

MTP-1500 Modular Thermal Printer
User Manual



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Part No. 090103-0010 (Rev. B - 05/03)

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1 General

The MTP-1500 series of modular thermal printers is designed specifically for the high performance, size and durability requirements of cut and drop applications. The compact size and high performance characteristics, coupled with its rugged design also make it ideal for the kiosk environment.

Four models make up the MTP-1500 Series:

- MTP-1530-SF - 80 mm (3.15 in) paper width , Full Cut . (Part # 901033-0006)
- MTP-1530 -SP - 80 mm (3.15 in) paper width , Partial Cut. (Part # 901034-0006)
- MTP-1532 -SF – 82.5 mm (3.25 in) paper width , Full Cut. (Part # 901033-0010)
- MTP-1532 -SP – 82.5 mm (3.25 in) paper width , Partial Cut. (Part # 901034-0010)

1.1 Definitions

1.1.1 Standard Mode versus Page Mode

Standard mode means printing data as it is received like most serial mode printers. If data is not received fast enough to keep the printer busy, the printer will print data it has received and then stop and wait for more data to be received so it can print a little more. This is the most commonly used mode of operation but anytime the printer has to stop and then restart, there is a possibility of reduced print quality.

- Page mode means that all the data to be printed on a page is received before printing begins so once the printing process starts, an entire page is printed at full speed.
- Most commands and parameters are the same for both standard mode and page mode but the ESC SP, ESC 2, and ESC 3 are set independently in standard mode and page mode, See section 4.2 Control Codes and Control Sequences List .
- Some commands apply only to page mode and some commands are ignored in page mode.

See Table xxx +++ add bookmark to COMMAND LIST table.

- Ladder bar codes can be printed only in page mode.

1.1.2 Hex Dump Mode

This function is sometimes useful for diagnosis of application programs when the printer does not perform as expected. In hex dump mode, the printer prints the hexadecimal code for each character received rather than processing the data as printable text and as control commands. The exception is that DLE EOT (real time STATUS request) and DLE ENQ (Real time request to printer) are executed as received even in hex dump mode. The hexadecimal notation is printed at 10 characters per line on the left side of the page and the printable characters (when possible) are printed on the right side of the page. Control codes print as periods on the right side section of the printout to help locate specific areas of the message to see what codes were actually received by the printer. After all data has been sent to the printer, pressing the paper feed button will flush the buffer and print the last line of data received.

Hex dump mode is initiated in any of three ways:

- 1) Open the platen, hold the paper feed button down, turn on power, then close the platen and release the paper feed button.
- 2) Set DIP switch DPSW2 position 5 ON and then turn on power.
- 3) Send the appropriate GS (A command. On entering hex dump mode, the printer prints a 4 line header “Hexadecimal Dump”, a blank line, “To terminate hexadecimal dump”, “press FEED three times.”

Hex dump mode is terminated by

- 1) pressing the paper feed button three times in quick succession or
- 2) by turning DIP switch DPSW2 position 5 OFF and turning power back on.

Print Sample

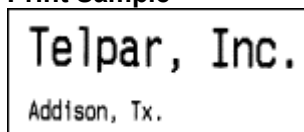


Figure 1 Print Sample

```

Hexadecimal Dump
To terminate hexadecimal dump,
press FEED button three times.

1B 21 30 54 65 6C 70 61 72 2C  .!0Telpar,
20 49 6E 63 2E 0D 0A 0D 0A 1B  Inc.....
21 00 41 64 64 69 73 6F 6E 2C  !.Addison,
20 54 7B 2E 0D 0A 0D 0A 0D 0A  Tx.....
0D 0A 0D 0A 0D 0A 0D 0A 0D 0A  .....
0D 0A 0D 0A 0D 0A 0D 0A 1D 56  .....V
30                                0

*** completed ***

```

Figure 2 Hex Dump of Print Sample

1.1.3 Explanation of Terms used throughout this manual

Receive buffer – Receives data from the host and stores the data temporarily until it can be processed to the print buffer or processed as otherwise required.

Print buffer – Stores the image data to be printed.

Start of line – There is no print data in the print buffer and the print position is not specified by ESC \$ or ESC \. Many commands are effective only at the start of line.

Printable area – In standard mode the length in the horizontal direction is: 80 mm (640 dots per line/8 dots per mm) for the 82.5 mm paper width version, 72 mm (576 dots per line/8 dots per mm) for the 80 mm paper width version. In page mode the length in the horizontal direction is: 80 mm (640 dots per line/8 dots per mm) for the 82.5 mm paper width version, 72 mm (576 dots per line/8 dots per mm) for the 80 mm paper width version. In page mode the length in the vertical direction is: 83 mm (664 dots per line/8 dots per mm) for the 82.5 mm paper width version, 92 mm (738 dots per line/8 dots per mm) for the 80 mm paper width version.

Printing area – Printing range set by command. The printing area must be less than or equal to the printable area.

MBS – Most Significant Bit of a byte of data.

LBS – Least Significant Bit of a byte of data.

OFF LINE – There is no switch for setting the printer On Line or Off Line. The printer automatically goes Off Line

- a. From power on (or reset through the I/O connector) until the printer is ready to receive data.
- b. During self test.
- c. While feeding paper with the paper feed button.
- d. When out of paper.
- e. When the print platen is open.
- f. During a macro execution and in standby status.
- g. When an error occurs.

1.2 Applications

- Parking ticket dispensing
- Automated Teller Machines (ATMs)

- Gaming receipts
- Interactive media kiosks

1.3 Standard Features

- Direct thermal printing
- Interfaces: Serial (RS232) and parallel (IEEE1284) .
- Paper widths - specified at time of order:
- Model MTP-1530 : 80 mm (3.15 in)
- Model MTP-1532 : 82.5. mm (3.25 in)
- Full or Partial Cut – specified at time of order.
- All metal construction
- Adjustable paper low sensor
- Paper auto load function
- ESC/POS [□] [1]. The commands conform to ESC/POS, which is a standard in the distribution industry.
- Print speed of up to 150 mm/sec (5.9 in/sec); 1200 dot lines/second)
- DIP switches accessible without removing cover.
- Paper capacity : 152 mm (6 in) diameter roll with 50 mm diameter core
- Overall size including 152 mm (6 inch) diameter roll of paper :
185.67 mm x 149.45 mm x 243.17 mm(7.31 in H x 5.88 in W x 9.57 in D)
- Inverted print mode
- Character code tables: PC437 (USA, default), Katakana, PC850 (Multilingual), PC860 (Portuguese), PC863 (Canadian-French), PC865 (Nordic), WPC1252, PC866 (Cyrillic2), PC852 (Latin2), PC858 (Euro), Space page.
- International character set : Control Boards, have the following: U.S.A., France, Germany, England, Denmark (2 choices), Sweden, Italy, Spain (2 choices), Japan , Norway, Latin America, Korea.
- Barcode embedded symbologies: UPC-A , UPC-E, JAN(EAN) 13, JAN(EAN)8 , 3 of 9 , ITF , CODABAR, Code93, and Code128 . Ladder Bar codes can be printed when using Page Mode.
- Bit image mode
- Reverse video mode
- Underline printing
- Continuous roll paper
- Page Mode
- Two character font sizes. Each can be printed from 1 to 8 times normal width and/or 1 to 8 times normal height.
- “Smoothing” command (see GS b) – applies only in Page mode.

1.4 Options for the MTP-1500 Series

- Microsoft® Windows® driver. [2]
- Black Mark sensing.

1.5 Specifications

- Resolution : 8 dots/mm (203 dots/in).
- Paper thickness : 0.056 mm to 0.15 mm maximum (0.0022 in to 0.0059 in).
- Operating temperature : 0° C to 55° C (32° F to 131° F).
- Storage temperature : -25° C to 70° C (-13° F to 158° F).
- Operating humidity : 10-85% RH (non-condensing).
- Peak current for head drive is 14A at 150 mm/second.
- **Weight : Standard configuration without paper +++ kg (+++ lbs.).**
- Expected life of mechanism: 15 million lines.
- Expected life of cutter: 1 million cuts.

1.6 Power Supply Requirements

1.6.1 Voltage : 24 VDC ±10%

Current Requirements

High Speed Mode	14 Amps peak	9 Amps average
Divided Energy Mode	11.5 Amps peak	7 Amps average
Stand-by	0.1 Amps	

Table 1 Current Requirements

1.6.2 No requirement for external 5 VDC power supply

The 5 VDC for logic is supplied from the 24 VDC, by a regulator internal to the printer.

1.6.3 3-Pin Hosiden Connector on Printer for Power Supply Connection

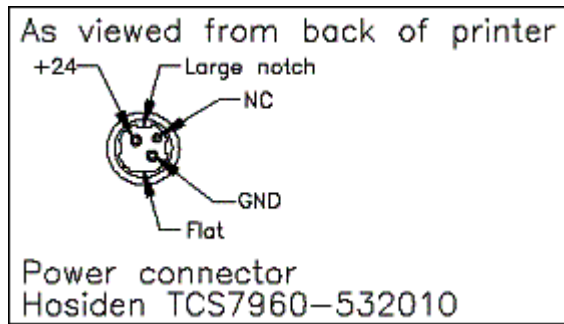


Figure 3 3-Pin Hosiden Power Supply Connector

1.7 Telpar Roll Paper for MTP-1500 Series

Thermal sensitive coating is on the “inside” of the roll.

- For MTP-1530 ;152 mm (6 in) outside diameter, 80 mm (3.15 in) wide, length 180 m (590 ft) P/N 251103-8006.
- For MTP-1532 :152 mm (6 in) outside diameter, 82.5 mm (3.25 in) wide, length 180 m (590 ft) - P/N 251103-8206.

Specific to Thermal Printers: Telpar, Inc. does not warranty damages to the thermal print head as a result of printing with thermal paper not specified or approved by Telpar, Inc.

2 Operator Instructions

2.1 Unpacking and Inspection

Carefully unpack and inspect your MTP-1500 for any damage that may have occurred in transit. Should any damage have occurred, notify Telpar, Inc., save the shipping carton and packing materials, and file a damage claim with the carrier. Specify the nature and the extent of the damage. Before installing or operating the printer, check the following:

- Printer mechanism and paper path are clear of all packing materials or other foreign matter.
- Paper is installed. DO NOT OPERATE the printer without paper. Refer to Section 2.2 - Paper Loading page 15 for paper loading instructions.

2.2 Paper Loading

2.2.1 Side-Loading Roll

The MTP-1500 series printer is configured as a side-loading printer. Slide roll of paper over spindle with paper fed under the bottom toward paper slot (front of unit).

To load paper, turn on the power and feed the straight edge of the paper into the paper guide. AUTOLOAD will automatic load paper once it is fed into the paper guide. Once paper has been initially loaded, the paper feed button may be used. Ensure that the paper is installed correctly and feeding properly with the thermal side facing up.

2.2.2 Black Mark Sensors Load

The MTP-1500 series printer may be used with the optional Black Mark Sensor. This requires the use of a pre-printed Top of Form (TOF) Mark or Black Mark on the form. Dip switch SW1 position 1 must be set to the ON position to enable black mark operation.

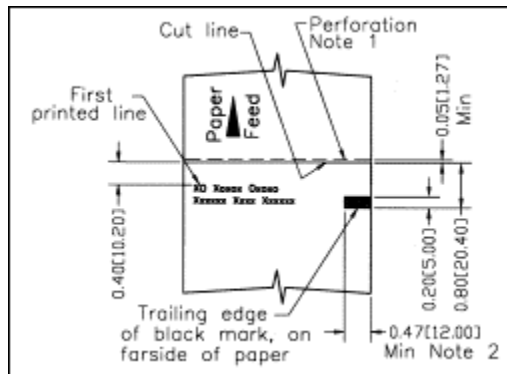
If DIP switch DSW1 position 1 is turned on to enable the Black Mark sensor when the printer is loaded with plain paper, at Power On the printer will feed about 17.5 inches of paper looking for a Black Mark and then go to an error mode since it did not find a Black Mark.

To load paper, turn on the power and feed the straight edge of the paper into the paper guide. Ensure that the paper is installed correctly and feeding properly with the thermal side facing up.

If using perforated paper, the perforation should be fed at least 1.27 mm (0.05 in) past the cut line to avoid a jam at the cutter. **The black mark may extend across the full width of the paper. (TBD)**

See Figure 4 Black Mark Specifications

See section 4.3.5 Top of Form Commands



NEED NEW DRAWING

Figure 4 Black Mark Specifications

See section 4.3.5 - Top of Form Commands for additional information.

2.3 Paper Jam

In the event of a paper jam condition do not force paper into the unit, or try to pry the paper out of the unit, this may damage the thermal print mechanism . Caution should be exercised when working next to the cutter mechanism , the blades are sharp and may cause serious injury.

