Intermec

User's Manual

3400 Bar Code Label Printer

P/N 059691-007

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

Canadian technical and service support: 1-800-687-7043
Canadian media supplies ordering information: 1-800-267-6936

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

Manual Change Record

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

Version	Date	Description of Change
002	8/94	Addendum 061800-001 added to the manual. It contains information on the Test and Service DIP switch settings for label rest point, 86XX Emulation, and forms adjust.
003	9/94	Information in addendum 061800-001 incorporated into the manual. Firmware version 1.5 information also added to the manual. This information includes: image before print command, HIBC Code 128, label rest location range, top of form range expanded, reimage only changed fields, new Test and Service DIP switch settings, double click to go Offline, and a new default storage region with the memory expansion.
004	2/95	The manual revision was rolled due to an internal issue. No change has been made to the manual information.
005	5/95	Label Debut information was removed from the base manual and made into a separate document.
006	10/95	The user's manual was made into an accessory. It is now bound in a 3-ring binder.
007	7/96	PrintSet information was added to manual along with minor revisions.

Contents

2 Operating the Printer

7 Optimizing Printer Performance

8 Using Test and Service Mode

A Appendix A

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. A documentation roadmap is also provided to guide you in finding the appropriate 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 1-800-755-5505, and in Canada call 1-800-688-7043. Otherwise, refer to the Worldwide Sales & Service list that was 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 equipment can cause death. If you must perform authorized emergency work on energized equipment, be sure that you comply strictly with approved safety regulations.

Warnings 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 blessures graves aux personnes manupulant l'équipement.

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

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

About This Manual

Analysts and programmers should use this manual to learn how to operate, program, and connect the printer to a network or system. The first part of this manual tells you how to install, operate, maintain, and troubleshoot your printer. The last part of the manual covers label design, programming, and advanced features of the 3400 printer. A basic understanding of DOS, programming, and data communications is necessary.

What You Will Find in This Manual

This table summarizes the information in each chapter of this manual:

For Information On	Refer To
Installing the printer	Chapter 1, "Getting Started." Tells you how to plug in the printer, load fanfold media, configure the serial port, and print a configuration test label.
Operating the printer	Chapter 2, "Operating the Printer." Explains the printer front panel, tells you how to load roll media, load ribbon, test for communications, and download fonts.
Routine maintenance	Chapter 3, "Maintaining the Printer." Shows how to maintain the printer.
Troubleshooting	Chapter 4, "Troubleshooting." Instructs how to clear error messages and troubleshoot programming or configuration problems.
Designing labels	Chapter 5, "Designing Labels and Using IPL Commands." Tells you how to use the Intermec Printer Language (IPL) command set to design labels.
Printer commands	Chapter 6, "IPL Commands." Provides a complete reference to the IPL command set.
Improving printer performance	Chapter 7, "Optimizing Printer Performance." Tells you how to fine-tune the printer to increase processing time.
Test and Service features	Chapter 8, "Using Test and Service Mode." Provides information on using Test and Service mode to print test labels, perform procedures and configure settings.
Reference information	Appendix A. Contains operating specifications, extended character sets, and reference tables.
Communications	Appendix B. Provides information on communication protocols for your system and serial port pin assignments.

Terms and Conventions

Listed below are special terms and conventions used throughout the manual. Refer to the glossary for a complete list of terms found in this manual.

Terms

"Printer" refers to the 3400 bar code printer.

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

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

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

Conventions

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

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

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

Other Intermec Manuals

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

Manual	Intermec Part Number
9154 Multi-Drop Line Controller System Manual	048517
9161B Installation Manual	049572
9180 Network Controller User's Manual	054292
Data Communications Reference Manual	044737
Model 200 Controller System Manual	063439
RF System User's Manual	053574
The Bar Code Book	051241

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Getting Started

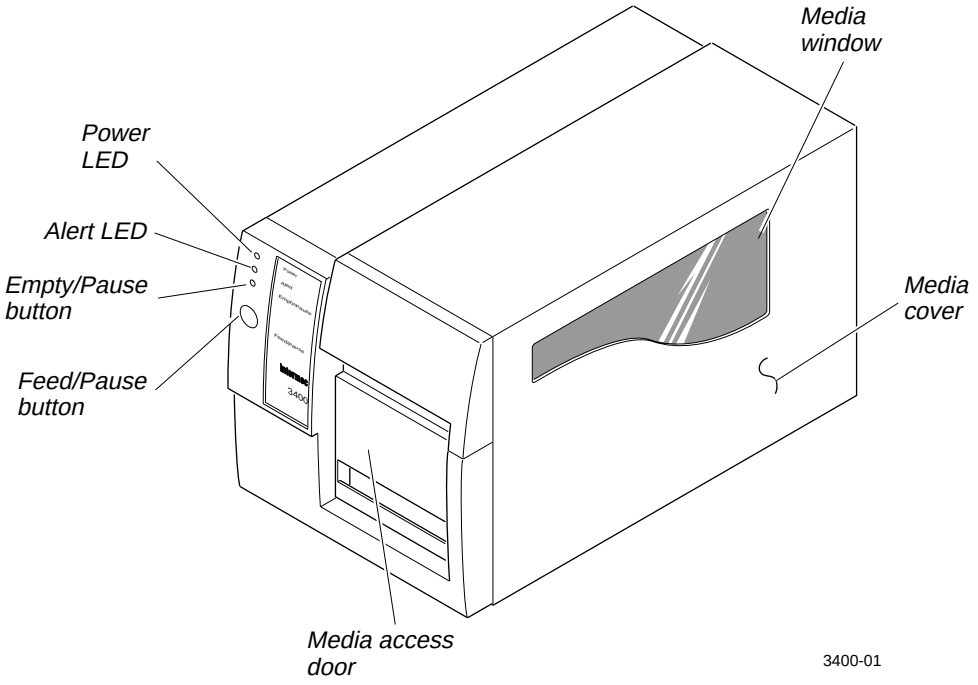
Getting to Know Your 3400 Printer

Features of the 3400 printer include:

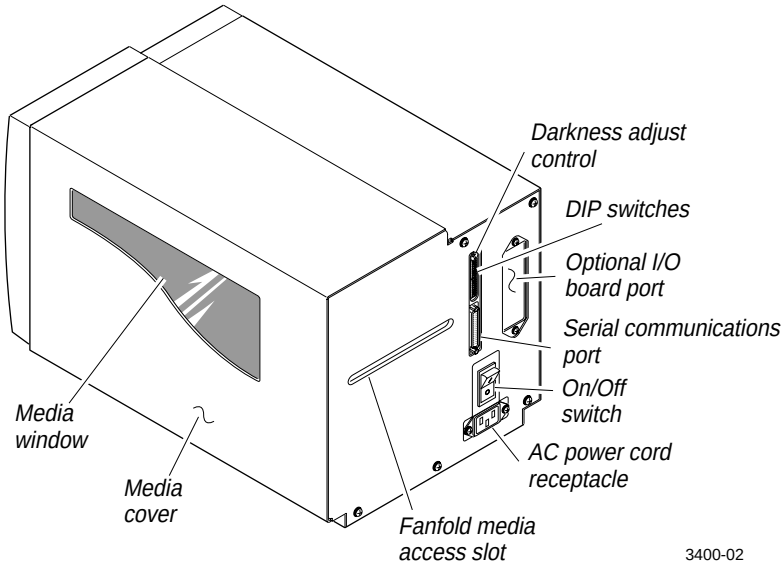
- Support for direct thermal and thermal transfer printing applications. Chapters 1 and 2 instruct you on how to load both types of media.
- An internal self-strip with integral liner takeup. See Chapter 2, "Operating the Printer," for more information.
- Minimal supervision and maintenance.

Use the following figures to familiarize yourself with the 3400 printer.

Front View



Back View



Several options are available for use with the 3400 printer. See Appendix A for complete descriptions of these options.

Preparing the Printer for Installation

Before connecting your 3400 printer to your data collection system, you need to:

- plug in your printer.
- open the printer and load media.
- print a configuration test label.

Plugging in the Printer

The back of the 3400 printer contains the AC power receptacle, the serial communications port, the On / Off switch, and two banks of DIP switches.

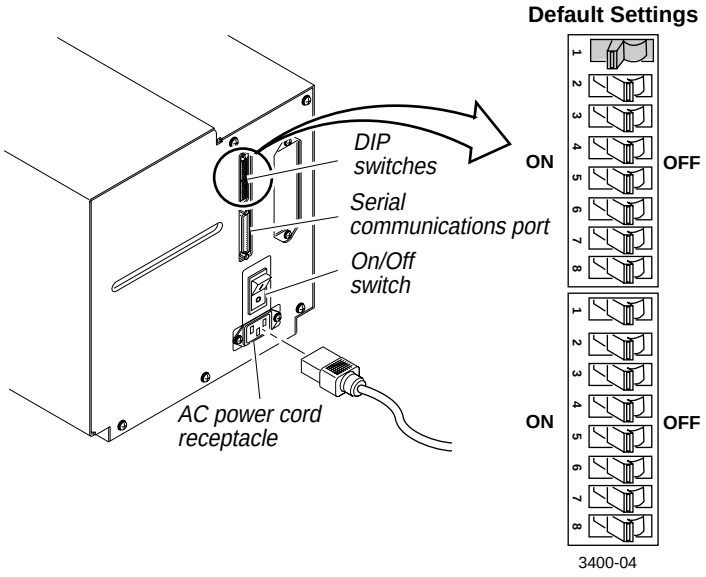
To plug in the printer

1. Turn the On / Off switch to the off position.
2. Make sure you set the DIP switches to their factory default settings.

   Top Bank Set switch 1 on. Set switches 2 through 8 off.

   Bottom Bank Set switches 1 through 8 off.

   For a description of the DIP switch settings, see "Configuring the Serial Port for Communications" later in this chapter.
3. Plug the AC power cord into the receptacle at the rear of the printer.



4. Plug the other end of the power cord into a grounded wall outlet or surge protector.

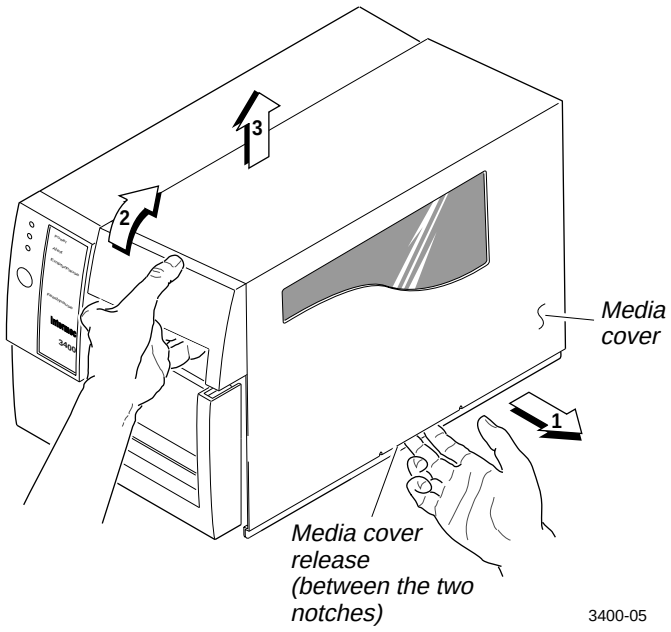
5. Set the On / Off switch to the on position. When you power on the printer, the Power On LED lights, the Empty / Pause LED flashes, and the printer (platen roller) advances. The yellow Empty / Pause LED then stays on steady because you have not loaded media yet.

Opening the Printer

You need to open the printer every time you load media or perform maintenance procedures.

To open the printer

1. Place the fingers of your right hand between the two notches on the lower edge of the media cover (the media cover release) and pull the bottom of the media cover away from the base of the printer.
2. Grasp the front of the media cover with your left hand and lift the front of the media cover upward to release it from the printer frame.
3. Lift the media cover away from the top of the printer.



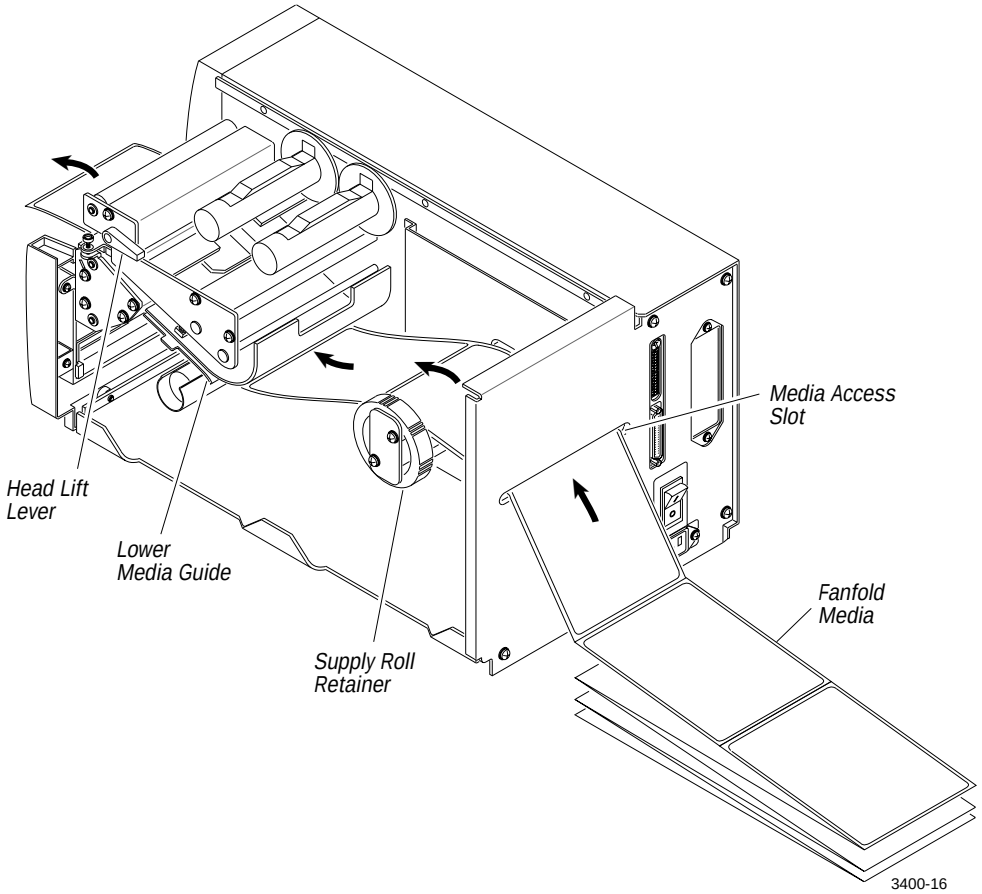
Loading Media for Fanfold Printing

Use the sample of fanfold media provided in the Media Envelope to complete the following procedures. In fanfold printing, a stack of fanfold media is placed at the rear of the printer and fed into the printer through a slot in the rear cover. Refer to Chapter 2, "Operating the Printer," for instructions on loading rolls of media.

To load media for fanfold printing

1. Open the printer.
2. Disengage the printhead by rotating the head lift lever clockwise until it releases.
3. Move the supply roll retainer by turning it counterclockwise and sliding it to the outer end of the supply post.
4. Place the fanfold media slightly lower than the slot in the printer back cover. Line the (box of) fanfold media up with the label path through the printer. Insert media through the slot at the rear of the printer and thread it over the supply roll post.
5. To allow easy access to the media path, pull down on the lower media guide. Make sure that the edge guide is slid all the way to the outer edge of the edge guide plate.
6. Insert the fanfold media through the printer mechanism as shown. The front edge of the media should pass over the tear bar and through the label dispense opening in the media cover. The fanfold media should pass over the supply roll post.
7. Release the lower media guide and adjust the edge guide to position the media firmly against the inside wall of the printer.
8. Slide the supply roll retainer up to the edge of the fanfold media and turn the supply roll retainer clockwise until it locks firmly in place securing the media against the inside wall of the printer.
9. Engage the printhead by rotating the head lift lever counterclockwise until it locks.
10. Close the printer by reversing the directions for removing the cover.

Loading Media for Fanfold Printing



11. Press Feed / Pause to advance one label through the printer and out the label opening in the front cover. The printer is now ready to print the configuration test label. The yellow Empty / Pause LED goes out.

Note: *If the yellow Empty/Pause LED does not go out, reload the media and try again.*

Note: *For your convenience, refer to the label with directions for loading media located on the inside of the media cover.*

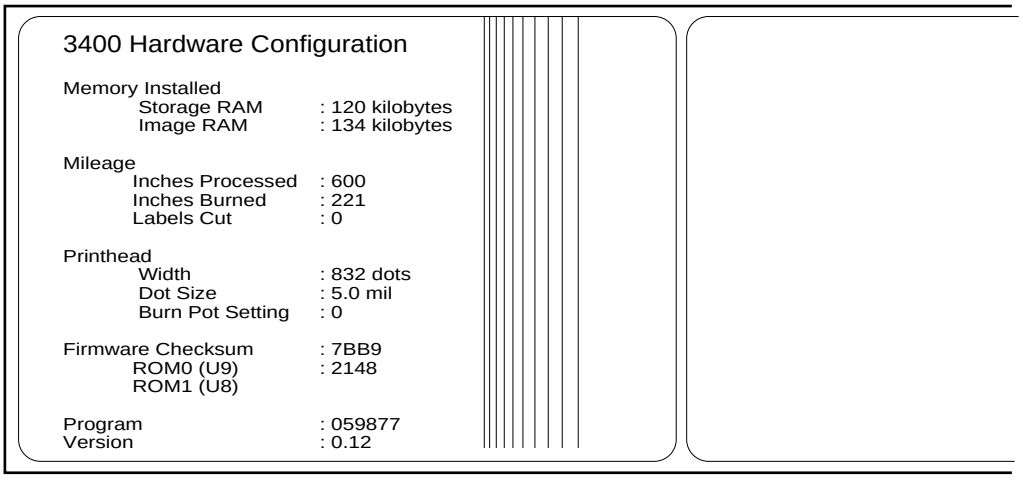
Printing the Hardware Configuration Test Label

Once media is loaded in the printer, you are ready to print the hardware configuration test label. The hardware configuration test label lists your printer's configuration. Use this label for reference when installing your 3400 printer and for verification of proper printer operation.

To print the hardware configuration test label

1. Turn the On / Off switch to the off position.
2. Press and hold the Feed / Pause button while switching the printer power on. The printer presents the hardware configuration test label.
3. Release the Feed / Pause button when the media starts moving. You are now ready to install the 3400 printer.

3400 Hardware Configuration Test Label



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What the Hardware Configuration Test Label Tells You

The hardware test label provides these statistics:

- Amount of installed memory
- Amount of media printed
- Printhead configuration
- Firmware information
- Printhead alignment (the vertical lines)

If a Hardware Configuration Test Label Does Not Print

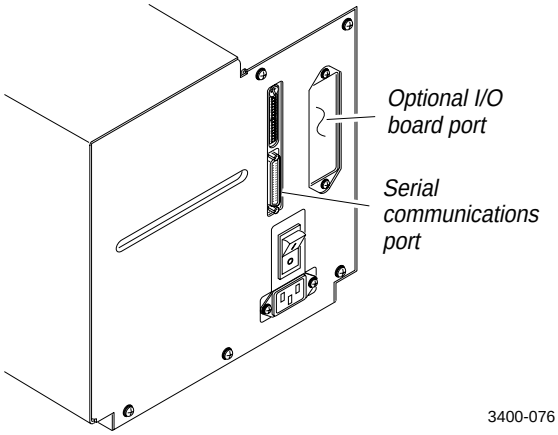
If you are unable to print a hardware configuration test label, see "Printer Operation Problems" in Chapter 4.

Connecting the Printer to Your System

You can connect your 3400 printer to a PC, a local area network, an AS/400 (or other midrange), or a mainframe. This section tells you how to connect your printer to any of these systems.

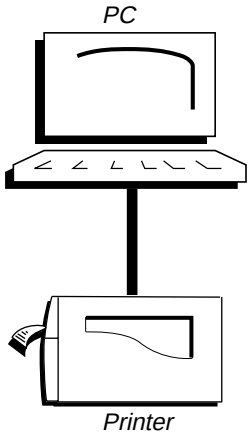
This illustration shows you where to connect your system to the printer. You can use either of these two ports on the rear of the printer:

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



Connecting the 3400 to a PC

You can connect the 3400 to either a serial port or parallel port (if you have the option installed) on your PC. You must provide the correct cables for connecting the printer. See the following sections for cable information. Contact your Intermec representative for ordering assistance if you do not have the appropriate cables.



Connecting the Printer to a PC Serial Port

To connect the 3400 to your PC serial port, you need a shielded EIA RS-232, RS-422, or RS-485 electrical interface with a 25-pin D-style subminiature connector. It must have pins on the printer end and an appropriate serial port connector on the other end.

Use the following table to determine the correct Intermec cable for your application. You cannot order an Intermec cable for the RS-422 interface, but there is a schematic on page 1-14 that you can use to purchase or make your own cable. See Appendix B for the RS-232, RS-422, and RS-485 serial port assignments.

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

To connect your printer to a PC serial port

1. Turn the On/Off switch to the off position.
2. Plug the 25-pin connector into the serial communications port on the rear of the 3400 printer.
3. Plug the other end of the cable into a serial (COM) port on the PC.
4. If necessary, change the PC serial port configuration to match your printer. See "Configuring the Serial Port for Communications" later in this chapter for more information.

Connecting the Printer to a PC Parallel Port

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

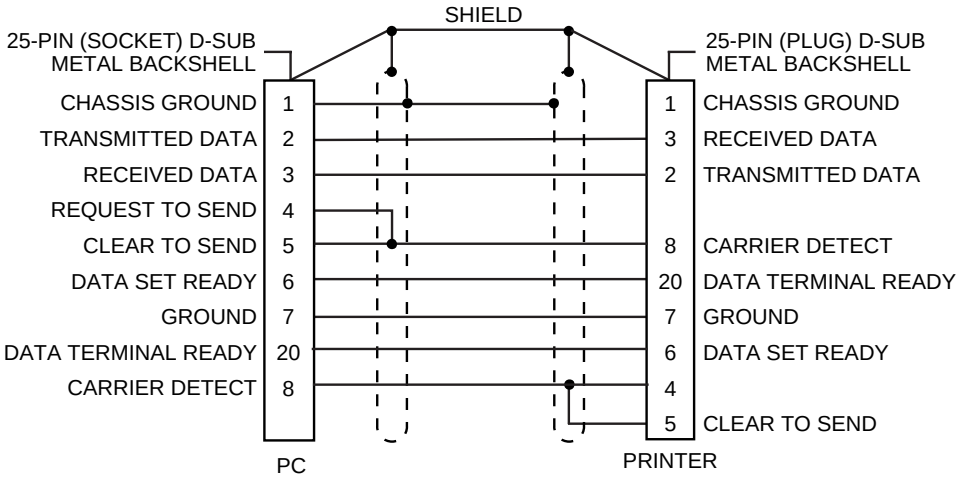
- a Centronics parallel interface adapter installed in the printer.
- a parallel cable to run between the printer and the PC.

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

To connect your printer to a PC parallel port

1. Turn the On/Off switch to the off position.
2. Plug the parallel interface connector into the parallel communications port on the rear of the 3400 printer.
3. Plug the other end of the cable into a parallel port on the PC.

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



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

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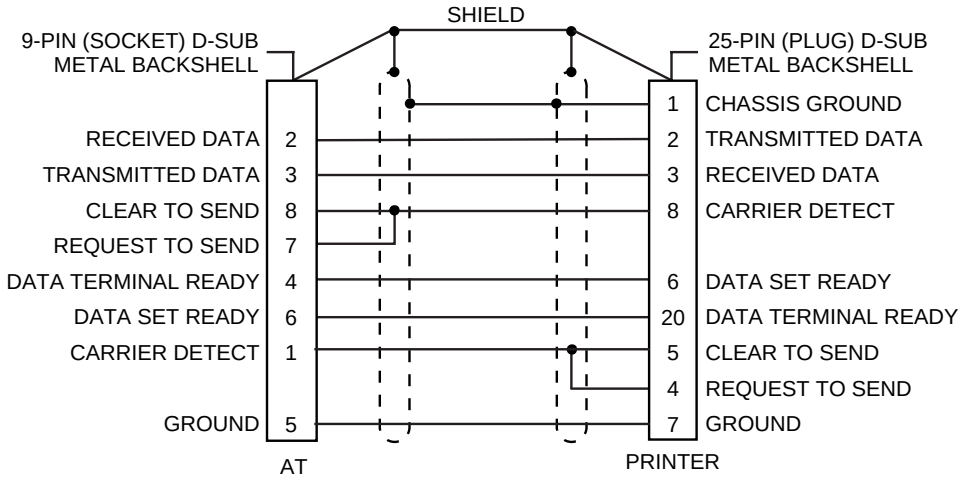
RS-232 Null Modem Cable for PC/AT (Intermec Part Number 048693)



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

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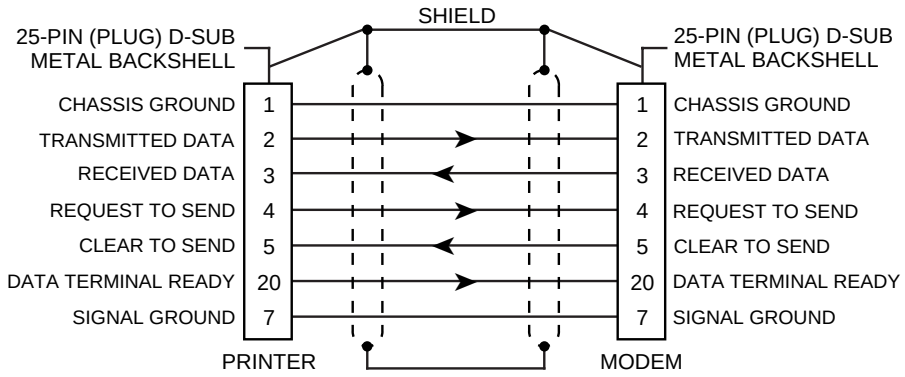
Straight Through DTE to DCE Cable for Use with a Modem (Intermec Part Number 043237S)



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

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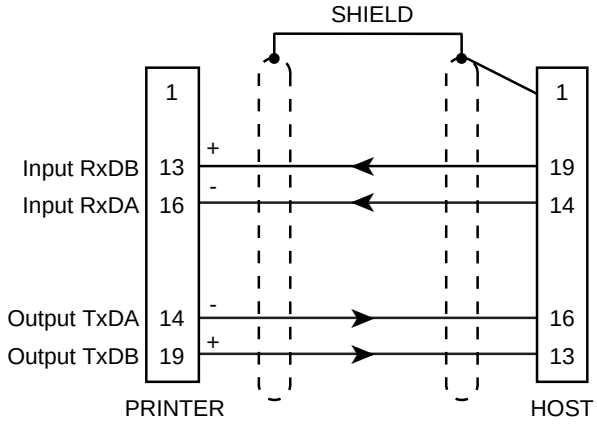
Note: *If you find that you are losing data, you may need to isolate the chassis ground from one of the two devices by connecting it to the shield.*

RS-422 Intermec Pin Assignments



NOTE: Connect pin 1 to shield at one end only.

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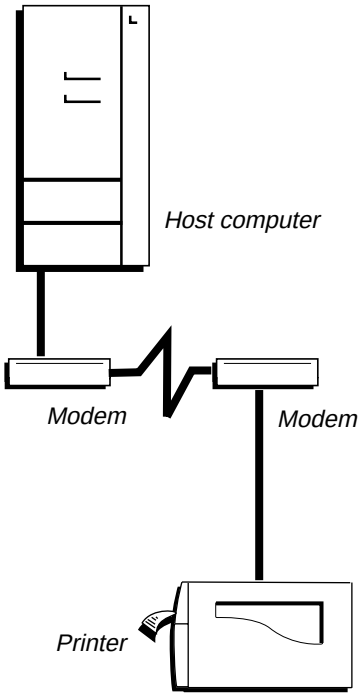
Note: *The host in this case includes Intermec products that support RS-422. Non-Intermec controllers may have different pin assignments.*

Connecting the 3400 to a PC With a Modem

Use a modem to communicate with your host from a remote location not accessible with remote cabling. You must use an asynchronous, dedicated (non-switched or manually switched), full-duplex modem. Refer to your modem documentation for communications requirements.



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To connect your printer to a PC 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 communications lines.
4. If necessary, change the printer's serial port configuration by following the instructions in "Configuring the Serial Port for Communications" later in this chapter.

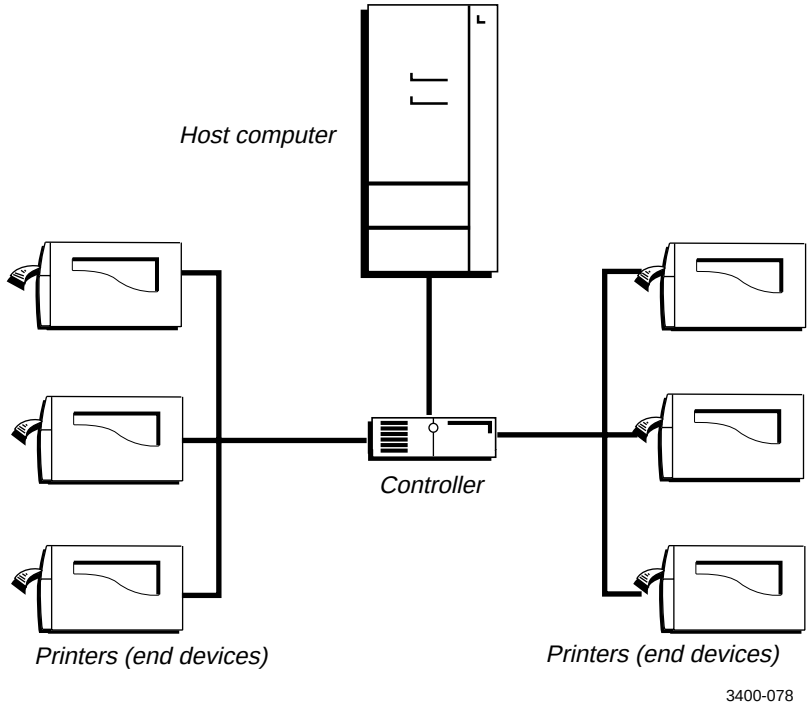
Connecting the 3400 to a Network

You can connect the 3400 printer to Novell NetWare networks, Token Ring networks, or other TCP/IP networks. To connect the 3400 printer to a network, you must have:

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

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

Connecting Your 3400 Printer to a Network



The network interface adapter (for example, Ethernet) connects to the parallel port of the printer. Your network must be able to use XON / XOFF (hardware handshake) protocol. 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)
- *Data Communications Reference Manual* (Intermec Part No. 044737)
- *Model 200 Controller System Manual* (Intermec Part No. 063439)
- *RF System User's Manual* (Intermec Part No. 053574)

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

Connecting the 3400 to an AS/400

To connect a 3400 printer directly to an AS/400 or midrange computer, you need:

- a twinax adapter card.
- a twinaxial cable equivalent to IBM part number 7362267 or 7362062. The maximum cable length for the twinax interface is 5,000 feet (1,525 meters).

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

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

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

Connecting the 3400 to a Mainframe

To connect a 3400 printer directly to an IBM mainframe, you need:

- a coax adapter card.
- a coaxial cable equivalent to IBM part number 2577672 or 1833108.

The maximum cable length allowed is 4,920 feet (1,500 meters). See the IBM specification *Installation and Assembly of Coaxial Cable and Accessories*, part number GA27-2805-4, for further information.

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

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

Cabling in Noisy Electrical Environments

The items listed below create noisy electrical environments that can disrupt data communications between your host computer and the 3400 printer:

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

If any of these items are near your printer, you may want to try any of the following suggestions to reduce the effects of electrical noise. If you need help eliminating noise, ask your Intermec representative for assistance.

- 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. You will find the chassis ground on the ground pin of the printer power cord.

Configuring the Serial Port for Communications

You need to configure the serial port of the 3400 printer to match the configuration of your PC or network controlling device. If the printer's default settings do not match, use the DIP switch settings table to configure the serial port.

To configure the printer serial port

1. Use the following DIP Switch Settings descriptions and table to locate the DIP switches you need to change to configure the serial port.
2. Use a small straight-slot screwdriver to set the appropriate DIP switches.

   For example, if you want to change the media type to thermal transfer, set DIP switch 8 on the bottom bank of switches to the on position.
3. Turn the printer power off and then on for the configuration changes to take effect.

Note: *Ignore Multi-Drop switches if you are not using a Multi-Drop network.*

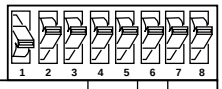
DIP Switch Settings Descriptions

Parameter	Description
Baud rate	The rate, in bits per second, at which the host exchanges data with the printer.
Parity	Adds one bit (1 or 0) to the character to make the sum of bits always odd or even.
Data bits	The number of bits that represent the ASCII characters.
Stop bits	Timing units between characters that synchronize character transmission.
Multi-Drop address	Unique address for each device connected with Multi-Drop protocol.
Protocol	The transmission standards for communication between the printer and each connecting device.
Media type	Enables the printer to work with either direct thermal or thermal transfer media.

DIP Switch Settings

Top Bank Switch Number

Default settings are noted with an * OFF
O = OFF
1 = 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					
reserved	1	O	1					
reserved	O	1	1					
reserved	1	1	1					
Parity Selection								
Even*				O	O			
Odd				1	O			
None				O	1			
None				1	1			
Word Length Selection								
7 Bit Word*						O		
8 Bit Word						1		
Reserved							O	O

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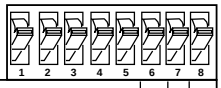
Bottom Bank Switch Number

Default settings are noted with an * OFF
O = OFF
1 = ON



	1	2	3	4	5	6	7	8
Multidrop 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			
Protocol Selection								
XON/XOFF*						O		
Intermec Protocols						1		
XON/XOFF Selection								
No Status Response*							O	
With Status Response							1	
DT/TTR								
Direct Thermal*								O
Thermal Transfer								1

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Verifying Printer Communications With Your System

After connecting the printer to your system, you need to test communications. The easiest way to test communications is to set the printer to Data Line Print mode, which is part of Test and Service mode, and send a character string down from your system.

If you have just printed a configuration test label, you are already in Data Line Print mode. Start the following procedure with Step 4.

To verify communications with your system

1. Turn the On / Off switch to the off position.
2. Press and hold the Feed / Pause button while you turn the On / Off switch to the on position. The printer prints the hardware configuration test label.
3. Release the Feed / Pause button. You are now in Data Line Print mode.
4. Transmit at least four characters from your system.

   At this point the printer does not attempt to interpret any printer commands, but simply prints each character with its hexadecimal equivalent underneath.

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

5. To enter normal Print mode, turn the printer power off and then on again.

If this procedure does not work, make sure that the DIP switches match the serial port configuration of the system and that you have the printer cable securely plugged into the correct port of your system.

If you receive a write fault error, your cabling may not be correct. See "Connecting the Printer to Your System" earlier in this chapter for more information.

