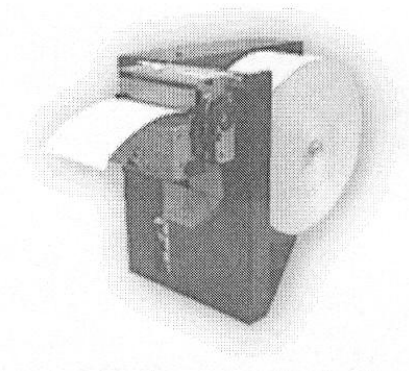


TELPAR

SP-327 Receipt Thermal Printer



User Manual



**187 Crosby Road
Dover, NH 03820**

For Sales, Technical Support, Warranty Returns and Repairs, please contact us at

800-872-4886

Please visit our website at any time at

www.telpar.com

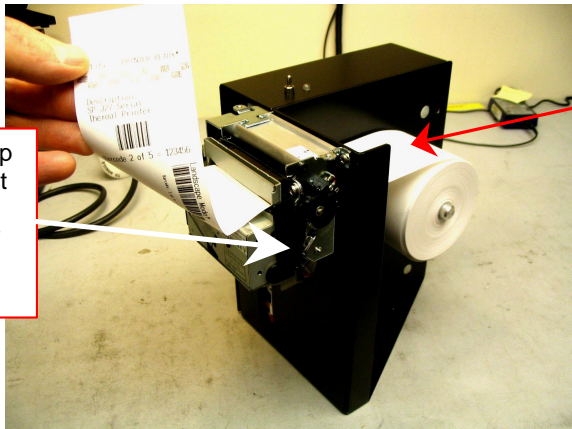
Telpar SP-327 Receipt Thermal Printer Summary

The TELPAR SP-327 Receipt Thermal Printer is a direct thermal printer designed as an economical solution to the demands of unattended hardcopy devices and applications.

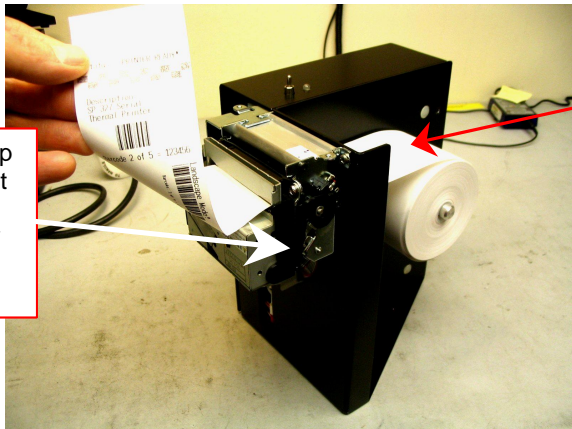
Applications include toll booth receipts, supermarket discount coupons, cash vouchers for exchanged goods, automated collection machines, parking validation slips, gas station pump receipts, and gaming machine receipts.

Printer Features:

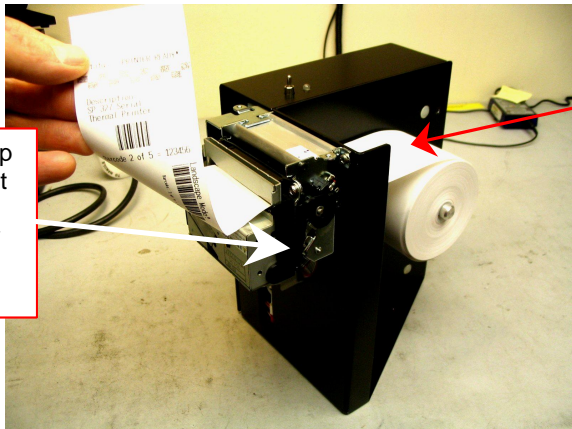
- Durable All Metal Construction
- Automatic Paper Loading
- Low paper Roll Detection
- Error Status LED and Beeper
- Single Multifunction Power & Paper Feed Switch
- Serial Communication with Status Feedback Modes
- 8 Dots/mm (203 Dots/Inch) Thermal Print Head
- 56mm (2.2 inches) Total Printing Width
- Speeds of up to 10 Character-lines per Second (Ten full lines consisting of 24 characters / line)
- Durable Guillotine Cutter (400,000 Cut Operations Typically)
- 7K Character Buffer
- Four Standard Character Sets
- Raster Graphics
- Bar Coding Capabilities (Barcode 3 of 9 and Interleaved 2 of 5).



Head-up Lever rotates up to raise the thermal print head off the paper to assist in clearing paper jams or quick paper removal.

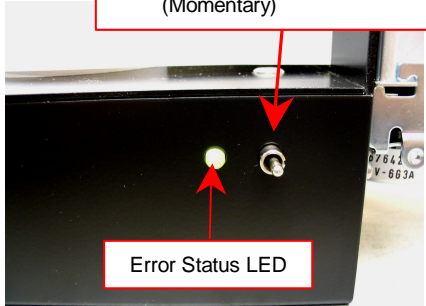


Thermal Paper unwinds from the top of the roll with the thermal coated side of the paper facing down as shown.

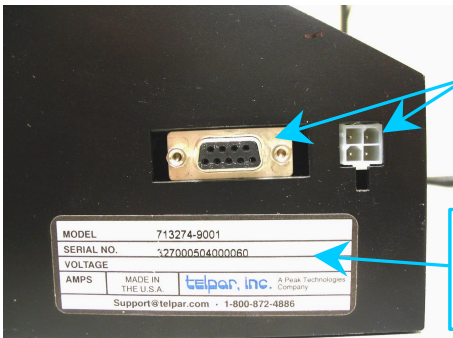


To auto feed paper into the printer, guide the leading edge of the paper into the paper entry slot in the chassis until it stops. Within a second, the printer platen will automatically grab the paper and feed approx. 1.5 inches of paper through the printer and cutter sections.

