MTP-600 Series Modular Thermal Printers

User Manual

TELPAR

Warranty

TELPAR — Printer Limited Warranty

For one (1) year after shipment of the printer product to Buyer, Telpar warrants the product against defects in materials and workmanship provided the product has been operated and maintained in accordance with manufacturer's operating and maintenance specifications. This warranty specifically excludes ribbons, paper and other consumable items.

THIS WARRANTY IS IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. TELPAR MAKES NO OTHER WARRANTY AND BUYER SPECIFICALLY WAIVES ANY OTHER WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THOSE DESCRIBED HEREIN.

Telpar's liability hereunder is limited to the repair or replacement of defective parts. This liability does not extend to normal wear and tear. Telpar will, solely at its option, remedy all valid warranty claims either by:

(a)   Repairing or replacing the defective unit at Telpar's factory; or

(b)   Repairing or replacing the defective subassembly at Telpar's factory.

If so directed by Telpar, Buyer shall return the defective unit or subassembly, transportation prepaid by Buyer, to Telpar's factory. After repair or replacement has been accomplished, Telpar will return the unit or subassembly, transportation prepaid by Telpar, to Buyer.

As a precondition to any warranty service, prior to return of any units or subassemblies to Telpar by Buyer, Buyer must contact Telpar's Order Administration Services and receive authorization in the form of a Return Material Authorization (RMA) number. Telpar reserves the right to refuse any goods it has not previously authorized for return, or any goods shipped without transportation prepaid.

NO WARRANTY SHALL APPLY TO ANY DAMAGE RESULTING FROM OR CAUSED BY BUYER, IF BUYER SHALL MAKE ANY CHANGES, MODIFICATIONS, ADDITIONS OR DELETIONS OF HARDWARE, SOFTWARE OR FIRMWARE IN THE PRINTER PRODUCTS SOLD HEREUNDER WITHOUT TELPAR'S ADVANCE WRITTEN CONSENT.

Warranty service may be obtained by returning the merchandise, freight prepaid, with a copy of your invoice to:

TELPAR

4181 Centurion Way

Dallas, Texas 75244-2312

ATTN.: Warranty Service Department.

Telephone: 800-872-4886 or 972-233-6631

Fax: 972-233-8947

Email: info@telpar.com

Upon inspection, Telpar will make necessary repairs or replacement and return the merchandise, shipping prepaid.

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1 General

The MTP-600 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 makes it ideal for the kiosk environment.

Six models make up the MTP-600 Series:

- MTP-620-S - 60 mm (2.36 in) paper width, RS-232C serial interface.
- MTP-620-P - 60 mm (2.36 in) paper width, Centronics parallel interface
- MTP-630-S - 85 mm (3.35 in) paper width, RS-232C serial interface.
- MTP-630-P - 85 mm (3.35 in) paper width, Centronics parallel interface.
- MTP-640-S - 114 mm (4.49 in) paper width, RS-232C serial interface.
- MTP-640-P - 114 mm (4.49 in) paper width, Centronics parallel interface.

1.1 Applications

- Parking ticket dispensing
- Automated Teller Machines (ATMs)
- Gaming receipts
- Interactive media kiosks

1.2 Standard Features

- Direct thermal printing
- Paper widths:
    - Model MTP-620: 60 mm (2.36 in)
    - Model MTP-630: 85 mm (3.35 in)
    - Model MTP-640:114. mm (4.49 in)
- All metal construction
- Adjustable paper low sensor
- Paper auto load function (if enabled by ESC c 1 3 command)
- ESC/POS® [1] The commands conform to ESC/POS, which is a standard in the distribution industry.
- Printer mechanism is UL recognized (File No. E171434)
- Print speed of up to 80 mm/sec (3.1 in/sec); 640 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:

    MTP 620:   163 mm x 115 mm x 231 mm(6.4"H X 4.5"W X 9.1"D)

    MTP 630/640: 163 mm x 170 mm x 231 mm(6.4"H X 6.7"W X 9.1"D)

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[1] ESC/POS is a registered trademark of SEIKO EPSON Corp.

- Inverted print mode
- International character set: Control Boards, Centronics parallel or serial, have the following: U.S.A., France, Germany, England, Denmark (2 choices), Sweden, Italy, Spain (2 choices), Japan (2 choices), Norway, Latin America.
- Barcode embedded symbologies: UPC-A, JAN(EAN) 13, JAN(EAN)8, 3 of 9, ITF, and CODABAR.
- Bit image mode
- Reverse video mode
- Continuous roll paper
- Black dot sensing

1.3 Options for the MTP-600 Series

- Paper width:
  - 60 mm (2.36 in) – MTP-620
  - 85 mm (3.35 inch) – MTP-630
  - 114 mm (4.49 in) – MTP-640
- Interfaces: Serial or parallel versions.
- Microsoft® Windows® driver.[2]

1.4 Specifications

- Resolution: 8 dots/mm (203 dots/in).
- Paper thickness: 0.06 μm to 0.10 μm maximum (.0024 in to .0039 in).
- Operating temperature: 5°C to 40°C (41°F to 104°F).
- Storage temperature: -20°C to 60°C (-4°F to 140°F).
- Operating humidity: 20-85% RH (non condensing).
- Peak current for head drive is 2.9 A at 80 mm/second at 50% printing ratio
- Weight: Standard configuration without paper 2.0 kg (4.5 lbs.).
- Expected life of mechanism: 50 km @ 25% printing ratio.
- Expected life of cutter: 3×10^5 cuts.

1.5 Power Supply Requirements

1.5.1 Voltage: 24 VDC ±5%

Current: See the following table. The current (A) for the typical models listed below is shown.

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[2] Microsoft and Windows are registered trademarks of Microsoft Corporation.

Current (A) for Printer Head							
Printing Rate	Printer Model	Printing Speed					
		High Speed 80mm/sec.		Medium Speed 50mm/sec		Low Speed 30mm/sec	
		Avg.	Peak	Avg.	Peak	Avg.	Peak
12.5%	MTP-620	0.44	0.58	0.32	0.58	0.29	0.29
	MTP-630	0.56	0.73	0.41	0.73	0.38	0.44
	MTP-640	0.83	1.07	0.60	1.70	0.55	0.58
25.0%	MTP-620	0.87	1.16	0.63	1.16	0.58	0.58
	MTP-630	1.11	1.45	0.81	1.45	0.75	0.87
	MTP-640	1.61	2.03	1.17	2.03	1.08	1.16
50.0%	MTP-620	1.73	2.32	1.26	2.32	1.16.	1.16
	MTP-630	2.23	2.91	1.62	2.91	1.50	1.74
	MTP-640	3.23	4.07	2.35	4.07	2.17	2.32
100.0%	MTP-620	3.47	4.65	2.53	4.65	2.32	2.32
	MTP-630	4.46	5.81	3.25	5.81	3.01	3.49
	MTP-640	■	■	■	■	4.35	4.65
		■ = Mode should not be used.					

Table 1 - Current (A) for Printer Head

Peak Current (A) for Motor	
Printer Model	Peak Current
MTP-620 (60mm)	1.0 A (<0.1 A typical)
MTP-630 (85mm)	1.0 A (<0.1 A typical)
MTP-640 (114 mm)	1.0 A (<0.1 A typical)

Table 2 - Peak Current for Motor

1.5.2 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.