Example of Using DOS to Verify Printer Communications

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

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

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

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

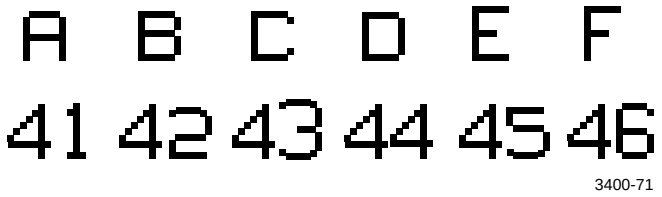
   where:

   `COPY CON COM1` tells the PC to copy the following information to the COM1 port.

   `ABCDEF` are random characters entered at the host.

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

The printer prints the following characters:



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Note: *If you are using a different platform to communicate with your printer, please refer to your host computer user's manual and Chapter 6, "IPL Commands," for information on downloading commands.*

2

Operating the Printer

Use this chapter to understand how to use the printer front panel, load fanfold media and media for self-strip printing, set the media sensitivity number, and communicate with the printer.

Learning How to Operate the Printer

To operate the printer, you need to understand:

Front panel Light emitting diodes (LEDs) help you monitor the status of the printer. The Feed / Pause button performs various tasks.

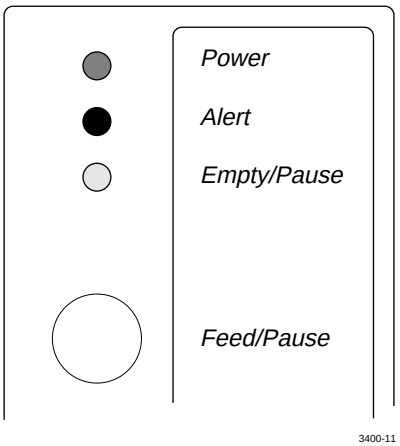
Loading media and ribbon Explains how to load fanfold media, thermal transfer ribbon, and the procedure for using the self-strip option.

Media sensitivity numbers Optimize print quality and print speed.

Communicating with the printer Explains different methods for transferring information from the host to the printer and from the printer to the host.

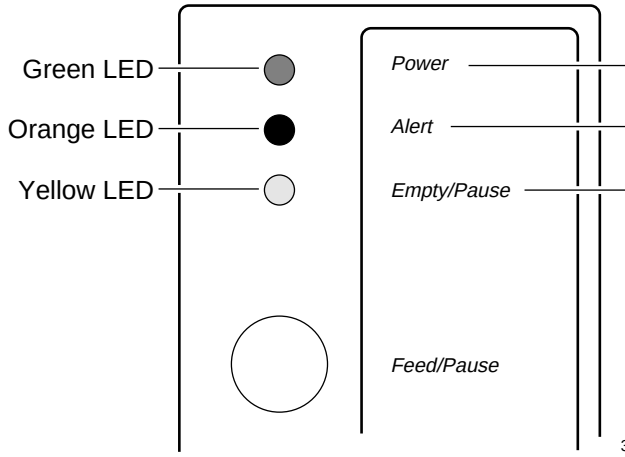
Understanding the Front Panel

On the front panel of the 3400 printer, you will find one button and three LEDs.



Front Panel LEDs

You use the front panel LEDs to monitor the status of the printer:



LED	State	Indication
Power	Off	Power Off
Power	On Steady	Power On
Alert	Off	Printing or Idle
Alert	On Flashing	Over-Temperature
Alert	On Steady	System Fault
Empty/Pause	Off	Printing or Idle
Empty/Pause	On Flashing	Paused
Empty/Pause	On Steady	Media Fault

Using the Front Panel LEDs for Troubleshooting

Over-Temperature If the printer overheats, the Alert LED flashes and the printer stops. Do not try to troubleshoot or adjust the printer–just allow it enough time to cool down and it will resume operation on its own.

Media or System Faults If the Empty / Pause or the Alert LED remains on, your printer is experiencing a media or system fault. For help, see Chapter 4, "Troubleshooting."

Feed/Pause Button

The Feed / Pause button, located on the front of the 3400 printer, performs the following functions depending on the mode of the printer:

Printer Mode	You Want To	What to Do
Idle	Feed out one label or a minimum specified amount of media.	Press and release the Feed / Pause button.
	Continuously feed media.	Press and hold the Feed / Pause button. When you release the button, the media stops feeding.
	Take the printer offline.	Press the Feed / Pause button twice. Press the button again to bring the printer online.
Printing	Pause the printer.	Press and release the Feed / Pause button. Press and release the button again to resume printing.
	Cancel the current print job.	Press and hold the Feed / Pause button until the printer stops printing.
Powered on for the first time	Print the hardware configuration label.	Press and hold the Feed / Pause button. See “Printing the Hardware Configuration Test Label” in Chapter 1 for more information.

Loading Media Into the Printer

You can load media into the 3400 printer in three different ways:

- Straight-through printing with roll media
- Self-strip printing with roll media
- Fanfold printing (see Chapter 1)

You can load media with the printer power turned on or off. The following procedures for loading media assume that you have the On/Off turned on.

Straight-Through Printing

In straight-through printing, you load a roll of media on the supply roll post and feed it straight through the printer mechanism and out the front of the printer. As the 3400 prints individual labels, you can remove them from the roll by pulling them down across the tear bar.

Note: *This procedure covers how to load media for straight-through Print mode using a roll of direct thermal or thermal transfer label media. The default setting for the printer is direct thermal mode.*

Note: *You should find a small label with a three-digit sensitivity number printed on it attached to your roll of media or a 15 digit number stamped on the side of the media roll. Save this information. You will need it to set the correct media sensitivity number. See "Setting the Media Sensitivity Number" later in this chapter for help.*

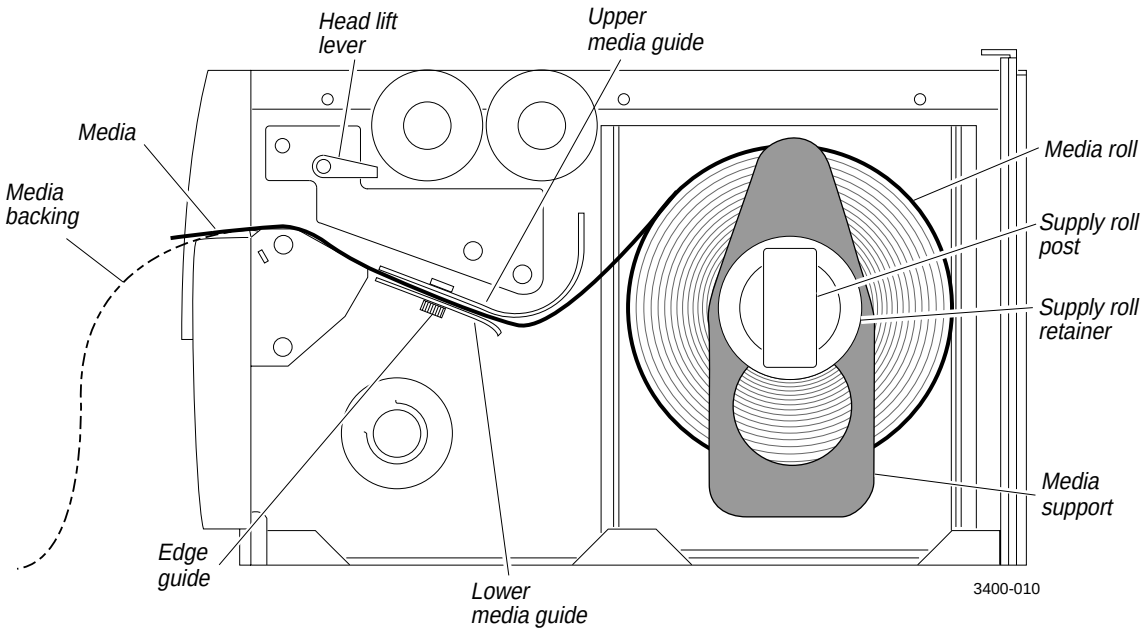
To load the media

1. Raise the printhead by rotating the head lift lever clockwise until the printhead disengages.
2. Turn the supply roll retainer counterclockwise to release it and slide it to the outer end of the supply roll post.

   Note: *This is not required when replenishing media of the same width.*

3. Place the media roll on the supply roll post and position it firmly against the printer.

Loading Media Into the 3400 Printer



4. Slide the supply roll retainer up to the edge of the media roll and turn the supply roll retainer clockwise to secure.

   Note: *If you are using a narrow roll of media (less than 3 inches), insert the media support between the roll of media and the supply roll retainer before securing it.*

5. Pull down on the lower media guide to allow easy access to the media path. Make sure that the edge guide slides all the way to the outer edge of the lower media guide.

   Note: *If you are replacing the empty media roll with a new roll of the same width, you do not need to adjust the edge guide or the supply roll retainer.*

6. Insert the label stock through the printer mechanism as shown. Make sure the label passes between the upper and lower media guides. The front edge of the media should pass over the tear bar and out the front of the printer.

7. Release the lower media guide and adjust the edge guide to position the media firmly against the inside wall of the printer.

   Note: *If you are using thermal transfer media, refer to the following chapter for information on loading the thermal transfer ribbon.*

8. Lower the printhead by rotating the head lift lever counterclockwise until it locks.
9. Use PrintSet, your third-party software, or the printer command set to tell the printer what kind of media you are using (continuous or mark label). Refer to the PrintSet online help, your third-party documentation, or Chapter 6, "IPL Commands," for help.

   An example of using the printer command set and DOS to configure your printer follows this procedure.

10. Press Feed / Pause to advance several inches of media through the printer and out the label opening in the front cover. Your printer is now ready to print labels.

Example of Selecting Continuous Label Stock Using DOS

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

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

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

   ```
   COPY CON COM1
   <STX><SI>T0<ETX>^Z
   ```

   where:

   `COPY CON COM1` copies the information to COM1.

   `<SI>T0` sets the label stock to continuous media.

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

3. Turn the printer power on and then off for the command to take effect.

Self-Strip Printing

Self-strip printing is used in applications where you want to apply labels to a surface immediately. After printing a label, the printer presents the label with the backing removed. The backing is collected on the rewinder hub after passing over the self-strip assist roller. The rewinder hub can hold the backing from an entire roll of media.

Note: *You should find a small label with a three-digit sensitivity number printed on it attached to your roll of media or a 15 digit number stamped on the side of the media roll. Save this information. You will need it to set the correct media sensitivity number. See "Setting the Media Sensitivity Number" later in this chapter for help.*

To load self-strip media

1. Open the printer.
2. Raise the printhead by rotating the head lift lever clockwise until the printhead disengages.
3. Turn the supply roll retainer counterclockwise to release it and slide it to the outer end of the supply roll post.

   Note: *If you are replacing the empty media roll with a new roll of the same width, you do not need to adjust the edge guide.*

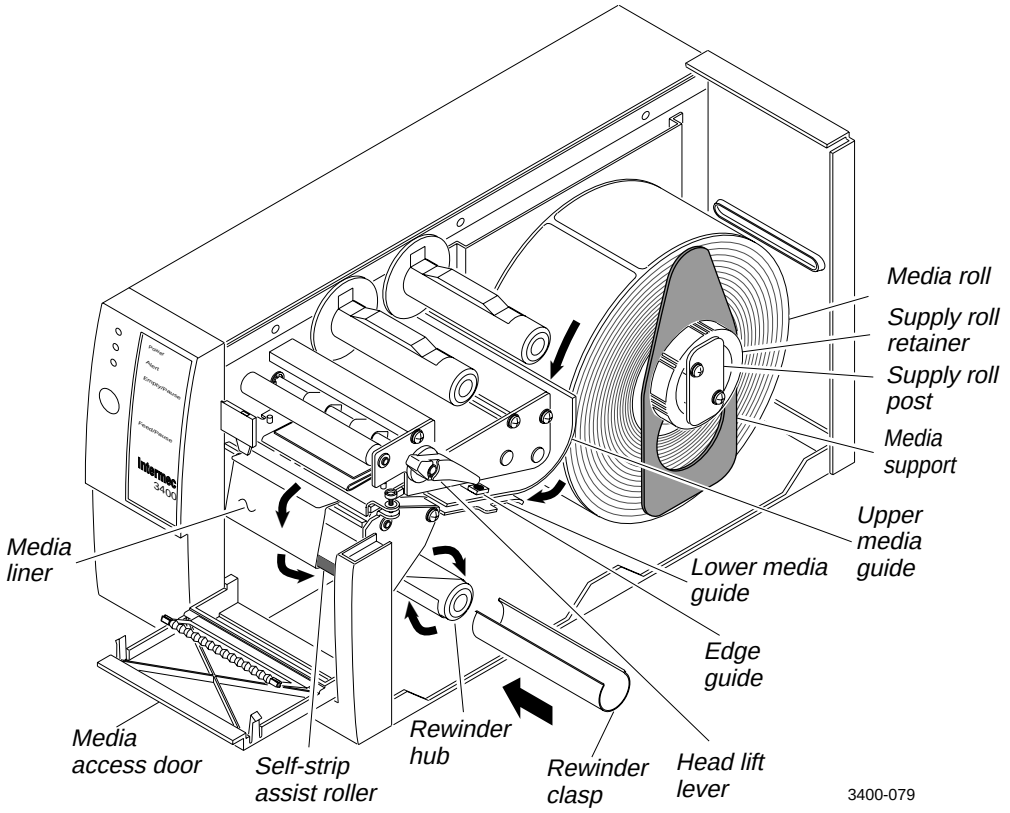
4. Place the media roll on the supply roll post and position it firmly against the inside wall of the printer.
5. Turn the supply roll retainer counterclockwise and slide it up to the edge of the media roll. Turn the supply roll retainer clockwise to secure.

   Note: *If you are using a narrow roll of media (less than 3 inches), insert the media support between the roll of media and the supply roll retainer before securing it.*

6. Unscrew the edge guide and slide it to the outer edge of the lower media guide. Screw it in place.

   Note*: If you are replacing the empty media roll with a new roll of the same width, you do not need to adjust the edge guide.*

Loading Media for Self-Strip Printing



7. Pull down on the lower media guide to allow easy access to the media path.
8. Unroll several inches of media and insert it between the media guides and out the front of the printer. Release the lower media guide.
9. Pull out 10 to 12 inches of media and remove the exposed labels from the media liner.
10. Open the media access door and thread the media liner under the self-strip assist roller and over the rewinder hub in a clockwise direction.
11. Remove the clasp from the rewinder hub and wind approximately 2 inches of media liner clockwise over the rewinder hub.

12. Secure the media to the rewinder hub by snapping the rewinder clasp onto the rewinder hub. Turn the rewinder hub clockwise to remove all slack from the media liner between the tear bar and the rewinder hub.
13. Close the media access door.
14. Use PrintSet, your third-party software, or the printer command set to enable self-strip and the label taken sensor. An example using the printer command set and DOS follows this procedure.
15. Rotate the head lift lever counterclockwise until it locks.
16. Press Feed / Pause to advance a label through the printer. Remove the exposed label from the front of the printer.
17. Unscrew the edge guide and slide it inward until it just touches the edge of the media. Screw it in place.
18. Replace the printer cover. The printer is now ready to print labels.

Example of Enabling Self-Strip and the Label Taken Sensor Using DOS

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

   `MODE COM1 96,E,7,1,N` (if not already set)

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

   ```
   COPY CON COM1
   <STX><SI>t1<ETX>^Z
   ```

   where:

   `COPY CON COM1` copies the information to COM1.

   `<SI>t1` enables the self-strip option.

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

3. Turn the printer power on and then off for the command to take effect.

Loading Thermal Transfer Ribbon

If you plan to use thermal transfer media, you must install a thermal transfer ribbon (TTR) to print in thermal transfer mode.

Note: *Save the packaging that your ribbon came in. Attached to the ribbon packaging is a small label with a three-digit sensitivity number printed on it. You need this information to set the correct media sensitivity number. Refer to the next section "Setting the Media Sensitivity Number," for more information.*

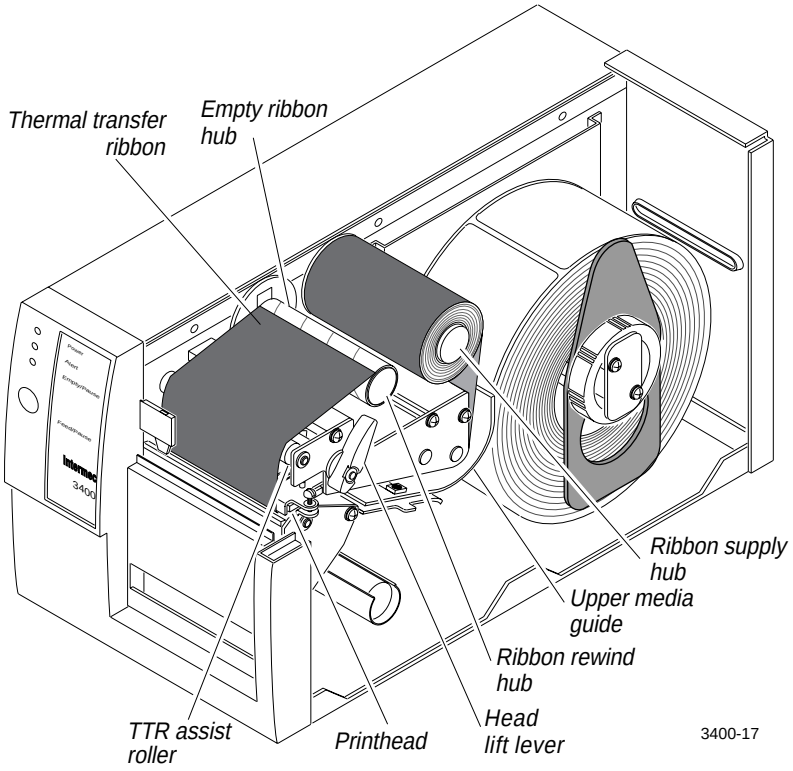
To load thermal transfer ribbon

1. Make sure the printhead is in the raised position. If not, turn the head lift lever clockwise until it releases the printhead.
2. Place the empty ribbon core that comes with the printer onto the ribbon rewind hub.
3. Detach the leader from the new thermal transfer ribbon roll and unwind the end of the ribbon approximately 8 inches. The edge of the ribbon has a leader (with an adhesive strip on the edge) to guide the ribbon through the printhead mechanism.
4. Slide the roll of thermal transfer ribbon onto the ribbon supply hub with the ribbon roll winding clockwise.
5. Route the ribbon leader through the printer mechanism as shown in the following illustration.

   Note: *Make sure the ribbon runs above the upper media guide. The shiny side of the ribbon must come in contact with the printhead.*

6. Attach the leader from the new thermal transfer ribbon roll to the empty ribbon core using the adhesive strip on the leader edge.
7. Wind the ribbon rewind hub clockwise until the ribbon runs smoothly through the printhead mechanism.
8. Engage the printhead by rotating the head lift lever counterclockwise until it locks.

Loading Thermal Transfer Ribbon



9. Enable thermal transfer printing by setting DIP switch 8 on the bottom bank of switches to the on position. For help, see "Configuring the Serial Port for Communications" in Chapter 1.
10. Press the Feed / Pause button to advance the ribbon through the printer.
11. Close the printer. The printer is now ready to print.

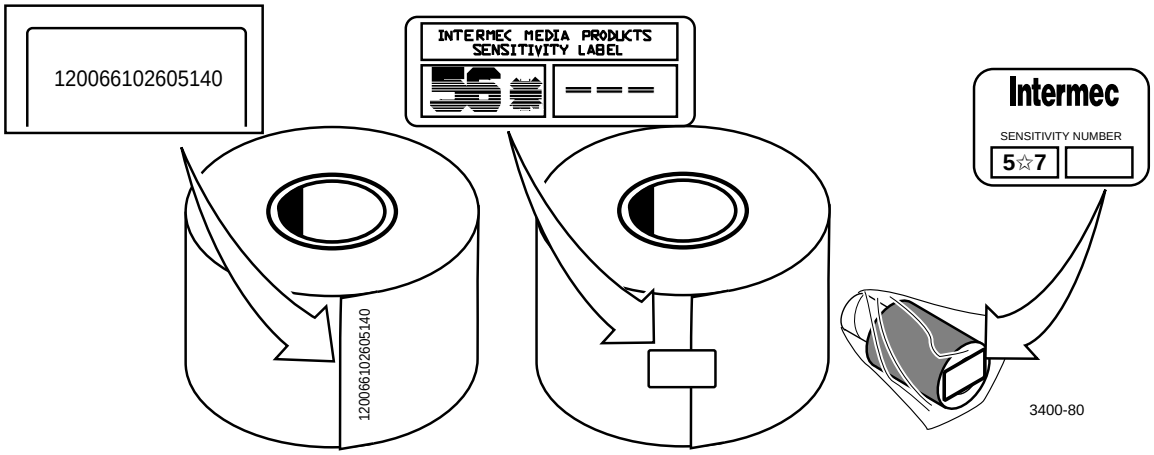
Note: *When replacing the thermal transfer ribbon roll in the future, use the empty ribbon supply core as the new rewinder core.*

Setting the Media Sensitivity Number

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

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

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



Use this three-digit number to optimize print quality and print speed on the 3400 printer. You can achieve the best print quality on the 3400 printer by using only Intermec ribbon and media products. The default sensitivity setting for thermal transfer media is 567. For direct thermal media, the default sensitivity setting is 420. Use the packaging that you saved, when loading media and ribbon, to determine the correct sensitivity number.

Use the PrintSet software, your third-party software, or the Intermec Printer Language (IPL) command set to change the media sensitivity number. For help setting the media sensitivity number using IPL commands, see the DOS example in the next section. If you want to see the current sensitivity setting of your 3400, print out a software configuration label.

To print a software configuration label

1. Turn the On / Off switch to the off position.
2. Press and hold the Feed / Pause button while turning the printer on. The printer prints out a hardware configuration label.
3. Set the DIP switches to print out the software test label.

   Top Bank Set switches 1 through 6 and 8 off. Set switch 7 on.

   Bottom Bank Set switches 1 through 8 off.
4. Hold the Feed / Pause button down for 1 second. The printer prints out the software configuration label.
5. Turn the printer power off and then on.
6. Return the DIP switches to their original settings.

Setting the Media Sensitivity Rating for Intermec Media and Ribbon

For direct thermal media, use the three digit sensitivity rating located on the roll of media to set the sensitivity rating. You can also use the values from the tables in the next section.

For thermal transfer media, you need to look in two places to determine the sensitivity rating. The sensitivity rating on each roll of thermal transfer media or ribbon has an asterisk (*) in place of one of the digits. On thermal transfer media, the rating contains the first and second digits, with an asterisk in place of the third digit. The rating on the ribbon has the first and third digits, with an asterisk in place of the second digit. .

To optimize the sensitivity rating for thermal transfer media, you combine the digits like this example:

Media or Ribbon	Sensitivity Rating	Description
Thermal transfer media	56*	The asterisk reserves the third digit to identify the ribbon's sensitivity number.
Thermal transfer ribbon	5*7	The asterisk reserves the second digit to identify the media's sensitivity number.
	567	Optimum sensitivity rating

Setting the Media Sensitivity Rating for Other Media and Ribbon

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

If you are unsure of how to set the media sensitivity rating, start with the highest setting, which provides the lowest energy (800 for thermal transfer and 700 for direct thermal), and work your way down until you achieve the best print quality.

Example of Setting the Media Sensitivity Number Using a PC Running DOS

1. At the DOS prompt, type the following command and press **Enter**:

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

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

   ```
   COPY CON COM1
   <STX><SI>g0,567<ETX>^Z
   ```

   where:

   `<SI>g0,567` sets the media sensitivity number to 567.

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

Direct Thermal Media Sensitivity Settings

Approximate Sensitivity Rating	Sensitivity Setting	Direct Thermal Media
700 Series High Sensitivity	740	Duratherm Lightning Plus 1
	720	Duratherm Lightning Plus 2
400 Series Medium Sensitivity	460	European IR
	450	Duratherm Lightning IR Labels 1
	440	European Thermal
	420	Duratherm Lightning Labels 1
100 Series Low Sensitivity	190	Duratherm Buff Tag
	180	Duratherm II-1
	170	European Tag
	160	Duratherm II Tag
	140	European Top
	130	Duratherm II-2 Labels
	120	European Thermal Economy Tag

Thermal Transfer Media and Ribbon Sensitivity Settings

Approximate Sensitivity Rating	Sensitivity Setting	Thermal Transfer Media and Ribbon (Media/Ribbon Stock)
800 Series High Sensitivity (Paper)	864	European Uncoated / Standard 1
	854	Duratran TTR Paper Labels / Standard 1
	834	Duratran TTR Paper Tags / Standard 1
600 Series Medium Sensitivity (Plastic)	687	Duratran TTR Polyester 1 / Premium 3 / 6 / 7
	683	Duratran TTR Polyester 1 / Premium
	677	Duratran Syntran / Premium 3 / 6 / 7
	673	Duratran Syntran / Premium
	637	European Polyester / Premium
	633	European Polyethelene / Premium
	627	Duratran Kimdura / Premium 3 / 6 / 7
	623	Duratran Kimdura / Premium
500 Series Medium Sensitivity (Paper)	567	Duratran II-1 / Premium 3 / 6 / 7
	563	Duratran II-1 / Premium
	557	Duratran II Tag-5 mil / Premium 3 / 6 / 7
	553	Duratran II Tag-5 mil / Premium
	537	European Tag / Premium 3 / 6 / 7
	533	European Tag / Premium
	527	Duratran II Tag-7 mil / Premium 3 / 6 / 7
	523	Duratran II Tag-7 mil / Premium
	517	European Coated / Premium 3 / 6 / 7
	513	European Coated / Premium
300 Series Low Sensitivity (Plastic)	369	Super Prem. Poly. / Super Prem.-3
	366	Super Prem. Poly. / Super Prem.-7

Communicating With the Printer

You are now ready to print labels by downloading data from the host to the 3400 printer. *Downloading* is the universal term used to describe the transfer of information from the host to any connected peripheral device, such as the 3400 printer. When you transfer data from your printer to the PC or host, you are performing a process called *uploading*.

You can use several methods to download information in your data collection system. The next sections describe different ways to communicate with the printer.

Using the PrintSet Software

Use the PrintSet application software to easily configure your printer from your PC. You can upload the current configuration settings, modify them, and then download them to the 3400 printer. PrintSet also lets you:

- download graphics and fonts.
- print test labels.
- allocate memory.
- download configuration files.

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

Using Third-Party Software

You can use third-party software to set many of the printer parameters. You can configure the parameters that your software does not set by using the printer command set of the configuration DIP switches.

Use your third-party software to create label formats and convert graphics into a UDC format that the 3400 printer can interpret.

Using Intermec Printer Language (IPL) Commands

You can create labels by downloading formats (designs) and data with IPL commands. You can use the printer to perform any function or activate any feature of the 3400 printer except for those features or functions that you set with the DIP switches. Use the following methods to download commands to the printer.

Note: *For help using IPL commands, see Chapter 6, "IPL Commands."*

Downloading Printer Commands Using DOS

Use the DOS Copy command to download printer parameter command strings or to print files stored on the PC. If necessary, you can modify and download them several times. For example, if your first attempt at a label format does not work, you can return to the text editor, change the incorrect commands, and then download the format again. By using this method, you eliminate the need to retype command strings that do not change.

To download commands using DOS

1. Connect the printer to the serial port on your PC using the correct cable (see "Connecting the Printer to Your System" in Chapter 1).
2. Configure the serial port using the DOS Mode command.

   From the DOS prompt, type the following command and press **Enter**:

   `MODE COM1 96,E,7,1,N`
3. Configure the printer for hardware flow control (XON / XOFF) communications protocol (which is the factory default configuration). For help, see "DIP Switch Settings" in Appendix A.
4. Enter the commands into a text file using a text editor or a word processor and save the file as an ASCII text file. See your DOS user's manual for more information.
5. Type the following DOS command and press **Enter**:

   `COPY` *`filename`* `COM1`

   where:

   The *`filename`* is the name of your text file.

   The `COPY` command copies the file to serial port 1 (`COM1`) of your PC.

Using ASCII Control Characters or Hexadecimal Equivalents

With many communications or terminal emulation software, you create the commands by using the equivalent ASCII control characters. For example, you enter <ETX> as **Ctrl-C**.

When you enter ASCII decimal equivalents in a word processor, they display on the screen as special characters. For hexadecimal equivalent (<ETX> = 03), consult the pull-out ASCII chart in Appendix A.

Using Readable Protocol/Command Characters

If it is difficult for you to edit or transmit command files containing control characters, you may want to use the readable protocol/command characters feature. To use the readable characters feature, type the ASCII characters in as a string. Use angle brackets around ASCII strings to represent the ASCII characters. For example, if you want to enter the ASCII mnemonic for "start of text," type the control character out as a readable character string: <STX>.

The printer automatically detects whether you are using control characters or readable protocol/command characters by the start of text (<STX>) character. Refer to the pull-out ASCII chart in Appendix A, "Printer Reference," for a complete listing of the control characters and their readable protocol/command character equivalents.

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

Downloading Printer Commands Using a Command String

Another way to download commands to your printer is through a PC communications program, a terminal emulation program, or a host terminal. If you make an error while entering commands, you must retype the command string instead of just editing it. If you keep your command strings short, it is easier to retype a command. Design your formats as combinations of several short command strings rather than one very long string.

Switching Between Print Mode and Program Mode

Print mode and Program mode are two different operating modes of the 3400 printer. Before you download information to the printer, make sure that you are in the correct mode.

- Use Program mode to define formats, pages, fonts, and characters.
- Use Print mode to download data and print labels.

To enter Program mode

- Type this command:

  <STX><ESC>P<ETX>

  It is a good practice to send this command every time that you download formats, even if you think the printer is already in Program mode. If the printer is in Program mode, it ignores this command.

To enter Print mode

- Type this command:

  <STX>R<ETX>

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

Note: *Use Print mode to download data and configuration commands to the printer. For a complete table of all printer commands, refer to Chapter 6, "IPL Commands."*

Printing a Test Label

If you would like to test your communications by downloading a label, follow the example below. Use the DOS editor to create the following label format and save it under the file name “TEST”:

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>E4;F4;<ETX>
<STX>H1;o240,150;f0;c2;h4;w2;d0,30;<ETX>
<STX>B2;o240,350;c0,1;h100;w3;i0;d0,11;p@;<ETX>
<STX>R<ETX>
<STX><ESC>E4<ETX>
<STX><CAN><ETX>
<STX>TEST LABEL<CR><ETX>
<STX>TEST<ETX>
<STX><ETB><ETX>
```

To print the test label

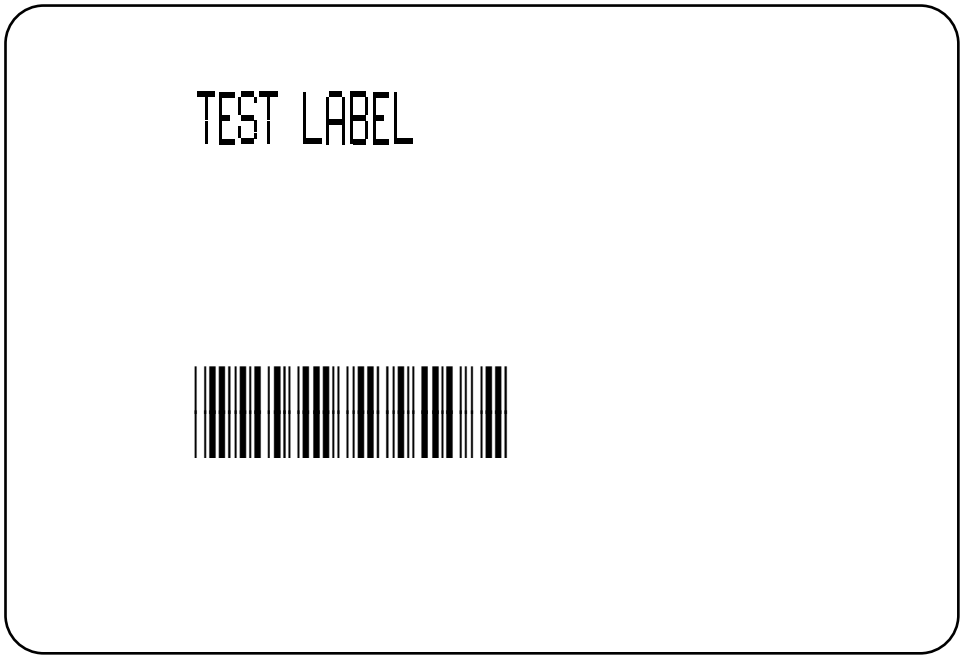
1. At the DOS prompt, type the following command and press **Enter**:

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

2. Type the following command line and press Enter:

   ```
   COPY TEST COM1
   ```

The 3400 printer prints out a label similar to the test label below:



3400-65

You are now ready to learn how to design and print your own labels. Refer to Chapter 5, "Designing Labels and Using Commands," if you are planning to use IPL to design your labels.

Using a Different Platform Than a PC

If you are operating your 3400 printer from a platform not discussed in this manual, it is important to keep several things in mind:

- The 3400 is an ASCII printer.
- You must configure the 3400 printer to match the settings of your platform to ensure proper communication.
- You must correctly structure the commands that you download. Refer to Chapter 6, “IPL Commands,” for a complete listing of 3400 printer commands.
- Ensure that the cable you are using to communicate with the printer has the correct pin-outs. Use the cable schematics in Chapter 1 for reference.

3

Maintaining the Printer

This chapter contains cleaning procedures and a schedule detailing how often to perform maintenance procedures. Even though the design of the 3400 printer enables it to withstand harsh environments, you must clean it on a regular basis to keep it running at its highest performance level. It is very important to perform the maintenance procedures if you expose the printer to dirt or debris. For information on maintenance procedures such as replacing media or ribbon, see Chapter 1, "Getting Started," and Chapter 2, "Operating the Printer."

Inspecting the Printer

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

- Make sure you have properly grounded the printer.
- Inspect the work environment. Large electric motors, welders, and switching equipment can affect printer performance. See Appendix B 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.

Tools for Cleaning the Printer

To clean the printer safely and effectively, use the following items:

- Isopropyl alcohol
- Cotton swabs
- Clean lint-free cloth
- Vacuum cleaner
- Soapy water / mild detergent

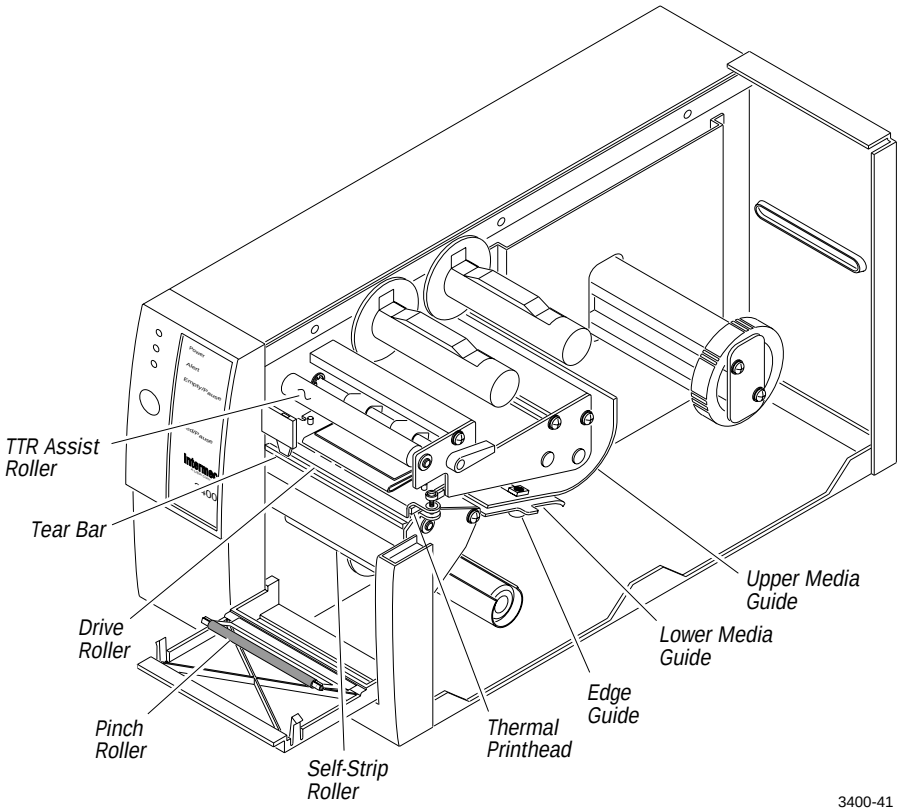
The following procedures explain how to access the printer parts and clean them without causing any harm to the printer or yourself.

Maintenance Schedule

Clean your printer regularly to maintain the quality of your labels and extend the life of your printer. This table contains suggestions for cleaning the printer. Use the illustration to locate the parts you need to clean.

Printer Component	Maintenance Period
Printhead	Inspect after every roll of media. Clean after every roll (or 6,000 inches) of media or more often if necessary.
Printer Cover	Clean as necessary.
Drive roller and tear bar Media path (not shown) Edge guide Upper media guide Lower media guide Thermal transfer ribbon (TTR) assist roller Self-strip roller Label gap sensor (not shown) Label mark sensor (not shown) Label taken sensor Pinch roller	Clean after every five rolls of media. If you are using hi-tack adhesive, you must clean after every roll of media. If you are using tag stock or continuous media, you may want to clean after every five rolls of media or as necessary. Clean more often in environments that are harsh or dusty.

Locating the Printer Parts You Need to Maintain



Warning
Switch off the printer power and remove the power cord before cleaning any part of the printer.

Avertissement
Mettez l'imprimante hors tension et débranchez le câble d'alimentation avant de nettoyer une parte de l'imprimante.

Cleaning the Printhead

In order for the printhead to provide good print quality, it must maintain close contact with the media. Therefore, cleaning media debris from the printhead is very important. Clean after every roll (or 6,000 inches) of media or when necessary.

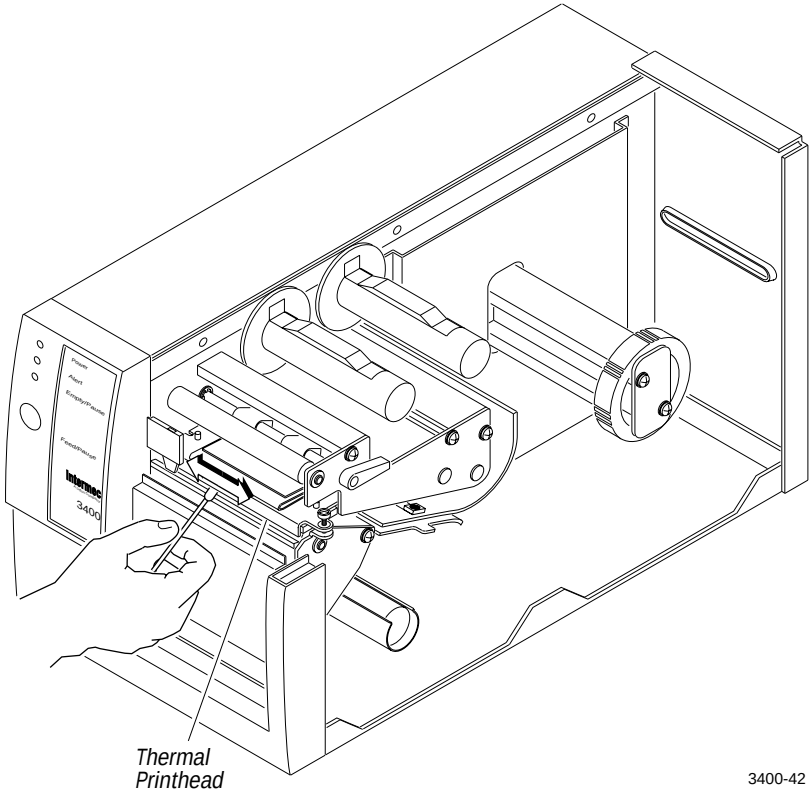
Caution
Do not use sharp objects such as knives or screwdrivers to scrape the printhead clean. Cleaning with sharp objects will damage the printhead. Clean with only a cotton swab, or a clean, lint-free cloth or tissue damp with isopropyl alcohol.

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.

To clean the printhead

1. Turn the On/Off switch to the off position and remove the power cord.
2. Remove the media cover.
3. Rotate the head lift lever clockwise until the printhead releases. This raises the printhead to allow for cleaning.
4. Remove the media and ribbon (if necessary).
5. Use a cotton swab moistened with alcohol to remove any dirt, adhesive, or debris from the print surface on the bottom of the printhead.
6. Wait 5 to 10 seconds for the print surface to dry. Replace the media and ribbon.
7. Engage the printhead by rotating the head lift lever counterclockwise until it locks in place.
8. If you are finished cleaning, replace the media cover.

Cleaning the Printhead



Cleaning the Printer Covers

Use a general purpose cleaner (soapy water / mild detergent) to clean the 3400 printer covers. Do not use abrasive cleansers or solvents. Be sure to clean the transparent panel on the media cover so that the media supply inside the printer is visible when you close the cover.

Cleaning the Drive Roller and Tear Bar

Cleaning the drive roller and tear bar preserves print quality by maintaining close contact between the media and the printhead.

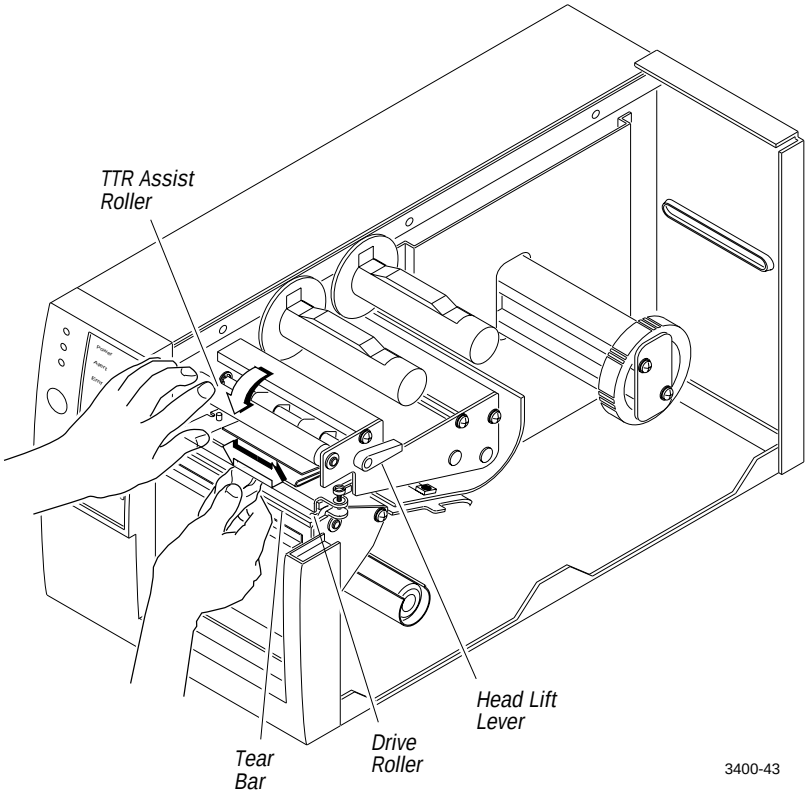
To clean the drive roller and tear bar

1. Turn the On/Off switch to the off position and remove the power cord.
2. Remove the media cover.
3. Rotate the head lift lever clockwise to release the printhead.
4. Remove the media and ribbon (if necessary).
5. Clean the drive roller by using a cloth dampened with isopropyl alcohol. Move the cloth over the drive roller in a side-to-side motion as shown. Make sure to rotate the roller so that you can clean all areas.

   Note: *Rotating the TTR assist roller towards you enables you to clean the entire drive roller surface.*

6. Clean both sides of the tear bar with a cloth dampened with isopropyl alcohol. Remove all traces of dust, paper, and adhesive.
7. Replace the media and ribbon.
8. Engage the printhead by turning the head lift lever counterclockwise until the printhead locks.
9. If you are finished cleaning, replace the media cover.

Cleaning the Drive Roller and Tear Bar



Cleaning the Media Guides and Media Path

You should clean the media guides and media path regularly to keep debris off the media surface and printhead where irregularities can spoil print quality or damage the printhead. Cleaning the guides also prevents the media from skewing or improperly tracking as it travels through the paper path which can result in smeared images and print off the side of the label. Always clean the media guides immediately after a label jam in the printer.

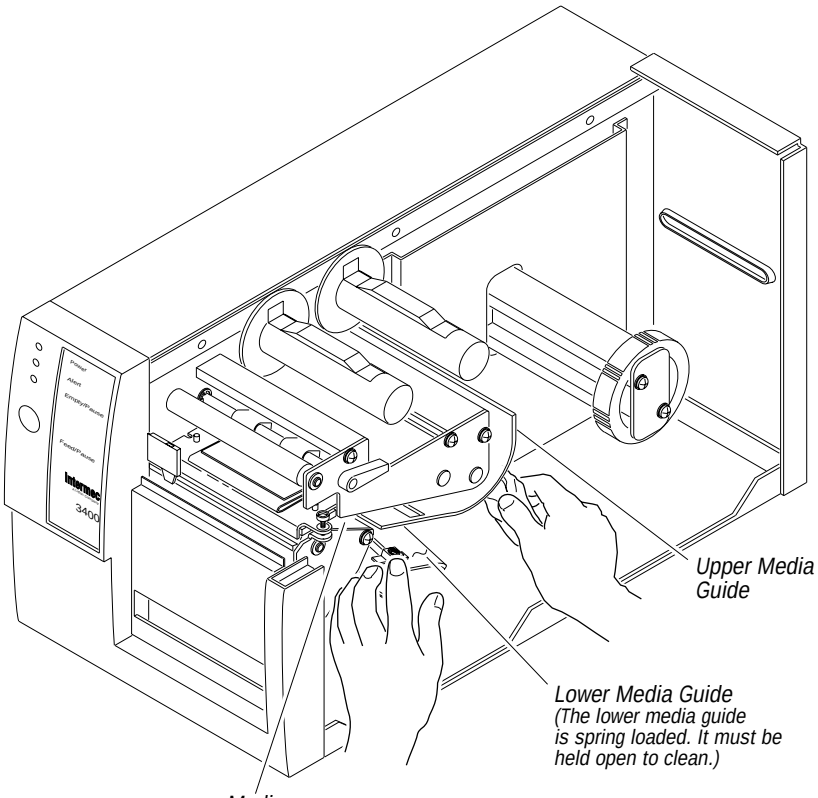
To clean the media guides and media path

1. Turn the On / Off switch to the off position and remove the power cord.
2. Remove the media cover.
3. Remove the media and ribbon (if necessary).
4. Pull down on the lower media guide to open up the media path.
5. Clean the lower media guide by using a lint-free cloth moistened with isopropyl alcohol as shown in the following figure.

   Note: *The lower media guide is spring loaded. You must hold it open to clean.*

6. Use the cloth moistened with isopropyl alcohol to clean the upper media guide. Be sure to remove all traces of debris.
7. Remove all traces of dust, paper, and adhesive from the media path with a soft bristle brush or vacuum.
8. Clean the flat surfaces of the media path (including the edge guide) with a lint-free cloth and isopropyl alcohol.
9. Release the lower media guide.
10. Replace the media and ribbon.
11. If you are finished cleaning, replace the media cover.

Cleaning the Media Path and Media Guides



Cleaning the Label Sensors

Three label sensors on the 3440 printer require regular cleaning:

- Label taken
- Label mark
- Label gap

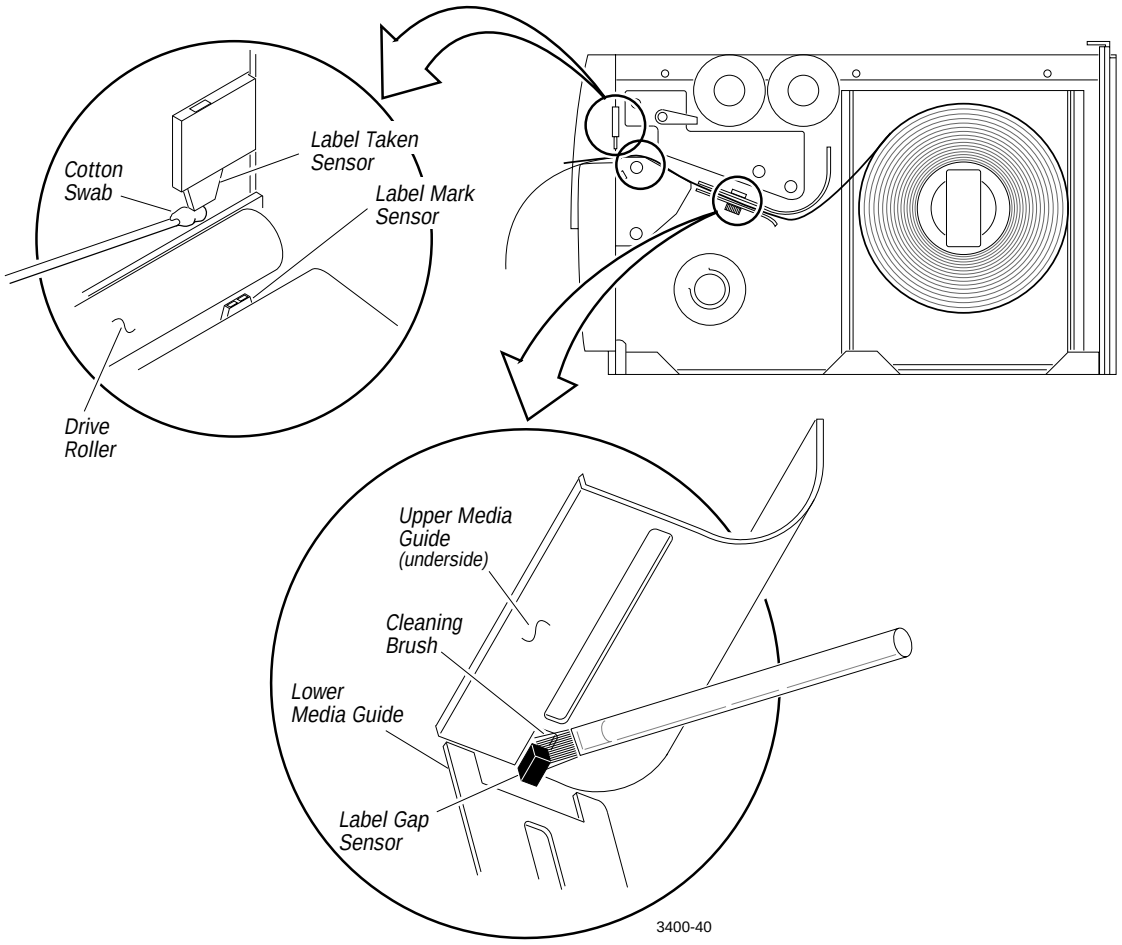
To clean the label sensors

1. Turn the On/Off switch to the off position and remove the power cord.
2. Remove the media cover.
3. Rotate the head lift lever clockwise to release the printhead. This raises the printhead to allow access to the label mark sensor.
4. Remove the media and ribbon (if necessary).
5. Clean the label taken sensor with a cotton swab moistened with isopropyl alcohol.
6. Pull down on the lower media guide to expose the label gap sensor. Using a cleaning brush or vacuum, remove all debris and dust from the label gap sensor.

   Note: *You may want to slide the label gap sensor toward the outboard edge of the printer for better access. Make sure you return the label gap sensor to its original position when you finish cleaning.*

7. Clean the label gap sensor with a cotton swab and alcohol.
8. Replace the media and ribbon.
9. Engage the printhead by rotating the head lift lever counterclockwise until it locks in place.
10. Replace the media cover.

Cleaning the Label Sensors



4

Troubleshooting

This chapter provides some hints for troubleshooting error messages that the printer sends to the host and problems you may experience with the printer.

Troubleshooting Checklist

Even though Intermec designed the 3400 printer to operate under harsh conditions, you may still encounter error messages at some time. You can easily fix most of the errors you encounter and consequently not delay operation of the printer for very long.

If you receive an error message or encounter a functional problem with the printer, try the following:

1. Send a <BEL> command to the printer and see if the printer sends an error message to the host in response.
2. If there is an error message, find it in the table under "Error Messages" in this chapter. Follow the instructions after the error message to correct the problem.

   or

   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. Follow the instructions listed after the symptom to correct the problem.
3. Clean the printer components and check all connections. See Chapter 3, "Maintaining the Printer," for details.

If the problem persists, contact your Intermec Customer Service Representative (1-800-755-5505) from North America. If you are an international customer, contact your local Intermec representative.

Printer Operation Problems

If your printer is not operating correctly, try locating the problem in the table below:

Symptom	Possible Causes	Solution
No power or loss of power.	You have damaged or disconnected the AC power cable.	Make sure you have plugged the power cable into both the printer and an outlet or power strip. Replace the cable if damaged.
	Printer circuit breaker tripped.	Turn the printer off, then back on again.
Labels stop feeding through the printer.	Printer is out of media.	Load new media. Refer to Chapter 1, "Getting Started," or Chapter 2, "Operating the Printer."
	You have loaded the label stock incorrectly.	Check the media path. See Chapter 1, "Getting Started," or Chapter 2, "Operating the Printer."
	Media is sticking to the paper path.	Clean any extraneous material from the paper path and clean it thoroughly. Refer to Chapter 3, "Maintaining the Printer."
	You have set the printer for continuous label stock.	Use the Transmit Configuration Parameters (<ESC>p) command to check the configuration setting. Select the correct setting with PrintSet or the Select Label Stock Type command (<SI>T). See Chapter 6, "IPL Commands."
Printer slows down.	You have incorrectly set the image bands or print speed.	Change the image bands or print speed settings. Use PrintSet to change them or see Chapter 6 , "IPL Commands," and Chapter 7, "Optimizing Printer Performance."
	Printer has aborted and reset the print speed and image bands.	Change the image bands or print speed settings. Use PrintSet to change them or see Chapter 6 , "IPL Commands," and Chapter 7, "Optimizing Printer Performance."
Labels stick to door or fail to strip.	The self-strip roller is dirty.	Clean the self-strip roller. See Chapter 3, "Maintaining the Printer."

Symptom	Possible Causes	Solution
The Alert LED flashes and printing stops.	Printhead has overheated.	Leave printer alone until it has time to cool down. It will resume printing on its own.
Media fault	The printhead is up.	Make sure the printhead is down. The head lift lever should be straight up and down. Press the Feed / Pause button to resume printing.
	Sensor type set incorrectly.	Configure the printer for the correct sensor. For help, see “Chapter 6, “IPL Commands.”
	You have incorrectly loaded the media.	Try reloading the media. For help, see “Loading Media for Printing” in Chapter 2.
Test configuration label does not print.	You have incorrectly loaded media.	Try reloading the media. For help, see “Loading Media for Printing” in Chapter 2.
	You have configured the printer for self-strip media.	Set the printer to the default configuration using the DIP switches. For help, see “Plugging In the Printer” in Chapter 1.
	Media fault.	Remove media from under the label taken sensor.
Printer is not communicating, not printing, or not printing properly.	Corrupt or incorrect information in the printer memory.	Reset the memory to return the printer to its default configuration. For help, see “Using Memory Reset” in Chapter 8. After you reset the memory, power off the printer and return the DIP switches to the required setting. For help, see “Configuring the Serial Port for Communications” in Chapter 1.

Print Quality Problems

If your labels are not being printed properly, check the following table to locate the symptom and correct the problem.

Symptom	Possible Causes	Solution
Blotches printing on labels.	Dirty printhead.	Clean the printhead. For help, see "Cleaning the Printhead" in Chapter 3.
	Dirty media path or rollers.	Clean the media path. For help, see "Cleaning the Media Guides and Media Path" in Chapter 3.
	Poor quality label or ribbon stock.	Use only Intermec label and ribbon stock to ensure superior print quality and product performance.
Printing is too light or too dark.	You have incorrectly set the darkness adjust control.	Adjust the knob to achieve the best print quality. For help, see "Adjusting the Print Darkness" in Chapter 7.
	Poor quality label or ribbon stock.	Use only Intermec label and ribbon stock to ensure superior print quality and product performance.
	You set the sensitivity setting command incorrectly.	Change sensitivity setting to match the type of media you are using (for help, see "Setting the Media Sensitivity Number" in Chapter 2). If you set the sensitivity setting correctly, try changing the dark adjust command.
	Dirty printhead.	Clean the printhead. For help, see "Cleaning the Printhead" in Chapter 3.
Printing not aligned on label.	Printer is misfeeding media.	Make sure you have correctly installed the media. For help, see "Loading Media for Printing" in Chapter 2.
Labels are not stopping at the right point for removal.	You have not set the label rest point command correctly.	Adjust the label rest point. See the Label Rest Point, Adjust command in Chapter 6, "IPL Commands," for more information.
	You have set the printer for continuous label stock.	Set the printer to thermal transfer or direct thermal label stock. For help, see "Loading Media for Printing" in Chapter 2.

Symptom	Possible Causes	Solution
Print quality is poor.	Incorrect media sensitivity setting.	Change sensitivity setting to match the type of media you are using. If you set the sensitivity setting incorrectly., try changing the dark adjust command. See Chapter 6 ”IPL Commands,” and Chapter 7, “Optimizing Printer Performance.”
	Print speed exceeds the capability of the media.	Lower your print speed or use Intermec media recommended for your print speed.
	The darkness of label print is too light or too dark.	Adjust the darkness adjust control. For help, see “Adjusting the Print Darkness” in Chapter 7.
	Printhead, platen roller or label path are dirty.	Clean printhead, platen roller, and label path as described in Chapter 3, “Maintaining the Printer.”
	Uneven print contrast (density).	Adjust the bias adjust screw. See “Correcting Uneven Print Quality” in Chapter 7.
	You are using incorrect label or ribbon stock to print labels..	Use only Intermec label and ribbon stock to ensure superior print quality and product performance.
	Ribbon wrinkling.	Check to make sure that you installed the ribbon correctly. For help, see “Loading Thermal Transfer Ribbon” in Chapter 2. Set the bias adjust screw. See “Correcting Uneven Print Quality” in Chapter 7.
Print quality is poor.	Ribbon installed upside down.	Install ribbon with shiny side facing the printhead. See “Loading Thermal Transfer Ribbon” in Chapter 2.
	Direct thermal / thermal transfer switch set in the wrong position.	Set the switch for the type of media you are using. For help, see “Loading Media for Printing” in Chapter 2.
	Media may be slipping against the platen roller causing the printing to compress.	Switch to approved media or clean the printhead and platen roller as described in Chapter 3, “Maintaining the Printer.”

Symptom	Possible Causes	Solution
The printer skips labels randomly or sends an intermittent error.	The label format extends beyond the label length.	Edit the format to ensure that the text fits on the label. For help, see "Editing Labels and Working With Fields" in Chapter 5.
Continuous media fault (yellow LED) light.	The label mark sensor is not in the correct position.	Properly position the label mark sensor. For help, see "Adjusting the Label Mark Sensor" in Chapter 7.

Communication Problems

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

Symptom	Possible Causes	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 as described in Chapter 1 to check the serial port settings.
	Damaged or incorrect I/O cable.	Check the connections at both ends or replace the cable. See Appendix B for cable information.

Preventing Data Loss

Several problems can cause data loss or communication problems on the 3400 printer. Data loss can result in printing errors or missing field data.

The 3400 printer is a serial ASCII device. It communicates with the host through an ASCII serial communication I/O port. Hardware handshaking involves the use of a hardware wire. Software handshaking involves a two way datalink between the devices. The two devices communicate with each other without losing data through the use of handshaking. The printer sends both forms of handshaking simultaneously when the printer's input buffer is full. Any loss of data can cause printing errors or missing data.

Hardware handshaking uses pin 11 or pin 20 of the RS-232 interface to control data flow. When the printer is using Intermec Standard protocol, it holds pins 11 and 20 high when the printer is ready to receive data. The printer holds the pins low when the printer is in one of the following conditions:

- Buffer full
- Ribbon fault
- No label stock
- Label at strip bar

The 3400 printer uses XON/XOFF protocol for software handshaking. When the input buffer is full, the printer transmits an XOFF character. This alerts the host to the fact that the printer buffer is full and cannot receive any more data. When the printer is ready to receive more data, it sends the XON character.

To check for communication problems

1. Check the cabling from the printer to the host system.
2. Check the interfacing of the devices that are communicating with the printer.
3. Check the printer for proper electrical operation of the I/O port.
4. Test to see that the host system is not overrunning the printer's input buffers.
5. Check to see that the data string being sent to the printer contains the correct information.

Error Handling

This section describes how the 3400 printer handles certain error conditions it may encounter in printer or programming commands.

Syntax Errors

The 3400 printer responds to syntax errors in the messages it receives from the host by attempting to execute the commands. It does not ignore a command with a syntax error. Instead, the printer produces output, even if it is erroneous. This gives you an indication of what went wrong and what should be done to correct the problem.

Parameter Errors

Certain commands require optional parameters. If you do not supply these parameters, the printer substitutes default values. If a parameter is above its maximum range limit, the printer uses the maximum value. If it falls below the minimum range, the printer uses the minimum value. Refer to Chapter 6, "IPL Commands," for the range and default value for each command.

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, then repeats printing the label. The printer remains at this setting until you reset it. If an image overrun still occurs, printing for that batch of labels stops and the printer executes any following commands.

Installing the optional 128K memory expansion decreases image overrun errors.

Invalid Numeric Character Errors

If you include nonnumeric characters 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 nonnumeric 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 to see if it has sufficient memory to store them. If there is insufficient memory, the printer disregards the last editing session. The printer design preserves the integrity of the existing data in the static RAM.

Error Codes

Most of the problems you may encounter cause the 3400 printer to send an error code to the host. When this happens, find the error code in the following table and complete the instructions to correct the problem.

Error Code	Problems	Solutions
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 (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 the 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.
26	Invalid page transmission syntax.	Check the page transmission syntax. The correct syntax is <ESC>y*n* with *n* ranging from 0 to 9.

Error Code	Problems	Solutions
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.	Empty the buffer contents. If the format still does not fit, delete some fields or other data from the format. You may have to remove or reduce the UDCs, formats, or fonts if necessary. **Note:** Entering <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 and each field can use up to 250 characters. Reduce field size or delete some fields.
46	Undefined statement.	Check the statement syntax.
52	Invalid UDC / UDF bitmap cell height / width or inter-character 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.

Replacing an 86XX or 44XX Printer With a 3400 Printer

The 3400 printer provides compatibility with both the more advanced Intermec 4400 printer and the earlier 8636 and 8646 bar code printers. The 3400 printer operates in Advanced mode or 86XX Emulation mode. The two modes have three operational subset modes: Print mode (contains configuration commands), Program mode, and Test and Service mode.

Both Advanced mode and 86XX Emulation mode operate on the same basic command set for print, configuration, program, and test and service commands. On initial power up, the 3400 printer is in Advanced mode. Advanced mode provides new features that make the 3400 compatible with the 4400 printer. When you select 86XX Emulation mode, the 3400 printer is compatible with the 8636 and 8646 printers. In 86XX Emulation mode, some of the Advanced mode features are not available.

Differences Between the 3400 and the 4400 Printer

The printer firmware for the 3400 printer is based on the 4400 printer firmware. Most of the features are similar, but some features are different or are not implemented due to differences in the printer electronics and design. This section identifies those differences.

No Control Panel and Display

The 3400 printer does not have a control panel and display. You set the printer configuration by setting the DIP switches and sending down online commands.

Configuration Commands

Due to differences in printer electronics and design, several printer configuration commands are not available on the 3400 printer. The following configuration commands have been disabled:

Set control panel access permission
Enable / disable audible alarm
Online / offline on power up
Set printhead pressure
Set ribbon save zones
Set printhead resistance values
Enable / disable cutter
Set label width

No Outline Font

The 3400 printer does not support an outline font. All other resident bitmap fonts (Font 0, 1, 2, 7, 20, 21, 22, 23, 24) are identical to the 4400 printer.

Storage and Image RAM

The 4400 printer uses dynamic RAM for imaging and 40K of static RAM for storing table, pages, formats, fonts, and UDCs. The 3400 printer uses both dynamic RAM and static RAM. The base printer comes with 256K of dynamic RAM and 32K of static RAM. For a printer with 32K of static RAM installed, the default amount allocated for storage RAM is 20K. For a printer with expanded RAM (128K) installed, the default is 120K. A configuration command (<SI>N) has been added that allows you to adjust the amount of RAM allocated for storage purposes. You can adjust the amount of storage RAM from 10K to 32K (10K to 128K for a printer with 128K RAM). You can use any static RAM you do not use for storage to image labels. If you want to increase throughput, use less static RAM for storage and more for label imaging.

Image Band Usage

If you select *n* image bands with the 4400 printer, it begins printing when it has imaged *n* = 1 bands. The 3400 printer begins printing when it has imaged *n* bands.

Printhead Size

The 4400 printhead has 896 elements (dots) for a total of 4.4 inches. The 3400 printhead has 832 elements for a total 4.1 inches.

No Printhead Resistance Test

Due to changes in the electronics, the printhead resistance test is not available on the 3400 printer.

Auto-Discriminate Protocols

The printer can automatically detect or discriminate between different Intermec communication protocols. A DIP switch allows the user to select whether an Intermec protocol or XON/XOFF protocol is in use. If an Intermec protocol is in use, the printer automatically detects whether that protocol is Intermec Standard, Polling Mode D, or Multi-Drop.

Differences Between 86XX Printers and 86XX Emulation

While the 3400 printer can emulate most functions of the 86XX series printers, there are some features that are different or are not implemented. This section identifies those differences.

No BEL Status Response

The 86XX printer checks all incoming messages for error before storing them in the data buffer to execute later. When it receives an erroneous message, it sends a BEL character back to the host as the printer status response and discards the whole message. It continues to process the next message without explaining to the host why the previous message is discarded. The 3400 printer design does not ignore any message that has an error in one of its commands. Instead, it executes all the commands as best as it can, ignoring invalid commands and using printer defaults for erroneous parameters. As a result, it treats mandatory data fields like optional data fields. Attempting to execute all commands in spite of errors gives the user clues as to what went wrong and what they can do to remedy the problem.

Even though the 3400 printer does not send the BEL status response back to the host, it still generates the internal error code like the 86XX printer. The user can use the same command to ask the printer to transmit its latest error code to the host. This feature of the 3400 printer is not affected by the 86XX Emulation mode or Advanced mode setting.

Prints Erroneous Labels

An 86XX printer does not print a label if the printed image does not fit within the boundaries of the label stock. The 3400 printer prints the label, even if the label is incomplete or the image overruns the next label. If the next label is overrun, the printer form feeds to the following label before the next print.

Limited User-Defined Protocol

The 3400 printer provides the capability to change protocol characters. However, unlike the 86XX printer, the user may not define their own protocol. The user may substitute characters to use as protocol characters, but the rules for the protocol chosen do not change. Any status response character that you replace with the NUL character is not used. Five tables of protocol characters exist. The user may redefine these characters and use the table for all protocols. One possible way for you to redefine protocol characters is to replace control characters with printable characters.

Caution is necessary since you cannot replace a control with more than one printable character. Refer to the table of user-defined protocols in Appendix B for information on compatibility.

No 8100 Protocol

You can change the command table and protocol table to provide a 8100-like protocol, but it does not match the 8100 protocol in at least two respects:

- No ACK/NAK response when it receives a record.
- 8100 protocol has no <ESC> or <SI> (shift) commands, but the 3400 printer uses both types of commands.

Differences Between the 3400 Printer and the 4100 Printer

The 3400 printer has many of the same features and functions as the 4100 printer. However, there are some features that are function differently or are not implemented. This section identifies those differences.

DIP Switches

The 4100 printer has DIP switches to select the number of stop bits, the enable self-strip and Test and Service, and to select baud rates of 110, 300, and 600. The 3400 printer does not provide DIP switches for these parameters. The 4100 printer has DIP switches to support even, odd, mark, and space parities. The 3400 printer supports even, off, and non parities. The 4100 printer has DIP switches to specify Intermec protocols. 3400 DIP switches allow selection between Intermec or XON / XOFF protocol, and between XON / XOFF No Status Protocol The 3400 printer can automatically detect when the Intermec protocol is in use. A front panel switch allows you to select between direct thermal or thermal transfer media on the 4100 printer. The 3400 printer provides a DIP switch for this selection.

Communications

The 3400 printer does not support baud rates below 1200 baud. It does not allow selection of number of stop bits. One stop bit is used. The 3400 printer does not support mark and space parity.

Entering Test and Service

To enter Test and Service mode on the 4100 printer, you set the appropriate DIP switch and power on the printer. The 3400 printer enters Test and Service mode by powering on the printer while pressing the front panel button.

No Cutter

The 3400 printer does not support the use of a cutter.

Front Panel

The 4100 printer has three front panel buttons: Pause, Feed, and Stop / Cancel. The 3400 printer has one front panel button for these three functions. The 4100 printer has three front panel LEDs: Power, Pause, and Paper / Ribbon (which flashes during label or ribbon faults). The 3400 printer has three front panel LEDs: Power, Alert, and Empty / Pause (which indicates printhead over-temperature or system failure).

RAM Differences

The 4100 printer uses static RAM for both storing label entities and for editing and imaging labels. You can allocate up to 250K of storage RAM when you have the expanded RAM installed. You may allocate up to 17 image bands for imaging with minimal storage RAM allocated. The 3400 uses static RAM for storing label entities and a separate dynamic RAM for editing and imaging. You may allocate up to 128K of storage RAM. By reallocating storage RAM in the 3400 printer, you may use a limited amount of static RAM along with dynamic RAM for imaging. Thus, if you install expanded RAM and allocate the minimum amount of storage RAM, you may allocate up to 12 image bands for imaging.

5

Designing Labels and Using IPL Commands

This chapter explains how to design and print your own labels using the Intermec Printer Language (IPL) command set. It covers the basic elements of label design and provides examples to guide you in designing your own labels. At first, these printer commands may seem cryptic, but you can quickly learn to use them once you begin designing labels.

Using Label Formats

To print a label using the 3400 printer, you must first specify a label format and then send data to fill in the appropriate fields in the format. A label format defines how information prints 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.

Chapter 6, "IPL Commands," contains a complete alphabetical listing of all IPL commands along with their purpose, syntax, and any other pertinent information.

Storing Label Formats

When you define a label, either by downloading printer commands or by using a label generation program, the printer stores the format in its RAM. Once you store a label in the printer, you can use it at anytime. You can call it up to print labels, or call it up in Program mode to modify one or more of the fields on the host.

Designing a Label Format

Label formats are combinations of several different fields that determine where and how different types of data appear in the label design. The fields on a label may differ in size, location, orientation, and data type. You must define information that you plan to print on the label as a field in the label format. Once you define the fields, you can pass data into the fields and print it. The following tutorial assumes that you are using the IPL command set.

To design a basic label format

1. Using a label from your roll of media, sketch an example of a format that you want to create. Your format can include any or all of these fields:
   - Human-readable (text)
   - Bar code
   - Line
   - Box
   - User-defined characters (UDCs) or graphics

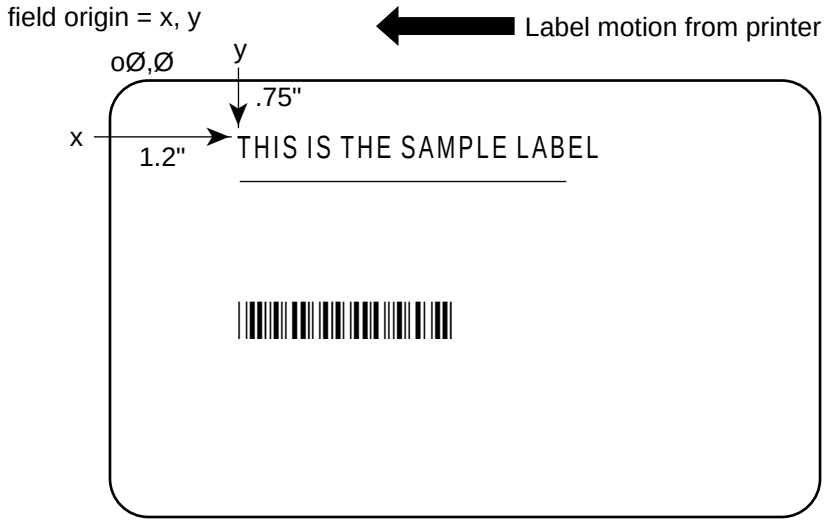
   In this example, you will design a simple label that includes a human-readable field, a line field, and a bar code field. See the example on the next page.
2. Determine the placement of each field from the label origin. The label origin (o∅,∅) is the top left corner of the label.

   To determine the horizontal or X origin of each field, measure the distance from the left side of the label to the upper left corner of the field.

   To determine the vertical or Y origin of each field, measure the distance from the top of the label to the upper left corner of the field.

   When you combine the two numbers, they form the field origin oX,Y.

In the illustration below, the horizontal or X origin of the human-readable field measures 1.2 inches from the left side of the label. The vertical or Y origin measures 0.75 inches from the top of the label.



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3. Convert the measurements for the human-readable field from inches to dots. Use this equation:

   1 inch (25.4 mm) = 203 dots
   1 mm = 8 dots

   In this example, the human-readable field origin in dots is:

   1.2 inches x 203 dots = 244 dots (“x” dimension)
   0.75 inches x 203 dots = 152 dots (“y” dimension)

   The origin for the first field is o244,152. Perform the preceding conversion for the line field and the bar code field.

4. Convert the measurements for the line field and the bar code field to complete this example.

To create or program the label format

1. Choose a bar code symbology and a human-readable font that suit your needs.

   For this example, you are going to use the 10x14 Standard font and the Code 39 bar code symbology. See Chapter 6, "IPL Commands," for information on the different symbologies and fonts available to you.

2. Define the parameters for each type of field in the format.

This type of field	Is represented by
Human-readable (text)	`H`
Bar code	`B`
Line	`L`
Box	`W`
User-defined characters (UDCs) or graphics	`U`

   See "Using Printer Commands According to Function" in Chapter 6 for a list of the parameters you can define for each type of field. For example, you need to define the following parameters for a human-readable field:

Parameter	Value for this example
Field type	`H0`
Field origin	`o244,152`
Font	`c2` (10x14 Standard font)
Field direction	`f0` (horizontal)
Height	`h4` (multiplied 4 times)
Width	`w2` (multiplied 2 times)
Field source and number of characters	`d0,30`

3. Create command strings for each type of field. You must bracket your field information between the start of text character (<STX>) and the end of text character (<ETX>).

   When you combine the parameters in the previous table into a command string, it should look like this:

   `<STX>H0;o203,102;c2;f0;h4;w2;d0,30;<ETX>`

4. Combine the command strings you define into one file and add the following commands bracketed by <STX> and <ETX>.

Command	Description
<ESC>C	Selects Advanced mode
<ESC>P	Enters Program mode
E4;F4	Erases the current format 4 and creates a new format 4
R	Saves the format and exits to Print mode
<ESC>E4	Accesses format 4
<ETB>	Prints the format

5. Create the data lines for the human-readable field and the bar code field. Do this by completing the following tasks:

   a. Type the information that you want to appear in the human-readable field and the bar code field in two separate lines.

   b. Separate the information with a <CR> at the end of the first text string.

      The <CR> tells the printer to enter the text into different fields. The first line will be the text for the human-readable field and so on.

   c. Preface the data lines with the <CAN> command. It erases all data in the current format and sets the internal field pointer to 0 (zero).

      Your command strings should look like this:

```
<CAN> _____________________________   Erases all data in current format
this is the sample label <CR> _____   Text for the human-readable field
sample _____________________________   Text for the bar code field
```

3240U.46

   d. Bracket the command strings between <STX> and <ETX>

6. Combine all of the command strings into one format and it should look like this example:

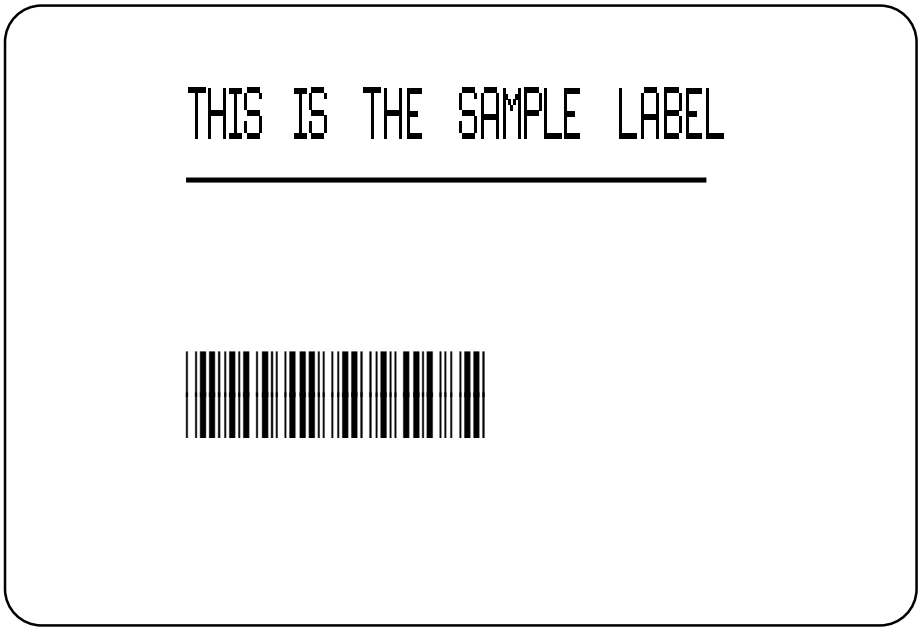
Note: *The difference between the lower case letter "l" and the numeral "1" is not very noticeable in the Courier font. Make sure that you enter the correct command.*

Command	Definition
<STX><ESC>C<ETX>	Select Advanced mode
<STX><ESC>P<ETX>	Enter Programming mode
<STX>E4;F4;<ETX>	Erase format 4, create format 4
<STX>H0;o240,150;f0;c2;h4;w2;d0,30;<ETX>	Edit / create human-readable field 0
<STX>L1;o240,250;f0;l550;w5;<ETX>	Edit / create line field 1
<STX>B2;o240,440;c0,1;h100;w3;i0;d0,11;p@;<ETX>	Edit / create bar code field 1
<STX>R<ETX>	Save format and exit to Print mode
<STX><ESC>E4<ETX>	Access format 4
<STX><CAN><ETX>	Erase all data
<STX>THIS IS THE SAMPLE LABEL<CR><ETX>	Data for human-readable field 0
<STX>SAMPLE<ETX>	Data for bar code field 1
<STX><ETB><ETX>	Print

Note: *The line breaks in the preceding example are shown for formatting purposes only and do not necessarily represent carriage returns.*

The format outlined above prints the label on the following page.

Sample Label Printed From the Format on the Previous Page



Label Design Fields

You define each type of field 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.
- 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.

Bar Code Fields

You can print bar codes in any of the symbologies listed below. A full description of each bar code symbology can be found in Appendix A. Refer to Chapter 6, "IPL Commands," for a complete list of commands to select the appropriate bar code symbology. Chapter 6 also contains a section titled "Using Printer Commands According to Function" that lists the command options available for editing a bar code field.

Symbology	Characters per inch
Code 39	7.00
Code 93	11.28
Interleaved 2 of 5	12.69
Code 2 of 5	
Codabar	9.23
Code 11	11.28
Code 128	18.46
UPC/EAN	14.50
HIBC	7.00
Code 16K	37.00*
Code 49	49.00*
POSTNET	4.2

* 0.719 inches high by 0.690 inches wide, 8 rows

Character Fields and Fonts

You can print character fields in any one of the printer's internal fonts or user-defined fonts. The 3400 printer contains several resident bitmap fonts in a range of sizes and styles.

You can change the size of the font character by using the width and height magnification or by using the pitch or point-size commands. The fonts themselves remain unchanged The font character charts in Appendix A illustrate the complete character set for each font.

The printer supports nine different international character sets for each command set mode. In 86XX Emulation mode, the international character substitution is compatible with Intermec 8636/8646 printers. In Advanced mode, the substitution complies with the ISO standards. The printer also contains character sets for IBM translation and Code Page 850.

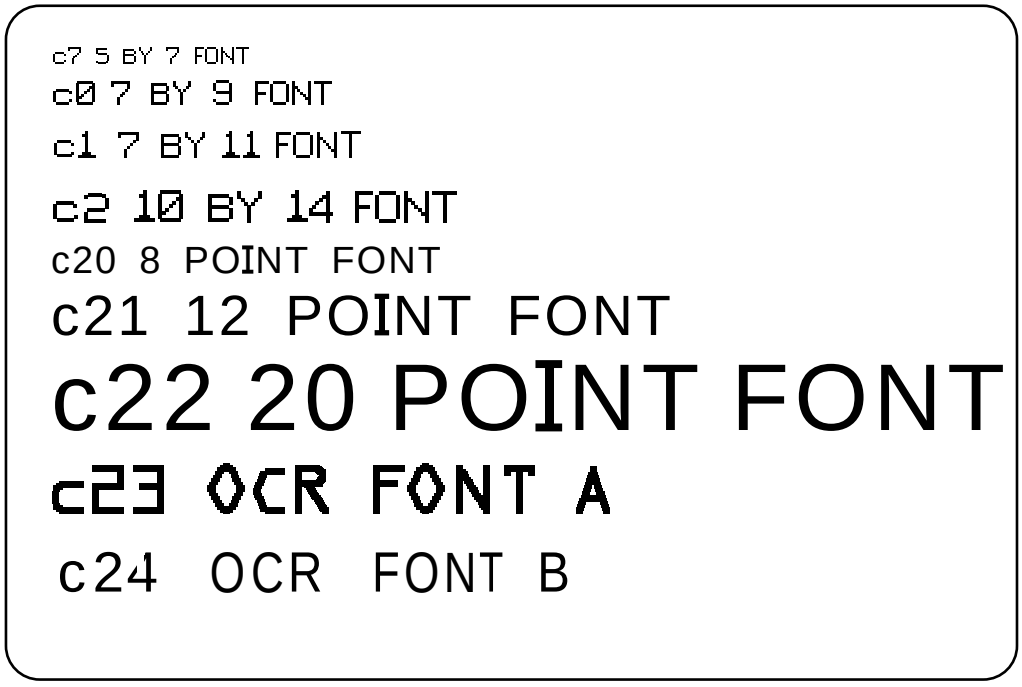
The internal fonts of the 3400 printer include:

- Four standard bitmap fonts measured in dots.
- Two bitmap fonts that can be recognized by optical character recognition (OCR) programs.
- Three bitmap fonts measured in point sizes.

Examples of the 3400 printer's resident fonts are shown on the following label.

Commands	Definition
<STX><ESC>C<ETX>	Selects Advanced mode
<STX><ESC>P<ETX>	Enters Programming mode
<STX>E3;F3;<ETX>	Erase format 3, create format 3
<STX>H0;o85,100;f0;c7;d3,c7 5 BY 7 FONT;<ETX>	Create human-readable field 0
<STX>H1;o85,150;f0;c0;d3,c0 7 BY 9 FONT;<ETX>	Create human-readable field 1
<STX>H2;o85,200;f0;c1;d3,c1 7 BY 11 FONT;<ETX>	Create human-readable field 2
<STX>H3;o85,250;f0;c2;d3,c2 10 BY 14 FONT;<ETX>	Create human-readable field 3
<STX>H4;o85,300;fO;c20;d3,c20 8 POINT FONT;<ETX>	Create human-readable field 4
<STX>H5;o85,370;f0;c21;d3,c21 12 POINT FONT;<ETX>	Create human-readable field 5
<STX>H6;o85,440;f0;c22;d3,c22 20 POINT FONT;<ETX>	Create human-readable field 6
<STX>H7;o85,590;f0;c23;d3,c23 OCR FONT A;<ETX>	Create human-readable field 7
<STX>H8;o85,690;f0;c24;d3,c24 OCR FONT B;<ETX>	Create human-readable field 8
<STX>R<ETX>	Save format and exit to Print mode
<STX><ESC>E3<ETX>	Access format 3
<STX><CAN><ETX>	Erase all data
<STX><ETB><ETX>	Print format

Internal Fonts Label



User-Defined Fonts

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

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

Downloading User-Defined Fonts

You can download user-defined fonts (UDFs) to the 3400 printer and store them in non-volatile memory. Although the printer reserves 16 font ID numbers (3 to 6, and 8 to 19) for UDFs, memory constraints may limit the number of fonts you can store.

Intermec's PrintSet software provides the easiest way to download fonts to the printer from a PC. If you do not have your 3400 printer connected to a PC, you can use PrintSet to create a *.PCF file for downloading at a later time. You can also use IPL commands to edit the *.PCF files.

PrintSet is on the disk that shipped with your getting started guide. If you have not done so, install the PrintSet application on your PC now. PrintSet uses a standard Windows user interface and includes online help. Refer to the online help for specific instructions on using PrintSet.

Since bitmap fonts can be memory intensive, you can use PrintSet to define a subset of a font (such as only defining the numbers). You can then download the subset of the font and save storage space on the printer.

The 3400 printer accepts two formats for bitmap fonts: 1 bit per byte and 6 bits per byte. PrintSet automatically converts all bitmap fonts to the 6 bits per byte format. To learn more about bitmap font formats, see "Creating User-Defined Fonts" later in this chapter.

Lines and Boxes

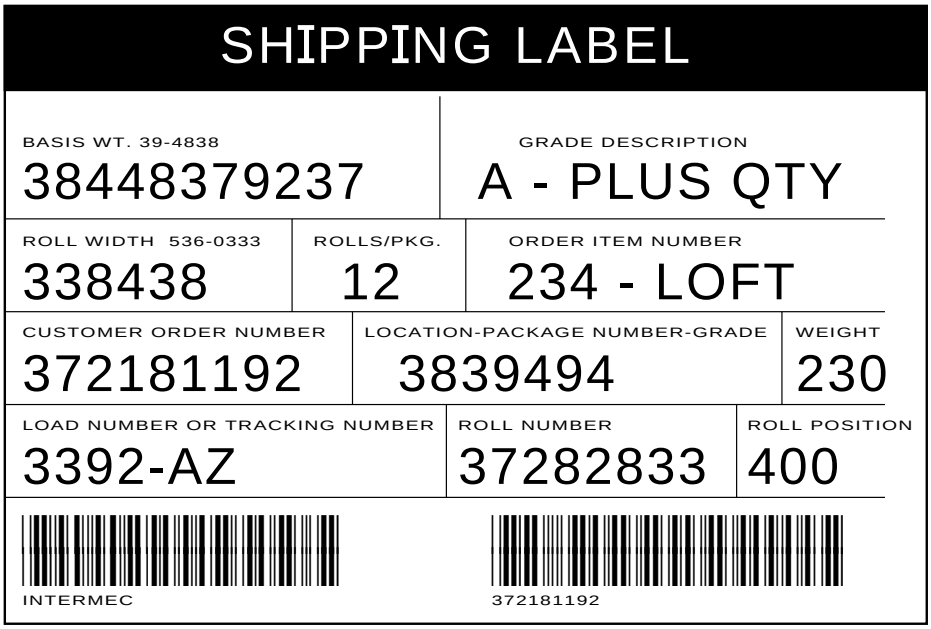
Use the command set (see Chapter 6, "IPL Commands") to define line or box fields on a label. You can use the commands to determine whether a box or line appears vertically or horizontally and to set the line length and thickness.

The following example uses vertical and horizontal lines to separate fields on a label, and uses a box field to make a label border. This format uses bold text to highlight the lines that contain line or box fields. This label format prints the label shown on the page following it.

Lines and Boxes Format

```
<STX><ESC>c1<ETX>
<STX><ESC>P;<ETX>
<STX>E4;F4,Demo 4;<ETX>
<STX>H00;o0,0;f0;h1;w1;c21;r0;b8;d3,  SHIPPING LABEL  ;<ETX>
<STX>H01;o10,80;f0;h1;w1;c0;r0;b0;d3,BASIS WT. 39-4838;<ETX>
<STX>H02;o10,90;f0;h1;w1;c21;r0;b0;d3,38448379237;<ETX>
<STX>H03;o320,80;f0;h1;w1;c0;r0;b0;d3,GRADE DESCRIPTION;<ETX>
<STX>H04;o300,90;f0;h1;w1;c21;r0;b0;d3,A-PLUS QTY;<ETX>
<STX>H05;o10,150;f0;h1;w1;c0;r0;b0;d3,ROLL WIDTH 536-0333;<ETX>
<STX>H06;o10,155;f0;h1;w1;c21;r0;b0;d3,338438;<ETX>
<STX>H07;o210,150;f0;h1;w1;c0;r0;b0;d3,ROLLS/PKG.;<ETX>
<STX>H08;o225,155;f0;h1;w1;c21;r0;b0;d3,12;<ETX>
<STX>H09;o320,150;f0;h1;w1;c0;r0;b0;d3,ORDER NUMBER;<ETX>
<STX>H10;o320,155;f0;h1;w1;c21;r0;b0;d3,234-LOFT;<ETX>
<STX>H11;o10,205;f0;h1;w1;c0;r0;b0;d3,CUSTOMER ORDER NUMBER;<ETX>
<STX>H12;o10,210;f0;h1;w1;c21;r0;b0;d3,372181192;<ETX>
<STX>H13;o235,205;f0;h1;w1;c0;r0;b0;d3,LOCATION-PACKAGE-GRADE;<ETX>
<STX>H14;o260,210;f0;h1;w1;c21;r0;b0;d3,3839494;<ETX>
<STX>H15;o490,205;f0;h1;w1;c0;r0;b0;d3,WEIGHT;<ETX>
<STX>H16;o490,210;f0;h1;w1;c21;r0;b0;d3,230;<ETX>
<STX>H17;o10,260;f0;h1;w1;c0;r0;b0;d3,LOAD NUMBER;<ETX>
<STX>H18;o10,265;f0;h1;w1;c21;r0;b0;d3,3392-AZ;<ETX>
<STX>H19;o265,260;f0;h1;w1;c0;r0;b0;d3,ROLL NUMBER;<ETX>
<STX>H20;o265,265;f0;h1;w1;c21;r0;b0;d3,37282833;<ETX>
<STX>H21;o470,260;f0;h1;w1;c0;r0;b0;d3,ROLL POSITION;<ETX>
<STX>H22;o470,265;f0;h1;w1;c21;r0;b0;d3,400;<ETX>
<STX>L32;o0,140;f0;l560;w1;<ETX>
<STX>L33;o280,57;f3;l83;w1;<ETX>
<STX>L34;o0,196;f0;l560;w1;<ETX>
<STX>L35;o200,140;f3;l56;w1;<ETX>
<STX>L36;o300,140;f3;l56;w1;<ETX>
<STX>L37;o0,252;f0;l560;w1;<ETX>
<STX>L38;o230,196;f3;l56;w1;<ETX>
<STX>L39;o480,196;f3;l56;w1;<ETX>
<STX>L40;o0,308;f0;l560;w1;<ETX>
<STX>L41;o255,252;f3;l56;w1;<ETX>
<STX>L42;o465,252;f3;l56;w1;<ETX>
<STX>B51;o10,320;c0,0;f0;h50;w1;r1;i2;d3,INTERMEC;<ETX>
<STX>B52;o280,320;c0,0;f0;h50;w1;r1;i2;d3,372181192;<ETX>
<STX>I51;o10,373;f0;h1;w1;c0;r0;b0;<ETX>
<STX>I52;o280,373;f0;h1;w1;c0;r0;b0;<ETX>
<STX>W53;o000,000;w2;l590;h390;<ETX>
<STX>R;<ETX>
```

Lines and Boxes Label



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Graphics

You must define a graphic field if you want to print a graphic image on a label. Before you can use this field, you need to download the graphic to the printer. Once you download the graphic, you can use it in any format.

Use the PrintSet application to easily download graphics to the 3400 printer. PrintSet automatically converts the graphic into a six bits per byte format that your printer can understand.

If you are using third-party label-generation software, convert your graphic file to a UDC format that the 3400 printer can interpret. After you convert the graphic, download it to the printer with PrintSet or IPL commands.

If you want to design your own graphic, refer to “Creating User-Defined Graphics” later in this chapter. The maximum size that you can define a graphic to be is 3 x 3 inches (600 x 600 dots). Due to message length constraints, you must design graphics in the 6 bits per byte format.

Editing Labels and Working With Fields

In addition to understanding the different types of printable fields on the 3400 printer, you need to know how to arrange them to define or change the format of a label. The following sections use examples to describe the commands that position, size, rotate, and edit label fields. For a complete list of all programming commands, see Chapter 6, "IPL Commands."

Whenever you create a format, the printer automatically creates a human-readable field zero (H0) along with it. The 3400 creates the H0 field with all field parameters set to the default setting. You can only delete field zero after you create one or more other fields. You cannot delete the last field in a format. The defaults for the H0 field are:

Command	Definition
`o0,0;`	Field origin is 0,0.
`f0;`	Field direction is horizontal with respect to the label motion from printer.
`h2;`	Field height magnification is two.
`w2;`	Field width magnification is two.
`c0;`	Selects the 7 x 9 standard font.
`b0;`	Selects no border around human-readable field.
`r0;`	Selects horizontal orientation of characters.
`d0,30;`	Variable data is entered in Print mode. The maximum number of characters that can be entered into this field is 30.

When creating a new format field, it is not possible to specify field zero as anything other than human-readable field zero (H0) without creating another field first. For example, you cannot make field zero a bar code field by doing the following:

```
<STX><ESC>P;E1;F1;B0<ETX>
```

To make field zero a bar code field, you have to delete human-readable field 0 and then define bar code field 0. To do this, you must create a temporary field (L1) before you can delete human-readable field zero (H0):

```
<STX><ESC>P;E1;F1;L1;D0;B0;D1<ETX>
```

This table describes each command in the string:

Command	Definition
<ESC>P;	Enter Program mode
E1;	Erase format 1
F1;	Create format 1
L1;	Create line field (temporary field)
D0;	Delete field zero
B0;	Create bar code field zero
D1;	Delete field 1

When numbering the fields in a format, it is important to remember to give every field a different number. Never use a field number more than once. You can have up to 200 fields numbering from 0 to 199. The importance of field numbering comes into play when you are in Print mode and are entering data into the label format. At this point, you can only identify the fields by the number, not by what type of field.

Also keep in mind that you enter data into fields according to their numeric value if you use a <CR> to separate the data. In other words, the first string of data you enter goes into the lowest numbered field, the second data entered goes into the next lowest numbered field, and so on.

Editing Existing Fields

If you make a mistake in a label format, you may not have to download the entire format again depending on the severity of the mistake. You can change a specific field in a format by sending a command in Program mode. You can modify just the incorrect format field(s) instead of having to download the entire format again.

The printer uses a field pointer to point to the field that you are going to modify when the printer is in Program mode. The pointer continues to point to the most recently selected field until you select a different format or field.

Use the following format as an example. Assume you have downloaded the following format to the printer:

Command Line	Description
`<STX><ESC>C<ETX>`	Select Advanced mode
`<STX><ESC>P<ETX>`	Enter Program mode
`<STX>E3;F3;<ETX>`	Erase format 3, create format 3
`<STX>H0;o81,100;f0;c0;d0,16;h1;w1;<ETX>`	Create field H0
`<STX>H1;o81,120;f0;c0;d0,16;h1;w1;<ETX>`	Create field H1
`<STX>H2;o81,150;f0;c2;d0,14;h1;w1;<ETX>`	Create field H2
`<STX>H3;o81,190;f0;c2;d0,16;h1;w1;<ETX>`	Create field H3
`<STX>B4;o81,0;f0;c0,1;h50;w1;d0,11;i0;p@;<ETX>`	Create field B3
`<STX>R;<ETX>`	Save and exit to Print mode

Download the following command string to change field 3 to h2;w2; and thereby change the height to 2 dots:

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

The following table describes each command in this string:

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

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

Deleting Fields

It is possible to delete any field from a format except for the last field. You can use the following command string to delete field 3 from format 4.