To release paper:

- Turn off power to the printer.
- Push the Head Open lever to the down position.
- (See *Figure 6 - MTP-1500 with Cutter Mechanism open*) Paper can be removed at this time. Once paper is cleared from the mechanism, return the Head Open lever to the up position.

2.3.1 Head Open Lever

The Head Open lever is located at the left front of the printer mechanism. The up position is ready to print. The down position lifts the print head off of the platen roller for manually inserting paper or for clearing a paper jam. The down (head open) position signals the microprocessor that the head is open so that no printing will occur.



Figure 6 - MTP-1500 with Cutter Mechanism open

3 Installation

3.1 Self Test Mode

The MTP-1500 has a self-test mode that will print and cut a sample ticket.

To place the unit into self-test mode , first turn power switch off, then press and hold the FEED push button switch and place the POWER switch in the ON position.. Release the switch after printing starts. See Figure 7 MTP-1500 Self Test Printout on page 20 . The first part of the self test message prints several fields showing how the printer is configured. Following the first part of the self test, you have the option of pressing the paper feed button to print a “barber pole” pattern print test or turning power off and back on to terminate the self test The printer goes to the off-line

(BUSY) state when self test starts and remains off-line until self test is finished due to either of these actions. All electrical/mechanical portions of the printer are exercised and checked by this action, except for the serial interface or parallel interface components.

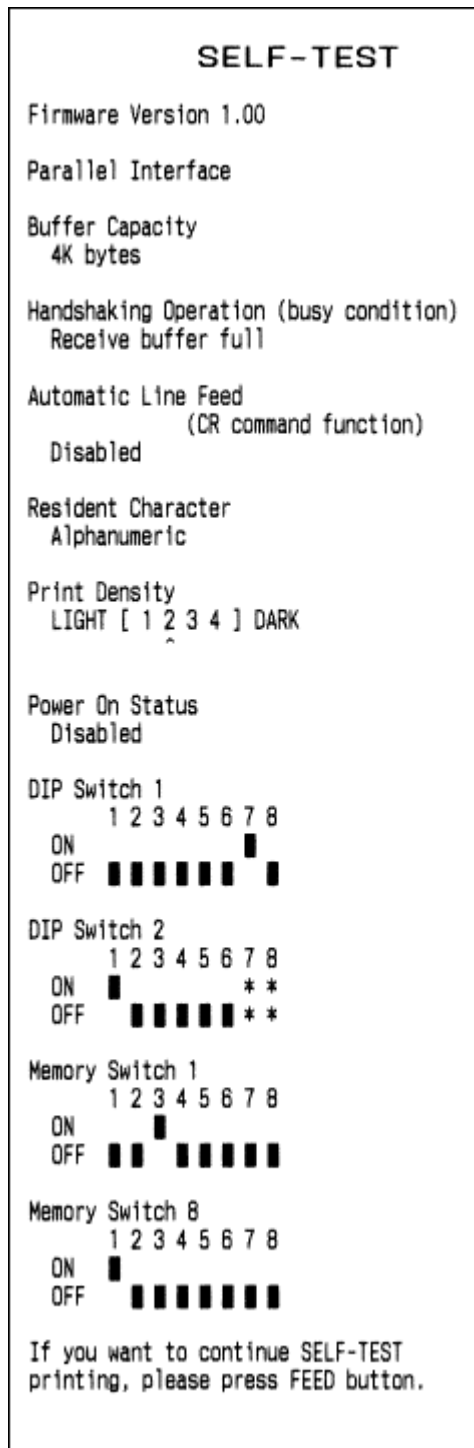


Figure 7 MTP-1500 Self Test Printout

4 Interface Specifications

4.1 General

The MTP-1500 Series includes a Serial RS232 interface and a IEEE1284 Parallel interface.

4.1.1 Setting of DIP Switches and MEMORY Switches

4.1.1.1 DSW1 – DIP Switch

DIP Switch 1 (DSW1) Settings					
Item	Bit No	Setup status		Setup state	Setup before shipping
		Bit 7	Bit 8		
Serial-interface-communication baud rate setting	8,7	Bit 7	Bit 8	38400 bps	19200
		OFF	OFF		
		ON	OFF	19200 bps	
		OFF	ON	9600 bps	
		ON	ON	4800 bps	
Even/odd parity selection	6	OFF		Odd parity	ODD
Parity use selection	5	OFF		No parity	No Parity
Serial interface handshaking	4	OFF		DTR/DSR control	DTR
		ON		Xon/Xoff control	
		ON		Even parity	
		ON		Parity used	
Interface Selection	3,2	Bit 3	Bit 2	Parallel interface	Parallel
		OFF	OFF		
Black Mark sensor	1	OFF		Disabled	Disabled
		ON		Enabled	
		ON,OFF		Serial interface	

Add to table for 3,2 Optional? Either,ON
 Table 2 - DIP Switch 1 (DSW1) Settings

4.1.1.2 DSW2 – DIP Switch 2

DIP Switch 2 (DSW2) Settings					
Item	Bit No.	Setup Status	Setup State	Setup before shipping	
Parallel I/O pin 31 = RESET	8	OFF	No reset	OFF	
		ON	Reset signal on pin 31		
Serial I/O pin 6 = RESET	7	OFF	No reset	OFF	
		ON	Reset signal on pin 6		
Factory use	6			OFF	
Operation mode selection	5	OFF	Normal	Normal	
		ON	Hex Dump		
Print density selection	3,4	Bit 3	Bit 4	Normal	
		ON	ON		Slightly light
		OFF	OFF		Normal
		ON	OFF		Slightly dark
		OFF	ON		Dark
Printer mechanism selection	1, 2	Bit 1	Bit 2	As required for mech	
		OFF	OFF		MTP-1532
		ON	OFF		MTP-1530
		OFF	ON		60 mm
		ON	ON		58 mm

Table 3 - DIP Switch 2 (DSW2) Settings

4.1.1.3 There are 8 MEMORY Switches, only two are currently used

Memory Switch 1		
Position		Function
#5	ON	Auto line feed enabled (Parallel interface only)
	OFF	Auto line feed disabled
#4	ON	Receive error is ignored (serial interface only)
	OFF	Receive error prints “?” (serial interface only)
#3	ON	BUSY condition when buffer is full
	OFF	BUSY when buffer is full or when OFF-LINE
Memory Switch 8		
Position		Function
#4	ON	Cutter is NOT installed
	OFF	Cutter is installed
#3	ON	Reverse paper feeding is enabled (See NOTE)
	OFF	Reverse paper feeding is disabled
#1	ON	Divided energy print mode
	OFF	High speed print mode

Note: Not all printer mechanisms allow reverse paper feeding. If reverse feeding is allowed, after cutting the paper with a GS V command, paper feeds backwards. The print starting position adjustment with GS (F can be set to the backward direction relative to the cutting position. In this case, the maximum backward feed length is 14 mm (112 * 0.125mm).

4.1.2 LEDs and Error Indication

Three LEDs (D3, D5, and D6) are located above Dip switch DSW1.

D3 is the green POWER LED, ON means power is stable and the printer is ready for operation. OFF means power is not stable.

D5 is a red PAPER OUT LED, OFF means paper is installed and the printer is ready for operation. ON means there is no paper installed in the printer mechanism (or the paper low sensor if selected). The PAPER OUT LED blinks steadily to specify that self test has finished the first part of printing and that the user can press the PAPER FEED button to print the “barber pole” character print part of the self test. The PAPER OUT LED also blinks steadily to specify that a MACRO is waiting for the user to press the PAPER FEED button to continue it’s execution (macro stand-by mode).

D6 is a red ERROR LED. OFF means there are no errors and the printer is ready for operation. ON indicates the printer is OFF LINE (except during paper feeding using the FEED button, during self-test printing, and in the error state). The ERROR LED blinks a defined pattern every 5.12 seconds to notify the user of various error conditions. When the LED is normally OFF and blinks ON, an error is indicated which may be recoverable. . When the LED is normally ON and blinks OFF, an error is indicated which is not recoverable. For any error that is not recoverable, power should be turned off as soon as possible.

Blink Rate	Error	Description	Recovery method
Continuous	Print head Temperature	The temperature has exceeded 70 degrees C	Automatic when the print head cools off.
1 blink ON	Cutter error	The cutter has failed to complete a cut	Recovers by DLE ENQ after the cutter Jam has been corrected
1 blink OFF	PCB error	The printer mechanism is not connected or the internal wiring is incorrect.	Turn power off and check connections between the printer mechanism and the controller board.
2 blinks ON	Black Mark	No Black Mark was detected	Recovers by DLE ENQ. within ???.
2 blinks OFF	R/W error	The CPU has detected a memory R/W error	Cycle power off and on to see if the error goes away.
3 blinks OFF	High voltage	The power supply voltage is too high	Turn power OFF, correct the problem before turning back on.
4 blinks OFF	Low voltage	The power supply voltage is too low.	Turn power OFF, correct the problem before turning back on.
5 blinks OFF	CPU error	A program execution error	Cycle power off and on to see if the error goes away.
6 blinks ON	Platen open	The Print platen is open	Recovers by DLE ENQ after the platen is closed.

4.2 Control Codes and Control Sequences List

		Location of Definition	Class	Standard mode	Page mode
HT	Horizontal tab	General	Execute	Yes	Yes
LF	Print and line feed	General	Execute	Yes	Yes
FF	PAGE MODE, print and return to standard mode	PAGE	Execute	Ignored	Yes

	Black Mark mode, print and feed to print starting position (Black Mark)	General, Top of Form	Execute	Yes	Disabled
CR	Print and carriage return	General	Execute	Yes	Yes
CAN	Cancel print data	PAGE	Execute	Ignored	Yes
DLE EOT	Real time status request	STATUS	Execute	Yes	Yes
DLE ENQ	Real time request to printer	General	Execute	Yes	Yes
ESC	Escape sequence header	---	---	---	---
FS	FS sequence header	---	---	---	---
GS	GS sequence header	---	---	---	---
ESC FF	Print data	PAGE	Execute	Ignored	Yes
ESC SP	Set right side character spacing	General	Setting	Yes	Yes
ESC !	Set print mode(s)	General	Setting	Yes	Yes
ESC \$	Set absolute print position	General, PAGE	Execute	Yes	Yes
ESC %	Select/cancel user-defined character set	Seldom	Setting	Yes	Yes
ESC &	Define user-defined characters	Seldom	Setting	Yes	Yes
ESC *	Select bit image mode	General	Execute	Yes	Yes
ESC -	Turn underline on/off	General	Setting	Yes	Yes
ESC 2	Select default line spacing	General	Setting	Yes	Yes
ESC 3	Set line spacing	General	Setting	Yes	Yes
ESC ?	Cancel user-defined characters	Seldom	Setting	Yes	Yes
ESC @	Initialize printer	General	Execute, Setting	Yes	Yes
ESC D	Set horizontal tabs	General	Setting	Yes	Yes
ESC E	Turn emphasized on/off	General	Setting	Yes	Yes
ESC G	Turn double-strike on/off	General	Setting	Yes	Yes
ESC J	Print and feed paper	General	Execute	Yes	Yes
ESC L	Select PAGE MODE	PAGE	Execute	Start line	Ignored
ESC M	Select character font	General	Setting	Yes	Yes
ESC R	Select international character set	General	Setting	Yes	Yes
ESC S	Select standard mode	PAGE	Execute	Ignored	Yes
ESC T	Select print direction	PAGE	Setting	Value	Yes
ESC V	Turn rotated print on/off	General	Setting	Yes	Value
ESC W	Set printing area	PAGE	Setting	Value	Yes
ESC \	Set relative print position	General, PAGE	Execute	Yes	Yes
ESC a	Select justification	General	Setting	Start line	Value
ESC c 3	Select paper sensors to output paper out signal	General	Setting	Yes	Yes
ESC c 4	Select paper sensors to stop printing	General	Setting	Yes	Yes
ESC c 5	Enable/disable panel buttons	General	Setting	Yes	Yes
ESC d	Print and feed n lines	General	Execute	Yes	Yes
ESC t	Select character code table	General	Setting	Yes	Yes
ESC {	Turn inverted print on/off	General	Setting	Start line	Value
FS p	Print NV bit image	NV & DL	Execute	Yes	Disabled
FS q	Define NV bit image	NV & DL	Setting	Start line	Disabled
GS FF	Feed paper to Black Mark	Top of Form	Execute	Yes	Yes

