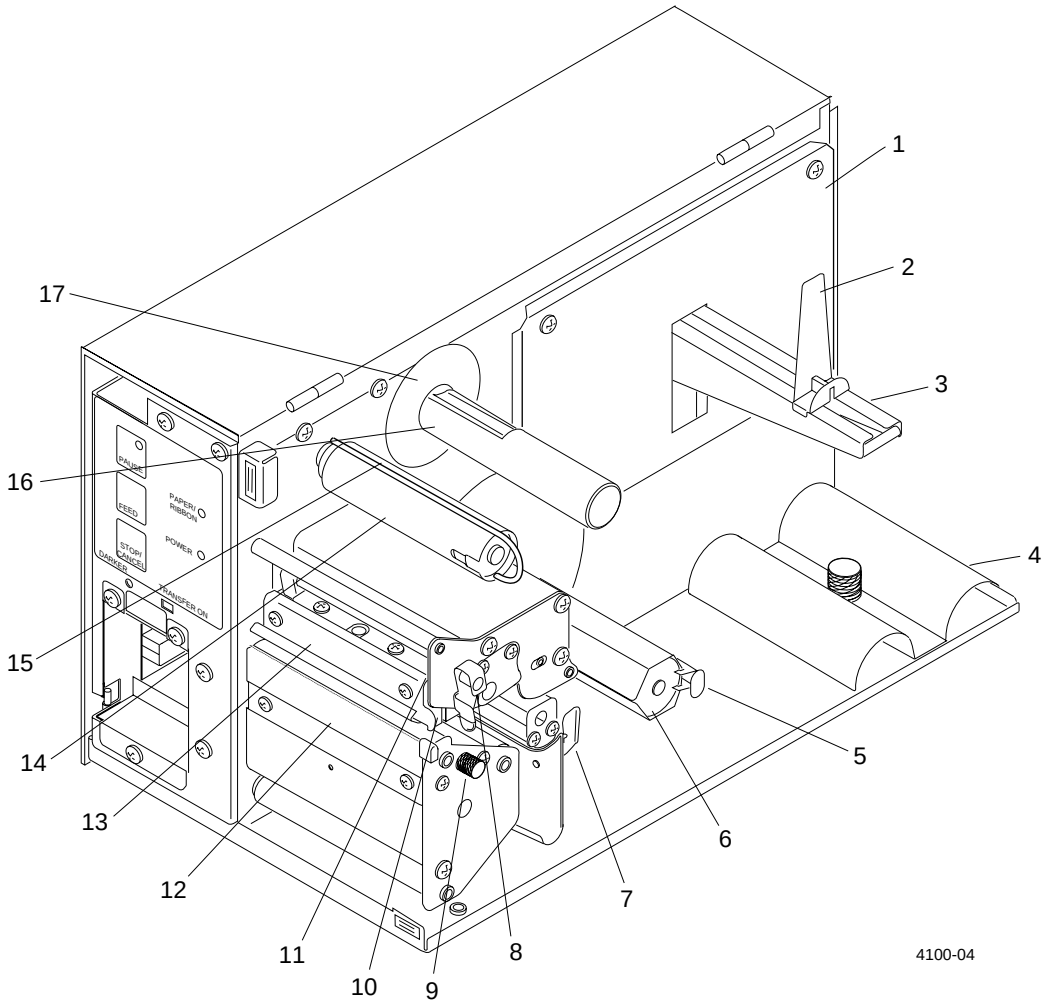


Printer Component Descriptions (Rear View)

The following table contains descriptions of the printer components as shown in the previous illustration.

No.	Name	Description
1	DIP switches	Control various printer modes and configuration settings. The top bank of DIP switches is above the serial port and the bottom bank is beneath the serial port.
2	Fuse holder	Contains a 1.5A Slo-Blo fuse for 115 VAC operation or a double pole circuit breaker at 1.2A for 230 VAC operation.
3	Power switch	Turn the printer on by moving the switch to the ON position and off by moving it to the OFF position.
4	AC power cord receptacle	The AC power cord plugs into this receptacle.
5	Serial communications port	Connects the printer to a host computer with a 25-pin D-style subminiature receptacle.

View of the 4100 Printer Mechanism



Printer Component Descriptions (Mechanism Detail)

The following table contains descriptions of the printer components as shown in the previous illustration.

No.	Name	Description
1	Supply roll back stop	Prevents the roll of unused media from rubbing against the interior of the printer.
2	Supply roll retainer	Secures the roll of unused media to the supply roll hanger.
3	Supply roll hanger	Holds the roll of unused media.
4	Rewind adapter	Guides printed media onto the rewinder hub during batch take-up printing. (Shown in its storage position when not in use).
5	Rewinder clasp	Secures printed media or used media backing to the rewinder hub.
6	Rewinder hub	Collects printed media in batch take-up mode or media bacing in self-strip mode.
7	Label adjust guide	Guides media from the supply roll to the drive roller.
8	Head lift lever	Disengages the printhead for loading media or ribbon and for adjusting printhead alignment.
9	Label gap sensor adjustment	Adjusts the label gap sensor, which scans the media for label gaps or edges so the printer can determine where to start a new label. Adjustable from 0.25" to 2.3".
10	Printhead	Prints label formats as they are transmitted from the host computer. The printhead resolution is 203 dots per inch (DPI).
11	Printhead support adjust screw	Moves the printhead support plate up or down to accomodate narrow media.
12	Tear off plate	Used for tearing off labels in straight-through printing mode.
13	Printhead support plate	Supports the outer end of the printhead when narrow media is used.
14	Ribbon rewind hub	Collects used thermal transfer ribbon.
15	Ribbon clasp	Secures used thermal transfer ribbon to the ribbon rewind hub.
16	Ribbon supply hub	Holds the supply of unused thermal transfer ribbon.
17	Ribbon supply back stop	Prevents the roll of thermal transfer ribbon from rubbing against the interior of the printer.

Printer Options

Listed below are the factory installabel options available for the 4100 printer.

Ribbon Save

Ribbon save is a factory-installed option that lifts the printhead either between labels (interlabel ribbon save) and / or within the label (intralabel ribbon save) so that the ribbon will not advance with the media.

When you use interlabel ribbon save, the printhead lifts when it detects the end of one label and lowers when it detects the front of the next label.

When using intralabel ribbon save, you must set the start and stop zones (lift and lower the printhead) within each label. For example, you may want to use ribbon save when printing a single bar code on a preprinted label. You would then program the 4100 printer to lift the printhead during the preprinted section and lower it when the label has fed far enough to print the bar code. Since the ribbon normally advances with the media when the printhead is down, if the printhead is up the ribbon will not advance with the media and ribbon will be conserved. You can set up to 10 zones per label. The minimum width of these zones depends on your printing speed.

Cutter

The cutter is a factory-installed option. The cutter mechanism can easily be removed at any time to return the printer to its normal tear off, self-strip, or batch rewind print modes. For your safety, the cutter comes with two interlock switches that prevent the cutting mechanism from operating if the front cover is not closed securely.

Operating Specifications

- media width: 0.75 inch (19mm) minimum; 4.25 inch (108mm) maximum
- media length: 0.50 inch (13mm) minimum; no limit on maximum
- media thickness: 0.005 inch (0.127mm) minimum; 0.10 inch (2.54mm) maximum
- tray size: Adjustable from 3.5 to 6.25 inches
- blade life: Approximately 1 million cuts (500,000 per cutting edge depending on media type)

Unpacking the 4100

Unpack the printer and put it on a clean, stable surface for testing. Remove the packing material from the printer mechanism that was used to prevent damage during shipping. Store the shipping container and materials in case you need to ship the printer for any reason.

The front panel cover of the printer is packed in a separate bag and must be installed on the printer. Refer to the instructions later in this section.

Checking the Order for Completeness

As you unpack the printer, verify the contents of the shipping container against this list.

- 4100 printer
- Front panel cover
- AC power cord
- 4100 Printer User's Manual
- Media envelope (contains sample thermal media and information on Intermec media products).

If any parts are missing, please contact your local Intermec representative.

Reporting Damage or Defects

Your 4100 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.*

Installing the Front Panel Cover

Before you can operate the printer, you must install the front panel cover.

To install the cover

1. Remove the front panel cover from its shipping bag.
2. Locate the two hinge pins on the front left of the printer. The top pin is positioned approximately 0.5 inch from the top of the printer, and the bottom pin is 1 inch from the bottom.
3. Align the two hinge pins with the hinges on the front panel cover and lower the cover panel into place on the printer.

Preparing the Printer for Installation

Before you install your 4100 printer and connect it to your data collection system, you need to start your printer and print a configuration test label. This test prints labels that provide information about the printer's configuration. For more detailed testing procedures, see Chapter 5, "Troubleshooting."

Use the instructions on the following pages to prepare your printer for installation. These procedures provide the most efficient method of starting your 4100 printer so you can operate it immediately and take advantage of all its features.

Plugging in the Printer

1. Check that the printer power switch is in the OFF position.
2. Plug the AC power cord into the receptacle on the back of the printer.
3. Plug the other end into a grounded wall outlet or surge protector.
4. Set the power switch (located on the back panel of the printer) to the ON position. When the printer is fully powered, the Power indicator light is lit.

Checking the DIP Switch Settings

Make sure the DIP switches on the rear panel are set to their factory default positions. For the top bank, Switch 1 is set to position 1 (ON) and Switches 2 through 8 are set to position 0 (OFF). For the bottom bank, Switches 1 through 8 are set to 0 (OFF). See "Configuring the Serial Port" in Chapter 2, "Installing the Printer," for details about the 4100 printer's factory default settings.

Opening the Printer

Whenever you load media, or perform most other maintenance procedures, you must open the printer.

To open the printer

1. Facing the front of the printer, grasp the right side of the front panel cover and pull it toward you to release the cover from its magnetic latches. The cover will swing open to the left on its hinges.
2. Grasp the bottom center of the right cover and pull it upward. The hinged right cover should come to rest on the top of the printer. No latches secure this cover when it is in the closed position.

Loading Media

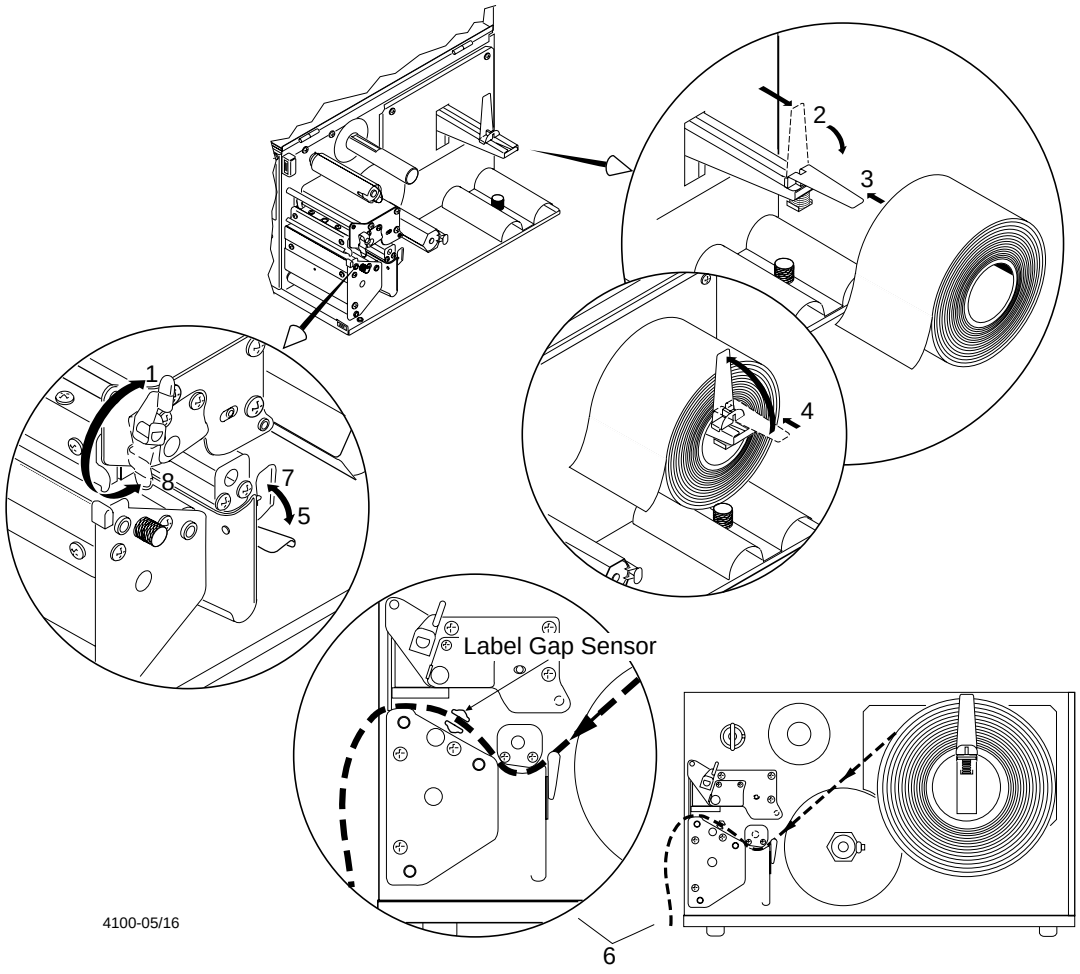
Once you have opened the two printer covers, you can load the media. Use the direct thermal media supplied with the printer to print the subsequent configuration test labels. When loading media, the power to the printer can either be turned on or off. This procedure assumes the printer has been turned on.

Note: *This procedure covers how to load media for the straight-through printing mode using direct thermal label stock on a roll. The printer's factory default is to print in direct thermal mode. Other forms of printing including self-strip mode, batch take-up mode, and thermal transfer printing are explained in Chapter 3, "Operating the Printer."*

To load media

1. Disengage the printhead by rotating the head lift lever clockwise to the UP position.

Loading Media Into the Printer



2. Slide the retainer to the outer end of the supply mount and flip the retainer down.
3. Place the label roll on the supply mount.
4. Flip the retainer to the upright position and slide it back firmly against the roll of media.
5. Rotate the media guide down.
6. Insert the label stock through the printer mechanism as shown. Make sure the label passes between the two forks of the label gap sensor, and that the front edge of the media passes over the tear off plate and through the label dispense opening in the front cover.
7. Rotate the media guide up and slide it to the edge of the media.
8. Engage the printhead by rotating the head lift lever counterclockwise to the DOWN position.
9. Close the right cover and front cover of the printer.
10. Press [**FEED**] to advance several inches of media through the printer and out the label opening in the front cover. The printer is now ready for you to print configuration test labels.

If You Have Difficulty Feeding the Media

The 4100 printer uses a label gap sensor to detect whether media is feeding through the printhead mechanism. If the printer is not sensing the media, try adjusting the label gap sensor's position by turning the adjusting knob for the movable label gap sensor. The sensor gauge behind and below the printhead can be viewed for making this adjustment. The sensor must be positioned over the media for the printer to print correctly.

If a label is not detected within 12 inches of feeding, the printer will stop and the PAPER/RIBBON indicator light will remain lit. In this case, check the threading of the media through the paper path and through the upper and lower media guides of the label gap sensor.

If the paper feeds forward only about 2.5 inches each time you press the feed button and does not seem to be stopping on a label edge, the printer may be configured for continuous stock instead of interlabel gap stock. Download the correct label stock configuration command, found in Chapter 7, "Printer Commands," then press [**FEED**].

Printing Configuration Test Labels

Once you have loaded the media into the printer you are ready to print configuration test labels for your printer's hardware and software configurations. These configuration tests require you to temporarily change the DIP switch settings on the back panel of the printer. When you have completed printing the test labels, be sure to return the DIP switches to their default settings described on page 1-15.

To print a self-test label

1. Turn the printer power switch OFF.
2. Enable Test and Service Mode by moving Switch 8 on the bottom bank of DIP switches to the 1 (ON) position.
3. Turn on the power to the printer. The printer will form-feed a few inches of media. The printer is now in Test and Service mode.
4. To print a hardware configuration label, set all of the switches on the top bank of DIP switches to the 0 (OFF) position. The settings for a software configuration label are the same except Switch 7 on the top bank must be set to the 1 (ON) position.
5. To print one configuration test label, set Switch 8 on the bottom bank of DIP switches to the 0 (OFF) position. To print a batch of 100 configuration test labels, set Switch 8 to the 1 (ON) position.
6. Press the [**FEED**] button to print the configuration test label or labels.
7. To temporarily halt printing, press the [**PAUSE**] button. To terminate the test, press the [**STOP/CANCEL**] button.

Note: *Be sure to return all DIP switches to the original settings after you complete the configuration tests. These switch settings will not take effect until you turn the printer off and then on again.*

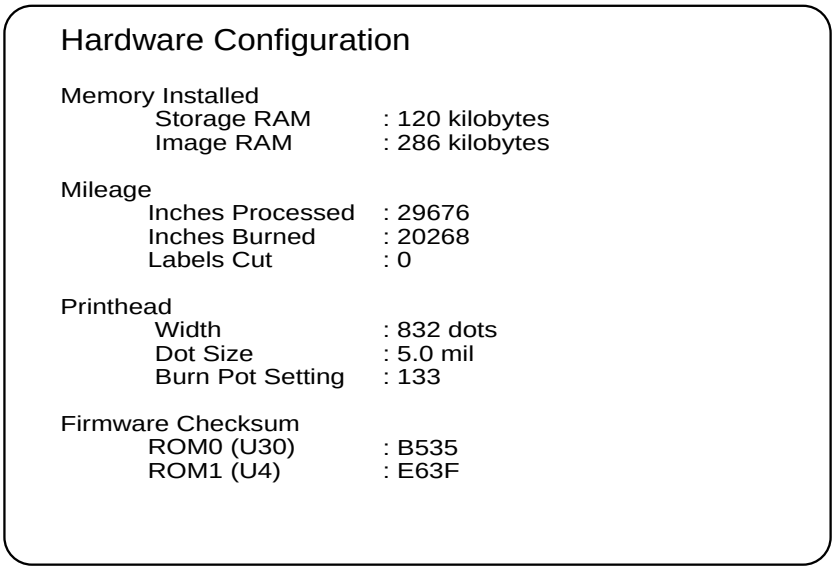
What the Configuration Test Labels Tell You

The configuration test labels offer useful information about your 4100 printer's configuration. The hardware test label provides statistics on the printer's installed memory, the amount of media printed, and on the printhead configuration. The three software test labels give detailed information on the printer's operational settings and capabilities.

If you are experiencing poor print quality, you may need to adjust the printhead support. Refer to Chapter 4, “Adjusting the Printhead Support,” if any of the following items are true:

- The printer is exhibiting signs of ribbon wrinkling.
- The print darkness on the label is inconsistent from top to bottom.
- You are using media less than 3.5 inches wide.

Sample Hardware Configuration Test Label



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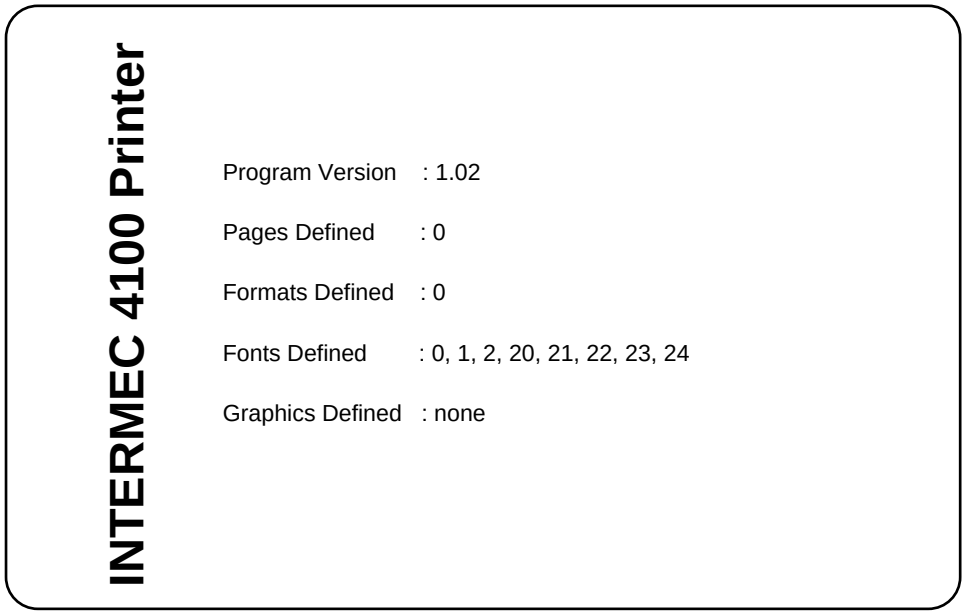
Sample Software Configuration Test Labels



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PRINT SPEED - 3.5 IPS

IMAGE BANDS - 3

MAX LABEL LENGTH - 5 inches

LABEL STOCK - Inter-label gap

MEDIA TYPE - Thermal Transfer

MEDIA LENGTH - 0 inches

CHARACTER SET - US ASCII

EMULATION - Disabled

LABEL RETRACT - Enabled

RIBBON SAVE - Disabled

SELF-STRIP - Disabled

CUTTER - Disabled

DARK ADJUST - 0

FORMS ADJUST - 0

SENSITIVITY - 420

BAUD RATE - 9600

DATA BITS - 7

MESSAGE LENGTH - 255

PARITY - Even

STOP BITS - 1

PROTOCOL - Standard

DEVICE ADDRESS - A

INTERNAL OPTIONS - none

EXTERNAL OPTIONS - none

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2

Installing the Printer

About Printer Installation

The Intermec 4100 bar code printer operates in a wide range of environments and can be configured to match most data collection systems. You can connect your printer directly to a host computer or integrate it into a large data collection network by connecting to the host through a port concentrator or controller. The printer can run in a point-to-point or in a multi-drop network configuration, or from a remote location through a dedicated modem.

This chapter shows how to connect the printer to a host through the printer's serial port. The serial port is wired as a data terminal equipment (DTE) device.

The printer's default communications parameters are suitable for most serial point-to-point installations, but can easily be changed if they are not the correct parameters for your system. Instructions for changing these parameters are included in this chapter.

These installation procedures contain the following information:

- Setting up the printer
- Connecting the printer to the host
- Configuring the serial port
- Determining the appropriate configuration
- Selecting appropriate cables

Preparing for Installation

Before you connect the 4100 printer to your system, you need to follow the steps below to set up your printer. Be sure to print a configuration test label by following the instructions in Chapter 1, "Getting Started."

Situating the Printer

The printer has these physical requirements:

- A location within 5 feet (1.5 m) of an electrical source
- A level, sturdy operating area
- Easy access to the power switch and the rear panel
- Make sure the printer is located away from potential hazards, such as water or other liquids

Connecting the Printer to the Host

You are now ready to connect your printer to the host computer. The proper way to connect the printer depends on the way your system is configured. This section contains procedures for point-to-point and nonswitched modem installations. References are provided for network installations.

Default (Point-to-Point) Installation

The printer's serial port default settings, shown in the table below, are suitable for connecting the serial port on the 4100 printer to most host computers. If these settings are compatible with your system, use the procedure following the table to connect the printer to the host computer.

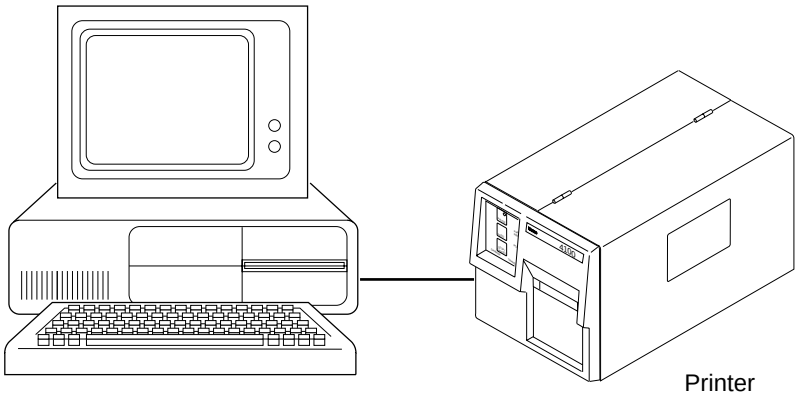
Serial port	Default setting
Baud rate	9600
Data bits	7
Parity	Even
Stop bits	1
Protocol	Standard

To use this procedure to install your system, you need a serial cable with an RS-232C or RS-422/485 interface, a 25-pin D-style subminiature connector on one end, and the appropriate host connector on the other end. If you are unsure about which cable to use, see "Connecting the Printer to a Network" later in this chapter.

To install the printer

1. Plug the 25-pin plug into the serial port on the rear panel of the 4100 printer.
2. Plug the other end of the cable into a serial port on the host computer. Your printer is now installed.
3. If necessary, change the printer configuration to match the host. See "Configuring the Serial Port" later in this chapter.

Typical Point-to-Point Installation



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About Network Installations

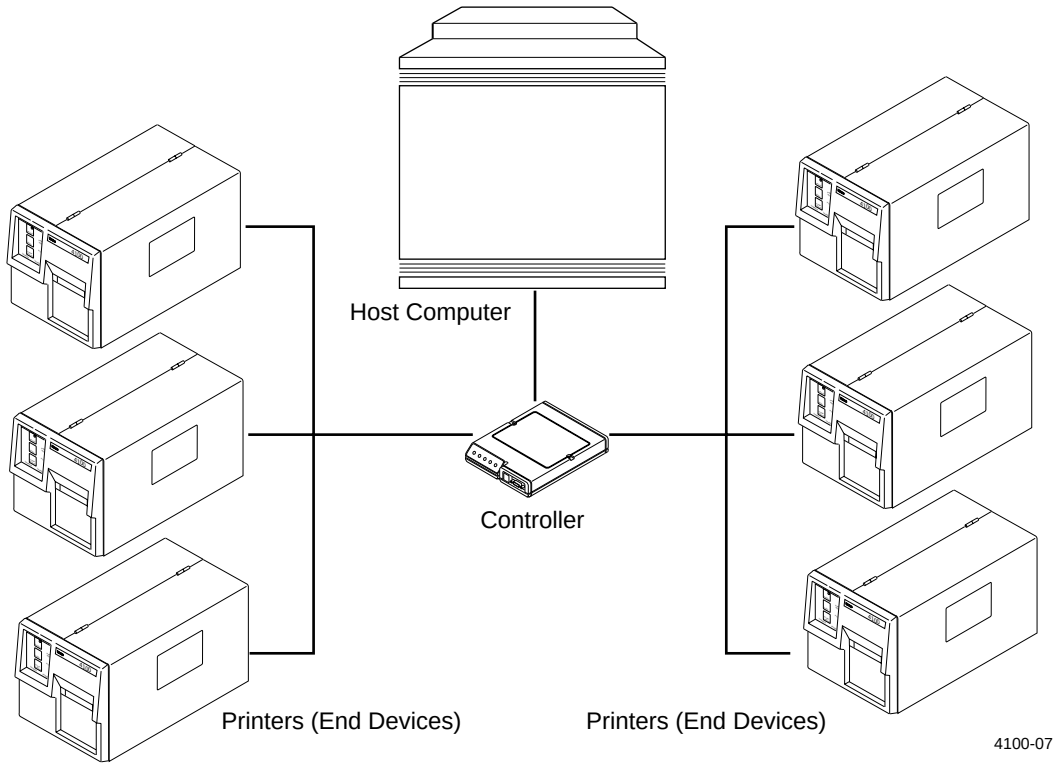
If you are installing your printer in a network environment, you may need to change the serial port settings to match the requirements of your network.

You can determine the communications requirements for your network by referring to the controlling device documentation. If the controlling device is an Intermec product, refer to the following manuals for instructions and information on the necessary cabling and connections.

- *9154 Multi-Drop Line Controller System Manual* (Intermec Part No. 048517)
- *9161B Installation Manual* (Intermec Part No. 049572)
- *9180 Network Controller User's Manual* (Intermec Part No. 054292)
- *RF System User's Manual* (Intermec Part No. 053574)
- *Data Communications Reference Manual* (Intermec Part No. 044737)

If you need to change the printer's communications parameters, follow the procedures in "Configuring the Serial Port" later in this chapter.

Typical Network Installation



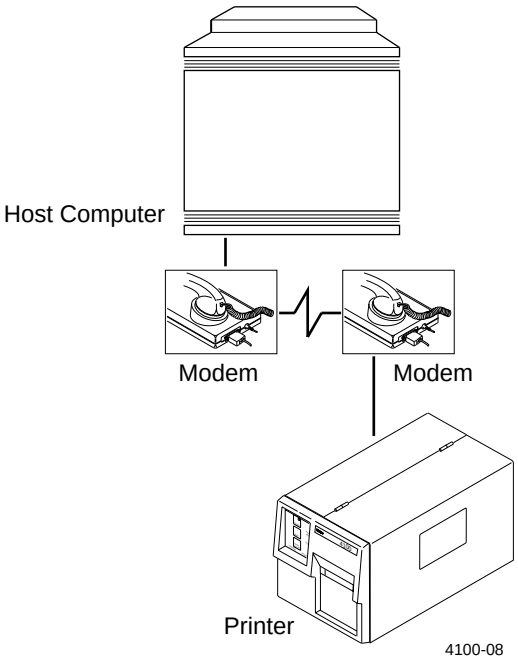
Modem Installation Procedure

Modems allow the printer to communicate with the host computer from a remote location not accessible with remote cabling. You must use an asynchronous, dedicated (nonswitched or manually switched), full duplex modem. Communications requirements should be described in the modem documentation.

To connect the printer to a host with a modem

1. Connect the printer serial port to a modem using a 25-pin to 25-pin RS-232 modem cable assembly (Intermec Part No. 043237S).
2. Connect a second modem to the host computer using an appropriate cable assembly for the host and modem.
3. Connect the two modems together using an acoustic coupler or a direct connection to telephone communication lines.
4. If necessary, change the printer's serial port configuration by following the instructions in "Configuring the Serial Port" later in this chapter.

Typical Modem Installation



Configuring the Serial Port

The 4100 printer's serial port settings should match those of your host computer or network controlling device. If you need to change the default settings, refer to the following tables. Use a small screwdriver or other suitable tool to move the DIP switches to the desired settings. The switches should click securely into the 1 (ON) or 0 (OFF) positions. The printer must then be turned off and on for the new switch settings to take effect.

Serial Port Settings

The following table summarizes your choices for the printer serial port settings.

Parameter	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.
Parity	Odd, Even, None	Checks each transmitted character for errors.
Stop Bits	1 or 2	Bits that follow each character to synchronize character transmission.
Protocol	Standard, XON / XOFF, Multi-Drop, Polling Mode D	The type of network used to connect the printer, the host, and the rest of the data collection system.
Device Address	A to Z, 0 to 5	Unique address for each device connected with Multi-Drop protocol.
Test and Service	Enabled or Disabled	Provides printer diagnostics to the host and prints test labels.
Self-Strip	Enabled or Disabled	Peels the media backing away from labels one at a time for on-demand printing.