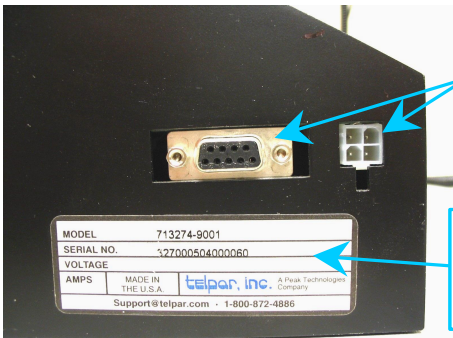
Three position Toggle Switch:



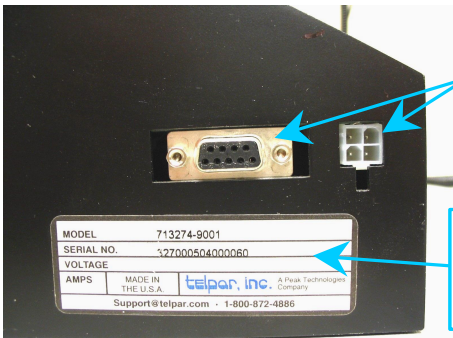
Full left position = OFF
Middle Position = ON
Full right position = Paper Feed (Momentary)



Four Position Power Connector (right)
See Section 1 on Page 1 for Power Cable Pinout.



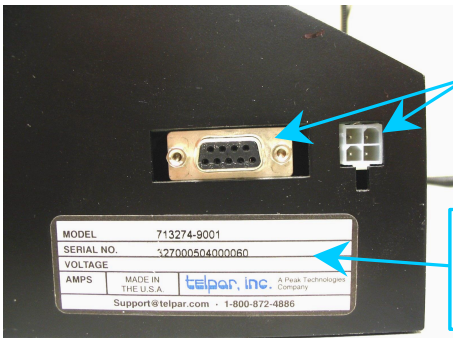
Nine position RS-232 DB Sub-Connector
See Section 16 on Page 8 for Interface Cable Pinout.



Serial Label information will be used when requesting Technical or Return / Repair Assistance from Telpar.



Error Status LED



MODEL	713274-9001
SERIAL NO.	127000504000060
VOLTAGE	
AMPS	
MADE IN THE U.S.A.	telpar, inc. A Peak Technologies Company
Support@telpar.com • 1-800-872-4886	

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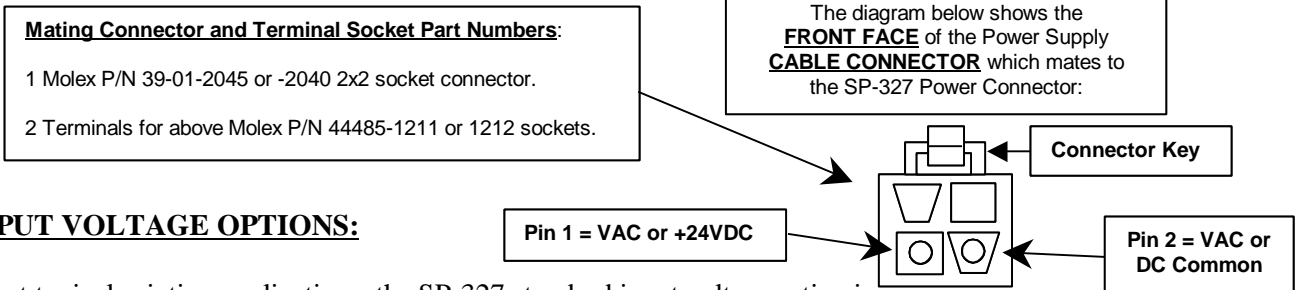
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1). POWER REQUIREMENTS:

The Table below shows both the peak and average amperages with their associated duty cycles for a typical SP-327 printer performing various printing operations. The SP-327 operation requires large peak current pulses at low duty cycles. Therefore, the average power requirement is typically low.

NOTE on GRAPHICS MODE CURRENT: The average current required in graphics mode is very low since it is limited by the data transfer rate. The Graphics Command requires the transmission of at least 5 characters to print 8 dots on a line. A baud rate set at 9600 (approx. 1 msec / char transmission time) produces a 0.1 amp peak or a 10 mAmp average at a 12% duty cycle. The Graphics Command requires a minimum of 60 characters to print all 448 dots on a line. In this situation, a 6 amp peak or 140 mAmp average is produced at a 2.3% duty cycle.

Font Type or Operational Condition	Maximum <u>Peak</u> Current	Typical Duty Cycle	Average Current
24 Characters / Line (Printing Full line of the letter 'H')	6.5 Amps	30%	2 Amps
48 Characters / Line (Printing Full line of the letter 'H')	5.5 Amps	42%	2.3 Amps
Graphics (Fire ALL 448 dots)	6.0 Amps	LOW	Less Than 0.20 Amps
Idle (on but doing nothing)	0.070 Amps Typical	NA	NA
Paper Feeding (no print)	0.150 Amps Typical	NA	NA



2). INPUT VOLTAGE OPTIONS:

For most typical printing applications, the SP-327 standard input voltage rating is:

- **18 VAC rms power supply rated at least 20VA**
- OR**
- **24 VDC regulated power supply rated at least 2.1Amps (50Watts)**

An optional 115 V.A.C. wall transformer & Cable assembly is available à **Telpar Part # 780327-0010.**

Note: All raw input voltage options listed above are provided with input transient suppression circuitry that will protect the print/cut mechanism and electronics from momentary over voltage conditions commonly found in switching power supplies and vehicular power sources.

3). RS-232 INTERFACE:

The SP-327 comes standard with an RS-232C Bi-directional communication interface.