GS !	Select character size	General	Setting	Yes	Yes
GS \$	Set absolute vertical print position	PAGE	Execute	Ignored	Yes
GS *	Define download bit image	NV & DL	Setting	Yes	Yes
GS (A	Execute test print	General	Execute	Yes	Ignored
GS (E	User setup commands	Seldom	Execute, Setting	Start line	Disabled
GS (F	Set adjustment values	Seldom	Setting	Yes	Yes
GS (M	Customize printer control values	Seldom	Setting	Start line	Value
GS /	Print download bit image	NV & DL	Execute	Empty	Yes
GS :	Start/end macro definition	Seldom	Execute, Setting	Yes	Yes
GS B	Set reverse video on/off	General	Setting	Yes	Yes
GS C 0	Select counter print mode	Counter	Setting	Yes	Yes
GS C 1	Select count mode (A)	Counter	Setting	Yes	Yes
GS C 2	Set counter	Counter	Setting	Yes	Yes
GS C ;	Select count mode (B)	Counter	Setting	Yes	Yes
GS E	Select head control method	Seldom	Setting	Yes	Yes
GS H	Select printing position of HRI characters	Bar Code	Setting	Yes	Yes
GS I	Transmit printer ID	Status	Execute	Yes	Yes
GS L	Set left margin	General	Setting	Start line	Value
GS T	Set print position to beginning of line	General	Execute	Yes	Ignored
GS V	Select cut mode and cut paper	General	Execute	Start line	Yes
GS W	Set printing area width	General	Setting	Start line	Value
GS \	Set relative vertical printing position	PAGE	Execute	Ignored	Yes
GS ^	Execute macro	Seldom	Execute	Yes	Yes
GS a	Enable/disable Auto Status Back (ASB)	Status	Execute, Setting	Yes	Yes
GS b	Turn smoothing mode on/off		Setting	Yes	Yes
GS c	Print counter	Counter	Execute	Yes	Yes
GS f	Select font for HRI characters	Bar Code	Setting	Yes	Yes
GS h	Set bar code height	Bar Code	Setting	Yes	Yes
GS k	Print bar code	Bar Code	Execute	Empty	Yes
GS r	Transmit status	Status	Execute	Yes	Yes
GS v 0	Print raster bit image	General	Execute	Empty	Disabled
GS w	Set bar code width	Bar Code	Setting	Yes	Yes

Table 4 Control Codes and Control Sequences

List of Control Codes and Control Sequence Locations	
Control Codes	Control Sequences
Bar Code	See 4.3.3 Bar Code Commands page 31
Counter	See 4.3.4 Counter Commands page 32
General	See 4.3.1 General Usage Print Commands page 27
NV & DL	See 4.3.7 NV Memory and Down Load Bit Images Commands page 36
Page	See 4.3.6 Page Mode Commands page 34
Seldom	See 4.3.8 Seldom Used Commands page 38
Status	See 4.3.2 Status Commands page 31

Top of Form	See 4.3.5 Top of Form Commands page 34
Disabled	Parameters will be processed as normal data.
Empty	Enabled only when at the beginning of a line.
Ignored	Command code and parameters are ignored.
Start line	Enabled only when there is no data in the print buffer
Yes	Function is enabled.

Table 5 List of Control Codes and Control Sequences Locations

4.3 Control Codes and Control Sequences Definition

4.3.1 General Usage Print Commands

General Usage Print Commands			
Name	Command ASCII	Command (hex) +n = data byte[hex]	Description
Tab	HT	09	Move the print position to the next horizontal tab position. Default is a TAB position every 8 columns. See ESC D.
Line feed	LF	0A	Print data and feed paper. Default line spacing = 3.75mm. See ESC 2 and ESC 3
Form feed	FF	0C	See Top of Forms Commands. See Page Mode Commands.
CR	CR	0D	If parallel interface is selected and automatic line feed is enabled (Memory Switch 1-5) then CR is treated as LF. See LF.
Real-time request to printer	DLE ENQ +n	10 05 +n	+n=01hex, Recover from error and restart printing from the line where the error occurred. +n=02hex, Recover from an error after clearing the receive and print buffers.
ESC	ESC	1B	ESC Sequence Header
FS	FS	1C	FS Sequence Header.
GS	GS	1D	GS Sequence Header.
Set right side character spacing	ESC (SP) +n	1B 20 +n	Set spacing to the right of each character to n x 0.125 mm (n x 0.0049"). Doubled for Double Wide. Does not affect the Kanji character set. Set values independently in Page and Normal modes.
Set Print mode	ESC ! +n	1B 21 +n	Set Print mode. See

			Section 4.4.1 - Set Print Mode. See ESC M, ESC E, ESC -, GS!
Set absolute print position	ESC \$ +n +m	1B 24 n m	Current print position is set to (n + m x 256) x 0.125 mm from the beginning of the line. See ESC \, GS \$, GS\ . See Page mode.
Select Bit Image mode	ESC \ +m +n1 +n2 +d1□dn	1B 2A +m +n1 +n2 (data)	Set Bit Image mode. See 4.4.2. - Set Bit Image Mode
Turn underline mode on/off	ESC - +n	1B 2D +n	n=0 (00 or 30 hex) Turn underline off. n=1 (01 or 31 hex) Turn on 1 dot line high underline. n=2 (02 or 32 hex) Turn on 2 dot line high underline. See ESC !.
Set default line spacing	ESC 2	1B 32	Set 3.75 mm line spacing (30 dot lines). See ESC 3.
Set Line feed pitch	ESC 3 +n	1B 33 +n	Set single line spacing to n dot lines (n x 0.125mm). Set independently in Page and Normal mode. Default = 30. See ESC 2.
Printer reset	ESC @	1B 40	Resets the printer to the mode it was in when power was turned on. Clears the data in the print buffer but does not the data in the receive buffer. The DIP switches and MEMORY switches are not rechecked. The MACRO definition is not cleared.
Set Horizontal Tab positions	ESC D +d1□dn NUL	1B 44 (DATA) 00	Set from 1 to 32 tab positions. Data values range from 1 to 255 in ascending order. If a data value is less than the previous data value, this command is terminated. NUL terminates this command when less than 32 TAB positions are being set. ESC D NUL clears all tab positions. Default is every 8 columns.
Turn emphasized mode on/off	ESC E +n	1b 45 +n	LSB = 0 Turn emphasized mode off. LSB = 1 Turn emphasized mode on. See ESC !.
Turn double-strike mode on/off	ESC G +n	1B 47 +n	LSB = 0 Turn double strike mode off. LSB = 1 Turn double strike mode on. Printout is the same as emphasized. See ESC E.
Name	Command	Command	Description

	ASCII	+n = data byte[hex]	
Forward paper feed for <i>n</i> dot lines	ESC J +n	1B 4A +n	Print if needed then feed paper <i>n</i> dot lines. Range = 0 to 255dec. If BM is enabled, this command can feed paper past the mark.
Select character font	ESC M +n	1B 4D +n	<i>n</i> =0 (00 or 30 hex) selects FontA (12x24). <i>n</i> =1 (01 or 31 hex) selects FontB (9x17). See ESC !
Select International character set	ESC R +n	1B 52 +n	Select international character set. See Section 5.3.14 – International Character Set +++ reprint section
Rotate print	ESC V +n	1B 56 +n	<i>n</i> = 1 (01 or 31 hex) Rotate the print 90 degrees clockwise. <i>n</i> = 0 (00 or 30 hex) Cancel the rotation. Rotated characters do not get underlined. Double wide becomes double high and double high becomes double wide. Not Page mode. See ESC ! and ESC -.
Set relative print position	ESC \ +n +m	1B 5C n m	Set printing to current print position + (<i>n</i> +(<i>m</i> *256)). Ignored if specified setting exceeds the printable area. See Page mode.
Select justification	ESC a +n	1B 61 n	<i>n</i> =0 (0 or 30 hex) Left justify. <i>n</i> =1 (01 or 31 hex) Center justify. <i>n</i> =2 (02 or 32 hex) Right justify. Normal mode only, must be received at the start of a line. See HT, ESC \$, and ESC \.
Select paper sensors to output paper end status	ESC c 3 +n	1B 63 33 +n	Bit 1 enables or disables the paper low sensor. Bit 3 enables or disables the paper out sensor. A value of 1 enables and a value of 0 disables. Applies to the parallel interface ONLY.
Select paper sensor to stop printing	ESC c 4 +n	1B 63 34 +n	Setting bit 0 or bit 1 high causes the Paper Low sensor to be used as a Paper Out sensor.
Panel buttons enable/disable	ESC c 5 +n	1B 63 35 +n	LSB = 0 Paper feed button is enabled. LSB = 1 Paper feed button is disabled. During a macro

			instruction standby the feed button is always enabled but will not feed paper.
Forward line feed for n character lines	ESC d +n	1B 64 +n	Print if needed then feed paper n character lines. Range = 0 to 255dec. Maximum amount of paper fed = 1016 mm (40"). Can feed past marks in BM mode.
Select Character code table	ESC t +n	1B 74 +n	See section 5.3 - Character Sets
Set/Reset Inverted print	ESC □ +n	1B 7B +n	LSB = 1, upside-down printing. LSB = 0, normal printing. This command must be received at the start of a line to be in effect for that line. Does not apply in page mode.
Select character size	GS ! +n	1D 21 +n	Characters can be printed in sizes from 1 to 8 times normal in either width or height. Bits 0, 1, and 2 set the character width multiplier. Bits 4, 5, and 6 set the character height multiplier. A value of 0 = Normal size. Does not apply to HRI characters when printing bar codes. See ESC !.
Test print	GS (A 02hex 00hex +n +m	1D 28 41 02 00 +n +m	n = 0 or 1 or 2 (00, 01, 02, 30, 31, or 32 hex). m=1 (01 or 31 hex) causes a Hexadecimal dump print pattern.). m=2 (02 or 32 hex) causes a Printer Status print pattern. m=3 (03 or 33 hex) causes a "barber pole" print pattern. Must be received at the start of a line. A cut is performed following the print test. The printer is reset following the print test, even download characters or bit image are erased.
Reverse video	GS B +n	1D 42 +n	Bit 0 = 0 (default) turns off and bit 0 = 1 turns on reverse video printing. Does not apply to bit image, user-defined bit image, bar codes and the HRI part of bar codes, or spaces skipped by HT, ESC \$, or ESC \

			commands. Does not affect the space between character lines. Underline does not apply while reverse video is enabled.
Set left margin	GS L +n +m	1D 4C +n +m	Set the left margin to dot position $m \times 256 + n$. Must be received at the start of a line. Does not apply in PASE mode. See GS W.
Set print position to the beginning of print line	GS T +n	1G 54 +n	$n=0$ (either 00 or 30hex) sets the print position to the start of the print line after deleting data in the print buffer. $n=1$ (either 01 or 31hex) sets the print position to the start of the print line after printing data in the print buffer.
Cut command	GS V m	1D 56 +m +n	If $m = 1$ (either 01hex or 31hex) a cut is performed and the $+n$ byte must not be sent. If m is a capital B (42hex) then paper is fed for n dot lines and then a cut is performed.
Set Right Margin	GS W +n +m	10 57 +n +m	Sets the print width to $m \times 256 + n$ relative to the left margin. Must be received at the start of a line. See GS L.
Print raster bit image	GS v 0 +m +x1 +x2 +y1 +y2 +data	1D 76 30 m x1 x2 y1 y2 data	See 4.4.3 - Set Raster Bit Image Mode

Table 6 General Usage Print Commands

4.3.2 Status Commands

Because some of the bits in the status responses are fixed, the user can confirm the command to which the status belongs and differentiate the status responses from XON/XOF as shown:

Response to Status Commands	
Response to	Bit Pattern
GS r	0 x x 0 x x x x
XON	0 0 0 1 0 0 0 1
XOF	0 0 0 1 0 0 1 1
DLE EOT	0 x x 1 x x 1 0
ASB (1 st byte)	0 x x 1 x x 0 0
ASB 2 nd -4 th	0 x x 0 x x x x

Table 7 Response to Status Commands

The transmit buffer is 99 bytes long. If more than 99 bytes are stored up without being transmitted, the status bytes that have no place to be stored will be thrown away.

Status Commands			
Name	Command ASCII	Command+n = data byte[hex]	Description
Real-time STATUS request	DLE EOT +n	10 04 +n	See Section 4.4.4 - Status Commands .
Transmit printer ID	GS I +n	1D 49 +n	See Section 4.4.4 - Status Commands .
Enable/disable Automatic Status Back (ASB)	GS a +n	1D 61 +n	See Section 4.4.4 - Status Commands .

Table 8 Status Commands

4.3.3 Bar Code Commands

Bar Code Commands			
Name	Command ASCII	Command +n = data byte[hex]	Description
Select print position for HRI characters	GS H n	1D 48 +n	n = 0 (either 00hex or 30hex), no HRI printed. n = 1 (either 01hex or 31hex), HRI printed above the bar code. n = 2 (either 02hex or 32hex), HRI printed below the bar code. n = 3 (either 03hex or 33hex), HRI printed both above and below the bar code. The font used is specified by GS f. Default = 0.
Select font for HRI	GS f +n	1D 66 +n	n = 0 (either 00hex or 30hex), print the HRI using FontA (12x24). n = 1 (either 01hex or 31hex), print the HRI using FontB (9x17). Default = 0.
Set Bar code height	GS h +n	1D 68 +n	Set the bar code height in dots. Default = 162. Range = 1 to 255dec.
Print bar code	GS k +n	1D 6B +n (data)	Selects the bar code type and

	(data+ NUL	00	prints. See Section 4.4.7 - Bar Code Command .
Set bar code width	GS w +n	1D 77 +n	n defines the width of lines used for printing bar codes in mm. For codes Code39, ITF, and CODABAR: n=2, 0.250 & 0.625. n=3, 0.375 & 1.000. n=4, 0.500 & 1.250. n=5, 0.625 & 1.625. n=6, 0.750 & 2.000. For codes UPC-A, UPC-E, JAN13, JAN8, Code93, and CODE128; the smaller number listed above = the Modulo Width. Default = 3.