1.5.3 3-Pin Hosiden Connector on Printer for Power Supply Connection
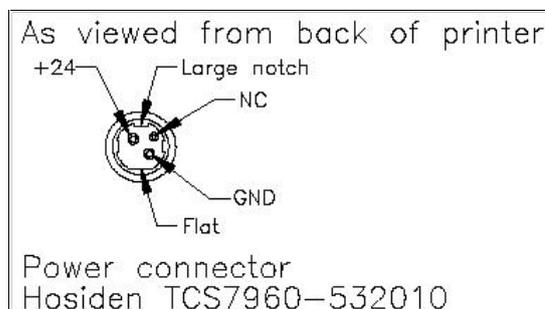
Figure 1 – 3-Pin Hosiden Power Supply Connector

1.5.4 4-Pin Molex Connector on Printer for Power Supply Connection
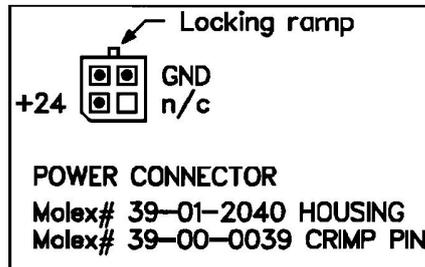
Figure 2 – 4-Pin Molex Power Supply Connector

1.6 Telpar Roll Paper for MTP-600 Series

Thermal sensitive coating is on the "outside" of the roll.

- For MTP-620:152 mm (6 in) outside diameter, 60 mm (2.36 in) wide, length *180 m (590 ft)* P/N 251102-0601

- For MTP-630:152 mm (6 in) outside diameter, 85 mm (3.35 in) wide, length 180 m (590 ft) P/N 251102-0602

- For MTP-640:152 mm (6 in) outside diameter, 114 mm (4.49 in) wide, length 180 m (590 ft) - P/N 251102-0604

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

2 Operator Instructions

2.1 Unpacking and Inspection

Carefully unpack and inspect your MTP-600 for any damage that may have occurred in transit. Should any damage have occurred, notify TELPAR, 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 for paper loading instructions.

2.2 Paper Loading

2.2.1 Side-Loading Roll

The MTP-600 series printer may be configured as a side-loading printer. Slide roll of paper over spindle with paper fed over the top 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. 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.

If AUTOLOAD has been enabled by the ESC C 1 3 command, inserting paper will result in the automatic loading of paper once it is fed into the paper guide. See ESC EM +*n* command for amount of paper to be automatically fed.

2.2.2 Drop In Roll

The MTP-600 series printer may also be configured as a drop in loader. Load the roll of paper by placing the spindle inside the roll of paper and place spindle in slots with paper fed over the top toward the paper slot (front of unit).

To load paper, turn on the power and feed the straight edge of the paper 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.

If AUTOLOAD has been enabled by the ESC C 1 3 command, inserting paper will result in the automatic loading of paper once it is fed into the paper guide. See ESC EM +*n* command for amount of paper to be automatically fed.

2.2.3 Fan Fold Load

Alternately, the MTP-600 series printer may be configured as a printer for fan-fold forms. This requires the use of a pre-printed Top of Form (TOF) Mark or Black Mark on the form

To load paper, turn on the power and feed the straight edge of the paper 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.

If AUTOLOAD has been enabled by the ESC C 1 1 command, inserting paper will result in the automatic loading of paper to the next black mark once it is fed into the paper guide. See ESC EM +*n* command for amount of paper to be automatically fed.

If using fan fold paper, the perforation or fold 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.
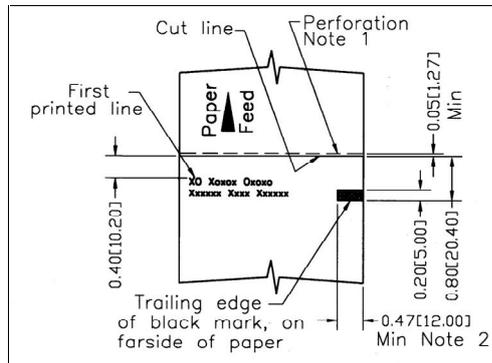
Figure 3 Fan-fold Black Mark Specifications
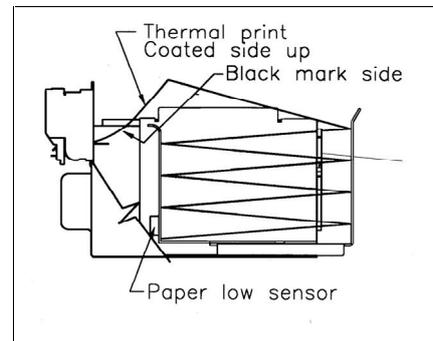
Figure 4 Side view of Fan Fold

See *4.2.4Top 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:

- Move Head Up lever to right of Advance wheel to top position.

- Lift cutter mechanism to "Open position (See *Figure 6 - MTP-640 with Cutter Mechanism open*) Paper can be removed at this time. Once paper is cleared from the mechanism, return the cutter assembly to its home position. Models MTP-620, MTP-630 and MTP-640 all operated similarly.

- Move Head Up lever to right of Advance wheel to the bottom position to return to printing position.

2.3.1 Head Up Lever

The Head Up lever is located by the Paper Feed knob. The down position is ready to print. The middle position reduces pressure between the printhead and the print paten roller for easier manual feeding. The up position lifts the printhead off of the platen roller for manually inserting paper or for clearing a

paper jam. Both the middle and up positions signal the microprocessor that the head is up so that no printing will occur.

Figure 5 - MTP-640 with Cutter Mechanism closed

Figure 6 - MTP-640 with Cutter Mechanism open

3 Installation

3.1 Self Test Mode

The MTP-600 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. Self-test samples will be printed and cut continuously until power is cut off Figure 7 MTP-630 Self Test Printout and (*Figure 8 - MTP-620 Self Test.*) All electrical/mechanical portions of the printer are exercised and checked by this action, except for the serial interface or parallel interface components.

The self-test printout is similar for both the serial and parallel interfaces. If the DIP switches that select the printer mechanism are set correctly, the first character on the line following the *checker board* pattern will be a "2", "3" or "4" indicating a 2-inch, 3-inch or 4-inch printer mechanism is connected to the controller board.

Figure 7 MTP-630 Self Test Printout

Figure 8 - MTP-620 Self Test Printout

4 Interface Specifications

4.1 General

The MTP-600 Series may be factory configured to be a Serial RS-232 interface or a Centronics Parallel.

4.1.1 Setting of DIP Switches

4.1.1.1 DSW1 – DIP Switch

Populated only on Serial Interface printers.

DIP Switch 1 (DSW1) Settings					
Item	Bit No	Setup status		Setup state	Setup before shipping
		Bit 1	Bit 2		
Serial-interface-communication baud rate setting	1,2	OFF	OFF	19200 bps	19200
		ON	OFF	9600 bps	
		OFF	ON	4800 bps	
		ON	ON	1200 bps	
Communication mode setting	3	OFF		DTR/DSR control	DTR
		ON		Xon/Xoff control	
Receive buffer size selection	4	OFF		4,096 byte	4096
		ON		45 byte	
Even/odd parity selection	5	OFF		Odd parity	ODD
		ON		Even parity	
Parity use selection	6	OFF		Use of parity	No Parity
		ON		No use of parity	
Data length selection	7	OFF		7 bit	8
		ON		8 bit	
Interface Selection	8	OFF		Centronics interface	Serial
		ON		Serial interface	

Table 3 - 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
		Bit 1	Bit 2		
Printer mechanism setting	1, 2	OFF	OFF	MTP-620	As required for mech
		OFF	ON	MTP-630	
		ON	OFF	MTP-640	
Registration memory installation	3	OFF		Memory not installed	OFF - Not installed
		ON		Memory Installed	
Paper cutting selection	4	OFF		No paper cutting at test printing	ON - Paper cutting
		ON		Paper cutting at test printing	

Table 4 - DIP Switch 2 (DSW2) Settings

4.2 Control Codes and Control Sequences

4.2.1 General Usage Print Commands

General Usage Print Commands			
Name	Command ASCII	Command +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 = 1/8 inch.
Form feed	FF	[0C]	Print if needed then feed paper to the top of the next page. Default page length is 44 lines. See ESC C. When CUT SHEET is selected as the paper type and the page length is set to 0 (See ESC C) then the paper is ejected until paper is not seen by the paper out sensor. When LABELS is selected as the paper type, data in the print buffer is printed and paper is advanced to the next label using the MARK detector.