DIP Switch Settings

The following table lists all possible settings for the top bank of DIP switches.

Note: *DIP switch position 1 = ON, and DIP switch position 0 = OFF.*

Top Bank Switch Number

O = OFF 1 = ON	OFF ON	1	2	3	4	5	6	7	8
Baud Rate Selection									
19,200		O	O	O					
9,600		1	O	O					
4,800		O	1	O					
2,400		1	1	O					
1,200		O	O	1					
600		1	O	1					
300		O	1	1					
110		1	1	1					
Parity Selection									
Even					O	O			
Odd					1	O			
None					O	1			
None					1	1			
Stop Bits									
1							O		
2							1		
Data Bits									
7								O	
8								1	
Self-Strip									
Disabled									O
Enabled									1

Bottom Bank Switch Number

O = OFF 1 = ON	OFF ON	1	2	3	4	5	6	7	8
Communication Protocol									
Standard		O	O						
XON/XOFF		1	O						
Polling Mode D		O	1						
Multi-Drop		1	1						
Multi-Drop Address Selection									
A				O	O	O	O	O	
B				1	O	O	O	O	
C				O	1	O	O	O	
D				1	1	O	O	O	
E				O	O	1	O	O	
F				1	O	1	O	O	
G				O	1	1	O	O	
H				1	1	1	O	O	
I				O	O	O	1	O	
J				1	O	O	1	O	
K				O	1	O	1	O	
L				1	1	O	1	O	
M				O	O	1	1	O	
N				1	O	1	1	O	
O				O	1	1	1	O	
P				1	1	1	1	O	
Q				O	O	O	O	1	
R				1	O	O	O	1	
S				O	1	O	O	1	
T				1	1	O	O	1	
U				O	O	1	O	1	
V				1	O	1	O	1	
W				O	1	1	O	1	
X				1	1	1	O	1	
Y				O	O	O	1	1	
Z				1	O	O	1	1	
0				O	1	O	1	1	
1				1	1	O	1	1	
2				O	O	1	1	1	
3				1	O	1	1	1	
4				O	1	1	1	1	
5				1	1	1	1	1	
Test and Service Modes									
Disabled									O
Enabled									1

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Connecting the Printer to a Network

Refer to the following information on interfaces and protocols if you are integrating your 4100 printer into a data collection network.

Host Requirements

Hardware and software requirements for operating the 4100 printer as follows:

- The host computer must use the American Standard Code for Information Exchange (ASCII) for data communications.
- A serial port must be available on the host if you are connecting directly to the printer.
- The host must support at least one of the following data communication interfaces: RS-232C, RS-422, or RS-485.

For information about configuring the host computer, port concentrator, or network controller, see the reference manual for the controlling device.

Communication Boundaries

The information below applies to all the printer's supported protocols.

Parameter	Maximum capacity
Message delay	9999 milliseconds
Character delay	9999 milliseconds
Message block size	255 characters (including STX and ETX characters)
Device address number (Multi-Drop)	A to Z, 0 to 5

Communication Protocols

The 4100 printer supports the flow control and block transfer protocols described below. All of these protocols are point-to-point except Multi-Drop. Application programs and / or ROM BIOS determine which protocols your computer can support. For more detailed information refer to the Intermec *Data Communications Reference Manual*, Part No. 044737.

Intermec "Standard" Protocol

Intermec "Standard" protocol is a proprietary block transfer / status response protocol. With the exception of single character status commands such as <ENQ> and <VT>, data is transmitted in message blocks beginning with the start of text (<STX>) character and ending with the end of text (<ETX>) character. Message blocks can be up to 255 characters, including the start of text and the end of text characters.

The printer returns its highest priority status when it receives a valid block (<STX>data<ETX>) or when it receives the status request command <ENQ>. When the printer receives the status dump command (<VT>), the printer returns all active status. The printer status response time ranges from 30 to 100 ms, depending on the complexity of the received message block. In the case of a transmission error, the printer responds with a <NAK> and discards the entire message block. Printer status conditions in descending order of priority, status response characters, and pin 11 / 20 states are shown in this table:

Printer status	Character	Pin 11/20
Buffer already full	GS	Busy
Ribbon fault	US	Busy
No label stock	EM	Busy
Buffer now full	DC3	Busy
Printhead hot	SI	Busy
Offline (paused)	DC3	Busy
Label at strip pin	FS	Ready
Label skipping	DC1	Ready
Printing	DC1	Ready
Ready / Online	DC1	Ready

When the printer returns Buffer now full (<DC3>) status, the currently received message block is accepted. At this time, the printer can accept short messages to allow parsing of immediate commands such as Reset (<DLE>) or Cancel batch printing (<EM>). However, if the printer responds with a <GS> to any message block, it means that the buffer is already full and the entire message block has been discarded.

Polling Mode D Protocol

Polling Mode D is a proprietary Intermec block transfer protocol that transmits data in blocks of up to 255 characters, including protocol overhead. The blocks are framed with LRC characters for additional data integrity. Use Polling Mode D for point-to-point networks that connect the 4100 to an Intermec port concentrator (RS-232C or RS-422).

Multi-Drop Protocol

Multi-Drop is a network protocol that allows you to connect up to 32 devices to an Intermec controller on a four-wire RS-485 (two twisted pair) interface. This protocol is similar to Polling Mode D except each device has a unique address (POL and SEL characters). You must use RS-485, which is automatically enabled when you enable Multi-Drop. Be sure to specify a unique address for the printer and verify that the baud rate is between 2,400 and 19,200.

XON/XOFF Protocol (Software and Hardware / Flow Control)

XON / XOFF protocol stops the host from sending data when the printer buffer fills up and starts the host again when the buffer empties. When you select the XON / XOFF protocol, you concurrently enable software and hardware flow control. Software flow control uses the ASCII characters <DC1> (XON) and <DC3> (XOFF) to start and stop the flow of data from the host to the printer. Hardware flow control uses pin 11 or pin 20 (internally connected together) on the printers serial port to indicate “Ready” or “Busy” for data flow control.

Note: *Do not confuse the <DC1> and <DC3> with the Standard protocol ready <DC1> and buffer full <DC3> status characters.*

The message length for the XON / XOFF protocol is unrestricted. The printer processes information as it is downloaded and stops when there is no more information. Use and <STX> and an <ETX> when you want to add comment lines to your command file. The printer ignores comments between an <ETX> and an <STX>. This comment feature is similar to using comment lines when programming in computer languages. Use it to document commands sent to the printer.

Pin 11 / 20 reports “Ready” and a <DC1> (XON) is transmitted when the printer finishes reloading at power up. Pin 11 / 20 reports “Busy” when the printers input buffer fills with 768 bytes of data. If the host ignores pin 11 / 20 and continues to transmit data, the printer transmits a <DC3> (XOFF) after receiving 15 additional characters. The printer continues to transmit a <DC3> after every 15 characters received if the host continues to transmit data. Data integrity is not guaranteed if this happens.

Pin 11/20 becomes "Ready" when the printer finishes transferring all the data from the input buffer. If a <DC3> is sent, the printer transmits a <DC1> (XON) and the host resumes transmission. When you switch the printer to Offline, pin 11/20 becomes "Busy" and a <DC3> is transmitted. When you switch the printer to Online and the input buffer is empty, pin 11/20 becomes "Ready" and a <DC1> is transmitted. The following table describes the states of printer XON/XOFF operation:

Note: *If the printer is already in an XOFF condition, switching to Offline or Online has no effect.*

# of Bytes Received	Online/Offline	Pin 11/20	Transmit
Do not care	Offline	Busy	<DC3>
768	Offline	Busy	
768 + each 15 thereafter	Online	Busy	<DC3>
Buffer empty	Online	Ready	<DC1> (if DC3 was sent)

Ready/Busy Protocol

Ready/Busy protocol uses hardware flow control on pin 11 or pin 20 to indicate the printer mechanical status and the printer input buffer input buffer status. To control data flow, pin 20 is the industry standard, however pin 11 is included in Intermec products for backward compatibility. The printer reports "Busy" on pin 11 and pin 20 when you switch to Offline, and "Ready" when you switch Online assuming the buffer is not full. Pressing the [**PAUSE**] button on the 4100 printer toggles the printer Online (LED off) and Offline (LED on).

Enable this option by setting the communication protocol to Ready/Busy. Hardware flow control does not work with multi-drop or modem connections.

User-Defined Protocol

The 4100 printer allows you to change protocol characters. However, unlike the Intermec 86XX series printer, the 4100 does not allow you to define your own protocol. Instead, you may substitute new characters to be used as protocol characters, but the rules for the protocol chosen do not change. There is one table of user-definable protocol characters that, when changed, is used by all protocols. Refer to the following table for the user-definable characters and the protocols they affect.

Note: *Any status response character that is replaced by the NUL character will not be sent back to the host.*

Communication Interfaces

Character	Protocol Affected			
SELECT IN		Polling Mode D	Multi-Drop	
POLL IN		Polling Mode D	Multi-Drop	
RES IN		Polling Mode D	Multi-Drop	
REQ IN		Polling Mode D	Multi-Drop	
SOM IN	Standard	Polling Mode D	Multi-Drop	XON / XOFF
EOM IN	Standard	Polling Mode D	Multi-Drop	XON / XOFF
AFF IN		Polling Mode D	Multi-Drop	
NEG IN		Polling Mode D	Multi-Drop	
DLE IN	Standard	Polling Mode D	Multi-Drop	XON / XOFF
XON IN				XON / XOFF
XOFF IN				XON / XOFF
SELECT OUT			Multi-Drop	
POLL OUT			Multi-Drop	
RES OUT		Polling Mode D	Multi-Drop	
REQ OUT		Polling Mode D	Multi-Drop	
SOM OUT		Polling Mode D	Multi-Drop	
EOM OUT		Polling Mode D	Multi-Drop	
AFF OUT		Polling Mode D	Multi-Drop	
NEG OUT	Standard	Polling Mode D	Multi-Drop	
DLE OUT	Standard	Polling Mode D	Multi-Drop	XON / XOFF
XON OUT				XON / XOFF
XOFF OUT		Polling Mode D	Multi-Drop	XON / XOFF
PROTO-CMD 1	Standard			XON / XOFF
PROTO-CMD 2	Standard			XON / XOFF
TIMEOUT ON EOM		Polling Mode D	Multi-Drop	

The 4100 printer supports serial communications with the following Electronics Industries Association (EIA) interfaces:

- RS-232C
- RS-422
- RS-485

These interfaces are described below. You may also find more detailed information in the *Data Communications Reference Manual* (Intermec Part No. 044737). The table that follows these interface descriptions lists the appropriate pin assignments for each interface.

RS-232C Serial Interface

The RS-232C serial interface is used in all asynchronous point-to-point full or half-duplex direct data communications or modem control. The cable connected to the printer must have the pin assignments listed in the table to operate properly under RS-232C.

Pin 20

Pin 20 of the RS-232C interface is the primary pin used by the 4100 printer to indicate its status when standard protocol is selected. Pin 20 is high when the printer status is ready. Pin 20 is low when the printer is in one of these conditions:

- Buffer full
- Ribbon fault
- No label stock
- Label at strip pin
- Offline

In XON/XOFF or hardware flow control, pin 20 and pin 11 indicate the printer mechanical status and the status of the printer input buffer. They are high when there is room in the buffer and low if the buffer is full or the printer is offline.

Pin 11

Pin 11 of the RS-232C interface is used by the 4100 printer to indicate its status. In Intermec Standard protocol, pin 11 still used for backward compatibility to the 86XX product line. It is high when the printer status is ready. Pin 11 is low during the same conditions as when pin 20 is low.

RS-485 Serial Interface

The RS-485 serial interface is used for multi-drop installations only. The cable connected to the printer must have the pin assignments listed in the table to operate properly under RS-485.

Interface	Pin No.	Name	Operation
RS-232 / 422 / 485	1	Chassis Ground (GND)	Connect to pin 1, chassis ground, of connected device.
RS-232	2	Transmit Data (TD)	Output: Connect to receive data pin of connected device.
RS-232	3	Receive Data (RD)	Input: Connect to transmit data pin of connected device.
RS-232 / 422 / 485	4	Request to Send (RTS)	Output: When a modem is used, connected to modem RTS pin. RTS is set to true before transmission. The printer sets RTS to false after transmission.
RS-232 / 422 / 485	5	Clear to Send (CTS)	Input: When a modem is used, connect to modem CTS pin. Modem must set CTS true before the printer transmits data. If not connected, CTS sets itself true.
RS-232 / 422 / 485	7	Signal Ground	To enable communications, connect to signal ground of connected device. Completes circuit for all RS-232 signals.
RS-232 / 422 / 485	11	Printer Status (PS)	Output: When not using software flow control (XON / XOFF), connect to input of connected device (CTS). Indicates printer mechanical status and status of printer input buffer.
RS-422 / 485	13	Input B	Input: Serial differential data to the printer.
RS-422 / 485	14	Output A	Output: Serial differential data from the printer.
RS-422 / 485	16	Input A	Input: Serial differential data to the printer.
RS-422 / 485	19	Output B	Output: Serial differential data from the printer.
RS-232 / 422 / 485	20	Data Terminal Ready (DTR)	Output: When a modem is used, connect to modem DSR pin. Indicates the printer is switched on. When using XON / XOFF or hardware flow control, this pin indicates the printer mechanical status and the status of printer input buffer.

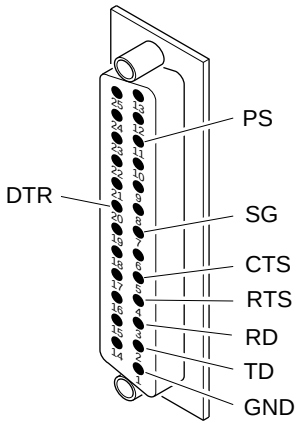
RS-422 Serial Interface

The RS-422 interface is used in long line point-to-point direct connect installations. The cable connected to the printer must have the pin assignments listed in the table to operate properly under RS-422.

Printer Serial Port

The serial port connection is on the printer rear panel. It is a 25-pin D-style subminiature receptacle. The port is wired as a data terminal equipment (DTE) device. Refer to the following illustration for the serial port pin assignments.

Printer RS-232/422/485 Serial Port



Choosing the Correct Cable

Your 4100 printer has many different cabling options available. Your choice of cabling depends on the network configuration, hardware interface, protocol used, cabling distance, and the electrical and environmental operating conditions of your printer. For typical installations, Intermec recommends the following:

- Shielded cable, minimum 24 gauge
- 25-pin D-style subminiature connector with metal backshell
- Cable shield connected to metal backshell
- EIA RS-232, RS-422, or RS-485 electrical interface

Intermec Cables

Intermec offers a full line of interface cables. These cables are not included with the printer and must be ordered separately. Contact your Intermec representative for ordering assistance.

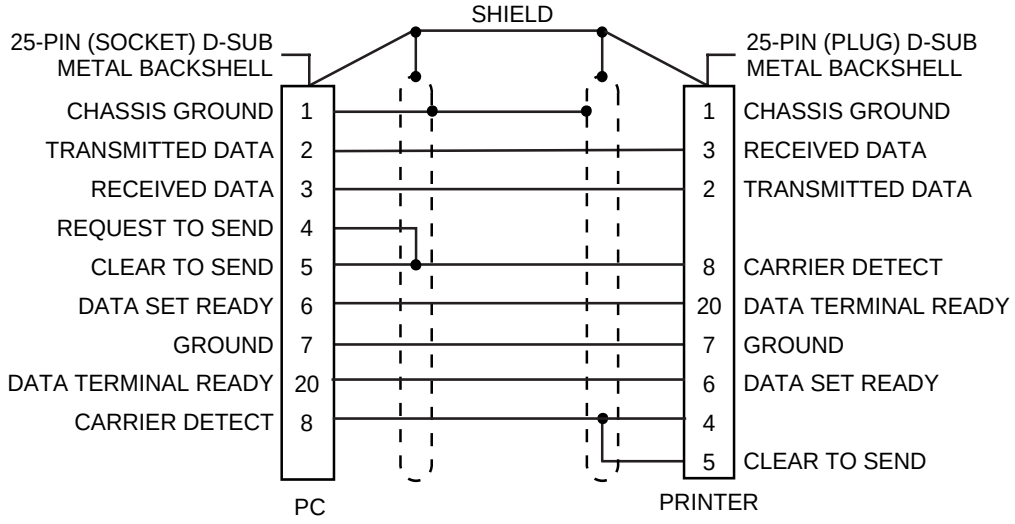
For connecting the 4100 printer to an IBM PC AT or compatible, use this Intermec cable: Intermec Part No. 048693.

For connecting the 4100 to an IBM PC XT or compatible, use this Intermec cable: Intermec Part No. 048668.

Cable Schematics

If you are making your own cables, the following diagrams show cable schematics for some of the more commonly used cables.

RS-232 Null Modem Cable for PC



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

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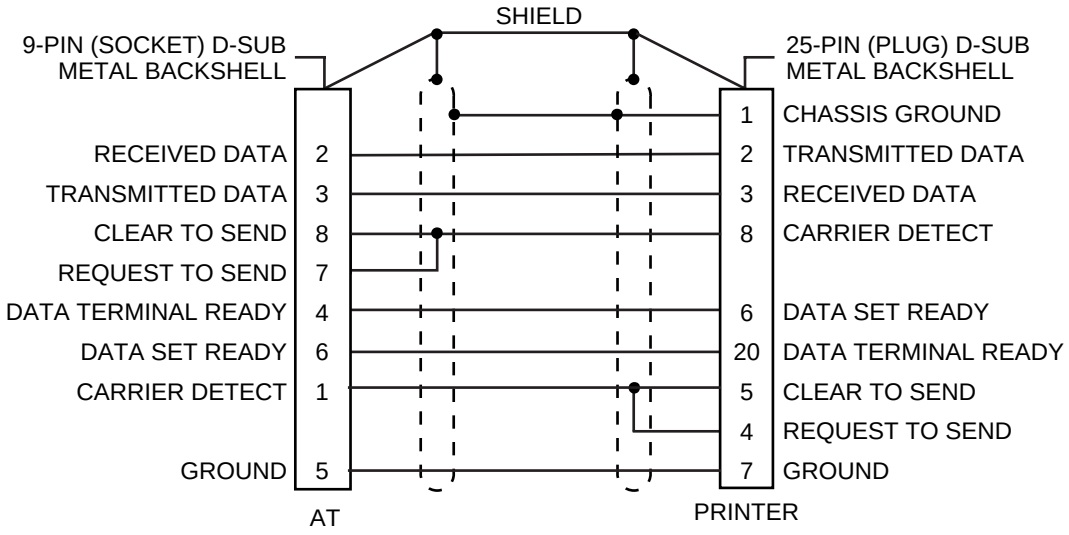
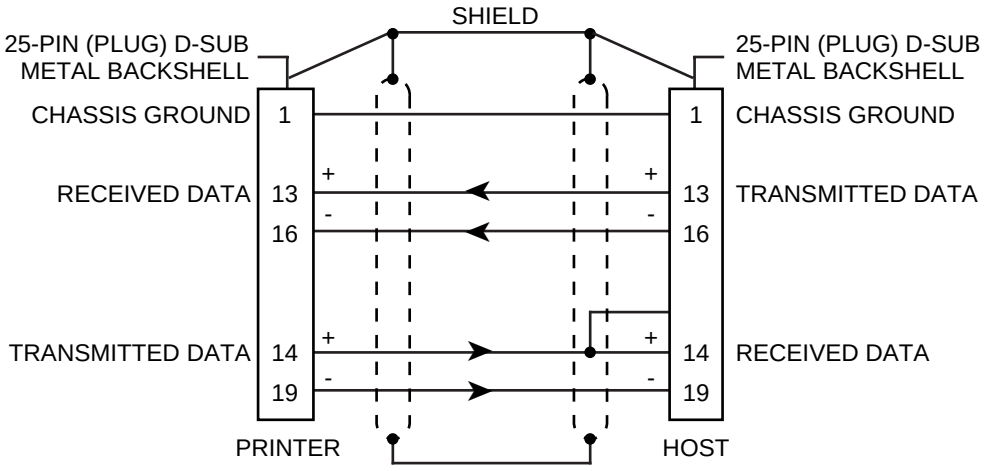
RS-232 Null Modem Cable for AT



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

4100-11

RS-422 Software Flow Control Null Modem Cable for AT



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

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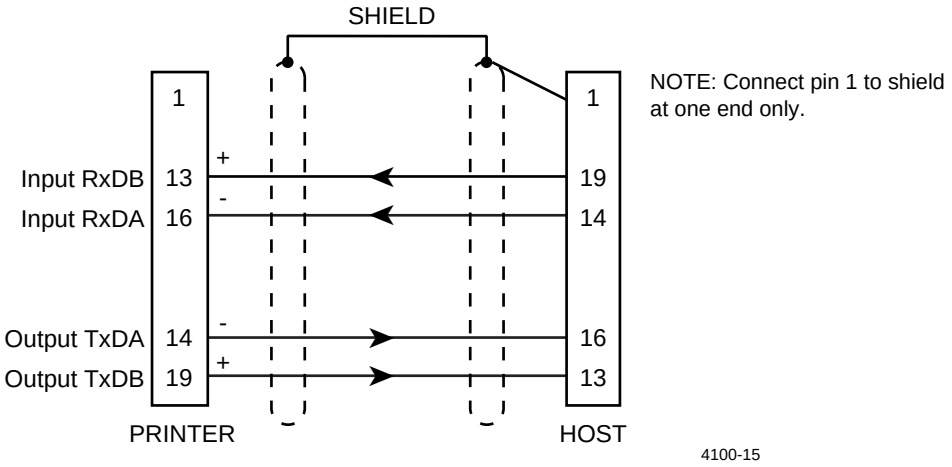
Straight Through DTE to DCE Cable for Use With a Modem



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 4100 printer:

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

If any of these items are near the printer, you can reduce the effects of their electrical noise by following these directions:

- Always use shielded cable. Connect the cable and 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 on the ground pin of the printer power cord.

Some experimentation may be required to eliminate the problems. If you need help, ask your Intermec representative for assistance.

3

Operating the Printer

About Printer Operation

Your 4100 printer comes with a variety of features and many choices for configuring and programming it. However, normal operation is quite straightforward.

This chapter describes the procedures that you use in the normal operation of your printer:

- Opening and closing the printer
- Loading various types of media
- Changing the thermal transfer ribbon
- Using the front control panel
- Adjusting the label gap sensor
- Printing the printer's buffer contents to clear the memory

Note: *If you are not familiar with the components that make up the printer, refer to the illustrations and descriptions in Chapter 1, "Getting Started."*

Opening and Closing the Printer

To replace media, clear paper jams, or maintain the printer, you must open the front and side covers of the printer. The front cover is held shut by two magnets. The side cover is held closed by its own weight, and has a clear plastic window that allows you to see how much media is loaded and how the printer is operating.

Opening the Printer

You need to open the printer when you load media or perform most other maintenance procedures.

To open the printer

1. Facing the front of the printer, grasp the right side of the front cover and pull it toward you to release the cover from its magnetic latches.
2. Grasp the bottom center of the right side cover and pull it upward. The hinged right cover should come to rest on the top of the printer.

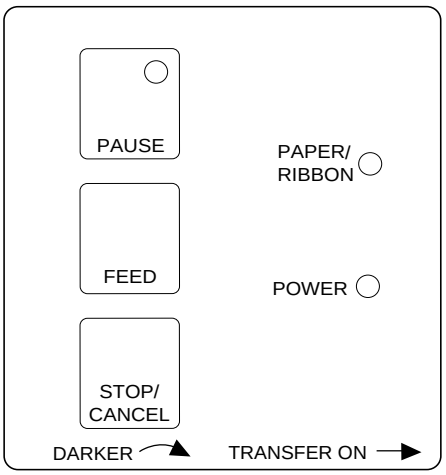
Closing the Printer

To close the printer after loading media or performing printer maintenance

1. Grasp the topmost part of the side cover and gently rotate it down until it rests against the printer.
2. Swing the front cover to the closed position until the magnetic latches securely hold the cover.

Using the Front Control Panel

The front control panel of the 4100 printer, illustrated at right, contains three buttons and three indicator lights that you use in the normal operation of the printer. The table on the next page describes the control panel components.



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Component	Description
Power On Indicator	Illuminates when the power switch on the rear panel is turned on.
Feed Button	Advances the media to the first position on the next label or to the tear-off plate. Holding this button down continuously advances the media.
Stop / Cancel Button	Cancels the current print job. The printer continues to process subsequent downloaded commands.
Pause Button	Temporarily stops printing and host communications. Holds all data in memory until the button is pressed a second time to resume printing.
Pause Indicator	Illuminates when the pause button is pressed. Flashes when data is downloading to the printer.
Paper / Ribbon Indicator	Illuminates when the printer is out of paper or ribbon.
Darkness Control Adjustment (Potentiometer)	Adjusts the resistance in a new printhead to print the same level of darkness as the previous printhead. Do not use this to adjust the darkness of individual labels or or print jobs. Instead, use the downloaded darkness command described in Chapter 7.
Transfer On Switch	Switch to off for direct thermal printing, or to on for thermal transfer printing.

Loading Media Into the Printer

The procedures on the next few pages explain how to load media (label stock) into the printer. The 4100 printer is capable of four different types of printing, and each type requires a different method of loading media. The four types of printing are:

- Straight-through printing
- Batch take-up printing
- Self-strip printing
- Fanfold printing

When you load media, you can turn the power to the printer either on or off. The following procedures for loading media assume the printer is turned on.

***Note**: If you are using media that is 3.5 inches or less in width, you will need to adjust the printhead support to ensure optimum print quality. Refer to Chapter 4, "Routine Maintenance," for instructions.*

Note: *The 4100 printer is adjusted at the factory using 4 mil thick label stock. When using heavier tag stock, the printhead may need to be adjusted. Refer to Chapter 4, "Routine Maintenance," for these procedures.*

Tools required: Phillips screwdriver

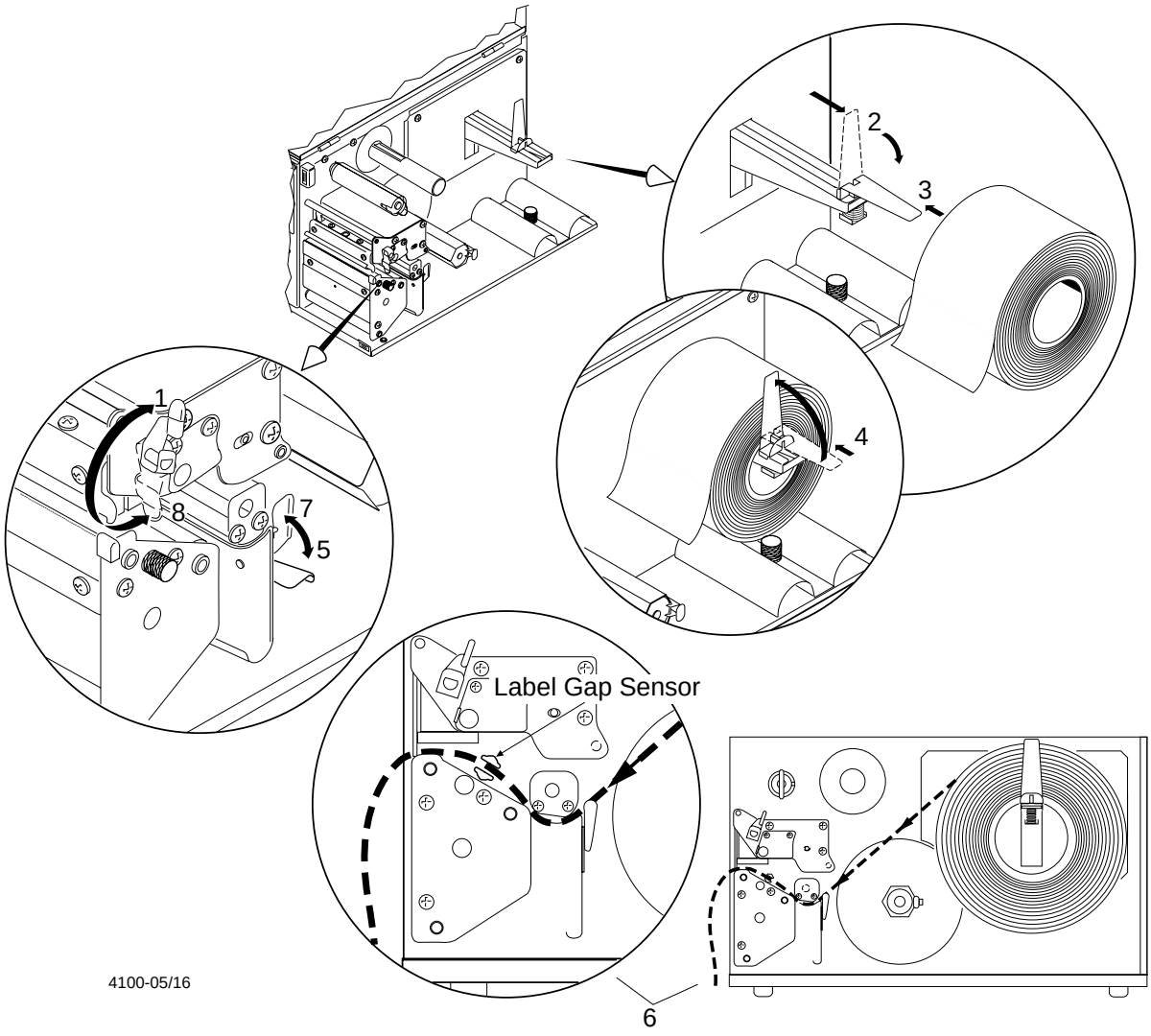
Straight-Through Printing

In straight-through printing, a roll of media is loaded on the supply roll and is fed straight through the printer mechanism and out the label dispense opening in the front panel. As individual labels are printed, you can remove them from the roll by pulling them down across the tear-off plate. If you are using the optional media cutter and tray, this device automatically cuts the printed labels off the roll and stacks them in the tray.

To load media for straight-through printing

1. Disengage the printhead by rotating the head lift lever clockwise to the UP position.
2. Slide the retainer to the outer end of the supply mount and flip it down.
3. Remove the old label roll and place the new label roll on the supply mount.
4. Flip the retainer to the upright position and slide the retainer firmly back against the roll of media.
5. Rotate the media guide down.
6. Insert the label stock through the printer mechanism as shown. Make sure the label passes between the two forks of the label gap sensor, and that the front edge of the label passes over the tear-off plate and through the label dispense opening in the front cover.
7. Rotate the media guide up and slide it to the edge of the media.
8. Engage the printhead by rotating the head lift lever counterclockwise to the down position and close the printer covers.
9. Press [**FEED**] to advance several inches of media through the printer and out the label opening in the front cover. The printer is now ready for printing.