Table 9 - Bar Code Commands

4.3.4 Counter Commands

Counter Commands			
Name	Command ASCII	Command +n = data byte[hex]	Description
Select counter print mode	GS C 0 +n +m	1D 43 30 +n +m	n = 00 hex, prints the actual digits indicated by the number value. n = 01 hex through 05 hex sets the number of digits to be printed. m=0 (either 00 hex or 30 hex), align right with leading spaces. m=1 (either 01 hex or 31 hex), align right with leading zero. m=2 (either 02 hex or 32 hex), align left with trailing spaces. If n = 0 then m has no meaning. Default is n=m=0.
Select count mode (A)	GS C 1 +n1 +n2 +m1 +m2 +n +r	1D 43 32 +n1 +n2 +m1 +m2 +n +r	n1+n2*256 = start count. m1+m2*256 = end count. n = step amount. r = the repetition number when the counter value is fixed. Count up mode is set when n1+n2*256 < m1+m2*256 and n and r are not =0. Count down mode is set when n1+n2*256 > m1+m2*256 and n and r are not =0. Counting stops when n1+n2*256 = m1+m2*256 and n and r are not =0. n = the amount to increment the count by. R = the repetition number when counter value is fixed.
Set counter	GS C 2 +n1 +n2	1D 43 32 +n1 +n2	n1+n2*256 sets the value of the serial number counter. In count-up mode; if the counter value goes outside the counter operation range set by GS C 1 or GS C ;, it is forced to convert to the minimum value set by GS c. In count-down mode; if the counter value goes outside the counter operation range set by GS

			C 1 or GS C ;, it is forced to convert to the maximum value set by GS c.
Select count mode (B)	GS C ; s1 ; s2 ; s3 ; s4 ; s5 ;	1D 43 3B s1 3B s2 3B s3 3B s4 3B s5	s1 through s5 are all character strings made up of the ASCII characters 0 through 9. s1 and s2 range from 0 to 65535 and s3 through s5 range from 0 to 255. s1 and s2 specify the counter range. s3 = the amount to increment the count by. S4 = the repetition number when the counter value is fixed. s5 = the counter value. Count-up mode is selected by s1 < s2 and s3 and s4 are not =0. . Count-down mode is selected by s1 > s2 and s3 and s4 are not =0. Counting stops when s1 = s2 or s3 = 0 or s4 = 0.
Print counter	GS c	1D 63	Sets the serial counter value in the print buffer and increments or decrements the counter value based on the count mode selected by GS C 0 and either GS C 1 or GS C ;. In count up mode the counter value is set to the minimum value if it goes out of the range set by GS C 1 or GS C ;. In count down mode the counter value is set to the maximum value if it goes out of the range set by GS C 1 or GS C ;.

Figure 8 Counter Commands

4.3.5 Top of Form Commands

Top of Form Commands			
Name	Command ASCII	Command +n = data byte[hex]	Description
Form feed	FF	0C	Print if needed then feed paper to the next Black Mark if the BM sensor is enabled. See GS (F, GS FF, and DSW1 position 1).
Feed to Black Mark	GS FF	1D 0C	Feed paper to the next Black Mark position. Ignored unless enabled by Dip SW 1 position 1. See GS (F, FF) and Dip Switch settings.

Table 10 Top of Form Commands

For additional information black mark sensing, see Section 2.2.2 Black Mark Sensors Load .

4.3.6 Page Mode Commands

Bar Code Commands			
Name	Command ASCII	Command +n = data byte[hex]	Description
Form feed	FF	0C	Print and return to standard mode. Printed data is cleared from the data buffer. The printing area set by ESC W is reset to the default setting. See ESC FF, ESC L, and ESC S
CAN	CAN	18	Cancel print data in page mode. See ESC L and ESC W.
Print data in Page mode	ESC FF	1B 0C	Prints all buffered data in the printing area. Printed data is not cleared from the data buffer. ESC T and ESC W values are not cleared. See FF, ESC L, and ESC S.
Set absolute print position	ESC \$ +n +m	1B 24 n m	In Page mode with the starting position (See ESC T) set to the top left corner or the bottom right corner this is a horizontal position but with the starting position set to the top right corner or the bottom left corner this is a vertical position. See ESC \, GS \$, GS\.
Select Page mode	ESC L	1B 4C	Must be received at the start of a line. Settings of ESC SP, ESC 2, ESC 3 have independent values in page mode and standard mode. ESC V, ESC a, ESC {, GS L, and GS W while in page mode makes the settings for standard mode but have no affect while in page mode. The printer returns to standard mode at power on, reset, or ESC @

			received. See FF, CAN, ESC FF, ESC S, ESC T, ESC W, GS\$, GS \.
Select standard mode	ESC S	1B 53	Data buffered in page mode is cleared. The printing area set by ESC W is initialized. Settings of ESC SP, ESC 2, ESC 3 are switched to the standard mode values. See FF, ESC FF, ESC L.
Select print direction	ESC T +n	1B 54 +n	Sets the position where data is buffered within the printing area set by ESC W. n=0 (either 00 hex or 30 hex) sets the starting position to the upper left corner and printing goes from left to right. n=1 (either 01 hex or 31 hex) sets the starting position to the lower left corner and printing goes from bottom to top. n=2 (either 02 hex or 32 hex) sets the starting position to the lower right corner and printing goes from right to left. n=3 (either 03 hex or 33 hex) sets the starting position to the upper right corner and printing goes from top to bottom.
In page mode, set printing area	ESC W +x1 +x2 +y1 +y2 +dx1 +dx2 +dy1 +dy2	1B 57 +x1 +x2 +y1 +y2 +dx1 +dx2 +dy1 +dy2	$x1+x2*256$ = horizontal starting position. $y1+y2*256$ = vertical starting position. $dx1+dx2*256$ = printing area width. $dy1+dy2*256$ = printing area height Defaults are $x1=x2=y1=y2=0$, $dx1=128$ for 82.5 mm printer or 64 for 80 mm printer, $dx2=2$, $dy1=152$ for 82.5 mm printer or 226 for 80 mm printer, $dy2=2$.
Set relative print position	ESC \ +n +m	1B 5C +n +m	Set printing position to current position plus $(n+m*256)*0.125$ mm. If the starting position is set (by ESC T) to the upper left or lower right of the printing area then the offset is in the horizontal direction but if the starting position is set to the upper right or lower left of the printing area then the offset is in the vertical direction.
Page mode, Set absolute vertical print position	GS \$ +n +m	1D 24 +n +m	Sets the absolute vertical starting position to buffer character data to $(n+m*256)*0.125$ mm referenced to the starting <i>posotopn</i> defined by ESC T. If the starting position is set (by ESC T) to the upper left or lower right of the printing area then the position is in the vertical direction but if the starting position is set to the upper right or lower left of the printing area then the position is in the horizontal direction.
Page mode, set relative vertical print position	GS \ +n +m	1D 5C +n +m	Set printing position to current position plus $(n+m*256)*0.125$ mm positive (down the page) or $65536-(n+m*256)*0.125$ mm negative (up

			the page). If the starting position is set (by ESC T) to the upper left or lower right of the printing area then the offset is in the vertical direction but if the starting position is set to the upper right or lower left of the printing area then the offset is in the horizontal direction.
Turn smoothing mode on/off	GS b +n	1D 62 +n	LSB = 0 turns smoothing off. LSB = 1 turns smoothing on. Smoothing applies to built-in or user defined characters when printed at any size larger than the normal. See ESC !, GS !.

Table 11 – Page Mode Commands

4.3.7 NV Memory and Down Load Bit Images Commands

A download bit image is stored in RAM and is cleared by a power cycle or by the commands ESC @ or ESC &. A download bit image (GS *) and user defined characters (ESC &) can not be defined simultaneously, defining either will cancel the other. An NV bit image is stored in non-volatile memory and is cleared only by redefining the NV bit image message. Frequent writes may damage the NV memory. Maximum recommended usage is 10 times per day.

Bar Code Commands			
Name	Command ASCII	Command +n = data byte[hex]	Description
Print NV image	FS p +n +m	1C 70 +n +m	Print the NV message +n defined by FS q in the resolution specified by +m. m = 0 (either 00 hex or 30 hex = 203 by 203 density. m = 1 (either 01 hex or 31 hex = 203 V by 102 H density. m = 2 (either 02 hex or 32hex = 102 V by 203 H density. m = 3 (either 03 hex or 33 hex = 102 V by 102 H density. Must be received when the print buffer is empty. Is not affected by print modes (emphasized, double strike, underline, character size, reverse video. rotated, etc) but is affected by upside-down printing mode. Data which exceeds the allowable print width of the printer is ignored. This command is ignored in Page mode.
Define NV image –	FS q +n +x1 +x2 +y1 +y2 (data) 01 hex through +x1 +x2 +y1 +y2 (data) n hex	1C 71 +n +x1 +x2 +y1 +y2 (data) 01 hex through +x1 +x2 +y1 +y2 (data) n hex	+n (1 through 255) defines the number of NV bit images to be stored in memory. For each NV bit image $(x1+x2*256)*8$ = number of dots being defined in the horizontal direction and $(y1+y2*256)*8$ = number of dots being defined in the vertical direction. Each NV bit image is terminated with a sequential number n. x1 and y1 can range from 0 through 255, x2 can range from 1 through 3, y2 can range from 0 through 1, but

			<p>$x1+x2*256$ can not be less than 1 or greater than 1023 and $y1+y2*256$ can not be less than 1 or greater than 288. The amount of data needed to complete this command is $(x1+x2*256)*(y1+y2*256)*8$ bytes. Each bit image stored requires an additional 4 bytes for header information. A total of 192 Kbytes is available for storage of all NV bit images. This command clears all previously stored NV bit images so to write a new NV bit image requires reloading all NV bit images which are to be stored. When this command is completed, the printer performs a hardware reset so all user-defined characters, downloaded bit images, and macros are cleared and all functions are the same as if power was turned off then back on. In standard mode this command must be received at the start of a line. This command does nothing in page mode. See drawing +++ add bookmark. (Rick)</p>
Define download bit image	GS * +x +y (data)	1D 2A +x +y (data)	<p>+x (1 to 255dec) defines the horizontal size as x times 8 dots. +y (1 to 48dec) defines the vertical size as y times 8 dots. x times y cannot exceed 1536. The download bit image is cleared by a power on reset, ESC @, or ESC &, (a download bit image (GS *) and user defined characters (ESC &) can not be defined simultaneously, defining either will cancel the other). See drawing +++ add bookmark. (Rick)</p>
Print downloaded bit image	GS /+m	1D 2F +m	<p>Print the downloaded bit image defined by GS * in the resolution specified by +m. m = 0 (either 00hex or 30hex = 203 by 203 density. m = 1 (either 01hex or 31hex = 203 V by 102 H density. m = 2 (either 02hex or 32hex = 102 V by 203 H density. m = 3 (either 03hex or 33hex = 102 V by 102 H density. Must be received when the print buffer is empty. Is not affected by print modes (emphasized, double strike, underline, character size, reverse video, rotated, etc) but is affected by upside-down printing mode. If the downloaded bit image exceeds the printable area, the excess data is not printed. If the margins have been set by the GS L and/or GS W commands, this</p>

			command will readjust the margins as required to print as much of the data as possible for the printer mechanism being used. In Page mode, the terms horizontal and vertical depend on the print starting position defined by ESC T.
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Table 12 – NV Memory Commands