Name	Command ASCII	Command +n = data byte[hex]	Description
ESC	ESC	[1B]	ESC Sequence Header.
FS	FS	[1C]	FS Sequence Header.
GS	GS	[1D]	GS Sequence Header.
Set Reverse video print mode	ESC RS	[1B 1E]	Start reverse video printing. Reverse and normal print can occur on the same line. Line spacing between character lines, spacing due to the FF command, and spacing due to the HT command do not print reverse video. See ESC US.
Reset Reverse video print mode	ESC US	[1B 1F]	End reverse video field. See ESC RS.
Set Print mode	ESC ! +n	[1B 21 +n]	Set Print mode. See Section 4.2.7.1 - Set Print Mode.
Set Bit Image mode	ESC +m +n1 +n2 +d1~dn	[1B 2A +m +n1 +n2 (data)]	Set Bit Image mode. 4.2.7.2. - Set Bit Image Mode
Set 1/6" line spacing	ESC 2	[1B 32]	Set 1/6 inch line spacing.
Set Line feed pitch	ESC 3 +n	[1B 33 +n]	Set single line spacing to n dot lines.
Printer reset	ESC @	[1B 40]	Initialize. See Section 4.2.7.3 - Printer Reset
Set line spacing	ESC A +n	[1B 41 +n]	Set line spacing to n dot lines.
Set Page length	ESC C +n	[1B 43 +n]	Set the page length to n character lines. Range = 0 to 63dec. Default is 44 lines. ESC C 00hex resets the page length and a FF command will cause paper to be ejected, this command should be used ONLY if CUT SHEETS is selected as the paper type.
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. ESC D NUL clears all tab positions. Default is every 8 columns.

Name	Command ASCII	Command +n = data byte[hex]	Description
Forward paper feed for *n* dot lines	ESC J +*n*	[1B 4A +*n*]	Print if needed then feed paper n dot lines. Range = 0 to 255dec.
Reverse paper feed for n dot lines	ESC K +*n*	[1B 4B +*n*]	Print if needed then reverse feed paper n dot lines. Range = 0 to 255dec.
Select International character set	ESC R +*n*	[1B 52 +*n*]	Select international character set. See Section 5.6 - International Character Set
Rotate print	ESC V +*n*	[1B 56 +*n*]	*n* = 1 = Rotate the print 90 degrees clockwise. *n* = 0 = Cancel the rotation. Inverted print can also be in effect to cause 270 degrees rotation. This is NOT a PAGE MODE. Does NOT apply to bar codes, Bit image, or registered image printing. Normal print and rotated print can occur on the same line. Double wide becomes double high and double high becomes double wide. Requires careful formatting.
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.
Reverse line feed for n character lines	ESC e +*n*	[1B 65 +*n*]	Print if needed then reverse feed paper n character lines. Range = 0 to 255dec.
Select Character code table	ESC t +*n*	[1B 74 +*n*]	Bit 0 of n=0 => Japan. Bit 0 of n=1 => Overseas (Code page 437). Default is 0.
Set/Reset Inverted print	ESC { +*n*	[1B 7B +*n*]	Bit 0 of n=1 => upside-down printing. Bit 0 of *n*=0 => normal printing. This command must be received at the start of a line to be in effect for that line.

Name	Command ASCII	Command +*n* = data byte[hex]	Description
Set Left Margin	GS L + *n1* + *n2*	[1D 46 + *n1* + *n2*]	Print if needed and then sets the left margin to dot position *n2* x 256+*n1*. In text mode, the margin is set module 4, *n1* = 0 through 3 gives a left margin of 0, *n1* = 4 through 7 gives a left margin of 4 dots, etc. In bit image mode, the margin is set modulo 8. The minimum allowable distance from the right margin is 80 dots. Bar Code commands are ignored if left margin and right margins are set too close for the barcode to be printed.
Paper cut	GS V +*n* +*m*	[1D 56 +*n* +*m*]	If *n* = 0 (either 00hex or 30hex) a full cut is performed and the +*m* byte must not be sent. If *n* = 1 (either 01hex or 31hex) a partial cut is performed and the +*m* byte must not be sent. If n is a capital A (41hex) then paper is fed for m dot lines and then a full cut is performed. If n is a capital B (42hex) then paper is fed for m dot lines and then a partial cut is performed.
Set Right Margin	GS W + *n1* + *n2*	[10 57 + *n1* + *n2*]	Same rules as GS L +*n* Set Left Margin listed above.

Table 5 - General Usage Print Commands

4.2.2 Status Commands

Status Commands			
Name	Command ASCII	Command+*n* = data byte[hex]	Description
Set Error Detection parameters	FS 9 +*n*	[1C 39 +*n*]	Sets the detection functions. See Section 4.2.7.5 - Status Commands for warning.
Set value of Status byte number 4 to n	FS r +*n*	[1C 72 +*n*]	Set value of STATUS byte number 4 to n. See Section 4.2.7.5 - Status Commands.
Set /Reset Auto status notification	GS a +*n*	[1D 61 +*n*]	Notify the printer status. See Section 4.2.7.5 - Status Commands.

Table 6 - Status Commands

4.2.3 Bar Code Commands

Bar Code Commands			
Name	Command ASCII	Command +*n* = data byte[hex]	Description
Set Bar width	GS e +*n* m	[1D 65 +*n* +*m*]	Set width of the bars used for bar code printing. n= width of a narrow bar. m = width of a wide bar. Defaults are *n* = 2 and *m* = 6. Range = 1 to 255dec. If a bar code does not consist of wide bars and narrow bars, n is set to the minimum width.
Set Bar code height	GS h +*n*	[1D 68 +*n*]	Set the bar code height in dots. Default = 60. Range - 1 to 255dec.
Bar code printing	GS k +*m* +*n* +d1~dn	[1D 6B +*m* +*n* (DATA)]	Selects the bar code type and prints. See Section 4.2.7.7 - Bar Code Command.
Set Bar code width magnification	GS w +*n*	[1D 77 +*n*]	Set the bar code width. Both the narrow bar width and the wide bar width are multiplied by n. Default = 1. Range = 1 to 255dec.

Table 7 - Bar Code Commands

4.2.4 Top of Form Commands

Top of Form Commands			
Name	Command ASCII	Command +*n* = data byte[hex]	Description
Mark detection (***See note below***)	GS <	[1D 3C]	Line feed to the next mark.
Set Line feed length after mark detection	GS A +*m* +*n*	[1D 41 +*m* +*n*]	Sets the line feed length after mark detection. m = 0. n = head detection distance in dot lines. Range = 0 to 63. Default = 16.

Table 8 Top of Form Commands

Minimum Form Length

The firmware included on the controller board will cause a TopOfForm error if the printer receives a SeekTopOfForm command (GS <) but a TopOfForm

Mark is not found within a specified distance starting from the print position at the time the SeekTopOfForm command is received.

The default setting is 44 lines of text print which equates to about 143 mm or 5.6 inches. The largest setting possible is 63 lines of text print which equates to about 205 mm or 8 inches. The command to change the form length is ESCAPE C +n with the Maximum value of +n defined as 63 decimal.

The TopOfForm version of the Windows Driver available for this printer sends the ESCAPE C +63dec command as part of the Initialize Sequence which is sent at the start of each document.

