

# **CHAPTER ONE – INTRODUCTION AND SPECIFICATIONS**

## **1.1 INTRODUCTION**

7400 Series printers are available in many different configurations; this manual includes detailed information for all configurations.

### **All 7400 Series printers incorporate the following standard features:**

- Durable, impact dot matrix receipt/journal printer with multiline validation
- 40 or 80 columns of print on one or two-ply paper (single-platen)
- Side-by-side receipt and journal in a variety of print columns including 40/40 (split-platen)
- Up to 40 lines of validation on checks or slips (up to 6 inch width)
- Selectable bar code printing for codes UPC-A, Interleaved 2 of 5, Code 39, and Code 128
- Up to 3.4 lines per second print speed (40 column)
- International character fonts
- Printer setup stored in EEPROM – switch selectable
- Take-up handler for the journal copy
- Pearl white color
- Cash drawer activation port

### **User specified options include the following:**

- Various printing column widths and platen lengths
- Dual cash drawer activation
- Automatic receipt cutter (autocutter)
- Interface cables
- Automatic receipt cutter -- full or tab cut for single ply-paper only
- Dual cash drawer activation port
- Custom programmable EPROM
- Time/date calendar/battery back-up -- Y2K compliant
- Locking journal case

## 1.2 SPECIFICATIONS

### *Printer Operations*

Print method	Bidirectional
Print speed	Up to 3.4 lines per second
Print type	9-needle impact dot matrix
Throughput	Up to 2.5 lps maximum

### *Printing Characteristics*

Font matrix	4x9 or 5x9 normal, 8x9 or 10x9 elongated
Character size	Up to 0.07"(W) x 0.12"(H) [1.8 x 3.1 mm]
Character set	Standard 96 character ASCII; international character sets included
Selectable bar codes	UPC-A, Interleaved 2 of 5, Code 39, and Code 128

### *Print Format (see Table 1.1 for single-/split-platen configuration)*

Number of columns	40 or 80 (single-platen); 24/24, 32/32, 38/38, 40/20, or 40/40 (split-platen)
Character spacing	Up to 20.5 cpi (10.25 cpi elongated)
Line spacing	6 lines per vertical inch-standard; 8 lines per vertical inch-optional
Printer area width	
Single platen	3.31" (84.0 mm) or 4.38" (111.0 mm)
Even-split platen	1.96" (49.8 mm)
Uneven-split platen	2.46" (62.5 mm) and 1.28" (32.5 mm)

**Table 1.1 – Single-/Split Platen Configuration**

Receipt Paper Width (in/mm)	Receipt Number of Columns	Journal Paper Width (in/mm)	Journal Number of Columns	Slip Val. Number of Columns	Print Density (cpi)
<b>Single</b> 4.50/114	80	4.50/114	80	80	18.5
<b>Split</b> 2.25/57	24	2.25/57	24	52	12.0
2.25/57	32	2.25/57	32	69	16.1
2.25/57	38	2.25/57	38	80	18.5
3.00/76	40	1.50/38	20	64	14.5
2.25/57	40	2.25/57	40	88	20.5
3.50/89	40	3.50/89	40	52	12.0

***Paper Handling***

Paper feed Friction rollers  
Rapid feed 5 lines per print head pass

***Interface***

Serial RS-232; DB-25F connector  
Baud rate 110, 150, 300, 600, 1200, 2400, 4800,  
or 9600  
Parallel 36-pin Centronics connector

***Communications Buffer***

Standard buffer 7936 bytes (8K RAM)  
Optional buffer 32512 bytes (32K RAM)

***Physical Characteristics***

Dimensions (W x D x H) 235 mm x 349 mm x 142 mm  
(9.25" x 13.75" x 5.6")  
Weight 15 pounds approximately

***Electronic Characteristics***

Programming EPROM  
Setup EEPROM

***Power Requirements***

Input voltage 120/240 VAC switch selectable  
Frequency 50/60 Hz  
Power 96 watts, operating

***Environmental***

Temperature  
Operating 0° to 40°C (32° to 104°F)  
Storage -20° to 60°C (-4° to 140°F)  
Relative humidity  
Operating 20% to 80% noncondensing  
Storage 5% to 95% noncondensing

### ***Reliability***

Mechanism life	10 million lines
Print head life	200 million characters
Autocutter life	250,000 cuts (single-ply paper)

### ***Ribbons***

Inked ribbon color	Purple or black
Type	Cartridge, nylon fabric, 0.5" x 27'
Life expectancy	6 million characters

### ***Validation Slip***

Maximum thickness	0.25 mm (0.01")
Maximum width	152.4 mm (6")
Number of copies	Up to 3: original and 2 copies
Print mode	Unidirectional; bidirectional; single-line

### ***Paper***

Single-platen width	89 mm (3.5 inch) one or two-ply roll 114 mm (4.5 inch) one or two-ply roll
Split-platen width	76 mm (3 inch) one-ply roll 57 mm (2.25 inch) one-ply roll 38 mm (1.5 inch) one-ply roll Consult factory for additional specifications.

### ***Certifications***

FCC
ETL (UL 1950)
Time/date Y2K compliant

## CHAPTER TWO - INSTALLATION

### **2.1 INITIAL POWER-UP**

**Note:** Serious damage may occur if an incorrect power source is inadvertently connected to the printer. If you are unsure as to the correct power requirements and connections, refer to the power requirements specifications given on **page 3, Section 1.2.**

Once you have verified the power requirements and have made the proper connections, turn the power switch on. The printer will go into an initialization state and, after a few seconds, the print head should move to the left end of the mechanism.

If the printer is in working order, follow the procedures listed below for ink cartridge and paper loading before configuring the printer (printed output is required when configuring the EEPROM).

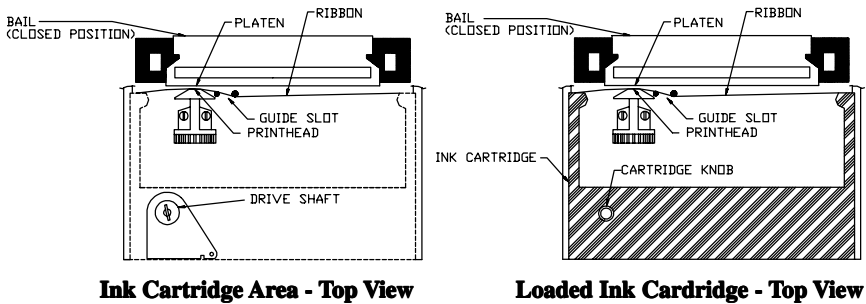
If the printer does not respond, make sure power is well connected, re-examine the power source for correct voltage compatibility, and/or check the fuse inside the printer frame. Call our Technical Support Group at (617) 254-1200 if the printer does not respond or if any other installation/configuration problems occur.

### **2.2 INK CARTRIDGE LOADING**

1. Turn the power off and remove the printer cover. Remove the used ink cartridge by pulling it directly off of the drive shaft (refer to **page 6, Figure 2.1**).
2. Before inserting the new ink cartridge, turn the cartridge knob counterclockwise until the ribbon is taut.
3. Carefully mount the ink cartridge onto the drive shaft, keeping the ribbon in between the platen and the print head.