***+++ Add drawing showing data structure for both download bit image and NV bit image. (Rick)

4.3.8 Seldom Used Commands

Seldom Used Commands			
Name	Command ASCII	Command +n = data byte[hex]	Description
Set/cancel user-defined character set	ESC % +n	1B 25 n	LSB of n = 0 (default) selects ROM character generator. LSB of n = 1 selects User Defined character generator. See ESC & and ESC ?.
Define User-defined characters	ESC & +y +c1 +c2 (+x +data)	1B 26 03 +c1 +c2 (data)	+y specifies 3 bytes per character in the vertical direction. +c1 specifies the first character to be downloaded and +c2 specifies the last character to be downloaded. +x specifies the number of dots in the horizontal direction. The value of +x is 12dec for FontA or 09dec for FontB). FontA or FontB are selected by ESC ! or ESC M. A download bit image (GS *) and user defined characters (ESC &) can not be defined simultaneously, defining either will cancel the other. See ESC %, ESC ?, +++ add dwg & bookmark. (Rick)
Cancel user-defined characters	ESC ? +n	1B 3F +n	The previous user defined character pattern for character +n (20 hex through 7E hex in either font selected by ESC !) is cleared and the internal character generator is used to print the character n. See ESC & and ESC %.
User-defined commands	GS (E +p1 +p2 +m (data)	1D 28 45 +p1 +p2 +m (data)	p1+p2*256 = the number of data bytes to follow +m plus 1. Function 1 enters the user defined mode. +m=01 hex, p1=03 hex, p2=00 hex, d1=49 hex, d2=4E hex. The printer transmits 37 hex 20 hex, 00 hex. Function 2 ends the user defined mode. +m=02 hex, p1=04 hex, p2=00 hex, d1=4F hex, d2=55 hex, d3=54 hex. The printer performs a software reset, m=2 is only effective

			<p>in the user defined mode.</p> <p>Function 3 allows setting of the memory switches. +m=03 hex, p1+p2*256 can vary from 10 dec to 65530 dec. The data structure is a 1 followed by b8 through b1. a1 (01 hex through 08 hex) specifies the memory switch to be changed. b8 represents position 8 of that memory switch and so on through b1 represents position 1 of that memory switch then another a followed by b8 through b1 can follow as specified by the values of p1 and p2. The values for each b are 30 hex to set a switch OFF, 31 hex to set a switch ON, or 32 hex to leave a switch unchanged. 32 hex should be sent for the "reserved" switches. The switch changes made become effective after a reset or power cycle. Running a self-test printout can check the switch settings. Frequent writes may damage the NV memory. Maximum recommended usage is 10 times per day.</p> <p>Function 4 causes the printer to transmit the settings of a memory switch. +m=04 hex, p1=02 hex, p2=00 hex. The data byte value is from)1 hex through 08 hex to specify which memory switch is being checked. The eleven data bytes transmitted are 37 hex, 21 hex, 8 data bytes representing the 8 switch positions, and 00 hex. The 8 data bytes are transmitted in the order of switch position 8 through switch position 1. For each switch position, the data sent will be 30 hex (an ASCII 0) if the switch is OFF or 31 hex (an ASCII 1) if the switch is ON.</p>
Set adjustment values	GS (F +p1 +p2 +a +m +n1 +n2	1D 28 46 04 00 +a +m +n1 +n2	Effective only when the BM sensor is enabled. +a = 01 hex selects the function for the position to start printing when used by FF or GS FF commands. +a = 02 hex selects the function for the position to start cutting when used by the GS V command. +m = 0 (either 00 hex or 30 hex) specifies a forward paper feed. +m = 1 (either 01 hex or 31 hex) specifies a reverse paper feed. (n1+n2*256)*0.125 mm specifies how much to feed. The default of all

			adjustment values is 0.
Save or load adjustment values in NV memory	GS (M +p1 +p2 +n +m	1D 28 4D +p1 +p2 +n +m	<p>Function 1 saves the settings made by GS (F in NV memory. +n = 1 (either 01 hex or 31 hex), +m = 1 (either 01 hex or 31 hex), +p1=02 hex, +p2=00 hex.</p> <p>Function 2. +n = 2 (either 02 hex or 32 hex), +m = 0 (either 00 hex or 30 hex), setting made by GS (F is set as the default value or +m = any value except either 00 hex or 30 hex, setting values are stored in area m of memory, +p1=02 hex, +p2=00 hex. Must be processed at the beginning of a line. No effect in page mode.</p> <p>Function 3 set whether or not the value saved in NV memory is the default to be used at power on. +n = 3 (either 03 hex or 33 hex). +m = 0 (either 00 hex or 30 hex), the printer does not load the value from NV memory at initialization. +m = any value except either 00 hex or 30 hex, the printer loads the value from NV memory at initialization.</p> <p>Frequent writes may damage the NV memory. Maximum recommended usage is 10 times per day.</p>
Start/end macro definition	GS :	1D 3A	Macro definition starts when this command is received during normal operation and ends when this command is received during macro definition. ESC @ does not clear the contents of the macro definition so ESC @ can be included in the macro definition. The contents of the macro can not exceed 2048 bytes.
Select head control method	GS E +n	1D 45 +n	+n=00 hex, Print speed 1 (150 mm/second). +n=10 hex, Print speed 2 (100 mm/second). +n=20 hex, Print speed 3 (80 mm/second). +n=30 hex, Print speed 4 (50 mm/second). When Memory switch 8 position 1 is set to divided energy, the maximum speed is 120 mm/second. Default is speed 1.
Execute macro	GS ^ +n +m +o	1D 5E +n +m +o	+n (0 through 255) specifies the number of times to execute the macro. +m (0 through 255) specifies how long to wait between executions of the macro (m*100 milliseconds) When the LSB on +o is 0, the macro executes n times at

			<p>the interval of $m \cdot 100$ msec. When the LSB on +o is 1, the macro executes then after an interval of $m \cdot 100$ msec the Paper Out LED flashes and the printer waits for the Paper Feed button to be pressed as a signal to execute the next sequence until the macro has executed +n times</p>
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Table 13 - Seldom Used Commands

4.4 Descriptions of Commands

4.4.1 Set Print Mode

ESC ! +n [1B 21 +n]

+n is defined as:

Print Mode Settings	
Bit 7	0 = Underline OFF 1 = Underline ON.
Bit 6	Not used.
Bit 5	0 = Double wide print OFF. 1 = Double wide print ON.
Bit 4	0 = Double high print OFF. 1 = Double high print ON.
Bit 3	0 = Emphasized print OFF. 1 = Emphasized print ON.
Bit 2	Not used.
Bit 1	Not used.
Bit 0	0 = FontA (12x24). 1 = FontB (9x17).

Figure 9 Print Mode Settings

Both double wide and double high can be selected for any of the type faces. When a printed line contains characters with different heights, the characters are arranged so that bottoms of all characters line up. All characters printed can be underlined except 90 degree-rotated characters. The space caused by the tab command HT is not underlined. The thickness of the underline is defined by ESC – regardless of the character size. Default = 0hex (12 x 24 matrix)..

4.4.2 Set Bit Image Mode

ESC \ +m +n1 +n2 +d1 □ dn [1B 2A +m +n1 +n2 (data)]

Specifies and prints bit image graphics.

Set Bit Image Mode				
+m	Mode	Vertical dot density	Horizontal dot density	Number of data bytes
00 hex	8 Single density	67.7 dpi	101.6 dpi	$n1+n2*256$
01 hex	8 Double density	67.7 dpi	203.2 dpi	$n1*n2*256$
20 hex	24 Single density	203.2 dpi	101.6 dpi	$(n1+n2*256)*3$
21 hex	24 Double density	203.2 dpi	203.2 dpi	$(n1+n2*256)$

Table 14 Set Bit Image Mode

If +m is not one of the specified values, the rest of the ESC sequence is ignored and all information starting with +n1 is treated as normal data.

In single density mode (+m=00 or 20), for each bit of data received the printer prints two dots horizontally so the horizontal resolution is 101.6 dpi.

In double density mode (+m=01 or 21), for each bit of data received the printer prints one dot horizontally so the horizontal resolution is 203.2 dpi.

In 8 dot mode (+m=00 or 01), for each data bit received the printer prints three dots vertically so the vertical resolution is 67.7 dpi.

In 24 dot mode (+m=20 or 21), for each data bit received the printer prints one dot vertically so the vertical resolution is 203.2 dpi.

+n1 and +n2 define the number of dots per line to be printed in the horizontal direction. +n1 and +n2 cannot both have a value of 0. The range of +n1 = 0 to 255 dec and the range of +n2 is 0 to 3 dec so a total number of horizontal dot position which can be printed with one ESC sequence can vary from 1 to 1023.. If +n1 or +n2 is outside this range, the ESC sequence is ignored and all data following is treated as normal data.

If the bit image data specified is more than what will fit on a line, the excess data is ignored.

If the width of the printing area set by GS L and GS W is less than the width required by the data sent with the ESC * command, the margins are re-adjusted to print as much of the graphics data as possible. The right margin is extended first and then if the data still will not fit then the left margin is readjusted up to the point where the full width of the print head is used for printing the graphics image.

When 8 dot bit image is selected, each byte of data represents 8 vertical dots to be printed. The MSB is the top dot to be printed and the LSB is the bottom dot to be printed. For each of the 8 bits within each data byte, a "1" represents a dot position to be printed and a "0" represents a dot position not to be printed.

When 24 dot bit image is selected, each series of three bytes of data represent 24 vertical dots to be printed. The first byte represents the top 8 dots to be printed, the second byte represents the 8 dots to be printed in the middle, and the third byte represents the bottom 8 dots to be printed. The MSB of each byte is the top dot to be printed and the LSB is the bottom dot to be printed. For each of the 24 bits within each series of three data bytes, a "1" represents a dot position to be printed and a "0" represents a dot position not to be printed.

After printing a bit image, the printer returns to normal mode. The graphics mode is not affected by print modes (emphasized, double-strike, underline, character size, or reverse video) but is affected by the inverted print mode.

4.4.3 Set Raster Bit Image Mode

GS v 0 +m +x1 +x2 +y1 +y2 +d1 dk [1D 76 30 +m +x1 +x2 +y1 +y2 (data)]
 Specifies and prints RASTER bit image graphics.

Set Raster Bit Image Mode			
+m	Mode	Vertical dot density	Horizontal dot density (RICK)
0 (00 or 30 hex)	Normal	203.2 dpi	203.2 dpi
1 (01 or 31 hex)	Double Wide	203.2 dpi	101.6 dpi
2 (01 or 32 hex)	Double high	101.6 dpi	203.2 dpi
3 (03 or 33 hex)	Quadruple	203.2 dpi	203.2 dpi

Table 15 Set Raster Bit Image Mode

The number of data bytes which must be sent to complete this command = $(x1+x2*256)*(y1+y2*256)$.

If +m is not one of the specified values, the rest of the ESC sequence is ignored and all information starting with +n1 is treated as normal data.

The values of x1 and x2 select the number of data bytes $(x1+x2*256)$ in the horizontal direction. The value of x1 can be from 1 to 128 and the value of x2 must be 00hex so the maximum number of dots which can be specified is 1024 (128 bytes times 8 bits per byte). Any data specified and received which exceeds the printing width of the printer is read in and then discarded.

The values of y1 and y2 select the number of dot rows $(y1+y2*256)$ in the vertical direction. The value of y1 can be from 0 to 255 and the value of y2 can be from 0 to 8 with the value of $(y1+y2*256)$ being in the range of 1 through 4095. **??? does not compute? EPSON to specify**

In standard mode, this command is effective only when there is no data in the print buffer. The starting point of the printed image can be set by the HT (Horizontal Tab), ESC \$ (Set absolute print position), ESC \ (Set relative print position), or GS L (Set left margin) command if that position is a multiple of 8.

This command is not affected by print modes (character size, emphasized print, double strike, inverted print, underline, reverse video, etc.). ESC a (Select justification) is effective on raster bit images. If the width of the printing area set by GS L and GS W is less than the minimum width, the printing area is extended to the minimum width only on the line in question. This minimum width is 1 dot in normal or double high mode and is 2 in double wide or quadruple mode.

Each data byte represents 8 horizontal dots to be printed with the MSB being to the left and the LSB being to the right. For each of the 8 bits within each data byte, a "1" represents a dot position to be printed and a "0" represents a dot position not to be printed. The first $x1+x2*256$ data bytes are printed as the first raster line. The next $x1+x2*256$ data bytes are printed as the second raster line. This sequence continues until all $y1+y2*256$ dot lines defined have been printed. After printing the raster bit image, the printer returns to normal mode.

4.4.4 Status Commands

Three commands pertain to status transmission: DLE EOT +n, GS I +n, and GS a +n.

DLE EOT +n **10 04 +n**

Real-time STATUS request

Status is transmitted immediately when this command is received without verifying that the host is ready to receive data. This command is executed even if the printer is off-line, the receive buffer is full, or there is an error status with a serial interface controller. With a parallel interface controller, this command cannot be executed when the printer is BUSY but is executed when the printer is OFF-LINE or in an error state if MEMORY switch 1-3 is on. Status will be transmitted even if a valid command string is received while receiving data as part of another command sequence (such a part of a bit image pattern).

EPSON to answer ??? Check to see if the data is also then printed so the bit image pattern does not mess up everything afterward.

This command must not be sent to the printer in the middle of any other multi-byte command sequence or this command will be interpreted as the remaining part of the multi byte command.

Status Commands	
n =	Action
01 hex	Transmit Printer status.
02 hex	Transmit Offline status.

03 hex	Transmit Error status.
04 hex	Transmit Paper roll status.