Loading Media Into the Printer for Straight-Through Printing



Self-Strip Printing

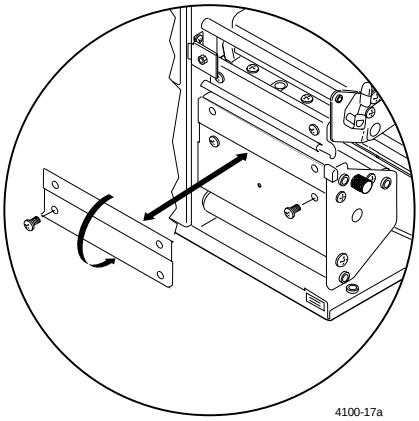
In self-strip printing, the printer presents each label after it is printed with the backing removed so it may be applied immediately. The backing is collected on the rewinder hub after passing over the bottom assist roller. The rewinder hub can hold the backing for an entire roll of media.

Follow the procedures below to prepare the printer for self-strip printing.

Tools required: Phillips screwdriver.

Note: *You must have the Present Sensor option installed to print in Self-Strip mode. The Present Sensor detects when a label has been removed and automatically advances the next one through the label dispense opening.*

Repositioning the Tear-Off Plate Before Printing



1. Remove the tear-off plate by unfastening the two screws that secure the plate to the printer.
2. Flip the tear-off plate upside down so that its serrated edge is on the bottom with the teeth facing the printer. Reattach the tear-off plate to the printer using the two screws.

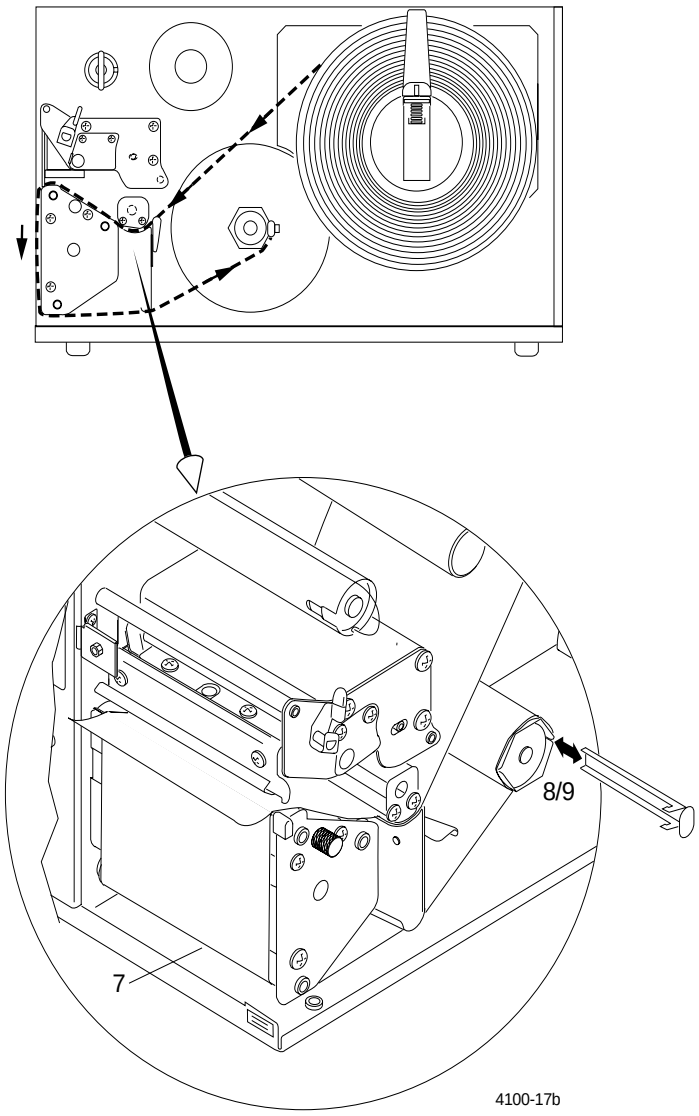
Loading the Media

With the tear-off plate reinstalled, you are ready to load the media for self-strip printing.

The first six steps of this procedure are shown in the illustration for straight-through printing earlier in this section. Steps 7 through 9 are shown in the illustration that accompanies this procedure.

1. Disengage the printhead by rotating the head lift lever clockwise to the UP position.

Loading Media Into the Printer for Self-Strip Printing



2. Slide the retainer to the outer end of the supply mount and flip it down.
3. Place the label roll on the supply mount.
4. Flip the retainer to the upright position and slide the retainer firmly back against the roll of media.
5. Rotate the media guide down.
6. Insert the label stock through the printer mechanism as shown in the illustration. Make sure the front edge of the media passes through the label gap sensor (illustrated on page 3-7) and over the top of the drive roller.
7. Pull the leading edge of the media down over the tear-off plate and beneath the bottom assist roller.
8. Remove the clasp from the media rewinder hub.
9. Wind a few inches of media counterclockwise onto the media rewinder hub, and then secure the media to the rewinder with the clasp.
10. Rotate the media guide up and slide it to the edge of the media.
11. Engage the printhead by rotating the head lift lever counterclockwise to the down position and close the printer covers.
12. Set Switch 8 on the top bank of DIP switches to position 1 or on.

13. Press [**FEED**] to advance a label through the printer.
14. Grasp the leading edge of the label where it has separated from the backing and pull it away from the printer.

Batch Take-Up Printing

Batch take-up printing (also known as label rewinding) allows you to print a batch of labels without having to remove individual labels from the front of the printer. As labels are printed, they are routed back inside the printer and collected on the media rewinder hub. Later, you can remove the roll of printed labels from the rewinder hub.

The printed labels are collected on the media rewinder hub after passing over the rewind adapter mounted on the front of the printer beneath the driver roller. The printer rewinder hub has a maximum capacity of 2,100 inches of rewound media; it cannot rewind an entire roll of media.

The procedure for loading media for batch take-up printing includes setting up the rewind adapter. Follow the steps below to prepare the printer for batch take-up printing.

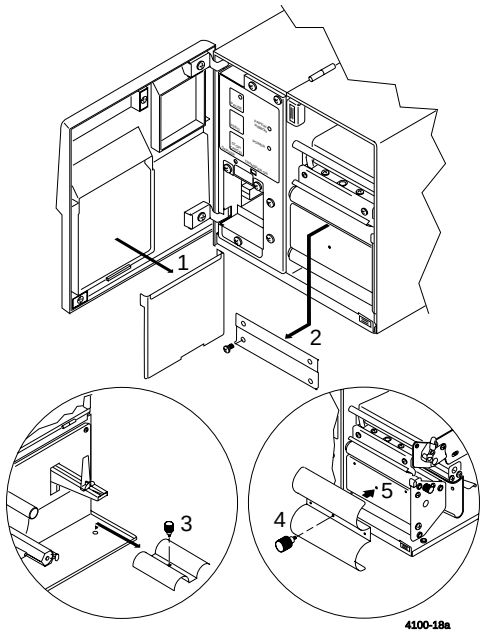
Tools required: Phillips screwdriver.

Installing the Rewind Adapter Before Printing

Before you can load the media for batch take-up printing, you must install the rewind adapter that guides the printed labels out of the printer mechanism and onto the media rewinder hub.

To install the rewind adapter

1. Open the front panel cover of the printer and remove the metal plate below the label dispense opening in the cover. The metal plate snaps in and out using two small clamps on the left and right of the plate.
2. If the tear-off plate is installed, unscrew the two screws that fasten it to the printer and remove the tear-off plate from the printer.

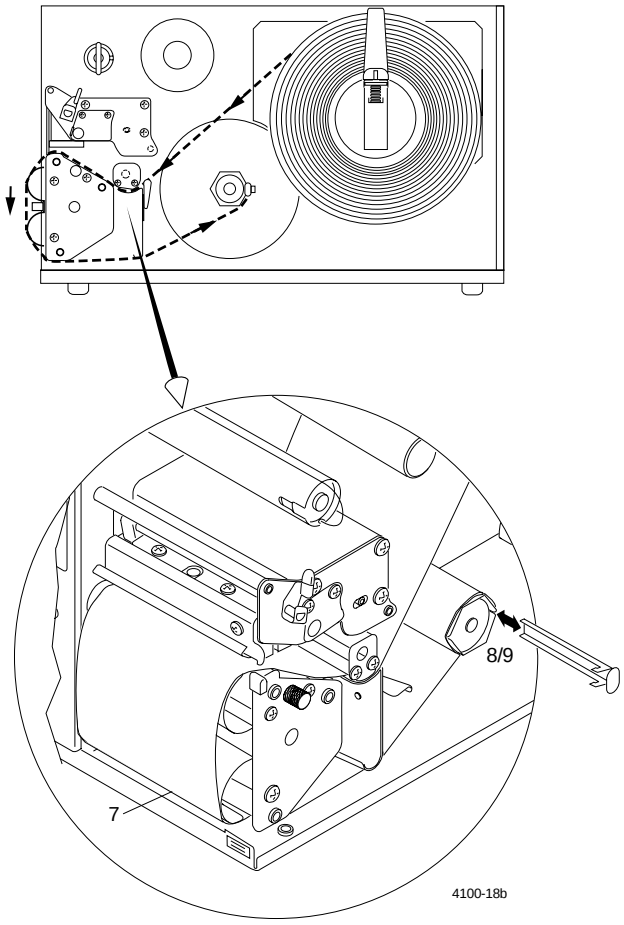


3. Open the right side cover and unscrew the knob that holds the rewind adapter in place. Remove the adapter from the printer. When not in use, store the rewind adapter below the media supply hub at the back of the printer interior.
4. With the front panel cover open, place the rewind adapter where the tear-off plate was attached.
5. Fasten the adapter to the printer by turning the center knob clockwise until the rewind adapter fastens securely to the printer. Make sure the top edge of the rewind adapter is parallel to the drive roller and the head adjust plate.

Loading the Media

With the rewind adapter in place, you are ready to load the media for batch take-up printing. The first six steps of this procedure are shown in the illustration for straight-through printing earlier in this section. Steps 7 to 9 are shown in the illustration that accompanies this procedure.

1. Disengage the printhead by rotating the head lift lever clockwise to the UP position.
2. Slide the retainer to the out of end of the supply mount and flip it down.
3. Place the label roll on the supply mount.
4. Flip the retainer to the upright position and slide the retainer firmly back against the roll of media.
5. Rotate the media guide down.
6. Insert the label stock through the printer mechanism as shown in the illustration. Make sure the front edge of the media passes through the label gap sensor and over the top of the drive roller.



7. Pull the leading edge of the media down over the rewind adapter and beneath the bottom assist roller.
8. Remove the clasp from the media rewinder hub.
9. Wind a few inches of media counterclockwise onto the media rewinder hub, and then secure the media to the rewinder with the clasp.
10. Rotate the media guide up and slide it to the edge of the media.
11. Engage the printhead by rotating the head lift lever counterclockwise to the DOWN position and close the printer covers.
12. Press [**FEED**] to advance several inches of media through the printer and onto the media rewinder hub.

Fanfold Printing

In fanfold printing, a stack of fanfold media is placed outside the back of the printer and fed into the printer though a gap in the back of the side cover. The media is fed into the printer mechanism using the same method as for straight-through printing.

To load fanfold media

1. Disengage the printhead by rotating the head lift lever clockwise to the UP position.

2. Rotate the media guide down.
3. Insert the label stock through the back of the printer into the printer mechanism, making sure the front edge of the media passes over the tear-off plate and through the label dispense opening in the front cover.
4. Rotate the media guide up and slide it to the edge of the media.
5. Engage the printhead by rotating the head lift lever counterclockwise to the DOWN position.
6. Close the printer covers. Make sure the fanfold media can move freely through the gap in the back of the side cover.
7. Press [**FEED**] to advance several inches of media through the printer and out the label opening in the front cover. The printer is now ready for printing.

Adjusting the Label Gap Sensor

If you are using die cut or tag stock media, you may need to adjust the label gap sensor. The label gap sensor detects the gap between individual labels of die cut media, and detects the notch separating tag stock labels. The printer uses this information to index the labels.

If the printer is not sensing the media, try adjusting the sensor position by turning the adjusting knob for the movable label gap sensor. The sensor is near the end of the two prongs that guide the media through the label gap sensor. Turning the knob clockwise moves the sensor away from the inside wall of the printer; turning the knob counterclockwise moves the sensor toward the inside wall of the printer.

If the media feeds forward only about 2.5 inches each time you press the [**FEED**] button, and does not seem to be stopping on a label edge, the printer may be configured for continuous stock instead of interlabel gap stock. Download the correct label stock configuration command, found in Chapter 7, “Printer Commands,” and then press [**FEED**].

Adjusting the Label Gap Sensor for Die Cut Media

For die cut media, the sensor can be positioned anywhere over the label so that it can detect the label gap. If you are using narrow media, you will need to adjust the sensor inward, in the direction of the supply roll back stop. To do this, turn the adjusting knob counterclockwise until the sensor is positioned over the media.

Adjusting the Label Gap Sensor for Tag Stock

If you are using tag stock, you must use a different procedure for adjusting the label gap sensor. The printer indexes tag stock using the notches along the edge of the media that indicate the spaces between the tags.

When you load tag stock, a notched edge of the media roll should face the supply roll back stop, toward the interior of the printer. For the label gap sensor to detect the notches, you must position the sensor over the notches on the inside edge of the media. To do this, turn the label gap adjusting knob counterclockwise until the sensor is over the notches. Use the notch in the sensor mechanism to line up the sensor with the notch on the edge of the media.

Setting Media Sensitivity

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 sensitivity rating consists of three digits, and is printed on each media roll or box. When you set the sensitivity in the printer to match the rating for your media, the amount of energy the printhead uses adjusts to a value that is suitable for your media. This setting improves the print quality and sets the darkness to an appropriate level.

To check your media sensitivity rating, print out a software configuration label. The sensitivity setting is one of the configuration settings displayed on the software configuration label. Refer to Chapter 1, “Getting Started,” for directions on printing the label.

The default setting of media sensitivity for direct thermal media on the 4100 printer is 420. The default setting for thermal transfer media is 563.

Setting the Approximate Sensitivity Rating for Your Media

You only need to enter the first digit to set the approximate rating for your media. The first digit (in the hundreds place) designates the range of sensitivity for your media. The second and third digits are used to fine-tune the printhead energy to improve print quality and label darkness. The approximate sensitivity ratings are the first numbers listed for each group in the media sensitivity setting table.

Fine-Tuning the Sensitivity Rating

The sensitivity rating on each roll of thermal transfer media or ribbon has an asterisk (*) in one of the digits. On thermal transfer media, the rating contains the first and second digits, with an asterisk in place of the third digit because this digit is reserved for ribbon. The rating on the ribbon has numbers in either 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*3 on the ribbon. In this case, fine-tuning of the printhead requires that you set the sensitivity rating to 563.

Set media sensitivity with the configuration command <SI>g. For example, enter the following command to set the sensitivity number 563:

```
<SI>g1, 563
```

Where:

`<SI>g1` sets the printer to thermal transfer media.

`,563` sets the sensitivity number to 563.

See Chapters 6, “Designing Labels and Using Commands,” and Chapter 7, “Printer Commands,” for more information on how to use this command.

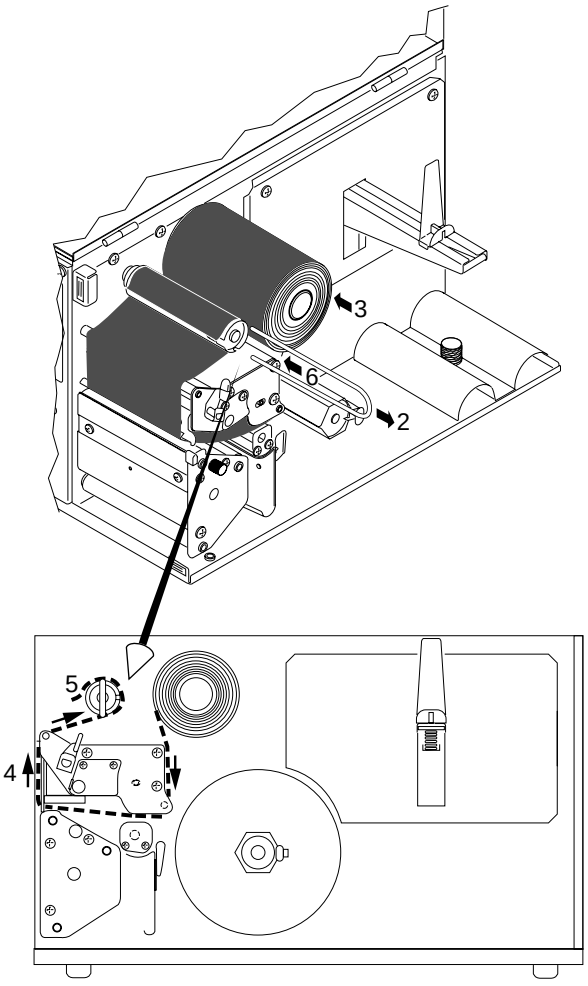
To set the sensitivity rating for direct thermal media, use the three digit sensitivity rating located on the roll of media or listed in the following table.

The following table provides you with both approximate sensitivity settings and settings that can be used for fine-tuning:

Media Type	*Sensitivity Setting*
700 Series High Sensitivity Direct Thermal	
Duratherm Lightning Plus	720
600 Series Thermal Transfer	
Duratran Kimdura / Standard ribbon	622
Duratran Kimdura / Premium ribbon	628
Duratran Syntran / Premium ribbon	678
Duratran Polyester / Premium ribbon	688
500 Series Thermal Transfer	
Duratran II Tag-5 mil / Premium ribbon	518
Duratran II Tag-8 mil / Premium ribbon	528
Duratran II-2 / Premium ribbon	548
Duratran II-1 / Standard ribbon	562
Duratran II-1 / Red ribbon	564
Duratran II-1 / Green ribbon	565
Duratran II-1 / Premium ribbon	568
400 Series Direct Thermal Media	
Duratherm Lightning-1	420
Duratherm Lightning IR	450
Duratherm Lightning-2	470
300 Series Thermal Transfer Media	
Super Premium Polyester / Super Premium ribbon	371
100 Series Low Sensitivity Direct Thermal	
Duratherm II-2	130
Duratherm II Tag	160
Duratherm Buff Tag	190

Loading the Thermal Transfer Ribbon

If you are printing in thermal transfer mode, you must install a thermal transfer ribbon on the ribbon supply hub and collect the used ribbon on the ribbon rewinder.



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To load thermal transfer ribbon

1. Disengage the printhead by rotating the head lift lever clockwise to the UP position.
2. Remove the ribbon clasp from the ribbon rewinder.
3. Slide the roll of ribbon onto the ribbon supply hub so that you can pull leading edge of the ribbon counterclockwise off the top of the roll.
4. Route the ribbon through the print mechanism as illustrated. Make sure the ribbon runs between the two edges of the black ribbon guide located behind the printhead. The shiny side of the ribbon must come in contact with the printhead. *Do not thread the ribbon between the two forks of the label gap sensor.*
5. Wind a few inches of ribbon onto the ribbon rewinder in a counterclockwise direction.
6. Slide the ribbon clasp over the ribbon and onto the rewinder.
7. Engage the printhead by rotating the head lift lever counterclockwise to the DOWN position.

Image Band Setting

To print labels as quickly as possible, you must adjust the print speed in conjunction with the number of image bands, which controls the speed of the imaging / printing process.

The 4100 printer starts imaging a label as soon as it receives the command that selects a format. If the Image Band command is too low, the imaging process is unable to keep up with the print speed, and the printer stops printing and then starts again at the lowest printing speed. If the Image Band command is set too high, the printer spends too much time imaging before printing which slows down label production. Since the 4100 printer begins imaging so early in the printing process, there is a reduced chance of imaging and print speed incompatibility. The image before print feature also improves label throughput.

How the Image Bands Command Works

The Image Band 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, thus giving the printer more memory (and time) to image the label before it starts printing.

The minimum number of required image bands depends on the print speed and the complexity of the label. More elements in a label require more image bands. Generally, the presence of the following factors require higher Image Band settings:

- Different sizes of outline fonts
- Formats with numerous fields
- Formats with numerous graphics

Optimizing the Number of Image Bands

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

If the printer aborts the label before it is through printing and attempts to reprint at the slowest (2.5 ips) speed, then the image band setting is too low. Return to the original print speed and increase the *original* number of image bands (the printer will have set the number of image bands maximum, which is ten). Continue to increase the number of image bands until the printer prints a label correctly at the optimal print speed.

If the printer aborts and reprints at the highest Image Band setting, the image band is too high. Lower the print speed and then try printing a label with the minimum number of image bands (2). Gradually increase the number of image bands until the label prints at the set print speed.

Modified Field Reimaging

If you are updating data in just a few fields, it might be faster to use the modified field reimaging command. When used correctly, this command can greatly increase the processing ability of your printer because only the fields that change or receive new data are reimaged. However, you need to take into account the number of fields you are thinking of reimaging. If the fields you choose to reimage take longer to erase and reimage than an entire label format, you will not increase throughput because erasing a field requires reimaging it with white space and erasing a label just requires clearing the RAM. The increase in processing can only be determined by printing a label both with and without modified feild reimaging enabled, and comparing the results.

When using the modified field reimaging command, make sure that you select enough image bands to allow the printer to retain the entire label image. One image band is equal to one inch. For example, if the printed image stops four inches from the beginning of the label, you must select four image bands to prevent reimaging.

To select the fields to reimage, use the following command:

<ESC>E {n}{,m}

where the default for n,m=0,0

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 that can be any letter from a to z. An error code is generated if an invalid format is entered.

If m=0, modified field reimaging is disabled. When m is a non-zero number, only the fields that receive new data are reimaged.

Note: *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.*

Printing Labels

Once you have loaded the media, the 4100 is ready to print labels. Before you print labels make sure you have:

- Loaded the correct size and type of media into the printer.
- Loaded ribbon into the printer if you will be printing in thermal transfer mode.
- Lowered the printhead securely into place.
- Switched the Thermal / Thermal Transfer switch to the appropriate setting for the type of printing you will be doing.
- Set the DIP switches to the appropriate printing configuration.
- Turned on the power to the printer.
- Connected the printer to the host or to the data collection network.

You are now ready to print labels by downloading data from the host to the 4100 printer. Refer to Chapter 6, “Designing Labels and Using Commands,” and Chapter 7, “Printer Commands.”

4

Routine Maintenance

About Printer Maintenance

For best performance, clean your 4100 printer on a regular basis, especially if it is exposed to debris. This chapter explains how to maintain the printer and covers the following topics:

- Inspecting the printer work environment and system connections
- Cleaning each printer component
- Adjusting the printhead support
- Replacing the cutter blade
- Replacing the printer's fuse

For information on replenishing media or ribbon, clearing jams, and other online maintenance procedures, see Chapter 3, "Operating the Printer."

Safety Precautions

Read the following precautions carefully before cleaning or repairing the printer.

WARNING
Always turn the power off before doing any maintenance work.

AVERTISSEMENT
Fermez toujours le courant avant de procéder à toute maintenance.

Do Not Repair or Adjust Alone

Do not, under any circumstances, repair or adjust energized equipment alone. The immediate presence of someone capable of rendering aid is essential for operator safety.

Do Not Repair or Clean With the Power On

Always turn off and unplug any device before cleaning or repairing it. Accidentally turning on any piece of equipment while cleaning can cause a serious injury.

First Aid

An injury, no matter how slight, should never be neglected. Always obtain first aid or medical attention immediately after incurring an injury.

Resuscitation

Persons working on or near high voltage equipment should be familiar with approved industrial first aid procedures. If someone is injured and stops breathing, begin resuscitation immediately.

Energized Equipment

Electrical equipment is dangerous. Never work on energized equipment unless authorized. Authorized emergency work on energized equipment must be performed in strict compliance with current safety regulations.

Inspecting the Printer

Inspect the printer and the rest of your data collection system equipment on a regular basis. Your inspections should include the following steps:

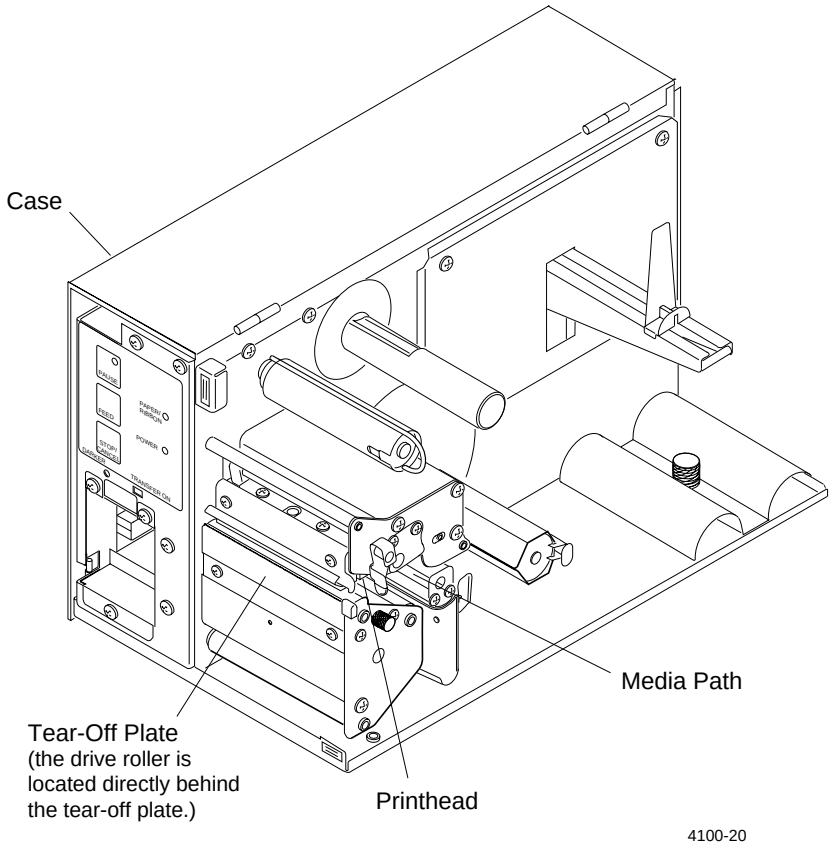
- Make sure the printer is properly grounded.
- Inspect the work environment. Large electric motors, welders, and switching equipment can affect printer performance. See Chapter 2, "Installing the Printer," for guidelines on appropriate environments.
- Keep the printer away from liquids.
- Check the data collection network regularly for loose wires or poorly installed connections. Be sure to replace corroded wires.

Components You Should Maintain

Clean your printer regularly to maintain the quality of your labels and extend the life of your printer. Refer to the illustration of parts to be maintained to locate the parts you should clean on the printer. The optional cutter has not been included in the illustration, however it does need to be cleaned if your printer has one. Use the following items to clean the printer effectively and safely:

- Isopropyl alcohol
- Cleaning brush
- Cotton swabs
- Clean lint-free cloth

Parts to Be Maintained



Printer Component	Maintenance Period
Driver roller and tear-off plate	Clean whenever contaminated by debris.
Media path	Clean whenever contaminated by debris.
Case	Clean as necessary.
Printhead	Clean every 50,000 linear inches of media (approximately eight 6,000-inch rolls) for direct thermal printing. Clean every 250,000 linear inches (approximately 41 6,000-inch rolls) for thermal transfer printing.
Cutter	Clean after every 5,000 to 10,000 labels cut. Replace after 500,000 cuts per side (total 1 million cuts).

Lubrication

All bearings in the 4100 printer are either permanently lubricated or made of low friction plastic and do not require maintenance lubrication. The three slip clutches in the printer are prelubricated and should not require further lubrication. However, if the printer mechanism creates a squeaking or humming noise, contact your Intermec representative for assistance.

Cleaning the Printer

The following procedures tell you how to access printer components and clean them without causing any damage.

Note: *Before cleaning any components, turn off and unplug the printer.*

Cleaning the Drive Roller

If the drive roller becomes contaminated with grit, label adhesive, or ink, your print quality may deteriorate. Clean the drive roller whenever these conditions occur.

Tools Required: Phillips screwdriver, cotton swabs or clean cloth, 70% isopropyl alcohol.

CAUTION
Do not scrape the rubber drive 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'imprimante d'étiquettes.

To clean the drive roller

1. Remove the tear-off plate from the front of the printer.
2. Rotate the printhead lift lever clockwise to the UP position.
3. Wipe any accumulated debris off the roller using a clean cloth or cotton swabs and alcohol. Rotate the roller to clean all areas.
4. Wipe any debris from the tear-off plate before reinstalling it.

Cleaning the Media Path

During normal operation of the 4100 printer, media debris may accumulate around the printer mechanism and along the media path. This debris should be cleaned away regularly using a soft bristle brush or vacuum cleaner. Remove all traces of dust, paper, and adhesive. Clean the flat services of the media path with a lint-free cloth and isopropyl alcohol.

Cleaning the Printer Case

The 4100 printer case may be cleaned with a general purpose cleaner. Do not use abrasive cleansers or solvents. Be sure to clean the transparent panel on the right side of the printer so that the media supply inside is visible when the cover is closed.

Cleaning the Printhead

Cleaning media debris from the printhead maintains close contact between the media and printhead, which provides good print quality. When using direct thermal media, you should clean the printhead after every 50,000 linear inches (approximately eight 6,000-inch rolls). When using thermal transfer media, the printhead should be cleaned after every 250,000 linear inches (approximately 41 6,000-inch rolls).

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 only a cotton swab, or a clean, lint-free cloth or tissue damp with isopropyl alcohol.

CONSEIL

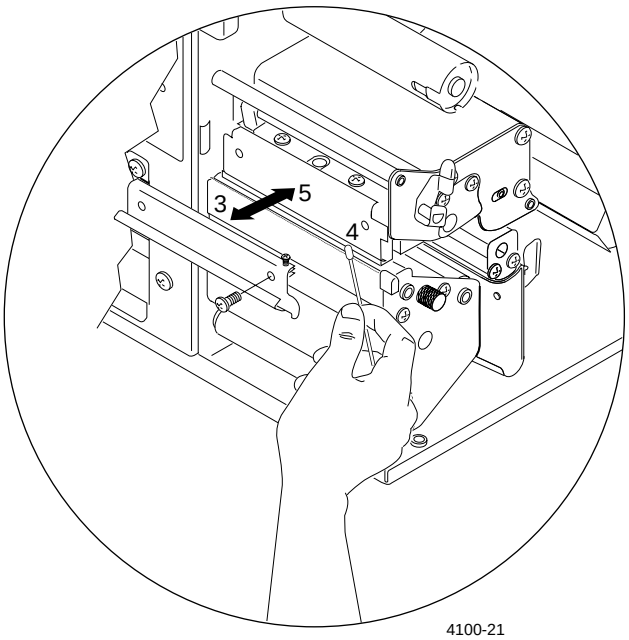
N'utilisez pas d'objets pointus tels que couteaux ou tournevis pour nettoyer la tête d'imprimante. Nettoyer avec des objets pointus endommagera la tête d'imprimante. Nettoyez-la seulement avec de la ouate ou avec un linge propre et libre de peluches, humecté avec de l'alcool d'isopropyl.