Default RS-232 Settings (in Standard Firmware) are the following:

Baud Rate = 9600 bps, 8 Data Bits, 1 Stop Bit, No Parity, and Hardware Handshaking.

An RS-232 Cable Pinout diagram can be found in section 16 (page 8).

4). ENVIRONMENTAL:

Normal operating temperature of the SP-327 is **- 40°C to + 60° C (- 40°F to + 140°F).**

The SP-327 has a compensating circuit that maintains print intensity for the temperature range specified above.

5) CONTROL CODES and ESCAPE SEQUENCES

The TELPAR Model SP-327 uses the following Control Codes and Escape Sequences to control special features of the printer such as printing in landscape mode, condensed mode, printing barcodes (3 of 9 and 1 2of 5 only), performing a paper cut, and many other features. The tables below describe these codes and sequences and what they do. For examples of using some of these codes and sequences, **please see section 17 for sample programming code written in MS Visual Basic 6.0.**

CONTROL CODES:

Control Code	HEX	DEC	Description
STX	02H	2	Landscape Print, Start of Text (ie. Print rotated 90 degrees)
ETX	03H	3	Landscape Print, End of Text (ie. Print rotated 90 degrees)
RLF	08H	8	Reverse Line Feed (one line feed space – registration after may not be exact)
SLF	0AH	10	Single Line Feed – feeds amount of paper as specified by ESC "3" n (see table below)
PT	0DH	13	Print Command – allows information from host to be printed to the printer
SO	0EH	14	Enable Double Width Print
SI	0FH	15	Enable Condensed Print
DBLH	10H	16	Enable Double Height Print
NDBH	11H	17	Disable Double Height Print
DC2	12H	18	Disable Condensed Print
S_REQ	13H	19	Ask for Printer Status (Error Status) See Section 6
DC4	14H	20	Disable Double Width Print
M_REQ	15H	21	Ask for current Print Mode, See Section 7
CAN	18H	24	Clears all data in the buffer
ESC	1BH	27	Escape Bit

ESCAPE SEQUENCES:

Escape Sequence	HEX	DEC	Description
ESC "@"	40H	64	Reset Printer (clears all data in the buffer)
ESC "3" n	33H	51	Set Line feed space to n * 0.0097 Inches (Default n = 4). See SLF in Table above.
ESC "c"	63H	99	Initiate a paper cut
ESC "C" n1 n2 Data CR	43H	67	Bar Code 3 of 9. n1 = Indent space from margin in mm, Height of Barcode = n2 * 4mm (n2 must be > 0. Therefore, the smallest barcode height = 4mm).
ESC "i" n1 n2 Data CR	69H	105	Bar Code Interleaved 2 of 5. n1 = Indent space from margin in mm, Height of Barcode = n2 * 4mm (n2 must be > 0. Therefore, the smallest barcode height = 4mm). NOTE: Use only an <u>EVEN</u> number of data bytes à the printer will generate an error message if either an odd number of data bytes or an illegal character is received.
ESC "h" n	68H	104	Fill n bytes of space (blank) in when using raster graphics. (Note: Print Density = 8 Dots / mm, Printing width = 56mm, or 448 Dots per Line)
ESC "j" n	6AH	106	Perform n dot steps. (Note: Print Density = 8 Dots / mm, Printing width = 56mm, or 448 Dots per Line)
ESC "l" n Data	6CH	108	N bytes of raster graphics. (Note: Print Density = 8 Dots / mm, Printing width = 56mm, or 448 Dots per Line)
ESC "r" n	72H	114	n = 0 to set light print n = 1 to set dark print

6). ECHO BACK PRINTER ERROR STATUS BYTE:

The user has the option of polling the printer for error status. This is accomplished by sending the printer the control code **S_REQ 13H**. The printer will then transmit back to the host the following one byte status:

BIT WEIGHT	DESCRIPTION
0	Paper Low = 1
1	Paper Out = 1
2	Cutter Jam = 1
3	Not used
4	Not used
5	Buffer Full = 1
6	Buffer Empty = 1
7	Not used

7). ECHO BACK PRINTER MODE STATUS BYTE:

The user has the option of polling the printer for mode status. This is accomplished by sending the printer the control code **M_REQ 15H**. The printer will then transmit back to the host the following one byte status indicating the current print modes:

BIT WEIGHT	DESCRIPTION
0	Landscape Print ON = 1
1	Double Wide ON = 1
2	Not used
3	Double High ON = 1
4	2 of 5 Bar-code ON = 1
5	Not used (always = 0)
6	Not used (always = 0)
7	Condensed Print ON = 1

8). PAPER CUTTER FEATURES:

- The SP-327 is equipped with a long life guillotine paper cutter that is user activated via the escape code ESC c.
- The printer controller board monitors the paper cutter's home switch. If the cutter blade is not on the home position (example: due to tampering), then the controller card will energize the cutter and home the guillotine blade.
- When the cutter is energized, *an internal watch timer is set for 1 second*. If the cutter blade does not reach the home position within this allotted time the controller board will set bit 2 of the STATUS byte to a logic one indicating a cutter jam has occurred. The same condition will occur if the cutter blade overshoots the home position.
- Also provided is a *solid state thermal overload circuit* for the cutter (this is to protect the cutter motor from a locked rotor or micro processor malfunction).
- The paper cutter's *MTBF(mean time between failure) is 400,000 cuts* .The *MTBF may be severely shortened* if TELPAR paper is not used. Contact TELPAR for replacement paper (see section 15 on page 7 for the part number for replacement Telpar paper for the SP-327).

9) PRINT MECHANISM FEATURES:

- 8 Dots/mm (203 Dots/Inch) Thermal Printhead
- 56mm (2.2 inches) Total Printing Width
- Mechanical dot density is 448 dots per line
- Print speeds of up to 10 character-lines per second (10 full lines consisting of 24 characters per line)
- Integrated Paper Out / Top of Form Sensor
- Embedded Thermistor for monitoring Print Head Temperature
- One piece cutter / mechanism assembly with tapped holes for easy mechanical mounting and service.