**Note:** During installation, you should hear the ink cartridge snap into place.

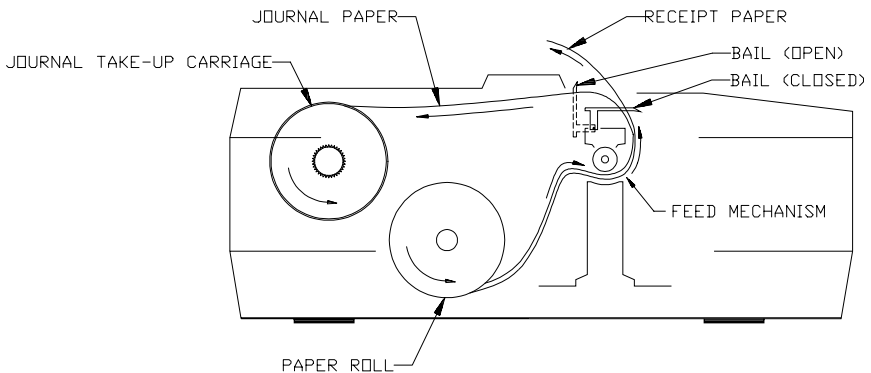
4. Thread the ribbon through the guide slot and, before closing the bail, make sure the ribbon is still tight by turning the cartridge knob counterclockwise.
5. The ink cartridge is now loaded.



**Figure 2.1**

### 2.3 PAPER LOADING

1. Turn the printer off and remove the paper cover.
2. Referring to **Figure 2.2**, insert the paper roll as shown and guide the paper through the feed mechanism.
3. Press the feed switch to advance the paper through the bail.
4. Lift the bail and manually direct the paper through the bail slot. Close the bail.
5. Advance the journal paper until it can be fastened to the journal take-up carriage.
6. When the journal paper has been attached to the clip on the journal take-up carriage, advance the journal take-up carriage by hand until the journal paper is taut.
7. The paper is now loaded. To configure your printer, refer to *Chapter Three – Printer Configuration*.



**Figure 2.2**

## CHAPTER THREE – PRINTER CONFIGURATION

### 3.1 INTRODUCTION

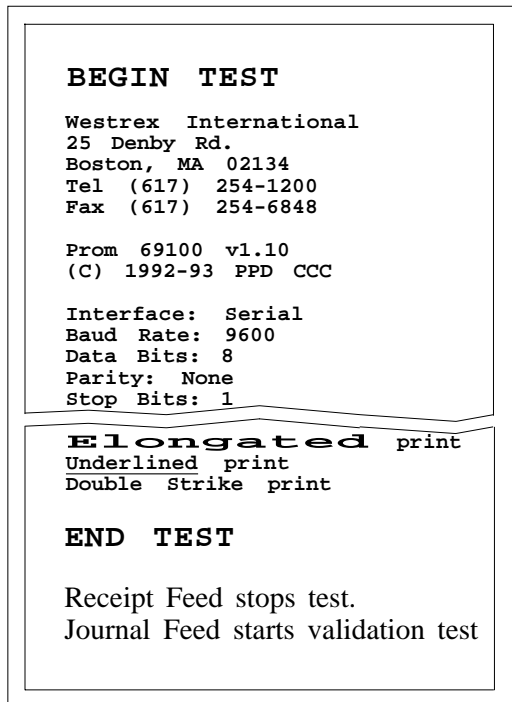
This chapter demonstrates how to obtain a printed self-test and describes all aspects of configuring the EEPROM parameters via the setup menu.

**Note:** Configuring a 7400 Series Printer requires printed output; the ink cartridge and paper must be loaded.

A self-test is recommended before using the setup menu for several reasons. A self-test performs a confidence test, initializes hardware, and reads the default settings of various software features from EEPROM. A self-test outputs a hard copy of all default EEPROM parameters which may need to be altered, depending on the user. A self-test also outputs examples of printed text, graphic characters, and text styles as well as running a slip validation test. Hence, it is particularly useful to print a self-test before changing the parameters in the setup mode. Running a confirmation self-test after configuring the EEPROM is also recommended.

### 3.2 OBTAINING A SELF-TEST PRINT OUT

1. Ensure that the ink cartridge and receipt paper have been loaded.
2. Turn the power off.
3. Depress and hold the receipt feed switch.
4. Turn the power on; hold the receipt feed switch down until printing begins.
5. Release the receipt feed switch. The self-test will now print out and should look similar to **Figure 3.1**.
6. After the self-test, a slip validation test may be performed. If a validation test is desired, press the journal feed switch. To cancel the test, press the receipt feed switch. **For more information on slip validation procedures, refer to page 18, Section 4.2.1.**



**Figure 3.1 - Sample Self-Test Print Out**

### 3.3 SETUP MENU AND CONFIGURATION

The setup menu allows you to modify EEPROM parameter settings by using the paper cut and receipt feed switches as each parameter is printed on the receipt paper, one by one, as instructed below. For more EEPROM information, refer to **pages 8-10, Section 3.4 - Printer EEPROM Parameters**.

#### Modifying an EEPROM Value:

1. Ensure that the ink cartridge and receipt paper have been loaded.
  2. Turn the power off.
  3. Depress and hold the paper cut switch.
  4. Turn the power on and release the paper cut switch. The words “Menu: Setup” are printed.
  5. The first parameter's default value will be printed.
    - a. If you want to keep the default value, press the paper cut switch to move on to the next parameter.
    - b. If you would like to change the default value, press the receipt feed switch; the printer will then print out the next available value for the baud rate. Subsequent toggles of the receipt feed switch will cause the current parameter to cycle through all values. When you get to the correct value, press the paper cut switch; the paper cut switch stores the last value printed and moves on to the next parameter.
- Repeat *step 5* for each EEPROM parameter.**
6. When you move past the last parameter in the menu, the system will store the user modified values into memory as the words “SAVING TO EEPROM” and, after a moment, “DONE” are printed. The printer then returns to normal operation.

7. Run a self-test to verify the changes.

### 3.4 PRINTER EEPROM PARAMETERS

<u>Parameter</u>	<u>Settings</u>	<u>Comments</u>
Baud Rate:	110; 150; 300; 600; 1200; 2400; 4800; 9600	These serial interface parameters must match the host interface.