For additional information on fan-fold and black mark sensing, see Section 2.2.3 Fan Fold Load.

4.2.5   Seldom Used Commands

Seldom Used Commands			
Name	Command ASCII	Command +*n* = data byte[hex]	Description
Set Auto Feed amount	ESC EM +*n*	[1B 19 +*n*]	Set amount of paper to feed during an AUTO LOAD cycle to n dot lines. Range = 0 to 255dec. Default = 10 mm. n = 0 disables AUTOLOAD. AUTOLOAD is disabled by default but can be enabled by the ESC c 1 3 command.
Motor speed control	ESC X +*n* +*m*	[1B 58 +*n* +*m*]	Set amount of time after paper feeding stops until the motor is turned off in 0.5 second intervals. n = excitation time after the motor stops. m = time from the motor stops until the motor is turned off. Range is 0 to 20 but n must be <= m. Default is n = 10, m = 20.

Name	Command ASCII	Command +n = data byte[hex]	Description
Select paper type	ESC c 1 +n	[1B 63 31 +n]	See Section 4.2.7.4 - Select Paper Type.
Set printing speed	ESC s +n	[1B 73 +n]	Print if needed then set the printing speed. 60hex = High speed.. 61hex or 62hex = medium speed (The print time is longer so the print is a little darker). 63hex = low speed printing (the peak current required is about half of what is needed for the other speeds).
Print Pulse width	FS E +n	[1C 45 +n]	Set the PRINT PULSE time. Default = 57. Range = 0 to 255 dec. Larger values of n cause darker print, smaller values of n cause lighter print. THE LIFE OF THE PRINT HEAD IS SHORTENED WHEN THE PULSE WIDTH IS INCREASED. NEVER exceed a value of n=128dec.
Set Print quality	GS E + n	[1D 45 +n]	Sets the printing quality conforming to the paper used. The low order 4 bits change the print darkness with x0hex being the lightest and xFhex being the darkest. The default is 3.

Table 9 - Seldom Used Commands

4.2.6 Commands Not Covered In This Manual

Several commands require additional memory chips to be present on the controller board and are not covered in this manual. These commands pertain to printing KANJI characters, allowing for storing and printing download character sets, download of bit image patterns, etc.

4.2.7 Descriptions of Commands

4.2.7.1 Set Print Mode

ESC ! +n   **[1B 21 +n]**

+*n* is defined as:

Bit 7 --- Not used.

Bit 6 --- Not used.

Bit 5 --- 0 = Double high print OFF.

        1 = Double high print ON.

Bit 4 --- 0 = Double wide print OFF.

        1 = Double wide print ON.

Bit 3 --- Not used.

Bit 2 --- Not used.

Bit 1 --- 1   1   0   0

Bit 0 --- 1   0   1   0

                          = 8 x 16 character typeface

                          = 12 x 24 character typeface

                          = 16 x 16 character typeface

                          = 24 x 24 character typeface
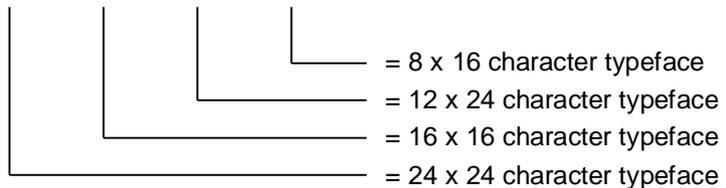
Both double wide and double high can be selected for any of the type faces. When a printed line contains characters with different heights, the characters are arranged so that bottoms of all characters line up. Default = 01hex (12 x 24 matrix)..

4.2.7.2 Set Bit Image Mode

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

Specifies and prints bit image graphics.

        m=97dec (61hex = a) defines each dot received is printed double wide.

        m=98dec (62hex = b). defines each dot is printed as received.

n1 and n2 define the number of dot lines to be printed. *n*1 and *n*2 cannot both have a value of 0, it is an invalid expression. The range of *n*1 = 0 to 255dec. The range of *n*2 is 0 to 3dec.

The number of dot lines to be printed is (*n*1+256*n2).

Bit Image Mode Settings				
Data bytes required per dot line if *m* = 97	Data bytes required per dot line if *m* = 98	Printer	Mechanism	Dots per line
28	56	MTP-620	2" mechanism	448
36	72	MTP-630	3" mechanism	576
52	104	MTP-640	4" mechanism	832

Table 10 - Bit Image Mode Settings

The number of data bytes required per dot line may be reduced if the margins are changed by command GS L + *m* and/or GS W + m.

With BR defined as the number of data bytes required per dot line, the number of data bytes required to complete this sequence = (*n*1+256**n*2)*BR).

Data format for Bit Image Printing. Each byte is printed with the bit 7 to the left side and bit 0 to the right side.

Data byte 1 is printed at the left side of the paper; byte 2 is printed immediately to the right of byte 1; and so on until the last byte of a dot line is printed at the right side of the paper (total number of bytes per line varies with the mechanism width as shown above). The next byte becomes data byte 1 of the next dot line and this process continues until all data specified by the values of n1 and n2 have been processed.

To print one dot line (or raster scan) the command sequence (all hex value) is:

for an MTP-630:   1B 2A 98 01 00 followed by 72 bytes of data.

or   1B 2A 97 01 00 followed by 36 bytes of data.

The MAXIMUM size bit image that can be defined by one ESC * command sequence is the width of the page X 5.03 inches down the page. This is derived by 3*256+255 = 1023 dot lines. 1023 dot lines @ 8 dot lines per mm = 127.875 mm = 5.034 inches.

For the MTP-620 printer this maximum size is 448 dots wide X 1023 dots high. Since the dot size is 8 dots/mm, the printed size is 56 mm wide by 127.875mm high (2.2 inches wide by 5.034 inches high).

The number of data bytes required to print this maximum size is 1023*56 = 57288 when using m=98 for maximum resolution.

For the MTP-640 printer this maximum size is 832 dots wide X 1023 dots high. Since the dot size is 8 dots/mm, the printed size is 56 mm wide by 127.875mm high (2.2 inches wide by 5.034 inches high).

The number of data bytes required to print this maximum size is 1023*104 = 106,392 when using m=98 for maximum resolution.

4.2.7.3 Printer Reset

ESC @ [1B 40]

Initializes the printer.

The print buffer is cleared, the receive buffer is retained

The character code set and the international character set are set to Japan. The character typeface is set to the 12x24 dots per character. The line pitch is set to 26 dot lines. Double wide and double high print modes are cleared. Reverse video and Inverted printing are disabled. Horizontal tab positions at set at every 8 columns. The page length is set to 44 lines.

Error detection is enabled for paper out, head up, thermal error, and voltage error. The paper low detection is disabled. The paper feed function is enabled.

Print quality is set to standard paper. Printing speed is set to high speed mode. The paper type is set to continuous roll.

Label head detection is set to mark detection. The mark head detection distance is set to 2 mm in the forward direction.

4.2.7.4 Select Paper Type

ESC c 1 +*n*   **[1B 63 31 +*n*]**

+*n* is defined as:

Bit 7 --- Not used.

Bit 6 --- Not used.

Bit 5 --- 0 = Forward detection of marks.
         1 = Reverse detection of marks.

Bit 4 --- Not used.

Bit 3 --- Not used.

Bit 2 --- Not used.

Bit 1 --- 0   0   1   1

Bit 0 --- 0   1   0   1

                   = Continuous roll, auto load enabled.

               = Cut sheets.