Figure 10 Status Commands

See section 0 - .

Status Bytes Transmitted

GS I +n

1D 49 +n

Transmit printer ID

+n=1 (01 or 31 hex) causes 24hex to be transmitted.

+n=2 (02 or 32 hex) causes Type ID to be transmitted.

Bit 2 = 1, BM sensor is enabled.

Bit 1 = 1, Autocutter is installed.

Bit 0 = 1, two-byte character code is supported.

Bit 0 = 0, two-byte character code is not supported.

+n=3 (03 or 33 hex) causes "Firmware Version" to be transmitted.

GS a +n

[1D 61 +n}

4.4.5 Enable/Disable Auto Status Back (ASB) mode

Causes the printer to transmit four status bytes on the XD line when this command is processed out of the receive buffer and also sets the conditions which will cause the printer to automatically transmit the status bytes. If all conditions are disabled then the ASB function is also disabled. The status bytes are transmitted without checking to see if the host is ready to receive the data.

+n is defined as:

Enable/Disable Auto Status Back (ASB) mode	
Bit	Function
Bit 7	Not used.
Bit 6	Not used.
Bit 5	Not used.
Bit 4	Not used.
Bit 3	1 = enable ASB for paper out status
Bit 2	1 = enable ASB for an error condition
Bit 1	1 = enable ASB for Online/Offline.
Bit 0	Not used – set to 0.

Table 16 Enable/Disable Auto Status Back (ASB) mode

See section 0 - .

Status Bytes Transmitted .

4.4.6 Status Bytes Transmitted

First Status Byte Transmitted		
	The first byte sent due to ASB status= printer information:	Status byte sent when DLE EOT 01hex is received
Bit 7	Not used – always OFF	Not used – always OFF.
Bit 6	1 = PAPER FEED button.	Not used
Bit 5	1 = Platen is open.	Not used.
Bit 4	Not used – always ON.	Not used – always ON.
Bit 3	1=OFF LINE, 0 = ON LINE.	1 = off-line, 0 = on-line.
Bit 2	Not used - always ON.	Not used – always ON.
Bit 1	Not used - always OFF	Not used – always ON
Bit 0	Not used - always OFF.	Not used – always OFF

Table 17 First Status Byte Transmitted

Second Status Byte Transmitted		
	The second byte sent due to ASB status = printer information:	Status byte sent when DLE EOT 02 hex is received
Bit 7	Not used - always OFF	Not used – always OFF
Bit 6	1 = An automatically recoverable error has occurred (Print head temperature or Platen open).	1 = an error occurred, 0 = no errors.
Bit 5	1 = An unrecoverable error has occurred.	1 = Printing is halted, 0 = not out of paper.
Bit 4	Not used - always OFF.	Not used – always ON.
Bit 3	1 = CUTTER error.	1 = paper is being fed by the paper feed button.
Bit 2	Not used	
Bit 1	Not used.	1 = Platen is open.
Bit 0	Not used.	Not used – always ON.

Table 18 Second Status Byte Transmitted

Third Status Byte Transmitted		
	The third byte sent due to ASB status = paper sensor information:	Status byte sent when DLE EOT 03 hex is received
Bit 7	Not used - always OFF	Not used – always OFF
Bit 6	Not used.	1 = an auto recoverable error has occurred (print head temperature or platen open).
Bit 5	Not used.	1 = an un recoverable error has occurred.
Bit 4	Not used - always OFF.	Not used – always ON.
Bit 3	1 = PAPER OUT	1 = a cutter error has occurred.
Bit 2	1 = PAPER OUT	1 = a mechanical error has occurred.
Bit 1	1 = PAPER LOW.	Not used – always ON.
Bit 0	1 = PAPER LOW	Not used – always OFF

Table 19 Third Status Byte Transmitted

Fourth Status Byte Transmitted		
	The fourth byte sent due to ASB status = paper sensor information:	Status byte sent when DLE EOT 04 hex is received
Bit 7	Not used – always OFF	Not used – always OFF
Bit 6	Not used.	Bits 6 & 5 both 1 = paper out.
Bit 5	Not used.	Bits 6 & 5 both 1 = paper out.
Bit 4	Not used – always OFF	Not used – always ON.
Bit 3	Not used	Bits 3 & 2 both 1 = Paper low.
Bit 2	Not used.	Bits 3 & 2 both 1 = Paper low.
Bit 1	1 = MEMORY switch 1-3 is ON	Not used – always ON.
Bit 0	Not used.	Not used – always OFF

Figure 11 Fourth Status Byte Transmitted

4.4.7 Bar Code Command

GS k +m +d1 □ dn NUL [1D 6B +m (DATA) 00]

For +m = 00hex through 06hex, +m selects the bar code type

Bar Code Commands			
+m	Bar Code	No. of data bytes	Valid data (ASCII)
00 hex	UPC-A	11 or 12	0 - 9
01 hex	UPC-E	11 or 12	0 - 9
02 hex	JAN(EAN)13	12 or 13	0 - 9
03 hex	JAN(EAN)8	7 or 8	0 - 9
04 hex	CODE39	variable	0 - 9, A-Z, space, \$ % + - . /
05 hex	I 2 of 5	even number	0 - 9
06 hex	CODABAR	variable	0 - 9, A,B,C,D, \$ + - . / :

Table 20 Bar Code Commands

Notes:

1. For UPC-A or UPC-E, Printing starts after 12 data bytes are received.
2. For JAN13 (EAN13), Printing starts after 13 data bytes are received.
3. For JAN8 (EAN8), Printing starts after 8 data bytes are received.
4. For ITF, the number of data bytes must be an even number.

GS k +m +n +d1 □ dn [1D 6B +m +n (DATA)]

For +m = 41hex through 49hex, +m selects the bar code type, +n = number of data bytes to follow.

Bar Code Command Values			
+m	Bar Code	+n(dec) =	Valid data
41 hex	UPC-A	11 or 12	0 - 9
42 hex	UPC-E	11 or 12	0 - 9
43 hex	JAN(EAN)13	12 or 13	0 - 9
44 hex	JAN(EAN)8	7 or 8	0 - 9
45 hex	CODE39	1 thru 255	0 - 9, A-Z, space, \$ % + - . /
46hex	I 2 of 5	even 1 thru 255	0 - 9
47hex	CODABAR	1 thru 255	0 - 9, A,B,C,D, \$ + - . / :
48hex	Code93	1 thru 255	00hex thru 7Fhex
49hex	Code128	2 thru 255	00hex thru 7Fhex

Table 21 Bar Code Command Values

Notes:

- +n indicates the number of data bytes which follow.
- If +n is outside the allowable range, the command aborts and following data is treated as normal data.

Notes when CODE93 (+m=48hex) is used:

- In the HRI fields, a small square is printed as the start character and as the stop character before and after the HRI character string.
- In the HRI field, a small solid block followed by alphabetic character is printed when a control code is printed. The character printed after the block for each control code is (nn in hex, alpha character): 00,U 01,A 02,B 03,C 04,D 05,E 06,F 07,G 08,H 09,I 0A,J 0B,K 0C,L 0D,M 0E,N 0F,O 10,P 11,Q 12,R 13,S 14,T 15,U 16,V 17,W 18,X 19,Y 1A,Z 1B,A 1C,B 1D,C 1E,D 1F,E 7F,T..

Notes when CODE128 (+m=49 hex) is used:

- The first character of the bar code data string must be the code set selection character (CodeA, CodeB, or CodeC) which selects the first code set to use. Code set characters are specified by sending a two character sequence, the first character is { (7B hex) and the second is a printable ASCII character. CodeA = {A, CodeB = {B, CodeC = {C.
 - Code set A consists of the ASCII characters 00 hex through 5F hex, FNC1 through FNC4, SHIFT, CodeB, and CodeC.
 - Code set B consists of the ASCII characters 20 hex through 7F hex, FNC1 through FNC4, SHIFT, CodeA, and CodeC.
 - Code set C consists of 2-digit numeral characters using one character (100 numerals from 00 dec through 99 dec or 00 hex through 63 hex), FNC1, CodeA, and CodeB.
- Special characters are specified by sending a two character sequence, the first character is { (7B hex) and the second is a printable ASCII character. The special characters are SHIFT and the FUNCTION characters. SHIFT = {S, FNC1 = {1, FNC2 = {2, FNC3 = {3, and FNC4 = {4. To specify the character { send {{. The usage of FUNCTION characters depends on the application program.
- In code set A the character just after SHIFT is processed as a character for code set B. In code set the character just after SHIFT is processed as a character for code set C. In code set C the SHIFT is invalid.
- HRI characters are not printed for the SHIFT characters or CODE SET selection characters.
- HRI for a Function character is a space.
- HRI for a control code (00hex through 1Fhex, and 7Fhex) is a space.
- Errors in the data cause the bar code processing to abort, data following is treated as normal data.
 - The top of the data field is not a code set selection character.
 - If a sequence {+n is invalid.
 - Characters that can not be used in special code set.

Notes in standard Mode:

1. If any invalid data is received, the printer only feeds paper and the following data is treated as normal data.
2. If the horizontal size exceeds the printing area, the printer only feeds paper.
3. This command only feeds enough paper to print the bar code regardless of ESC 2 and ESC 3 settings.
4. This command is valid only when there is no data in the print buffer. When there is data in the print buffer, the data following +m is treated as normal data.
5. This command is not affected by print modes (emphasized, double-strike, underline, character size, reverse video, or rotated print) but is affected by the inverted print mode.

Notes in Page mode:

1. This command develops the bar code data in the print buffer. The print position moves to the right side dot of the bar code.
2. If any invalid data is received, the printer stops command processing and the following data is treated as normal data. The data buffer position does not change.
3. If the bar code width exceeds the printing area, the bar code is not printed but the data buffer position moves to the left side of the printing area.

4.5 Serial (RS232C) Interface

4.5.1 Serial (RS232C) Interface Specification

Serial (RS232C) Interface Specification	
Item	Specification
Data receive speed	38400, 19200, 9600, 4800 bps (set by DIP switch)
Synchronizing method	Asynchronous, Full duplex
Hand shake	DTR/DSR signal or XON/XOFF (set by DIP switch)
Input output level	RS232C
Signal level	Space (logic=0) +3 V □ +12 V Mark (logic=1) -3 V □ -12 V

Table 22 - Serial (RS232C) Interface Specification

4.5.2 Serial I/O Connector

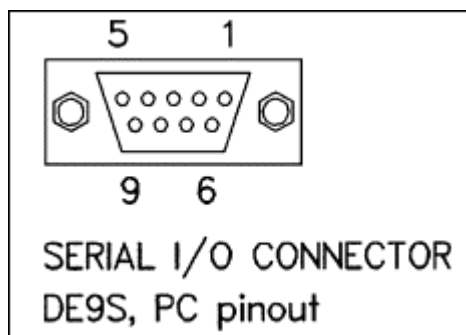


Figure 12 - Serial I/O Connector +++ redo as DE9P

Serial (RS232C) Interface Pin Assignments			
Pin	Name	Direction	Function
2	RD	I	RS232 received data.
3	XD	O	RS232 transmitted data.
4	DTR	O	Hardware handshake line.
5	GND	-	Logic ground.
6	DSR	I	High ("space") = OK for the printer to transmit data when requested. The state of DSR is IGNORED for XON/XOF

			handshaking if selected. Dip Switch SW2 position 7 ON reconnects this signal to be a hardware RESET input signal (normal connection to the DTR line from a computer will hold the printer always reset).
7	RTS	O	Same as DTR.

Table 23 - Serial (RS232C) Interface Pin Assignments

4.5.3 Flow Control

MEMORY switch 1 position 3 ON sets the BUSY condition when the receive buffer is full. OFF sets the BUSY condition when the receive buffer is full or when Off Line.

The MTP-1500 employs a 4 K byte data buffer to allow the host computer to rapidly transfer data. Under some circumstances it may be possible to completely fill the buffer. When the Receive Buffer is within 128 bytes of being full, the MTP-1500 signals the host computer to pause until the receive buffer has room 256 bytes. The flow control information is sent to the host using hardware or software protocols as determined by the DIP switch settings.

The hardware protocol uses the DTR line of the serial interface. This pin are asserted or negated as necessary to turn off and turn on the flow of data. The software protocol uses the XON (11hex) and XOFF (13hex) ASCII control codes which are sent back to the host to start and stop the data stream. When XON/XOF handshaking is enabled, the XON and XOF are transmitted without checking the state of the DSR line of the I/O connector. Some host systems may not support one or both of these protocols.

If memory switch 1 position 3 is set to OFF and DTR handshaking is enabled, then the DTR line goes to the BUSY state whenever the printer is OFF LINE (see section 1.1.3 add bookmark) or when the receive buffer is full. If memory switch 1 position 3 is set to ON and DTR handshaking is enabled, then the DTR line goes to the BUSY state from the time power is turned on until the printer is ready to receive data, during self test, or when the receive buffer is full. If XON/XOF is enabled then the DTR line goes to the BUSY state from the time power is turned on until the printer is ready to receive data or during self test.