Tools Required: Phillips screwdriver, cotton swabs or clean cloth, isopropyl alcohol.

To clean the printhead

1. Open the front panel cover and the right side cover.
2. Rotate the printhead lift lever clockwise to the UP position.
3. Remove the printhead support plate and ribbon shield from the front of the printer mechanism. They are fastened to the printhead mount by two screws located above the drive roller. This step exposes the front edge of the printhead and the print surface on the bottom of the printhead.
4. Use a cotton swab and alcohol to remove any dirt, adhesive, or debris from the print surface on the bottom of the printhead.

Cleaning the Printhead



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5. Reinstall the printhead support plate and ribbon shield. Make sure the tab on the right side of the ribbon shield fits into the slot on the printhead mount, and that the ribbon shield is parallel to the drive roller. Also make sure the slotted plastic spacer attached to the head support adjustment screw fits into the notch in the printhead mount.
6. Rotate the printhead lift lever counterclockwise to the down position until the lever is locked securely in place.

Note: *For details about the printhead support plate, refer to the illustration in the next section.*

Cleaning the Cutter Blades

The cutter requires a minimal amount of maintenance.

Tools Required: WD-40® or a similar petroleum-based lubricant, silicone-based lubricant, clean cloth or cotton swab.

CAUTION

CAUTION

Do not use any petroleum-based lubricants on the plastic parts of the cutter mechanism as they can damage the plastic. You must use silicone-based lubricants on the plastic areas of the cutter.

CONSEIL

Ne pas utiliser de lubrifiant à base d'essence sur les parties en plastique du mécanisme du massicot, sous peine de risquer de les endommager. Utiliser seulement des lubrifiants à base de silicone.

After every 5,000 to 10,000 labels cut, check the front and back sides of the cutter blades. If there is adhesive buildup on the blades, clean them with a cloth or cotton swab sprayed with WD-40 or a similar product. Rub the surfaces until the blades are completely clean.

You should also clean parts of the cutter where the media enters and exits the cutter assembly. Watch for signs of adhesive buildup such as slower cutter operation or increased effort to cut media.

You may also want to lubricate the plastic part of the cutter blade assembly that moves up and down with the blade. Be sure that you use a *silicon-based lubricant* on the plastic.

The cutter produces dust and paper particles as it operates. Make sure this debris does not build up inside the printer or the cutter mechanism. A small vacuum cleaner or compressed air is effective in removing a buildup of these particles.

Adjusting the Printhead Support

If you are using media that is 3.5 inches or less in width, you must adjust the printhead support to ensure optimal print quality and to avoid excessive wear on the drive roller and printhead. You may also need to adjust the printhead support if your printer exhibits signs of ribbon wrinkling or the print darkness on the label is inconsistent from top to bottom.

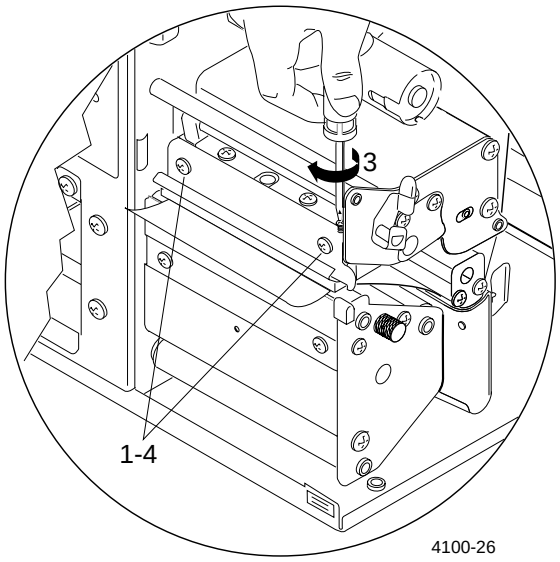
The printhead support plate supports the outer end of the printhead when you are using narrow media. Without this support, the printhead would bear down excessively on the drive roller.

Tools Required: Phillips screwdriver, cotton swabs or clean cloth, isopropyl alcohol.

To adjust printhead support

1. Loosen the two screws that fasten the printhead support plate to the printhead mount, leaving the screw on the left slightly snug.

Printhead Support Adjustment



2. Load the media you will be printing on and engage the printhead by rotating the head lift lever to the DOWN position.
3. Turn the printhead support adjustment screw clockwise until the printhead support plate moves down and contacts the bearing plate underneath.
4. Tighten the two screws to secure the printhead support plate to the printhead mount.

Note: *The screws that secure the printhead support plate to the printhead mount also secure the ribbon shield. When you loosen these screws, both the plate and the ribbon shield may move. Make sure the ribbon shield is parallel to the drive roller when you have completed this adjustment procedure.*

Adjusting the Printhead Alignment

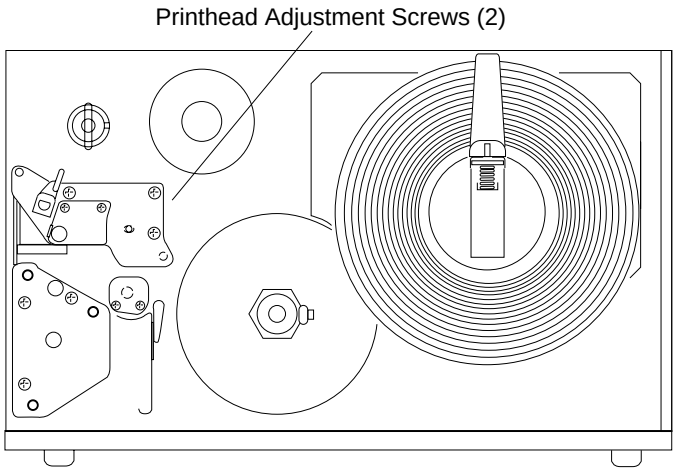
The 4100 printer is adjusted at the factory using 4 mil thick label stock. When using heavier tag stock, you may need to adjust the printhead forward.

Adjust the horizontal position of the printhead by turning the right and left printhead adjust screws that correspond to the right and left sides of the printhead. Turning the screws 1/2 turn counterclockwise will move the printhead .012 inch forward. Conversely, turning the screws 1/2 turn clockwise moves the printhead backward by the same amount.

Tools Required: Phillips screwdriver, 1/16 inch hex key, and 4100 alignment plate.

To adjust the printhead alignment for a coarse adjustment

1. Loosen the screws that secure the bearing block mounting bracket.
2. Place the alignment plate over the bearing block mounting bracket and insert the upper and lower drive roller bearings into the corresponding holes in the alignment plate. The narrow tab on the top of the alignment plate should be centered in the printhead alignment slot. If the tab does not center, use the hex key to turn the left printhead adjust screw until the tab is centered.



CAUTION

Do not turn the printhead adjust screws more than two turns in either direction. Damage to the printhead assembly could result if the adjustment screws are turned too far.

CONSEIL

Ne tournez pas les vis d'ajustement de la tête d'impression de plus de deux tours dans chaque direction. Vous risquez d'endommager l'assemblage de la tête d'impression si les vis d'ajustement sont serrées à fond.

3. To align the opposite end of the printhead, turn the alignment plate upside down and insert the contoured edge into the space along the left end of the printhead.
4. When the alignment plate is seated against the metal shoulders of the upper and lower drive rollers, use hex key to adjust the right printhead adjust screw. Move the printhead forward until it just touches the edge of the alignment plate.

The printhead should now be aligned roughly so that the print line is centered on the drive roller. Print quality at this point should be fairly good. To optimize the print quality, perform the following fine adjustment procedure.

To adjust the printhead alignment for a fine adjustment

1. Print bar codes on a label and inspect the printing quality.
2. Use the hex key to turn the left and right head adjust screws counterclockwise 1/4 to 1/2 turn until you achieve the desired print quality.
3. Push the bearing block back into contact with the printhead support plate and tighten the screws to secure the bearing block mounting bracket.
4. Turn the left head adjust screw 1/4 turn counterclockwise.

Replacing the Cutter Blade

The lifetime of the cutter blades is 1 million cuts, or 500,000 cuts per side. The blades are reversible for extra life before replacement. The cutter blades cannot be sharpened and must be replaced when both cutting edges become dull. Replacement cutter blades are available for purchase from Intermec (Part No. 501137).

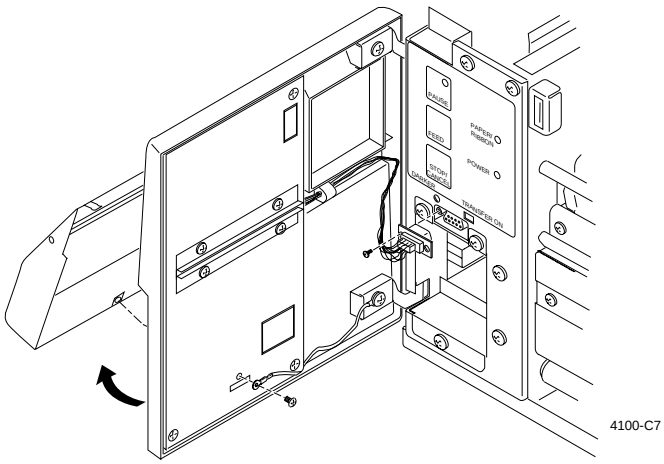
Tools Required: Phillips screwdriver, straight slot screwdriver, WD-40® or a similar petroleum-based lubricant, silicone-based lubricant, Loctite® a thread-locking adhesive, clean cloth or cotton swab.

WARNING
Turn off the power and disconnect the power cord from the printer before replacing the cutter blades.

AVERTISSEMENT
Fermez le courant et déconnectez le cordon d'alimentation avant de remplacer les lames.

WARNING
The moving blade is spring loaded and sharp and may cause injury. If you have any doubts about your ability to replace the blades correctly and safely, please contact your local Intermec representative.

AVERTISSEMENT
Faites attention de ne vous pas blesser avec la lame mouvant qui est à rèssort et très acérée. Si vous n'êtes pas sûr de pouvoir remplacer vous-mêmes les lames correctement et sans risquer de vous blesser, veuillez vous adresser à votre représentant local Intermec.



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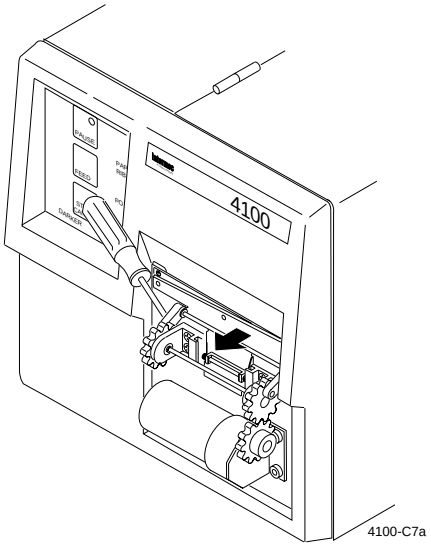
To remove the cutter blades

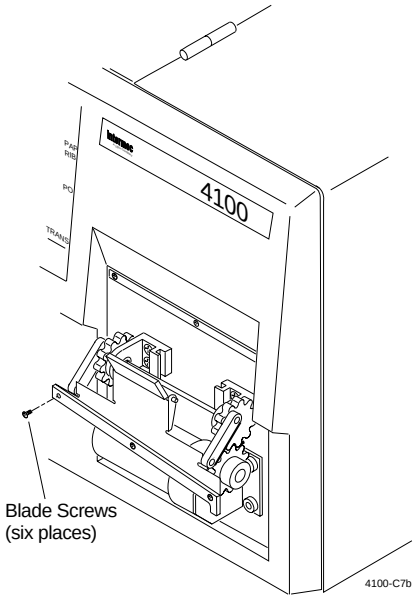
1. Turn off the power and disconnect the power cord to the 4100 printer.
2. Open the front cover and disconnect the cutter cable plug.
3. Remove the cutter cover by removing the Phillips screw just above the plastic tab at the inside bottom center of the cutter door. Pull outward on the bottom of the cutter cover to remove it.

Step 4



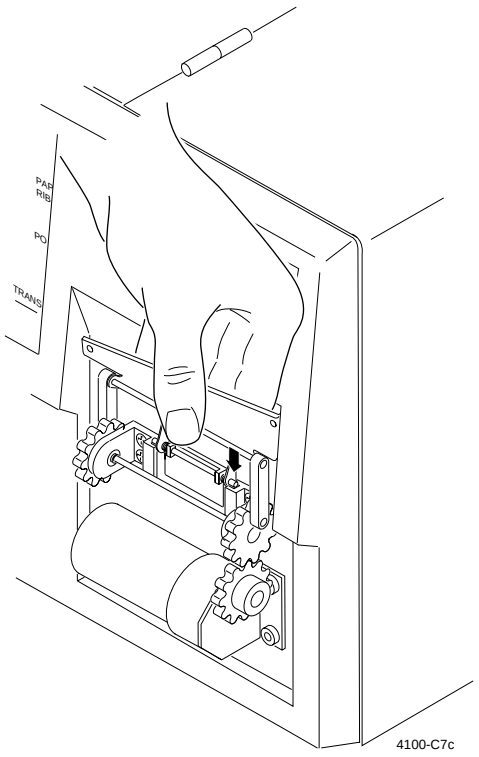
4. Rotate the gears so the moving blade is at its highest position. Pull the blade mount outward by pulling on the plastic link arms that connect to the gears, or use a screwdriver to pry the arms back.

Step 5



5. Remove the six Phillips screws that secure the blades to the blade mount and remove the blades.
6. Inspect both blades for dust or adhesive buildup. Apply some WD-40 to the blade surfaces using a small cloth, if necessary.
7. Clean the area where the blades were mounted, if necessary.

Steps 1 and 2



To replace the cutter blades

1. If the blades are still sharp on the reverse side, secure the bottom blade to the top blade mount and mount the top blade in the bottom position. Otherwise, install new blades.
2. Place a small amount of Loctite in the six blade mounting holes.
3. Use the three blade screws (removed earlier) to secure the bottom blade to the top blade mount. Use the three remaining blade screws to mount the top blade in the bottom position.
4. Reset the spring attached to the moving blade by pressing the spring mount against the main plate until it is flat against the plate.
5. Insert the pin ends of the blade mount plate into the grooves in the gear bearing mounts.
6. Gently position the moving blade against the fixed bottom blade. The spring will pull the blades together.
7. Replace the cutter cover by inserting the top tabs into the front cover and swing the bottom of the cover downward into place. Fasten the cover with the Phillips screw removed earlier.
8. Reconnect the cutter cable plug and power cord.
9. Switch on the printer power. The cutter will cycle and should stop with the blades in the fully down position.

The cutter is now ready for use.

Replacing the Fuse

If the Power On light does not come on when you turn on the printer, you may need to replace the main power fuse. The fuse and fuse holder are located on the rear of the 4100 printer. To replace the fuse, you will need a 1.5A Slo-Blo fuse for 115 VAC operation. Printers that operate at 230 VAC use a 1.2A double pole circuit breaker.

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 replacer 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. Turn the fuse holder half a turn counterclockwise.
3. The fuse holder will pop out. Pull the fuse holder from the printer.
4. Remove the old fuse from the holder.
5. Install the new fuse in the holder
6. Press the fuse holder into place and turn it half a turn clockwise or until it stops.
7. Connect the power cord to the printer.
8. Turn on the printer. If it still does not receive power, contact your Intermec representative.

5

Troubleshooting

About Troubleshooting

Your 4100 printer will operate reliably in harsh conditions, but you may still encounter error messages. You can fix most of the errors you encounter without having the printer inoperable for long.

This chapter tells you how to troubleshoot error messages that the printer sends to the host and details certain problems you could experience with the printer. Most of the problems you will encounter should be listed in this chapter.

Troubleshooting Checklist

If you encounter a problem with the printer, try the following:

- Check if the printer sends an error message to the host in response to a <BEL> command.
- If there is an error message, find it in the table under "Error Message" in this chapter and follow the instructions.
- If the printer does not send an error message to the host, try to locate the symptom in the tables under "Printer Operation Problems" or "Print Quality Problems" in this chapter and follow the instructions.
- Clean the printer components and check all connections. See Chapter 4, "Routine Maintenance," for details.

If the problem persists, contact your Intermec sales 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 loss of power	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 in 115 VAC printers, or circuit breaker tripped in 230 VAC units.	Replace the fuse as shown in Chapter 4. Reset the circuit breaker for 230 VAC printers.
Labels stop indexing	Media is sticking to the paper path.	Clean any extraneous material from the paper path and clean it thoroughly. See Chapter 4.
	Label gap sensor is not set correctly.	Adjust the label gap sensor. See Chapter 3.
	Printer is out of media.	Load new media. See Chapter 3.
	Label stock is loaded incorrectly.	Check the media path. See Chapter 3.
	Printer is set for continuous label stock.	Check the variable used with the label stock type configuration command <SI>T. See Chapter 7.
Printer slows down	Image bands or print speed are incorrectly set.	Change the image bands or print speed settings. See Chapter 7.
	Image overrun condition has occured and print speed and image bands were reset.	Change the image bands or print speed settings. See Chapter 7.
Media jam occurs	Media is backed up behind the cutter.	Push [FEED] button to perform a cut. Or, open the cover to remove media from behind the cutter. Reinsert the media through the cutter's paper guide. Make sure the slot on the cutter is clear. Or, follow the procedures in Chapter 4 for removing the cutter blade and then cleaning it.

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
Blotches on labels	Dirty printhead.	Clean the printhead. See Chapter 4.
	Dirty media path.	Clean the media path. See Chapter 4.
	Poor quality label or ribbon stock.	Replace stock with Intermec Media Products Label and/or ribbon stock.
Printing is too light or too dark.	Dirty printhead.	Clean the printhead. See Chapter 4.
	Incorrect media grade.	Select the correct media grade. See Chapter 7.
	Poor quality label or ribbon stock.	Replace stock with Intermec Media Products Label and/or ribbon stock. See Chapter 3.
Printing not aligned on label	Printer is misfeeding media.	Make sure the media is installed properly along the entire media path. See Chapter 3.
Print quality is poor	Printhead not fully engaged.	Make sure the printhead lift lever is fully engaged in the DOWN (6 o'clock) position.
	Ribbon installed upside down.	Install ribbon with shiny side facing printhead. See Chapter 3.
	Ribbon wrinkling.	Install ribbon correctly (see Chapter 3) or adjust the printhead support (see Chapter 4).
	Direct Thermal/Thermal Transfer switch in wrong position.	Set the switch for the type of media you are using.
	Incorrect media sensitivity.	Select correct media sensitivity number. See Chapters 3 and 7.
	Printhead support is out of alignment.	See "Adjusting the Printhead Support" in Chapter 4.

Communication Problems

If your printer is not receiving downloaded data, try the solutions in the accompanying table.

Symptom	Cause	Solution
Printer does not communicate with the host	Serial port is incorrectly configured.	Make sure the printer's serial port settings match those of the host. Print a software test configuration label described in Chapter 1 check the serial port settings.
	Damaged or incorrect I/O cable.	Check the connections at both ends or replace the cable. See Chapter 2 for cable information.

Error Handling

This section describes how the 4100 printer handles certain error conditions it may encounter in printer or programming commands.

Syntax Errors

The 4100 printer responds to syntax errors in the messages it receives from the host by attempting to execute the commands. It will not ignore a command with a syntax error. Instead, the printer will produce output even if it is erroneous. This will give you indications about what went wrong and what should be done to correct the problem.

Parameter Errors

Certain commands require mandatory or optional parameters. If these parameters are not supplied, default values will be substituted. If a parameter is above its maximum range limit, the maximum value will be used. If it falls below the minimum range, the minimum value will be used. The range and the default value for each command is listed in Chapter 7, "Printer Commands."

Image Overrun Errors

Image overrun occurs when a label is too complex to image for a given print speed. An overrun will cause the printer to abort the label being printed. This error is most common on labels over 5 inches long.

The printer automatically attempts to correct for this error condition by resetting to the lowest print speed and to the highest number of image bands, and then prints the label again. The printer remains at this setting until you reset it. If an image overrun still occurs, then printing for that batch of labels will stop and any following commands will be executed.

Installing the optional 256K memory expansion module will allow you to print more complex labels because it allows the printer to image the entire label before printing.

Invalid Numeric Character Errors

If non-numeric characters are included within a numeric data string in a command, the printer disregards them and continues to process the rest of the valid numeric characters. However, if a non-numeric character begins the numeric data string, the printer uses a default value for the affected command.

Here are two examples of valid numeric character strings and one example of an invalid string:

12a	valid
1a2	valid
a12	invalid

Insufficient Storage RAM Errors

Before storing new formats, graphics, or user-defined fonts in the static RAM, the printer checks for sufficient memory for them. If there is insufficient memory, the last editing session will be disregarded. The printer will preserve the integrity of the existing data in the static RAM.

Error Codes

Most of the problems you encounter will cause the 4100 printer to send an error code to the host. When this happens, find the message in the table below and follow the instructions to fix the problem.

Error Code	Problem	Solution
00	No error	
01	Invalid bar code check character	Verify the bar code check character modifier used in the bar code program command.
02	Invalid number of bar code characters (Code UPC/EAN)	Verify the number of bar code characters used in the bar code program command.
04	Bar code check character within numeric field marks	Check the bar code program command for accuracy.
05	Supplemental delimiter within numeric field marks (Code UPC/EAN)	Check the bar code program command for accuracy.
06	Invalid supplemental character count (Code UPC/EAN)	Check the bar code program command for accuracy.
07	More than one supplemental delimiter (Code UPC/EAN)	Check the bar code program command for accuracy.
08	Invalid start/stop characters (Codabar)	Verify start and stop characters in the label format.
11	Invalid bar code data	Verify data in the label format.
12	Data count exceeded	Data count should not exceed what is specified for field.
13	Entering data in non-data entry field	Check the field for accuracy.
21	Quantity or batch count out of range	Quantity of labels or number of batches should be between 1 and 9999.
22	Field increment/decrement out of range	Quantity should be between 1 and 9999.
23	Intercharacter/message delay out of range	Delay should be between 0 and 9999.
24	Missing preamble/postamble data	Delete the setup for preamble or postamble data, or include the data.
25	Invalid format transmission syntax	Check the format transmission syntax. The correct syntax is <ESC>x [n] with n ranging from 0 to 19.

Error Code	Problem	Solution
26	Invalid page transmission syntax	Check the page transmission syntax. The correct syntax is <ESC>y [n] with n ranging from 0 to 9.
27	Invalid font transmission syntax	Check the font transmission syntax. The correct syntax is <ESC>v [n] with n ranging from 0 to 24.
28	Invalid UDC transmission syntax	Check the UDC transmission syntax. The correct syntax is <ESC>u [n] with n ranging from 0 to 99.
32	Non-immediate command or data received after buffer full	Allow the printer to empty the buffer contents before sending commands or data.
33	Invalid field delimiters	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 data shift command	Correct the shift command syntax.
36	Invalid or undefined format number	Verify that the format numbers are between 0 and 19.
37	Insufficient room in RAM to print format	Reduce the number of data fields in the format.
38	Invalid or undefined field number	Verify the field number in the label format.
41	Syntax error for program commands	Check the program command for proper syntax.
42	Insufficient room in RAM to store format	If the format still does not fit, delete some fields or other data from the format, or remove or reduce the UDCs, formats, or fonts. The command <ESC>m tells the host how much memory is installed and how much is available.
43	Too many fields in label format	You can use up to 200 fields in a format. Delete fields until you have 200 or fewer.
46	Undefined statement	Check the statement syntax.
52	Invalid UDC / UDF bitmap cell height / width or intercharacter space	Verify that cell heights and widths are between 1 and 599, and that the intercharacter space is between 0 and 199.
53	Insufficient room in RAM to store UDC or UDF	Remove or reduce formats, fonts, or UDCs.
54	Invalid UDC command syntax	Correct the UDC command syntax.

Using Test and Service Mode

When the 4100 printer is in Test and Service mode, you can print test labels and provide printer hardware diagnostic information to the host.

To enter Test and Service mode

1. Power off the printer.
2. Enable Test and Service mode by moving Switch 8 on the bottom bank of DIP switches to the 1 or on position.
3. Power on the printer. The printer is now in Test and Service mode.
4. Set the DIP switches to the Test and Service function you wish to perform. See the following table for a list of the DIP switch settings.
5. Hold the **[FEED]** button down for 1 second. The test begins immediately.
6. If you wish to perform another function, change the DIP switch settings and hold the **[FEED]** button for 1 second. The function currently being executed is terminated and the new function is performed.

Note: *For all Test and Service tests, pressing the* ***[FEED]*** *button pauses the current test. Holding the* ***[FEED****] button aborts the current test and starts a new test.*

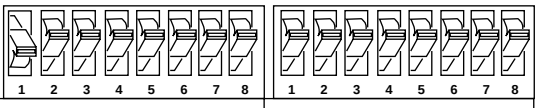
7. To exit Test and Service mode, cycle the printer power and reset the DIP switches to their original setting.

Note: *Be sure to return all DIP switches to their original settings after you complete the configuration tests. These switch settings will not take affect until you turn the printer off and then on again.*

The printer remains in Test and Service mode until the power is turned off and the DIP switches are reset. All functions are executed as soon as they are selected. Selecting a new function terminates the current test.

Use the information provided in the following table to set the DIP switches for the appropriate Test and Service mode function that you wish to perform.

Test and Service DIP Switch Settings



O = OFF 1 = ON TESTS	OFF ON	Top Bank 1	2	3	4	5	6	7	8	Bottom Bank 1	2	3	4	5	6	7	8
Test Prints		O	O	O													
Configurations					O	O	O										
Hardware								O	O								A
Software								1	O								A
Test Labels					1	O	O										
Print Quality								O	O								A
Pitch								1	O								A
Page					O	1	O										
Single Page										B	B	B	B	B			A
All Pages										1	1	1	1	1			A
Format					1	1	O										
Single Format										B	B	B	B	B			A
All Formats										1	1	1	1	1			A
UDC					O	O	1										
Single UDC										B	B	B	B	B	B	B	A
All UDCs										1	1	1	1	1	1	1	A
Font					1	O	1										
Single Font										B	B	B	B	B	B		
All Fonts										1	1	1	1	1	1		
Data Line Print		1	O	O													
Cloning		O	1	O													
Receiver					O												
Sender					1												
Selective Transfer		1	1	O													
Receiver					O	O	O										
Send Pages					1	O	O										
Single Page								C	C	C	C	C	D	D	D	D	D
All Pages								1	1	1	1	1	1	1	1	1	1
Send Format					O	1	O										
Single Format								C	C	C	C	C	D	D	D	D	D
All Formats								1	1	1	1	1	1	1	1	1	1
Send UDC					1	1	O										
Single UDC								C	C	C	C	C	C	C			
All UDCs								1	1	1	1	1	1	1			
Send Font					O	O	1										
Single Font								C	C	C	C	C	D	D	D	D	D
All Fonts								1	1	1	1	1	1	1	1	1	1
Send Configuration					1	O	1										
Send Tables					O	1	1										
Send All					1	1	1										
Memory Reset		O	O	1													
Page/Format					O	O	O										
UDC/Font					1	O	O										
Configuration					O	1	O										
Tables					1	1	O										
All					1	1	1										

A: OFF = Batch of 1. ON = Batch of 100.
B: Page/Format/UDC/Font number. Least significant bit first.
C: Source Page/Format/UDC/Font number. Least significant bit first.
D: Destination Page/Format/UDC/Font number. Least significant bit first.

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Printing Test Labels

The 4100 printer can print a variety of test print labels to provide you with information about the printer's configuration and about the quality of the printing.

To print out a hardware configuration test label

1. Power off the printer.
2. Enable Test and Service mode by moving Switch 8 on the bottom bank of DIP switches to the 1 or ON position.
3. Power on the printer. The printer is now in Test and Service mode.
4. Set the DIP switches to the test or service function you wish to perform. See the Test and Service DIP Switch Settings table for the correct settings.
5. Hold the **[FEED]** button down for 1 second. The test begins immediately.

   For most tests you can print either a single test label or a batch of 100 test labels. Use the [**PAUSE**] button to temporarily suspend the test print. Use the [**STOP/CANCEL**] button to terminate the test print. For detailed information on printing configuration test labels, see Chapter 1 "Getting Started."
6. Exit Test and Service mode by cycling the printer power and resetting the DIP switches to their original settings.

Using Data Line Print

Use Data Line Print mode to troubleshoot communication between the printer and the host. You can also use it to test printer operation. When you enable Data Line Print mode, the 4100 printer prints out all data and protocol characters received by the serial port with the hexadecimal equivalent underneath. Holding the **[FEED]** button down momentarily suspends the test. Pressing the **[STOP/CANCEL]** button causes the printer to transmit the firmware program and version number to the host.

To enter Data Line Print mode

1. Power off the printer.
2. Enable Test and Service mode by moving Switch 8 on the bottom bank of DIP switches to the 1 or ON position.

3. Power on the printer. The printer is now in Test and Service mode.
4. Set DIP Switch 1 to the ON position.
5. Hold the **[FEED]** button down for 1 second. You are now in Data Line Print mode.

Performing Cloning

Cloning is a Test and Service mode procedure that copies the RAM contents (configuration, formats, fonts, pages, and graphics) from the memory of one printer to the memory of another. 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.

To perform cloning, you must be aware of these limitations:

- You can only clone from like printer to like printer. You cannot clone a 4100 printer to an 86XX or to a 4400.
- The sender and receiver printers must be running the same firmware version. If you are unsure of the version, perform the Data Line Print mode function and press the **[STOP/CANCEL]** button.
- The sender and receiver printers must have exactly the same amount of static RAM installed. Again, if you are unsure of this, print a configuration test label.

When you set the printer DIP switches to the cloning setting, you also set the printer serial port to 19,200 Baud, even parity, 1 stop bit, and 8 data bits. When you select cloning, the 4100 printer initiates the data transfer by sending an <ENQ> message to the receiving printer. The receiving printer responds by transmitting its program and version numbers, and the amount of static RAM installed. If the numbers are identical to those of the sending printer, the sender begins the data transfer. The PAUSE indicator on the sending printer flashes during the data transfer. If the transfer is successful, the sending printer's PAUSE indicator turns off. If the transfer fails, the indicator stays lit.