           = Labels, auto load to block, mark enabled

       = Continuous roll (default).
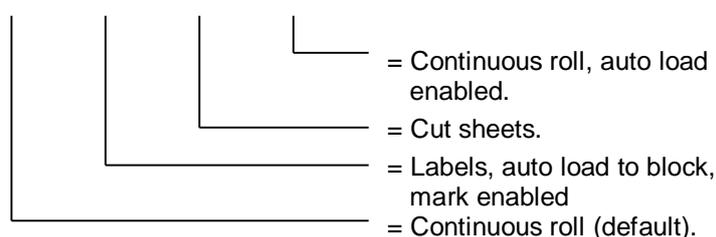
Default is 0. If there is data in the print buffer when this code is received, the data is printed and then this command takes affect. When cut sheets is selected, the cut sheets are automatically fed when they are loaded into the printer (auto load). When the selection changes from cut sheets to any other paper, an existing form will automatically be ejected.

4.2.7.5 Status Commands

TRANSMISSION OF STATUS applies ONLY to the SERIAL INTERFACE.

Three commands pertain to status transmission: FS 9 +*n*, FS r +*n*, and GS a +*n*.

GS a +*n*   **[1D 61 +*n*}**

Causes the printer to transmit four status bytes on the XD line and also sets the functions which will cause the printer to automatically transmit the status bytes whenever an event occurs except that GS a NUL [1D 61 00] does not cause status to be transmitted. The default state on +*n* is 0 so that status is not automatically sent when an event occurs.

To POLL for status rather than have status sent requires a six character sequence to be sent to the printer: GS a +*n*>NUL GS a NUL [1D 61 7F 1D 61 00]. The [1D 61 7F] causes status to be transmitted and the [1D 61 00] disables the automatic status transmission.

+*n* is defined as:

Bit 7 --- Not used.

Bit 6 --- Not used.

Bit 5 --- Not used.

Bit 4 --- 1 enable AUTO STATUS when the AUTO PAPER LOAD function is used.

Bit 3 --- Not used.

Bit 2 ---1 enable AUTO STATUS when a specified error occurs (See FS 9 +*n*).

Bit 1 --- 1 enable AUTO STATUS when the printer is OFF LINE.

Bit 0 --- Not used.

FS 9 +*n*   **[1C 39 +*n*]**

WARNING: **Use this command with care. If Paper Out sensor is disabled, the printer will continue to print even if it runs out of paper. This may cause damage to the thermal print head.**

Enables/disables the detection functions which can cause an AUTOMATIC STATUS TRANSMISSION (if Automatic Status is enabled). A "1" at the specified bit location enables that detection function. A "0" at the specified bit location disables that detection function. The default state is all functions enabled except for PAPER LOW. Disabling a detection function causes the Status Bytes transmitted by the printer to report the function as OK even if it is in an ERROR state.

+*n* is defined as:

Bit 7 --- Not used.

Bit 6 --- PAPER OUT.

Bit 5 --- PAPER LOW.

Bit 4 --- Not used

Bit 3 --- HEAD UP.

Bit 2 --- VOLTAGE ERROR.

Bit 1 --- PRINT HEAD THERMAL error.

Bit 0 --- PAPER FEED button is pressed.

For the parallel interface, if the Paper Low function is enabled, a Paper Low condition is treated as Paper Out.

FS r tn   **[1c 72 tn]**

+*n* = the fourth byte to be transmitted whenever a STATUS BYTE SEQUENCE is transmitted.

4.2.7.6 Four Status Bytes Transmitted

The four Status Bytes transmitted are defined as:

The first byte:

Bit 7 --- Not used.

Bit 6 --- 1 = PAPER FEED button.

Bit 5 --- Not used.

Bit 4 --- 1 = AUTO LOAD.

Bit 3 --- 1=OFF LINE, 0 = ON LINE.

Bit 2 --- Not used.

Bit 1 --- Not used.

Bit 0 --- Not used.

The second byte:

Bit 7 --- 1 = POWER SUPPLY VOLTAGE is abnormal.

Bit 6 --- 1 = PRINT HEAD TEMPERATURE is abnormal.

Bit 5 --- 1 = Hardware error.

Bit 4 --- 1 = MARK CHECK failed.

Bit 3 --- 1 = CUTTER error.

Bit 2 --- 1 = HEAD UP sensor.

Bit 1 --- Not used.

Bit 0 --- Not used.

The third byte:

Bit 7 --- Not used.

Bit 6 --- Not used.

Bit 5 --- Not used.

Bit 4 --- Not used.

Bit 3 --- Not used.

Bit 2 --- 1 = PAPER OUT.

Bit 1 --- Not used.

Bit 0 --- 1 = PAPER LOW.

The fourth byte is the parameter (+*n*) from command sequence FS r +*n* [1C 72 +*n*] which was last processed out of the FIFO buffer.

4.2.7.7 Bar Code Command

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

+*m* selects the bar code type. +*n* defines the number of data bytes which follow.

m = 41hex = UPC-A	n = 11 or 12
m = 43hex = JAN(EAN)13	n = 12
m = 44hex = JAN(EAN)8	n = 7 or 8
m = 45hex = CODE39	n is variable.
m = 46hex = ITF (Interleaved 2 of 5)	n is variable.
m = 47hex = CODABAR.	n is variable.

If more data is sent than can fit on the printer being used, the print will start left justified and run off the sheet to the right. Any data exceeding the page width will be lost.

4.3 Serial (RS-232C) Interface

4.3.1   Serial (RS-232C) Interface Specification

Serial (RS-232C) Interface Specification	
Item	Specification
Data receive speed	19200, 9600, 4800,1200 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	RS-232C
Signal level	Space (logic=0) +3 V ~ +12 V
	Mark (logic=1) -3 V ~ -12 V

Table 11 - Serial (RS-232C) Interface Specification

4.3.2 Serial I/O Connector

Figure 9 - Serial I/O Connector

Serial (RS-232C) 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.

Table 12 - Serial (RS-232C) Interface Pin Assignments

4.3.3 Flow Control

The MTP-600 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 buffer is within 50 bytes of being full, the MTP-600 signals the host computer to pause until a line of data is printed, or until the buffer is under the 50-byte limit. The flow control information is sent to the host using hardware or software protocols as determined by the DIP Switch setting.

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 and XOFF ASCII characters (^Q and ^S) which are sent back to the host to start and stop the data stream. Some host systems may not support one or both of these protocols.

4.4 Centronics Parallel Interface

4.4.1 Parallel I/O Connector

DB 25S, PC Pinout
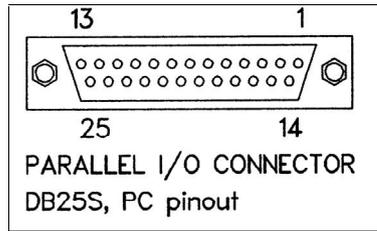
Figure 10 - Parallel I/O Connector

Parallel Interface Pin Assignments			
Pin	Name	Direction	Function
1	/STB	I	Active Low Pulse to send data tp printer
2	DO	I	ASCII data bit 0 (LCB)
3	D1	I	ASCII data bit 1
4	D2	I	ASCII data bit 2
5	D3	I	ASCII data bit 3
6	D4	I	ASCII data bit 4
7	D5	I	ASCII data bit 5
8	D6	I	ASCII data bit 6
9	D7	I	ASCII data bit 7
10	/ACK	O	Active low pulse when data is accepted
11	BUSY	O	High level when printer cannot accept data.
12	PE	O	High level when printer is out of paper
13	SLCT	O	*1
14		-	n/c.
15	/ERR	O	*1
16	/INIT	I	Low level = system reset.
17		-	n/c.
18 thru 25		-	Logic ground.

Table 13 - Parallel Interface Pin Assignments

*1.   Pins SLCT and /ERR are connected together. The function of pins PE, SLCT, and /ERR vary depending on the control sequence FS 9 + n.