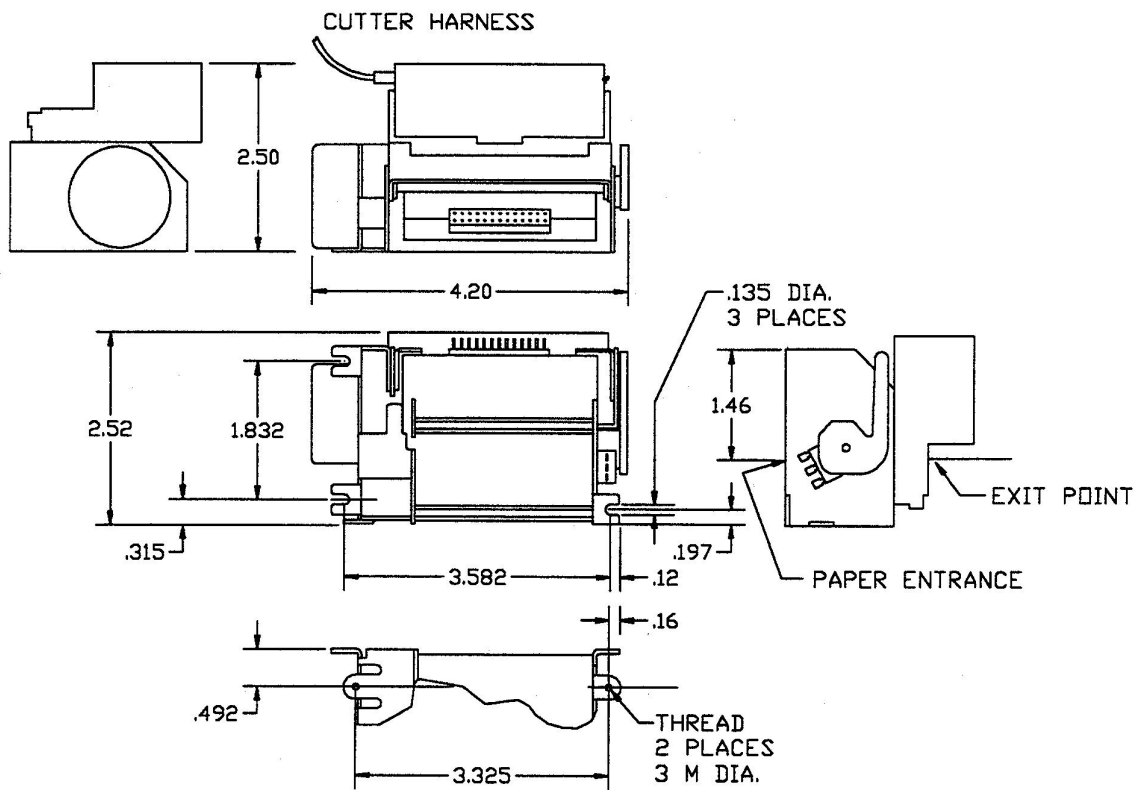


Figure 1: mechanism dimensions.

10). CONTROLLER FEATURES (Circuit Board Assembly):

- Standard 7K ram buffer
- *Socketed External program EPROM*
- Print head protected by a power switch watch dog timer
- **OPTIONAL** dip switch selectable baud rate (100-38.4 k bps)

11). SELF TEST MODE:

The SP-327 has a self test mode that will print and cut a sample ticket utilizing all of its control code features. The printer does **NOT** have to be connected to the host via the serial port to print a Self Test ticket.

NOTE: The printer's Power / Feed Switch has three valid positions of operation: **OFF**, **ON** (middle position), and **PAPER FEED** (the Paper Feed position is temporary – the switch should spring back into the ON position whenever the switch is released from the Paper Feed position).

To place the unit into self test mode, first turn the power switch to the off position. Next, push the power switch all the way over to the Paper Feed position. Release the switch after one second, and a self test sample will be printed and cut. All electrical/mechanical portions of the printer are exercised and checked by this action.

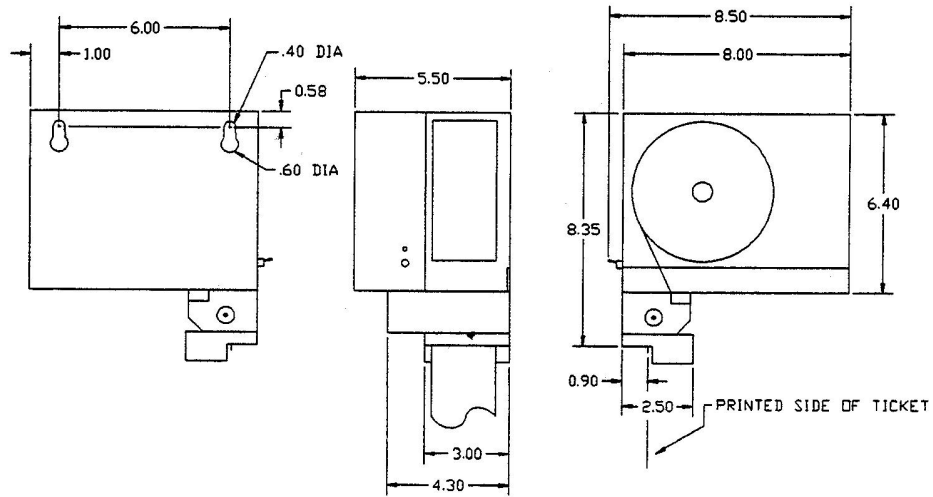
12) SP327 Standard Default RS232 Parameters

(Fixed in Firmware on all standard Models)