To perform cloning

1. Connect the serial ports of the sender and receiver ports together with an RS-232 null modem cable.
2. Enable Test and Service mode by moving Switch 8 on the bottom bank of DIP switches to the 1 or on position.

3. Power on the printer. The printer is now in Test and Service mode.
4. Set the DIP switches on the sender printer and receiver printer for cloning as shown in the Test and Service DIP Switch Settings table earlier in this chapter.
5. Press the [**FEED**] button to initiate cloning. The PAUSE indicator on the sending printer flashes while the data is being transferred and then turns off. cloning is now complete.

Performing 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 is useful for setting up different printers to print the same label formats.

With Selective Transfer, you can download these label design attributes from one 4100 printer to another:

- Any specified page or all pages
- Any specified format or all formats
- Any specified font or all fonts
- Any specified user-defined character (UDC) or all UDCs

When you set the printer DIP switches to the setting for Selective Transfer, you also set the printer serial port to 19,200 Baud, even parity, 1 stop bit, and 8 data bits. When you select Selective Transfer, the 4100 printer initiates the data transfer by sending an <ENQ> message to the receiving printer. The data transfer begins when the receiving printer responds with a <DC1> message. The Pause indicator light on the sending printer flashes while the data is being transferred. For pages, format, and fonts, the destination and source numbers can be different. For user-defined characters, the destination and source numbers must be the same.

To perform Selective Transfer

1. Connect the serial ports of the sender and receiver ports together with an RS-232 null modem cable. Refer to Chapter 2, “Installing the Printer,” for cabling information.
2. Enable Test and Service mode by moving Switch 8 on the bottom bank of DIP switches to the 1 or on position.

3. Power on the printer. The printer is now in Test and Service mode.
4. Set the DIP switches on the sender printer and receiver printer as shown in the Test and Service DIP Switch Settings table earlier in this chapter.
5. Select the types of data you wish to transfer (such as pages, formats, or fonts) by setting the corresponding DIP switches shown in the Test and Service DIP Switch Settings table.
6. Press the [**FEED**] button on the receiving printer, and then on the sending printer to initiate selective transfer. The PAUSE indicator on the sending printer flashes while the data is being transferred and then it turns off. The Selective Transfer is now complete.
7. Exit Test and Service mode by cycling the printer power and returning all DIP switches to their original settings.

Using Memory Reset

Use Memory Reset if you want to return the 4100 printer to its default configuration or if you need to increase the amount of memory available in your printer. You can also use Memory Reset to clear pages and formats, user-defined characters and fonts, configurations, tables, or all of these parameters.

To use Memory Reset

1. Power off the printer.
2. Enable Test and Service mode by moving Switch 8 on the bottom bank of DIP switches to the 1 or on position.
3. Power on the printer. The printer is now in Test and Service mode.
4. Set the DIP switches to the memory reset function you wish to perform. See the Test and Service DIP Switch Settings table earlier in this chapter.
5. Hold the [**FEED**] button down for one second. The test begins immediately.
6. If you wish to perform another memory reset function, change the DIP switch settings and hold the [**FEED**] button for 1 second. The function currently being executed is terminated and the new function is performed.
7. To exit Test and Service mode, cycle the printer power and reset the DIP switches to their original setting.

Note: *You can also use the Test and Service command (D) to reset all RAM. See Chapter 7, "Printer Commands," for more information.*

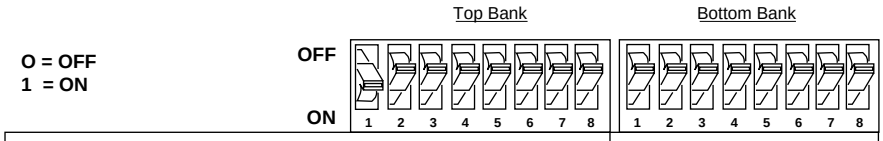
Changing Configuration Commands in Test and Service Mode

Test and Service mode also provides you with an alternative to sending down configuration commands from the host. You can change the following configuration commands by setting the Test and Service mode DIP switches:

- label rest point
- 86XX emulation
- X forms adjust
- Y forms adjust

The following table provides you with the Test and Service mode DIP switch settings for changing the configuration commands. For procedures on how to perform each function, see these sections: “Adjusting the Label Rest Point,” “Setting 86XX Emulation Mode,” and “Using Forms Adjust.”

Configuration DIP Switch Settings



	Top Bank								Bottom Bank							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Label Rest Point	O	1	1													
Adjust Forward				O					N	N	N	N	N			
Adjust Backward				1					N	N	N	N	N			
86XX Emulation	1	O	1													
Advanced Mode				O	O											
10 Mil				1	O											
15 Mil				1	1											
X Forms Adjust	1	1	1	1												
Adjust Forward					O				N	N	N	N	N			
Adjust Backward					1				N	N	N	N	N			
Y Forms Adjust	1	1	1	O					N	N	N	N	N			

N: Number. Least significant bit first.

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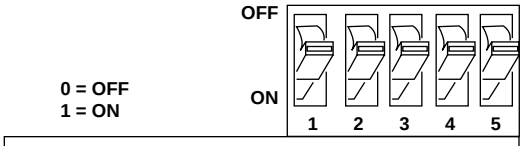
Setting the Number of Dot Increments

You can move several configuration commands forward or backward by setting the two banks of DIP switches. Use the top bank of DIP switches to determine whether the movement is forward or backward. Use the bottom bank of DIP switches to set the number of dot increments for label rest point, X forms adjust, and Y forms adjust.

Note: *Refer to the Configuration DIP Switch Settings table for the top bank DIP switch settings. The table on the following page shows the settings for the bottom bank of switches.*

Dot Increments DIP Switch Settings

Bottom Bank



# of dot increments	1	2	3	4	5
1	1	O	O	O	O
2	O	1	O	O	O
3	1	1	O	O	O
4	O	O	1	O	O
5	1	O	1	O	O
6	O	1	1	O	O
7	1	1	1	O	O
8	O	O	O	1	O
9	1	O	O	1	O
10	O	1	O	1	O
11	1	1	O	1	O
12	O	O	1	1	O
13	1	O	1	1	O
14	O	1	1	1	O
15	1	1	1	1	O
16	O	O	O	O	1
17	1	O	O	O	1
18	O	1	O	O	1
19	1	1	O	O	1
20	O	O	1	O	1
21	1	O	1	O	1
22	O	1	1	O	1
23	1	1	1	O	1
24	O	O	O	1	1
25	1	O	O	1	1
26	O	1	O	1	1
27	1	1	O	1	1
28	O	O	1	1	1
29	1	O	1	1	1
30	O	1	1	1	1

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To set the number of dot increments

1. In the top bank, turn the appropriate switches on or off for forward or backward movement. See the Configuration DIP Switch Settings table for the appropriate DIP switch settings.
2. Go to the Dot Increments DIP Switch Settings table and scan down the # of dot increments column until you reach the number of dot increments you want to adjust the command forward or backward.
3. In the bottom bank, turn on the switches that have a 1 in their column. Turn off all other switches.
4. Press the [**FEED**] button and the printer prints out the software configuration label and stops at the new location.

Adjusting the Label Rest Point

The Label Rest Point configuration command adjusts the point where the printer presents each label for removal. Use this command in conjunction with self-strip applications. The label rest point adjust range is from -30 dot increments (furthest back) to +30 dot increments (furthest forward). Use a negative number if you want the printer to retract the label a number of dot increments after it prints the label. Use a positive number if you want the printer to feed the label a number of dot increments after it prints the label.

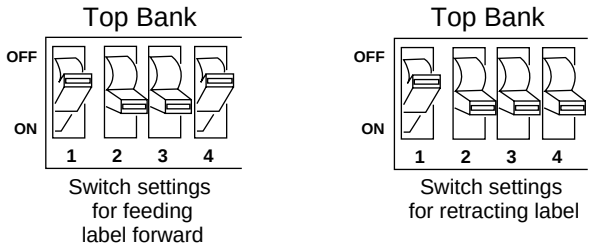
There are two ways to adjust the label rest point. You can set it by using a printer software command (<SI>f{n}) or by using the Test and Service DIP switches. See Chapter 7, “Printer Commands,” for more information on the software command to adjust the label rest point. Follow the procedure below to use the DIP switch settings to adjust the label rest point.

To set the label rest point

1. Power off the printer.
2. Enable Test and Service mode by moving Switch 8 on the bottom bank of DIP switches to the 1 or on position.
3. Turn on the power to the printer. The printer is now in Test and Service mode.
4. In the top bank of the Test and Service DIP switches, turn off Switch 1 and turn on Switches 2 and 3.

To adjust the label rest point forward (feed more label), turn off Switch 4.

To adjust the label rest point backward (retract label), turn on Switch 4.



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5. In the bottom bank of the Test and Service DIP switches, turn the appropriate DIP switches on or off. To set the label rest oint forward or backward a given number os increments, see the Dot Increments DIP Switch Settings table earlier in this chapter.
6. Press the [**FEED**] button. The printer prints out the software configuration label.
7. Verify the Label Rest Point number on the software configuration label matches the number you set in Step 5.
8. If you need to readjust the DIP switches in the bottom bank, repeat Steps 5 through 7. If not, exit Test and Service mode by powering off the printer and returning all DIP switches to their original settings.

Using 86XX Emulation Mode

If you are replacing an Intermec 8636 or 8646 printer with a 4100 printer, you can keep your existing network, hardware, software, and label formats by using 86XX Emulation mode. The labels your 4100 printer produces will look just like the ones that your 86XX printer produced.

To set the printer to 86XX Emulation mode

1. Upload label formats, fonts, and graphics from the 8636 or 8646 printer to the host computer.
2. Disconnect the 86XX printer and install the 4100 printer. (See Chapter 2.)

3. Make sure the 4100 printer is powered off.
4. Enable Test and Service mode by moving Switch 8 on the Bottom Bank of DIP switches to the 1 or on position.
5. Turn on the power to the printer. The printer is now in Test and Service mode.
6. In the top bank of the Test and Service DIP switches, turn on Switches 1 and 3 and turn off Switch 2.

   Use the table below to help you choose the appropriate DIP switch settings:

Setting	Description
86XX 10 mil	The printer emulates an 8636 or 8646 printer, printing multiples of 10 mil (0.01 inch) drag and 15 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.
Advanced (default)	The printer uses the 3400 command set and prints in multiples of 5 mil (0.005 inch) drag and 5 mil (0.005 inch) picket bar codes.

   To enable 10 mil emulation, turn on Switch 4 and turn off Switch 5.

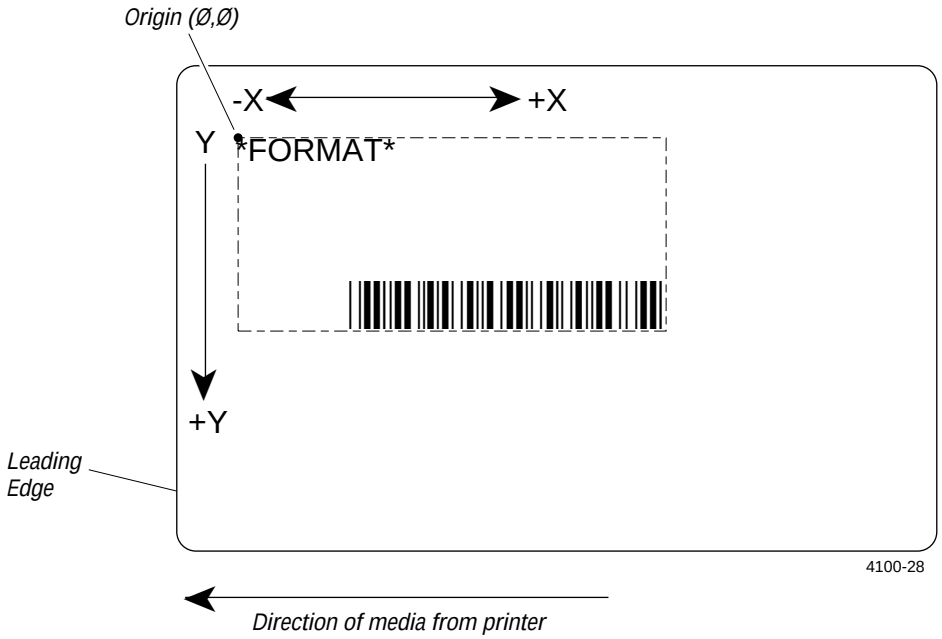
   To enable 15 mil emulation, turn on Switches 4 and 5.

   To enable Advanced mode, turn off Switches 4 and 5.
7. Press the [**FEED**] button. The printer prints out the software configuration label. Verify the correct mode is stated on the label.
8. Turn the printer off and set the DIP switches to your desired configuration.
9. Turn the printer on.
10. Download the 86XX format, fonts, and graphics from the host to the 4100 printer.

Forms Adjust

If your label prints too close to one edge, you can reposition it using the X Forms Adjust and Y Forms Adjust features. The X adjustment controls the position of the printing area along the length of the label. The Y adjustment controls the position of the printing area along the width (height) of the label.

X Forms Adjust and Y Forms Adjust



The figure above shows the default X and Y origin. You control the X origin (top of form) with the Test and Service DIP switches or the <SI>F command. You control the Y origin with the DIP switches only.

The default X origin is 10 dot increments (0.05 inch) from the edge of the label. You can move the X origin forward or back 30 dot increments. Each dot increment is 5 mil (.005 inch).

The default Y origin is 10 dot increments (0.05 inch) from the leading edge of the label. You can move the Y origin forward 30 dot increments.

Setting the X Forms Adjust

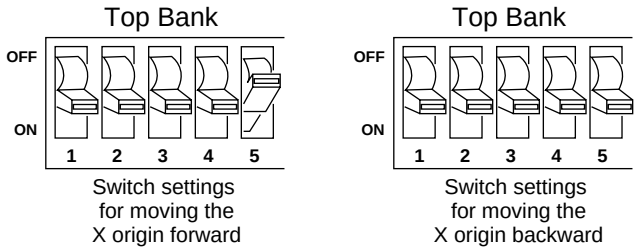
When you move the X origin forward, the printer moves the top of form away from the edge before printing the label information. When you move the X origin backward, the printer moves the top of form closer to the edge before printing the label information.

To set the X Forms Adjust

1. Power off the printer.
2. Enable Test and Service mode by moving Switch 8 on the bottom bank of DIP switches to the 1 or on position.
3. Turn on the power to the printer. The printer is now in Test and Service mode.
4. In the top bank of the Test and Service DIP switches, turn on Switches 1, 2, 3, and 4.

   To move the X origin forward, turn off Switch 5.

   To move the X origin backward, turn on Switch 5.



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5. In the bottom bank of the Test and Service DIP switches, turn on or off the appropriate DIP switches. See the Dot Increments DIP Switch Settings table to set the X Forms Adjust forward or backward a given number of increments.
6. Press the [**FEED**] button.

   The printer prints out the software configuration label.
7. Verify the X Forms Adjust number on the software configuration label matches the number you set in Step 4.
8. Exit Test and Service mode by cycling the printer power and returning the DIP switches back to their original settings.

Setting the Y Forms Adjust

With the Y Forms Adjust feature, you can control the position of the image in the direction parallel to the printhead. For information on how to move the image forward a number of dot increments, see the Dot Increments DIP Switch Settings table. If your label is too close to one edge of the printhead, you can use this feature to adjust it.

To set the Y Forms Adjust

1. Power off the printer.
2. Enable Test and Service mode by moving Switch 8 on the bottom bank of DIP switches to the 1 or on position.
3. Turn on the power to the printer. The printer is now in Test and Service mode.
4. In the top bank of the Test and Service DIP switches, turn on Switches 1, 2, and 3. Turn off Switch 4.
5. In the bottom bank of the Test and Service DIP switches, turn on or off the appropriate DIP switches. See the Dot Increments DIP Switch Settings table to set the X forms adjust forward or backward a given number of increments.
6. Press the [**FEED**] button. The printer prints out the software configuration label.
7. Verify the Y Forms Adjust number on the software configuration label matches the number you set in Step 4.
8. Exit Test and Service mode by cycling the printer power and returning the DIP switches to their original settings.

Using Test and Service Mode Commands

Test and Service Mode commands provide printer hardware diagnostic information to the host. The results of these tests are reported as two-character ASCII codes representing the sensor values. The printer does not use a pass or threshold for these sensor values. The host determines if the output of the printer's sensors is outside the normal operating range. Use the command <ESC>T to enter Test and Service mode from Print mode.

Note: *All commands in Test and Service mode end with the command terminator (;), except the last command in a message.*

Command Code	Summary	Description
A	Ambient Temperature Transmit*	Transmits the ambient temperature sensor A / D output back to the host. The value ranges from 00 to 255.
B	Printhead Resistance Test, Begin*	Causes the printer to begin the printhead resistance test. The printer responds with the ASCII character string "pass" or "fail".
C	Pitch Label, Print*	Causes the printer to print the pitch label.
D	Factory Defaults, Reset	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	Transmissive Sensor	Transmits the label gap transmissive sensor A / D output back to the host. Value ranges from 00 to 255.
K	Dark Adjust*	This command changes the darkness of the print on your labels. It is for fine-tuning only.
L	Label Path Open Sensor Value, Transmit*	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	Reflective Sensor Value, Transmit	Transmits the label mark reflective sensor A / D output back to the host. The value ranges from 00 to 255.
P	Printhead Temperature Sensor Value, Transmit	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, Print	Causes the printer to print out the print quality program and model number label.

* The 4100 printer ignores this command.

Command Code	Summary	Description
R	Test and Service Mode, Exit	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	Label Taken Sensor Value, Transmit	Transmits the label taken sensor A/D output back to the host. The range of the value is 00 to 255.
U	40 Volt Supply Value, Transmit*	Transmits the 40 volt supply A/D output back to the host. The range of the value is 00 to 255.
V	Printhead Volt Supply Value, Transmit*	Transmits the printhead volt supply A/D output back to the host. The range of the value is 00 to 255.
;	Command Terminator	All commands in Test and Service mode must end with the command terminator except for the last command in a message.

* The 4100 printer ignores this command.

6

Designing Labels and Using Commands

Introduction to Label Design

The 4100 printer prints versatile and effective labels in any format, with straightforward methods that are easy to learn. To get the most out of your 4100, you should design labels that are easy to read, contain accurate information, and conserve media by using space efficiently.

If you are just starting out, and you have not designed labels before, it may take some practice to design useful labels. In this chapter you will learn about label design techniques, using the 4100 command set, and you will see examples of the many ways you can use your printer.

Using Label Formats

In order to print a label from the 4100 printer, you must specify a label format and then send data to fill in the appropriate fields in the format.

A *label format* is a set of dimensions and terms used to map the information printed on a label. If you want to print a number on a label, the label format must indicate the location of the number, its font and size, and whether the number has a vertical or horizontal orientation.

In order to download a format to the printer, you download a list of *commands* that contain the format. This chapter explains how to use these commands to design labels. For complete lists of printer commands, see Chapter 7. At first glance these commands may seem cryptic, but you can quickly learn and understand them once you begin designing labels.

Before you try any of the examples which begin on the next page, set your printer DIP switches to the default settings. Be sure to return your printer to your selected configuration when you finish the examples.

An example of a simple label format is shown here along with a sample of data that can be passed to the format. There is also an example of what the printed label looks like.

Like all examples in this manual, this example uses mnemonics to represent control codes like <STX> (start of text). If you want to use human-readable protocol / command characters, you can type these examples as they look on the page directly into your word processor or text editor. Refer to the next section, “Communicating With the Printer” for more information on how to print this label. If you would rather translate these mnemonics to HEX or ASCII, you can use the translation table given in the Appendix.

The line breaks in this example are shown for formatting purposes only and do not represent carriage returns.

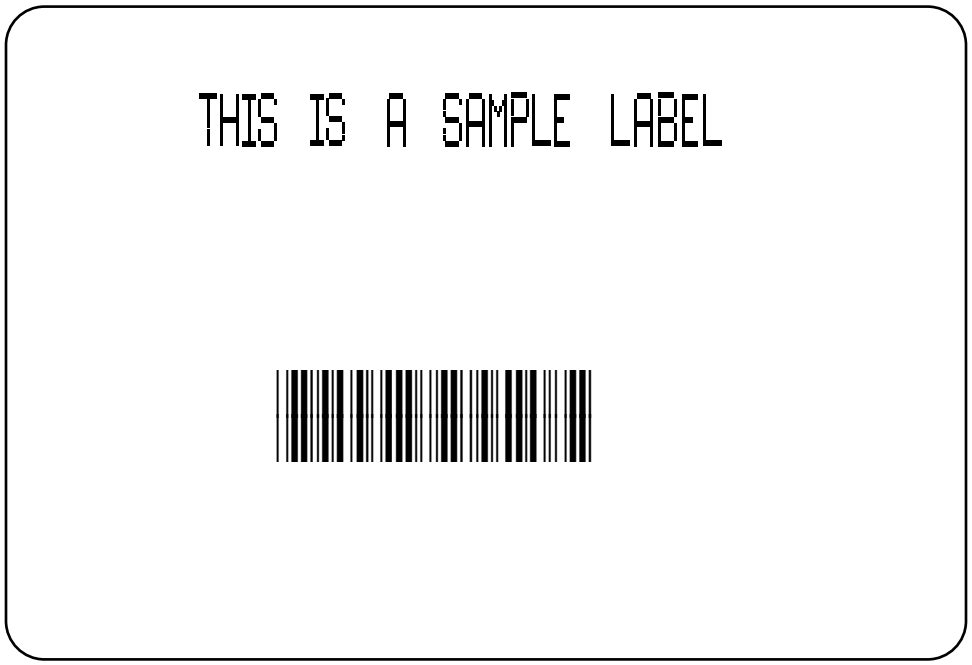
Format

```
<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;o170,220;c0,1;h50;w1;i0;d0,11;p@;<ETX>
<STX>R<ETX>
```

Data

```
<STX><ESC>E4<ETX>
<STX><CAN><ETX>
<STX>THIS IS A SAMPLE LABEL<CR><ETX>
<STX>SAMPLE<ETX>
<STX><ETB><ETX>
```

Sample Printed Label



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Format

<STX>	Mark the beginning of this message line.
<ESC>c	Select 8636 / 46 emulation mode.
<ETX>	Mark the end of this message line.
<ESC>P	Enter programming mode.
E4;F4;	Erases anything previously stored as format 4 and accesses the location for format 4.
H0	Define field 0 as a human-readable field.
o120,50	Set the origin of field 0 at coordinates 120,50.
f0	Do not rotate the field.
c2	Determines that field 0 will print in font 2.
h2	Set the height for field 0 to two times actual size.
w1	Set the height for field 0 to actual size.
d0,30	Specify that the data for field 0 will be entered in Print mode and that the data will be a maximum of 30 characters long.
B1	Define field 1 as a bar code field.
o170,220	Set the origin of field 1 at coordinates 170,220.
c0,1	Select Code 39, the printer enters a check digit.
h50	Set the height for field 1 to 50 dots.
w1	Set the width for field 1 to actual size.
i0	No human-readable interpretive field will print below the bar code.
d0,11	Specify that the data for field 1 will be entered in Print mode and that the data will be a maximum of 11 characters long.
p@	The bar code will not have a prefix.
R	Exit Programming mode and enter Print mode.

Data

<ESC>E4	Accesses format 4 from the printer's memory
<CAN>	Clears all host-entered data for the current format and sets the field pointer to the lowest field.
THIS IS A SAMPLE LABEL	This is the data for the first field.
<CR>	Instructs the printer to go to the next data entry field.
SAMPLE	This is the data for this field.
<ETB>	Tells the printer to print the label.

Communicating With the Printer

To send a label format to the 4100, you must go through a process called *downloading*, which is the transfer of information from the host to any connected peripheral device, such as the 4100 printer. Uploading is when you send data from your printer to your PC or host.

There are several ways to download information. You can download from either a terminal on your host or from a PC, and you can use several different methods from either of these platforms.

Using Intermec Label Design Software

The best way to download information to a 4100 printer is with Intermec's Label Design software package. This WYSIWYG program lets you design labels on screen in a Microsoft Windows environment and takes care of all communications and protocol between your PC and the 4100. For more information regarding Label Design, contact your Intermec sales representative.

Using the Printer Command Set

If you do not have Label Design, you can communicate with the printer by downloading commands from the printer command set. The example of the sample printed label earlier in this chapter uses several commands from the printer command set.

The commands in the printer command set can perform any function or activate any feature of the 4100 printer. The method you use to download the commands is up to you, but if you do not have Label Design, here are some of the options you might try.

Downloading Printer 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), and you must configure the serial port using the DOS mode command. The DOS Copy and Print commands usually use the hardware flow control (Ready / Busy) communication protocol. To use this protocol, the printer must be in Ready / Busy mode. Set DIP switch 1 of the Bottom Bank on and DIP switch 2 of the Bottom Bank off. Next, enter the commands into a text file using a text editor or a word processor, and then copy the file to the serial port on your PC. If you use a word processor, be sure to save the file as an ASCII text file.

Send the file to the printer with the following DOS command:

```
copy (filename) com1:
```

Filename is the name of your text file and the printer is hooked to serial port number 1 (COM 1) of your PC.

Using the DOS Copy command has the advantages of creating a file that can be stored in the PC and then modified and downloaded 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 retyping command strings that you decide to change.

Note: *If you do not set the hardware flow control protocol, the file you want to download must be smaller than the input buffer of the printer (1K) and must contain only one <STX> at the beginning of the message and one <ETX> at the very end of the message. Each message, including <STX> and <ETX> must be less than 256 characters. To avoid unpredictable results, Intermec recommends that you always set the Ready/Busy protocol.*

Using a Text Editor or Word Processor to Create Your Label

There are two ways that you can enter ASCII text characters using most text editors or word processors: control codes or readable protocol / command characters. Many word processors have the ability to represent ASCII characters such as <ETX> by entering a control code. Refer to the User's Manual of your word processor for details. 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. Place angle brackets around ASCII strings to represent these characters. For example, if you want to enter the ASCII mnemonic for Start of Text, type the control character out as the 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. If you use any control characters in a message that begins with the readable protocol / command character <STX>, they will be thrown away.

Downloading Printer Commands Using PC Communications Programs or Host Terminals

You can download commands to your printer through a PC communications program, a terminal emulation program, or a host terminal. 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**]. When you enter ASCII decimal equivalents in a word processor, they display on the screen as special characters.

For hexadecimal equivalents, consult the translation chart in the Appendix.

In any of these situations, the commands you enter through the keyboard are sent immediately to the printer in real time. Therefore, if you make an error while entering commands, you need to retype the entire command string instead of just editing it. Minimize this inconvenience by keeping your command strings short. In other words, design your formats as combinations of several short command strings rather than one very long one.

For example, the following format can be sent to the printer in one of two ways. The first example shows the format organized into several short command strings. The second example illustrates the same format sent to the printer as one long command string.

Example 1

```
<STX><ESC>c<ETX>
<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>
```

Example 2

```
<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>
```

In the first example, each line begins with the start of message character <STX> and finishes with the end of message character <ETX>. Whenever the printer receives the <ETX> character, it will send either a positive or negative response. If the printer sends a negative response, you only need to retype the line with the mistake in it. In the second example, if the printer sends a negative response or you make a mistake, you will need to retype the entire line.

Switching Between Print Mode and Program Mode

Print mode and Program mode are two different operating modes of the 4100 printer. Before you download information to the printer, make sure you are in the correct mode.

- Use Program mode to define formats.
- Use Print mode to download data.

The command to enter Program mode is:

<STX><ESC>P<ETX>

Enter this command before you download formats, even if you think the printer is in Program mode already. If the printer is in Program mode, the command is ignored.

The command to enter Print mode is:

<STX>R<ETX>

Enter this command before each set of data or as your last format command. If the printer is in Print mode already, this command will be ignored.

Note: *Besides being used to pass data, Print mode is also used to download configuration commands to the printer. Configuration commands are commands used mostly to set or enable 4100 options and features. For complete tables of commands, refer to Chapter 7.*

Creating Label Design Components

No matter which design method you use, by designing a label you are actually defining the *fields* that data will be printed in.

Most label formats (like the sample shown earlier) are combinations of several different fields. 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.

Different Kinds of Fields

Each type of field is defined to hold a certain type of data. You can define bar code fields (with or without interpretive fields), human-readable fields, graphic fields, line fields, or box fields. You must define the data you plan to print on your label as a field in the label format.

Each field type gives you options for interpreting your data. The fields that contain the most options are bar code fields and human-readable fields.

To design a label that best meets your needs, you should familiarize yourself with the different kinds of fields that you can print. The following pages describe the fields that will be most useful to you.

About Bar Code Symbologies

Your 4100 printer can print bar codes in a dozen symbologies. To use one in a label design, see "Program Mode Command Descriptions" in Chapter 7 under the c[n][,modifier1][,modifier2] [,modifier 3]; command. The 4100 printer can print a bar code in the following symbologies: Code 39, Code 93, Code 2 of 5, Interleaved 2 of 5, Codabar, Code 11, Code 16K, Code 49, Code 128, UPC, EAN, and P. The following information comes from *The Bar Code Book* by Roger C. Palmer.

Code 39

Code 39 is the first alphanumeric symbology ever developed and is widely thought of as the standard non retail symbology. It is a discrete self-checking, variable length symbology that can be readily printed in a variety of technologies such as the automobile industry. Every Code 39 character has five bars and four spaces. Of these nine elements, three are wide, and six are narrow, making Code 39 a two-width code. Although there are only 43 data characters in Code 39's character set, it is possible to encode all 128 ASCII characters using Code 39's Full ASCII feature. A Code 39 symbol begins and ends with an asterisk (*), which is this symbology's start and stop code. Each character is separated from its neighbor by a loosely toleranced intercharacter gap that contains no information. An optional modulo 43 check character is defined for use in specific applications that require exceptional data security. The Health Industry Bar Code Council (HIBCC) has adopted the use of this check character for health care applications. As a general rule, the use of this check character is encouraged.

Code 93

Introduced in 1982, Code 93 was specially designed to complement Code 39. Given the correct type of reading equipment, the two alphanumeric codes can be freely mixed throughout a system without changes to any host software. Each Code 93 character has nine modules that may be either black or white. Each character contains three bars and three spaces. Though Code 128 is the densest symbology for data that contains long strings of numbers, Code 93 is the densest symbology for random alphanumeric symbology.

Code 2 of 5

Code 2 of 5 is a numeric symbology developed in the late 1960's. 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, with the spaces only separating individual bars. Bars may be either wide or narrow, where the wide bar is conventionally three times the width of the narrow bar. Spaces are typically equal to the narrow bars. Narrow bars are identified as a 0 bit and wide bars as 1 bit.