Stop Bits:	1; 2	All stop bit combinations are possible except for: <u>7 data, 1 stop, no parity</u> ; this combination is not supported
Data Bits:	7; 8	
Parity:	None; Even; Odd	
Pin 4/5:	RTS/Off; RTS/CTS; RTS/Reset; Error/Reset	Select "RTS/CTS" for standard operation.
RVI:	Enabled; Disabled	Select "Disabled" for standard operation.
ID:	0 thru 9	Printer ID number for serial interface. See <b>page 36</b> .
Platen:	40 long; 40 short; 80 long 7250; 40 long 7250; 40 short 7250; 80; 27/27; 32/32; 38/38; 40/20; 40/40	This is set at the factory and must never be changed. A 4.5" single platen is always 80 columns long. A 3.5" single platen is 40 columns long or short. An uneven-split platen is always 40/20 columns. An even-split platen can be 27/27, 32/32, 38/38 or 40/40 columns.
Validation:	Single line; Unidirectional; Bidirectional	This parameter must match the validation style of the installed mechanism.
BOF Sensors:	Type 1; Type 5	This is set at the factory and should not be changed. Type 1 = 42.9 mm; Type 5 = 36.9 mm.
Autofeed:	Off; On	When on, the printer will feed one line after a carriage return.
Control Codes:	PPD; ANSI	Selects the default control code set.
Set:	USA; UK; German; French; Swedish; Danish; Netherlands; Dutch; Italian; TRS-80; Spanish; Japanese (Yen); Norwegian	Selects the default international character set.

Bar Code Speed	Fast (light duty) Normal	Faster printing yields slightly less quality
Bar Code Height	1 line 2 lines 3 lines 4 lines	It is easier to line up a scanner on a taller bar code; however, it takes longer to print.
Optional Check Digit	Off; On	Defines the power-up state of the check digit option for Interleaved 2 of 5 Code and Code 39.
Bar Code Overstrike	Off; On	Overstriking produces a better quality bar code; however, it takes twice as long to print.
Bars	Wide; Thin	More data can fit into the bar code using thin bar resolution. Interleaved 2 of 5 and Code 39, both 3:1 two-level codes, are readable using thin bars. Code 128 and UPC, both four-level codes, are not. However, UPC is a fixed length code, so it does not benefit from the use of thin bars. <b>NOTE:</b> If a bar code is too big to fit on the receipt, it will not be printed.
Debug:	Off; On	“Off” for normal operation. “On” to print control codes sent from computer.
Paper Out:	Beep; Off-line; Ignore	Selects the printer’s response to a paper out condition.
Set Clock?:	No; Yes	If the clock option is present, select “Yes” to proceed to set the time and date.* Select “No” to end the setup procedure.

\* To set the time, press the feed switch to increment the digit pointed to by the arrow. If you go past the number, continue pressing the feed switch; the value returns to 0 after 9. If the value is correct as it is, do not press the feed switch. When the value is correct, press the cut switch to move on to the next digit. Continue this process until all values of the time have been set. The AM/PM portion of the time is set in the same way. After the time has been set, the date is printed; set the date in the same manner as the time. **NOTE:** The time and date can be easily set using host control codes (see **Chapter 5**).

## CHAPTER FOUR – SPECIAL FUNCTIONS

### 4.1 RESET PROCEDURE

When powered on or reset by the host, the printer performs a confidence test, initializes hardware and reads the default settings of various software features from EEPROM. The printer moves the print head to the left margin and goes “unbusy” in the manner appropriate to the interface. In the case of an RS-232C interface, the printer raises RTS and transmits an XON. For the parallel interface, the printer lowers the busy line and pulses the acknowledge signal. The printer then begins normal on-line operation.

If an error was detected during the self-test in RAM or EPROM, the printer does not attempt to move the print head. It goes “unbusy” as described above, then sounds an alarm for about five seconds. The error line is asserted on the parallel interface.

### 4.2 RESET FROM COMPUTER

A hardware reset line is provided on the parallel interface. A reset function may be specified for pin 5 of the serial interface in the setup menu; pin 5 is then monitored by printer software. The printer may also be reset by software control codes. The printer resets immediately when a DC1 <1> command is received. The ANSI mode ESC c command is stored in the buffer and is executed in order along with all of the other data sent.

The printer will take a maximum of four seconds to complete the reset procedure; the printer ignores data from the computer during this time. If the computer is reset while the printer is operating normally, nonsensical data may be printed.

### 4.3 ERROR HANDLING

#### *Parallel Interface*

The parallel interface has an active low error signal (/ERROR) which is asserted low by the printer when a mechanism error, input buffer overflow error, or memory error is detected. Refer to *Chapter 6 – Parallel Interface* for connector pin-outs and signal definitions.

#### *Serial Interface*

For the RS-232C serial interface, an error status byte (**refer to Table 4.1**) is sent from the printer when activated with an EOT <04> command from the computer. The ENQ <05> and CAN <18> commands may also activate the error status byte. However, they are buffered with other data and are not executed until all data received ahead of it are processed. The CAN command also clears any data in the current print line buffer. The computer may also choose to reset the printer to recover from the error condition, thus disregarding the ENQ and CAN commands. In this situation, the printer will transmit a

DC1 <11> signal back to the computer. Refer to *Chapter 7 – Serial Interface* for connector pin-outs and signal definitions.

**Table 4.1 Error Status Byte**

<b>Bit #</b>	<b>Bit Error</b>	<b>Comment</b>
0 - LSB	Buffer overflow error	There is an input buffer overflow due to an improper handshaking procedure preventing XON/XOFF transmission.
1	Off-line	The printer is off-line. Data are buffered normally, but will not print until it is put back on-line by the operator.
2	Mechanism error	The print head is jammed, or the 28.5 volt power supply or timing signal failed.
3	Communications	There is a Parity/Framing/Overrun UART error: the printer/computer interfaces (baud, parity, etc.) are not set identically, or there is an improper or unusually noisy interconnect cabling.
4	Memory error	During a self-test or reset, the PROM check sum test or RAM functional test failed.
5	Reset flag	Set to “1” when the printer is reset. Cleared to “0” when the status is read.
6	Always 1	This bit is always set to “1” to distinguish the error byte from other ASCII control codes transmitted by the printer over the reverse channel.
7- MSB	Undefined	This bit is not present in 7-bit data formats and undefined in 8-bit formats.



be placed. As the line buffer fills, the active position moves from left to right. Various commands (e.g. horizontal tabs) modify the active position. The bidirectional validation station also supports a vertical reference (“active line”) to the active position. The power-up default active position is the left margin of the receipt roll, column 1.

## 4.8 HORIZONTAL POSITIONING

### *Margins*

Margins are a way of modifying the print “window.” For example, the autowrap feature wraps the data to the next line at the left margin, not the far left column; a CR will move the active position to the left margin, not the far left column. Both left and right margins can be modified by the computer to lie anywhere within the range of the platen type. On power-up or reset, the left margin defaults to the far left column on reset and the right margin defaults to the far right column. Whenever the print station is changed, the right margin is moved to the far right column while the left margin is not changed.

### *Tabs*

Horizontal tab stops can be set or cleared at any column. A single command string can be used to set or clear up to 17 stops. A stop can also be set or cleared any time at the current active position. Once tab stops have been set, HT <09> is used to advance the active position to the next stop.

### *Absolute or Relative Movement*

The active position can also be moved to a particular column number or by a specific number of columns to the right of the current active position.

## 4.9 CHARACTER ATTRIBUTES

The following attributes can be turned on or off on a character by character basis:

<i>Elongation</i>	Double width characters (including spaces) occupy two normal printing columns: 20 elongated characters fill a 40-column line.
<i>Double Strike</i>	Characters are overprinted in a second, unidirectional print pass.
<i>Emphasized</i>	Characters are overprinted in a second, unidirectional print pass. The second pass is offset slightly for a bolder look than double strike.
<i>Underlined</i>	Characters and spaces between characters are underlined.
<i>Italicized</i>	Characters are italicized.