If XON/XOF handshaking is enabled the printer sends XON when the printer goes On Line after a power on, when the receive buffer becomes available following a buffer full condition, when the printer switches from Off Line to On Line, or when the printer recovers from an error using DLE ENQ 1 or DLE ENQ 2. The printer sends XOF when the receive buffer becomes full or when the printerr switches from On Line to Off Line.

4.6 Centronics Parallel (IEEE-1284) Interface

4.6.1 Parallel I/O Connector

DB 25S, PC Pinout

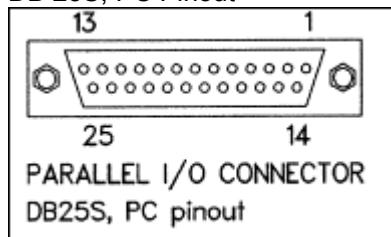


Figure 13 - Parallel I/O Connector +++ Change dwg to CENT
 ??? add definition of 1284 handshaking protocol

Parallel Interface Pin Assignments				
Pin	Name	Nibble & Byte mode	Direction	Function
1	/STB	HostClk	I	Active Low Pulse to send data tp printer
2	DO	DO	I/O	ASCII data bit 0 (LCB)
3	D1	D1	I/O	ASCII data bit 1
4	D2	D2	I/O	ASCII data bit 2
5	D3	D3	I/O	ASCII data bit 3
6	D4	D4	I/O	ASCII data bit 4

7	D5	D5	I/O	ASCII data bit 5
8	D6	D6	I/O	ASCII data bit 6
9	D7	D7	I/O	ASCII data bit 7
10	/ACK	PtrClk	O	Active low pulse when data is accepted
11	BUSY	PtrBusy	O	High level when printer cannot accept data.
12	PE	AckDataReq	O	High level when printer is out of paper
13	SLCT	Xflag	O	
14	/AFXT	HostBusy	I	.
15	n/c	ND	-	
16	GND	GND	I	Logic ground.
17	Fgnd	FG	-	.
18	Logic-H	Logic-H	O	
19 thru 30	GND	GND	-	Logic ground.
31	/INIT	/INIT	I	
32	/ERROR	/DataAvail	O	
33	GND	ND	-	
34	DKSTAT	ND	O	
35	+5V	ND	O	
36	/SLCTIN	1284-Active	I	

Table 24 - Parallel Interface Pin Assignments

5 Specifications

5.1 Features

The MTP-1500 series uses an ultra high-speed line thermal printer driven by 24 VDC, printing on 80 mm (3.15 in) or 82.5 mm (3.25 in) width paper.

- This printer is suitable for variety of application, such as POS terminals, ticket machines, coupon machines, label printers, medical instruments, and so on.
- High speed printing : It can print at 150 mm/s (1200 dot line/s) max. Low power consumption: the peak current for head drive is only 14 A (at 150 mm/s printing speed).
- Paper auto loading function : Thermal paper can be set without head-up lever operation by auto loading.
- ESC/POS® *1 Commands: These commands conform to ESC/POS™, which is a standard in the distribution industry.
- Auto Cutter : Printer with auto cutter (full cut/partial cut versions) is standard.

5.2 General Specifications +++ redo

General Specifications			
Specifications	MTP-1530	MTP-1532	.
Printing method	Thermal-sensitive line dot method		
Dot Structure	576 dots/line	640 dots/line	
Dot pitch (horizontal)	0.125 mm (8 dot/mm)-Dot density		
Dot pitch (vertical)	0.125 mm (8 dot/mm)-Line feed pitch		
Effective printing area	72 mm	80 mm	
Paper width	79.5 +/- 0.5 mm	82.5 +/- 0.5 mm	
Paper thickness	56~150 μm (0.0022 – 0.0059")		

Cutting type		Full or partial (Depends on printer mechanism)
Number of columns (default)		48 columns/line (12x24 dot font) 53 columns/line (12x24 dot font)
Maximum printing speed		150 mm/second
Character composition, Number of characters per line		FontA = 12x24 dots FontA = 12x24 dots 48 columns 53 columns FontB = 9x17 dots FontB = 9x17 dots 64 columns 71 columns
CHARACTER SIZE (mm): 12x24 – 9x17 (normal size)		1.25 W by 3.0 H 1.25 W by 3.0 H 0.88 W by 2.13 H 0.88 W by 2.13 H
Interface		IEEE-1284(Centronics) and RS232C
Power Supply	For head	See Section 1.6 – Power Supply Requirements
	For motor	DC 24V± 5%, 1 A typical while feeding paper
	For cutter	DC 24V± 5%, 0.9 A max. 0.11A typical
Expected Life	Mechanism	15 million lines (except print head & cutter) Print head: 100 million pulses, Wear resistance: +++Km.
	Cutter	1 million cuts (750,000 when 30 degrees C or above and 60% RH or above)
Environmental condition	Operating temperature	0 to +55°C
	Operating humidity	10 to 85% RH (No condensation)
	Storage temperature	-25 to +70°C
	Storage humidity	10 to 90% RH (No condensation) except for paper
Detection	Head temperature	By thermistor (applied energy control, abnormal temperature detection)
	Paper out/Mark detect	By photointerrupter
+++	Platen open	Micro switch
+++	Black Mark (optional)	Reflective photosensor
Paper		Thermal Sensitive paper

Table 25 - General Specifications

5.3 Character Sets

5.3.1 Overview

Overview of Character Sets		
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Figure 14 Overview of Character Sets

5.3.2 PC437 U.S.A., Standard Europe Character Set

MTP-1500 CHARACTER SET																
PC437 (U.S.A., Standard Europe																
Power On default or ESC t 00hex																
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
20	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
80	Ç	ü	é	â	ä	å	ç	ê	ë	è	í	î	ï	Ë	À	
90	É	Æ	Ö	ö	Û	ü	ÿ	Ö	Ü	ç	£	¥	℔	ƒ		
A0	á	í	ó	ú	ñ	ñ	•	•	•	•	•	•	•	•	•	•
B0	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
C0	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
D0	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
E0	α	β	Γ	π	Σ	σ	μ	τ	Φ	Ω	δ	ω	φ	ε	Π	
F0	≡	±	≥	≤	∫	÷	≈	°	•	•	•	•	•	•	•	•

Figure 15 PC437 U.S.A., Standard Europe Character Set

5.3.3 Katakana Character Set

MTP-1500 CHARACTER SET	
Katakana	
ESC t 01hex	
	0 1 2 3 4 5 6 7 8 9 A B C D E F
20	! " # \$ % & ' () * + , - . /
30	0 1 2 3 4 5 6 7 8 9 : ; < = > ?
40	@ A B C D E F G H I J K L M N O
50	P Q R S T U V W X Y Z [\] ^ _
60	` a b c d e f g h i j k l m n o
70	p q r s t u v w x y z { } ~
80	- _ . : ; ' " ' +
90	± ∓ ∓ ∓ ∓ ∓ ∓ ∓ ∓ ∓ ∓ ∓ ∓ ∓ ∓ ∓ ∓
A0	。 「 」 、 ・ ヲ アイウエオヤユヨツ
B0	- アイウエオカキクケコサシスセソ
C0	タチツテトナニヌネノハヒフヘホマ
D0	ミムメモヤユヨラリルレロワヅン °
E0	= ≠ ≠ ≠ ≠ ≠ ≠ ≠ ≠ ≠ ≠ ≠ ≠ ≠ ≠ ≠ ≠ / \
F0	× 月 年 月 日 時 分 秒 千 市 区 町 村 人 選

Figure 16 Katakana Character Set (80-FF hex)

5.3.4 PC850 (Multilingual) Character Set

MTP-1500 CHARACTER SET																
PC850 (Multilingual)																
ESC t 02hex																
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
20	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
80	Ç	ü	é	ä	å	à	ç	ê	ë	è	í	î	ï	Ë	Ä	Å
90	É	Æ	Ö	Ø	Ò	Ù	Ý	Û	Ü	Ø	£	Ø	×	f		
A0	á	í	ó	ú	ñ	Ñ	º	¸	¸	¸	¸	¸	¸	¸	¸	¸
B0	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸
C0	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸
D0	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸
E0	ó	ß	ö	ø	ö	µ	þ	þ	ú	ú	ý	ý	ý	ý	ý	ý
F0	-	±	_	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸

Figure 17 PC850 Multilingual Character Set

5.3.5 PC860 (Portuguese) Character Set

MTP-1500 CHARACTER SET																
PC860 (Portuguese)																
ESC t 03hex																
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
20	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
80	Ç	Ù	é	â	ã	ä	Á	ç	ê	ë	è	í	ô	ï	Ë	Ä
90	É	À	È	Ö	Ø	Ó	Ô	Ï	Õ	Ü	Ç	È	Ù	Ë	Ó	
A0	á	í	ó	ú	ñ	Ñ	•	¿	Ò	~	½	¾	;	«	»	
B0	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
C0	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
D0	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
E0	α	β	Γ	π	Σ	σ	μ	τ	Φ	Θ	Ω	δ	ω	φ	ε	Π
F0	≡	±	≥	≤	∫	∫	÷	≈	°	•	•	√	n	²	■	

Figure 18 PC860 Portuguese Character Set

5.3.6 PC863 Canadian French Character Set

MTP-1500 CHARACTER SET																
PC863 (Canadian-French)																
ESC t 04hex																
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
20	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	ø	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
80	ç	ü	é	à	â	ä	ñ	ç	ê	ë	ÿ	ı	_	À	Š	
90	é	è	ê	ë	ÿ	ı	ö	ı	ø	ı	ø	ı	ø	ı	ø	f
A0		ˆ	ó	ú	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ
B0	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ
C0	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ
D0	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ
E0	α	β	Γ	π	Σ	σ	μ	τ	φ	θ	Ω	δ	ω	φ	ε	Π
F0	≡	±	≥	≤	∫	∫	÷	≈	°	·	·	√	n	²	■	

Figure 19 PC863 Canadian French Character Set

5.3.7 PC865 Nordic Character Set

MTP-1500 CHARACTER SET																
PC865 (Nordic)																
ESC t 05hex																
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
20	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
80	ç	ü	é	ä	å	à	â	ç	ê	ë	è	é	í	ï	ÿ	À
90	É	Æ	Ö	Ö	Û	Û	Û	Û	Û	Û	Û	Û	Û	Û	Û	Û
A0	á	í	ó	ú	ñ	ñ	ñ	ñ	ñ	ñ	ñ	ñ	ñ	ñ	ñ	ñ
B0	ÿ	ÿ	ÿ	ÿ	ÿ	ÿ	ÿ	ÿ	ÿ	ÿ	ÿ	ÿ	ÿ	ÿ	ÿ	ÿ
C0	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ
D0	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ
E0	α	β	Γ	π	Σ	σ	μ	τ	Φ	Ω	δ	ω	φ	ε	Π	
F0	≡	±	≥	≤	ƒ	ƒ	÷	≈	°	°	°	°	°	°	°	°

Figure 20 PC865 Nordic Character Set

5.3.8 WPC 1252 Character Set

MTP-1500 CHARACTER SET	
WPC1252	
ESC t 10hex	
	0 1 2 3 4 5 6 7 8 9 A B C D E F
20	! " # \$ % & ' () * + , - . /
30	0 1 2 3 4 5 6 7 8 9 : ; < = > ?
40	@ A B C D E F G H I J K L M N O
50	P Q R S T U V W X Y Z [\] ^ _
60	` a b c d e f g h i j k l m n o
70	p q r s t u v w x y z { } ~
80	€ , f „ - † ‡ ^ % § < [2
90	‘ ’ “ ” • - - ~ “ § > @ z Ÿ
A0	ı ç £ ¤ ¥ ¦ § ¨ © ª « ¬ ® ¯
B0	° ± ² ³ ´ µ ¶ · ¸ ¹ º » ¼ ½ ¾ ¿
C0	À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î
D0	Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ ß
E0	à á â ã ä å æ ç è é ê ë ì í î ï
F0	ø ñ ò ó ô õ ö ÷ ø ù ú û ü ý þ ÿ

Figure 21 WPC 1252 Character Set

5.3.9 PC866 Cyrillic #2 Character Set

MTP-1500 CHARACTER SET																
PC866 Cyrillic 2)																
ESC t 11hex																
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
20	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
80	А	Б	В	Г	Д	Е	Ж	З	И	Й	К	Л	М	Н	О	П
90	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я
A0	а	б	в	г	д	е	ж	з	и	й	к	л	м	н	о	п
B0	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣
C0	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣
D0	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣	␣
E0	р	с	т	у	ф	х	ц	ч	ш	щ	ъ	ы	ь	э	ю	я
F0	ё	ё	ё	ё	ї	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı	ı