Selected Parallel Interface Functions		
PE	SLCT & /ERR	Condition
Low	Low	Head up or Top of Form error.
Low	High	Normal – Ready to print (or PH temperature error).
High	Low	Paper out or paper low (if enabled by FS 9 + n)
High	High	PH voltage or Hardware error.

Table 14 - Selected Parallel Interface Functions

5 Specifications

5.1 Features

The MTP-600 series uses an ultra high-speed line thermal printer driven by 24 VDC, printing on 60 mm (2.36 in), 85 mm (3.35 in) or 114 mm (4.40 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 80 mm/s (640 dot line/s) max. Low power consumption: the peak current for head drive is only 2.9 A (at 80 mm/s printing speed, 50% printing ratio) for the MTP-620 only 2.9 A (at 80 mm/s printing speed, 50% printing ratio) for the MTP-630 and 4.1 A for the MTP-640.

- Paper auto loading function: Thermal paper can be set without head-up lever operation by auto loading function if enabled by ESC c 1 3..

- 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 under software control) is standard.

5.2 General Specifications

Specifications	MTP-620	MTP-630.	MTP-640.
Printing method	Thermal-sensitive line dot method		
Dot Structure	448 dots/line	576 dots/line	832 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	56 mm	72 mm	104 mm
Paper width	60 mm	85 mm	114 mm
Paper thickness	60~100 μm *1		
Cutting type	Full or partial (Software control)		
Number of columns (default)	37 columns/line (12x24 dot font)	48 columns/line (12x24 dot font)	69 columns/line (12x24 dot font)
Maximum printing speed	640 dot line/s (80 mm/s)		
Character composition, dimensions (WxH), No. of characters	12x24 dots, (1.5x3.0 mm), 37 columns 24x24 dots, (3.0x3.0 mm), 18 columns 8x16 dots, (1.0x2.0 mm), 56 columns 16x16 dots, (2.0x2.0 mm), 28 columns	12x24 dots, (1.5x3.0 mm), 48 columns 24x24 dots, (3.0x3.0 mm), 24 columns 8x16 dots, (1.0x2.0 mm), 72 columns 16x16 dots, (2.0x2.0 mm), 36 columns	12x24 dots, (1.5x3.0 mm), 69 columns 24x24 dots, (3.0x3.0 mm), 34 columns 8x16 dots, (1.0x2.0 mm), 104 columns 16x16 dots, (2.0x2.0 mm), 52 columns
Interface	Centronics, RS-232C		

Specifications		MTP-620	MTP-630.	MTP-640.
Power Supply	For head	See Section 1.5 - Power Supply Requirements.		
	For motor	DC 24V± 5%, 1.0 A max., <0.1A typical		
	For cutter	DC 24V± 5%, 1.0 A max.		
Expected Life	Mechanism	Pulse durability: 1×10^8 pulse/dot (standard driving method)		
		Wear resistance: 50 km (at 25% printing ratio)		
	Cutter	3×10^5 cuts		
Environmental condition	Operating temperature	0 to +50°C*³		
	Operating humidity	20 to 85% RH (No condensation)		
	Storage temperature	-20 to +60°C		
	Storage humidity	5 to 95% RH (No condensation)		
Detection	Head temperature	By thermistor (applied energy control, abnormal temperature detection)		
	Paper out/Mark detect	By photointerrupter		
Paper		Thermal Sensitive paper		

Table 15 - General Specifications

*1:   There may be exceptions

*2:   24 VDC, minimum head resistance

*3:   Guarantee: +5°C~+40°C.

5.3 Error Detection Function

Error Detection Functions	
Error Condition	Explanation
Paper Out	1) When the PAPER OUT SENSOR detects no paper for 6 mm continuously during printing or paper feed, the PAPER OUT state is assumed. For the SERAIL INTERFACE: If Xon/Xoff flow control is selected, Xoff is transmitted. If DTR/DSR flow control is selected, the DTR signal goes to the "mark" (BUSY) state.
	2) If the PAPER OUT state is detected when data is being printed, one line is printed after which the printer is automatically set to the off line state (busy state).
	3) When paper is replaced, one line is fed after approximately 1 second then printing resumes. For the SERAIL INTERFACE: If Xon/Xoff flow control is selected, Xon is transmitted. If DTR/DSR flow control is selected, the DTR signal goes to the "space" (READY) state.
	4) When the paper-out detection is disabled by the FS 9 +*n* command, the PAPER OUT function is not executed.
	5) When there is no paper in the printer, paper cannot be fed with a command but can be fed with the PAPER FEED button.
	6) If the paper-out state is detected, the printer stops the paper motion and printing functions.
	If the paper out sensor is not connected the paper-out state is assumed.

Paper Low	1) When a PAPER LOW state is detected, the data receive and printing continue to function.
	2) The PAPER LOW function is disabled when the power is turned on or the printer is initialized. It can be enabled with the FS 9 +*n* command.
	3) If the PARALLEL interface is used and the PAPER LOW detector is enabled, a PAPER LOW condition is treated as a PAPER OUT condition.
	When the detection connector is open, the PAPER LOW state is assumed.
Head Up	1) When the HEAD UP lever is raised during printing, the head drive and motor drive operations are stopped. For the SERIAL INTERFACE: If Xon/Xoff flow control is selected, Xoff is transmitted. If DTR/DSR flow control is selected, the DTR signal goes to "mark" (BUSY) state.
	2) When the print head is lowered, one line is fed after approximately 1 second then printing resumes.
	3) When the HEAD UP function is disabled by the FS 9 +*n* command or the *SLTIN signal, the HEAD UP function is not executed. . For the SERIAL INTERFACE: If Xon/Xoff flow control is selected then Xon is transmitted. If DTR/DSR flow control is selected, then the DTR signal goes to "space" (READY) state.
	4) When the HEAD UP function is enabled, paper cannot be fed with a command but can be fed with the Paper Feed push button.
Print Head Thermal Error	1) The temperature of the thermal head is detected by the thermistor built into the thermal head to prevent the thermal head from overheating.
	2) If an abnormal temperature (excessively high temperature) is detected, the thermal head is set to the busy state. The busy state is maintained until the temperature is reduced to the specified temperature.
	3) When the PRINT HEAD TEMRERATURE is disabled by the FS 9 +*n* command, the temperature fault function is not executed.
	4) If the PRINT HEAD TEMRERATURE is abnormal and the function is enabled, paper cannot be fed with a command but can be fed with the Paper Feed push button.
	5) If the temperature of the thermal head falls to the printing enable level, the printer immediately returns to the normal state when there are no other errors.
Blown Fuse Detection Function	1) When the system detects that the fuse for motor protection has blown, . For the SERIAL INTERFACE: If Xon/Xoff flow control is selected then Xoff is transmitted. If DTR/DSR flow control is selected the DTR signal goes to the "mark" (BUSY) state.
	2) Turn off the power and replace the fuse state.
	When the fuse is blown, data cannot be received or paper cannot be fed with the Paper Feed push button.