## **4.10 INVERTED PRINT**

Characters are printed from right to left and upside down to produce an inverted line. Inverted and regular print cannot be mixed on the same line. Control codes to set or clear this mode must be issued before sending the printable characters.

Inversion does not change the order of lines of text within a message, nor does it change the direction of paper feeding. For example, to print an entire message upside down, send the last (bottom) line first and the first (top) line last.

## **4.11 QUIET MODE**

Quiet printing is achieved by sending a control code to slow the motor to half its normal speed.

## **4.12 UNIDIRECTIONAL PRINTING**

The printer will print from left to right only. This feature is used when the most exact vertical alignment is needed.

## **4.13 DEBUG MODE**

Debug mode is provided to aid in debugging computer software. This mode may be turned on in the setup menu or by a control code sent by the computer. A reset will turn off the debug mode if it was initially turned on by the computer. If debug mode is turned on in the setup menu, it must be turned off in the setup menu as well.

When debug mode is on, control characters are printed in hexadecimal code. Printable characters print normally. For example, if the computer sends the characters SO <0E> G <47> o <6F> LF <0A>, the printer would print <0E> Go <0A>.

## **4.14 AUTOWRAP**

If autowrap is off (the power-up default), lines longer than the print width are truncated. If autowrap is on, characters wrap to the left margin of the next line. The autowrap feature is selected through a control code.

## **4.15 AUTOMATIC RECEIPT CUTTER (Autocutter)**

To cut the receipt, press the paper cut switch on the top panel or send a control code to command a cut. The printer feeds six lines before cutting in order to guarantee that the last printed line is above the cutter blade. The autocutter is designed to cut single-ply paper only.

## 4.16 SELF-TEST

A self-test displays the EEPROM default values, runs a confidence test, and lists the EPROM serial number. A self-test can be invoked either manually (refer to Chapter 3, page 7, Section 3.2), or with a control code (refer to Chapter 5, page 21).

## 4.17 STATION SELECTION

Depending on the configuration of the controller and mechanism, up to three stations can be selected: receipt, journal (on split-platen units), and validation. The computer directs data to each station with various control codes.

The default station after a reset is the receipt station. In the case of split-platen models, data entered into the line buffer from left to right causes the printer to automatically skip over the unusable space between the receipt and journal platen and move directly to the far left column of the journal station. The journal station will advance only if characters are printed.

If the journal station is selected, the active column is initialized at the far left column of the right-hand paper roll. If the validation or receipt station is selected, the active column is set at the left margin.

## 4.18 BIT-MAPPED GRAPHICS

The bidirectional validation printer supports bit-mapped graphics for validation only. When the graphics mode is selected with ESC G <1B 47>, each ASCII character between @ <40> and DEL <7F> is interpreted as an individual hexadecimal representation of a single vertical dot-line of print as shown below:

Printhead	Bit Format	Sample Dot Character	Bit Format	Hex Code	ASCII Character
Top dot 1	bit 1 (LSB)	●	1	6D	m
dot 2	bit 2		0		
dot 3	bit 3	●	1		
dot 4	bit 4	●	1		
dot 5	bit 5		0		
dot 6	bit 6	●	1		
dot 7	bit 7 (always 1)		1		
dot 8	N/A				
Bottom dot 9	N/A				

Note that, when in bit-mapped graphics mode, only 6 dots or print hammers are available. At the end of the first horizontal group of dot-lines to be printed, an LF <0A> will perform the usual print execution function. **However, the paper will feed only six dot-lines so that the new top line will appear immediately beneath the previous bottom line.**

None of the normal print functions are recognized in graphics mode; the only legal control codes that can be sent are the LF command and ESC A, which terminate graphics mode.

Refer to the ASCII Chart on **page 33** for Bit/Hex/ASCII equivalents.

#### 4.19 NEWLINE

When newline mode is on (power-up default), an LF prints the line and moves the active position to the left margin. When newline mode is off, an LF prints the line but does not change the column of the active position.

#### 4.20 INTERNATIONAL CHARACTER SET

The character set contains all the letters, numbers and symbols that can be printed. The chart below shows the characters for US and foreign sets.

USA	#	\$	@	[	\	]	^	`	{		}	~
BRITISH	£	\$	@	[	\	]	^	`	{		}	~
GERMAN	#	\$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
FRENCH	£	\$	à	°	ç	§	^	`	é	ù	è	ë
SWEDISH	#	ä	é	Ä	Ö	Å	Ü	é	ä	ö	å	ü
DANISH	#	\$	@	Æ	Ø	Å	Ü	`	z	ø	å	ü
NETHERLANDS	#	\$	@	Æ	Ø	Å	^	°	z	ø	å	~
DUTCH	£	\$	@	[	U	]	^	`	{	ü	}	~
ITALIAN	£	\$	§	°	ç	é	^	ù	à	ò	è	ì
TRS-80	#	\$	@	↑	↓	←	→	`	{		à	~
SPANISH	Æ	\$	@	í	ñ	¿	^	`	í	ñ	}	~
JAPANESE	#	\$	@	[	¥	]	^	`	{		}	~
NORWEGIAN	#	ä	@	Æ	Ø	Å	Ü	`	z	ø	å	ü

23H 24H 40H 5BH 5CH 5DH 5EH 60H 7BH 7CH 7DH 7EH

## 4.21 SLIP VALIDATION

The Model 7400 uses either a unidirectional or bidirectional form validation process. Unidirectional validation provides up to 15 lines of print, while bidirectional offers up to 40 lines of print.

### *Slip Validation Insertion*

Inserting a form is a fast, yet delicate, action. It is a good idea to practice form or check insertion in order to develop a “feel” for the printer’s response once the form enters the machine. It is also important to insert the form so that it is clamped by the printer on both sides. If only one side is clamped, the form will skew during validation. Make sure the form does not touch the ribbon. Do not use bent forms or checks.

### *Slip Validation Command Information and Specifications*

Unidirectional validation uses a solenoid to pinch the slip against the platen. This mode can provide up to 15 lines of validation. The slip advances along with the journal roll. The printer waits until the validation station has been selected before actually pinching the slip. Selecting any other print station releases the slip. The computer may request the printer to report on the status of the bottom of form (BOF) sensor with the EM command. The computer may also issue a load slip command; the printer waits for the slip to be seen by the BOF sensor before pinching the slip. Then it moves the slip past the sensor until the bottom edge is just above the sensor. This position allows five lines of printing before the slip pops out of the pinch rollers. If the computer sends an FS or ENQ command directly following the load slip command, the printer responds with an ACK when the slip has been loaded.

Bidirectional validation uses a stepper motor to move the slip up and down independently of the paper roll and can provide up to 40 lines of validation. The EM, FS, and ENQ commands work as described above. The load slip command is similar; it turns the stepper motor rollers continuously until the slip is inserted and has moved far enough to just cover the BOF sensor. At this point, the computer can use the ESC [ \* e commands to move the slip up or down in line or step increments. Do not move the slip down too far or it may get stuck inside the printer.