Figure 22 PC866 Cyrillic#2 Character Set

5.3.10 PC852 Latin 2 Character Set

MTP-1500 CHARACTER SET	
PC852 Latin 2)	
ESC t 12hex	
	0 1 2 3 4 5 6 7 8 9 A B C D E F
20	! " # \$ % & ' () * + , - . /
30	0 1 2 3 4 5 6 7 8 9 : ; < = > ?
40	@ A B C D E F G H I J K L M N O
50	P Q R S T U V W X Y Z [\] ^ _
60	` a b c d e f g h i j k l m n o
70	p q r s t u v w x y z { } ~
80	Ç Ü é à ä ö ç ÷ è ö ö ÷ ž Ā Ć
90	É Ĺ ĩ ö ö Ĺ ĩ š š Ő Ű Ŧ ŧ × ċ
A0	á í ó ú Ā ā ž ž Ę ħ ž Ć ħ « »
B0	Ë Ë Ë Ë Ë Ë Ë Ë Ë Ë Ë Ë Ë Ë Ë Ë
C0	Ł ł Ŧ ŧ - † Å å Ů ů Ű ű Ų ų
D0	đ Đ Đ Ę ě Ě ě Ě ě Ě ě Ě ě Ě ě
E0	ó ß ö Ñ ñ Ñ Ñ Š š Ŕ Ů Ů Ů Ů Ů
F0	- ~ . ~ ~ š + . ° " ' Ů Ŕ Ů

Figure 23 PC852 Latin 2 Character Set

5.3.11 PC858 Euro Character Set

MTP-1500 CHARACTER SET																
PC858 Euro																
ESC t 13hex																
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
20	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
80	Ç	ü	é	à	ä	å	ç	ê	ë	è	ÿ	ï	ï	Ä	Å	
90	É	Æ	Ö	ö	Û	ù	ý	Ö	Ü	ø	£	Ø	×	f		
A0	á	í	ó	ú	ñ	ñ	ª	º	¸	¸	¸	¸	¸	¸	¸	¸
B0	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸
C0	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸
D0	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸	¸
E0	ó	ß	ö	ö	ö	ö	µ	þ	þ	ú	ú	ý	ÿ	ÿ	ÿ	ÿ
F0	-	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±

Figure 24 PC858 Euro Character Set

5.3.12 Space Page Character Set

MTP-1500 CHARACTER SET																
Space Page																
ESC t FFhex																
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
20	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
80																
90																
A0																
B0																
C0																
D0																
E0																
F0																

Figure 25 Space Page Character Set
Table 26 - Default Character Set

5.3.13 Overseas Character Set

MTP SERIES CHARACTER SET-Overseas																	
MSB	LSB	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
2		!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?	
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
5	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_	
6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	
7	p	q	r	s	t	u	v	w	x	y	z	{		}	~		
8	ç	ü	é	â	ä	à	â	ç	ê	ë	è	ï	î	ï	Ä	Å	f
9	É	æ	Æ	ö	ö	ò	ù	ù	ÿ	Ö	Ü	Ç	£	¥	℞	ƒ	
A	á	í	ó	ú	ñ	ñ	ñ	ñ	¿	¡	½	¼	¼	¼	¼	¼	¼
B	Ł	ł	ł	ł	ł	ł	ł	ł	ł	ł	ł	ł	ł	ł	ł	ł	ł
C	L	L	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
D	u	u	u	u	u	u	u	u	u	u	u	u	u	u	u	u	u
E	α	β	Γ	Π	Σ	σ	μ	τ	ϕ	θ	Ω	δ	δ	δ	δ	δ	δ
F	≡	±	z	z	z	z	z	z	z	z	z	z	z	z	z	z	z

Table 27 - Overseas Character Set

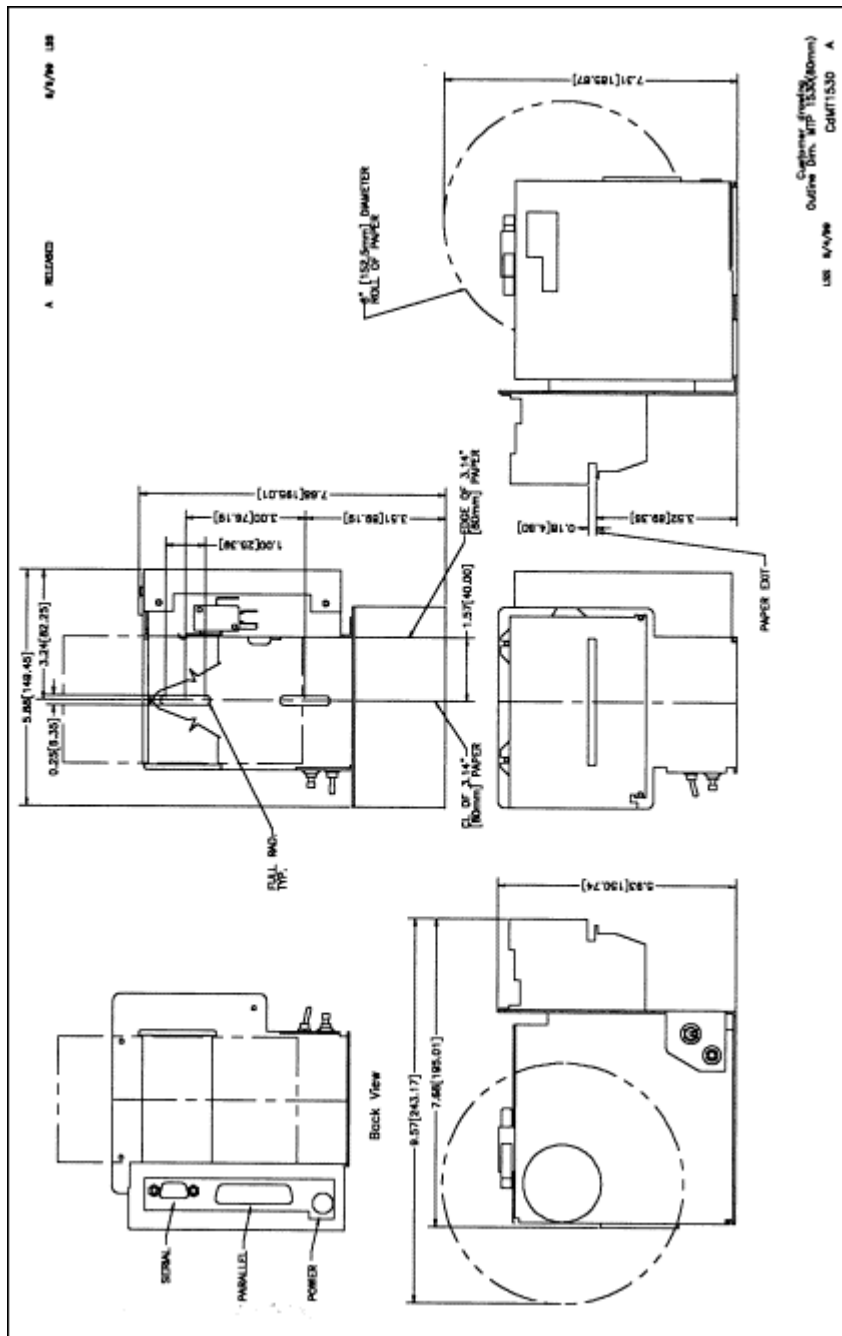
5.3.14 International Character Set

MTP-1500 CHARACTER SET													
ESC R +n = INTERNATIONAL CHARACTER SET													
+n	hex	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
0	USA	#	\$	@	[\]	^	~	{		}	~
1	France	#	\$	à	"	ç	§	^	~	é	ù	è	~
2	Germany	#	\$	ä	Ä	ö	Ü	^	~	ä	ö	ü	ß
3	England	#	\$	@	[\]	^	~	{		}	~
4	Denmark	#	\$	@	Æ	Ø	Å	^	~	æ	ø	å	~
5	Sweden	#	¤	é	Ä	Ö	Å	Ü	é	ä	ö	å	Ü
6	Italy	#	\$	@	"	\	é	^	ù	ä	ö	è	ì
7	Spain	#	\$	@	í	Ñ	¿	^	~	"	ñ	}	~
8	Japan	#	\$	@	[¥]	^	~	{		}	~
9	Norway	#	¤	é	Æ	Ø	Å	Ü	é	æ	ø	å	Ü
10	Denmark 2	#	\$	é	Æ	Ø	Å	Ü	é	æ	ø	å	Ü
11	Spain 2	#	\$	á	í	Ñ	¿	é	~	í	ñ	ó	ú
12	LatAmer	#	\$	á	í	Ñ	¿	é	ü	í	ñ	ó	ú
13	Korea	#	\$	@	[₩]	^	~	{		}	~

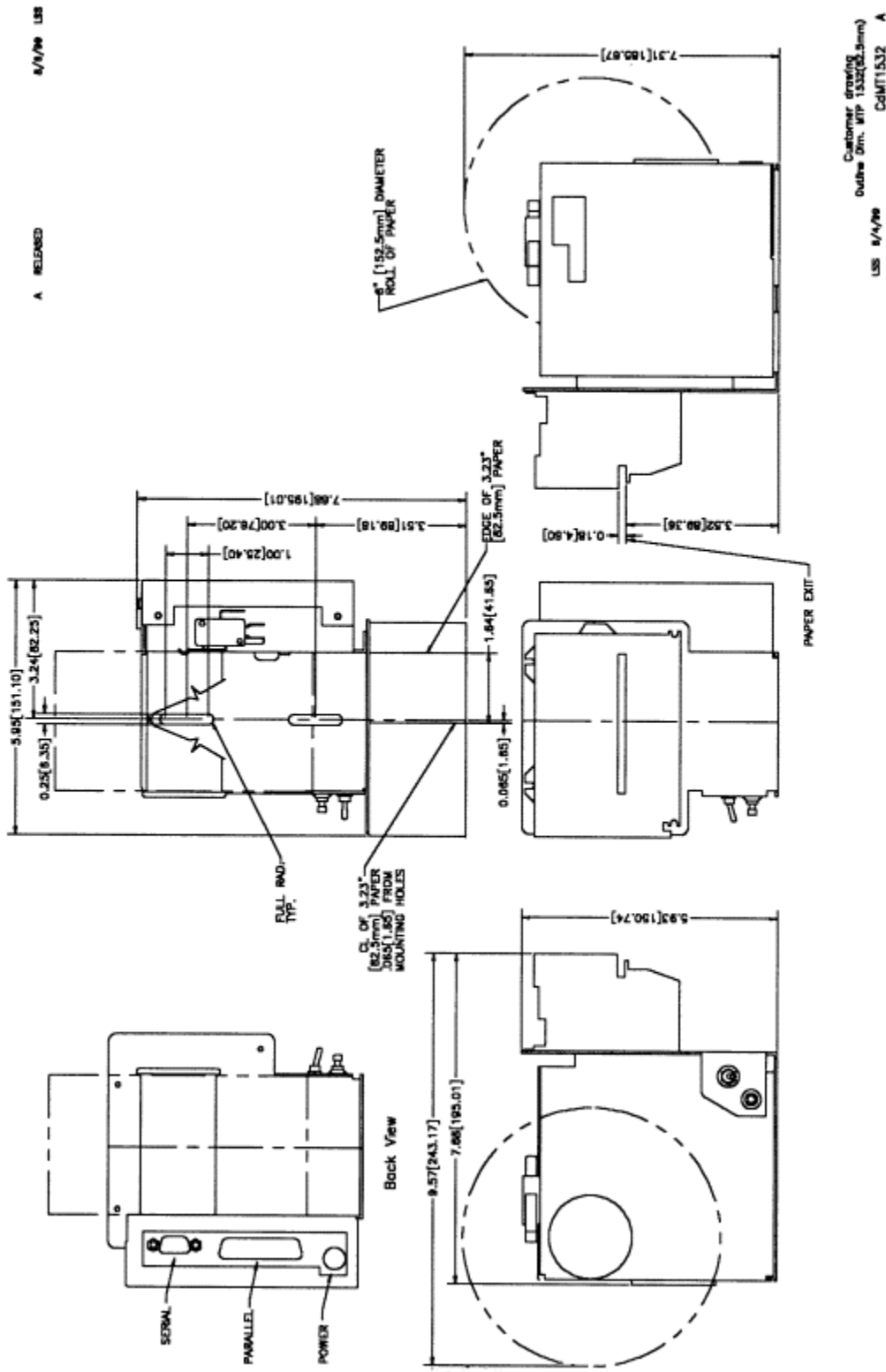
Table 28 - International Character Set

5.4 Dimensional Drawings of MTP-1530 (80 mm) Version

5.4.1 Dimensional Drawing of MTP-1530 (80 mm) Version



5.4.2 Dimensional Drawings of MTP-1532 (82.5 mm) Version





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Part No. 090103-0010 (Rev. B - 05/03)

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