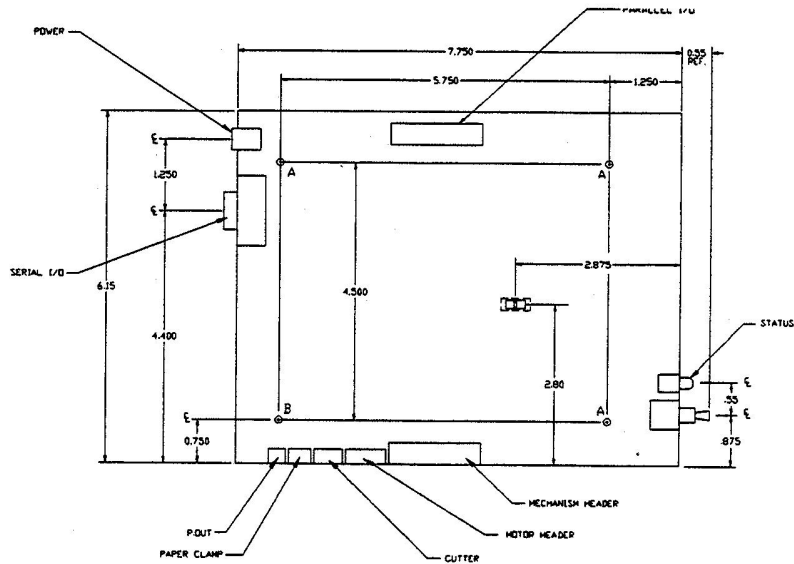
NOTE: Custom Firmware may use different parameters based on customer request

Baud Rate	9600
Parity	NONE
Data Bits	8 Data Bits
Stop Bits	1 Stop Bit
Flow Control	Hardware

13). CHASSIS / MECHANISM CUTTER DIMENSIONS (figure 2):



14). PRINTED CIRCUIT BOARD DIMENSIONS (figure 3):



A. .125 DIA. HOLE AFTER PLATING,
3 PLACES.
B. .312 DIA. STAND OFF WITH #4/40
THRU THREAD.

15.) **SP327 Error Codes (Lights and Beeper Status)**

	LED	BEEPER
No Paper in Mechanism (Head Closed)	Green / Red Flashes	½ Sec Pulses
Head Up	Green / Red Flashes	½ Sec Pulses
Cutter Not Home	Solid Green	Very Fast Pulses
Paper Roll Low *	Solid RED	OFF
Normal (Ready) w/ Paper	Solid Green	OFF

* The Paper Roll Low indication will activate when the diameter of the paper roll decreases to approximately 43mm (approx. 1.7 inches).

Character Sizes for Various Fonts:

Font Type	Characters / Line	Lines / Inch
Normal (Default)	24	6.2
Normal Double Wide	12	6.2
Normal Double High	24	4.2
Normal Double Wide & Double High	12	4.2
Condensed	48	11.8
Condensed Double Wide	24	11.8
Condensed Double High	48	6.2
Condensed Double Wide & Double High	24	6.2

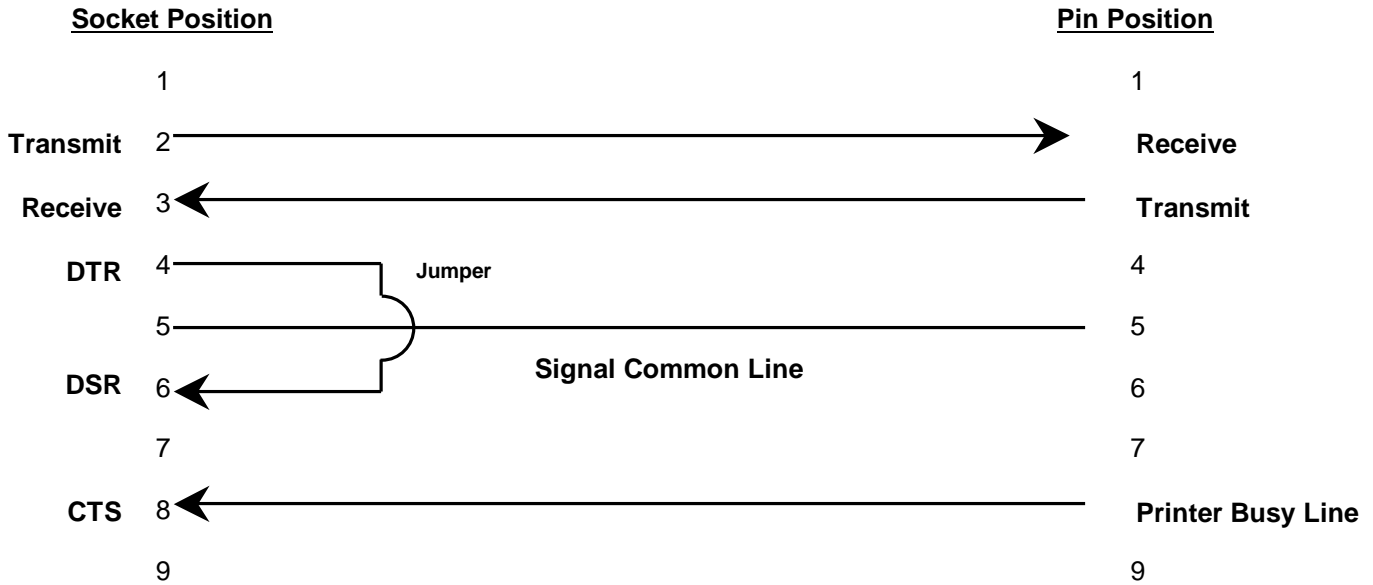
PAPER:

The recommended thermal paper for use with the Telpar SP-327 is **Telpar Part # 751327-0030**. Please contact Telpar Sales when ordering this paper.