Bidirectional validation also offers double height characters and advanced form handling features, including form length, absolute vertical positioning, vertical tabs, and variable line spacing. The suggested procedure for using these interdependent features is to set form length and then line spacing. Then use the load slip command; the active position is initialized to the bottom of form.

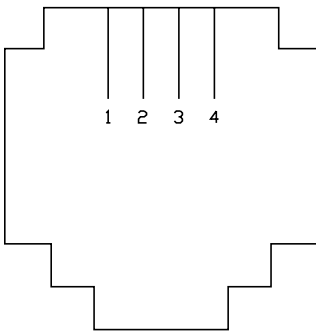
## 4.22 CASH DRAWER ACTIVATION

**NOTE:** 7400 Series printers are designed and tested to work only with APG and Indiana Cash Drawers.

The printer may be equipped with one or two cash drawer drivers. The computer instructs the printer to open the cash drawers with software commands. If the cash drawer is equipped with a switch to sense if the drawer is opened or closed, the computer may request an RS-232C interface to report the status of the cash drawer.

Each output supplies 1.0 amps at 40 VDC maximum (28.5 VDC minimum) for a period of 150 milliseconds to the cash drawer solenoid. The output is unregulated. A solid state relay can be driven if it has a maximum rating of 40 VDC.

Connections are as follows:



- PIN 1 SENSE SWITCH
- PIN 2 SENSE SWITCH RETURN
- PIN 3 SOLENOID RETURN
- PIN 4 SOLENOID (+ POLARITY PULSE)

## CHAPTER FIVE - CONTROL CODES

### 5.1 CONTROL CODE SUMMARY

The two control code sets supported are PPD and ANSI. The power-up default control set may be specified in the setup menu or selected with control codes. Codes are marked with an “X” to indicate that they are a part of the PPD and/or ANSI control code sets. Refer to the specific sections indicated for additional information on the commands. For reference, an ASCII Code Chart is shown in **Section 5.2, page 33**.

<b>ASCII &lt;HEX&gt;</b>	<b>Description</b>	<b>PPD</b>	<b>ANSI</b>	<b>Ref.</b>
NUL <00>	No operation; not stored.	X	X	7.1
SOH <01>	Select validation station. Same as ESC [ 3 p.	X		4.17
STX <02>	Enter text mode.	X	X	7.3
ETX <03>	Exit text mode.	X	X	7.3
EOT <04>	Error status request (not stored in buffer).	X	X	4.3
ENQ <05>	Status request.	X	X	4.3
ACK <06>	Open cash drawer 2 (if equipped).	X		4.22
BEL <07>	Sound beeper and open cash drawer 1 (ANSI mode only sounds beeper).	X	X	4.22
HT <09>	Move active position to next horizontal tab stop.	X	X	4.8
LF <0A>	Print line.	X	X	4.6
VT <0B>	Move active position to next vertical tab stop.		X	4.21
FF <0C>	Move active position to top of next page (bidirectional validation only).		X	4.21

ASCII <HEX>	Description	PPD	ANSI	Ref.
CR <0D>	Move active position to the left margin.	X	X	4.5
SO <0E>	Elongation on.	X		4.9
SI <0F>	Elongation off.	X		4.9
DC1 <11>	Software reset.	X	X	4.2
DC2 <12>	Self-test.	X	X	4.16
DC3 <13>	Inverted print on.	X		4.10
DC4 <14>	Inverted print off.	X		4.10
ETB <17>	Open unidirectional validation pinch rollers; select receipt station.	X		4.17
CAN <18>	Clear the line buffer.	X		4.3
EM <19>	Status request (not stored in buffer). The printer responds immediately with a status byte:	X	X	4.4
	Bit 0 = 1 Cash drawer 1 sense switch is open			4.22
	Bit 1 = 1 Cash drawer 2 sense switch is open			4.22
	Bit 2 = 0 Reserved for future use			
	Bit 3 = 1 Receipt roll out (split-platen only)			4.4
	Bit 4 = 1 Validation document not present			
	Bit 5 = 1 Paper roll out (journal side on split-platen)			4.4
	Bit 6 = 1 Always 1			
	Bit 7 = Undefined			
FS <1C>	Paper status request.	X		4.4
	The printer responds with an ACK <06> if the paper roll is present or a NAK <15> if the paper roll is out. If the validation station is selected, the presence of the validation slip is reported instead.			

ASCII <HEX>	Description	PPD	ANSI	Ref.
GS <1D>	Disable printer.	X	X	7.7
RS <1E>	Cut receipt (if equipped with autocutter).	X		4.15
US <1F>	Enable printer.	X	X	7.7
DEL <7F>	No operation; not stored in buffer.	X	X	7.1
ESC D <1B 44>	Double strike on.	X		4.9
ESC H <1B 48>	Double strike off.	X		4.9
ESC R n <1B 52> **	Select international character set. Where n <*>=  A <41> USA B <42> UK C <43> German D <44> French E <45> Swedish F <46> Danish G <47> Netherlands H <48> Dutch I <49> Italian J <4A> TRS-80 K <4B> Spanish L <4C> Japanese (Yen) M <4D> Norwegian	X		4.20
ESC E <1B 45>	Emphasized print on.	X		4.9
ESC G <1B 47>	Enter bit mapped graphics mode (bidirectional validation only).	X		4.18
ESC V <1B 56>	Vertical elongation on (bidirectional validation only).	X		4.9
ESC A <1B 41>	Vertical elongation off (bidirectional validation only).	X		4.9

<b>ASCII &lt;HEX&gt;</b>	<b>Description</b>	<b>PPD</b>	<b>ANSI</b>	<b>Ref.</b>
ESC F <1B 46>	Emphasized print off.	X		4.9
ESC - 1 <1B 2D 31>	Underline on.	X		4.9
ESC - 0 <1B 2D 30>	Underline off.	X		4.9
ESC EOT <1B 04>	Italics on (24/24 column models only).	X		4.9
ESC ENQ <1B 05>	Italics off.	X		4.9
ESC s 1 <1B 73 31>	Half speed printing on.	X		4.11
ESC s 0 <1B 73 30>	Half speed printing off.	X		4.11
ESC u 1 <1B 75 31>	Unidirectional print on.	X		4.12
ESC u 0 <1B 75 30>	Unidirectional print off.	X		4.12
ESC > <1B 3E>	Active position set to far left column of right platen; validation station is deselected (split-platen models only). Same as ESC [ 1 p.	X		4.17
ESC < <1B 3F>	Active position set to left margin; validation station is deselected. Same as ESC [ 2 p.	X		4.17
ESC n <1B **>	Skip n lines where n = 0 through 8 <30 through 38> (use ESC 0 to overprint).	X		4.6
ESC c <1B 63>	Software reset (stored in buffer).		X	4.2
ESC H <1B 48>	Set horizontal tab stop at active column.		X	4.8
ESC J <1B 4A>	Set vertical tab stop at active line (bidirectional validation only).		X	4.21