Code 2 of 5 is discrete and self-checking; its disadvantage is its low density. As a result, the start and stop characters have sometimes been shortened to 2-bar codes: 00 for the start code and 10 for the stop code. Code 2 of 5 has largely been taken over by Interleaved 2 of 5.

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. There are five bars, two of which are wide and three of which are narrow. Similarly, there are five spaces in each character, two of which are wide and three of which are narrow. A complete Interleaved 2 of 5 symbol consists of the start code (two narrow bars and two narrow spaces), the data characters, and the stop code (one wide bar, a narrow space, and a narrow bar). It is often used with a modulo 10 check digit in the final position in order to improve data security.

Codabar

Originally developed in 1972, Codabar is a numeric symbology most commonly used in libraries, blood banks, and air parcel express applications. Codabar is a self-checking, discrete symbology having 16 characters in its set: the numbers 0 through 9, and the characters $, :, / , ., + and -. There are four different start / stop codes, allowing some useful information to be conveyed in these overhead characters. The widths of the bars and spaces to be printed can take on 18 different values, depending on the particular character. All Codabar characters are constructed from four bars and the three intervening spaces.

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. There are 11 different data characters that can be represented in addition to a stop / start character. The character set includes the 10 digits and the dash symbol. Each character is represented by a standalone group of three bars with two included spaces. Data security is obtained by using one or preferably two check digits.

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. A different start and stop character is used on each row of the UPC encodation patterns.

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. Each row contains four "words" encoded in a format. Each row has a start and a stop code and contains 18 bars and is 70 modules long. These parallel rows of data also include information indicating the row number. The bottom row also encodes the number of rows in the symbol. The equipment keeps track of the row numbers and the number of rows to expect. As in most bar code symbologies, Code 49's bar height can be varied to suit the application requirements. Taller bars will allow greater ranges of scanner tilt angles and additional vertical redundancy.

Code 128

Code 128 was introduced in 1981 as a very high density, alphanumeric symbology. It is variable length, continuous code that employs multiple element widths. Each Code 128 character has 11 modules which may be either black or white. Each character has three bars and three spaces. Code 128 has 106 different printed characters. Each printed character can have one of three different meanings, depending on which of three different character sets is used. Three different start characters tell the equipment which of the character sets is being used, and three shift codes permit changing characters sets inside a symbol. Code 128 has been adopted by the Uniform Code Council (UCC) for marking shipping containers.

UPC

Universal Product Code (UPC) is a fixed-length, numeric, continuous weakly self-checking symbology that has been used in the supermarket industry since 1973. It is a subset of EAN. UPC is a coding system as well as a symbology; it is designed to identify a product and its manufacturer. UPC uses four element widths. Two common types of UPC are Version A, which encodes 12 digits and Version E which encodes 6 digits. The first digit of a UPC Version A represents the number system. It indicates what type of product the symbol is identifying. The next five digits comprise a code identifying the product's manufacturer, and the next five digits represent the product code. The final digit is a check digit.

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 thirteenth digit is encoded into a parity pattern of the left-hand six digits. This thirteenth digit, in combination with the twelfth digit, defines two flag characters that represent a country code. An EAN-8 symbol as a left-hand guard pattern, four odd parity digits, a center guard pattern, four even parity digits, and a right-hand guard pattern. An EAN-8 symbol encodes two flag digits, five data digits, and one check digit.

POSTNET

The Postal Numeric Encoding Technique (POSTNET) was developed by the U.S. Postal Service to provide bar codes with ZIP Code information for envelopes. The code is easily read by optical reading systems, and because the information is presented several times within the bar code, it is easy to find and fix errors.

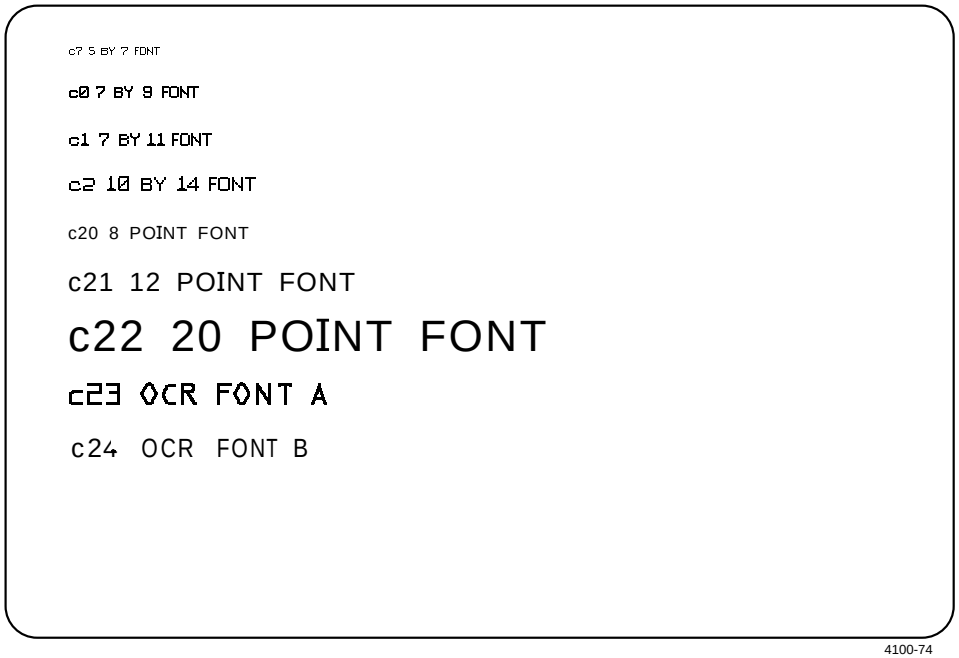
Character Fields and Fonts

You can print character fields in any one of the printers internal fonts. The 4100 printer contains several resident bitmap fonts. Bitmap fonts are defined as a matrix of dots and blanks. Change the size of the bitmap font (the fonts themselves remain unchanged) by using the width and height magnification or by using the pitch or point size commands. The font character chart is shown in the Appendix.

The set of internal fonts in the 4100 printer contains:

- Three standard bitmap fonts measured in dot sizes (7x9, 7x11, and 10x14).
- Two bitmap fonts that can be recognized by optical character recognition (OCR) programs.
- Three bitmap fonts measured in point sizes 8, 12, and 20.

Examples of the 4100 printers internal fonts are shown on the label below.



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User-Defined Fonts

User-defined fonts (UDFs) can be downloaded to the 4100 printer and stored in the battery backed static RAM. Font ID numbers 3 to 6 and 8 to 19 are reserved for user-defined fonts.

To download a bitmapped font, first enter the "T" to create a new font. The font is identified by its ID number and optional eight-character ASCII name. You specify the base width and height of the font with "x" and "y" commands. The "z" command selects the intercharacter gap. Each character is identified by the "t" command followed by the "u" command with accompanying bitmap data. For proportional fonts, the width of each individual character can be defined with the "Z" command.

In 86XX Emulation mode, the printer receives downloaded fonts in the same manner as the 8636 and 8646 printers. Characters are created column by column, from the top of the column downward. In 86XX Emulation mode, each byte of data represents 1 bit in the bitmap. The following example lists the command and data required to define a font with the two characters "$" and "i."

```
<STX><ESC>c<ETX>
<STX><ESC>P<ETX>
<STX>T11,FONT11<ETX>
<STX>x10;y14;z2<ETX>
<STX>t36<ETX>
<STX>u0,00111110001100<ETX>
<STX>u1,01111111001110<ETX>
<STX>u2,01100011000110<ETX>
<STX>u3,01100011000110<ETX>
<STX>u4,11111111111111<ETX>
<STX>u5,11111111111111<ETX>
<STX>u6,01100011000110<ETX>
<STX>u7,01100011000110<ETX>
<STX>u8,01110011111110<ETX>
<STX>u9,00110001111100<ETX>
<STX>t105<ETX>
<STX>u4,00110011111111<ETX>
<STX>u5,00110011111111<ETX>
<STX>R<ETX>
```

Bitmaps can also be created in Advanced mode. However, in Advanced mode each data byte represents 6 bits in the bitmap. Bits 0 through 5 represent the data (bit 0 is the higher bit in the bit map). Bit 6 must always be 1. Bit 7 is reserved for control codes and for compatibility on 7-bit hosts. The bits map from the top of a column downward, with bit 0 being the uppermost bit.

Here is the same example UDF created with the characters "$" and "i" created in Advanced mode. The character widths are defined for each character to make this a proportional font.

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>T11,FONT11<ETX>
<STX>x10;y14;z2<ETX>
<STX>t36<ETX>
<STX>u0,|qp<ETX>
<STX>u1,~sA<ETX>
<STX>u2,FcA<ETX>
<STX>u3,FcA<ETX>
<STX>u4,<DEL><DEL>C<ETX>
<STX>u5,<DEL><DEL>C<ETX>
<STX>u6,FcA<ETX>
<STX>u7,FcA<ETX>
<STX>u8,N<DEL>A<ETX>
<STX>u9,L~@<ETX>
<STX>t105<ETX>
<STX>u0,L<DEL>C<ETX>
<STX>u1,L<DEL>C<ETX>
<STX>R<ETX>
```

Downloading Fonts

If you have Intermec Label Design software, you can purchase additional bitmap fonts and download them to the 4100. The requirements are that the bitmap fonts should be compatible with Hewlett-Packard Laserjet II™ printers. For more information on the fonts available and the procedure for downloading them, consult your *Label User's Manual*.

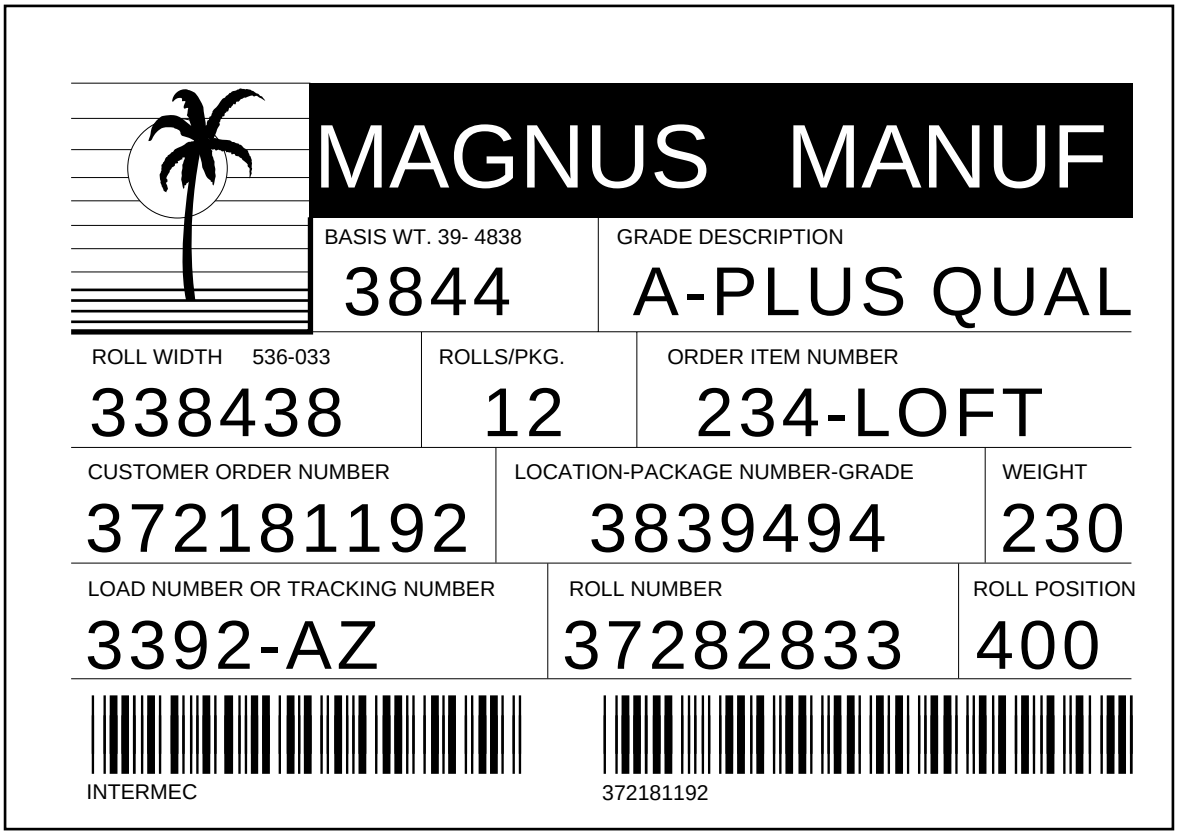
Bitmapped fonts can also be downloaded using the 4100 command for defining characters. The characters in the font must match the one bit per byte or six bit per byte format of 4100 graphics. For more information, see the discussion of graphics later in this chapter.

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 on the label. Use the length and width commands to set the length and thickness of the lines.

The following example shows a label where vertical and horizontal lines are used to separate fields on the label.

Lines and Boxes Used on a Label



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Graphics

A graphic field can be used to print a graphic image on a label. 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 you could any other letter or bar code image.

To get a graphic into a format that can be understood by the 4100, you must send it as either a one bit per byte or six bit 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 bitmapped image is an arrangement of 1's and 0's that can look similar to the example below but are 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, then converting each of the squares to either a 1 or a 0, 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.

Downloading One Bit Per Byte Graphics

To download a one bit per byte user-defined image to the 4100, you must use the correct protocol characters and define the bitmap as a user-defined image. The 4100 must also be operating in 86XX Emulation mode.

The following example is the same bitmap shown on the previous page, but it now includes the commands needed to download it to the printer, and the ones and zeros are now listed one vertical column at a time.

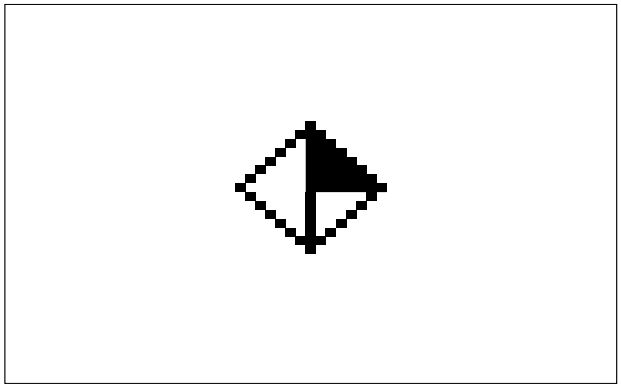
In this example, the graphic is given the number G3, the name "diam," the dimensions 15 by 15, and each column is assigned a number, u0 through u14.

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

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

Diamond Graphic

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



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Six Bits Per Byte

Six bits per byte format is a much more compact format than one bit per byte. For graphics, six bits per byte means that you can download large graphics more quickly when the printer is in Advanced mode rather than 86XX Emulation mode.

The arrangement of the bits is very important in this format. Every byte is composed of eight bits (0-7), but only bits 0-5 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 bit per byte format in the following way.

1. Draw the graphic on graph paper.
2. Change the graph paper drawing into a pattern of 1‘s and 0‘s.
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 0s 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 you download.)
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'll use to download the data.
7. Make sure the printer is in Advanced mode and not in 86XX 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;y16;<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, 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>
```

Editing Labels and Working With Fields

The next few sections explain the commands you use to position, size, rotate, and edit label formats. Chapter 7 lists all programming commands.

Editing Labels

If you make a mistake in a label format, depending on the severity of the mistake, you do not have to redownload the entire format. You can change a specific field in a format by sending a command in Program mode. This is true if you want to fine tune your format or change the entire look of your label.

For example, if you want to change field 3 (defined by the third line from the bottom) in the following format:

```
<STX><ESC>c<ETX>
<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>
```

from h1;w1; to h2;w2;, you can use the following command:

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

This command string tells the printer to:

`<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> characters simply mark the beginning and end of a message.*

Deleting Fields

If you want, you can delete a field from a label format entirely. The only condition is that you cannot delete the last field in a format. For example, you cannot delete field 0 from a format that has no other fields. 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 label format y.

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

This command string tells the printer to:

<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 fonts and bar code symbologies have default sizes, and the user-defined fields will print as large 3 x 3 inches, but each of these fields can be further scaled by using magnification commands. If your printer contains expansion RAM, you can print fields up to 4 x 4 inches.

Magnifying Fonts and Character Fields

The internal fonts in the 4100 already have sizes associated with them. This base size is the smallest size that a character of a particular font can be printed. For example, the letters in font 0 are 7 dots wide by 9 dots high, and there is a 1-dot gap between characters. If you design a field that will print 10 letters in font 0, the field will be 79 dots wide by 9 dots high.

In 86XX Emulation mode, magnification is provided only by height and width magnification of the font in multiples of a fixed base size. In Advanced mode, fonts may be increased in size by height and width magnification, or by pitch or point size. Only one of the three methods of magnification can be used for each field. Point size is measured by 1/72 of an inch, so that a 36-point font would measure 1/2 inch. Pitch is measured by characters per inch. If a bitmapped font is increased by pitch or point, the height/width magnification value that most closely matches the pitch or point size will be used.

By applying magnification factors (h for height and w for width), you can increase the height or width of a field. If you increase the field height to 2 (h2) for a base size of a field 79 dots wide by 9 dots high, the field height doubles and the final field prints 79 dots long by 18 dots high. If you change the magnification to h3, the field height triples, and the field prints 79 dots by 27 dots.

Increasing the width of a text field to 2 (w2) would make each letter in the field twice as wide. For the base size in the example above, the final field would print 158 dots wide by 18 dots high.

Magnifying Bar Code Fields

You can magnify bar code fields by 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 in general, but 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 Advanced mode and 10 mil in 86XX Emulation mode. When you specify a narrow element width of w3, the width of the narrowest element in the bar code symbology is 3 dots wide. The spaces and large element widths 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, you determine the print position by defining the coordinates of the upper-left corner of the unrotated field.

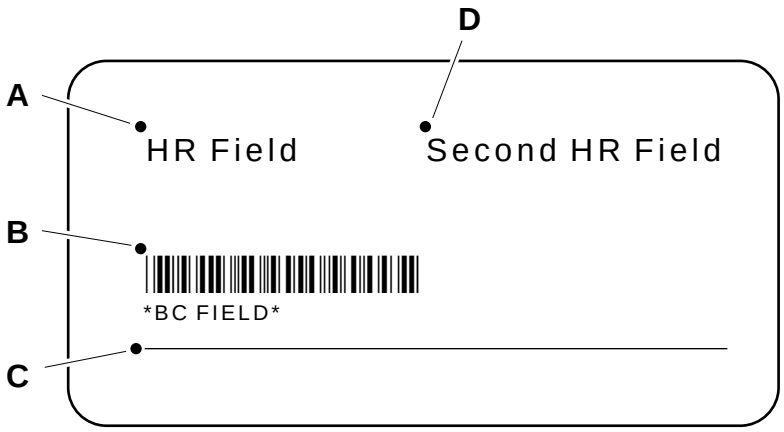
The upper-left corner of an unrotated field is called the *field origin*. To define the coordinates of the field origin, you use the origin command ox,y where o is the command that specifies origin, x is the distance from the left side of the label, and y is the distance from the label top.

The x and y coordinates of the field origin are measured in dots, and there are 203.2 dots per inch, or 8 dots per millimeter.

To position a field to print 1 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 running the printer in 86XX Emulation mode, the dot sizes will be doubled (101.6 dots per inch or 4 dots per millimeter).*

Field Positions



A = o101, 203 C = o101, 420
B = 0101, 320 D = o300, 203

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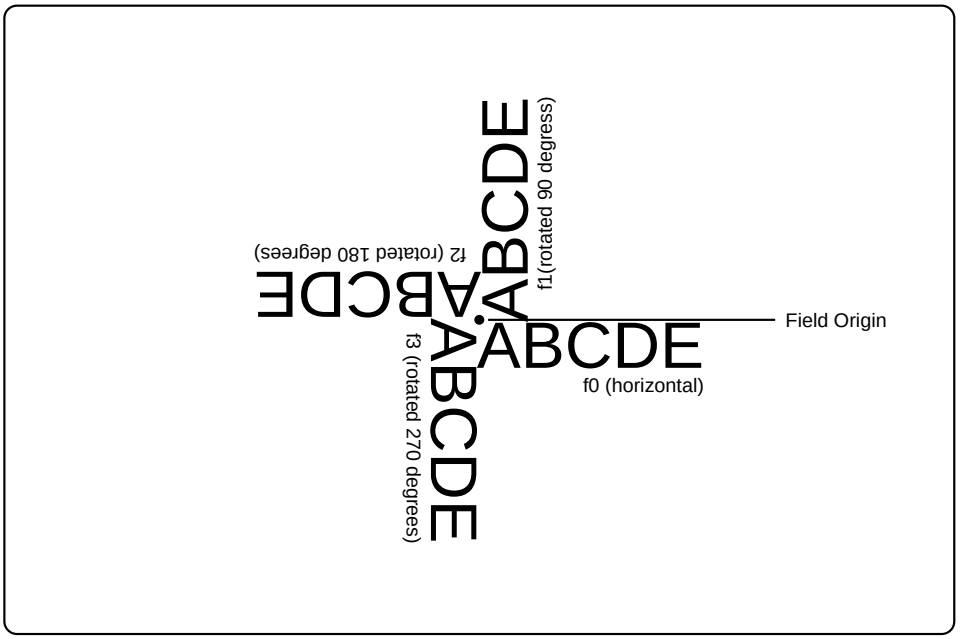
Rotating Fields

To position a rotated field, remember that the field origin remains 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.

Field Rotations



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Storing Label Formats

When you define a label, either by downloading printer commands or by using Label design software or a similar program, its format is stored in the RAM of the 4100.

There is enough RAM in the 4100 to store several different label formats, while still having enough room to store downloaded fonts, graphics, and data. Of course there is a limit to what can be stored in the printer, and printer memory should be used as carefully as possible.

In its base configuration, the 4100 has 20K of static RAM. You may expand the available RAM with the 256K RAM expansion option. The <ESC>m command will report the amount of available static RAM.

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

There are limits to the number of formats, fonts, graphics or pages that you can store in the 4100. You can define up to 20 formats, 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.

Designing Pages

A page is a collection of one or more formats that are combined to print at the same time. This is practical in cases where you need to attach similar labels to different positions on an object. For example, you may need to attach one label to a product and a different label to the product container. With the 4100 page printing capability, you can print both labels at the same time.

Because you can print pages of several formats at once, you can also print labels on precut media rolls of different sized labels. You can define a page that prints one large label for every two small labels.

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.

Pages and formats exist independently of each other. This means you can delete a page without affecting any of the formats.

Format Examples

Now that you have learned about the different types of fields that are used to design a label, it is time for a few more practical examples of label designs. Use the following examples to learn more about labels design and the use of printer commands.

Example 1

The first example is a fairly simple label designed to demonstrate the different types of data you can print.

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Format for Example 1

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>E3;F3;<ETX>
<STX>H0;o81,100;f0;c2;d0,16;h4;w4;<ETX>
<STX>H1;o81,200;f0;c2;d3,Warehouse Part # 3666;h3;w3;<ETX>
<STX>B2;o81,300;f0;c0,1;h75;w1;i0;d0,11;p@;<ETX>
<STX>L3;o81,400;f0;l800;w6;<ETX>
<STX>R<ETX>
```

Data for Example 1

<STX><ESC>E3<CAN><ETX>
<STX>L0C 1246<CR><ETX>
<STX>3666<ETX>
<STX><ETB><ETX>

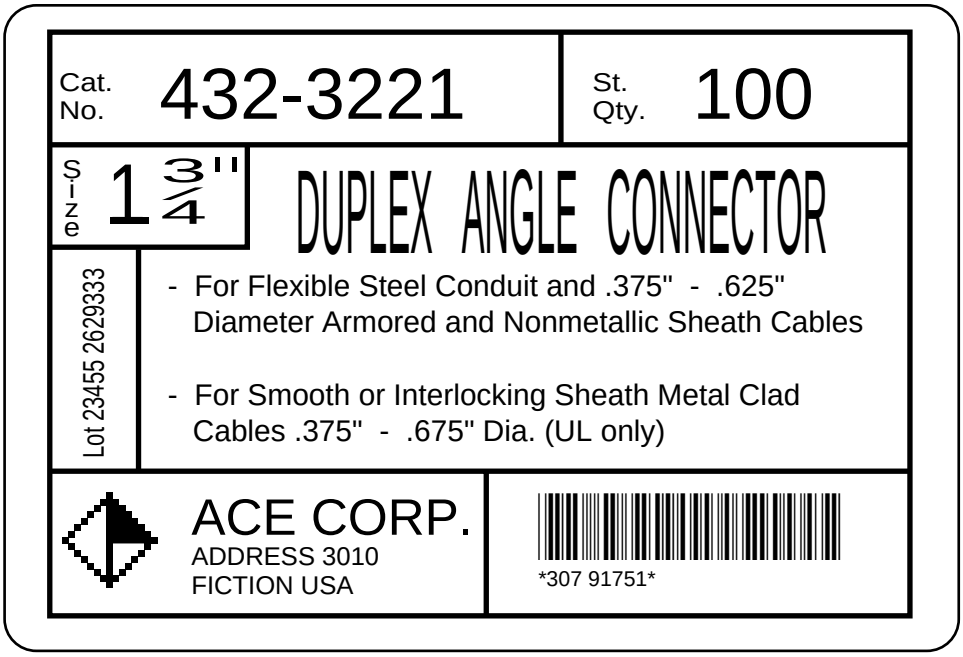
The <STX> and <ETX> characters are used simply to mark the beginnings and ends of the command strings. The other characters are described in the table that follows.

Command	Description
<ESC>C	Operate in Advanced mode.
<ESC>P	Enter Programming mode.
E3;	Erase anything previously stored as format 3.
F3;	Access format 3.
H0;	Designate field 0 as a human-readable field.
o81,100;	Set the origin at grid coordinates 81,100.
f0;	Set the field rotation to 0, which is unrotated and horizontal.
c2;	Select internal font 2.
d0,16;	Determine that data will be sent during print mode and will be a maximum of 16 characters long.
h4;	Sets the height magnification factor to 4. (Four times the normal height).
w4;	Set the field width magnification factor to 4. (Four times the normal width).
H1;	Define field 1 as a human-readable field.
o81,200;	Set the field origin at coordinates 81, 200.
f0;	Set the rotation factor of the field to 0.
c2;	Select internal font 2.
d3,Warehouse Part # 3666;	Assign the constant value “Warehouse Part # 3666” to the field.
h3;	Set the field height magnification factor to 3. (Three times the normal height).
w3;	Set the field width magnification factor to 3. (Three times the normal width.)
B2;	Define field 2 as a bar code field.
o81,300;	Set the origin at coordinates 81,300.
f0;	Set the field rotation to 0 (unrotated).
c0,1;	Select Code 39, the printer enters a check digit.
h75;	The field height is 75 dots high.

Command	Description
w1;	The narrowest element is 1 dot wide.
i0;	No human readable interpretive field will print below the bar code.
d0,11;	Data from Print mode, 11 characters long maximum.
p@;	The bar code field will not have a prefix.
L3;	Define field 3 as a line field.
o81,400;	Set the field origin at coordinates 81, 400.
f0;	Define the field rotation as horizontal (no rotation).
l800;	Define the line to be 800 dots long.
w6;	Determine the line will be 6 dots thick.
R	Exit Programming mode and enter Print mode.
<ESC>E3	Access format 3.
<CAN>	Clear all host-entered data for the current format and expect data for the lowest numbered field in the format.
LOC 1246<CR>	Data for the first field in the format. (Go to next field.)
3666	Data for the bar code field.
<ETB>	Print the label.

Example 2

The format example on this page is a complex label designed to demonstrate the different types of data that can be printed by your 4100 printer. This example contains human-readable fields, a bar code field, line fields, a box field, and the diamond graphic field defined earlier in this section.



4100-02

Graphic for Example 2

Download the one bit per byte graphic diamond graphic explained in "Downloading One Bit Per Byte Graphics" earlier in this chapter.

Format for Example 2

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>E5;F5;<ETX>
<STX>H0;o35,40;c21;d3,Cat.;k10;<ETX>
<STX>H1;o35,70;c21;d3,No.;k10;<ETX>
<STX>H2;o165,0;c21;d3,432-3221;k40;<ETX>
<STX>H3;o785,40;c21;d3,Std.;k10;<ETX>
<STX>H4;o785,70;c21;d3,Qty.;k10;<ETX>
<STX>H5;o915,0;c21;d3,100;k40;<ETX>
<STX>L6;o740,10;f3;l130;w8;<ETX>
<STX>L7;o25,140;l1130;w8;<ETX>
<STX>H8;o30,165;c21;f3;r1;d3,Size;k10;<ETX>
<STX>H9;o80,170;c0;d3,1 ";k30;<ETX>
<STX>H10;o150,165;f3;r1;c0;d3,3/4;h3;w7;<ETX>
<STX>L11;o300,140;f3;l130;w8;<ETX>
<STX>L12;o25,270;l275;w8;<ETX>
<STX>H13;o60,560;f1;c0;d0,20;h3;w2;<ETX>
<STX>L14;o140,270;f3;l310;w8;<ETX>
<STX>H15;o360,120;c22;d3,DUPLEX ANGLE CONNECTOR;h3;w1;<ETX>
<STX>H16;o170,320;c21;d3,- For Flexible Steel Conduit and .375"
- .625";k12;<ETX>
<STX>H17;o212,375;c21;d3,Diameter Armored and Nonmetallic
Sheath Cables;k12;<ETX>
<STX>H18;o170,450;c21;d3,- For Smooth or Interlocking Sheath
Metal Clad;k12;<ETX>
<STX>H19;o212,505;c21;d3,Cables .375" - .675" Dia. (UL
only);k12;<ETX>
<STX>L20;o25,580;l1130;w8;<ETX>
<STX>U21;o40,610;c2;h9;w9;<ETX>
<STX>H22;o210,600;c21;d3,ACE CORP.;k20;<ETX>
<STX>H23;o210,670;c21;d3,ADDRESS 3010;k10;<ETX>
<STX>H24;o210,710;c21;d3,FICTION USA;k10;<ETX>
<STX>B25;o685,615;c0,0;d0,20;i1;h100;p@;<ETX>
<STX>I25;h2;w2;<ETX>
<STX>L26;o590,580;f3;l185;w8;<ETX>
<STX>W27;o015,000;w10;l1150;h775;<ETX>
<STX>R<ETX>
```