16) Serial RS-232 Interface Cable Suggestion:

**Computer End of Cable (Host) Side
(9 Position, Female D-Sub Connector)**

**TELPAR Printer End of Cable
(9 Position, male D-Sub Connector)**



```

'Telpar SP-327 sample test code written in MS Visual Basic 6.0
' The MSComm Control must be used and setup to run this program

' Use COM1 Port for RS-232 Communications.
MSComm1.CommPort = 1
' 9600 baud, no parity, 8 data, and 1 stop bit.
MSComm1.Settings = "9600,N,8,1"
' Tell the control to read entire buffer when Input is used.
MSComm1.InputLen = 0
' DSR Timeout in mSec
MSComm1.DSRTimeout = 50
' CTS Timeout in mSec
MSComm1.CTSTimeout = 50
' Open the port.
MSComm1.PortOpen = True

' CTS Holding State
CHolding = MSComm1.CTSHolding
Debug.Print "MSComm1.CTSHolding = " + Str$(MSComm1.CTSHolding)
' DSR Holding State
DHolding = MSComm1.DSRHolding
Debug.Print "MSComm1.DSRHolding = " + Str$(MSComm1.DSRHolding)

If MSComm1.DSRHolding = False Then
  MSComm1.PortOpen = False
  GoTo SerialOpps
End If

MSComm1.Output = Chr$(10)
MSComm1.Output = Chr$(13)

'Example of Error Status Checking
MSComm1.Output = Chr$(19) 'Get Error Status
While (MSComm1.InBufferCount <= 0)
  NahDah = DoEvents() 'prevents program from being locked in an infinite loop
Wend
'Read Status
A$ = MSComm1.Input

Debug.Print "Status = *" + A$ + "***"

Status$ = Hex$(Asc(A$))

If Right$(Status$, 1) = "0" Then
  MSComm1.Output = "Status: PRINTER READY!"
  MSComm1.Output = Chr$(10) 'Line Feed
  MSComm1.Output = Chr$(13) 'Carriage Return
  MSComm1.Output = Chr$(10)
  MSComm1.Output = Chr$(13)
End If

'If there is an error, then Debug.Print info to VB's Immediate Window. Ref User Manual Section 6.0:
If Right$(Status$, 1) = "1" Or Right$(Status$, 1) = "3" Or Right$(Status$, 1) = "5" Or Right$(Status$, 1) = "7" Then Debug.Print "PAPER LOW
SENSOR DOES NOT SEE PAPER ROLL."
If Right$(Status$, 1) = "2" Or Right$(Status$, 1) = "3" Or Right$(Status$, 1) = "6" Or Right$(Status$, 1) = "7" Then Debug.Print "PAPER OUT
LEVER ON PRINTER MECH MAY BE IN THE PAPER RELEASE POSITION."
If Right$(Status$, 1) = "4" Or Right$(Status$, 1) = "5" Or Right$(Status$, 1) = "6" Or Right$(Status$, 1) = "7" Then Debug.Print "POSSIBLE
CUTTER PROBLEM!"

'Example of the SP-327 Graphics Mode Checker Board
For y = 1 To 3
  For x = 1 To 10
    ' Raster Graphics --> ESC + "I" + #of bytes to follow + the actual data bytes
    MSComm1.Output = Chr$(27) + "I" + Chr$(55) + Chr$(255) + Chr$(255) + Chr$(255) + Chr$(255) + Chr$(255) + Chr$(255) + Chr$(0) + Chr$(0) +
Chr$(0) + Chr$(0) + Chr$(0) + Chr$(255) + Chr$(255) + Chr$(255) + Chr$(255) + Chr$(255) + Chr$(255) + Chr$(0) + Chr$(0) + Chr$(0) + Chr$(0) + Chr$(0)
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Chr$(255) + Chr$(0) + Chr$(0) + Chr$(0) + Chr$(0) + Chr$(0) + Chr$(0) + Chr$(255) + Chr$(255) + Chr$(255) + Chr$(255) + Chr$(255)
MSComm1.Output = Chr$(13)
  Next x
  MSComm1.Output = Chr$(13)
Next y

```

The ticket shown below was generated using the sample code found on this page and the next:

Status: PRINTER READY!



Description:
SP-327 Serial
Thermal Printer



Barcode 2 of 5 = 123456



```

For y = 1 To 3
  For x = 1 To 10
    ' Raster Graphics --> ESC + "I" + #of bytes to follow + the actual data bytes
    MSComm1.Output = Chr$(27) + "I" + Chr$(50) + Chr$(0) + Chr$(0) + Chr$(0) + Chr$(0) + Chr$(0) + Chr$(0) + Chr$(255) + Chr$(255) + Chr$(255) +
    Chr$(255) + Chr$(255) + Chr$(0) + Chr$(0) + Chr$(0) + Chr$(0) + Chr$(0) + Chr$(0) + Chr$(255) + Chr$(255) + Chr$(255) + Chr$(255) + Chr$(255) +
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    Chr$(255) + Chr$(255) + Chr$(255) + Chr$(255) + Chr$(255)
    MSComm1.Output = Chr$(13)
  Next x
  MSComm1.Output = Chr$(13)
Next y

MSComm1.Output = Chr$(10)
MSComm1.Output = Chr$(13)

MSComm1.Output = Chr$(10)
MSComm1.Output = Chr$(13)

MSComm1.Output = "Description: "
MSComm1.Output = Chr$(13)

MSComm1.Output = "SP-327 Serial"
MSComm1.Output = Chr$(13)
MSComm1.Output = "Thermal Printer"
MSComm1.Output = Chr$(13)
MSComm1.Output = Chr$(10)
MSComm1.Output = Chr$(13)

'Example of Interleave 2 of 5 Barcode
MSComm1.Output = Chr$(27) + "i" + Chr$(12) + Chr$(3) + "123456" + Chr$(13)
MSComm1.Output = Chr$(13)
MSComm1.Output = Chr$(10)
MSComm1.Output = Chr$(13)
MSComm1.Output = "Barcode 2 of 5 = 123456"
'MSComm1.Output = Chr$(10)
MSComm1.Output = Chr$(13)

'Example of Landscape Mode
MSComm1.Output = Chr$(2) 'Enter Landscape Mode
MSComm1.Output = " Landscape Mode!"
MSComm1.Output = Chr$(10)
MSComm1.Output = Chr$(13)

'Example of Barcode 3 of 9 Barcode in landscape mode
MSComm1.Output = Chr$(27) + "C" + Chr$(1) + Chr$(2) + "*"123456*" + Chr$(13)
MSComm1.Output = Chr$(13)

MSComm1.Output = Chr$(15) ' Enable Condensed Mode
MSComm1.Output = " Barcode: 3 of 9 = 123456"
MSComm1.Output = Chr$(10)
MSComm1.Output = Chr$(13)

MSComm1.Output = Chr$(3) 'End Landscape Mode
MSComm1.Output = Chr$(18) ' Disable Condensed Mode

MSComm1.Output = Chr$(10)
MSComm1.Output = Chr$(13)
MSComm1.Output = Chr$(27) + "c" 'Initiate a paper cut
MSComm1.Output = Chr$(13)

MSComm1.PortOpen = False

End

' End of SP327