<b>ASCII &lt;HEX&gt;</b>	<b>Description</b>	<b>PPD</b>	<b>ANSI</b>	<b>Ref.</b>
ESC L <1B 4C>	Move up half line for superscript (bidirectional validation only).		X	4.21
ESC K <1B 4B>	Move down half line for subscript (bidirectional validation only).		X	4.21
ESC D <1B 44>	Move active position down 1 line without changing column.		X	4.21
ESC E <1B 45>	Move active position down 1 line and over to the left margin.		X	4.19
ESC Q <1B 51>	Start self-test (stored in buffer).		X	4.16
<b><i>Set Modes</i></b>				
ESC [ 2 0 h <1B 5B 32 30 68>	Line feed newline mode on.	X	X	4.19
ESC [ 3 h <1B 5B 33 68>	Debug mode on.	X	X	4.13
ESC [ > 1 h <1B 5B 3E 31 68>	Select inverted printing.	X	X	4.10
ESC [ > 2 h <1B 5B 3E 32 68>	Select unidirectional printing.	X	X	4.12
ESC [ > 3 h <1B 5B 3E 33 68>	Select half speed printing.	X	X	4.11
ESC [ > 4 h <1B 5B 3E 34 68>	Select vertical elongation (bidirectional validation only).	X	X	4.21
ESC [ ? 7 h <1B 5B 3F 37 68>	Autowrap on.	X	X	4.14
<b><i>Reset Modes</i></b>				
ESC [ 2 0 1 <1B 5B 32 30 6C>	Line feed newline mode off.	X	X	4.19
ESC [ > 1 1 <1B 5B 3E 31 6C>	Select non-inverted printing.	X	X	4.10

ASCII <HEX>	Description	PPD	ANSI	Ref.
ESC [ > 2 1 <1B 5B 3E 32 6C>	Select bidirectional printing.	X	X	4.12
ESC [ > 3 1 <1B 5B 3E 33 6C>	Select normal speed printing.	X	X	4.11
ESC [ > 4 1 <1B 5B 3E 34 6C>	Deselect vertical elongation. (bidirectional validation only).	X	X	4.21
ESC [ = 2 1 <1B 5B 3D 32 6C>	Select PPD control codes.	X	X	5.1
ESC [ = 3 1 <1B 5B 3D 33 6C>	Select ANSI control codes.	X	X	5.1
ESC [ ? 7 1 <1B 5B 3F 37 6C>	Autowrap off.	X	X	4.14
<b>Horizontal Margins</b>				
ESC [ p1 ; p2 s <1B 5B * 3B * 73>	Set left margin to column p1; set right margin to column p2.	X	X	4.8
ESC [ p s <1B 5B * 73>	Set left margin to column p.	X	X	4.8
ESC [ ; p s <1B 5B 3B * 73>	Set right margin to column p.	X	X	4.8
<b>Horizontal Tabs</b>				
ESC [ p1; p2;...px u <1B 5B * 3B * 3B * 75>	Set horizontal tab stops at columns p1, p2, px where x <17.	X	X	4.8
<b>Vertical Tabs (bidirectional validation only)</b>				
ESC [ p1 ; p2 ; ... px v <1B 5B * 3B * 3B * 76>	Set vertical tab stops at lines p1; p2, px (p > 1).	X	X	4.21

ASCII <HEX>	Description	PPD	ANSI	Ref.
<b><i>Tabulation Clear</i></b>				
ESC [ g <1B 5B 67>	Clear horizontal tab stop at active column.	X	X	4.8
ESC [ 3 g <1B 5B 33 67>	Clear all horizontal tab stops.	X	X	4.8
ESC [ 1 g <1B 5B 31 67>	Clear vertical tab stop at active line (bidirectional validation only).	X	X	4.8
ESC [ 4 g <1B 5B 34 67>	Clear all vertical tab stops (bidirectional validation only).	X	X	4.8
<b><i>Horizontal Position Absolute</i></b>				
ESC [ p ^ <1B 5B * 60>	Move active position to column p.	X	X	4.8
<b><i>Horizontal Position Relative</i></b>				
ESC [ p a <1B 5B * 61>	Move active position forward p columns.	X	X	4.8
<b><i>Horizontal and Vertical Position Absolute</i></b>				
ESC [ p1 ; p2 f <1B 5B * 3B * 66>	Move active position to column p1 and line p2 (default p1, p2 = 1) (bidirectional validation station only).	X	X	4.8
<b><i>Vertical Position Relative</i></b>				
ESC [ p e <1B 5B * 65>	Move active position down p lines.	X	X	4.21
ESC [ = p e <1B 5B 3D * 65>	Move active position up p lines (bidirectional validation only).	X	X	4.21
ESC [ > p e <1B 5B 3E * 65>	Move active position down p steps (bidirectional validation only).	X	X	4.21
ESC [ < p e <1B 5B 3C * 65>	Move active position up p steps (bidirectional validation only).	X	X	4.21

ASCII <HEX>	Description	PPD	ANSI	Ref.
----------------	-------------	-----	------	------

*Device Status Report*

ESC [ 5 n <1B 5B 35 6E>		X	X	4.3
----------------------------	--	---	---	-----

Printer response is in the form:  
ESC p x1 x2 ESC \  
<1B 50 \* \* 1B 5C>

Where x1 = an 8-bit data stream with the following parameters:

- Bit 0 - LSB 1= Buffer overflow error
- Bit 1 1= Off-line
- Bit 2 1= Mechanism error
- Bit 3 1= Communications error
- Bit 4 1= Memory error
- Bit 5 1= Reset flag
- Bit 6 Always 1
- Bit 7 - MSB Undefined

and x2 = an 8-bit data stream with the following parameters:

- Bit 0 - LSB 1= Cash drawer sense switch 1 is open\*
- Bit 1 1= Cash drawer sense switch 2 is open\*
- Bit 2 Reserved for future use
- Bit 3 1= Receipt roll out (split-platen only)
- Bit 4 1= Validation document not present
- Bit 5 1= Paper roll out (journal roll out split-platen)
- Bit 6 Always 1
- Bit 7 - MSB Undefined

The error byte (x1) and error line are reset by this command. Status is valid when the printer responds, not when the request is received.

\* "Open" means that an SPST switch connected to the cash drawer input of J4 or J5 is open circuited (closed circuit = shorted to ground). Whether the drawer is open or closed depends on how the switch is rigged in the drawer (see **Section 4.22** for connector pin-outs).