Print Head Voltage Error	1)	If the voltage is not 24 V ±15%, a head voltage error is assumed and the printer is automatically set to offline mode. For the SERIAL INTERFACE: If Xon/Xoff flow control is selected then Xoff is transmitted. If DTR/DSR flow control is selected, the DTR signal goes to "mark" (BUSY) state.
	2)	When the power voltage is set to the above normal value, the printer becomes usable.
	3)	When the head voltage error detection is disabled by the FS 9 +*n* command, the head voltage error detection function is not executed.
Cutter Error	1)	If a cut operation does not terminate within approx. 4 seconds, a cutter error is assumed as a hardware error. The printer is automatically set to offline mode. . For the SERIAL INTERFACE: If Xon/Xoff flow control is selected then Xoff is transmitted. If DTR/DSR flow control is selected the DTR signal goes to "mark" (BUSY) state.
	2)	When the power is turned on again or the hardware is reset, the printer becomes usable.
	3)	If the cutter blade is not located at the home position when the printer is initialized, the cutter is automatically positioned.
	4)	This detection function is valid only when the cutter use mode is selected with the DIP switch.
	5)	If a paper cutting command is received when the cutter is being disconnected, a hardware error is assumed after approx. 4 seconds.
Motor Power Saving Function	1)	After the motor operation stops, an electric current is made to flow for one phase only to maintain the pulse motor phase for approx. 10 seconds.
	2)	When the electric current is off at the start of motor operation, an electric current is made to flow at the same phase for up to dozens of milliseconds to fix the pulse motor phase. Then the motor operation starts.
MCU Operation Error Detection Function	1)	The watchdog timer detects MPU operation errors to prevent the printer from being damaged by an abnormal operation.

Table 16 - Error Detection Functions

5.4 Default Character Set

Table 17 - Default Character Set

5.5 Overseas Character Set

Table 18 - Overseas Character Set

5.6 International Character Set

```
               MTP-600 SERIES 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  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  à  ò  è  ì
  7 Spain      ₧  $  @  ¡  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  ¡  ñ  ¿  é  `  í  ñ  ó  ú
 12 LatAmer    #  $  á  ¡  ñ  ¿  é  Ü  í  ñ  ó  ú
 13 Japan 2    #  $  @  [  ¥  ]  ^  `  {  |  }  ~
```

Table 19 - International Character Set

5.7 MTP-620 Dimensional Drawings
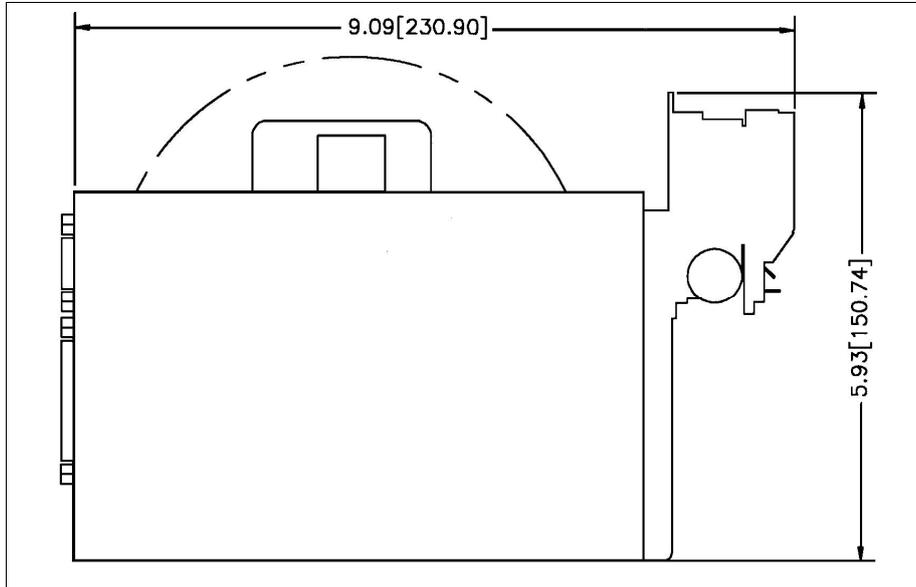
Figure 11 MTP-620 Left Side View
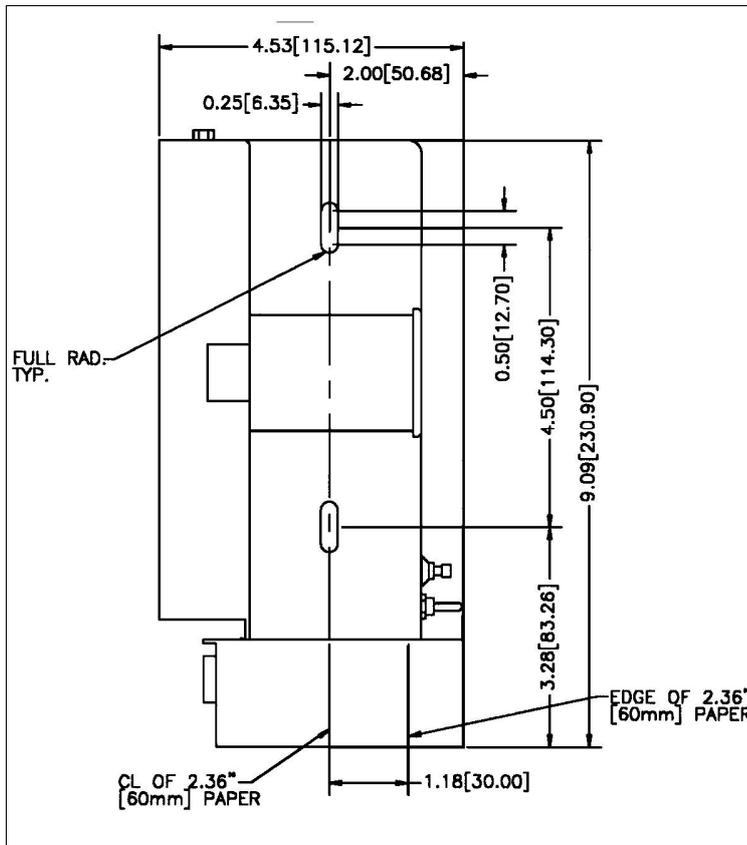
Figure 12 MTP-620 Top View
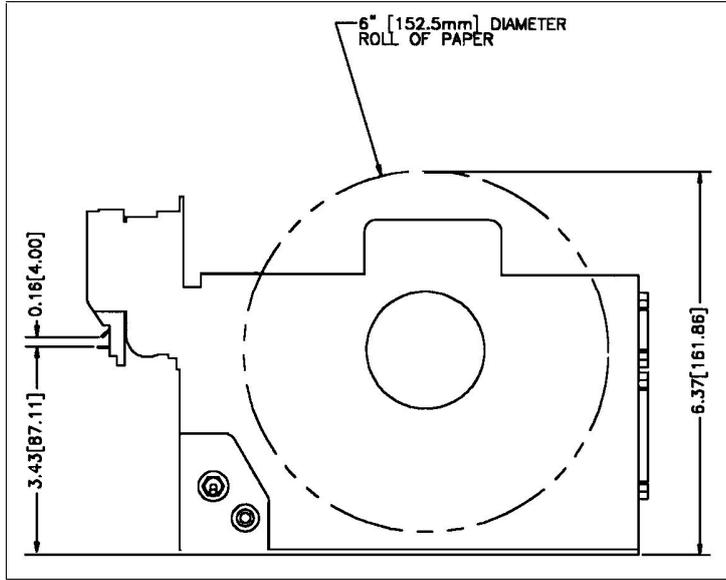
Figure 13 MTP-620 Right Side View