```

SerialOpps:

MsgBox "Print Operation has been Cancelled. Make sure Power to the printer is ON and/or try a different COM Port."

End

SP-327 Thermal Printer Maintenance Manual

Introduction

The SP-327 printers are designed to require a minimum of maintenance and service. This section provides basic instructions for general care, maintenance and cleaning of the thermal print mechanism.

Electrical and mechanical repairs should be performed by *qualified personnel only*. Make certain that all electrical connections are disconnected before any service is performed on the SP-327 printers. Personnel involved in repair and maintenance of the print mechanism, or other electronic components should take appropriate measures to guard against electrostatic discharge. Electrostatic discharge can damage the heating elements and ICs associated with the printer.

Required Tools and Supplies 1. Common hand tools 2. Short bristle brush 3. Denatured alcohol 4. Cleaning rags 5. Cotton swabs 6. Low temperature grease

General Care and Handling

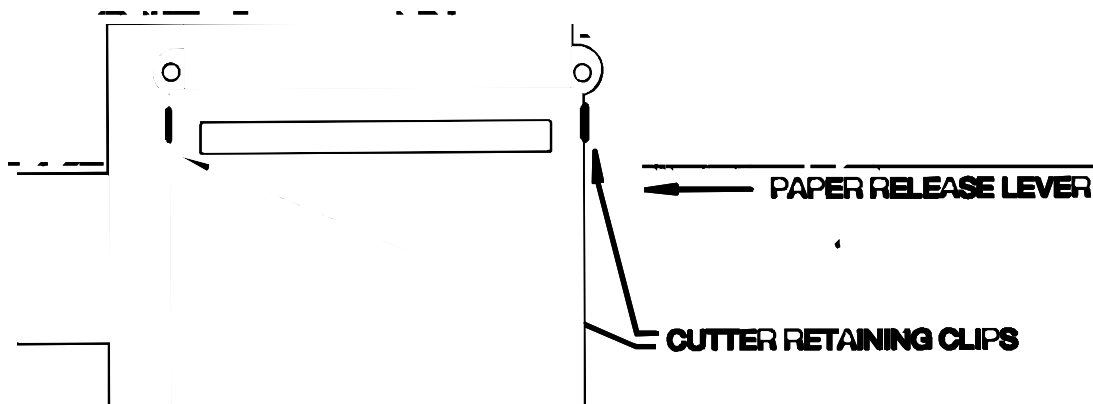
To ensure high print quality and long print head life, always use thermal paper approved by TELPAR Corporation. Do not operate the printer without paper installed in the mechanism. Operation without paper may cause damage to the thermal print head. When the printer is not in use, it is recommended that the paper release lever be switched to the release position. This will prevent deformation of the soft print platen from constant spring pressure.

In applications where prolonged dense printing is performed, condensation may occur. This condition occurs when the thermal print head is heated to the point where it releases water vapor contained within the paper. Condensation can also appear when printing in extreme low temperatures, or in high humidity environments. Excessive condensation can cause the paper to stick in the mechanism and cause a jam condition.

Removing Paper from the Mechanism

Excess paper that remains in the print mechanism may be easily removed before cleaning. Paper can be removed by turning the motor in the reverse direction by hand. Tweezers may be used to remove remaining paper lodged in the mechanism. Caution should be exercised when removing paper with any tool. The surface of the thermal print head is made of a ceramic material that can be easily damaged. A cotton swab is recommended for removal of paper dust in this area.