ASCII <HEX>	Description	PPD	ANSI	Ref.
<i>Form Length (bidirectional validation only)</i>				
ESC [ p t <1B 5B * 74>	Set form length to p lines; where 0 < form length = < 128. Active line becomes top of form.	X	X	4.21
<i>Line Spacing Increment (bidirectional validation only)</i>				
ESC [ ; p <sp> G <1B 5B 3B * 20 47>	Set line spacing to p decipoints where 1 decipoint = 1/720".	X	X	4.21
ESC [ ; 9 0 <sp> G <1B 5B 3B 39 30 20 47>	Set 8 lines per inch spacing (90 decipoints).	X	X	4.21
ESC [ 1 2 0 <sp> G <1B 5B 31 32 30 20 47>	Set 6 lines per inch spacing (120 decipoints).	X	X	4.21
ESC [ ; 1 4 4 <sp> G <1B 5B 3B 31 34 34 20 47>	Set 5 lines per inch spacing (144 decipoints).	X	X	4.21
<i>Select Graphic Rendition</i>				
ESC [ p1 ; p2 ; . . . px m <1B 5B * 3B * 3B * 6D>	Select the character attributes specified by the parameter(s) p1-px.	X	X	4.9
	<u>Parameter</u> <u>Attribute</u>			
	0            Normal (default)			
	1            Bold/Emphasized print on			
	3            Italicized print on			
	4            Underscore on			
	60          Double Width/Elongation on			
	61          Double strike on			
	Parameters are executed in order. A "0" resets all attributes, including those preceding it within the same control string.			

ASCII <HEX>	Description	PPD	ANSI	Ref.
<i>Cash Drawer/Validation</i>				
ESC [ 1   <1B 5B 31 7C>	Open cash drawer 1 (if so equipped).	X	X	4.22
ESC [ 2   <1B 5B 32 7C>	Open cash drawer 2 (if so equipped).	X	X	4.22
ESC [ 5   <1B 5B 35 7C>	Load slip/document.	X	X	4.21
ESC [ 6   <1B 5B 36 7C>	Eject slip/document.	X	X	4.21
ESC [ 7   <1B 5B 37 7C>	Cut receipt.	X	X	4.15
ESC [ 8   <1B 5B 38 7C>	The active position set to left margin; validation station is deselected; validation pinch rollers open (unidirectional validation only). Same as ESC [ 1 p string.	X	X	4.17

*Select Character Set*

ESC [ p x <1B 5B * 78>	Select character set.	X	X	4.20
---------------------------	-----------------------	---	---	------

<u>Parameter (p)</u>	<u>Character Set</u>
0	USA (default)
1	USA
2	UK
3	German
4	French
5	Swedish
6	Danish
7	Netherlands
8	Dutch
9	Italian
10	TRS-80
11	Spanish
12	Japanese (Yen)
13	Norwegian

ASCII <HEX>	Description	PPD	ANSI	Ref.
<i>Select Print Station</i>				
ESC [ 1 p <1B 5B 31 70>	The active position is set to the left margin; the validation station is deselected. This is the default state after a reset. For split-platen models, as data is entered into the line buffer from left to right, the printer automatically skips over the unused space between the receipt and journal sides, moving directly to the far left column of the journal side. The journal side will advance only if characters are printed.	X	X	4.17
ESC [ 2 p <1B 5B 32 70>	The active position is set to the far left column of the journal side; the validation station is deselected (split-platen models only). Otherwise, it is the same as the ESC [ 1 p string.	X	X	4.17
ESC [ 3 p <1B 5B 33 70>	The active position is set to the left margin; the validation station is selected. For unidirectional validation, the document is automatically clamped when the first line of print is executed. A separate command is required to release the document at the end of validation printing. For bidirectional validation, the active position is initialized at the bottom of form. The paper must be fed backwards to move the active position toward the top of the document.	X	X	4.17
ESC [ 4 p <1B 5B 34 70>	The active position is set to the far left column of the journal side; the validation station is deselected. On split-platen models, a paper feed command received after this string will move paper only on the journal side for one line only.	X	X	4.17
ESC [ 5 p <1B 5B 35 70>	The active position is set to the far left column of the journal side; the validation station is deselected. On split-platen models, a paper feed command received after this string will move paper only on the journal side until cancelled with another ESC [ * p string.	X	X	4.17

ASCII <HEX>	Description	PPD	ANSI	Ref.
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***Print Time/Date***

ESC [ 0 q <1B 5B 30 71>	Print time.	X	X	3.2
ESC [ 1 q <1B 5B 31 71>	Print date.	X	X	3.2
ESC [ 2 q <1B 5B 32 71>	Request time (RS-232C only).	X	X	3.2
ESC [ 3 q <1B 5B 33 71>	Request date (RS-232C only).	X	X	3.2
ESC [ 4 q <1B 5B 34 71>	Select 12 hour format.	X	X	3.2
ESC [ 5 q <1B 5B 35 71>	Select 24 hour format.	X	X	3.2

***Set Time (Printer Response to Request Time)***

ESC [ p1 ; p2 ; p3 <sp> q <1B 5B * 3B * 3B * 20 71>		X	X	3.4
--	--	---	---	-----

Where:     p1 = hours (24 hour clock)  
               p2 = minutes  
               p3 = seconds

***Set Date (Printer Response to Request Date)***

ESC [ p1 ; p2 ; p3 ! q <1B 5B * 3B * 3B * 21 71>		X	X	3.4
---	--	---	---	-----

Where:     p1 = month (1-12)  
               p2 = day (1-31)  
               p3 = year (0-99)

---

---

**ASCII**

<b>&lt;HEX&gt;</b>	<b>Description</b>	<b>PPD</b>	<b>ANSI</b>	<b>Ref.</b>
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**Bar Code Command Set**

ESC B 5 data LF <1B 42 39 ..... 0A>	Interleaved 2 of 5 Code. Check digit is off, data = even number of digits. Check digit is on, data = odd number of digits.			3.4
ESC B 9 data LF <1B 42 35 ..... 0A>	Code 39 Data = ASCII character set. Check digit optional.			3.4
ESC B 8 dd dd .. dd LF <1B 42 38 .. .. .. 0A>	Code 128 "C". dd=all number pairs from 00 to 99.			3.4
ESC B A n ddddd ddddd LF <1B 42 41 . ..... 0A>	UPCA n=number system digit. d=10 data digits.			3.4
ESC B A n ddddd ddddd ss LF <1B 42 41 . ..... .. 0A>	UPCA with 2 digit supplement. n=number system digit. d=10 data digits. s=2 supplemental digits.			3.4
ESC B A n ddddd ddddd ssss LF <1B 42 41 . ..... ..... 0A>	UPCA with 5 digit supplement. n=number system digit. d=10 data digits. s=5 supplemental digits.			3.4
ESC B + <1B 42 2B>	Enable optional check digit.			3.4
ESC B - <1B 42 2D>	Disable optional check digit.			3.4

## 5.2 ASCII CODE CHART

Bits				B7	0	0	0	0	1	1	1	1
				B6	0	0	1	1	0	0	1	1
				B5	0	1	0	1	0	1	0	1
B4	B3	B2	B1	<HEX>	<0>	<1>	<2>	<3>	<4>	<5>	<6>	<7>
0	0	0	0	<0>	NUL	DLE	SP	0	@	P	`	p
0	0	0	1	<1>	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	<2>	STX	DC2	"	2	B	R	b	r
0	0	1	1	<3>	ETX	DC3	#	3	C	S	c	s
0	1	0	0	<4>	EOT	DC4	\$	4	D	T	d	t
0	1	0	1	<5>	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	<6>	ACK	SYN	&	6	F	V	f	v
0	1	1	1	<7>	BEL	ETB	'	7	G	W	g	w
1	0	0	0	<8>	BS	CAN	(	8	H	X	h	x
1	0	0	1	<9>	HT	EM	)	9	I	Y	i	y
1	0	1	0	<A>	LF	SUB	*	:	J	Z	j	z
1	0	1	1	<B>	VT	ESC	+	;	K	[	k	{
1	1	0	0	<C>	FF	FS	,	<	L	\	l	
1	1	0	1	<D>	CR	GS	-	=	M	]	m	}
1	1	1	0	<E>	SO	RS	.	>	N	^	n	~
1	1	1	1	<F>	S1	US	/	?	O	_	o	DEL

**Note:** The hexadecimal code for any ASCII character consists of the hex column number for that character and the corresponding hex row number. Examples: **NUL** (ASCII)= **00** (Hex); **DEL** (ASCII)= **7F** (Hex).