```
<STX><ESC>P;F4;D3;R<ETX>
```

The following table describes each command in this string:

Command	Description
<ESC>P	Enter Program mode
F4;	Access format 4
D3;	Delete field 3
R;	Return to Print mode

Positioning Fields

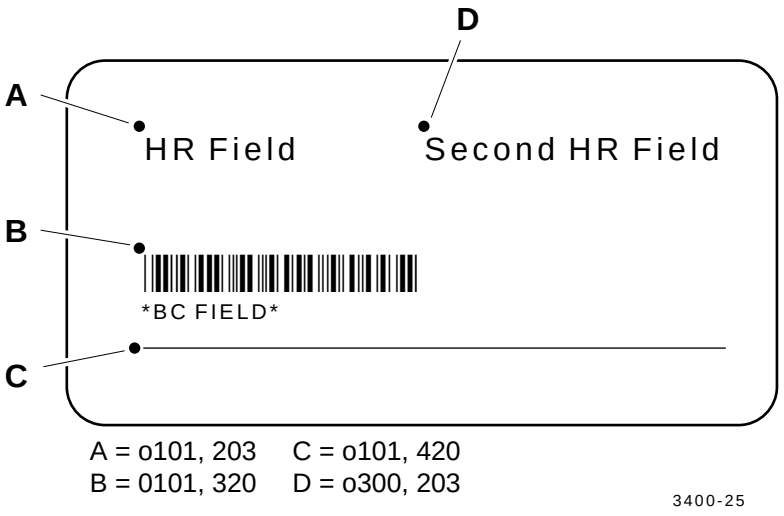
Using the IPL command language to position fields is the trickiest part of designing labels. Since you cannot tell exactly how the field looks until it prints, you may need to make several test prints before you get the field positioned correctly.

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

The field origin is the upper left corner of an unrotated field. 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 top of the label. The X and Y coordinates of the field origin use dots as their form of measurement. There are 203 dots per inch, or 8 dots per millimeter.

To position a field to print approximately 0.5 inch from the left side and 1 inch from the top of your label, the origin command is o101,203.

Field Positions



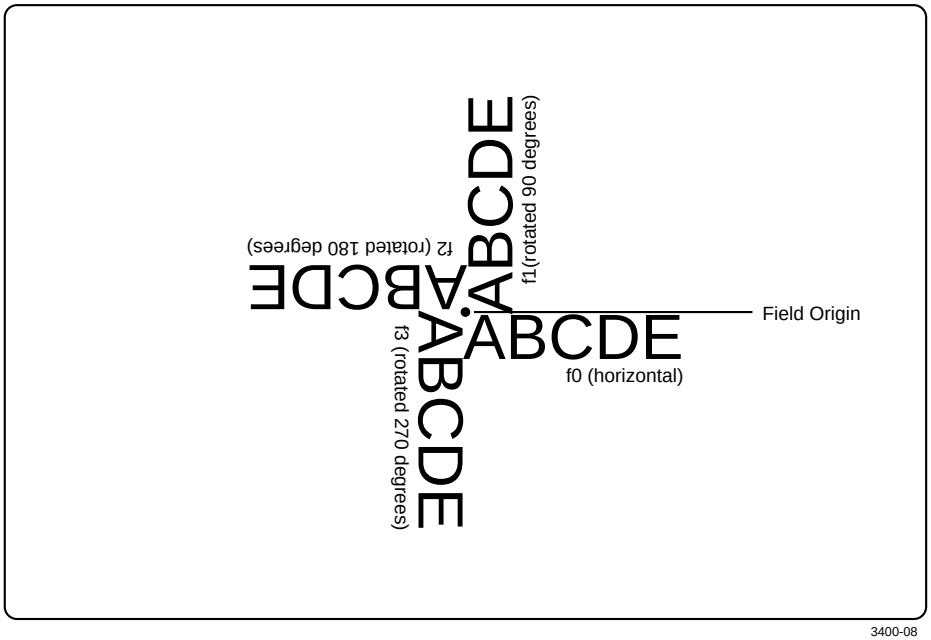
Note: *If you are operating your printer in 86XX Emulation mode, the dot sizes are doubled (101 dots per inch or 4 dots per millimeter), so the origin for 1 inch from the top of the label and 0.5 inch from the left side is o50,101.*

Rotating Fields

You can rotate any type of printable field in increments of 90 degrees counterclockwise around the field origin. To position a rotated field, you should keep in mind that the field origin remains on the corner where it was before you rotated the field. If you rotate a field 90 degrees counterclockwise, the origin that was at the upper left corner is now at the lower left corner. Use the field direction command (f*n*) to define the field rotation.

- To rotate a field 90 degrees, you must position the lower left corner of the rotated field.
- To rotate a field 180 degrees, you must position the lower right corner of the rotated field.
- To rotate a field 270 degrees, you must position the upper right corner of the rotated field.

Field Rotations



Scaling Fields

You can determine the size of a field by 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 character fields print as large as you design them (up to the maximum), but you can scale each of these fields even further by using magnification commands.

Magnifying Fonts and Character Fields

The internal fonts in the printer already have sizes associated with them. For example, the letters in font c0 are 7 dots wide by 9 dots high, with a 1-dot gap between characters. If you design a field that prints 10 letters in font c0, the field will be 79 dots wide by 9 dots high.

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

The human-readable field H0 prints the 7 x 9 font as follows (assuming you enter the word "example" as data):

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By applying a magnification factor of 3 to human-readable field H0, the font now prints out the image below:

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Increasing the width of a text field to 2 makes each letter in the field twice as wide. If you do this to the example above, with field height h2, the final field will print 158 dots wide by 18 dots high.

Magnifying Bar Code Fields

You can also use height and width commands to modify bar code fields, 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. However, 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 (1 dot in Advanced mode) for drag mode only. When you specify a narrow element width of w3, the width of the narrowest element in the symbology is three dots wide. The spaces and large element widths grow according to preset ratios for each symbology.

Note: *You can only print a bar width of 1 if you are printing in drag mode. If you select a width of 1 in picket mode, the printer defaults to 2. Refer to the Glossary for an explanation of both drag and picket mode.*

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 99 dots wide, but special equipment is required to scan a bar code that wide.

Note: *If you are using the POSTNET symbology, follow the rules for magnifying fonts.*

Designing Pages

A page is a collection of one or more formats that you combine to print at the same time. This feature is helpful when you need to print several different labels for application at once. For example, you may need to attach one type of label to a product, and a different label to its container. With the page printing capability, you can print both labels at the same time. Being able to print pages of several formats at once also allows you to print labels on media rolls that have different sizes and shapes of labels already precut.

When you group label formats into a page, you assign the formats to positions designated by the letters a through z. You can print the formats used in pages independent of each other.

Creating User-Defined Graphics

You can create user-defined graphics (user-defined characters, or UDCs) in two ways: 1 bit per byte or 6 bits per byte. To use the UDC in a format, you must first define a graphic field using the IPL command U*n*[,*name*]. For help on using the User-Defined Character Field, Create or Edit (U*n*[,*name*]) command, see Chapter 6, "IPL Commands."

Creating One Bit Per Byte User-Defined Graphics

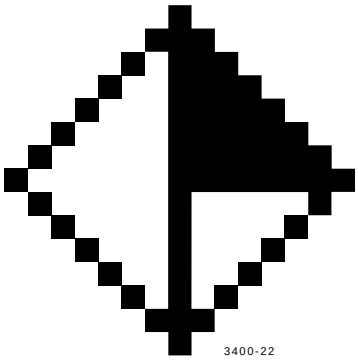
One bit per byte is the standard graphic format used for downloading to an Intermec 8636/8646 printer. You can download a one bit per byte graphic to the 3400 printer when it is in 86XX Emulation mode. A one bit per byte bitmap image is an arrangement of ones and zeros that looks similar to the following example.

Bitmap Pattern	Row
000000010000000	Row 0
000000111000000	Row 1
000001011100000	Row 2
000010011110000	Row 3
000100011111000	Row 4
001000011111100	Row 5
010000011111110	Row 6
100000011111111	Row 7
010000010000010	Row 8
001000010000100	Row 9
000100010001000	Row 10
000010010010000	Row 11
000001010100000	Row 12
000000111000000	Row 13
000000010000000	Row 14

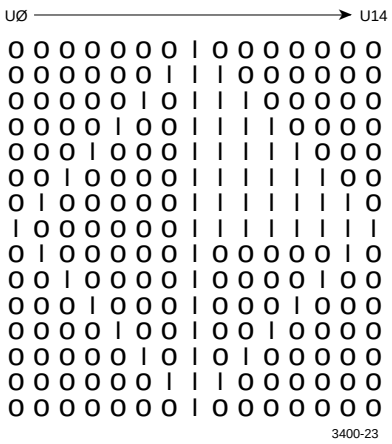
If you look closely at the bitmap pattern above, you can see that it is the outline of a diamond with a line down the middle, and the upper right corner blacked in.

To create your own graphic

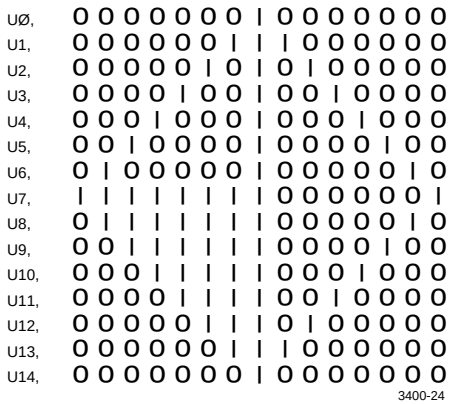
1. Draw your design on a piece of graph paper:



2. Convert each of the squares to either a one or a zero (the zeros are blanks and the ones are dots) , and type 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 prints.



3. Read the pattern of ones and zeros down each column starting at the top left corner. The first column on the left becomes the data for the u0 command line, the second column becomes the data for the u1 command line, and so on. Type this into a text file:



4. Ensure that the printer is in 86XX Emulation mode, then add the protocol characters and define the bitmap as a user-defined graphic. The following example gives the graphic the number 3, the name "diamond", the dimensions 15 rows by 15 columns, and adds the ASCII characters necessary for the 3400 printer to understand the graphic.

Command Line	Description
<STX><ESC>c<ETX>	Select 86XX mode
<STX><ESC>P<ETX>	Enter Program mode
<STX>G3,diamond;x15;y15;<ETX>	Create UDC bitmap 3 (diamond)
<STX>u0,000000010000000;<ETX>	Define column 0
<STX>u1,000000101000000;<ETX>	Define column 1
<STX>u2,000001000100000;<ETX>	Define column 2
<STX>u3,000010000010000;<ETX>	Define column 3
<STX>u4,000100000001000;<ETX>	Define column 4
<STX>u5,001000000000100;<ETX>	Define column 5
<STX>u6,010000000000010;<ETX>	Define column 6
<STX>u7,111111111111111;<ETX>	Define column 7
<STX>u8,011111110000010;<ETX>	Define column 8
<STX>u9,001111110000100;<ETX>	Define column 9
<STX>u10,000111110001000;<ETX>	Define column 10
<STX>u11,000011110010000;<ETX>	Define column 11
<STX>u12,000001110100000;<ETX>	Define column 12
<STX>u13,000000111000000;<ETX>	Define column 13
<STX>u14,000000010000000;<ETX>	Define column 14
<STX>R<ETX>	Save and exit to Print mode

Creating Six Bits Per Byte User-Defined Graphics

The six bits per byte format is more compact than one bit per byte. When you use six bits per byte, you can download large graphics more quickly. The printer must be in Advanced mode to use the six bits per byte format.

The arrangement of the bits is very important in this format. Eight bits (0 through 7) compose every byte, but the printer only uses bits 0 through 5 to map the image.

You must always set bit 6 (the seventh bit) to 1 so you can download data to the printer. 7-bit hosts reserve bit 7 (the eighth bit) for parity and compatibility.

You can download graphics like the previous one bit per byte (diamond) bitmap example in a six bits per byte format by following the procedure below. Please refer to "Creating Six Bits Per Byte User-Defined Fonts" for an illustrated example of creating a six bits per byte format.

To download a six bits per byte graphic

1. Draw the graphic on graph paper.
2. Change the graph paper drawing into a pattern of ones (square is filled in) and zeros (square is empty).
3. Starting from the top row, divide each vertical column into groups of six digits. (If the bottom group has less than six digits, add zeros to this group until it also has six.) The six digits in each group are the six bits that are 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, then add a 0 in the bit 7 position so that each group now has eight digits. (Eight digits complete the byte.)
5. Starting with the first group of 8 bits in the first column, reverse the order of each group so that bit 0 is now last and bit 7 is first. Work from the top of each column to the bottom. 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.
7. Make sure the printer is in Advanced mode and not in 86XX Emulation mode.

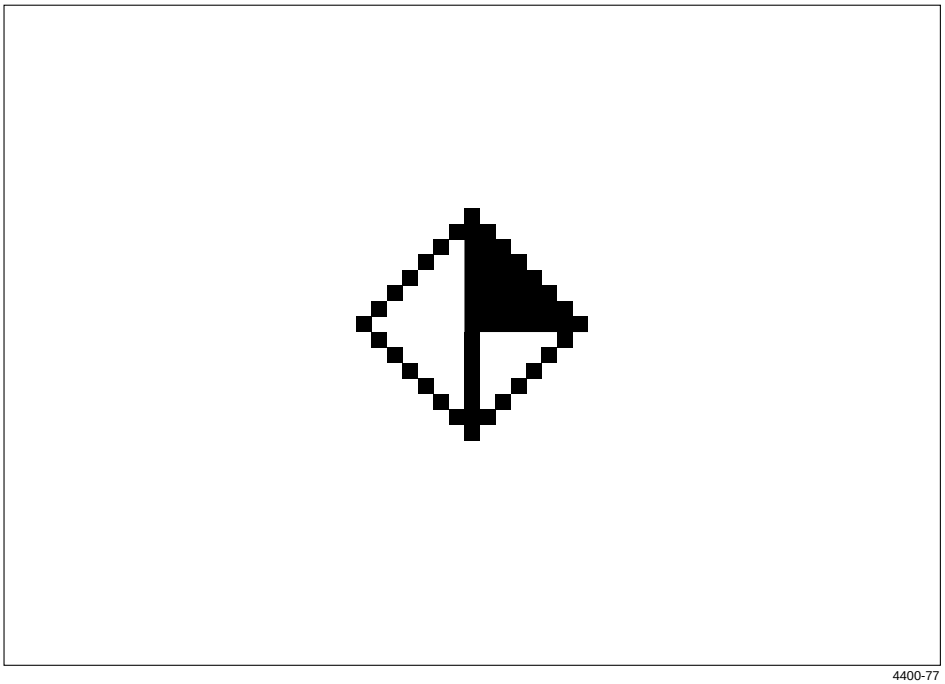
8. Download the graphic so that each column is represented by a command string.

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

Command	Definition
<STX><ESC>C<ETX>	Select Advanced mode
<STX><ESC>P<ETX>	Enter Programming mode
<STX>G2,diamond;x15;y15;<ETX>	Create UDC bitmap 2 (diamond), 15 rows by 15 columns
<STX>u0,@B@;<ETX>	Define column 0
<STX>u1,@E@;<ETX>	Define column 1
<STX>u2,`H@;<ETX>	Define column 2
<STX>u3,PP@;<ETX>	Define column 3
<STX>u4,H`@;<ETX>	Define column 4
<STX>u5,D@A;<ETX>	Define column 5
<STX>u6,B@B;<ETX>	Define column 6
<STX>u7,<DEL><DEL>G;<ETX>	Define column 7
<STX>u8,~CB;<ETX>	Define column 8
<STX>u9,|CA;<ETX>	Define column 9
<STX>u10,xc@;<ETX>	Define column 10
<STX>u11,pS@;<ETX>	Define column 11
<STX>u12,`K@;<ETX>	Define column 12
<STX>u13,@G@;<ETX>	Define column 13
<STX>u14,@B@;<ETX>	Define column 14
<STX>R<ETX>	Save and exit to Print mode

After downloading the graphic to the printer, download the following format to see how the graphic prints. A label similar to the one following the format prints:

Command	Definition
<STX><ESC>C<ETX>	Select Advanced mode
<STX><ESC>P<ETX>	Enter Programming mode
<STX>E4;F4<STX>	Create format 4
<STX>U1;o525,325;c2;w10;h10;<ETX>	Create graphic field 1, origin of 525,325, use graphic 2, and magnify it by a factor of 10
<STX>R<ETX>	Save and exit to Print mode
<STX><ESC>E4<ETX>	Select format 4
<STX><ETB><ETX>	Print



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Creating User-Defined Fonts

There are two ways to create user-defined fonts: one bit per byte format (86XX Emulation mode) or six bits per byte format (Advanced mode).

One Bit Per Byte

In 86XX Emulation mode, the printer receives downloaded fonts in the same manner as the 8636/8646 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 "$" (t36) and "i" (t105). Refer to the example of designing a one bit per byte graphic on page 3-25.

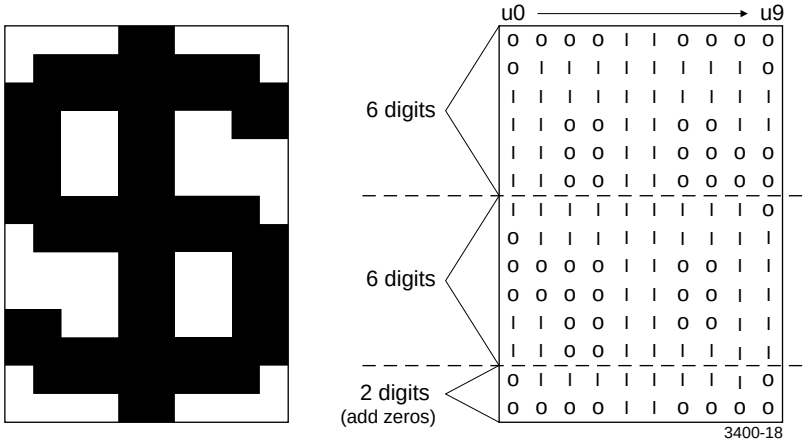
Command Line	Definition
<STX><ESC>c<ETX>	Enter 86XX Emulation mode
<STX><ESC>P<ETX>	Enter Programming mode
<STX>T11,FONT11<ETX>	Create bitmap font 11
<STX>x10;y14<ETX>	Define cell width and height
<STX>t36;Z12<ETX>	Create character 36 ($), character width is 12
<STX>u0,00111110001100<ETX>	Define column 0
<STX>u1,01111111001110<ETX>	Define column 1
<STX>u2,01100011000110<ETX>	Define column 2
<STX>u3,01100011000110<ETX>	Define column 3
<STX>u4,11111111111111<ETX>	Define column 4
<STX>u5,11111111111111<ETX>	Define column 5
<STX>u6,01100011000110<ETX>	Define column 6
<STX>u7,01100011000110<ETX>	Define column 7
<STX>u8,01110011111110<ETX>	Define column 8
<STX>u9,00110001111100<ETX>	Define column 9
<STX>t105;Z4<ETX>	Create character 105 (i), character width is 4
<STX>u4,00110011111111<ETX>	Define column 4
<STX>u5,00110011111111<ETX>	Define column 5
<STX>R<ETX>	Save and exit to Print mode

Six Bits Per Byte

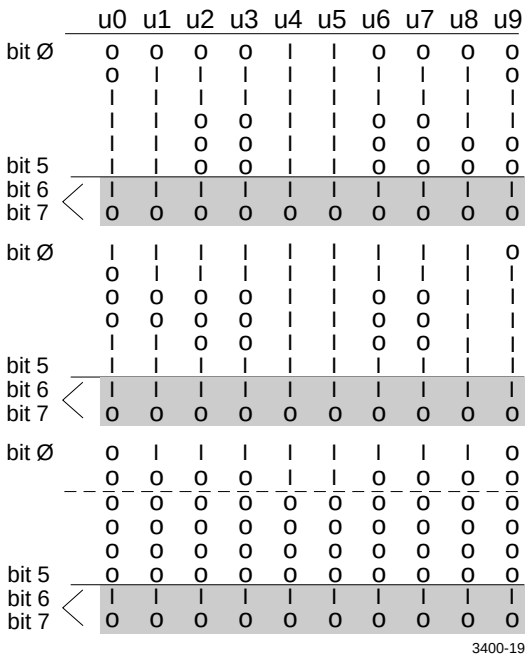
You can also create bitmaps in Advanced mode. In Advanced mode, each data byte represents 6 bits in the bitmap. The maximum size for each font character is 3-by-3 inches (600-by-600 dots). It is possible to define up to 256 characters.

You can download fonts like the previous one bit per byte (“$” and “i”) bitmap examples in a six bits per byte format by performing the following procedure.

1. Draw the character on graph paper.
2. Change the graph paper drawing into a pattern of ones and zeros.

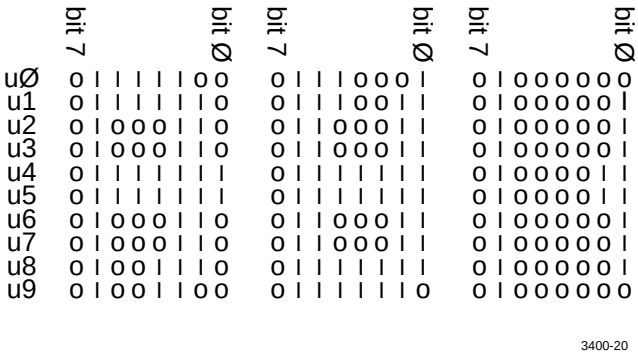


3. Starting with the first column, divide each vertical column into groups of six digits. (If the bottom group has less than six digits, add zeros to this group until it also has six.) The six digits in each group are the six bits that are downloaded in a byte of data. The top digit of each group is bit 0, the bottom digit is bit 5.



4. Add a 1 in the bit 6 position, and then add a 0 in the bit 7 position so that each group now has eight digits. Eight digits complete the byte.
5. Starting with the first group of eight bits in the first column (u0), reverse the order of each group so that bit 0 is now last and bit 7 is first. Work from the top of each column to the bottom. Each eight-digit group is now a binary representation of an ASCII character.

Note: *In the illustration below, each column is now represented as a row.*



6. Translate each eight-digit group into an ASCII character according to the chart in Appendix A:

   uØ = |q@
   u1 = ~sA
   u2 = FcA
   u3 = FcA
   u4 = <DEL><DEL>C
   u5 = <DEL><DEL>C
   u6 = FcA
   u7 = FcA
   u8 = N<DEL>A
   u9 = L~@

7. Make sure the printer is in Advanced mode and not in 86XX Emulation mode.
8. Download the font so that you represent each column is with a command string.

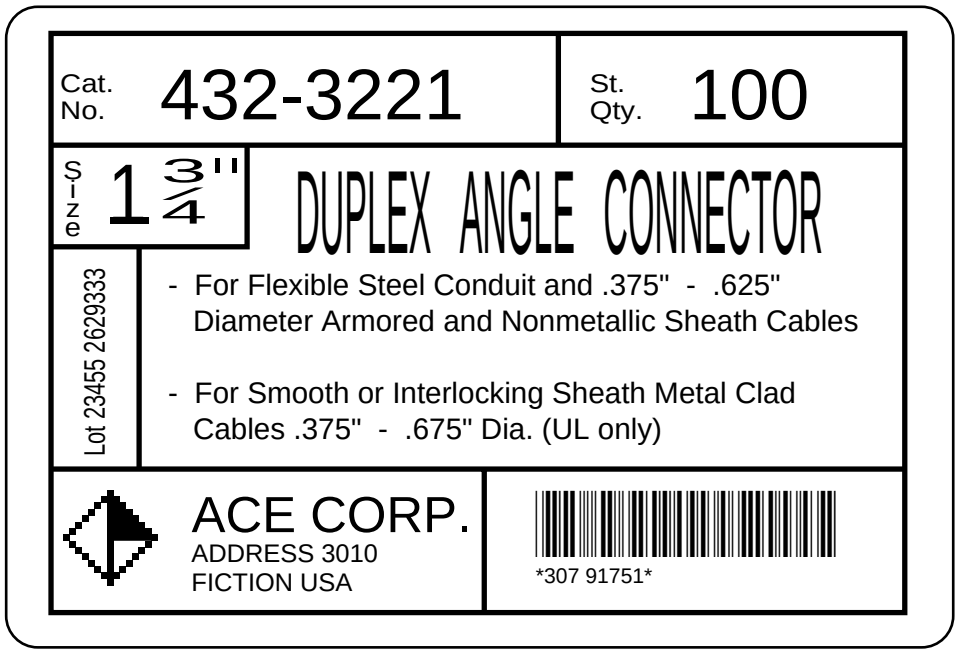
Here are the previously defined characters shown in a six bits per byte format with ASCII characters.

Commands	Definitions
<STX><ESC>C<ETX>	Selects Advanced mode
<ESC>P;<ETX>	Enters Programming mode
<STX>T11,FONT11<ETX>	Create bitmap font 11
<STX>x10;y14;<ETX>	Define cell width (10) and cell height (14)
<STX>t36;Z12<ETX>	Create ASCII character 36 ($), define character width as 12
<STX>u0,|q@<ETX>	Define column 0
<STX>u1,~sA<ETX>	Define column 1
<STX>u2,FcA<ETX>	Define column 2
<STX>u3,FcA<ETX>	Define column 3
<STX>u4,<DEL><DEL>C<ETX>	Define column 4
<STX>u5,<DEL><DEL>C<ETX>	Define column 5
<STX>u6,FcA<ETX>	Define column 6
<STX>u7,FcA<ETX>	Define column 7
<STX>u8,N<DEL>A<ETX>	Define column 8
<STX>u9,L~@<ETX>	Define column 9
<STX>t105;Z4<ETX>	Create ASCII character 105 (i), define character width as 4
<STX>u0,L<DEL>C<ETX>	Define column 0
<STX>u1,L<DEL>C<ETX>	Define column 1
<STX>R<ETX>	Save and exit to Print mode

Format Example

This format example is a complex label designed to demonstrate the different types of data you can print with your 3400 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 chapter.

Complex Label Format



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Graphic for Example

Download the six bits per byte diamond graphic explained in "Creating User-Defined Graphics" in this chapter. Refer to page 5-30 for the format.

Format for Example

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>E5;F5;<ETX>
<STX>H0;o35,40;c21;d3,Cat.;k12;<ETX>
<STX>H1;o35,70;c21;d3,No.;k12;<ETX>
<STX>H2;o165,0;c21;d3,432-3221;k36;<ETX>
<STX>H3;o785,40;c21;d3,Std.;k12;<ETX>
<STX>H4;o785,70;c21;d3,Qty.;k12;<ETX>
<STX>H5;o915,0;c21;d3,100;k36;<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;k12;<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.;k24;<ETX>
<STX>H23;o210,670;c21;d3,ADDRESS 3010;k12;<ETX>
<STX>H24;o210,710;c21;d3,FICTION USA;k12;<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

```
<STX><ESC>E5<CAN><ETX>
<STX>Lot 23455 2629333<CR><FS>307 91747<FS><ESC>I2<ETX>
<STX><RS>5<ETB><ETX>
```

Use the <ETX> and <STX> characters to mark the beginnings and ends of the command strings. The other characters are explained in the following table. Most of the printer command lines explained below are those that contain commands previously not discussed in this chapter. Refer to previous examples for clarification of the lines that are not explained or see Chapter 6, "IPL Commands," for a further explanation of the command language.

Example Command	Description
`<ESC>C`	Selects 4400 (Advanced) mode.
`<ESC>P`	Selects Program mode.
`E5;F5;`	Erases anything previously stored as format five and accesses the location for format five.
`H0;`	Defines field 0 as a human-readable field.
`o35,40;`	Sets the origin of field 0 at coordinates (35,40).
`c21;`	Sets the font for field 0 to font 21.
`d3,Cat.;`	Sets the data for field 0 to have the constant value: Cat.
`k12;`	Sets the point size to 12.
`L6;`	Defines field 6 as a line field.
`o740,10;`	Sets the origin for field 6 at (740,10).
`f3;`	Rotates field 6 by 270 degrees counterclockwise around the field origin.
`l1300;`	Sets the length of the line in field 6 to 130 dots.
`w8;`	Sets the width of field 6 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 by 270 degrees counterclockwise around the origin.
`r1;`	Rotates the characters in field 8 by 90 degrees counterclockwise.
`d3,Size;`	Defines the constant data for field 8.

Example Command	Description
`k12;`	Sets the point size to 12.
`H10;`	Defines field 10 as a human-readable field.
`o150,165;`	Sets the origin for field 10 at (150,165).
`f3;`	Rotates field 10 by 270 degrees counterclockwise around the origin.
`r1;`	Rotates the characters in field 10 by 90 degrees counterclockwise.
`c0;`	Sets the font for field 10 to font 0 (7x9 Standard).
`d3,3/4;`	Defines constant data for field 10.
`h3;`	Sets the height to three times the original size.
`w7;`	Sets the width to 7 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 by 90 degrees around the origin.
`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 to three times its actual height.
`w2;`	Sets the width to 2 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 font two.
`h9;`	Sets the height to nine times the original size.
`w9;`	Sets the width to 9 dots.
`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.

Example Command	Description
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	Edits the interpretive field for bar code field 25.
h2	Sets the height of the interpretive field to twice its original height.
w2	Sets the width of the interpretive field to 2 dots.
W27;	Defines field 27 as a box field.
o015,000;	Sets the origin of field 27 at 15,0.
w10;	Defines the line width of the box as 10 dots.
l1150;	Defines the length of the box as 1150.
h775;	Sets the height of the box to 775.
R	Sets the printer in Print mode.
<ESC>E5	Accesses format 5 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>	Specifies that the following data is to be incremented.
307 91747	This is the data intended for the next data-entry field. It is being specified as data to be incremented.
<FS>	Specifies that the preceding data is to be incremented.
<ESC>I2	The data surrounded by <FS> commands is to be incremented by a value of 2 after each label is printed.
<RS>5	Sets the number of labels to print when the print command is executed.
<ETB>	Tells the printer to print the label.

6

IPL Commands

This chapter provides a detailed description of all commands available in the Intermec Printer Language (IPL) command set. All Intermec printers use the same IPL command set. You cannot use some of the printer commands with the 3400 printer, but this chapter includes them for reference. the command descriptions note those commands not active in the 3400 printer. If you send a command the 3400 printer does not use, 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.

Use Print mode commands to print labels and download data. Use Configuration commands (also sent in Print mode) to enable or disable printer features and options. Use Program mode commands 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. You need to define labels within the functional boundaries listed in Appendix A. For help on using the IPL commands, see Chapter 5, “Designing Labels and Using IPL Commands.” .

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.

Note: *Command are case sensitive. Enter them as they appear in this manual. For example, if the command is an uppercase “A,” do not enter it as “a.”*

To look up commands by their command codes, please refer to the alphabetical “Printer Commands Cross Reference” in Appendix A.

The following table lists a summary of all commands available in the IPL command set. You will find a detailed description of each command later in this section.

Summary of IPL Commands

Function	Command Code	Factory Default	8636/46 Emulation	Page No.	Command Mode
40 Volt Supply Value, Transmit	U		yes	74	Test / Serv.
86XX Emulation Mode, Enter	<ESC> c		yes	21	Print
86XX or Advanced Mode on Power Up	<SI>C	1	yes	34	Configuration
Abort Print Job	<EM>		yes	17	Immediate
Advanced Mode, Select	<ESC>C		yes	21	Print
Alphanumeric Field Separator	<GS>		yes	21	Print
Ambient Temperature, Transmit*	A		N / A	73	Test / Serv.
Amount of Storage, Define	<SI>N	20	yes	34	Configuration
Audible Alarm, Enable or Disable*	<SI>a	0	N / A	34	Configuration
Auto-Transmit 1, Enable	<ESC>j		yes	35	Configuration
Auto-Transmit 2, Enable	<ESC>d		yes	35	Configuration
Auto-Transmit 3, Enable	<ESC>e		yes	35	Configuration
Auto-Transmit 1,2, and 3, Disable	<ESC>k		yes	36	Configuration
Bar Code Type, Select	c	0	yes	46	Program
Bar Code Field, Create or Edit	B	0	yes	54	Program
Bar Height Magnification, Define	h	50	yes	65	Program
Bar Width Magnification, Define	w	1	yes	72	Program
Batch Count, Set	<US>	1	yes	22	Print
Bitmap Cell Height for Graphic or UDF, Define	y	1	yes	55	Program
Bitmap Cell Width for Graphic or UDF, Define	x	1	yes	55	Program
Bitmap User-Defined Font, Clear or Define	T		yes	56	Program
Border Around Human-Readable Text, Define	b	0	yes	56	Program
Box Field, Create or Edit	W	0	yes	56	Program
Character Bitmap Origin Offset, Define	X	0	yes	57	Program
Character Height Magnification, Define	h	2	yes	65	Program

* The 3400 printer ignores these commands.

Summary of IPL Commands (continued)

Function	Command Code	Factory Default	8636/46 Emulation	Page No.	Command Mode
Character Rotation or Bar Code Ratio, Define	r	0	yes	57	Program
Character Width Magnification, Define	w	1	yes	72	Program
Clear All Data	<CAN>		yes	22	Print
Clear Data from Current Field	<DEL>		yes	23	Print
Code 39 Prefix Character, Define	p		yes	58	Program
Command Tables, Load	C		yes	58	Program
Command Terminator	;		yes	23	Test / Serv.
Command Terminator 2	<LF>		yes	23	Print
Command Terminator 1	<NUL>		yes	23	Print
Configuration Parameters, Transmit	<ESC>p		yes	23	Print
Control Panel Access Permission, Set*	<SI>A	0	N / A	36	Configuration
Current Edit Session, Save	N		yes	59	Program
Cut*	<SO>		N / A	23	Print
Cutter, Enable or Disable*	<SI>c	0	N / A	36	Configuration
Dark Adjust	K		yes	73	Test / Serv.
Dark Adjust, Set	<SI>d	0	yes	36	Configuration
Data Shift - International Characters	<SUB>		yes	24	Print
Data Source for Format in a Page, Define	e	0	no	59	Program
End-of-Print Skip Distance, Reset	<SI>D	200	yes	37	Configuration
Error Code, Request	<BEL>		yes	17	Immediate
Factory Defaults, Reset	D		yes	73	Test / Serv.
Field, Delete	D	0	yes	60	Program
Field, Select	<ESC>F	0	yes	25	Print
Field Data, Define Source	d	0	yes	60	Program
Field Decrement, Set	<ESC>D	1	yes	24	Print

* The 3400 printer ignores these commands.

Summary of IPL Commands (continued)

Function	Command Code	Factory Default	8636/46 Emulation	Page No.	Command Mode
Field Direction, Define	f	0	yes	61	Program
Field Increment, Set	<ESC>I	1	yes	24	Print
Field Origin, Define	o	0,0	yes	61	Program
First Data Entry Field, Select	<ACK>		yes	25	Print
Font, Transmit	<ESC>v	0	yes	25	Print
Font Character Width, Define	Z	cell	yes	62	Program
Font Type, Select	c	0	yes	62	Program
Form Feed	<FF>		yes	26	Print
Format, Create or Edit	A		yes	63	Program
Format, Create or Edit	F		yes	63	Program
Format, Erase	E		yes	63	Program
Format, Select	<ESC>E	0	yes	26	Print
Format, Transmit	<ESC>x	0	yes	27	Print
Format Direction in a Page, Define	q	0	no	63	Program
Format Offset Within a Page, Define	O	0,0	no	64	Program
Format Position in a Page, Assign	M	a	no	64	Program
Format Position from Page, Delete	m	a	no	64	Program
Graphic Type, Select	c	0	yes	65	Program
Graphic or UDC, Define	u		yes	65	Program
Height Magnification of Bar, Box, or UDC, Define	h	50,100,1	yes	65	Program
Human-Readable Field, Create or Edit	H	0	yes	66	Program
IBM Language Translation, Enable or Disable	<SI>i	0	yes	37	Configuration
Increment and Decrement, Disable	<ESC>N		yes	27	Print
Intercharacter Delay, Set	<SYN>	0	yes	38	Configuration
Intercharacter Space for UDF, Define	z	2	yes	67	Program

* The 3400 printer ignores these commands.

Summary of IPL Commands (continued)

Function	Command Code	Factory Default	8636/46 Emulation	Page No.	Command Mode
Interlabel Ribbon Save, Enable or Disable	<SI>s		yes	38	Configuration
Interpretive Field, Edit	I		yes	67	Program
Interpretive Field, Enable or Disable	i	0	yes	67	Program
Label and Gap Length, Transmit	<ESC> L		yes	18	Immediate
Label Path Open Sensor Value, Transmit*	L		N / A	73	Test / Serv.
Label Rest Point, Adjust	<SI>f	0	yes	38	Configuration
Label Retract, Enable or Disable	<SI>R	1	yes	39	Configuration
Label Retract Distance, Set	<SI>r	284	yes	39	Configuration
Label Stock Type, Select	<SI>T	1	yes	40	Configuration
Label Taken Sensor Value, Transmit	T		yes	74	Test / Serv.
Label Width, Set*	<SI>W	896	N / A	40	Configuration
Length of Line or Box Field, Define	l	100	yes	68	Program
Line Field, Create or Edit	L	0	yes	68	Program
Maximum Label Length, Set	<SI>L	1000	yes	40	Configuration
Media Sensitivity, Select	<SI>g	0,420	yes	41	Configuration
Message Delay, Set	<ESC><SYN>	0	yes	41	Configuration
Next Data Entry Field, Select	<CR>		yes	28	Print
Number of Image Bands, Set	<SI>I	3	yes	41	Configuration
Numeric Field Separator	<FS>		yes	28	Print
Online or Offline on Power Up*	<SI>O	0	no	42	Configuration
Options Selected, Transmit	<ESC>O		yes	28	Print
Outline Font, Clear or Create*	J		N / A	68	Program
Outline Font, Download*	j		N / A	68	Program
Page, Create or Edit	S		no	69	Program
Page, Delete	s		no	69	Program
Page, Select	<ESC>G	0	no	29	Print

* The 3400 printer ignores these commands.

Summary of IPL Commands (continued)

Function	Command Code	Factory Default	8636/46 Emulation	Page No.	Command Mode
Page, Transmit	<ESC>y	1	no	29	Print
Pitch Label, Print*	C		yes	73	Test/Serv.
Pitch Size, Set	g	12	no	69	Program
Point Size, Set	k	12	no	70	Program
Postamble, Set	<EOT>	NUL	yes	42	Configuration
Preamble, Set	<SOH>	NUL	yes	42	Configuration
Print	<ETB>		yes	29	Print
Print Line Dot Count Limit, Set	v		yes	70	Program
Print Quality Label, Print	Q		yes	73	Test/Serv.
Print Speed, Set	<SI>S	30	yes	43	Configuration
Printer Language, Select	<SI>l	0	yes	43	Configuration
Printhead Parameters, Transmit	<ESC>H		yes	30	Print
Printhead Pressure, Set*	<SI>H	0	N/A	43	Configuration
Printhead Resistance Test, Begin*	B		N/A	73	Test/Serv.
Printhead Resistance Values, Transmit*	S		N/A	74	Test/Serv.
Printhead Temperature Sensor Value, Transmit	P		yes	73	Test/Serv.
Printhead Test Parameters, Set*	<SI>U		N/A	44	Configuration
Printhead Volt Supply Value, Transmit	V		no	74	Test/Serv.
Program Mode, Enter	<ESC>P		yes	30	Print
Program Mode, Exit	R		yes	70	Program
Program Number, Transmit	<ESC>M		yes	30	Print
Quantity Count, Set	<RS>	1	yes	30	Print
Reflective Sensor Value, Transmit	M		no	73	Test/Serv.
Remaining Quantity and Batch Count, Transmit	<ESC>Q		yes	18	Immediate
Reset	<DLE>		yes	18	Immediate

* The 3400 printer ignores these commands.

Summary of IPL Commands (continued)

Function	Command Code	Factory Default	8636/46 Emulation	Page No.	Command Mode
Ribbon Save Zones, Set*	<SI>Z		N / A	44	Configuration
Self-Strip, Enable or Disable	<SI>t	0	yes	44	Configuration
Start and Stop Codes (Code 39), Print	<ESC><SP>		yes	31	Print
Status Dump	<VT>		yes	19	Immediate
Status Enquiry	<ENQ>		yes	19	Immediate
Storage Area Usage, Transmit	<ESC>m		yes	31	Print
Test and Service Mode, Enter	<ESC>T		yes	31	Print
Test and Service Mode, Exit	R		yes	44	Configuration
Top of Form, Set	<SI>F		yes	44	Configuration
Transmissive Sensor Value, Transmit	G		yes	73	Test / Serv.
User-Defined Character, Clear or Create	G		yes	70	Program
User-Defined Character Field, Create or Edit	U	0	yes	71	Program
User-Defined Characters, Transmit	<ESC>u	0	yes	31	Print
User-Defined Font Character, Clear or Create	t		yes	71	Program
User-Defined Tables, Transmit	<ESC>Z		yes	32	Print
Warm Boot	<BS>		yes	32	Print
Width of Line, Box, Bar, or Character, Define	w	1	yes	72	Program

* The 3400 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.

Immediate Commands

System Commands		Page Number
<BEL>	Error Code, Request	6-17
<DLE>	Reset	6-18
<EM>	Abort Print Job	6-17
<ENQ>	Status Enquiry	6-19
<VT>	Status Dump	6-19

Program Mode

Bar Code Field Editing Commands		Page Number
c	Bar Code Type, Select	6-46
d	Field Data, Define Source	6-60
f	Field Direction, Define	6-61
h	Bar Height Magnification, Define	6-65
i	Interpretive Field, Enable or Disable	6-67
o	Field Origin, Define	6-61
p	Code 39 Prefix Character, Define	6-58
r	Character Rotation or Bar Code Ratio, Define	6-57
w	Bar Width Magnification, Define	6-72

Bitmap User-Defined Field Editing Commands		Page Number
t	User-Defined Font Character, Clear or Create	6-71
u	Graphic or UDC, Define	6-65
X	Character Bitmap Origin Offset, Define	6-57
x	Bitmap Cell Width for Graphic or UDF, Define	6-55
y	Bitmap Cell Height for Graphic or UDF, Define	6-55
Z	Font Character Width, Define	6-62
z	Inter-Character Space for UDF, Define	6-67

Box Field Editing Commands		Page Number
f	Field Direction, Define	6-61
h	Height Magnification of Bar, Box or UDC, Define	6-65
l	Length of Line or Box Field, Define	6-68
o	Field Origin, Define	6-61
w	Width of Line, Box, Bar or Character, Define	6-72

Format Editing Commands		Page Number
B	Bar Code Field, Create or Edit	6-54
D	Field, Delete	6-60
H	Human-Readable Field, Create or Edit	6-66
I	Interpretive Field, Edit	6-67
L	Line Field, Create or Edit	6-68
U	User-Defined Character Field, Create or Edit	6-71

Human-Readable Field Editing Commands		Page Number
b	Border Around Human-Readable Text, Define	6-56
c	Font Type, Select	6-62
d	Field Data, Define Source	6-60
f	Field Direction, Define	6-61
g	Pitch Size, Set	6-69
h	Character Height Magnification, Define	6-65
k	Point Size, Set	6-70
o	Field Origin, Define	6-61
r	Character Rotation or Bar Code Ratio, Define	6-57
w	Character Width Magnification, Define	6-72

Interpretive Field Editing Commands		Page Number
b	Border Around Human-Readable Text, Define	6-56
c	Font Type, Select	6-62
f	Field Direction, Define	6-61
g	Pitch Size, Set	6-69
h	Character Height Magnification, Define	6-65
k	Point Size, Set	6-70
o	Field Origin, Define	6-61
r	Character Rotation or Bar Code Ratio, Define	6-57
w	Character Width Magnification, Define	6-72

Line Field Editing Commands		Page Number
f	Field Direction, Define	6-61
l	Length of Line or Box Field, Set	6-68
o	Field Origin, Define	6-61
w	Width of Line, Box, Bar or Character, Define	6-72

Print Mode Commands

Test and Service Commands		Page Number
D	Reset Factory Defaults	6-73
G	Transmissive Sensor Value, Transmit	6-73
M	Reflective Sensor Value, Transmit	6-73
P	Printhead Temperature Sensor Value, Transmit	6-73
Q	Print Quality Label, Print	6-73
R	Test and Service Mode, Exit	6-44
T	Label Taken Sensor Value, Transmit	6-74

Transmit Commands		Page Number
<ESC>H	Printhead Parameters, Transmit	6-30
<ESC>L	Label and Gap Length, Transmit	6-18
<ESC>M	Program Number, Transmit	6-30
<ESC>m	Storage Area Usage, Transmit	6-31
<ESC>O	Options Selected, Transmit	6-28
<ESC>p	Configuration Parameters, Transmit	6-23
<ESC>Q	Remaining Quantity and Batch Count, Transmit	6-18
<ESC>u	User-Defined Characters, Transmit	6-31
<ESC>v	Font, Transmit	6-25
<ESC>x	Format, Transmit	6-27
<ESC>y	Page, Transmit	6-29
<ESC>Z	User-Defined Tables, Transmit	6-32

Immediate Commands

The following command set is effective in any of the operational modes of the 3400 printer. Use the commands in this set to query the printer about the status of the printer and any print jobs. These commands also abort print jobs, request error conditions, and reset the printer. Unlike other commands that the printer stores in the data buffer and executes in the order received, the printer executes immediate commands as soon as it receives them 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. It also sets batch and quantity to their original values before printing. The printer continues to execute other commands remaining in the buffer.

Error Code, Request

Purpose: Solicits error codes from the printer.

Syntax: <BEL>

Notes: The printer sends back the most recent error code as 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 4, “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 dot increments.

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 you select continuous stock, 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: The printer erases all data and commands in the input buffer upon reset.

Status Dump

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

Syntax: <VT>

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

Status Enquiry

Purpose: Transmits the current printer status to the host.

Syntax: <ENQ>

Notes: The printer uploads the status 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:

- 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 you choose a new format, the field pointer automatically points to the lowest numbered data entry field and continues to point to that field until you select a different field or format. 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 Section 2, "Operating the Printer." The command string to enter Print mode from Program mode or Test and Service mode is:

```
<STX>R<ETX>
```

Note: *You must precede each string of commands with the start of message character <STX> and follow it with the end of message character <ETX>. The next command in the message terminates all Print mode commands. 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 appear in alphabetical order according to the command description.

86XX Emulation Mode, Enter

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

Default: *n*=0

Syntax: <ESC>c*n*

n = 0 Specifies 10 mil (0.010 inch) dot size.
n = 1 Specifies 15 mil (0.015 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.

This command may also be set by using Test and Service DIP switch settings. See Chapter 8, "Using Test and Service Mode," for more information.

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.

You will lose all previously host-entered data when you switch operating modes.

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. The printer ignores any non-alphanumeric characters within this region.

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.

The printer generates an error code (21) if *n* is out of range.

See Section 7, "Optimizing Printer Performance," for information on optimizing image bands for batch printing.

Clear All Data

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

Syntax: <CAN>

Notes: If you select a format, the pointer indicates the first data entry field in the format after you clear the data. If you select a page, 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 you clear the data.

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: The printer transmits only the configuration parameters that you can set from the host.

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

Refer to Appendix A for a complete list of the configuration parameters that the printer uploads to the host.

Cut

Syntax: <SO>

Notes: The 3400 printer ignores this command.

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 command allows you to enter command characters as data instead of commands in both Advanced and 86XX Emulation mode.

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. The printer decrements the values in data entry field by *n* after it prints each batch.

Notes: The printer generates an error code (22) 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.

The printer increments the values in data entry fields by *n* after it prints each batch.

Notes: The printer generates an error code (22) if the increment value is out of range.

Field, Select

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

Default: *n*=0

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

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

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

If you use the field number, the printer enters all following data into field *n*. If you use the field *name*, the printer enters all following data into all fields with the specified name in the current format or page. You must bracket the field *name* with quotation marks ("").

The printer generates an error code (33) if you enter an invalid field number.

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*

The font ID number is *n*. 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 you send the commands and data remains in Advanced mode.

The printer generates an error code (27) if you enter an invalid font number.

Form Feed

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

Syntax: <FF>

Notes: If you use self-strip, the printer feeds out one blank label to the strip pin, skipping an entire label.

If you use batch operation with die cut label stock, the label moves to the tear bar.

If you use continuous label stock, 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*]

To select a format, *n* is a numeric format ID ranging from 0 to 19. The printer starts imaging the label as soon as it receives the command to select a format.

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

When you enable the ,*m* parameter, the printer only reimages the fields that change for subsequent prints. Otherwise , the printer reimages the entire. If you set ,*m* to 0, you disable it. If you set ,*m* to non-zero, you enable it.

Notes: After you select the format, the field pointer points to the lowest numbered data entry field.

The printer must be able to completely image a label, within the available number of image bands, for the reimaging command to work and retain the image.

The printer clears all host-entered / variable data from this format.

The printer generates an error code (36) if you enter an invalid format number.

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*

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

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

The printer generates an error code (25) if you enter an invalid format number.

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 you do not select a page and the pointer designates the last field, the field pointer moves back to the first data entry field in the format.

If you select a multiformat page 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. You must enclose the data 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 you specify for the field. The length of data does not change. Rather, values are incremented or decremented as in an odometer: 9 increments to 0.

The printer ignores any nonnumeric characters within the region.

Options Selected, Transmit

Purpose: Uploads the list of selected options.

Syntax: <ESC>O*n*

The options include:

n = 0	No options selected
n = 4	Self-strip

Notes: The 3400 only supports the self-strip option.

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 you select the page, 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.

The printer generates an error code (36) if you enter an invalid field number.

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.

The printer generates an error code (26) if you enter an invalid page number.

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: You will lose all previously entered data 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: The printer generates an error code (21) 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: The printer clears all previous data for the current field.

Storage Area Usage, Transmit

Purpose: Uploads information on the amount of storage RAM allocated and the amount of allocated RAM that you are not using.

Syntax: <ESC>m

The amounts are measured in kilobytes.

Notes: The printer uploads the amount of total RAM available for formats, fonts, and UDCs. The amount of available RAM not being used follows it. A comma separates the two numbers: 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*

The graphic ID number is *n*. 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 Emulation mode, each data byte represents one bit of the graphic image.

The printer generates an error code (28) if you enter an invalid number.

User-Defined Tables, Transmit

Purpose: 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: You will find tables listing the default under "User-Defined Interface Tables" later in this chapter.

The printer generates an error code (12) if you enter an invalid number.

Use this command 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. The printer executes all previous commands before the warm boot takes effect.

You will lose any data sent after this command, or before the printer finishes rebooting.

Use this command when configuration changes require a printer reset.

Configuration Commands

Configuration commands, like print mode commands, are effective when the 3400 is in print mode. You should use configuration commands for the following tasks:

- To set parameters for configuration features
- To enable or disable options

Some configuration commands only take effect when you reset the printer or cycle the power. Some commands are effective immediately. If you need to reset the printer, use the warm boot command <(BS>). The printer performs the reset after it executes all previous commands. The warm boot command contrasts with the <DLE> reset command, which executes immediately after the printer receives it (even if other commands are waiting to execute). The command string to enter Print mode from Program mode is:

<STX>R<ETX>

Note: *You must precede each string of commands by the start of message character <STX>, and follow it with the end of message character <ETX>. The printer terminates a configuration command when it receives 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 list of command descriptions is in alphabetical order.

86XX or Advanced Mode on Power Up

Purpose: Selects 86XX or Advanced printer operating 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 = 60 With expanded RAM

Syntax: <SI>N*n*

You can adjust *n* from 10K to 32K without the addition of expanded RAM.

You can adjust *n* 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 the printer executes this command, it erases all previously stored formats, fonts or UDCs but does not change the printer configuration.

Audible Alarm, Enable or Disable

Syntax: <SI>a*n*

Notes: The 3400 printer ignores this command.

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: The printer transmits a status response 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: The 3400 printer ignores this command.

Cutter, Enable or Disable

Syntax: <SI>c*n*

Notes: The 3400 printer ignores this command.

Dark Adjust, Set

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

Default: *n* = 0

Syntax: <SI>d*n*

n ranges from -10 to +10 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 you pause printing.

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: This command is effective upon execution.

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 you enter the value.

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

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 (see Appendix A). This command overrides the language translation 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: The 3400 printer ignores this command.

Label Rest Point, Adjust

Purpose: Adjusts the point at which labels stop for removal. Use this command 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. You can also set this command with the Test and Service DIP switches. Refer to Chapter 8, "Using Test and Service Mode," for more information.

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 you select die-cut label stock, the printer determines the retract distance automatically.

If you select continuous label stock, 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 or cycle the power after issuing the command.

Label Width, Set

Syntax: <SI>W*n*

Notes: The 3400 printer ignores this command.

Maximum Label Length, Set

Purpose: Defines the maximum label length as *n* dot increments. The printer uses this number for detecting media faults. It does not use this number 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*]

Use *n* to select direct thermal (DT) or thermal transfer (TTR) media. You can only set this parameter with DIP switches on the 3400 printer.

Use ,*m* to set the sensitivity. See Chapter 2, "Operating the Printer," for details on setting this parameter.

Notes: This command becomes 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: The 3400 printer ignores this command.

Postamble, Set

Purpose: Sets the postamble character to *n*.

Default: *n* = <NUL>

Syntax: <EOT>*n*

When *n* = <NUL>, the printer does not send a postamble character. *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>, the printer does not send a preamble. *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*

You can set *n* to a value of 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: You can only use one language per print job. See Appendix A for international character sets.

This command is effective upon execution.

Printhead Pressure, Set

Syntax: <SI>H*n*

Notes: The 3400 printer ignores this command.

Printhead Test Parameters, Set

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

Notes: The 3400 printer ignores this command.

Ribbon Save Zones, Set

Syntax: <SI>Z*n*[,*m*]

Notes: The 3400 printer ignores this command.

Self-Strip, Enable or Disable

Purpose: Turns the self-strip option on or off.

Default: *n* = 0

Syntax: <SI>t*n*

n = 0 Disables the self-strip option.

n = 1 Enables the self-strip option.

Notes: This command becomes effective after you reset the printer or cycle the printer power.

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

Use Program mode commands to design label formats and to download user-defined fonts and graphics. To set the printer to program mode, send the following command string:

<STX><ESC>P<ETX>

When creating or editing formats, the printer uses a field pointer to designate the field that is to be modified when the printer is in program mode. 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 you select a different format or field.

Note: *You must precede each string of commands with the start of message character <STX>, and followed it with 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. The printer ignores parentheses*
{( )} and <LF> characters.

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 Type, Select

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 16. Values for ,*m* vary depending on the symbology you select.

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).

Use the following table to find the correct bar code for your format.

Value	Symbology
n = 0	Code 39
n = 1	Code 93
n = 2	Interleaved 2 of 5
n = 3	Code 2 of 5
n = 4	Codabar
n = 5	Code 11
n = 6	Code 128
n = 7	UPC/EAN Codes
n = 8	HIBC Code 39
n = 9	Code 16K
n = 10	Code 49
n = 11	POSTNET
n = 15	JIS-ITF
n = 16	HIBC Code 128

The following pages contain detailed descriptions of the different symbologies and the parameters that you can set for each.

Code 39

c0[,*m*] Select Code 39. The default for ,*m* is 0.

Intermec printers support three 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 3400 printer to be backward compatible with 86XX printers.

If you enter <ESC><SPACE> as data, the 3400 prints the start and stop characters.

- `c0,0` Select 8646 compatible Code 39. No check digit.
- `c0,1` Select 8646 compatible Code 39. Printer enters 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.

Code 93

c1 Select Code 93.

Interleaved 2 of 5

c2[,*m*] Select Interleaved 2 of 5. Default for ,*m* is 0.

The printer adds a zero 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.

Code 2 of 5

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.

Codabar

c4[,*m*] Select Codabar. Default for ,*m* is 0.

Valid start/stop characters range from A to D and from a to d. You can define them as part of the bar code field or you can download them 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.

Code 11

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.

Code 128

c6[,*m1*][,*m2*] Select Code 128.

In 86XX Emulation mode, you can print the Function 1 character by entering <SUB> 1. In Advanced mode, you can print the Function 1 character by entering <SUB><SUB> 1. You can print the characters for Function 2, 3, and 4 in the same way.

UCC-128 serial shipping container code automatically starts in subset C and a <FNC1>. It is a fixed length version of Code 128 requiring you to enter 19 numeric characters. The printer forces the first two characters to zero. The default for ,*m1* = 0 (Code 128). The default for ,*m2* = 0 (keep parentheses and spaces).

`c6,0,0` Code 128, keep parentheses and spaces.

`C6,0,1` Code 128, ignore parentheses and spaces in the bar code but keep them in the interpretive field.

`c6,1,0` Select UCC-128 Serial Shipping Container Code.

`c6,1,1` Select UCC-128 Serial Shipping Container Code and keep parentheses and spaces in interpretives.

UPC/EAN

c7[,*m1*][,*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

UPC/EAN (continued)

Use a "." to delimit the bar code data from the supplemental data. Data to the right of the "." is supplemental data; data to the left is bar code data. You can add the two- or five-digit supplemental to any version of the UPC/EAN code.

The flag 1 option only applies to EAN 8, EAN 13, and UPC version A. For EAN 13, enabling the flag 1 option prints the first character of the bar code interpretive. For EAN 8 and UPC version A, enabling the flag 1 option moves the first and last character of the bar code interpretive outside of the guard bars.

`c7,0[,`*m2*`]` Select UPC/EAN Codes. Printer enters check digit and flag 1 enable.

`c7,1[,`*m2*`]` Select UPC/EAN Codes. Printer enters check digit and flag 1 disabled.

`c7,2[,`*m2*`]` Select UPC/EAN Codes. Host enters check digit and printer verifies Flag 1 enabled.

`c7,3[,`*m2*`]` Select UPC/EAN Codes. Host enters check digit and printer verifies. Flag 1 disabled.

Use ,*m2* to select the UPC/EAN codes listed below. Default is 0.

`0`	variable length
`1`	EAN 8
`2`	EAN 13
`3`	UPC Version A
`4`	UPC Version E
`5`	UPC Version D1
`6`	UPC Version D2
`7`	UPC Version D3
`8`	UPC Version D4
`9`	UPC Version D5

HIBC Code 39

c8[,*m1*][,*m2*] Selects HIBC Code 39. Default for ,*m1* is 0.

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 Single format.

c8,4 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.

Code 16K

c9 Select Code 16K.

Use a SUB> 1 to represent the function 1 character in 86XX Emulation mode. In Advanced mode, you can represent the function 1 character by entering <SUB><SUB> 1. You can represent the characters for functions 2, 3, and 4 in the same way.

If you want to produce a square symbol, specify a height magnification of 1 in Advanced mode. You can specify a square symbol by using a height magnification of 250 in 86XX Emulation mode.

Code 49

c10 Select Code 49.

Use a SUB> 1 to represent the function 1 character in 86XX Emulation mode. In Advanced mode, you can represent the function 1 character by entering <SUB><SUB> 1. You can represent the characters for functions 2, 3, and 4 in the same way.

If you want to produce a square symbol, specify a height magnification of 1 in Advanced mode. You can specify a square symbol by using a height magnification of 250 in 86XX Emulation mode.

The 3400 printer only supports alphanumeric (0) and numeric (2) modes.

POSTNET

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 x 2, resulting in a symbology sized according to the POSTNET specification.

JIS-ITF

c15[,*m*] Selects JIS-ITF bar code. Default for ,*m* is 0.

c15,0 5 dot narrow bar width magnification.

c15,1 8 dot narrow bar width magnification.

c15,2 10 dot narrow bar width magnification.

The following command defines a data source for the current field and how many characters are in the field.

d[*n*][,*m*] Selects the category for the JIS-ITF bar code. The default for *n*,*m* is 0,14.

d0 This field receives data from a host and *m* is the data length. Lengths of 6 (condensed), 14 (standard), and 16 (extended) are valid for ,*m*.

d2 This field acts as a slave field and receives its data from another field (master slave), and ,*m* is the master slave field ID.

d3 The printer defines the data during Program mode (fixed), and ,*m* determines the JIS-ITF type. If the data length is not exactly 6, 14, or 16, the printer uses the next highest JIS-ITF type with zero padding in front.

The JIS-ITF bar code is the Japanese Industry Standard for Interleaved 2 of 5. JIS-ITF bar codes are in a box of solid black line that measure 0.19 inch (4.75 mm) and always include an interpretive field (21 x 14O CR-B (JIS x 9001)) that it centers underneath the bar code field.

Valid narrow bar width magnifications are 5, 8, and 10 dots. Due to printhead dot size limitations, the printer cannot achieve a true 2.5 to 1 ratio when using a narrow bar width of 5 dots. Instead, the printer uses a wide bar width of 12 dots for a true 2.4 to 1 ratio.

JIS-ITF bar code fields consist of the three categories: standard, condensed, and enlarged. If you are not using the command to define the source of the field data, the printer automatically chooses a category. If your bar code field contains 14 characters, the printer uses standard JIS-ITF. If your field contains 6, the printer uses the condensed version, and if your field contains 16, the printer uses the enlarged version.

HIBC Code 128

c16[,*m1*][,*m2*] Selects HIBC Code 128. Default for ,*m1* is 0.

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`	Single format.
`c16,4`	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: Edits or creates a bar code field.

Default: *n* = 0

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

Values for *n* range between 0 and 199.

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

Note: When you create a bar code field, you automatically create an interpretive field if you have enabled it.

Notes: Parameters for the default field are:

Field origin	0,0
Field direction	0 degrees
Bar code type	Code 39
Check digits	Disabled
Prefix	None
Data length	20
Ratio	3 to 1
Interpretive	Disabled
Height magnification	50
Width magnification	1

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.

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: The printer generates an error code (52) 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*

Values for *n* can range between 1 and 599.

Notes: The printer generates an error code (52) if the width is invalid.

Bitmap User-Defined Font, Clear or Define

Purpose: Clears or creates a user-defined bitmap font set. The font ID number is *n*.

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

Values for *n* can range from 3 to 6 and 8 to 19.

,*name* is an optional field. The field can be up to eight ASCII characters.

Notes: If font set *n* has already been defined, the printer erases all previous characters in the font set. You cannot edit an existing font; you can only recreate it. To change any characters, you must transmit the entire font set.

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 you define each character's width 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 you select r0, the printer substitutes r1.

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 *n*1.

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, you must send the entire 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 you reset or repower the printer. See the command tables 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*]

When *n* = 0, the format receives its data during Print mode.

When *n* = 1, 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. You can only offset data delimited by numeric field separator <FS> or alphanumeric field separator <GS>.

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: You cannot delete the last field in a format. If you delete the current field, the field pointer points to the next field. If you delete a master field, you also delete all slave fields of that master field.

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 Human-readable fields

n = 0,30 All fields except human-readable and JIS-ITF

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

d0[,*m1*] and d[1,*m1*];

Optional data is entered in print mode. ,*m1* is the maximum number of data (up to 250) that you can enter into this field. The default for ,*m1* is 20 characters for bar code fields, and 30 characters for human-readable fields.

d2[,m1][,m2];

You copy data into this field from field ,*m1*. You must define the field before you can use it. ,*m2* is an optional positive integer numeric field offset that can range from 0 to 9999, with 0 as the default. You can only offset data delimited by numeric field separator (FS) or alphanumeric field separator (GS). A bar code field cannot copy data from a human-readable field, but a human-readable field can copy data from a bar code field.

d3[,m1];

Fixed data *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 nonprinting characters) is 250. You cannot enter data with 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: Character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*).

Syntax: z*n*

n values can range between 1 and 599. The printer ignores the intercharacter space command (z*n*) if you use it 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*]

For human-readable fields, *n* values can range from 0 to 24.

Use ,*m1* to add to the intercharacter gap value of the font. The intercharacter gap is the space between characters. The values for ,*m1* range from -199 dots to 199 dots. If you do not select an intercharacter gap value, the printer uses the default value of the selected font.

You can select fonts with these values:

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 (activated with the addition of expansion RAM)

Format, Create or Edit

Purpose: Edits or creates a format.

Syntax: A*n*[,*name*] or F*n*[,*name*]

The format ID number is *n*. Values can range between 1 and 19.

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

Notes: The printer generates an error code (25) if the format number is out of range.

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, Erase

Purpose: Erases format ID number *n*.

Syntax: *En*

Values for *n* range between 1 and 19.

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. *n* and ,*m* represent increments of dot sizes.

Default: *n* = 0

,*m* = 0

Syntax: O*n*[,*m*]

Values for *n* range between 0 and 19999.

Values for ,*m* 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*

Values for *p* 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*

Values for *p* range between a and z.

Values for *n* range from 0 to 19.

Notes: A format may be in multiple positions. The printer generates an error code 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: Maps one column of bitmap for a graphic or a font character. The column you are going to map is *n*.

Syntax: u*n,m...m*

Values for *n* range between 0 and 599.

Notes: In 86XX emulation mode, *m...m* is a string of 1s and 0s that make up the column and specify whether or not to print in that row element of the column (*m* = 1 prints, *m* = 0 does not). Any unmapped columns or row elements default to *m* = 0. In 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*

Values for *n* 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 bit map.

Human-Readable Field, Create or Edit

Purpose: Edits or creates a human-readable field.

Default: *n* = 0

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

Values for *n* can range between 0 and 199.

The ,*name* parameter 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, the printer creates a default human-readable field.

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 amount of space added to the default intercharacter gap length for a user-defined bitmap font. You define the intercharacter gap length by the number of dot increments *n*.

Default: *n* = 2

Syntax: z*n*

Values for *n* can range between 0 and 199.

Notes: The printer generates an error code (52) for invalid lengths.

The printer ignores this command if you use it with the font character width command (Z*n*).

Interpretive Field, Edit

Purpose: Edits an interpretive field.

Syntax: I*n*

The ID number of the corresponding bar code field is *n*. The range is from 0 to 199.

Notes: *n* is the field ID number of the bar code field to be interpreted. You cannot create interpretive fields with this command; you can only create or delete them when enabling the interpretive of 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	Disable
n = 1	Enable
n = 2	Enable with start and stop characters.

Syntax: i*n*

Notes: When you enable the interpretive field, the human-readable information in font 0 (7x9 standard) prints 2 dots below the bar code field, left justified.

Length of Line or Box Field, Define

Purpose: Defines the length of a line or box. You define the length of a line or box field in the 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: Accesses or creates a line field.

Default: *n* = 0

Syntax: `L`*n*`[,`*name*`]`

Values for *n* can range between 0 and 199.

The ,*name* parameter 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, Download

Syntax: `j`*nn....nn*

Notes: The 3400 printer ignores this command.

Outline Font, Clear or Create

Syntax: `Jn[,name, filetype]`

Notes: The 3400 printer ignores this command.

Page, Create or Edit

Purpose: Edits or creates a page.

Syntax: S*n*

The numeric page ID is *n*. Values for *n* can range between 1 and 9.

Notes: You cannot edit the default page. The printer generates an error code if a page number is out of range.

Page, Delete

Purpose: Deletes a page.

Syntax: s*n*

The numeric page ID is *n*. Values for *n* can range between 1 and 9.

Notes: You cannot delete the default page (page 0).

Pitch Size, Set

Purpose: Sets the pitch size that defines the size of the characters in human-readable fields. You can only use this command in Advanced mode. When you use the pitch size command, you disable the height and width magnification and point size.

Default: *n* = 12

Syntax: g*n*

n values can range between 1 and 50.

Notes: You can use this command for both bitmap and outline fonts (with expanded memory). Pitch is characters per line. A higher pitch results in smaller characters.

Point Size, Set

Purpose: Sets the point size that defines the size of the characters in human-readable fields. You can only use this command in Advanced mode.

Default: *n* = 12

Syntax: k*n*

Values for *n* can range between 4 and 212.

Notes: This command works most effectively on fonts c20, c21, and c22.

A point size equals 1/72 of an inch. A higher point size means larger characters.

Print Line Dot Count Limit, Set

Syntax: v*n*

Note: This is a null command and the printer ignores it.

Program Mode, Exit

Purpose: Instructs the printer to exit Program mode and enter Print mode. It saves any format or page currently being edited.

Syntax: R

User-Defined Character, Clear or Create

Purpose: Clears or creates a graphic bitmap.

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

Values for *n* can range between 0 and 99.

The ,*name* parameter 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 you have already defined graphic *n*, the printer erases and redefines it.

User-Defined Character Field, Create or Edit

Purpose: Edits or creates a graphic field.

Default: *n* = 0

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

Values for *n* can range between 1 and 199. The ,*name* parameter is an optional field. The field can be up to eight ASCII characters (not counting the semicolon) and cannot start with a number.

Notes: Parameters for the default field are:

Field origin	0,0
Field direction	0 degrees
Character rotation	0 degrees
UDC	0
Height magnification	1
Width magnification	1

User-Defined Font Character, Clear or Create

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

Syntax: t*n*

Values for *n* can range between 0 and 255.

The decimal representation of the ASCII character is *n*; the printer erases existing characters.

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 values can range between 1 and 250.

Test and Service Mode Command Descriptions

The following table gives descriptions of the test and service mode commands. To enter Test and Service mode from print mode, send <ESC>T from the host terminal.

Note: *All commands in Test and Service mode end with 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 will respond 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 Value, Transmit	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.
R	Test and Service Mode, Exit	Causes the printer to exit test and service mode.

* The 3400 printer ignores this command.

Command Code	Summary	Description
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 value can range from 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 3400 printer ignores this command.

User-Defined Interface Tables

The following tables show commands, in the order you must download them, 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 you must download them, 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 Inter-Character Delay	SYN
Print	ETB
Clear All Data	CAN
Abort Print Job	EM
Data Shift	SUB
Go To Escape Command Table	ESC

Print Command Description (continued)	**Default Print Command**
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 you must download them.

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 Media Sensitivity	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	
Takeup Reel Full	BS	
Label at Strip Pin	FS	
Skipping	DC1	
Printing	DC1	
Ready	DC1	
Clear	DC1	Auto-Transmit 1
Label at Strip Pin	FS	Auto-Transmit 1
Takeup 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 (msec) (Range: 0 - 255) (14 Hex = 20 msec)

Communication Protocol Characters

The following table shows the characters available for different protocols. Refer to the protocol you are using for your system.

Protocol Characters	Standard	XON/XOFF	Polling Mode D	Multi-Drop
Select In			GS	GS
Poll In			FS	FS
Reset In			EOT	EOT
Request for Acknowledgment In			ENQ	ENQ
Start of Message In	STX	STX	STX	STX
End of Message In	ETX	ETX	ETX	ETX
Acknowledgment In			ACK	ACK
Negative Acknowledgment In			NAK	NAK
Data Line Escape In	DLE	DLE	DLE	DLE
XON In		DC1		
XOFF In		DC3		
Select Out				GS
Poll Out				FS
Reset Out			EOT	EOT
Request for Acknowledgment Out			ENQ	ENQ
Start of Message Out			STX	STX
End of Message Out			ETX	ETX
Acknowledgment Out			ACK	ACK
Negative Acknowledgment Out	NAK		NAK	NAK
Data Line Escape Out	DLE	DLE	DLE	DLE
XON Out		DC1		
XOFF Out		DC3		
Status Enquiry In	ENQ	ENQ		