SP-327 Mechanism in a Fully Closed Position



Cleaning

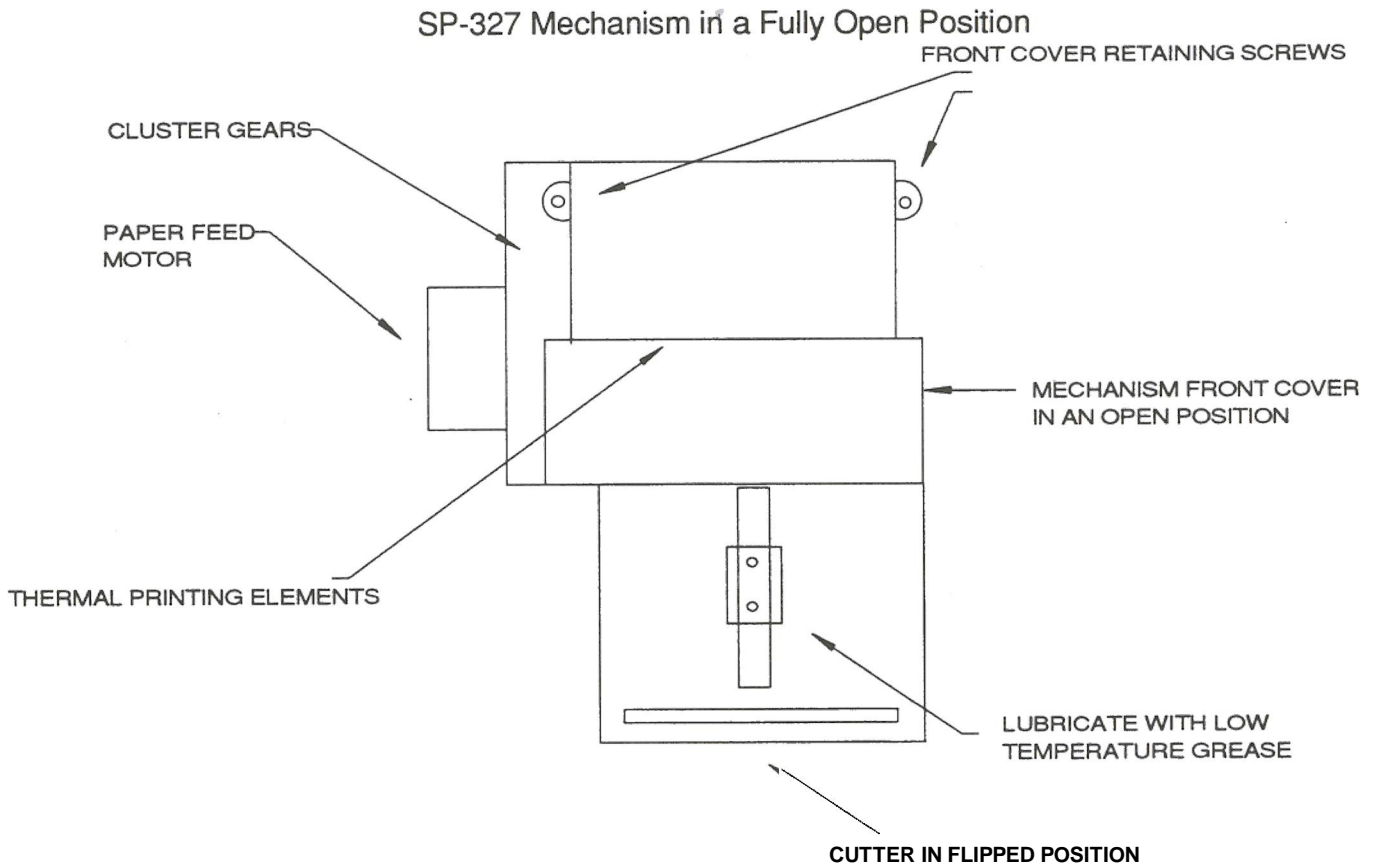
Print quality will deteriorate if paper particles or thermal sensitive residues build on the heating elements of the thermal print head. To clean the mechanism and print elements, follow the procedure below.

1. Push outward (left and right) on the cutter retaining tabs and flip the cutter assembly forward out of the way.
2. Once the cutter is out of the way, locate the two upper front cover retaining screws and remove them from the assembly.
3. Flip the front of the print mechanism forward to gain access to the printer platen and thermal print elements. .
4. Remove the print platen from the mechanism carriage (note proper orientation of platen and paper release cam lever position)
5. Once the platen has been removed, the thermal print elements will be visible. The print head may be cleaned with a cotton swab moistened with alcohol. Do not use an abrasive cleanser, paper or shop cloth to clean the print head as damage may occur to the heating elements.
6. The print head assembly may be reassembled in the reverse order once the alcohol has been dried completely.
7. Make certain that cluster gears are free from excessive dust or paper particles. The cluster gears may be cleaned with compressed air, or with a short bristle brush.

Once the mechanism is reassembled, a test print is recommended. The SP-327 exterior may be cleaned with a non-abrasive cleanser. Care should be taken to prevent liquids from entering inside the electrical sub-assemblies.

Cutter Assembly

Prior to any type of service or maintenance to the cutter mechanism, disconnect all power to the printer. Caution must be observed when service cleaning is being performed on the cutter assembly. Cutter blades are sharp and may cause serious injury. The cutter assembly can be cleaned with alcohol and cotton swabs. Moisten a cotton swab to clean the blade and associated mechanical components. Once the cutter assembly has been cleaned, wipe off excess solvent. Low temperature grease may be applied to the cutter as shown below.



Examples of Printing Problems (Cause and Effect)

Poor Print Quality	<ul style="list-style-type: none">• Dirty Thermal Print Mechanism/Head• Worn Print Head• Poor Quality Thermal Paper• Damaged Thermal Print Head
Premature Wear of Thermal Print Head	<p>Mean time between failures for the thermal print head is to print on 90 Kilometers of approved paper through the mechanism.</p> <ul style="list-style-type: none">• Printing with paper not approved by Syntest• Printing in an environment where abrasive particulate is allowed to enter the print mechanism
Premature Wear of the Paper Cutter	<p>Mean time between failures for the cutter mechanism is 400,000 cuts.</p> <ul style="list-style-type: none">• The MTBF of the cutter may be severely shortened if Syntest approved paper is not used.

Maintenance Chart

The following chart represents a recommended maintenance schedule for the SP-327 printer. Specific environmental conditions may shorten or lengthen the suggested periods between cleaning.

Clean Office or Light Use	Once Per Year
Clean Factory Environment Medium Use	Monthly
Dirty Factory Environment Heavy Use	Weekly