Data for Example 2

```
<STX><ESC>E5<CAN><ETX>
<STX>Lot 23455 2629333<CR>307 91747<CR><ESC>I2<ETX>
<STX><RS>5<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	Operate in Advanced mode.
<ESC>P	Enter Programming mode.
E5;F5;	Erases anything previously stored as format 5 and accesses the location for format 5.
H0;	Defines field zero as a human-readable field.
o35,40;	Sets the origin of field zero at coordinates (35,40).
c21;	Sets the font for field zero to font 21.
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.
o35,70;	Sets the origin of field 1 at coordinates (35,70).
c21;	Sets the fonts for field 1 to font 21.
d3,No.;	Set the data for field 1 the constant value: No.
k10;	Sets the point size to 10.
H2;	Defines field 2 as a human-readable field.
o165,0;	Sets the origin of field 2 at (165,0).
c21;	Sets the font of field 2 to font 21.
d3,432-3221;	Sets the constant data for field 2.
k40;	Set the point size to 40.
H3;	Defines field 3 as a human-readable field.
o785,40;	Sets the origin of field 3 at (785,40).
c21;	Sets the font for field 3 to font 21.
d3,std.;	Defines constant data for field 3.
k10;	Sets the point size to 10.
H4;	Defines field 4 as a human-readable field.
o785,70;	Sets the origin of field 4 at (785,70).
c21;	Sets the font for field 4 to font 21.

Command	Description
`d3,Qty.;`	Defines constant data for field 4.
`k10;`	Sets the point size to 10.
`H5;`	Defines field 5 as a human-readable field.
`o915,0;`	Sets the origin of field 5 at (915,0).
`c21;`	Sets the font for field 5 to font 21.
`d3,100;`	Defines the constant data for field 5.
`k40;`	Sets the point size to 40.
`L6;`	Defines field 6 as a line field.
`o740,10;`	Sets the origin for field 6 at (740,10).
`f3;`	Rotates field 6 270 degrees counterclockwise around the field origin.
`l130;`	Sets the length of the line in field 6 to 130 dots.
`w8;`	Sets the width of field 6 to eight times its actual width.
`L7;`	Defines field 7 as a line.
`o25,140;`	Sets the origin for field 7 at (25,140).
`l1130;`	Sets the length of the line in field 7 to 1130 dots.
`w8;`	Sets the line width to 8 dots.
`H8;`	Defines field 8 as a human-readable field.
`o30,165;`	Sets the origin of field 8 at (30,165).
`c21;`	Defines the font for field 8 as font 21.
`f3;`	Rotates field 8 270 degrees counterclockwise around the origin.
`r1;`	Rotates the characters in field 8 90 degrees counterclockwise.
`d3,Size;`	Defines the constant data for field 8.
`k10;`	Sets the point size to 10.
`H9;`	Defines field 9 as a human-readable field.
`o80,170;`	Sets the origin of field 9 at (80,170).
`c0;`	Defines the font for field 9 as font 0.
`d3,1 ";`	Defines constant data for field 9.
`k30;`	Sets the point size to 30.
`H10;`	Defines field 10 as a human-readable field.
`o150,165;`	Sets the origin for field 10 at (150,165).
`f3;`	Rotates field 10 270 degrees counterclockwise around the origin.
`r1;`	Rotates the characters in field 10 90 degrees counterclockwise.
`c0;`	Sets the font for field 10 to be font 0.

Command	Description
d3,3/4;	Defines constant data for field 10.
h3;	Sets the height to three times the original size.
w7;	Sets the width to seven times the original size.
L11;	Defines field 11 as a line field.
o300,140;	Sets the origin for field 11 at (300,140).
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 8 dots.
L12;	Defines field 12 as a line field.
o25,270;	Sets the origin of field 12 at (25,270).
l275;	Sets the length of the line in field 12 to 275 dots.
w8;	Sets the width of field 12 to 8 dots.
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.
c0;	Determines that field 13 prints in font 0.
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.
h3;	Sets the height of field 13 to three times the actual size.
w2;	Sets the width of field 13 to two times the actual size.
L14;	Defines field 14 as a line field.
o140,270;	Sets the origin of field 14 at (140,270).
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 8 dots.
H15;	Defines field 15 as a human-readable field.
o360,120;	Sets the origin of field 15 at (360,120).
c22;	Determines that the field prints in font 22.
d3,DUPLEX ANGLE CONNECTOR;	Defines constant data for field 15.
h3;	Sets the height to three times the original size.
w1;	Sets the width to original size.
H16;	Defines field 16 as a human-readable field.

Command	Description
`o170,320;`	Sets the origin for field 16 at (170,320).
`c21;`	Determines that field 16 prints in font 21.
`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.
`o212,375;`	Sets the origin of field 17 at (212,375).
`c21;`	Determines that field 17 prints in font 21.
`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.
`o170,450;`	Sets the origin of field 18 at (170,450).
`c21;`	Determines that field 18 prints in font 21.
`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.
`o212,505;`	Sets the origin of field 19 at (212,505).
`c21;`	Determines that field 19 prints in font 21.
`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.
`o25,580;`	Sets the origin of field 20 at (25,580).
`l1130;`	Sets the length of the line in field 20 to 1130 dots.
`w8;`	Sets the width to 8 dots.
`U21;`	Defines field 21 as a graphic field.
`o40,610;`	Sets the origin of field 21 at (40,610).
`c2;`	Determines that field 21 prints in UDC 2.
`h9;`	Sets the height to 9 times the original size.
`w9;`	Sets the width to 9 times the original size.
`H22;`	Defines field 22 as a human-readable field.
`o210,600;`	Sets the origin of field 22 at (210,600).

Command	Description
c21;	Determines that field 22 prints in font 21.
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.
o210,670;	Sets the origin of field 23 at (210,670).
c21;	Determines that field 23 prints in font 21.
d3,ADDRESS 3010;	Defines constant data for field 23.
k10;	Sets the point size to 10.
H24;	Defines field 24 as a human-readable field.
o210,710;	Sets the origin of field 24 at (210,710).
c21;	Determines that field 24 prints in font 21.
d3,FICTION USA;	Defines constant data for field 24.
k10;	Sets the point size to 10.
B25;	Defines field 25 as a bar code field.
o685,615;	Sets the origin of field 25 at (685,615).
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.
i1;	Determines that an interpretation of the bar code prints with start and stop characters included.
h100;	Determines that the bar code height is 100 dots.
p@;	Clears all prefixes from the bar code field.
I25;	Defines field 25 as an interpretive field.
h2;	Sets the height to two times the original size.
w2;	Sets the width to two times the original size.
L26;	Defines field 26 as a line field.
o590,580;	Sets the origin of field 26 at (590,580).
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 8 dots.
W27;	Defines field 27 as a box field.
o015,000;	Sets the origin of field 27 at (015,000).
w10;	Sets the width of field 27 to 10 dots.

Command	Description
I1150;	Sets the length of field 27 to 1150 dots.
h775	Sets the height to 775 times the original size.
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.
<FS>	Field separator
307 91747	This is the data intended for the next data-entry field.
<FS>	Field separator.
<ESC>I2	Sets the field increment value to increment by 2.
<RS>5	Tells the printer to print 5 labels.
<ETB>	Tells the printer to print the labels.

7

Printer Commands

Introduction

This chapter provides a detailed description of all commands available in the Intermec printer command set. The Intermec printer command set is used with all Intermec printers and includes every command used by the entire product line. Some of the commands are not used with the 4100 printer, but have been included for reference. Those commands not active in the 4100 printer are noted in the command descriptions. If you send a command not used by the 4100 printer, it ignores the command. When designing label formats or printing labels, refer to this chapter for command reference information.

Command Set Summary

Commands depend on the operating mode of the printer: 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 Chapter 6, "Designing Labels and Using Commands," you use Print mode commands to print labels and download data. You use Configuration commands (also sent in Print mode) to enable or disable printer features and options. Program mode commands are used for label format design. Immediate commands take precedence over all other commands and allow you to query the printer on the status of print jobs, to abort print jobs, and to reset the printer. The functional boundaries of labels are listed at the end of this chapter.

To make finding a command easier, the following table lists all commands (regardless of operating mode) in alphabetical order according to the command description. The pages that follow this table contain complete descriptions of the commands separated according to the operating mode of the printer.

The following table lists a summary of all commands available in the Intermec printer command set. Each command is described in detail later in this chapter.

Summary of the Printer Command Set

Function	Command Code	Factory Default	8636/46 Emulation	Page No.	Command Mode
40 Volt Supply Value, Transmit	U		yes	7-67	Test / Serv.
86XX Emulation Mode, Select	<ESC>c		yes	7-19	Print
86XX or Advanced Mode on Power Up	<SI>C	1	yes	7-31	Configuration
Abort Print Job	<EM>		yes	7-15	Immediate
Advanced Mode, Select	<ESC>C		yes	7-19	Print
Alphanumeric Field Separator	<GS>		yes	7-19	Print
Ambient Temperature, Transmit*	A		N / A	7-66	Test / Serv.
Amount of Storage, Define	<SI>N	20	yes	7-32	Configuration
Audible Alarm, Enable or Disable*	<SI>a	0	N / A	7-32	Configuration
Auto-Transmit 1, Enable	<ESC>j		yes	7-32	Configuration
Auto-Transmit 2, Enable	<ESC>d		yes	7-33	Configuration
Auto-Transmit 3, Enable	<ESC>e		yes	7-33	Configuration
Auto-Transmit 1, 2, and 3, Disable	<ESC>k		yes	7-33	Configuration
Bar Code, Select Type	c	0	yes	7-43	Program
Bar Code Field, Create or Edit	B	0	yes	7-48	Program
Bar Height Magnification, Define	h	50	yes	7-59	Program
Bar Width Magnification, Define	w	1	yes	7-65	Program
Batch Count, Set	<US>	1	yes	7-20	Print
Bitmap Cell Height for Graphic or UDF, Define	y	1	yes	7-49	Program
Bitmap Cell Width for Graphic or UDF, Define	x	1	yes	7-49	Program
Bitmap User-Defined Font, Clear or Define	T		yes	7-50	Program
Border Around Human-Readable Text, Define	b	0	yes	7-50	Program
Box Field, Create or Edit	W	0	yes	7-50	Program
Character Bitmap Origin Offset, Define	X	0	yes	7-51	Program
Character Height Magnification, Define	h	2	yes	7-59	Program

* The 4100 printer ignores these commands.

Summary of the Printer Command Set (Continued)

Function	Command Code	Factory Default	8636/46 Emulation	Page No.	Command Mode
Character Rotation or Bar Code Ratio, Define	r	0	yes	7-51	Program
Character Width Magnification, Define	w	1	yes	7-65	Program
Clear All Data	<CAN>		yes	7-20	Print
Clear Data from Current Field	<DEL>		yes	7-21	Print
Code 39 Prefix Character, Define	p		yes	7-52	Program
Command Tables, Load	C		yes	7-52	Program
Command Terminator	;		yes	7-67	Test / Serv.
Command Terminator 1	<NUL>		yes	7-21	Print
Command Terminator 2	<LF>		yes	7-21	Print
Configuration Parameters, Transmit	<ESC>p		yes	7-21	Print
Control Panel Access Permission, Set*	<SI>A	0	N / A	7-34	Configuration
Current Edit Session, Save	N		yes	7-53	Program
Cut	<SO>		N / A	7-21	Print
Cutter, Enable or Disable	<SI>c	0	N / A	7-34	Configuration
Dark Adjust	K		yes	7-66	Test / Serv.
Dark Adjust, Set	<SI>d	0	yes	7-34	Configuration
Data Shift - International Characters	<SUB>		yes	7-22	Print
Data Source for Format in a Page, Define	e	0	no	7-53	Program
End-of-Print Skip Distance, Set	<SI>D	200	yes	7-34	Configuration
Error Code, Request	<BEL>		yes	7-15	Immediate
Factory Defaults, Reset	D		yes	7-66	Test / Serv.
Field, Delete	D	0	yes	7-54	Program
Field, Select	<ESC>F	0	yes	7-22	Print
Field Data, Define Source	d	0	yes	7-54	Program
Field Decrement, Set	<ESC>D	1	yes	7-22	Print

* The 4100 printer ignores these commands.

Summary of the Printer Command Set (Continued)

Function	Command Code	Factory Default	8636/46 Emulation	Page No.	Command Mode
Field Direction, Define	f	0	yes	7-55	Program
Field Increment, Set	<ESC>I	1	yes	7-23	Print
Field Origin, Define	o	0,0	yes	7-55	Program
First Data Entry Field, Select	<ACK>		yes	7-23	Print
Font, Transmit	<ESC>v	0	yes	7-23	Print
Font Character Width, Define	Z	cell	yes	7-56	Program
Font Type, Select	c	0	yes	7-56	Program
Form Feed	<FF>		yes	7-24	Print
Format, Create or Edit	A		yes	7-57	Program
Format, Create or Edit	F		yes	7-57	Program
Format, Erase	E		yes	7-57	Program
Format, Select	<ESC>E	0	yes	7-24	Print
Format, Transmit	<ESC>x	0	yes	7-25	Print
Format Direction in a Page, Define	q	0	no	7-57	Program
Format Offset Within a Page, Define	O	0,0	no	7-58	Program
Format Position From Page, Delete	m	a	no	7-58	Program
Format Position in a Page, Assign	M	a	no	7-58	Program
Graphic or UDC, Define	u		yes	7-59	Program
Graphic Type, Select	c	0	yes	7-58	Program
Height Magnification of Bar, Box, or UDC, Define	h	50,100,1	yes	7-59	Program
Human-Readable Field, Create or Edit	H	0	yes	7-60	Program
IBM Language Translation, Enable or Disable	<SI>i	0	yes	7-35	Configuration
Increment and Decrement, Disable	<ESC>N		yes	7-25	Print
Intercharacter Delay, Set	<SYN>	0	yes	7-35	Configuration
Intercharacter Space for UDF, Define	z	2	yes	7-60	Program

* The 4100 printer ignores these commands.

Summary of the Printer Command Set (Continued)

Function	Command Code	Factory Default	8636/46 Emulation	Page No.	Command Mode
Interlabel Ribbon Save, Enable or Disable	<SI>s	0	yes	7-35	Configuration
Interpretive Field, Edit	I		yes	7-61	Program
Interpretive Field, Enable or Disable	i	0	yes	7-61	Program
Label and Gap Length, Transmit	<ESC>L		yes	7-15	Immediate
Label Path Open Value, Transmit*	L		N / A	7-66	Test / Serv.
Label Rest Point, Adjust	<SI>f	0	yes	7-36	Configuration
Label Retract, Enable or Disable	<SI>R	1	yes	7-36	Configuration
Label Retract Distance, Set	<SI>r	284	yes	7-36	Configuration
Label Stock Type, Select	<SI>T	1	yes	7-37	Configuration
Label Taken Sensor Value, Transmit	T		yes	7-67	Test / Serv.
Label Width, Set*	<SI>W	896	N / A	7-37	Configuration
Length of Line or Box Field, Define	l	100	yes	7-61	Program
Line Field, Create or Edit	L	0	yes	7-62	Program
Maximum Label Length, Set	<SI>L	1000	yes	7-37	Configuration
Media Sensitivity, Select	<SI>g	0,420	yes	7-37	Configuration
Message Delay, Set	<ESC><SYN>	0	yes	7-38	Configuration
Next Data Entry Field, Select	<CR>		yes	7-25	Print
Number of Image Bands, Set	<SI>I	3	yes	7-38	Configuration
Numeric Field Separator	<FS>		yes	7-26	Print
Online or Offline on Power Up*	<SI>O	0	no	7-38	Configuration
Options Selected, Transmit	<ESC>O		yes	7-26	Print
Outline Font, Clear or Create	J		yes	7-62	Program
Outline Font, Download	j		yes	7-62	Program
Page, Create or Edit	S		no	7-63	Program
Page, Delete	s		no	7-63	Program
Page, Select	<ESC>G	0	no	7-26	Print

* The 4100 printer ignores these commands.

Summary of the Printer Command Set (Continued)

Function	Command Code	Factory Default	8636/46 Emulation	Page No.	Command Mode
Page, Transmit	<ESC>y	1	no	7-27	Print
Pitch Label, Print*	C		yes	7-66	Test/Serv.
Pitch Size, Set	g	12	no	7-63	Program
Point Size, Set	k	12	no	7-63	Program
Postamble, Set	<EOT>	NUL	yes	7-39	Configuration
Preamble, Set	<SOH>	NUL	yes	7-39	Configuration
Print	<ETB>		yes	7-27	Print
Print Line Dot Count Limit, Set	v		yes	7-64	Program
Print Quality Label, Print	Q		yes	7-66	Test/Serv.
Print Speed, Set	<SI>S	30	yes	7-39	Configuration
Printer Language, Select	<SI>l	0	yes	7-40	Configuration
Printhead Parameters, Transmit	<ESC>H		yes	7-27	Print
Printhead Pressure, Set*	<SI>H	0	N/A	7-40	Configuration
Printhead Resistance Test, Begin*	B		N/A	7-66	Test/Serv.
Printhead Resistance Values, Transmit*	S		N/A	7-67	Test/Serv.
Printhead Temperature Sensor Value, Transmit	P		yes	7-66	Test/Serv.
Printhead Test Parameters, Set*	<SI>U		N/A	7-40	Configuration
Printhead Volt Supply Value, Transmit	V		no	7-67	Test/Serv.
Program Mode, Enter	<ESC>P		yes	7-27	Print
Program Mode, Exit	R		yes	7-64	Program
Program Number, Transmit	<ESC>M		yes	7-28	Print
Quantity Count, Set	<RS>	1	yes	7-28	Print
Reflective Sensor Value, Transmit	M		no	7-66	Test/Serv.
Remaining Quantity and Batch Count, Transmit	<ESC>Q		yes	7-16	Immediate
Reset	<DLE>		yes	7-16	Immediate

* The 4100 printer ignores these commands.

Summary of the Printer Command Set (Continued)

Function	Command Code	Factory Default	8636/46 Emulation	Page No.	Command Mode
Ribbon Save Zones, Set	<SI>Z		N / A	7-40	Configuration
Self-Strip, Enable or Disable	<SI>t	0	yes	7-41	Configuration
Start and Stop Codes (Code 39), Print	<ESC><SP>		yes	7-28	Print
Status Dump	<VT>		yes	7-16	Immediate
Status Enquiry	<ENQ>		yes	7-17	Immediate
Storage Area Usage, Transmit	<ESC>m		yes	7-29	Print
Test and Service Mode, Enter	<ESC>T		yes	7-29	Print
Test and Service Mode, Exit	R		yes	7-67	Configuration
Top of Form, Set	<SI>F		yes	7-41	Configuration
Transmissive Sensor Value, Transmit	G		yes	7-66	Test / Serv.
User-Defined Character, Clear or Create	G		yes	7-64	Program
User-Defined Character Field, Create or Edit	U	0	yes	7-64	Program
User-Defined Characters, Transmit	<ESC>u	0	yes	7-29	Print
User-Defined Font Character, Clear or Create	t		yes	7-65	Program
User-Defined Tables, Transmit	<ESC>Z		yes	7-30	Print
Warm Boot	<BS>		yes	7-30	Print
Width of Line, Box, Bar, or Character, Define	w	1	yes	7-65	Program

* The 4100 printer ignores these commands.

Using Printer Commands According to Function

The following commands are grouped according to purpose. In order to perform a specific function, refer to the following lists for the necessary commands.

Program Mode

Programming

Editing a Page

Editing a Format

Editing a Bar Code Field

Editing a Human-Readable Field

Editing an Interpretive Field

Editing a Line Field

Editing a UDC Field

Editing a Box Field

Editing a UDC

Editing a Bitmap User-Defined Field

Immediate Commands

System Commands

Print Mode

Print Commands

Configuration Commands

Transmit Commands

Protocol Modification Commands

Test and Service Commands

Immediate Commands

The following command set is effective in any of the operational modes of the 4100 printer. Use the commands in this set to query the printer about the status of the printer and any print jobs. They also abort print jobs, request error conditions, and reset the printer. Unlike other commands that are stored in the printer's data buffer and executed in the order that they are received, immediate commands are executed as soon as they are received, regardless of printer mode.

Abort Print Job

Purpose: Stops batch printing.

Syntax: <EM>

Notes: The printer sets the remaining quantity and batch counts to 1, batch and quantity are set to original values before printing. Other commands remaining in the buffer continue to be executed.

Error Code, Request

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. It also resets the error code to 00. See Chapter 5, "Troubleshooting" for a list of error codes.

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.

Remaining Quantity and Batch Count, Transmit

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

Syntax: <ESC>Q

Reset

Purpose: Executes a printer power-up reset immediately.

Syntax: <DLE>

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

Status Dump

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

Syntax: <VT>

The printer status is uploaded in the following order of priority:

<GS> Buffer already full

<US> Ribbon fault

<EM> No label stock

<DC3> Buffer now 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: The printer status is uploaded in the following order of priority:

<GS> Buffer already full

<US> Ribbon fault

<EM> No label stock

<DC3> Buffer now full

<FS> Label at strip pin

<DC1> Skipping

<DC1> Printing

<DC1> Ready

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 continues to point to that field unless a different field or format is selected. If you select a field by using the <ESC>F command, new data entered into the field overwrites any data already existing in the field.

You may send Print mode commands through the methods described in Chapter 6, "Designing Labels and Using Commands." 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. For example, to separate the <ESC>F command from data, type:*

```
<ESC>F4<NUL>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.

86XX Emulation Mode, Select

Purpose: Instructs the printer to operate in 86XX Emulation 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 are in 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 host entered data is lost.

Advanced Mode, Select

Purpose: Instructs the printer to operate in Advanced mode.

Syntax: <ESC>C

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

All data host entered before switching operating modes is lost.

Alphanumeric Field Separator

Purpose: Increments or decrements alphanumeric characters within a field-separated region. The data must be enclosed between two sets of <GS> commands:

<GS>data<GS>

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. Each region is independently incremented or decremented according to the increment or decrement value specified for the field.

The length of data does not change. Rather, values are incremented or decremented as in an odometer. For example, 9 increments to 0, and Z increments to A.

This command marks the region of characters to increment or decrement, but it does not actually increment or decrement.

Any non-alphanumeric characters within this region 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. This command causes the printer to make n copies of the same label.

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.

Clear All Data

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

Syntax: <CAN>

Notes: If a format 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 transmitted.

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

Refer to the Appendix for a complete list of the configuration parameters that are uploaded to the host.

Cut

Syntax: <SO>

Notes: Advances the label out to the cutter and cuts the label stock. This command is executed only if the cutter is installed and not enbabled.

Data Shift – International Characters

Purpose: Allows command characters to be entered as data.

Syntax: <SUB>

Notes: In 86XX Emulation 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 Advanced and 86XX Emulation mode.

Field, Select

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

Default: n=0

Syntax: <ESC>Fn or <ESC>F{"name"}

The range for n is from 0 to 199.

Notes: The parameter for this command can either be the field number or the field name, but not 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 with the specified name 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.

Field Decrement, Set

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

Default: n=1

Syntax: <ESC>D{n}

The range for n is from 1 to 9999.

Field separated values in data entry fields are decremented by n after each batch is printed.

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 separated values in data entry fields are incremented by n after each batch is printed.

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

First Data Entry Field, Select

Purpose: Sets the field pointer to the lowest numbered data entry field that can accept print mode data.

Syntax: <ACK>

Notes: This command ensures that data prints 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 24.

Notes: The data is in the form of the current printer mode (that is Advanced or 86XX Emulation). Each data byte represents 6 bits of the font's bitmap in Advanced mode or one bit in 86XX Emulation mode.

A target printer to which the commands and data are sent remains in Advanced mode.

An error code (27) is generated if an invalid font number is entered.

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 strip pin, 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 moves to the end-of-print skip distance.

Format, Select

Purpose: Selects a format for data entry or printing.

Default: n=0

Syntax: <ESC>E{n}{,m}

Format 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.

When the ,m parameter is enabled, only the fields that change are reimaged for subsequent prints. Otherwise , the entire label is 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.

A label must be completely imaged within the available number of image bands for the reimaging command to work and retain the image.

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

An error code (36) 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 0 to 19.

Notes: A target printer receiving the commands remains in Advanced mode.

An error code (25) 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

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. The data must be enclosed between two sets of <FS> commands: <FS>data<FS>.

Syntax: <FS>

Notes: You can have more than one region per field as long as they do not overlap. Each region is independently incremented or decremented according to the increment or decrement value specified for the field. The length of data does not change. Rather, values are incremented or decremented as in an odometer: 9 increments to 0.

Any non-numeric characters within the region are ignored.

Options Selected, Transmit

Purpose: Uploads the list of selected options.

Syntax: <ESC>O{n}

The options include:

n = 0 No options selected
n = 1 Cutter
n = 4 Self-strip
n = 5 Ribbon save

Notes: You cannot have options 1 and 4 installed on the same printer. You can select option 5 simultaneously with either of those options.

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 host entered data will be cleared from this page.

An error code (36) 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: none

Syntax: <ESC>y{n}

n is the page ID number.

The range is 1 to 9.

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

An error code (26) 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: Here is an example of what you can expect to see: 832,5.0.

Program Mode, Enter

Purpose: Causes the printer to enter program mode for the purpose of creating or 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

Here is an example of what you might see: 059877,1.4.

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

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 for n is from 1 to 9999.

Notes: An error code (21) is generated if the quantity is out of range.

Incrementing and decrementing of data occurs between label batches.

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.

Storage Area Usage, Transmit

Purpose: Uploads information on the amount of storage RAM allocated and the amount of allocated RAM that is not being used.

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 available RAM not being used. The numbers are separated by a comma: 32,10.

Test and Service Mode, Enter

Purpose: Enters Test and Service mode.

Syntax: <ESC>T

Notes: The printer completes all print jobs before executing this command. Any host entered data entered prior to the command is erased when the printer enters Test and Service mode.

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: If the printer is in Advanced mode, each data byte represents 6 bits of the graphic bitmap. If the printer is in 86XX Emulation mode, each data byte represents one bit of the graphic image.

An error code (28) is generated if an invalid number is entered.

User-Defined Tables, Transmit

Purpose: This command causes the printer to upload the user-defined command and protocol tables that 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 at the end of the Program mode command descriptions under "User-Defined Interface Tables".

An error code (12) is generated if an invalid number is entered.

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, are lost.

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

Configuration Commands

Configuration commands, like print mode commands, are effective when the 4100 is in Print mode. You should use configuration commands for the following:

- Set parameters for configuration features
- Enable or disable options

Some configuration commands only take effect when the printer is reset or the power is cycled. Some commands are effective immediately. If a printer reset is needed, use the warm boot command (<BS>). The reset takes 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 Advanced Mode on Power Up

Purpose: Selects 86XX Emulation or Advanced mode on power up.

Default: n=1

Syntax: <SI>C{n}

n=0 Selects 86XX Emulation mode.
n=1 Selects Advanced mode.

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

Amount of Storage, Define

Purpose: Defines the amount of RAM allocated for storage in kilobytes.

Default: n = 20 Without expanded RAM

n = 120 With expanded RAM

Syntax: <SI>N{n}

n can be adjusted from 10K to 32K without the addition of expanded RAM.

n can be adjusted from 10K to 128K with the addition of expanded RAM.

n is the amount of RAM allocated in kilobytes.

Notes: This command is designed for printers that share image generation and format / UDC / fonts storage area.

This command is buffered up and is effective upon execution. When this command is executed, all previously stored format, fonts or UDCs are erased, but the printer configuration remains unchanged.

Audible Alarm, Enable or Disable

Syntax: <SI>a{n}

Notes: This command is ignored by the 4100 printer.

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> Take-up 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). Without auto-transmit enabled, the host must use the <ENQ> or <VT> command to determine the status.

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 complete and the buffer is empty

<RS> Insufficient RAM for printing or storage

Notes: A status response is transmitted when this condition occurs.

This command becomes effective upon execution.

Auto-Transmit 1, 2, and 3, Disable

Purpose: Disables the auto-transmit statuses.

Syntax: <ESC>k

Notes: This command becomes effective upon execution.

Control Panel Access Permission, Set

Syntax: <SI>A{n}

Notes: This command is ignored by the 4100 printer.

Cutter, Enable or Disable

Purpose: Enables or disables the label cutter.

Default: n=0

The cutter is enabled if n is non-zero.

Syntax: <SI>c{n}

Notes: The optional cutter must be installed before this command is used. This command is buffered up and becomes effective after the printer is repowered or reset.

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 in increments of one. The darkest setting is +10 and the lightest setting is -10.

Notes: This command becomes effective upon execution.

End-of-Print Skip Distance, Set

Purpose: Sets the end-of-print skip distance. This distance is a value in dot size increments that the label advances after printing or when printing is paused.

Default: n = 0 Label stock mode

n = 118 Continuous stock mode

Syntax: <SI>D{n}

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

Notes: To advance the label out to the tear bar in label stock mode, set n to 108.

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 printer to the default.

This command is effective upon execution. This command is ineffective in self-strip 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 upon execution.

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.

Interlabel Ribbon Save, Enable or Disable

Syntax: <SI>s{n}

Notes: This command is ignored by the 4100 printer.

Label Rest Point, Adjust

Purpose: Adjusts the point at which labels are presented for removal. This command is used mostly for self-strip 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 die-cut 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 (Label Retract Distance, Set) command. See also Select Label Stock Type (Label Stock Type, Select) 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=0

Syntax: <SI>r{n}

The parameter range for n is from 0 to 399.

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 (no breaks between labels).

n=1 Label stock with gaps between labels.

n=2 Label stock with marks between labels (on back of label stock).

Notes: To make this command effective, reset the printer, cycle the power, or press the [**FEED**] after issuing the command.

Label Width, Set

Syntax: <SI>W{n}

Notes: This command is ignored by the 4100 printer.

Maximum Label Length, Set

Purpose: Defines the maximum label length as n dot increments. This number is used only for detecting media faults. 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 100 to 4800 in dot increments.

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

Media Sensitivity, Select

Purpose: Selects the media sensitivity of the printer.

Default: n=0

m=420 for direct thermal media
m=567 for thermal transfer media

Syntax: <SI>g{n}{,m}

You can use n to select direct thermal (DT) or thermal transfer media on some printers. However, this parameter can only be set by the Transfer On switch on the front of the 4100 printer.

Use m to set the media sensitivity. See Chapter 3, "Operating the Printer," for details on setting this parameter.

Notes: This command is effective upon execution.

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. n is the delay at the start of a printer transmission.

Notes: This command is effective upon execution.

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 6 if you have 32K of static RAM in the printer. If you have expanded RAM in the printer, n can range from 2 to 12.

Notes: This command is effective upon execution.

Online or Offline on Power Up

Syntax: <SI>O{n}

Notes: This command is ignored by the printer.

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.

Notes: This command is effective upon execution.

Print Speed, Set

Purpose: Sets the print speed.

Default: n=30

Syntax: <SI>S{n}

n can have a value of either 20, 30, 40, or 50 (corresponding to 2, 3, 4, or 5 ips).

Notes: This command is effective upon execution.

Printer Language, Select

Purpose: Selects the printer language.

Default: n=0

Syntax: <SI>l{n}

0	USA	5	Sweden
1	United Kingdom	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. See the Appendix for international character sets.