Status Dump In	VT	VT		
Timeout on EOM ACK			20 (DEC) (14 Hex)	20(DEC) (14 Hex)

7

Optimizing Printer Performance

This chapter explains how to optimize and maintain print quality, use the printer memory more efficiently, and maximize throughput.

Optimizing and Maintaining Print Quality

Intermec designed and configured the 3400 printer to provide the best possible print quality for both direct thermal and thermal transfer media. However, there are many factors that you need to take into account before you can achieve maximum print quality for your own application. The following sections address these factors:

- Selecting the correct media
- Setting the print speed
- Selecting the correct media sensitivity number
- Selecting the correct bar code orientation
- Correcting uneven print quality
- Adjusting the print darkness

Selecting the Correct Media

Media selection is one of the most important decisions you can make concerning print quality. The 3400 printer supports a wide selection of both direct thermal and thermal transfer media. To achieve optimum performance in your application, you must evaluate requirements such as print speed and environmental conditions.

It is important that you select the proper media when printing at higher speeds. Using good quality media reduces the occurrence of images that fade or bleed. If you want to print quality labels at higher print speeds, you must select media with low reaction or release imaging temperatures. Printing at lower speeds produces the highest quality labels. However, it is ultimately up to you and your Intermec Applications Analyst to decide the proper media for your application.

Please consult your Intermec Applications Analyst to ensure the selection of the proper media for your individual application. Refer to "Setting the Media Sensitivity Number" in Chapter 2 for a complete list of available media.

Setting the Print Speed

The print speed you select affects the printed image. Therefore, it is important to select the proper media when printing at higher speeds. The printer produces the highest quality labels at lower print speeds. You can achieve optimal print quality for most direct thermal media at speeds below 3.0 ips.

To print labels as quickly as possible, you must adjust the print speed in conjunction with the number of image bands. The print speed and image band settings determine the rate at which the printer processes the images of your labels. This in turn affects the speed of the entire printing process. See "Increasing Throughput" later in this chapter for more information.

To achieve optimal print quality at speeds greater than 3.0 ips, you may need to fine tune the printer (or select thermal transfer media). It is important to properly set the sensitivity number and the dark adjust. If necessary, further adjustment of controls such as the bias adjust screw can improve print quality.

Selecting the Correct Media Sensitivity Number

Intermec prints a three-digit sensitivity number on each media roll or box to specify a heating schedule optimized for print speed and print history. Each print element on the 3400 printer heats individually and various types of media require different temperatures. Therefore, each heating schedule is unique due to different media chemistries and manufacturing processes. These heating schedules have been developed to produce the highest possible print quality for bar codes.

Before you load media into the printer, check to see that the sensitivity number for the media matches the number set in the printer. This improves the print quality and sets the darkness to an appropriate level. The 3400 default setting for direct thermal media sensitivity is 420. For thermal transfer media, the default setting is 567. For information on setting the media sensitivity, see "Setting the Media Sensitivity Number" in Chapter 2.

Selecting the Correct Bar Code Orientation

You can alter the format to improve print quality and print speed. At high speeds, the printer produces the best quality bar codes when you use the drag orientation (printing parallel to paper motion). For more information on formats, please see Chapter 5, "Designing Labels and Using IPL Commands." See the Glossary for an explanation of drag and picket bar code orientations.

Correcting Uneven Print Quality

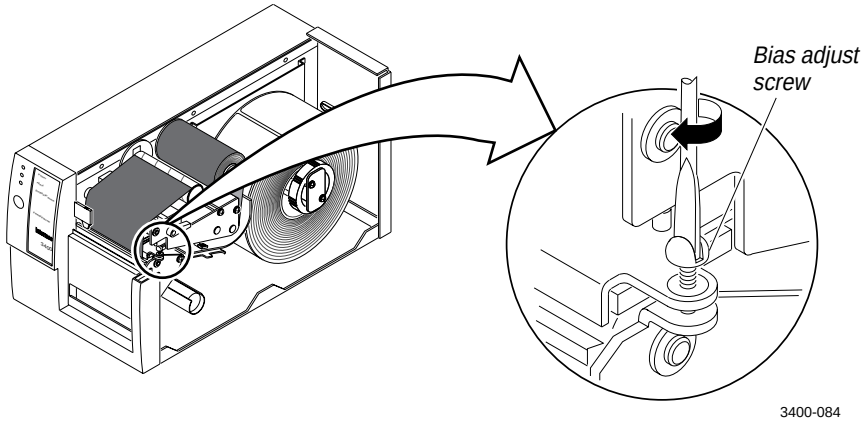
You may experience problems in print quality (ribbon wrinkling or light print on one side of your label) if the printhead is not making even contact with the label stock. This condition can happen with any size label stock, but is most common when using narrow label stock. You need a straight-slot screwdriver to turn the bias adjust screw. .

To achieve the best print quality, adjust the bias adjust screw each time you use media of a different width.

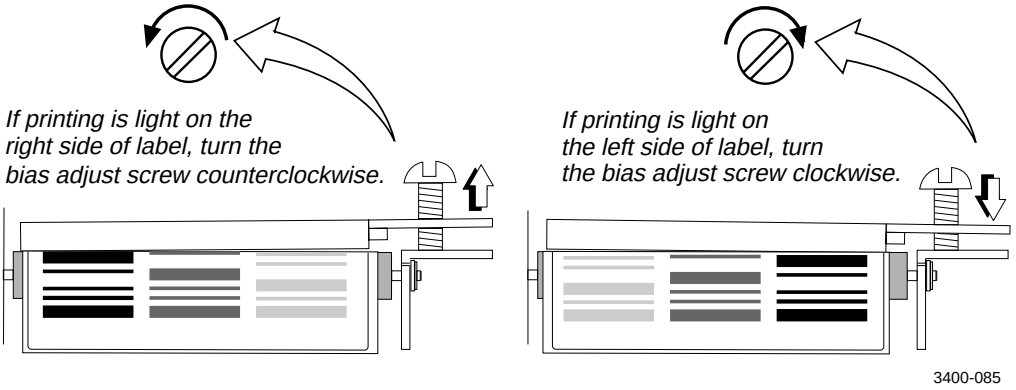
Note: *You must properly adjust the bias adjust screw to prevent premature printhead failure and excessive platen wear.*

To adjust the bias adjust screw

1. Remove the media cover and locate the bias adjust screw.



2. To compensate for uneven print quality, turn the bias adjust screw as shown. Adjusting the bias adjust screw causes the printhead to rest evenly on the drive roller and results in even print quality.



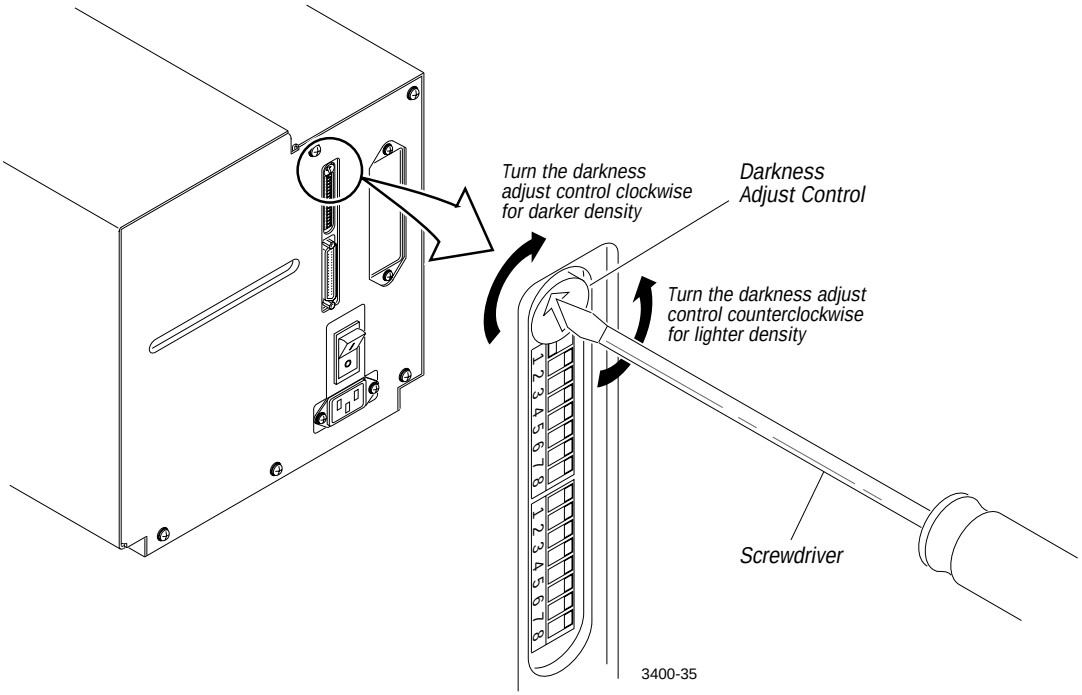
3. Replace the media cover.

Adjusting the Print Darkness

Use the darkness adjust control in combination with the Dark Adjust, Set command <SI>d to fine-tune the darkness of print on your labels. For help, see Chapter 6, "IPL Commands." The fine adjustments compensate for variations in the media ("lot to lot"), the printhead, or the printer. Set the darkness adjust control after you enter the media sensitivity number.

To adjust the print darkness

1. Locate the darkness adjust control on the back of the printer.
2. Use a small straight-slot screwdriver to adjust the print darkness.
   - To increase the print darkness, turn the control clockwise.
   - To decrease the print darkness, turn the control counterclockwise.



Adjusting the Label Mark Sensor

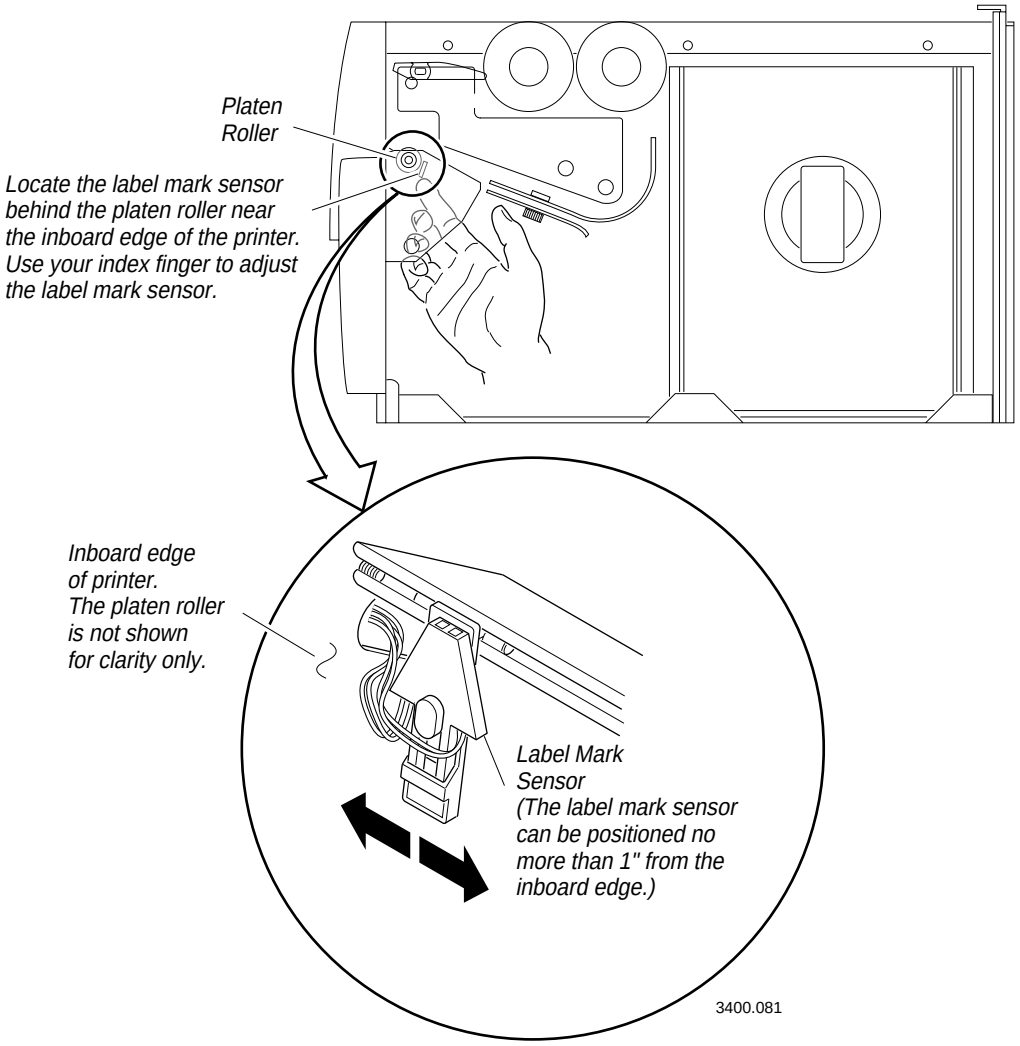
The label mark sensor detects the mark on the back of continuous media stock. The printer uses the output to determine the start of print. You will find the label mark sensor behind the platen roller and near the inboard edge of the printer.

To adjust the label mark sensor

1. Remove the media cover and locate the label mark sensor.
2. Use your index finger to slide the label mark sensor to the correct position for your media.

   You can position the label mark sensor anywhere from the inboard edge of the printer to the center of the paper path.
3. Print a few labels to make sure that the label mark sensor is detecting the black mark on the media.
4. Replace the media cover.

Adjusting the Label Mark Sensor



Using the Printer Memory

To receive the best performance from your 3400 printer, you must understand how the printer RAM is used. The following sections can help you determine the most efficient way to use your printer memory. It is important to remember that using a lot of available memory for storage, reduces the amount of memory used for imaging. The end result is a decrease in printer performance.

How Is the 3400 RAM Used?

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

The 3400 printer uses static RAM for storing tables, pages, formats, fonts, and user-defined characters (UDCs). For a printer with 32K of static RAM installed, the default amount allocated for storage RAM is 20K. Any RAM not used for storage can be used for imaging. A configuration command (<SI>N) allows you to adjust the amount of RAM allocated for storage purposes from 10K to 32K. If you require additional RAM, a memory expansion option is available.

The following parameters are supported independent of the amount of static RAM installed or allocated by the printer:

- Maximum number of formats: 20 (Formats 1 to 19 can be edited. Default format 0 cannot be edited)
- Fields per format: 200
- Maximum data buffer size for a field: 250
- Maximum number of UDCs: 100
- Number of user-defined fonts: 16

Making the Most of Your RAM

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

When you run into a memory usage problem, use the Transmit Storage Area Usage (<ESC>m) command to see how much memory remains available. After sending the (<ESC>m) command to the printer, the printer uploads information on the amount of storage RAM allocated and the amount of allocated RAM that is unused. The two numbers are separated by a comma. For example, the printer might send back the following: 32,10 indicating that 32K is allocated for storage and that 10K is unused. If you find that it is necessary to increase your available memory, you can do one of the following:

- Adjust the amount of RAM allocated for storage purposes with the configuration command <SI>N. A printer with 32K of static RAM installed can adjust the amount of RAM allocated for storage from 10K to 32K. For printers with expanded RAM installed, the amount of storage RAM can be adjusted from 10K to 128K. If you set the amount of RAM to an amount too small to hold the existing formats, pages, fonts, and UDCs - they are erased.
- Increase the amount of available memory by using the Memory Reset portion of the Test and Service menu. See "Using Memory Reset" in Chapter 8 for more information.
- Delete any unneeded user-defined fonts and graphics. See the Program mode commands in Chapter 6, "IPL Commands."

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

  UDCs: G*n* without any following data deletes UDC *n*.

- Delete pages and formats by using the Program mode commands. For help, see Chapter 6, "IPL Commands."

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

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

- Purchase additional memory. Please contact your Intermec representative for information on purchasing additional memory for the 3400 printer.

Increasing Throughput

To print labels as quickly as possible, you must adjust the print speed in conjunction with the number of image bands (one image band equals 1 inch of label). The print speed and image band settings determine the rate at which the printer processes the images of your labels. This in turn affects the throughput of the entire printing process.

The 3400 printer begins imaging the label as soon as it receives the command to select a format, <ESC>E. Since the 3400 printer starts imaging the label so early, the chance that the imaging process will be unable to keep up with the print speed decreases and throughput improves. However, if the number of image bands is too low, the imaging process is unable to keep up with the print speed. In this case, the printer stops printing and starts again at the lowest print speed with the maximum number of image bands. If the image band command is set too high, the printer spends more time than necessary imaging and slows down label production.

What Is an Image Band?

Image bands are a section of memory where a picture of a label format is drawn. This drawing process is known as imaging. Once the picture is imaged, the printer loads the picture from the image bands to the printhead for printing. Each image band is equal to 1 inch of length of the label format. The number of image bands you use may be less than the length of the label being printed. The number of image bands (in inches) does not have to equal the length of the label since the printer recycles the image bands. Once the contents of an image band have been printed, it may be reused to image the next section of the label.

Keep in mind that the more complex the label, the longer it will take to image each section, thus requiring a slower print speed. To use a higher print speed, use more image bands to allow more of the imaging process to complete before printing begins.

How the Image Bands Command Works

The image bands command controls the amount of memory allotted to the imaging process. When you increase the image band adjustment to a higher number, you are adding more buffers to the imaging memory. By doing this, more of the label format is imaged before printing begins.

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

To set the number of image bands, use the <SI>I command. See the Number of Image Bands, Set command in Chapter 6 for more information.

Optimizing Print Speed and Image Band Setting

The maximum number of image bands available for use is 6 for a printer with 32K of static RAM. The maximum number of image bands available for use is 12 bands with 128K of static RAM. The minimum number of image bands available is two.

To optimize the number of image bands for your print speed

1. Set the image band setting at the lowest number (2).
2. Print a label at the desired speed.

   If the label prints, the image band setting is optimal. You do not need to perform any more adjustments.

   If the number of image bands is too low, the printer aborts the label before printing is completed and attempts to reprint the label at the slowest speed (2 ips) with the highest number of image bands (6). You need to continue with Step 3.
3. Return to the original print speed and increase the original number of image bands one at a time.

   Continue to increase the number of image bands until the printer prints a label correctly.

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

To print very complex labels at high speeds, you must allocate enough image bands to completely image the label before printing. Allocate one band for each inch of label length. By doing this you can print at any speed, however, there may be a considerable delay between labels.

Reimaging Modified Fields

You can now choose to reimage only the fields in a label format that you modify instead of reimaging the entire label format. If you are updating data in only a few simple fields, it might be faster to use the modified field reimaging command. However, you need to take into account the type of fields you will be reimaging. If you choose to reimage a field that takes longer to erase and reimage than it takes an entire label format to erase and reimage, you will not be increasing throughput. Erasing a field requires reimaging it with zeros and erasing a label requires only clearing the RAM. When you use it correctly, this command parameter can greatly increase the throughput of your printer.

To use the modified field reimaging command

1. Make sure that you select enough image bands to allow the printer to retain the entire label image.

   One image band is equal to 1 inch of label length.

2. Select the fields to reimage by using the following command:

   <ESC>E*n*,*m*

See the Format, Select command in Chapter 6 for more information on how to reimage modified fields.

Optimizing Image Bands for Batch Printing

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

To optimize the number of image bands for batch printing, you must select enough image memory to allow the printer to retain the entire label image. To optimize batch printing, select the number of image bands (1 band = 1 inch) to equal the label size. Therefore, if the printed image stops at a distance of four inches from the beginning of the label, you must select four image bands to prevent reimaging if the label is 5 inches long.

8

Using Test and Service Mode

This chapter explains the different procedures you can perform while the 3400 printer is in Test and Service mode. Use Test and Service mode on the 3400 to print test labels, perform special procedures such as cloning, and change select configuration commands.

Using Test and Service Mode Procedures

For all Test and Service mode tests, pressing the Feed / Pause button pauses the current test. Holding the Feed / Pause button aborts the current test and starts a new test.

To enter Test and Service mode

1. Turn the On / Off switch to the off position.
2. Press and hold the Feed / Pause button while turning the power on.

   The printer prints out a hardware configuration label and then enters Data Line Print mode.
3. Set the DIP switches to the test or service function you wish to perform. See the following table for a list of the DIP switch settings.
4. Hold the Feed / Pause button down. The test begins immediately.
5. If you wish to perform another function, change the DIP switch settings and press the Feed / Pause button.

   The function the printer is currently executing terminates, and the printer performs the new function.

To exit Test and Service mode

1. Turn the printer power off.
2. Reset the DIP switches to their original settings.
3. Turn the printer power back on.

The printer remains in Test and Service mode until you turn the power off again and reset the DIP switches. The printer executes all functions as soon as you select them.

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

Test and Service DIP Switch Settings

Default settings are noted with an *

O = OFF
1 = ON

TESTS	Top Bank OFF/ON 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								Q
Software							1	O								Q
Test Labels				1	O	O										
Print Quality							O	O								Q
Pitch							1	O								Q
Page				O	1	O	O	O								
Single Page									N	N	N	N	N			Q
All Pages									1	1	1	1	1			Q
Format				1	1	O	O	O								
Single Format									N	N	N	N	N			Q
All Formats									1	1	1	1	1			Q
UDC				O	O	1	O	O								
Single UDC									N	N	N	N	N	N	N	Q
All UDCs									1	1	1	1	1	1	1	Q
Font				1	O	1	O	O								
Single Font									N	N	N	N	N	N		
All Fonts									1	1	1	1	1	1		
Data Line Print	*1	O	O	O	O	O	O	O								
Cloning	O	1	O													
Receiver				O	O	O	O	O								
Sender				1	O	O	O	O								
Selective Transfer	1	1	O													
Receiver				O	O	O										
Send Pages				1	O	O	S									
Single Page							1	S	S	S	S	D	D	D	D	D
All Pages								1	1	1	1	1	1	1	1	1
Send Format				O	1	O	S									
Single Format							1	S	S	S	S	D	D	D	D	D
All Formats								1	1	1	1	1	1	1	1	1
Send UDC				1	1	O	S									
Single UDC							1	S	S	S	S	S	S	S		
All UDCs								1	1	1	1	1	1	1		
Send Font				O	O	1	S									
Single Font							1	S	S	S	S	D	D	D		
All Fonts								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										

Q: OFF = Batch of 1. ON = Batch of 100.
N: Page/Format/UDC/Font number. Least significant bit first.
S: 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 3400 printer can print a variety of test print labels that provide you with information about the printer configuration and the quality of the printing. .

To print a test label

1. Turn the On / Off switch to the off position.
2. Press and hold the Feed / Pause button while turning on the printer.

   The printer prints out a hardware configuration label and then enters Data Line Print mode.
3. Set the DIP switches to print out the test label of your choice: software, print quality, or pitch. Refer to the Test and Service DIP Switch Settings table for the correct settings.
4. Hold the Feed / Pause button down until the printer starts printing.

   The printer begins printing out the test label immediately.
5. Exit Test and Service mode by turning the printer off and returning all DIP switches to their original settings.

Using Data Line Print

Use Data Line Print mode to troubleshoot communication between the printer and the host, and to test the operation of the printer. When the printer is in Data Line Print mode, it prints out all downloaded data with the hexadecimal equivalent directly underneath it. Hold the Feed / Pause button down to momentarily suspend the test. Press the Feed / Pause button longer to transmit the firmware program and version number to the host.

To enter Data Line Print mode

1. Turn the On / Off switch to the off position.
2. Press down and hold the Feed / Pause button while turning on the printer.

The hardware configuration test label prints out. 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 takes to program them individually.

To perform cloning, you must be aware of the following limitations:

- You can only clone from like printer to like printer. You cannot clone a 3400 printer to an 86XX or 4400 printer.
- The sender and receiver printers must be running the same firmware version. If you are unsure of the version number, print out the hardware configuration test label.
- The sender and receiver printers must have exactly the same amount of static RAM installed. If you do not know how much RAM your printer contains, print a configuration test label as described in "Printing Test Labels" earlier in this chapter.

When you set the printer DIP switches to the cloning setting, the printer serial port is set to 19,200 baud, even parity, 1 stop bit, and 8 data bits. After the printer is powered on, the 3400 printer initiates the data transfer by sending an <ESC>M message to the receiving printer. The receiving printer responds by transmitting its program and version numbers. If the numbers are identical to those of the sending printer, the sending printer begins transferring data. The Alert LED of the sending printer flashes during the data transfer. If the transfer is successful, the Alert LED turns off on the sending printer and the receiving printer reboots.

To perform cloning

1. Turn the On / Off switch to the off position.
2. Press down and hold the Feed / Pause button while turning on the printer. The hardware configuration test label prints out. You are now in Data Line Print mode.
3. Connect the serial ports of the sender and receiver ports together with an RS-232 null modem cable. For help, refer to "Connecting the Printer to Your System" in Chapter 1 and "Communications Interfaces" in Appendix B.

4. Set the DIP switches on the sender and receiver printers for cloning as shown in the table of Test and Service Mode DIP Switch Settings on page 8-4.
5. Press the Feed / Pause button on the receiving printer first, then the sending printer to initiate the cloning procedure.

   The Alert LED on the sending printer flashes while the data is being transferred and then goes out. When the printer completes the cloning process, the receiving printer executes a warm boot.
5. Exit Test and Service mode by turning off the printer and returning all DIP switches to their original settings.

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, use the selective transfer command. Use this command to set up different printers to print the same label formats.

Using the Selective Transfer command, you can download the following label design attributes from one 3400 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, the printer serial port is set at 19,200 baud, even parity, 1 stop bit, and 8 data bits. If you are transferring pages or fonts, the destination and source numbers can be different. If you are transferring formats or UDCs, the destination and source number must be the same.

To perform Selective Transfer

1. Turn the On / Off switch to the off position.
2. Press down and hold the Feed / Pause button while turning on the printer. The hardware configuration test label prints out.

3. Connect the serial ports of the sending and receiving ports together with an RS-232 null modem cable. For help, refer to "Connecting the Printer to Your System" in Chapter 1 and "Communications Interfaces" in Appendix B.
4. Set the DIP switches on the sending printer and receiving printer for selective transfer as shown in the table of Test and Service DIP Switch Settings on page 8-4.
5. Select the type of data that you wish to transfer (such as pages, formats, fonts, or UDCs) by setting the corresponding DIP switches shown in the table on page 8-4.
6. Press the Feed / Pause button on the receiving printer and then on the sending printer to initiate selective transfer.
7. Exit Test and Service mode by turning the printer power off and returning all DIP switches to their original settings.

Using Memory Reset

Use Memory Reset if you want to return the 3400 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. Turn the printer On / Off switch to the off position.
2. Press and hold the Feed / Pause button while turning on the printer. The printer prints out a hardware configuration.
3. Set the DIP switches to reset a portion or all of the memory by using the Test and Service Mode DIP Switch Settings table on page 8-4.
4. Hold the Feed / Pause button down for 1 second. The printer resets a portion or all of its memory.
5. To exit Test and Service mode, turn the printer power off and then on.

Note: *You can also use the Test and Service command (D) to reset all printer RAM.*

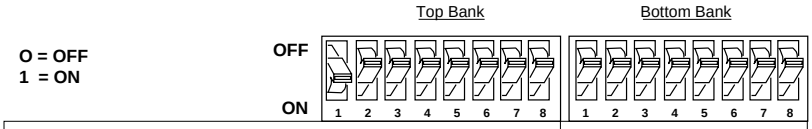
Changing Configuration Commands in Test and Service Mode

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.

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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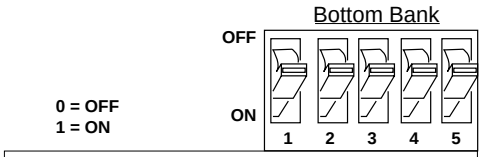
Setting the Number of Dot Increments

You can move the label rest point and X forms adjust configuration commands forward or backward by setting the printer 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. The printer moves in 5 mil increments or 0.005 inches per dot.

Note: *The table below only shows the settings for the bottom bank of switches, see the Configuration DIP Switch Settings table for the Top Bank DIP switch settings.*

Dot Increments DIP Switch Settings



# 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 on page 8-9 for the appropriate DIP switch settings.
2. Go to the Dot Increments DIP Switch Settings table on page 8-10 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 / Pause button and the printer prints out the software configuration label and stops at the new location.

For example, you print a label and discover that it does not extend far enough from the tear bar. You need to move the label rest point forward 10 dot increments (0.05 inch) so that the printer feeds more label out when it is done printing. Find 10 in the # of Dot Increments column. It shows a 1 in the columns of DIP switches 2 and 4, and a O in the columns of 1, 3, and 5. The 1 tells you to turn the switch on. The O tells you to turn the switch off. Turn on switches 2 and 4. Turn off all other switches.

Adjusting the Label Rest Point

The label rest point configuration command adjusts the point at which 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 switch bank. See Chapter 6 for more information on the software command called Label Rest Point, Adjust. Follow the procedure below to use the DIP switch settings to adjust the label rest point

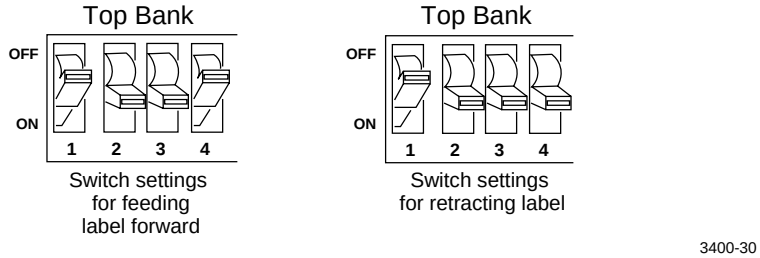
To adjust the label rest point

1. Turn the On / Off switch to the off position.
2. Press and hold the Feed / Pause button while turning on the printer.

   The printer prints out the hardware configuration test label and then enters Data Line Print mode.
3. 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 DIP switch 4.

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



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4. 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 on page 8-10.
5. Press the Feed / Pause button.

   The printer prints out the software configuration label and stops at the new location.
6. Verify the label rest point number on the software configuration label matches the number you set in Step 4.
7. Try printing again to see if you need to readjust the DIP switches in the bottom bank.
8. If you need to readjust the DIP switches in the Bottom Bank, repeat Steps 4 through 6. If not, exit Test and Service mode by turning off the printer and returning all DIP switches to their original settings.

Setting 86XX Emulation Mode

If you are replacing an Intermec 8636 or 8646 printer with a 3400 printer, you can keep your existing network, hardware, software, and label formats by using 86XX Emulation mode. The labels produced on the 3400 printer will look like the ones that your old 86XX printer printed.

There are two ways to set the printer to 86XX Emulation mode:

- Use the software command to select 86XX Emulation mode <ESC>c. For help, see Chapter 6, "IPL Commands."
- Use the DIP switches in the Test and Service DIP switch bank.

To set the printer to 86XX emulation mode using DIP switches

1. Upload label formats, fonts, and graphics from the 8636 or 8646 printer to the host computer.
2. Turn the On/Off switch to the off position.
3. Disconnect the 86XX printer and install the 3400 printer. See Chapter 1 for information on installing the 3400 printer.
4. Press and hold the Feed/Pause button while turning on the printer. The printer prints out the hardware configuration label.
5. In the Top Bank of the Test and Service DIP switches, turn on switches 1 and 3 and turn off switch 2.

6. 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 10 mil (0.01 inch) picket bar codes.
86XX 15 mil	The printer emulates an 8636 or 8646 printer printing multiples of 10 mil (0.01 inch) drag and 15 mil (0.015 inch) picket bar codes.
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 DIP switch 4 and turn off DIP switch 5.

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

   To enable Advanced mode, turn off DIP switches 4 and 5.

7. Press the Feed / Pause button.

   The printer prints out the software configuration label. Verify that the label states the correct mode.

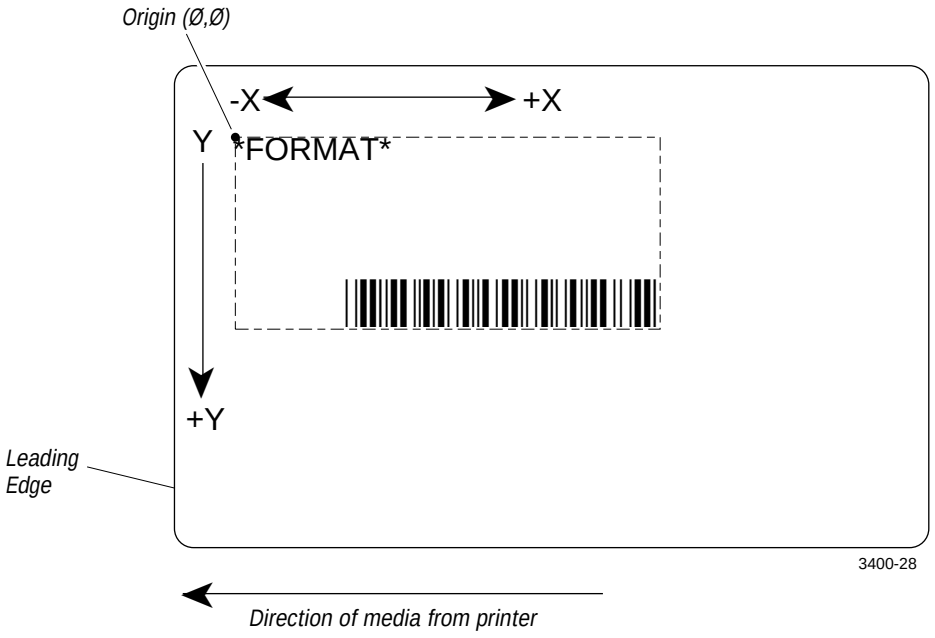
8. Turn the printer off and then on.

9. Download the 86XX formats, fonts, and graphics from the host to the 3400 printer.

Using Forms Adjust

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

The following figure shows the default X and Y origins. You can control the default X origin (top of form) with software command <SI>F or with the Test and Service DIP switches. See Chapter 6 for the Top of Form, Set software command and its default. You can control the default Y origin with the DIP switches only.



The default X origin is 0.10 inch (20 dot increments) 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 0.05 inch (10 dot increments) from the leading edge of the label. You can move the Y origin forward 30 dot increments.

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.

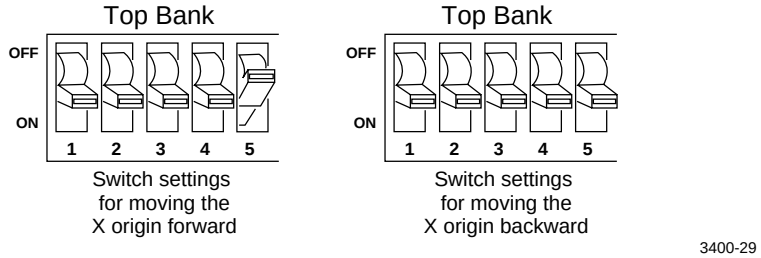
To set the X forms adjust

1. Turn the On / Off switch to the off position.
2. Press and hold the Feed / Pause button while turning on the 3400 printer.

   The printer prints out the hardware configuration label and then enters Data Line Print mode.
3. 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.



4. 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 on page 8-10 to see how to set the X forms adjust forward or backward a given number of increments.
5. Press the Feed / Pause button.

   The printer prints out the software configuration label using the new X forms adjust setting.
6. Verify the X forms adjust number on the software configuration label matches the number you set in Step 4.

Y Forms Adjust

Use the Y Forms Adjust feature to control the position of the image in the direction parallel to the printhead. See the Dot Increments DIP Switch Settings table on page 8-10 for information on how to move the image forward a number of dot increments. If your label is too close to one edge of the printhead, you can adjust it using this feature.

To set the Y forms adjust

1. Turn the On / Off switch to the off position.
2. Press and hold the Feed / Pause button while turning on the printer.

   The printer prints out the hardware configuration label and then enters Data Line Print mode.
3. In the Top Bank of the Test and Service DIP switches, turn on switches 1, 2, and 3.
4. 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 on page 8-10 to see how to set the X forms adjust forward or backward a given number of increments.
5. Press the Feed / Pause button. The printer prints out the software configuration label using the new Y forms adjust setting.
6. Verify the Y forms adjust number on the software configuration label matches the number you set in Step 4.

Appendix A

Appendix A

A

Use this chapter to find reference information such as specifications and international character sets.

3400 Printer Specifications

This section describes the specifications for the 3400 printer.

Dimensions (no options installed)

Height	11 inches (27.9 cm)
Width	10.5 inches (26.7 cm)
Length	17 inches (43.2 cm)
Weight	35 pounds (15.8 kg)

Electrical Requirements

Input Voltage	100, 115, or 230 VAC ± 10%
Frequency	47-63 Hz

Printing Method

The 3400 printer is capable of direct thermal (DT) printing, or thermal transfer (TTR) printing using thermal transfer ribbon.

Printing Speed

Maximum	5 inches per second (50.8 mm per second)
Minimum	2 inches per second (127 mm per second)

The print speed can be changed in 1 ips increments only: 2, 3, 4 or 5.

Printhead

Printed dot size	0.00492 inch square (0.127 mm)
Width	4.1 inches maximum (104 mm)
Resolution	203 dots per inch (8 dots per mm)
Number of elements	832 per printhead
"X" dimensions	10 mil to 50 mil (0.25 mm to 1.27 mm; 5 mil (0.13 mm) in drag mode only (specified media only)

Media Specifications

Roll	6,000 linear inches (152 m)
Length	0.5 inch (13 mm) minimum for butt cut media
	1.0 inch (25.4 mm) minimum for self-strip media
Width	0.5 inch (13 mm) to 4.75 inches (121 mm)
Thickness	0.0120 inches (.3 mm) maximum
Roll Diameter	8.38 inch maximum diameter (213 mm)

Ribbon Specifications

Roll	6,000 linear inches (152 m)
Widths	2.0 inches (51 mm)
	3.0 inches (76 mm)
	4.1 inches (104 mm)
Diameter	2.25 inches maximum (57 mm)

Environment

Operating	50°F to 104°F (10°C to 40°C)
Humidity	10% to 90% noncondensing

Self-Strip Specifications

The self-strip rewinder hub can take up the backing of an entire 6,000 inches roll of media.