## CHAPTER SIX - PARALLEL INTERFACE

### 6.1 HANDSHAKING

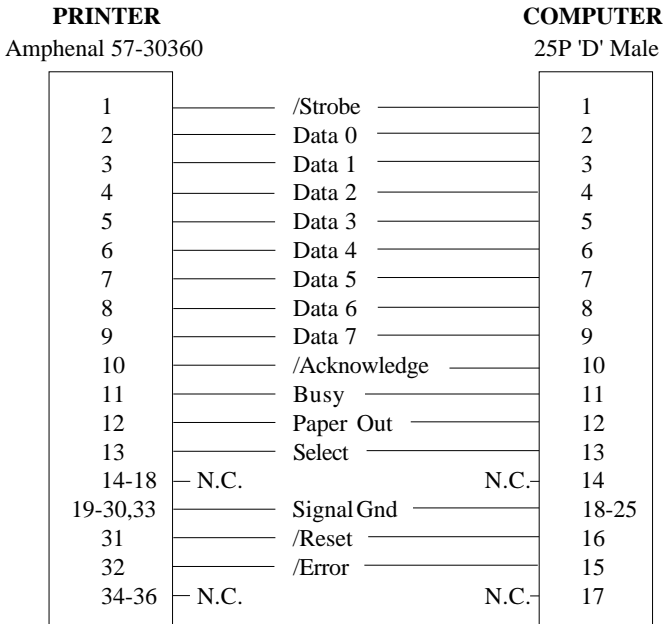
After receiving an active low strobe pulse (1.0  $\mu$ S min.), the busy line will go high, signifying that the printer is busy processing the character data, D0-D7. When the printer is ready to accept another character, the busy line drops low again and an active low acknowledge (ACK) pulse (10 $\mu$ S min.) is produced. When the printer is executing a reset or self-test process, the printer asserts the busy line high. When it returns to normal operation, the printer brings the busy line low, and pulses the acknowledge line.

For detailed information on the error signal, refer to **pages 11-13, Section 4.3**.

The select signal enables the printer.

### 6.2 PARALLEL WIRING

**Figure 6.1** diagrams the correct wiring for parallel interfacing with an IBM PC compatible. Connections are straight through.



**Figure 6.1 – Parallel Interface Connections**

## CHAPTER SEVEN - SERIAL RS-232C INTERFACE

### 7.1 RTS HANDSHAKING

The RTS line will go low when the input buffer has filled to within 256 bytes of its capacity. It will go high again when less than 256 bytes remain in the buffer. When the printer is executing a reset or self-test process, the RTS line is held low. When it returns to normal operation, the printer brings the RTS line high, then transmits an XON.

### 7.2 XON/XOFF HANDSHAKING

The printer will transmit an XOFF <13> when the input buffer has filled to within 256 bytes of its capacity. It will transmit an XON <11> when less than 256 bytes remain in the buffer. XON/XOFF is always enabled, except when STX/ETX/ACK handshaking is used.

### 7.3 STX/ETX/ACK (Block Text Mode)

Data may be transmitted to the printer in a block. The block is in the format:

STX data data data ETX

The printer stores the data in a buffer, but does not execute the data until the block is complete. When the ETX is received, the printer asserts the RTS line low. The printer then executes the data in the buffer. When the buffer is emptied, the printer asserts the RTS line high, and transmits either an ACK if no error was detected or an error byte if an error was detected.

### 7.4 RS-232C WIRING

Refer to **Figure 7.1** for correct serial interfacing with an IBM PC compatible computer.

**RxD** - Printer receives data from computer

**TxD** - Printer transmits data to computer

**RTS** - Enable Printer (500 ms per minute duration)

### 7.5 HARDWARE RESET

If the hardware reset function is desired, RTS/Reset or Error/Reset must be specified for pins 4 and 5 in the setup menu. A high level on the pin 5, held for a minimum of 500 ms, will reset the printer.

## 7.6 ERROR SIGNAL

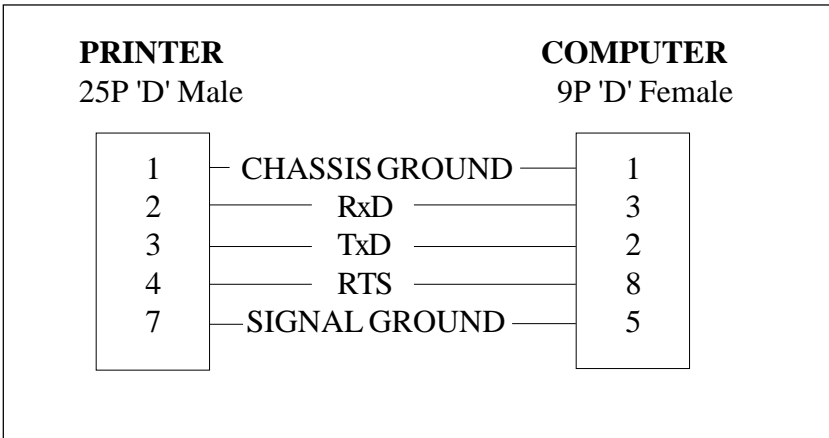
If the error signal function is desired, the error/reset function must be specified for pins 4 and 5 in the setup menu. A positive RS-232C voltage on pin 4 indicates that an error was detected. The error indication is cleared with a CAN command or any command requesting an error report.

## 7.7 PRINTER ID

This feature is used when two printers are connected to a common host, RS-232C RxD signal. Data input to each printer may be enabled or disabled with the following commands ("ID" is specified in the setup menu).

GS	ID	Disable printer:
<1D>	<xx>	To disable all printers, ID = A <41>.
		To disable individual printers,
		ID = <30> thru <39>.
US	ID	Enable printer:
<1D>	<xx>	To enable all printers, ID = A <41>.
		To enable individual printers,
		ID = <30> thru <39>.

**Figure 7.1 - Serial RS-232C Interface Connections**



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# **Model 7400/7450 User Manual**



# **Model 7400/7450 User Manual**

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## **Certificate of Compliance for Equipment Meeting for Part 15 Class A Requirement**

**Before Proceeding, please read the following FCC Class A Device Statement:**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

**Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.**

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

### **Canadian Department of Communications**

"This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications."

"Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada."

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