5.8 MTP-630/MTP-640 Dimensional Drawings
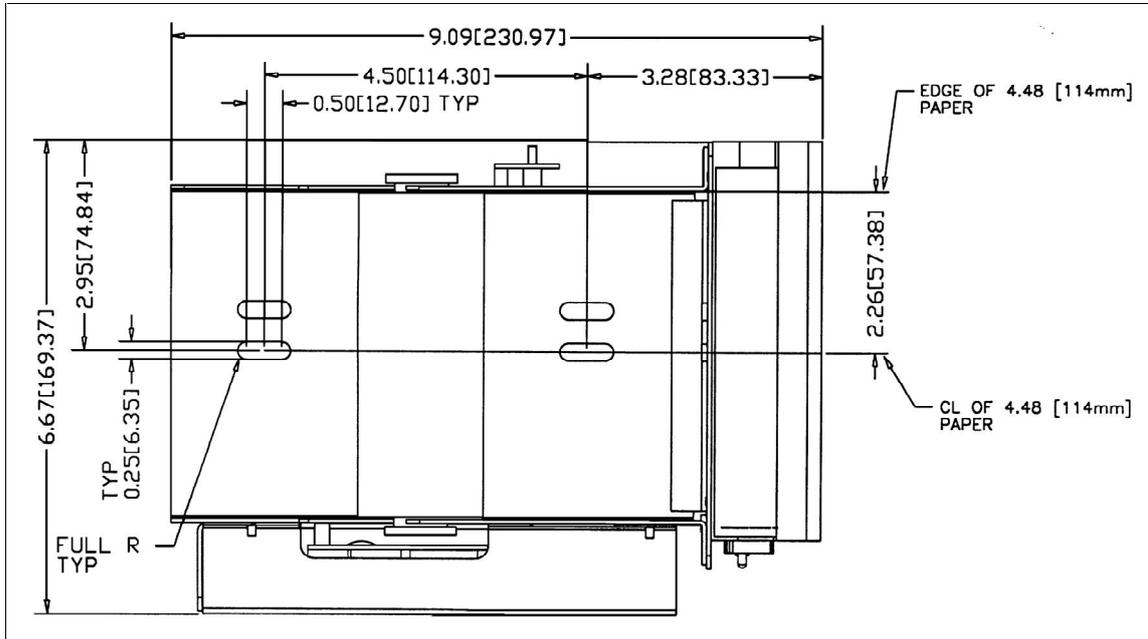
Figure 14 - MTP-630/MTP-640 Dimensional Drawing with Mounting Holes (Top View)
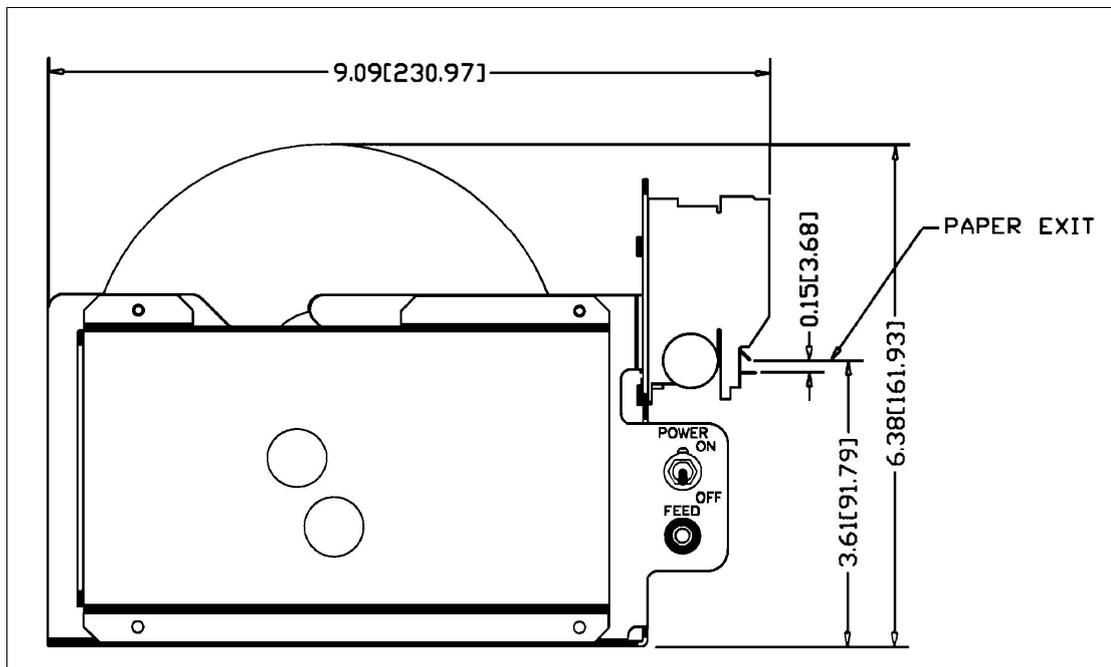
Figure 15 - MTP-630/MTP-640 Dimensional Drawing
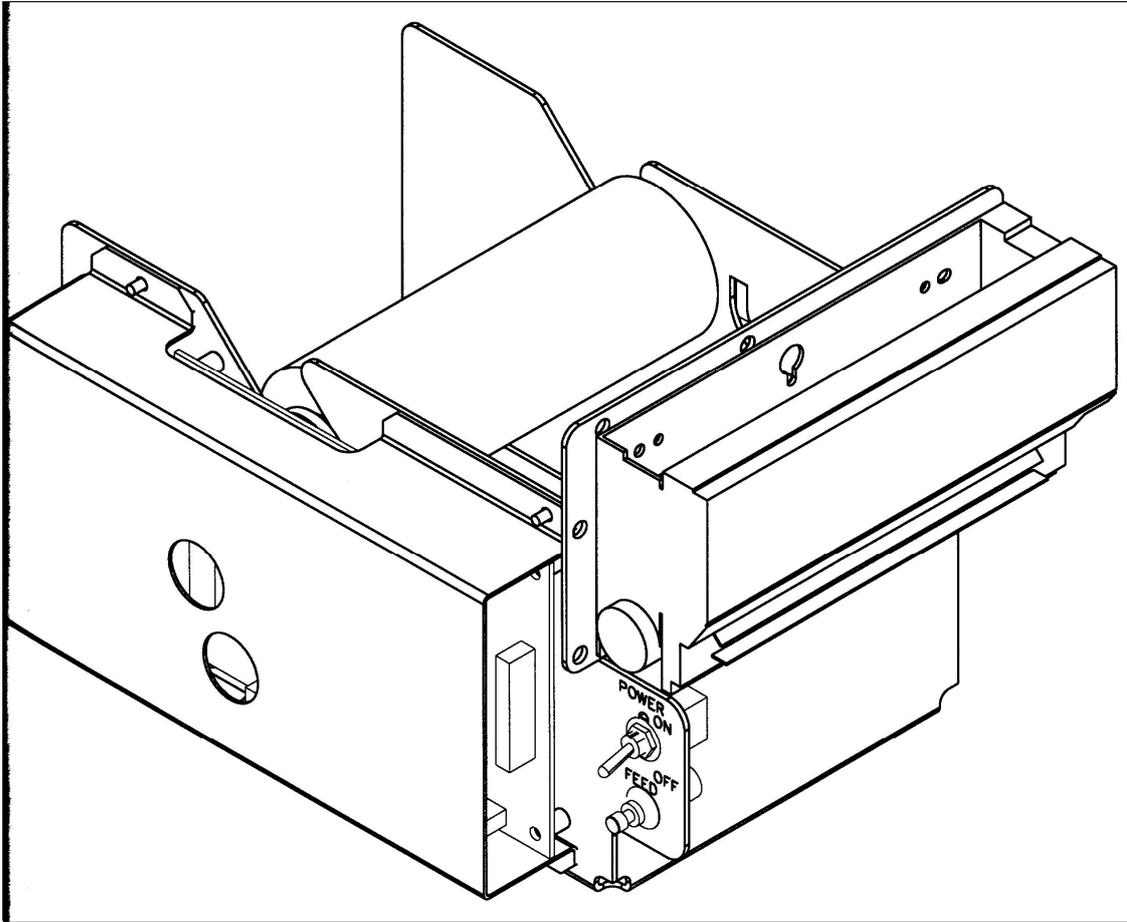
Figure 16 - MTP-630/640 Isometric Drawing

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