Peel Release	10-50 grams

Communications

Asynchronous RS-232C, RS-422, RS-485 interfaces
Serial ASCII code
Hardware (Ready/Busy) Flow Control
XON/XOFF Protocol
Intermec Standard Block Protocol
Polling Mode D Protocol
Multi-Drop Protocol
Baud Rates: 1200, 2400, 4800, 9600, 19200

Fonts and Graphics

There are nine resident bitmap scaleable fonts (including OCR A and B).

You can use font ID 3 through 6 and 8 through 9 to download user-defined fonts.

200 dpi graphics resolution.

Maximum UDF	3 inches square (76.2 mm)
Maximum UDC	3 inches square (76.2 mm)

Character Sets

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

Memory

Base	256K of DRAM 32K of SRAM
Optional	128K of SRAM

Agency Approvals

Safety Requirements

USA	UL 1950 2nd Edition UL Listed
Canada	CSA C22.2 #950-M89 CSA Certified
Europe	EN 60950 (IEC 950 Amendments 1 and 2) TÜV Rheinland Licensed

Emission Standards

USA	FCC 15B Class B Verified
Canada	DOC SOR 88 / 475 Class B Verified
Germany	BZT FTZ VFG 243 Class B
Europe	EN 55022 (CISPR 22)

Factory Default Settings

The following table lists the factory default settings for the 3400 printer. These parameters are set using downloadable printer commands described in Chapter 6, "IPL Commands." The printer's serial port defaults, which are set using the rear panel DIP switches, are described in Chapter 2, "Operating the Printer."

Configuration	Default Setting
Preamble Character	Disabled
Postamble Character	Disabled
Auto-Transmit 1	Disabled
Auto-Transmit 2	Disabled
Auto-Transmit 3	Disabled
Message Delay	0 milliseconds
Power-Up Mode	Advanced mode
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
Print Speed	3 inches per second (ips)
Label Stock Type	Die-cut
Inter-Character Delay	0 milliseconds

Appendix A

A

Printer Commands Cross Reference

Appendix A

A

Communication Protocol Characters

Protocol Characters	Standard	XON/XOFF	Polling Mode D	Multi-Drop
Select in			GS	GS
Poll in			FS	FS
Reset in			EOT	EOT
Request for Acknowledgment in			ENQ	ENQ
Start of Message in	STX	STX	STX	STX
End of Message in	ETX	ETX	ETX	ETX
Acknowledgment in			ACK	ACK
Negative Acknowledgment in		NAK	NAK	
Data Line Escape in	DLE	DLE	DLE	DLE
XON in		DC1		
XOFF in		DC3		
Select out				GS
Poll out				FS
Reset out			EOT	EOT
Request for Acknowledgment out		ENQ	ENQ	
Start of Message out			STX	STX
End of Message out			ETX	ETX
Acknowledgment out			ACK	ACK
Negative Acknowledgment out	NAK		NAK	NAK
Data Line Escape out	DLE	DLE	DLE	DLE
XON out		DC1		
XOFF out		DC3		
Status Enquiry in	ENQ	ENQ		
Status Dump in	VT	VT		
Timeout on EOM			15	15

Configuration Parameters Upload

Upload configuration parameters to the printer in the form of configuration commands. The commands are concatenated into one command string within a message. Listed below is the order in which the commands are transmitted and the number of bytes in each command.

Commands	Syntax	Bytes
Set Message Delay	<ESC><SYN> [n]	6
86XX / Advanced Mode on Power Up	<SI>C[n]	3
Set End-of-Print Skip Distance	<SI>D[n]	6
Set Darkness Adjust	<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]	4
Set Print Speed	<SI>S[n]	4
Select Label Stock Type	<SI>T[n]	3
Set Inter-Character 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
Enable Auto-Transmit 1*	<ESC>j	2
Enable Auto-Transmit 2*	<ESC>d	2
Enable Auto-Transmit 3*	<ESC>e	2
Total bytes		**82-84**

* Only sent if enabled.

Appendix A

A

Printer Functional Boundaries

This section defines the boundaries and limits available to the user within the command set. Every printer function or feature has a functional limit that assumes unlimited common memory. Since several functions may compete for common memory, the memory limit may be reached before the functional limit is reached.

Format Boundaries

The following table contains the functional boundaries for 3400 label formats. If you find that you have trouble managing the printer memory, you may want to restructure your formats or purchase additional memory.

Format Boundary Parameter	Functional Limit
Bar Code Height Magnification	999
Bar Code Width Magnification	99
Characters in a Field Name	8
Characters in a Field	250 (includes field delimiters)
Field Data Offset	9999
Fields in a Format	200
Font Character Height Magnification	250
Font Character Size	3 inches square
Font Character Width Magnification	250
Formats	20
Formats in a Page	26
Increment or Decrement Value	9999
Line Length	9999
Line Width	9999
Pages	10
Quantity or Batch Size	9999
Slaves to a Field	20
User-Defined Character Height Magnification	250
User-Defined Character Size	3 inches square
User-Defined Character Width Magnification	250

Format Boundary Parameter (continued)	**Functional Limit**
User-Defined Characters	100
User-Defined Font Sets	16

Communication Boundaries

The following table contains the communication boundaries for the 3400 printer.

Parameter	**Functional Limit**
Message Delay	9999 millisecond
Inter-Character Delay	9999 milliseconds
Message Block Size	255 (includes STX and ETX characters)

Appendix A

A

Printer Options

This page contains a list of the options you can use with the 3400 printer along with a brief description. Consult your Intermec representative to order any option.

Memory Expansion

The memory expansion option replaces the 32K of SRAM with 128K of SRAM to hold more formats, fonts, or bit-mapped graphics. It also increases the printer's image buffering capabilities. .

Twinax Interface

This option lets you connect your printer to an IBM twinaxial cable system with a twinax interface so your 3400 printer emulates an IBM 5256 Model 1 printer and can operate with an IBM System / 34, System / 36, System / 38 or AS / 400 host computer.

Coax Interface

The coax interface adapter lets the 3400 printer emulate an IBM 3287 printer by connecting the printer to IBM 3270 Type A coaxial cable computer systems operating in the VTAM (CICS / IMS / TSO) or 8100 (DPPX) environments. With the coaxial adapter you can connect the printer to an IBM 3174 / 76 / 99 system controller / multiplexer.

Batch Takeup

This device automatically spools labels as they are printed. This attachment is limited to small batches with maximum outer diameter (OD) of 5 inches.

Kanji/Katakana

This option allows the 3440 printer to print Japanese characters in two Kanji fonts and three Katakana fonts. This option also provides increased storage capacity.

Centronics Parallel Interface

The centronics parallel interface allows only one-way communications with the printer. You can either purchase the Intermec parallel cable (Intermec Part No. 051211), purchase the appropriate cable from your local computer store, or use the following information to make your own interface cable.

The following pin descriptions are for the printer's parallel interface connector:

Signal	Pin	Return	Direction	Description
DATASTB	1	19	IN	Negative pulse. Latches DB0-7 on the rising edge. Eight bits in parallel provide data input. High is logical 1 and LOW is logical 0.
DB0	2	20	IN	
DB1	3	21	IN	
DB2	4	22	IN	
DB3	5	23	IN	
DB4	6	24	IN	
DB5	7	25	IN	
DB6	8	26	IN	
DB7	9	27	IN	
ACK	10	28	OUT	Negative pulse. Data has been received.
BUSY	11	29	OUT	If HIGH, printer cannot receive data.
PE	12	30	OUT	If HIGH, out of ribbon or media.
SELECT	13	-	OUT	Pulled to +5V. Printer is on.
CHASSIS GND	17	-	-	Printer's chassis gnd isolated from logic gnd.
INIT	31	16	IN	Clears I/OINT0 latch.
FAULT	32	33	OUT	See printer display.

***Note**: The maximum cable length for a parallel interface is 10 feet.*

Appendix A

A

Bar Code Symbologies

Most of the following information has been taken out of *The Bar Code Book* by Roger C. Palmer (Intermec Part No. 051241). The 3400 printer can print a bar code on a label in any of the following symbologies:

Bar Code	Description
Codabar	A bar code symbology that is variable length, discrete, and self-checking. It requires close printing tolerances. It is used in department store price labeling, libraries, medicine, photofinishing envelopes, air bills, and American Blood Commission blood tags. The character set is limited to 16 characters: 0 – 9, dollar sign ($), colon (:), period (.), slash (/), plus, (+), and minus (-). Its maximum density is 12.8 characters per inch.
Code 2 of 5	A discrete, self-checking code for encoding numeric data only. The bars encode information and the spaces separate individual bars. It can achieve densities of 15 characters per inch. The Nieaf Company in the Netherlands developed Code 2 of 5.
Code 11	A high-density, discrete, numeric bar code developed by Intermec. The character set includes the numbers 0 through 9 and the dash character (-). Each character is represented by a standalone group of three bars with two included spaces. This code is not self-checking. One or two check digits provide data security. Code 11 is widely used in labeling telecommunications equipment. Its maximum density is 15 characters per inch.
Code 16K	A two-dimensional (stacked rows) ultra-high density bar code that has loose printing tolerances. Code 16K is based on Code 128 (128 squared is 16,384 or 16K). It requires a check digit. Code 16K is widely used in labeling unit-dose packaging for the healthcare industry; it is suitable for labeling small objects because it can encode more data in less area than many other codes. The character set includes all 128 ASCII characters.
Code 39	An alphanumeric bar code symbology that is discrete, variable length, and self-checking. It requires loose printing tolerances. It is used in manufacturing, government agencies, and healthcare. The character set is A – Z uppercase, 0 – 9, dollar sign ($), period (.), slash (/), percent (%), space ( ), plus, (+), and minus (-). It can be extended to full 128 character ASCII by use of a two-character encoding scheme (see full ASCII). Its maximum density is 9.8 characters per inch.
Code 49	A bar code symbology that is multirow, fixed length, and continuous. It requires loose printing tolerances. It is suitable for labeling small objects because it can encode more data in less area than other codes. The character set is all 128 ASCII characters. Its maximum density is 93.3 alphanumeric characters per inch or 154.3 numeric characters per inch.

Bar Code	Description
Code 93	A bar code symbology that is discrete, variable length, and self-checking. It requires loose printing tolerances. It can be used interchangeably with Code 39 when higher density printing is required. The character set is the same as Code 39: A – Z uppercase, 0 – 9, dollar sign ($), period (.), slash (/), percent (%), space ( ), plus, (+), and minus (-). It can be extended to full 128 character ASCII by use of a four-character encoding scheme (see Full ASCII). Its maximum density is 14.8 characters per inch.
Code 128	A variable length, continuous, and weakly self-checking bar code developed by Computer Identics. It requires loose printing tolerances. Its high density makes it useful when printing data in a limited space. The character set includes all 128 ASCII characters. Each character is represented by 11 modules and four bar widths. Its maximum density is 12.1 alphanumeric characters per inch or 24.2 numeric characters per inch.
Code One	A 2D matrix symbology that is especially useful for applications such as small parts labels that do not provide sufficient space for linear bar codes. In addition to data storage and error correction symbols, each Code One symbol contains a set of horizontal lines in the center, called a finder pattern, that helps readers quickly locate and identify each symbol. Code One symbols also contain vertical reference bars to help readers locate the relative positions of each data bit.
EAN	European Article Numbering; now also called IAN (International Article Numbering). International standard bar code for retail food packages corresponding to the Universal Product Code (UPC) in the United States. UPC is a subset of EAN, and a reader equipped to read EAN can also read UPC. A reader equipped to read UPC may not decode EAN. The EAN and UPC symbols were developed by IBM and introduced into the market in 1971. The U.S. adopted UPC in 1973; EAN was adopted in 1976.
HIBC	Health Industry Bar Code standard. A modified version of Code 39 that has 43 characters, utilizes the Modulus 43 check character, and reserves some character combinations for special usage.
Interleaved 2 of 5	A bar code developed by Intermec for Computer Identics that encodes the ten digits 0 through 9. The name Interleaved 2 of 5 is derived from the method used to encode two characters. In this symbol, two characters are paired, using bars to represent the first character and the interleaved spaces to represent the second character. Each character has two wide elements and three narrow elements, for a total of five elements. The specification for this bar code is set forth in MHI / AIR USD-1. It can achieve a maximum density of 7.8 characters per inch.

Bar Code	Description
Maxicode	Maxicode is a fixed-size symbology where height and width magnification is ignored. This symbology is made up of offset rows of hexagonal elements arranged around a bull's-eye finder pattern. Each hexagon represents one bit of information and is either black or white depending on the state of the encoded data bit. United Parcel Service (UPS) developed Maxicode for the specific purpose of encoding information about a parcel.
PDF417	A 2D stacked symbology. Each row includes start / stop characters, row identifiers, and symbol characters, which consist of four bars and four spaces each and contain the actual data. PDF417 provides an extensive error detection and correction option that can recover up to 510 characters lost due to a damaged label or to an error in scanning.
POSTNET	The Postal Numeric Encoding Technique (POSTNET) was developed by the U.S. Postal Service to provide an optimized bar code system for encoding ZIP code information on letter mail so that the encoded information may be reliably read and decoded by optical reading systems. POSTNET utilizes redundant information within a compact bar code format to provide error detection capability and a significant degree of error correction capability.
UPC	Encodes the number system character (type of encoded product), five-digit manufacturer number assigned by the UPCC, five-digit product code assigned by the manufacturer, and a modulus 10 check digit as the 11th character. The code is numeric, and there are other versions. Nominal dimensions for the UPC symbol include a module width of 13 mils (+-) 4 mils. Magnification factors range from 0.80 to 2.00 of nominal supporting densities of 10.21 to 4.08 characters per inch, with a nominal of 8.17 characters per inch.

International Character Sets

The following tables show which hex codes to download for international characters not available in the U.S. character set. To use the tables, find the hex code for the U.S. character that corresponds with the character in your language.

Advanced Character Table

If you are running your printer in Advanced mode (you are not using 86XX emulation), use this table to find the right hex codes for the international character sets.

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

8636/46 Character Table

This table shows the hex codes for the character sets that print if your printer is running under 86XX emulation mode.

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

IBM Translation Character Table

If you are running your printer with Translation enabled, use this table to find the right hex codes for the international character sets.

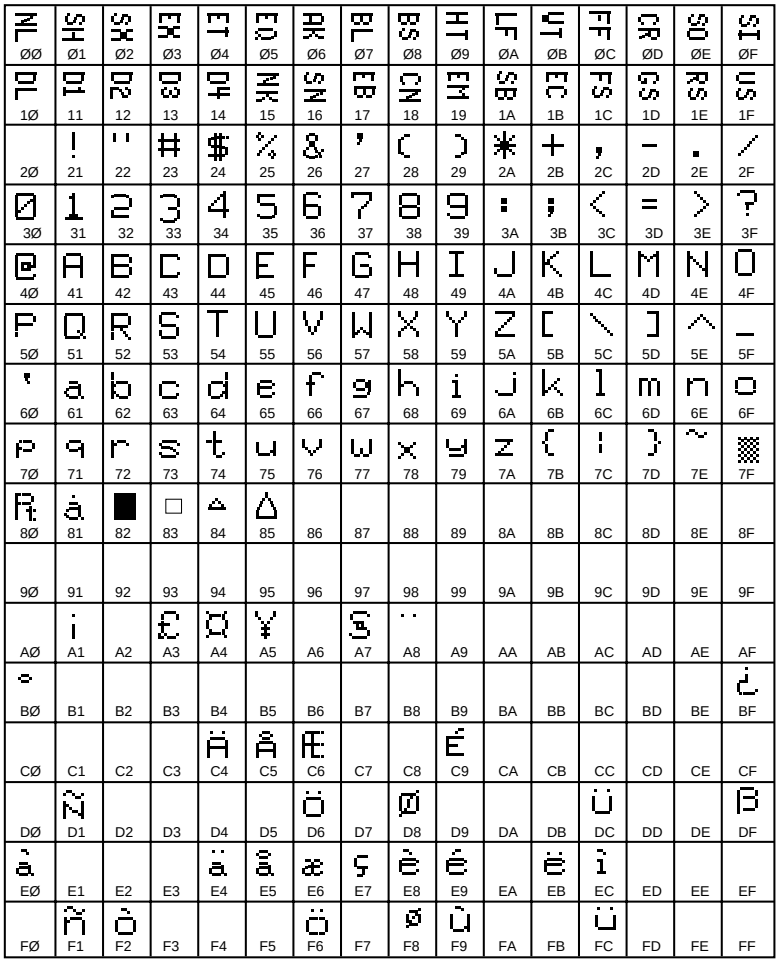
	4F	7B	5B	7C	4A	E0	5A	5F	79	C0	6A	D0	A1
U.S. ASCII	¦	#	$	@	¢	\	!	¬	`	{	¦	}	~
U.K. ASCII	¦	#	£	@	$	\	!	¬	`	{	¦	}	_
Germany	!	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
France	!	£	$	à	°	ç	§	^	`	é	ù	è	¨
Norway/Denmark	!	Æ	Å	Ø	#	\	¤	^	`	æ	ø	å	ü
Sweden/Finland	!	Ä	Å	Ö	§	É	¤	^	é	ä	ö	å	ü
Spain	¦	Ñ	Pt	@	[	\	]	¬	`	{	ñ	}	¨
Switzerland	!	#	$	à	°	ç	é	^	ù	ä	ö	ü	è
Italy	!	£	$	§	°	ç	é	^	ù	à	ò	è	ì

Extended Character Sets

Each internal font in the 3400 has a different character set associated with it as shown in the following tables. The hex codes accompany each character.

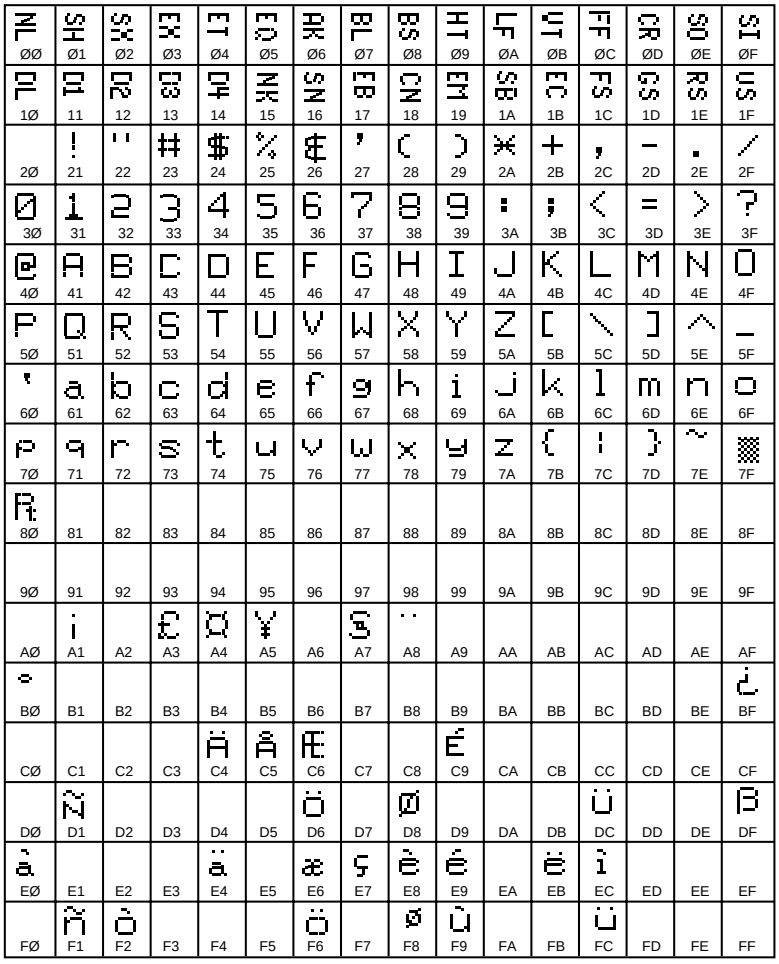
Characters in Fonts

c0 7x9 Standard
c1 7x11 OCR
c2 10x14 Standard



3400-55

Characters in Font c7 5x7 Standard



3400-56

Characters in Fonts ***c20 8 point***
c21 12 point
c22 20 point

ØØ	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	ØA	ØB	ØC	ØD	ØE	ØE
1Ø	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
2Ø	! 21	" 22	# 23	$ 24	% 25	& 26	' 27	(28	) 29	* 2A	+ 2B	, 2C	- 2D	. 2E	/ 2F
0 3Ø	1 31	2 32	3 33	4 34	5 35	6 36	7 37	8 38	9 39	: 3A	; 3B	< 3C	= 3D	> 3E	? 3F
@ 4Ø	A 41	B 42	C 43	D 44	E 45	F 46	G 47	H 48	I 49	J 4A	K 4B	L 4C	M 4D	N 4E	O 4F
P 5Ø	Q 51	R 52	S 53	T 54	U 55	V 56	W 57	X 58	Y 59	Z 5A	[5B	\ 5C	] 5D	^ 5E	_ 5F
` 6Ø	a 61	b 62	c 63	d 64	e 65	f 66	g 67	h 68	i 69	j 6A	k 6B	l 6C	m 6D	n 6E	o 6F
p 7Ø	q 71	r 72	s 73	t 74	u 75	v 76	w 77	x 78	y 79	z 7A	{ 7B	| 7C	} 7D	~ 7E	7F
8Ø	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F
9Ø	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F
AØ	¡ A1	¢ A2	£ A3	¤ A4	¥ A5	¦ A6	§ A7	¨ A8	© A9	a AA	« AB	¬ AC	- AD	® AE	¯ AF
º BØ	± B1	2 B2	3 B3	´ B4	µ B5	¶ B6	· B7	¸ B8	1 B9	0 BA	» BB	¼ BC	½ BD	¾ BE	¿ BF
À CØ	Á C1	Â C2	Ã C3	Ä C4	Å C5	Æ C6	Ç C7	È C8	É C9	Ê CA	Ë CB	Ì CC	Í CD	Î CE	Ï CF
Ð DØ	Ñ D1	Ò D2	Ó D3	Ô D4	Õ D5	Ö D6	× D7	Ø D8	Ù D8	Ú DA	Û DB	Ü DC	Ý DD	Þ DE	ß DF
à EØ	á E1	â E2	ã E3	ä E4	å E5	æ E6	ç E7	è E8	é E9	ê EA	ë EB	ì EC	í ED	î EE	ï EF
õ FØ	ñ F1	ò F2	ó F3	ô F4	õ F5	ö F6	÷ F7	ø F8	ù F9	ú FA	û FB	ü FC	ý FD	þ FE	ÿ FF

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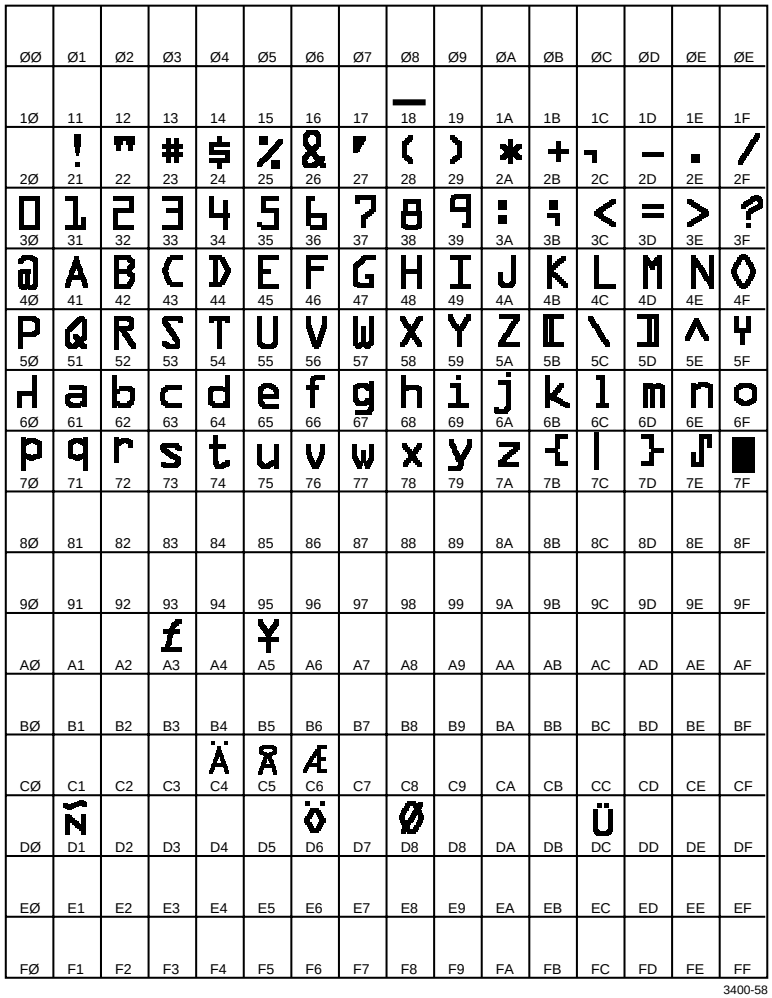
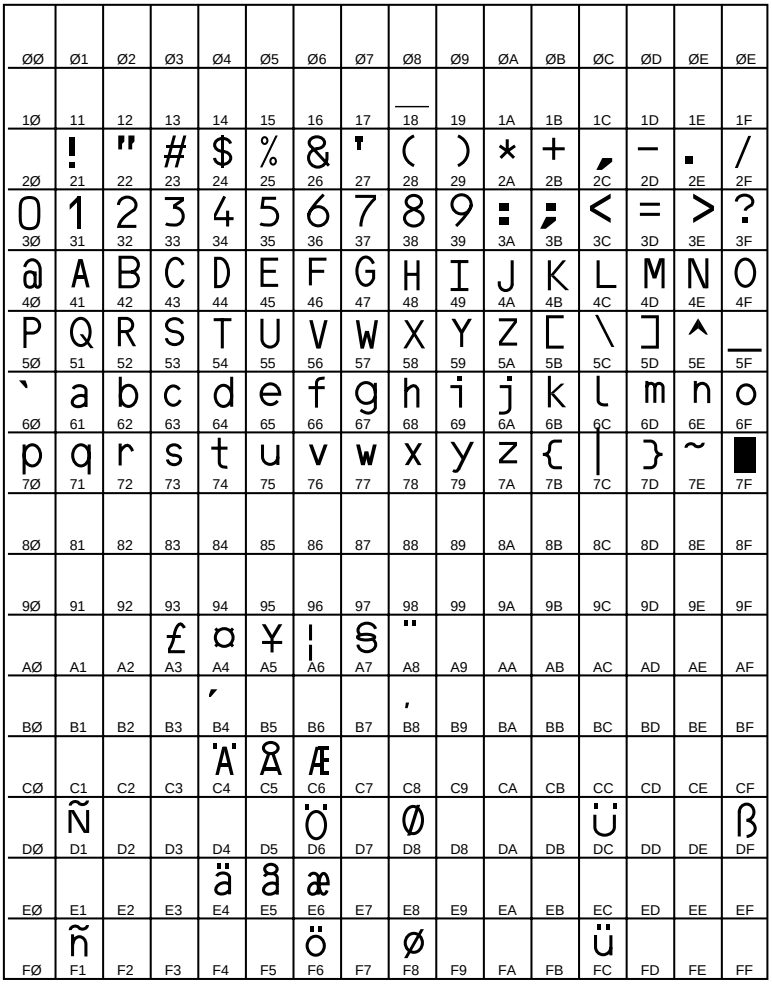
Characters in Font c23 OCR A



3400-58

Characters in Font c24 OCR B Size 2



3400-59

Appendix A

A

DIP Switch Settings

Insert the Pagemaker fold-out page here.

Appendix A

Full ASCII Chart {XE "Full ASCII chart"}{ XE "ASCII chart, pull-out table" }

Insert the Pagemaker fold-out page here.

B

Appendix B

Appendix B

Communications Reference

Use the following information on interfaces and protocols if you are integrating your 3400 printer into a data collection network.

Host Requirements

Hardware and software requirements for operating the 3400 printer are 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-232, RS-422, or RS-485.

For information on 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) Unlimited block size for XON / XOFF
Device address number (Multi-Drop only)	A to Z, 0 to 5

Communication Protocols

Communication protocols are important because they determine the transmission standards for communication between the printer and the host. The 3400 and the host must use the same protocol and parameters to communicate properly. The 3400 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* (Intermec Part No. 044737).

Intermec Standard Protocol

Intermec Standard protocol is a proprietary block transfer / status response protocol. Except for single character status commands (<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 or 512 (for the 4400 only) characters, including the start of text and end of text characters. The 3400 printer auto-discriminates between Standard, Polling Mode D, and Multi-Drop protocols.

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 30ms to 100ms 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 the table below:

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
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, the buffer is already full and the entire message clock has been discarded.

XON/XOFF Protocol (Software and Hardware Flow Control)

The 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 this 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 printer's serial port to indicate "Ready" or "Busy" for data flow control. As with Standard protocol, data is enclosed by <STX> and <ETX>. Status responses conform to the table above except that <DC2> is substituted for <DC1> and <DC4> is substituted for <DC3>.

The message length for the 3400 printer in this protocol is unrestricted. That is, the printer processes information as it is being downloaded and stops when there is no more information. There is no restriction on the number of characters that can be sent down at a time. <STX> and <ETX> are optional.

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 printer's 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 has transferred all the data from the input buffer. If a <DC3> is sent, the printer transmits a <DC1> (XON) and the host may resume transmission. When the printer is switched to Offline, pin 11/20 becomes "Busy" and a <DC3> is transmitted. When the printer is switched to Online (and the input buffer is empty), pin 11/20 becomes "Ready" and a DC1 is transmitted.

Printer XON/XOFF operation is shown in the following state table:

# of Bytes Received	Online/Offline	Pin 11/20	Transmit
Don't Care	Offline	Busy	DC3
768	Online	Busy	
768 + each 15 thereafter	Online	Busy	DC3
Buffer Empty	Online	Ready	DC1 (if DC3 was sent)

XON/XOFF, No Status Protocol

This protocol is identical to XON/XOFF protocol except that status is not returned after each message received. However, status is still returned for the status request (<ENQ>) and the status dump (<VT>) commands.

Polling Mode D

Polling Mode D is a block transfer protocol that transmits data in blocks of up to 255 characters, including protocol overhead. For Polling Mode D, the host/concentrator is responsible for asking the printer for data it might have (polling) and requesting to send data to the printer (selecting). The blocks are framed with LRC characters for additional data integrity. Polling Mode D is normally used for point-to-point networks that connect the 3400 to an Intermec port concentrator (RS-232 or RS-422 are acceptable).

This protocol is the default setting for the 3400 printer. Return the protocol setting to Polling Mode D by setting the printer DIP switches to the factory default settings (9600, E, 7, 1) or by sending down the Test and Service mode command "D."

Multi-Drop Protocol

Multi-Drop lets you connect up to 32 devices to an Intermec controller on a four-wire RS-485 (two twisted pair). This protocol is similar to Polling Mode D except each device has a unique address (POL and SEL character). You must use an 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.

User-Defined Protocol

The 3400 printer provides the capability to change protocol characters. However, the user may not define their own protocol. The user may substitute characters to be used as protocol characters, but the rules for the chosen protocol do not change. Any protocol characters that are replaced by the NUL character are not used. One table of protocol characters exists. The user may redefine these characters to create a table that is used by all of the protocols. One possibility for the user to redefine protocol characters might be the replacement of control characters with printable characters.

Note: *Please use caution when replacing control characters with printable characters. One control character cannot be replaced with more than one printable character.*

The following table lists the protocol characters that may be redefined and the protocols they affect:

Character	Protocol Affected
SELECT IN	POL MODE D, MULTI-DROP
POLL IN	POL MODE D, MULTI-DROP
RES IN	POL MODE D, MULTI-DROP
REQ IN	POL MODE D, MULTI-DROP
SOM IN	STD, POL MODE D, MULTI-DROP, XON / XOFF
EOM IN	STD, POL MODE D, MULTI-DROP, XON / XOFF
AFF IN	POL MODE D, MULTI-DROP
NEG IN	POL MODE D, MULTI-DROP
DLE IN	STD, POL MODE D, MULTI-DROP, XON / XOFF
XON IN	XON / XOFF
XOFF IN	XON / XOFF
SELECT OUT	MULTI-DROP
POLL OUT	MULTI-DROP
RES OUT	POL MODE D, MULTI-DROP
REQ OUT	POL MODE D, MULTI-DROP
SOM OUT	POL MODE D, MULTI-DROP
EOM OUT	POL MODE D, MULTI-DROP
AFF OUT	POL MODE D, MULTI-DROP
NEG OUT	STD, POL MODE D, MULTI-DROP
DLE OUT	STD, POL MODE D, MULTI-DROP
XON OUT	XON / XOFF
XOFF OUT	XON / XOFF
PROTO-CMD 1	STD, XON / XOFF
PROTO-CMD 2	STD, XON / XOFF
TIMEOUT ON EOM	POL MODE D, MULTI-DROP

Communications Interfaces

The 3400 printer supports serial communications with the following interfaces:

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

These interfaces are described below. You can find more detailed information in the *Data Communications Reference Manual* (Intermec Part No. 044737).

RS-232 Serial Interface

The RS-232 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 following table to operate properly under RS-232.

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 following table to operate properly under RS-422.

RS-485 Serial Interface

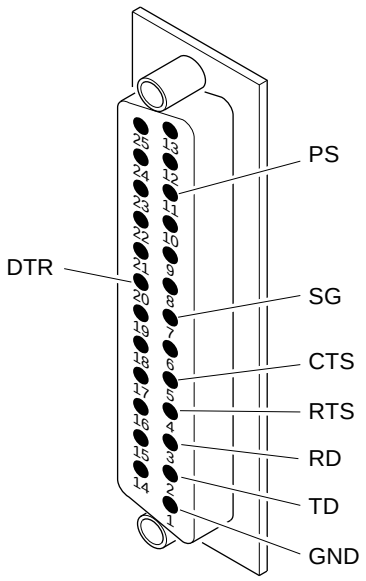
The RS-485 serial interface is used for Multi-Drop installations only. The cable connected to the printer must have the pin assignments listed in the following table to operate properly under RS-485.

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, connect 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 (SG)	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 (for example, CTS). Indicates printer mechanical status and status of printer input buffer.

Interface	Pin No.	Name	Operation
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 DTR pin. When using Intermec Standard Protocol, this pin indicates that the printer is switched on. When using XON / XOFF or hardware flow control, this pin indicates the printer mechanical status and the status of the printer input buffer.

Printer Serial Port

The serial port connector is located 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 figure:



4400-16

G

Glossary

ASCII
American Standard Code for Information Interchange. A standard, 7-bit character code used for computing.

backing
Silicon release liner on media to which labels are attached until ready for use.

bar code
A printed machine-readable code that consists of parallel bars of varied width and spacing.

batch takeup
A device that rewinds media; useful for printing batches of labels.

BEL
A character that sends an error message.

character set
Refers to specific letters, numerals, and symbols that support a particular language (for example, French, US ASCII).

cloning
A procedure that copies the RAM contents (configuration, formats, fonts, pages and graphics) from the memory of one printer to the memory of another.

configuration
The current settings that determine the operating characteristics of the printer.

Data Line Print mode
A mode of operation in which the printer prints each command (accompanied by its ASCII code) that it receives from the host.

data file
The collection of data and printer commands that, when sent to the printer, is merged with a format file to print a label.

density
The amount of information encoded in a given area.

direct thermal
A method of thermal printing in which images are printed when heat from the thermal printhead produces a black mark on the media.

drag
A method of bar code printing in which all the bars are printed at once, in parallel. The bar code appears across the width of the label.

EAN
European Article Numbering; now also called IAN (International Article Numbering). International standard bar code for retail food packages corresponding to the Universal Product Code (UPC) in the United States.

Emulation mode
An operating mode in which the printer has the operating characteristics of another printer. The 3400 can operate in 8636/46 Emulation which emulates an Intermec 8636 or 8646 printer.

Feed/Pause
A printer control panel button that advances the media.

field
A graphic element which is the basic unit of a format. The four basic types of fields are bar code, graphic, line, and text.

fixed data field
Bar code and text fields that never vary from one label to the next; the data in a fixed field is a permanent part of the format.

fixed format
A format in which the data never varies from one label to the next such as a return address label. A fixed format needs no additional data to print a label.

font
A character set of a given type size and style. See also character set.

font file
See Soft Font.

format file
The arrangement of fields on a label.

graphic
A bitmap picture downloaded to the printer by the host before printing.

HIBC
Health Industry Bar Code standard. A modified version of Code 39 that has 43 characters, utilizes the Modulus 43 check character, and reserves some character combinations for special usage.

human-readable
A character, number, or symbol printed in a font that can be read by a human; as opposed to bar code symbology, which can only be read by a machine. See text.

image bands
A portion of an image, in the shape of a strip of the image. A certain number of image bands are stored in memory before printing begins. This method allows printing and imaging to take place simultaneously.

imaging
The process of generating a picture of the label in printer memory.

increment/decrement field
Bar code or text fields the printer automatically changes from one label to the next. For example, a batch of labels with serial number text or bar code fields, that change from 001, to 002, to 003, and so on.

index
To move from the start of the label to the start of print. With continuous media, to advance the media over the "label gap" to the "edge" of the next label.

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

ISO
International Organization for Standardization. An internationally accepted 7-bit character code. (The US version is ASCII.)

ips
Inches per second. A measurement of print speed that measures the number of inches of media printed each second.

label
The part of the media on which data prints.

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.

offline
The state in which the printer is not able to carry out two-way communication with the host.

online
The state in which the printer is able to carry out two-way communication with the host.

page
A group of labels that are always printed together. When labels on a page share the same data, it reduces the number of commands that must be sent to the printer.

parallel
A communication scheme in which the bits of a byte are transferred simultaneously over a multistrand cable.

parameters
The operating limits of the printer.

picket
A method of bar code printing in which the bars in the bar code are printed one at a time, in a series. The bar code appears along the length of the label.

pitch
(1) The number of characters printed in one horizontal inch determined by the increment by which the printer platen moves. (2) Rotation of a bar code symbol about an axis parallel to the direction of the bars.

point size
Font height; 72 points equals one-inch as measured from slightly above the top of the upper-case letters to slightly below the bottom of the lower-case descenders.

Polling Mode D
A protocol capable of controlling communications between multiple devices and a single multiport controller.

print speed
Measured in inches per second (ips), the rate at which media travels past the printhead.

printhead
The mechanism inside the printer that prints. The printhead consists of 832 thermal elements.

printhead elements
The parts of the printhead that print by placing a mark on the label when heated. Each element is 0.005 square inches in area and is switch on and off separately in order to react with the media or thermal transfer ribbon to create a mark on the label.

ready
The state in which the printer is able to print; the normal operating state of the printer.

Ready/Busy line
Pin 11/20 of the rear panel connector. Indicates the printer is ready or not ready.

RS-232
Standard for serial binary data interchange. The standard covers the physical, electrical, and functional characteristics of the interface.

RS-422
Standard for the voltage and impedance levels for serial data transmission on balanced lines.

RS-485
Standard for allowing multiple devices to share a common set of serial data communication lines. The signaling is very similar to RS-422. The maximum number of devices allowed is 32.

scan
To read a bar code with a device known as a scanner, 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 optional device for the 3400 printer that presents each label after it is printed, with the backing removed so it may be applied immediately.

sensitivity
The responsiveness of thermal media, or of thermal transfer ribbon, to heat; it is determined by the time required for a unit measure of heat to affect the media or ribbon.

serial
A communication scheme in which the bits of a byte are transferred one at a time.

skip
To move the paper at slew speed to the next label.

soft font
A file stored in the printer to provide the ability to print text using fonts that are not resident in the printer.

Standard protocol
A communications protocol capable of controlling communications between two devices connected by a single data communication line.

symbology
A scheme for encoding data as bar code. Code 39, Interleaved 2 of 5, and Codabar are examples of different symbologies.

thermal transfer
A method of printing by which heat from the printhead melts ink from the ribbon onto media. The ink adheres to the media as it cools.

top of form
The point at which printing can start on a label. Separated from the edge of the label by the margin.

UPC
Universal Product Code. Bar code used widely in the United States.

user-defined characters (UDC)
See Graphic.

user-defined fonts (UDF)
See Soft Font.

variable data field
Bar code and text fields that change from one label to the next.

XON/XOFF
A protocol that stops the host from sending data when the printer buffer fills up and starts it again when the buffer empties.

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