This command is effective upon execution.

Printhead Pressure, Set

Syntax: <SI>H{n}

Notes: The 4100 printer ignores this command.

Printhead Test Parameters, Set

Syntax: <SI>U{n}{,m}{,p}{,q}

Notes: The 4100 printer ignores this command.

Ribbon Save Zones, Set

Purpose: Defines the start and stop points of a ribbon save zone within the label. This command does not enable inter-label ribbon save.

Syntax: <SI>Z{n,m}

n and m are the zone start and zone stop distances, in dot increments, from the detected front of the label. The difference between m and n depends on the speed (number of ips) at which you are printing. Refer to the table on the next page. Also, m must be bigger than n by at least 100, or the command will be ignored.

Print Speed (ips)	Minimum Dot Increments	Minimum Inches	Print Speed (ips)	Minimum Dot Increments	Minimum Inches
2.5	135	0.675	5.5	220	1.10
3.0	148	0.74	6.0	232	1.16
3.5	163	0.815	6.5	246	1.23
4.0	179	0.895	7.0	263	1.315
4.5	193	0.965	7.5	283	1.415
5.0	210	1.05	8.5	306	1.53

Notes: The ribbon save option must be installed or the printer will ignore this command. Setting a ribbon save zone enables ribbon save. Entering no ribbon save zones clears all ribbon save zones within this label. If only one parameter is entered, the command is ignored. The maximum number of zones possible on one label is 10. Additional zones are ignored. This command is buffered up and becomes effective upon execution.

Self-Strip, Enable or Disable

Syntax: `<SI>t{n}`

Notes: This command is ignored by the 4100 printer. However, you can enable self-strip by using the DIP switches.

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.

Notes: This command is effective upon execution.

Program Mode Commands

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 you create or edit formats, the printer uses a field pointer to designate the field that is to be modified when the printer is in Program mode. To download commands in Program mode, you must specify the field to be changed. If you do not select a field, the pointer continues to point to the last selected field until a different format or field is selected.

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.*

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

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 from 0 to 11.

Notes: Modifiers apply only to bar code symbologies.

For more information on bar code symbologies, please refer to *The Bar Code Book* by Roger Palmer (Intermec Part No. 051241).

Bar codes may be selected in the following manner with the following optional modifiers:

c0{,m} Select Code 39. The default for m is 0.

Intermec printers 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 4100 printer to be backward compatible with 86XX printers.

If you enter <ESC><SPACE> as data, the start and stop characters are printed.

c0,0 Select 8646 compatible Code 39. No check digit.

c0,1 Select 8646 compatible Code 39. Printer enter check digit.

c0,2 Select 8646 compatible Code 39. Host enters check digit and printer verifies.

c0,3 Select full ASCII Code 39. No check digit.

c0,4 Select full ASCII Code 39. Printer enters check digit.

c0,5 Select full ASCII Code 39. Host enters check digit and printer verifies.

c0,6	Select 43 character Code 39. No check digit.
c0,7	Select 43 character Code 39. Printer enters check digit.
c0,8	Select 43 character Code 39. Host enters check digit and printer verifies.
c1	Select Code 93.
c2{,m}	Select Interleaved 2 of 5. Default for m is 0.

A zero is added to character strings that are odd in length.

c2,0	Select Interleaved 2 of 5. No check digit.
c2,1	Select Interleaved 2 of 5. Printer enters check digit.
c2,2	Select Interleaved 2 of 5. Printer enters check digit.
c3{,m}	Select Code 2 of 5. Default for m is 0.
c3,0	Select Code 2 of 5. 3-bar start / stop code.
c3,1	Select Code 2 of 5. 2-bar start / stop code.
c4{,m}	Select Codabar. Default for m is 0.

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 they can be downloaded as part of the print data. Start / stop characters sent down with printer data override the characters defined by the bar code field.

c4,0	Select Codabar. Host enters start / stop codes and printer verifies.
c4,1,x,y	Select Codabar. Printer enters start code x and stop code y; x and y can range from A to D.
c5{,m}	Select Code 11. The default for m is 0.
c5,0	Select Code 11. Printer enters 2 check digits.
c5,1	Select Code 11. Printer enters 1 check digit.
c5,2	Select Code 11. Host enters 2 check digits and printer verifies.
c5,3	Select Code 11. Host enters 1 check digit and printer verifies.

c6{,m1}{,m2} Select Code 128. The default for m1 is 0 (Code 128). The default for m2 is 0 (keep parentheses and spaces).

In 86XX Emulation mode, the Function 1 character can be printed by entering <SUB> 1. In Advanced mode, the Function 1 character can be 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 in subset C and a <FNC1>. It is a fixed length version of Code 128 requiring 19 numeric characters to be entered. The first two characters are forced to zeros.

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. Keep parentheses and spaces.
c6,1,1	Select UCC-128 Serial Shipping Container Code. Ignore parentheses and spaces in the bar code but keep them in the interpretive.

c7{,m}{,m2} Select UPC/EAN Codes. 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

A "." 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.

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**.**

m2 selects UPC/EAN codes as 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. Default for m1 is 0. m2 is the field identifier.

The next three modifiers conform to Supplier Standard:

c8,0	Select HIBC Code 39. Primary format.
c8,1	Select HIBC Code 39. Alternate primary format.
c8,2,m2	Select 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	Select HIBC Code 39. Single format.
c8,4	Select HIBC Code 39. First data format.
c8,5,m2	Select HIBC Code 39. Second data format. The linkage character comes from m2, which is the field identifier.
c8,6	Select HIBC Code 39. Multiple data format.
c9	Select Code 16K.

<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. A square symbol is specified by a height magnification of 250 in emulation mode.

c10	Select Code 49.

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 1 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.

c11 Select POSTNET.

POSTNET uses the height ("h") and width ("w") commands in the same way as a font. Other symbologies use "h" to specify the bar height and "w" to specify the narrow bar width. POSTNET uses "h" and "w" to magnify the base character cell.

Each character cell is 13 dots high by 22 dots wide. The default width and height magnification for POSTNET is 2 by 2, resulting in a symbology sized according to the POSTNET specification.

c16{,m1}{,m2} Selects HIBC Code 128. Default for m1 is 0. m2 is the field identifier.

The next three modifiers conform to Supplier Standard:

c16,0 Select HIBC Code 128. Primary format.

c16,1 Select HIBC Code 128. Alternate primary format.

c16,2,m2 Select HIBC Code 128. Secondary format. The linkage character comes from m2, which is the field identifier.

The next four modifiers conform to Provider Standard:

c16,3 Select HIBC Code 128. Single format.

c16,4 Select HIBC Code 128. First data format.

c16,5,m2 Select HIBC Code 128. Second data format. The linkage character comes from m2, which is the field identifier.

c16,6 Select HIBC Code 128. Multiple data format.

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 8 ASCII characters, but cannot start with a numeric character.

Notes: Parameters for the default field are:

Field origin	0,0
Field direction	0 degrees
Bar code	Code 39
Check digits	Disabled
Prefix	None
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

Syntax: y{n}

n values can range between 1 and 600 (1 and 800 with expansion RAM).

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. n is the number of columns for the UDC, bit-mapped or user-defined font. For outline fonts, n represents the width of the base character in number of dots.

Default: n=1 Bitmap fonts and graphics

Syntax: x{n}

n values can range between 1 and 599.

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

Bitmap User-Defined Font, Clear or Define

Purpose: Use this command to clear or create a user-defined bitmapped 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 8 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.

Border Around Human-Readable Text, Define

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.

Notes: When n is greater than 0, the field prints white letters with an n dot size border surrounding the field.

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 8 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

Character Bitmap Origin Offset, Define

Purpose: Defines the offset, to the right, of all characters in a font. If each characters 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. For example, n=2 shifts the character origins over two columns to the right.

Default: n=0

Syntax: X{n}

n values can range between 0 and 599.

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 bar code ratio is the ratio of the wide element to narrow element, and depends on the value of n.

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 is 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.

Command Tables, Load

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 digits for every entry in the table.

Syntax: `C{t}, {command 1}, {command 2}, ..., {command n}`

t is the command table identifier. The range is 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 at the end of this chapter under "User-Defined Interface Tables."

To modify only a few commands, send the <ESC>Z command, capture the output, modify it, and send it back to the printer.

Current Edit Session, Save

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

Syntax: N

Notes: The current page, format, UDC, or UDF is automatically saved when a new one is called or when program mode is exited.

Data Source for Format in a Page, Define

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.

Field, Delete

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 a master field is deleted, all slave fields of that master field are deleted.

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}{,m 1}{,m 2};

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,m{,x};

Data is copied into this field from field m. Field m must be defined before it can be used. 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,x;

Fixed data x 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 0 and 19999

m values can range between 0 and 19999.

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: Characters bitmap width, minus the font character offset (Xn) plus the intercharacter space (zn).

Syntax: Z{n}

n values can range between 1 and 599.

The intercharacter space command (zn) is ignored if used with this command.

Notes: For bitmap characters only.

Font Type, Select

Purpose: Selects a font type for human-readable fields.

Default: n=0

Syntax: c{n}{,m1}{,m2}{,m3}

n values can range from 0 to 24 for human-readable fields.

Fonts may be selected in the following manner:

c0	7x9 Standard (86XX font)
c1	7x11 OCR (86XX font)
c2	10x14 Standard (86XX font)
c3-c6	User-defined fonts
c7	5x7 Standard (86XX font)
c8-c19	User-defined fonts
c20	8 point
c21	12 point
c22	20 point
c23	OCR A
c24	OCR B size 2
c25	Outline font (only available with expanded RAM)

Format, Create or Edit

Purpose: Use this command to edit or create a format n.

Syntax: A{n}{,name} or 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, Erase

Purpose: Erases format ID number n.

Syntax: E{n}

n values can range between 1 and 19.

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 Within 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 0 and 19999.

m values can range between 0 and 19999.

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.

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.

Graphic Type, Select

Purpose: Selects a graphic for graphic fields.

Default: n=0

Syntax: c{n}

Values for n can range between 0 and 99.

Notes: This applies to a graphic field only.

Graphic or UDC, Define

Purpose: This command maps 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 Emulation mode, m...m is a string of 1‘s and 0‘s 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 Advanced mode, each data byte m represents 6 bits of the bitmap.

Height Magnification of Bar, Box, or UDC, Define

Purpose: Defines box, bar code or UDC 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

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

Intercharacter Space for UDF, Define

Purpose: Defines the inter-character gap length for a user-defined bitmap font. Inter-character 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.

This command is ignored if used with the font character width command (Zn).

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 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}`

Enter n=0 to disable interpretive field. Enter n=1 to enable interpretive field with start and stop characters. Enter n=2 to enable interpretive field without start or stop characters.

Notes: When enabled, the human-readable information in font 0 (7x9 standard) is printed 2 dots below the bar code field, left justified. Use the I command to edit an interpretive field.

Length of Line or Box Field, Define

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.

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

Outline Font, Clear or Create

Purpose: Clears / creates on outline user-defined font.

Syntax: `J{n}{,name}`

The font ID is n and ,name is an optional field of up to eight ASCII characters except for the semicolon. If font set n has already been defined, all previous font description will be erased.

Notes: This command is only available with the addition of expanded RAM.

Outline Font, Download

Purpose: Downloads outline font descriptions where n is the information describing all characters within the font.

Syntax: `j{font description...}`

Notes: The printer will store the incoming font description into the font selected by the J command. This command is only available with the addition of expanded RAM.

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 advanced 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. Pitch is characters per line. A higher pitch results in smaller characters.

Point Size, Set

Purpose: In advanced 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, and c22.

The printer must be in advanced mode to use this command. Point size equals 1/72 inch. A higher point size means larger characters.

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

User-Defined Character, Clear or Create

Purpose: This is the command to clear or create a graphic bitmap.

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 8 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 Character, Create

Purpose: Specifies which font character is to be defined next.

Syntax: t{n}

n values can range between 0 and 255.

n is the decimal representation of the ASCII character; existing characters are erased.

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, bar code fields, and graphics (drag).

n=2 Human-readable fields and POSTNET (picket and bar code fields.

Syntax: w{n}

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.

Test and Service Mode Commands

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 the command terminator (;), 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	Begin Printhead Resistance Test*	Causes the printer to begin the printhead resistance test. The printer responds with the ASCII character string "pass" or "fail".
C	Print Pitch Label*	Causes the printer to print the pitch label.
D	Reset Factory Defaults	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.
K	Dark Adjust*	This command changes the darkness of the print on your labels. It is for fine-tuning only.
L	Transmit Label 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. Range of the value is 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.

Command Code	Summary	Description
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 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 40 Volt Supply Value*	Transmits the 40 volt supply A / D output back to the host. The range of the value is 00 to 255.
V	Transmit Printhead Volt Supply Value*	Transmits the printhead volt supply A / D output back to the host. The range of the value is 00 to 255.
;	Command Terminator	All commands in Test and Service mode must end with the command terminator except for the last command in a message.

*The 4100 printer ignores this command.

User-Defined Interface Tables

The following tables show commands, in the order they must be downloaded, when you replace the User-Defined Command / Protocol characters. There is a table for each type of command, as specified by a specific value for t.

Print Commands (t=0)

The following list shows the Print mode commands, in the order they must be downloaded, when you are replacing the command codes.

Print Command Description	Default Print Command
Command Terminator 1	NUL
Set Preamble	SOH
Set Postamble	EOT
Status Inquiry	ENQ
Select First Data Entry Field	ACK
Transmit Error Code	BEL
Warm Boot	BS
Command Terminator 2	LF
Status Dump	VT
Form Feed	FF
Select Next Data Entry Field	CR
Label Cut Command	SO
Go To Shift Command Table	SI
Reset	DLE
Set Intercharacter Delay	SYN
Print	ETB
Clear All Data	CAN
Abort Print Job	EM
Data Shift	SUB
Go To Escape Command Table	ESC
Numeric Field Separator	FS
Alphanumeric Field Separator	GS
Set Quantity Count	RS
Set Batch Count	US
Clear Data From Current Field	DEL

Escape Print Commands (t=1)

This table lists the <ESC> commands in the order they must be downloaded.

Escape Command Description	Default Escape Command
Set Message Delay	SYN
Enter Start / Stop Character	(space)
Select Advanced Mode	C
Set Field Decrement	D
Select Format	E
Select Field	F
Select Page	G
Transmit Printhead Parameters	H
Set Field Increment	I
Transmit Label and Gap Length	L
Transmit Software Version Number	M
Disable Increment / Decrement	N
Transmit Options Selected	O
Enter Program Mode	P
Transmit Quantity and Batch Count	Q
Enter Test and Service Mode	T
Transmit User-Defined Command Tables	Z
Select 86XX Emulation Mode	c
Enable Auto-Transmit 2	d
Enable Auto-Transmit 3	e
Enable Auto-Transmit 1	j
Disable Auto-Transmit 1, 2 and 3	k
Transmit Static RAM Usage	m
Transmit Configuration Parameters	p
Transmit User-Defined Characters	u
Transmit Font	v
Transmit Format	x
Transmit Page	y

Shift Print Commands (t=2)

The following 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	Default Shift Command
Control Panel Access	A
86XX or Advanced Mode on Power Up	C
Set End-of-Print Skip Distance	D
Set Top of Form	F
Set Printhead Pressure	H
Set Number of Image Bands	I
Set Maximum Label Length	L
Define Amount of Storage	N
Online or Offline on Power Up	O
Enable or Disable Label Retract	R
Set Print Speed	S
Select Label Stock Type	T
Set Printhead Test Parameters	U
Set Label Width	W
Set Ribbon Save Zone	Z
Audible Alarm	a
Enable or Disable Cutter	c
Set Dark Adjust	d
Adjust Label Rest Point	f
Select TTR or Direct Thermal	g
IBM Language Translation	i
Select Printer Language	l
Set Label Retract Distance	r
Enable or Disable Self-strip	t

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 Command	
Buffer Already Full	GS	
Printhead Test Fail	SO	
Label Path Open	US	
Ribbon Fault	US	
No Label Stock	EM	
Buffer Now Full	DC3	
Take-Up Reel Full	BS	
Label at Strip Pin	FS	Cutter Busy / Jammed
Skipping	DC1	
Printing	DC1	
Ready	DC1	
Clear	DC1	Auto-Transmit 1
Label at Strip Pin	FS	Auto-Transmit 1
Take-Up Reel Full	BS	Auto-Transmit 1
No Label Stock	EM	Auto-Transmit 1
Ribbon Fault	US	Auto-Transmit 1
Room in Buffer	DC1	Auto-Transmit 2
Imager Overrun	HT	Auto-Transmit 3
Print Job Complete and Buffer Empty	SOH	Auto-Transmit 3
Insufficient RAM	RS	Auto-Transmit 3

Protocol Commands (t=4)

The following list contains the protocol codes in the order they must be downloaded.

Command Description	Command Characters
SELECT IN	GS
POLL IN	FS
RES IN	EOT
REQ IN	ENQ
SOM IN	STX
EOM IN	ETX
AFF IN	ACK
NEG IN	NAK
DLE IN	DLE
XON IN	DC1
XOFF IN	DC3
SELECT OUT	GS
POLL OUT	FS
RES OUT	EOT
REQ OUT	ENQ
SOM OUT	STX
EOM OUT	ETX
AFF OUT	ACK
NEG OUT	NAK
DLE OUT	DLE
XON OUT	DC1
XOFF OUT	DC3
Proto-Cmd 1	ENQ
Proto-Cmd 2	VT
Timeout on EOM ACK	20 (ms) (Range: 0 - 255) (14 Hex = 20 ms)

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	Multidrop
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) (14 Hex)	20(DEC) (14 Hex)

Printer Functional Boundaries

This section defines the boundaries and limits of the printer command set. Each function or feature has a 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. These limits are shown in the following table.

For example, if you have downloaded several large graphics, you may run out of memory before you can store 20 formats. In this case you may want to restructure the previously stored data or consider purchasing additional printer memory.

Parameter	Functional Limit (Max.)
Number of pages	10
Number of formats in a page	26
Number of formats	20
Number of fields in a format	200
Number of slaves to a field	20
Number of characters in a field name	8
Number of characters in a field (including delimiters)	200
Field data offset	9999
Font character height / width magnification	250
Font character size	3 inches square
UDC size	3 inches square
Bar code width magnification	9999
Bar code height magnification	9999
UDC height / width magnification	250
Line length / width	9999
Number of user-defined characters	100
Number of user-defined font sets	16
Increment / decrement value	9999
Quantity / batch size	9999
Message delay	9999 milliseconds
Intercharacter delay	9999 milliseconds
Message block size	255 (including <STX> and <ETX> characters)

A

Appendix

Appendix A

4100 Printer Specifications

This section describes the specifications and performance parameters for the 4100 bar code printer.

Dimensions (no options installed)

Height	10.0 inches (25.4 cm)
Width	10.0 inches (25.4 cm)
Length	18.0 inches (45.7 cm)
Weight	39 pounds (17.7 kg)

Electrical Requirements

Input Voltage	115 or 230 VAC ±10%
Frequency	50 Hz to 60 Hz
Fuse breaker	1.5A Slo Blo at 115 VAC or 1.2A double pole circuit at 230 VAC

Printing Method

The 4100 printer is capable of direct thermal (DT) printing, or thermal transfer (TTR) printing using thermal transfer ribbon.

Printing Speed

Maximum	8.5 inches per second (216 mm per second)
Minimum	2.5 inches per second (63.5 mm per second)

Printhead

Element	0.005 inch (0.13 mm) square
Width	4.1 inches (104 mm) maximum
Resolution	203 DPI (8 dots per mm)
"X" dimensions	10 mil to 50 mil (0.25 mm to 1.27 mm); 5 mil (0.13 mm) in drag mode only

Media Specifications

Roll	6,000 linear inches (152 m)
Length	0.5 inch (13 mm) to 10 inches (254 mm)
Width	0.75 inch (19 mm) to 4.65 inches (118 mm)
Thickness	0.005 inch (0.13 mm) to 0.008 inch (0.20 mm)
Core Size	1.5 inches (38 mm) to 3 inches (76 mm)
Roll Diameter	8.38 inches (213 mm) maximum
Rewind Capacity	2,100 linear inches (53 m) or 5.0 inches maximum outside diameter (127 mm)

Ribbon Specifications

Roll	12,000 linear inches (305 m)
Widths	2.5 inches (64 mm)
	3.25 inches (83 mm)
	4.1 inches (104 mm)
	4.5 inches (114 mm)

Cutter Specifications

Media Width	0.75 inch (19mm) minimum; 4.25 inches (108 mm) maximum
Media Length	0.50 inch (13mm) minimum; no limit on maximum
Media Thickness	0.005 inch (0.13 mm) minimum; 0.010 inch (.25 mm) maximum
Tray Size	Adjustable from 3.5 inches to 6.25 inches
Blade Life	Approx. 1 million cuts (500,00 per cutting edge)

Environment

Operating	40°F to 100°F (4°C to 38°C)
Storage	-40°F to 158°F (-40°C to 70°C)
Humidity	10% to 95% noncondensing

Communications

Asynchronous RS-232C, RS-422, and RS-485 interfaces

Serial ASCII code

Intermec Standard Block Protocol

XON / XOFF Protocol

Ready / Busy Protocol

Polling Mode D Protocol

Multi-Drop Protocol

Baud Rates: 110, 300, 600, 1200, 2400, 4800, 9600, 19200

Fonts and Graphics

Nine resident bitmapped scalable fonts (including OCR A and B)

200 DPI graphics resolution

Character Sets

US ASCII, UK ASCII, French, German, Italian, Norwegian / Danish, Spanish, Swedish / Finnish

Bar Code Symbologies

Symbology	Characters per inch
Code 39	7.00
Code 93	11.28
Interleaved 2 of 5	12.69
Codabar (numeric characters, $ and -)	9.23
Code 11	11.28
Code 128 (numeric characters, $ and -)	18.46
UPC / EAN	14.50
Code 49	49.00*
Code 16K	37.00*

*0.719 inches high by 0.690 inches wide, eight rows

Factory Defaults

The following table lists the factory default settings for the 4100 printer. You can set these parameters by using downloadable printer commands described in Chapter 7. For information on the printer serial port defaults, which you set by using the rear panel DIP switches, see Chapter 2.

Configuration	Default Setting
Message delay	0 milliseconds
Power up mode	Advanced mode
Cutter	Disabled
End-of-print skip distance	100 dots
Top of form	20 dots
Media sensitivity	420
Number of image bands	3
Maximum label length	1000 dots
Printer character set	US ASCII
Label retract	Enabled
Label retract distance	0 dots
Print speed	3.5 inches per second (ips)
Label stock type	Die cut
Interlabel ribbon save	Disabled
Ribbon-save zones	Disabled
Intercharacter delay	0 milliseconds
Preamble character	Disabled
Postamble character	Disabled
Auto-transmit 1	Disabled
Auto-transmit 2	Disabled
Auto-transmit 3	Disabled

Extended Character Sets

The 4100 printer supports two different character sets for its eight resident fonts. One character set supports Advanced mode and the other supports 86XX Emulation mode. The character sets start in the upper left corner of the tables and read from left to right.

Advanced Mode Character Set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p				°	À	Đ	à	ð
1			!	1	A	Q	a	q			¡	±	Á	Ñ	á	ñ
2			"	2	B	R	b	r			¢	²	Â	Ò	â	ò
3			#	3	C	S	c	s			£	³	Ã	Ó	ã	ó
4			$	4	D	T	d	t			¤	´	Ä	Ô	ä	ô
5			%	5	E	U	e	u			¥	µ	Å	Õ	å	õ
6			&	6	F	V	f	v			¦	¶	Æ	Ö	æ	ö
7			'	7	G	W	g	w			§	·	Ç	×	ç	÷
8			(	8	H	X	h	x			¨	¸	È	Ø	è	ø
9			)	9	I	Y	i	y			©	¹	É	Ù	é	ù
A			*	:	J	Z	j	z			ª	º	Ê	Ú	ê	ú
B			+	;	K	[	k	{			«	»	Ë	Û	ë	û
C			,	<	L	\	l	|			¬	¼	Ì	Ü	ì	ü
D			-	=	M	]	m	}			-	½	Í	Ý	í	ý
E			.	>	N	^	n	~			®	¾	Î	Þ	î	þ
F			/	?	O	_	o				¯	¿	Ï	ß	ï	ÿ

86XX Emulation Mode Character Set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p				å		ö		
1			!	1	A	Q	a	q				1	Ä	ü		
2			"	2	B	R	b	r				2	ß	Pt		
3			#	3	C	S	c	s				3	ç	§		
4			$	4	D	T	d	t			¤	4	æ	ë		
5			%	5	E	U	e	u			Æ	5	É	Ü		
6			&	6	F	V	f	v				6	à	ä		
7			'	7	G	W	g	w				7	é	á		
8			(	8	H	X	h	x				8	ù	Å		
9			)	9	I	Y	i	y				9	ì	¥		
A			*	:	J	Z	j	z					è	Ò		
B			+	;	K	[	k	{			Ø		¨			
C			,	<	L	\	l	|					£			
D			-	=	M	]	m	}			ø		ñ			
E			.	>	N	^	n	~			°		Ñ			
F			/	?	O	_	o				¡	¿	Ö			

Appendix A

International Character Sets

The 4100 printer support eight different international character sets for both Advanced mode and for 86XX Emulation mode. The character substitution tables are listed below.

In Advanced mode the international character substitution complies with ISO standards. In 86XX Emulation mode the international character substitution is compatible with Intermec 8636 and 8646 bar code printers.

Advanced Mode International Character Set

	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S.	#	$	@	[	\	]	^	`	{	¦	}	~
England	£	$	@	[	\	]	^	`	{	¦	}	-
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
Denmark	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	-
France	£	$	à	°	ç	§	^	`	é	ù	è	¨
Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	£	$	§	°	ç	é	^	ù	à	ò	è	ì
Spain	£	$	§	¡	Ñ	¿	^	`	°	ñ	ç	~
Switzerland	#	$	à	°	ç	é	^	ù	ä	ö	ü	è

86XX Emulation Mode International Character Set

	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S.	#	$	@	[	\	]	^	`	{	¦	}	~
England	£	$	@	[	\	]	^	`	{	¦	}	~
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
Denmark	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
France	£	$	à	°	ç	§	^	`	é	ù	è	¨
Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	#	$	§	°	ç	é	^	ù	à	ò	è	ì
Spain	Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	ç	~
Switzerland	#	$	à	°	ç	é	^	ù	ä	ö	ü	è

ASCII Translation Table

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 zeros
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

ASCI6x7

Configuration Parameters Upload

Configuration parameters are uploaded in the form of configuration commands that the printer would receive to set those parameters. The commands are concatenated into one command string within a message. The following table lists the order in which the commands are transmitted and the number bytes in each command.

Command	Syntax	Bytes
Set message delay	<ESC><SYN> [n]	6
86XX / Advanced mode on power up	<SI>C[n]	3
Enable / disable cutter	<SI>c[n]	3
Set end-of-print skip distance	<SI>D[n]	6
Set darkness adjustment	<SI>d{n}	5
Set top of form	<SI>F[n]	6
Select media sensitivity	<SI>g[n,m]	7
Set number of image bands	<SI>I[n]	4
Set maximum label length	<SI>L[n]	6
Select printer language	<SI>l[n]	3
Define amount of storage ram	<SI>N[n]	5
Enable / disable label retract	<SI>R[n]	3
Set label retract distance	<SI>r[n]	5
Set print speed	<SI>S[n]	4
Enable / disable interlabel ribbon save	<SI>s[n]	3
Select label stock type	<SI>T[n]	3
Disable ribbon save zones	<SI>Z	2
Set all 10 ribbon save zones	<SI>Z[n,mx10]	110
Set intercharacter delay	<SYN>[n]	5
Set preamble	<SOH>[n]	2-3
Set postamble	<EOT>[n]	2-3
Disable auto-transmit 1, 2, & 3	<ESC>k	2

Command	Syntax	Bytes
Disable autotransmit 1*	<ESC>j	2
Enable autotransmit 2*	<ESC>d	2
Enable autotransmit 3*	<ESC>e	2
Total bytes		**195-203**

*Only sent if enabled

4100 Printer Options

Listed below are some of the options available with the 4100 printer. Consult your Intermec representative for a complete list of options. Each 4100 printer option includes an instruction sheet.

Present Sensor/Self-Strip

The 4100 printer is mechanically configured for self-strip printing. However, you must have the optional Present Sensor installed to print in Self-Strip mode. If you apply labels one at a time as soon as they are printed, you can work more quickly and easily with Self-Strip mode. With this option, the printer does not present a new label until you have removed the previous one.

Memory Expansion

The memory expansion option provides an additional 256K of nonvolatile (battery backed) bulk storage to hold more formats, fonts, or bit-mapped graphics. It also increases the printer's image buffering capabilities. The addition of expansion RAM allows you to print 4 by 4 inch characters and graphics. The memory expansion option also includes the outline font c25.

Cutter and Tray

With the cutter and tray, your 4100 printer cuts media into individual labels and drops them into a tray ready for use. This option works best for individual random lengths or short batches of different label lengths.

Ribbon Save

The ribbon save option minimizes waste in thermal transfer printing by stopping the stepping of the ribbon through areas of the label that are blank or preprinted.

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 take-up
A device that rewinds media; useful for printing batches of labels.

BEL
A command character that instructs the printer to return an error status code.

character set
Refers to specific letters, numerals, and symbols that support a particular language (e.g., French, U.S. 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.

cutter
An optional device for the 4100 printer that cuts individual labels and drops them into a tray.

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.

EAN
European Article Numbering. A bar code used widely in Europe.

Emulation mode
An operating mode in which the printer has the operating characteristics of another printer. The 4100 can operate in 86XX Emulation mode which emulates an Intermec 8636 or 8646 printer.

Feed
A printer control panel button that advances the media.

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 with 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.

format file
A collection of printer commands and data that determines 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.

Interpretive Field
A text field that describes the data in the associated bar code field.

ISO
International Standardization Organization. An internationally accepted 7-bit character code. (The U.S. 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 die-cut label stock.

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.

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.

page
A group of formats that are always printed together.

parameters
The operating limits of the printer or variable information sent with a command.

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
A unit of measurement for font height; 72 points equal one inch.

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 832 thermal elements.

ribbon save
An optional device for the 4100 printer that disengages the thermal transfer ribbon while labels are being fed forward or at any other time printing does not take place.

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 signalling 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, that 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 operational mode for the 4100 printer that presents each label after it is printed, with the backing removed so it may be applied immediately. This requires installation of the optional Present Sensor.

sensitivity
The responsiveness to heat of thermal media or of thermal transfer ribbon; 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 media 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.

text
Human-readable alphanumeric characters, as opposed to bar codes, which are machine readable.

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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